DOCUMENT RESUME

ED 075 668 VT 020 045

TITLE	Microfiche Collection of Clearinghouse Documents Reported in Abstracts of Instructional Materials in Vocational and Technical Education (AIM), Volume 6, Number 2.
INSTITUTION	Ohio State Univ., Columbus. Center for Vocational and Technical Education.
SPONS AGENCY	National Inst. of Education (DHEW), Washington, D.C.
PUB DATE	73
NOTE	5,730p.
EDRS PRICE	MF-$13.20 HC Not Available from EDRS.
DESCRIPTORS	Agricultural Education; Business Education; Career Education; Clearinghouses; Distributive Education; Documentation; Health Occupations Education; Home Economics Education; Indexes (Locaters); Industrial Arts; Information Retrieval; Information Storage; *Instructional Materials; *Microfiche; *Technical Education; Trade and Industrial Education; *Vocational Education

ABSTRACT

Documents announced with VT numbers only in Volume 6, Number 2 (VT 020 044) of "Abstracts of Instructional Materials in Vocational and Technical Education" (AIM) are included in this microfiche set. The microfiche set is arranged in the following sequence: (1) a Vocational Technical (VT) number index to documents in the microfiche collection, (2) the subject and author indexes from AIM, and (3) the full text of documents listed in the VT number index. The texts are filmed continuously in VT number sequence. (DE)

Microfiche Collection of Clearinghouse Documents Reported in Abstracts of Instructional Materials in Vocational and Technical Education

(AIM)

Compiled and Indexed by The Center for
Vocational and Technical Education

Vol. 6 No. 2
1973

This publication was prepared pursuant to a contract with the Bureau of Occupational and Adult Education, U.S. Department of Health, Education and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their judgement in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official Bureau of Occupational and Adult Education position or policy.

VT 020 045

The Center for Vocational and Technical Education
The Ohio State University
1960 Kenny Road, Columbus, Ohio 43210

INTRODUCTION

This collection of microfiche consists of the documents which are announced with VT number only in Abstracts of Instructional Materials in Vocational and Technical Education (AIM), Vol. 6 No. 2, 1973. Microfiche availability is shown in the resume as IF AVAILABLE IN VT-ERIC SET. The documents are grouped in VT number sequence and filmed continously as a microfiche set. These documents are not available on microfiche as individual items, but are obtainable only through purchase of this set, or from agencies who have this set and have the capability of reproducting microfiche. The microfiche set includes the following sections:

1. Vocational Technical (VT) Number Index to Microfiche Collection of Clearinghouse Documents Reported in AIM, Vol. 6 No. 2, 1973.

2. Selected indexes from AIM, Vol. 6 No. 2, 1973.

   a. Subject Index
   b. Author Index

   The documents identified in the indexes with an ERIC Document (ED) number are usually available as separate documents from the ERIC Document Reproduction Service (EDRS). Information about EDRS Service can be found in AIM or Research in Education (RIE).[1] Items not available through EDRS will include a source of availability. The page numbers shown in these indexes refer to the location of the abstracts in AIM Vol. 6 No. 2, 1973.

3. The full text of documents listed in the Vocational Technical (VT) Number Index to Microfiche Collection of Clearinghouse Documents Reported in AIM Vol. 6 No. 2, 1973.

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[1] Research in Education is published 12 times a year. The first issue was No. 1, November 1966. Subscription: Domestic $38.00 a year; foreign $47.50. Single copy: Domestic $ 3.25. Send check or money order (no stamps) to the Superintendent of Documents, U.S. Goverment Printing Office, Washington, D.C. 20402.

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VT 015 132
SMITH, GEORGE N.
CAREER EDUCATION PROGRAM. A PROTOTYPE
INSTRUCTIONAL SYSTEM FOR CAREER DEVELOPMENT.

MESA PUBLIC SCHOOLS, ARIZ. CENTER FOR CAREER
DEVELOPMENT.
MF AVAILABLE IN VT-ERIC SET.
CVTE-T-27
PUB DATE - 72 74P. PALS COLLECTION

DESCRIPTORS - GRADE 5; HUMAN RESOURCES; SLOW LEARNERS, HIGH ACHIEVERS; *CAREER EDUCATION; VOCATIONAL DEVELOPMENT; *INSTRUCTIONAL PROGRAMS; RESOURCE MATERIALS; *ENRICHMENT ACTIVITIES; *LEARNING ACTIVITIES; GOAL ORIENTATION; EVALUATION TECHNIQUES; *OCCUPATIONAL CLUSTERS; SOCIAL SCIENCES; CODIFICATION; BEHAVIORAL OBJECTIVES
IDENTIFIERS - *INSTRUCTIONAL PACKAGES; CAREER AWARENESS

ABSTRACT - A DESCRIPTION OF THE PURPOSE, SCOPE, AND SEQUENCE OF A PROTOTYPE DEVELOPMENTAL CAREER EDUCATION PROGRAM FOR THE ELEMENTARY AND SECONDARY GRADES PRECEDES AN OVERVIEW OF THE DESIGN OF "INSTRUCTIONAL PACKAGES," WHICH ARE CORRELATED WITH EIGHT DISTINCT ELEMENTS OF CAREER EDUCATION AT EACH GRADE LEVEL. THIS PARTICULAR "PACKAGE" FOR GRADE 5 CONTAINS: (1) A GOAL STATEMENT ABOUT RECOGNIZING THE IMPACT OF VARIOUS CAREER CLUSTERS ON LIFE STYLES, (2) PERFORMANCE OBJECTIVES, (3) TEACHING PROCEDURES AND LEARNING ACTIVITIES, (4) ENRICHMENT ACTIVITIES FOR SLOW AND FOR FAST LEARNERS, (5) TIME ALLOTMENTS AND GROUPING REQUIREMENTS, (6) LISTS OF RESOURCES AND INSTRUCTIONAL MEDIA, AND (7) SAMPLE TEST ITEMS AND STUDENT EVALUATION PROCEDURES. A MASTER RESOURCE LIST INCLUDES THE LOCATIONS OF RESOURCE PERSONS IN THE COMMUNITY. (AG)

VT 015 132

CV [illegible]
CVTE 7-27

DR. [illegible]
SUP[illegible]

A PROTOTYPE INSTRUCTIONAL SYSTEM
FOR
CAREER DEVELOPMENT

CAREER AWARENESS

INSTRUCTIONAL PACKAGE NUMBER 110
APPROXIMATE AGE LEVEL - 10

1972

[illegible]

[illegible]

This program [illegible]. [illegible] the group [illegible] about [illegible] of their [illegible] commitment [illegible] beginning [illegible] learners. In the final analysis, it is only by and through the classroom teacher that Career Education will become a reality.

THE SCOPE AND SEQUENCE OF CAREER EDUCATION

The scope of Career Education focuses on eight distinct elements, each specifically designed to promote the growth and development, interaction, and decision-making skills of children and youth as related to their future success in society. The elements include:

1. (CA) Career Awareness
2. (SA) Self Awareness
3. (AA) Appreciations/Attitudes
4. (DM) Decision-Making Skills
5. (EC) Economic Awareness
6. (BC) Skill Awareness and Beginning Competency
7. (ES) Employability Skills
8. (EA) Educational Awareness

Each learner will have direct experience with each element at every grade level. The sequencing of these elements for instruction employs a traditional organizational pattern of age and/or grade level. For example, Figure 1 depicts both the scope and sequence of the Career Education Program using the abbreviations shown above for each element.

Figure 1.

[illegible]

	Grade	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	K								
[illegible]	1								
	2								
[illegible]	3								
[illegible]	4								
10	5								
11	6								
12	7								
13	8								
14	9								
15	10								
16	11								
17	12								

THE DESIGN OF THIS INSTRUCTIONAL PACKAGE (I.P.)

Each I.P. has four distinct parts: (1) a goal statement; (2) performance objectives; (3) an affective predictor; and, (4) activities.

(1) The Goal Statement:
A goal statement is a redefinition at each age and/or grade level of the eight elements (themes) of the Career Education Program. The goal statement, although more specific than each of the eight elements, is more general than a performance objective.

(2) Performance Objectives:
The performance objective of an I.P. is designed to help the teacher and learner identify three things: (a) what the learner is expected to be able to do; (b) what conditions are imposed; and (c) how the learner or teacher will be able to know if the desired competency has been achieved. Performance objectives identify cognitive and affective behaviors.

Cognitive Behavior: [illegible] skills that a learner [illegible]:

Comprehension:	[illegible]
Application:	refers to the ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws, and theories.
Analysis:	refers to the ability to break down material into component parts so that its organizational structure may be understood. This may include the identification of the parts, analysis of the relationships between parts, and recognition of the organizational principles involved.

Affective Behavior: refers to the interest and attitude of the learner toward an objective. Three categories of affective behavior are used to help the teacher recognize the type of behavior the learner could be displaying as works to achieve an objective.

Receiving:	Awareness level, willingness to receive information, the learner's attention level.
Responding:	Does the learner show acquiescence, willingness or satisfaction through his responses?

(3) The Affective Predictor:

Much has been written concerning the need for teachers to recognize and deal realistically with the affective side of learning--the interest and attitude toward learning as expressed by the learner's behavior during instruction. The affective predictor is designed to help teachers recognize the cues that often describe exactly how the learner feels about the learning task he is working with. For each performance objective an affective predictor is included which is an indicator, for the teacher, of the type of behavioral

[illegible]

[illegible]

1__[illegible]
2__Willing[illegible]
3__Controlled [illegible]

Responding
4__Acquiescence in responding - [illegible]
5__Willingness to respond - discusses, performs
6__Satisfaction in response - helps, assists, greets

Valuing
7__Acceptance of a value - differentiates, completes, reports
8__Preference for a value - proposes, follows, joins
9__Commitment (Conviction) - initiates, justifies, works

(4) Activities:

For each of the performance objectives in an I. P., two types of activities or planned learning strategies have been designed for the learner: a reading option and a non-reading option.

Reading Option:	A planned activity that relies primarily on a learner's ability to read.
Non-Reading Option:	A planned activity that is specifically designed to help the learner find some other way to achieve the performance objective other than reading skills.

Criteria were established which describe specifically the components of an activity. These are listed below:

Time:	The activity should not exceed forty-five minutes of instructional time, nor be less than twenty minutes.
Grouping:	The activity should suggest how learners should be organized during the instructional time, e.g., large group (lg), small group (sg), independent study (ind).

[illegible]	[illegible]
[illegible]	[illegible] will be [illegible] the activity should be included.
Enrichment:	The activity should include additional suggestions for the fast learner as well as suggestions for the slow learners.
Resources:	The activity should list suggested resource materials, e.g., texts, workbooks, film strips, 8 and 16mm films, cassettes, human resources, etc., where the resources may be obtained and their approximate costs.
Media:	The activity should illustrate content in more than one instructional medium
Evaluation:	The activity should include sample test items or examples of oral questions that may be used by the teacher to determine whether or not the learner can demonstrate the desired behavior of the performance objective. The activity should also contain feedback procedures (a way to report to the learner) that insure the learner will systematically receive reports on his progress.
Interest:	The activity should generate a high level of student interest and personal value.

PAMPHLETS AVAILABLE TO TEACHERS AND STUDENTS

Occupations

1. Because You Like People...Choose a Career in Mental Health (7 careers mentioned)	1. National Assoc. of Mental Health (contact local office)
2. Bricklaying As a Vocation	2. Structural Clay Products Institute 1750 Old Meadow Road McLean, Virginia 22101
3. Careers in Statistics	3. American Statistical Assoc. 806 15th Street, N.W. #640 Washington, D.C. 20005
4. Gemology As a Career (available in classroom quantities)	4. Gemological Institute of America Registrar's Office 11940 San Vicente Blvd. Los Angeles, California 90049
5. Medical Record Librarian - Key Member of the Medical Team	5. American Medical Record Assoc. 211 East Chicago Street Chicago, Illinois 60611
6. Archaeology As a Career (single copies free; additional 10¢ ea.)	6. Archaeological Institute of America 100 Washington Square, East New York, New York 10003
7. The Big Story (on journalism) (single copies free; additional 10¢ ea.)	7. Professional Journalistic Society Sigma Delta Chi Room 852, 35 E. Wacker Drive Chicago, Illinois 60601
8. Careers in Consumer Finance (available in classroom quantities)	8. National Consumer Finance Assoc. 1000 16th Street N.W. Washington, D.C. 20036
9. Careers in Petroleum Engineering	9. Society of Petroleum Engineers AIME 6200 N. Central Expressway Dallas, Texas 75206
10. The Challenge of Real Estate (available in classroom quantities)	10. National Assoc. of Real Estate Boards Department of Public Relations 1300 Connecticut Ave., N.W. Washington, D.C. 20036
11. Dental Assisting: A Career of Action (available in classroom quantities)	11. American Dental Assistants Association Suite 1230 211 East Chicago Avenue Chicago, Illinois 60611

Continued:

12. Excitement, Travel, Careers as An Overseas Secretary (single copies)	12. United Business Schools Assoc. 1101 Seventeenth Street, N.W. Washington, D.C. 20036
13. Four Futures (nursing, dietetics, physical therapy, occupational therapy)	13. U.S. Department of Defense Advisory Committee on Women in the Services Washington, D.C. 20301
14. Horticulture: A Challenging Career (up to 25 copies)	14. Americal Society for Horticultural Science P.O. Box 109 St. Joseph, Michigan 49085
15. Information Concerning Geophysics (limit of 5 copies)	15. American Geophysical Union 2100 Pennyslvania Ave., N.W. Washington, D.C. 20037
16. Oil In the Market Place (available in classroom quantities)	16. American Oil Company 900 South Michigan Avenue Chicago, Illinois 60680
17. Opportunities in the Welding Industry (available in classroom quantities)	17. American Welding Society, Inc. Director, Information and Engineering United Engineering Center 345 East 47th Street New York, New York 10017
18. Penetrating New Frontiers With Mineral Engineers, Geologists, Mining Engineers, and Metallurgists	18. Society of Mining Engineers of AIME 345 East 47th Street New York, New York 10017
19. Photography As A Career	19. Professional Photographers of America. 1090 Executive Way Oak Leaf Commons Des Plaines, Illinois 60018
20. Planning a Career in Electronics	20. Electronics Industries Assoc. 2001 Eye Street, N.W. Washington, D.C. 20006
21. Satisfaction Guaranteed (on whether work is satisfying or drudgery)	21. Connecticut Mutual Life Ins. Co. Human Relations Program 140 Garden Street Hartford, Connecticut 06115
22. Special Librarianship: Information At Work (1 to 50 copies free)	22. Special Libraries Association 235 Park Avenue South New York, New York 10003

Continued:

23.	What Is a Medical Technologist? (available in classroom quantities)	23.	The Upjohn Company 7171 Portage Road Kalamazoo, Michigan
24.	What It Takes To Be a Secretary and Your Career As a Secretary (single copies of each)	24.	United Business Schools Assoc. 1101 Seventeenth Street, N.W. Washington, D.C. 20036
25.	Why Stay In School? (available in large quantities)	25.	Sun Life Assurance Co. of Canada One North LaSalle Street Chicago, Illinois 60602
26.	Your Career As a Chemist (limit 5 copies. Advanced reading level)	26.	The Chemical Institute of Canada Burnside Building 151 Slater Street Ottowa, Ontario, Canada
27.	Your Career As An Aero/Space Engineer (limit of 50 copies)	27.	American Institute of Aeronautics and Astronautics 1290 Avenue of the Americas New York, New York 10019
28.	Your Career in Optics	28.	Optical Society of America 2100 Pennsylvania Avenue, N.W. Washington, D.C. 20037
29.	Your Career in Textiles (one copy free)	29.	American Textile Manufacturers Institute, Inc. 1501 Johnston Building Charlotte, North Carolina 28202
30.	Secretarial Career Kit	30.	National Secretaries Association (International) 1103 Grand Avenue, Suite 410 Kansas City, Missouri 64106
31.	Music Therapy as a Career	31.	National Assoc. for Music Therapy Inc. P.O. Box 610 Lawrence, Kansas 66044
32.	Your Career in the Hotel/Motel Industry	32.	American Hotel and Motel Assoc. Educational Institute 221 West 57th Street New York, New York 10019

Continued:

A partial list of material available from the telephone company is listed below. A complete list is on file with committee members. These may be obtained with a letter from teacher or students, or with a collect call to the Portland office.

Pacific Northwest Bell
Public Relations Office
421 S.W. Oak Street
Portland, Oregon 97204

1. A Telephone History of the Pacific Northwest
2. Alexander Graham Bell
3. Cardiac
4. Education For a World of Change
5. Electronic Switching: A New "Brain"
6. How The Telephone Works
7. Laser: The New Light
8. Mr. Bell Invents The Telephone
9. Overseas Telephone Service
10. Picturephone Service: Adding Sight to Sound.
11. Radio Relay
12. Signals in Space
13. Telephone Tips For Baby Sitters
14. Teletraining
15. Ten Men and the Telephone
16. The Birth and Babyhood of the Telephone
17. The Magic Behind Your Dial
18. The Magic Of Your Telephone
19. The Story of the Bell Solar Battery
20. The Transistor Age

VT 016 606
COMMUNITY NURSE REFRESHER CURRICULUM GUIDE.

OREGON STATE BOARD OF EDUCATION, SALEM. DIV. OF INSTRUCTIONAL SERVICES.

MF AVAILABLE IN VT-ERIC SET.
PUB DATE - JAN72 71P.

DESCRIPTORS - *CURRICULUM GUIDES; HUMAN SERVICES; *REFRESHER COURSES; *NURSES; *COMMUNITY COLLEGES; VOCATIONAL RETRAINING; BIBLIOGRAPHIES; RESOURCE MATERIALS; CAREER EDUCATION; HEALTH OCCUPATIONS EDUCATION; *ADULT VOCATIONAL EDUCATION; BEHAVIORAL OBJECTIVES; PROGRAM PLANNING; LEARNING ACTIVITIES; EVALUATION TECHNIQUES; COURSE CONTENT
IDENTIFIERS - EDUCATIONAL AWARENESS; EMPLOYMENT SKILLS

ABSTRACT - A DETAILED DESCRIPTION OF PLANNING PROCEDURES FOR A NURSES' REFRESHER PROGRAM AT THE COMMUNITY COLLEGE LEVEL PRECEDES AN OVERVIEW OF THREE INSTRUCTIONAL UNITS FOR UPDATING THE TRAINING OF NURSES RETURNING TO PRACTICE. A MINIMUM OF 240 HOURS FOR A 10 OR 11-WEEK PROGRAM FOR 12 STUDENTS EMPHASIZES CLINICAL PRACTICE. THE UNITS DEAL WITH: (1) RETURN TO NURSING, (2) NURSING CARE, PRINCIPLES, AND PRACTICES, AND (3) THE PROFESSIONAL NURSE, WITH COURSE REQUIREMENTS OF 36, 180, AND 24 HOURS, RESPECTIVELY. FOR EACH COURSE, GENERAL AND SPECIFIC GOALS AND OBJECTIVES, CONTENT OUTLINES, SUGGESTED LEARNING ACTIVITIES, AND EVALUATION PROCEDURES ARE PRESENTED IN A 4-COLUMN FORMAT. THIS CURRICULUM GUIDE, DEVELOPED BY EDUCATORS AND REPRESENTATIVES OF THE HEALTH SERVICE INDUSTRY, IS 3-HOLE PUNCHED FOR EASY INSERTION INTO A RING BINDER. THE APPENDIXES INCLUDE EXTENSIVE RESOURCE LISTS, A BIBLIOGRAPHY FOR PROGRAM PARTICIPANTS, POLICY STATEMENTS CONCERNING NURSING IN OREGON, AND A PROGRAM EVALUATION FORM. (AG)

COMMUNITY NURSE REFRESHER CURRICULUM GUIDE

Published by:
THE OREGON BOARD OF
EDUCATION
Dale Parnell
Superintendent, Public Instruction
Prepared by:
THE DIVISION OF
INSTRUCTIONAL SERVICES
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Leonard Kunzman
Director, Career Education
942 Lancaster Drive NE
Salem, Oregon 97310

January 1972

PREFACE

In its policy statement, *Career Education in Oregon,* the Oregon Board of Education has stated that one of its major objectives is "assuring that opportunities for advanced occupational preparation are readily accessible to all persons through community colleges and other public and private post-high school programs, or business and industry." The development of curriculum materials is an important contribution that the Board and its staff can make toward the achievement of this objective.

Specialized training at the post-high school level, such as a community-based nurse refresher course, is part of Oregon's total career education concept which defines career exploration and broad-based career cluster education as the responsibility of secondary schools. This means a new kind of cooperation must spring up between high schools and community colleges to assure that noncollege-bound students identify and achieve their career goals.

A related objective toward which the Board and its staff are working is cooperative planning by community colleges, private vocational schools and colleges, business and industry, apprenticeship, four-year institutions, and other agencies and organizations to assure that the needs of all students for occupational training are met.

Because it is predicted that health services will become a leading industry by 1975, educational agencies need to assess how well their programs are meeting students' need or desire for training in health occupations. Part of the assessment should include a review of retraining programs.

Dale Parnell

DALE PARNELL
Superintendent, Public Instruction

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ACKNOWLEDGMENTS

Educators and representatives of the health service industry worked together to develop this guide. The final draft was assembled and written under the direction of Joan E. Stoddard, Health Occupations Specialist, Division of Instructional Services, Oregon Board of Education.

Special recognition is given to Mrs. Gladys Hatfield for her assistance in developing all phases of the curriculum.

Grateful recognition is also given to staff members of the Oregon State Board of Nursing and to the members of the Community Nurse Refresher State Education Advisory Committee, whose contributions were invaluable.

COMMUNITY NURSE REFRESHER STATE EDUCATION ADVISORY COMMITTEE

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Mrs. Margaret Ross, Oregon League for Nursing
Miss Norma Lyslo, Oregon Association of Hospitals
Miss Janis Glasby, Blue Mountain Community College
Robert Moldenhauer, Umpqua Community College

[illegible]

At this [illegible] I.P. will [illegible] each I.P., [illegible] components of an I.P. Figure 2 depicts the coding system.

Figure 2.
Coding of The [illegible] Instructional Package

110.01401 is a sample code number.

The first numeral "1" refers to the element (theme) Career Awareness. Other elements and their codes are: 2--Self Awareness; 3--Appreciations/Attitudes; 4--Decision-Making Skills; 5--Economic Awareness; 6--Skill Awareness and Beginning Competency; 7--Employability Skills; 8--Educational Awareness.

The second and third numerals "10" refer to the developmental age of the learner - age 10.

The fourth and fifth numerals refer to the level of the performance objective--in this case the first performance objective at the comprehension level - 01. Other levels and their codes are:

Comprehension	01 - 39
Application	40 - 79
Analysis	80 - 99

The sixth numeral refers to the affective predictor--#4 or acquiescence in responding. Other levels of affective predictors are:

1 Awareness
2 Willingness to receive
3 Controlled or selected attention
4 Acquiescence in responding
5 Willingness to respond
6 Satisfaction in response
7 Acceptance of a value
8 Preference for a value
9 Commitment (Conviction)

The seventh and eighth numerals refer to the type of activity - #01 —reading option. The code refers to the options in this way:

Reading Option	01 - 49
Non-Reading Option	50 - 99

FOREWORD

Nursing comprises one of the largest health service occupations. With the 1980 projected nationwide need for registered nurses, it will be necessary to direct educational resources not only to preparing more nurses but to retraining nurses who have not practiced recently and who plan to return to nursing. This curriculum guide for community-based nurse refresher programs has been developed in the belief that community colleges can meet the educational needs of nurses who require retraining to qualify for employment as nurses in their communities. However, other organizations offering regular nurse refresher programs or supervised nursing practice and individualized instruction will find it a helpful resource.

Content of this guide has been carefully reviewed by members of the Community Nurse Refresher State Education Advisory Committee and others involved in nursing. All areas are considered essential for giving individuals who return to nursing the necessary skills and confidence, even though nursing practices or patterns may vary from community to community.

Leonard E. Kunzman

LEONARD KUNZMAN
Director, Career Education

IMPLEMENTING THE I.P.

Time:

Each I.P. [illegible] twenty [illegible] tion [illegible] used at [illegible] level, [illegible] through Career Education goals.

Teacher and [illegible]

By design, each I.P. necessitates certain decisions be made by both teachers and learners:

(a) Where should the learner begin?
When a group of learners begin to work in an I.P., it is expected that some will already be able to demonstrate the competencies described by several objectives. When this is true, a learner should not have to be involved in the activity for that objective but should proceed with a succeeding objective in the same I.P. Check the entry level of each learner by using the sample test items for each activity so that you can prescribe on an individual basis.

(b) Should the learner use the reading or non-reading option?
Reading, as a learning skill, is often not the most appropriate strategy for some learners. This is especially true for children and youth who are non-readers or reading below grade level. For this reason, for each performance objective both reading and non-reading options have been designed by teachers.

(c) Are the activities included in the I.P. appropriate for the learner?
The teacher may elect to use any one of the activities contained in the I.P., or any combination of the activities, or, if she prefers, develop a new activity to help the learner successfully achieve the objective. If a new activity is developed, the teacher is asked to write that activity in the standard format and submit it to the Center for Career Development so eventually other teachers may have access to the plan.

[illegible]

When the I.P. has been completed, [illegible] be requested from the teacher-[illegible]

Product [illegible] to the [illegible] completed each problem [illegible].

Process [illegible] requests comment [illegible] of its application to the learner's growth and development, his interaction, and decision-making [illegible].

MESA PUBLIC SCHOOLS
Center for Career Development
GOAL STATEMENTS

Career Awareness Theme

105.00 To acquire a knowledge of home and school related career performance.

106.00 To identify the relationships of home and school careers as they relate to the functioning of the community.

107.00 To acquire a knowledge of careers necessary for the maintenance of the community and to recognize the interdependency of these careers.

108.00 To identify and extend similarities of local careers to careers in general.

109.00 To classify various careers into groups based upon similarity of career performances.

*110.00 To recognize the impact of various career clusters on life styles.

111.00 To identify abilities required for the various career clusters.

112.00 To become cognizant of the relationship of attitudes, values, and abilities to the career clusters.

113.00 To develop and evaluate the correlation between career clusters and the learner's interests, values, and abilities.

114.00 To study career clusters, based upon the learner's interests, values, and abilities.

115.00 To select for in-depth exploration a career cluster based upon his interests, values, and abilities.

116.00 To develop a procedure to obtain needed abilities required in the career choice.

117.00 To identify the further requirements of his selected career and to reassess his abilities, interests, and attitudes of his anticipated life role.

110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS ON LIFE STYLES.

110.014 The learner will define and use the term career cluster.

110.024 The learner will explain in his own words career cluster.

110.036 Given two careers within a career cluster, the learner will explain at least two similarities and differences of those careers to the instructor's satisfaction.

110.044 The learner will identify a source of information that lists the career clusters and explains each of them.

110.058 The learner will explain the relationship between life style and the careers held in his home, including his daily schedule, his home site, and his family's social interaction.

110.404 Given a career, the learner will select from three other examples of careers, the one which is most similar to the given career and explain why.

110.415 After a guided group discussion, the learner will name a career cluster and name several careers appropriate to that cluster.

110.424 Given names of the career clusters with a basic description of each cluster, the learner will match at least 3 familiar careers to the list of career clusters, to the instructor's satisfaction.

110.436 The learner will describe similarities of people within a career cluster as it would pertain to education, training, talent, and life style.

110.806 The learner will list to the instructor's satisfaction six related careers and predict a suitable name for that cluster.

110.816 The learner will analyze at least ten careers within a given cluster in terms of their common purposes.

110.827 Using two career clusters, the learner will predict possible ways of life within those clusters.

110.837 The learner will generalize about the kinds of life one might have who was employed within a single career cluster.

110.847 Using the components of an individual's life style, including his daily schedule, his home site, and his social interaction, the learner will predict the most suitable life style for that individual.

110.857 After guided discussion, the learner will identify the differences in ways of living, the life style, in two contrasting career clusters.

G. S. #110. TO [illegible] IMPACT OF VARIOUS CAREER CLUSTERS
(CVIE # 12) ON LIFE STYLE.

P. O. #110.014 The learner will define and use the term career cluster.

Activity #110.01401 Time: 45 min. Grp: lg, ind

Teacher Directions:

1. In a large group setting the teacher defines and uses the term career cluster. This initial presentation is followed by a guided discussion involving both teacher and learners using and clarifying the term.
2. The teacher will then use the overhead projector to display the career clusters and the careers under each cluster.
3. The teacher assigns the same reading assignment for each learner. This reading further presents the definition of career cluster and samples of careers within each cluster.
4. The teacher brings the class together again and involves them in a guided discussion to reemphasize the term and its use.

Learner Directions:

1. The learner listens to the initial presentation of the term (possibly taking notes) and then participates in a discussion of the term and use of the term career cluster.
2. The learner watches as the teacher presents transparencies on the overhead projector defining career clusters and the careers under each cluster.
3. The learner reads assigned reading.
4. The learner participates in guided discussion to reemphasize the term and its use.

Enrichment for a fast learner:

1. The learner is asked to choose a book or books on particular careers of his interest and then decide under which clusters the careers fit.
2. The fast learner works individually with a slow learner to help him understand the term and its use.

Enrichment for a slow learner:

1. The slow learner will work with a fast learner to help him further understand the term and its use.
2. The slow learner views several filmstrips or records which present several careers within one cluster to help him further understand the term and its use.
3. The slow learner participates in a discussion with his teacher to help him further understand the term.

Resources:

See master list of resources.
Readings, essays developed by teacher or a CCD member.
CCD Cluster Lists.
Books (fast learner) - see master list of resources.
Filmstrips: People Who Work For Our Health.

Types of Media Appropriate: record player, filmstrip viewer, overhead projector, tape recorder.

Sample Test Items:

1. Define the term career cluster. (Definition)
2. Write a paragraph to explain what the term career cluster means and use the words career cluster as you write. (Essay)
3. There are only 10 career clusters. (True or false)

Feedback Procedures:

The learner obtains feedback from performance on the test.

Mike Carroll
Connie Bickford
Pat Cobb
Bev Cooper
Holmes School

G. G. 110. [illegible]
(CVII #12) ON LIFE STYLES.

P. O. #110.014 The learner will define and use the term career cluster.

Activity #110.01450 Time: 45 min. Grp: lg, ind

Teacher Directions:

1. In a large group situation the teacher defines and uses the term career cluster. This initial presentation is followed by a guided discussion involving both teacher and learners using and clarifying the term.
2. The teacher will then use the overhead projector to display the career clusters and the careers under each cluster. Additional help is obtained from teacher's oral description and/or another learner as transparency is presented.
3. The teacher will prepare an audio tape which further presents the definition of career cluster and samples of careers within each cluster to which the learner will listen as the other learners read the written story (see Activity #110.01401, Teacher Direction #3).
4. The teacher brings the class together again and involves them in a guided discussion to reemphasize the term and its use.

Learner Directions:

1. The learner listens to the initial presentation of the term (possibly taking notes) and then participates in a discussion of the term and use of the term career cluster.
2. The learner watches as the teacher presents transparencies on the overhead projector defining career clusters and the careers under each cluster.
3. The learner listens to a tape which is a condensed version of the essay the other learners are reading.
4. The learner participates in guided discussion to reemphasize the term and its use.

Enrichment for a fast learner:

The learner talks to several people about their careers and decides under which cluster the careers fit.

Enrichment for a slow learner:

1. Simplify and condense the tape used in the reading option.
2. Provide illustrative guide which contains high-interest, low-reading about career clusters.
3. The learner participates in a discussion with his teacher to help him further understand the term.

#110.01[illegible]0

[illegible]

Resource people: see master list of resources.
Transparencies: developed by teacher or CCD member to show different career clusters.

Types of Media Appropriate: record player, filmstrip viewer, overhead projector, tape recorder.

Sample Test Items:

1. Teacher orally asks the questions:
   a. Define the term career cluster.
   b. Give a paragraph to explain what the term career cluster means and use the words career cluster as you talk.
   c. There are only 10 career cluster. (True or false)

   Learner responds orally.

Feedback Procedures:

The learner obtains feedback from performance on the test.

Mike Carroll
Connie Bickford
Pat Cobb
Bev Cooper
Holmes School

G. S. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CVTE # 12) ON LIFE STYLE.

P. O. #110.036 Given two careers within a career c[illegible]er will explain at least two similarities and [illegible]es of those careers to the instructor's satisfaction.

Activity #110.03601 Time: 45 min. Grp: lg, ind

Teacher Directions:

1. In a large group situation, the teacher will examine, as an example, at least 2 careers within a career cluster as to their similarity and difference.
2. Utilizing the overhead projector, the class as a whole will mutually examine 2 careers as to their similarities and differences.
3. After providing the learners with a list of careers that are grouped as to their career cluster, the instructor will assign the learner to read about 2 or more careers within a cluster to determine at least 2 similarities and 2 differences of said careers.

Learner Directions:

1. The learner will listen to teacher's presentation.
2. The learner will contribute his knowledge of the careers being examined in order that similarities and differences will be stated.
3. From a prepared list, the learner will select 2 careers within a career cluster which he will read about so as to prepare a written statement of at least two similarities and two differences of his 2 chosen careers.

Enrichment for a fast learner:

Given a list of careers, the learner will do reading to ascertain if the similarities are "great enough" that they might be grouped into a career cluster.

Enrichment for a slow learner:

Using his father's career as a starting point, the learner will compile a list of careers that perform similar tasks.

Resources:

Books: For Junior Doctors Only, Fletcher, Helen.
Doctor's Tools, Lerner, Marguerite.

See master list of resources on careers.

Types of Media Appropriate: overhead projector, chalkboard

Sample Test Items:

1. Of the two careers you've read about, list 2 similarities and 2 differences.

Feedback Procedures:

Learner performance on evaluative instrument.

Connie Bickford
Holmes School

G. S. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CVTE # 12) ON LIFE STYLES.

P. O. #110.036 Given two careers within a career cluster, the learner will explain at least two similarities and differences of those careers to the instructor's satisfaction.

Activity #110.03650 Time: 135 min. G[illegible] Ind

Teacher Directions:

1. In a large group situation, the teacher will examine, as an example, at least 2 careers within a career cluster as to their similarity and differences.
2. Utilizing the overhead projector, the class as a whole will mutually examine 2 careers as to their similarities and differences.
3. After the learners select two careers within a career cluster, the instructor will assign the learner to interview workers in these careers to ascertain at least 2 similarities and 2 differences of said careers.

Learner Directions:

1. The learner will listen to teacher's presentation.
2. The learner will contribute his knowledge of the careers being examined in order that similarities and differences will be stated.
3. Using a tape recorder, the learner will select two careers within a career cluster to interview. The learner will then orally summarize his research so as to point out at least 2 similarities and 2 differences.

Enrichment for a fast learner:

Given a list of careers, the learner will interview such workers to ascertain if the similarities are "great enough" that they might be grouped into a career cluster.

Enrichment for a slow learner:

Given 2 careers within a career cluster, the learner will view filmstrips to observe their similarities and differences.

Resources:

Refer to master list of resources on careers.

Types of Media Appropriate: overhead projector, filmstrip projector, chalkboard

Sample Test Items:

State 2 similarities of these careers you studied:
a. to a teacher.
b. to another learner.
c. into a tape recorder.

Feedback Procedures:

Learner performance on evaluative instrument.

Connie Bickford
Holmes School

G. S. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CVTE #12) ON LIFE STYLES

P. O. #110.044 The learner will identify a source of information that lists the career clusters and explains each of them.

Activity #110.04401 Time: 45 min. Grp: lg, ind

Teacher Directions:

1. Conduct a group discussion showing several information sources which contain career explanations.
2. Write the names of the sources on a chart or the chalkboard.
3. Assign learners to copy the sources from the chart and read them orally to a partner.
4. Assign the learners to write at least one source from memory.

Learner Directions:

1. Learners will listen, view, and examine the information sources which contain career explanations, noting cover, title, and author.
2. The learners will copy the names of sources of information provided by the teacher after which he will read his list orally to a student partner.
3. The learner will write at least one source of information from memory.

Enrichment for a fast learner:

1. The learner will bring in a source of his own containing information about career clusters.
2. The learner will personally develop a source of information from research to be used by other learners in the classroom.
3. The learner will help a slow learner to read the list of career information sources.

Enrichment for a slow learner:

1. Receive help from a more capable learner in reading the list of career information sources and possibly writing them for him.
2. Listen to a tape identifying the career information sources.

[illegible]

1. Dictionary of Occupational Titles, U.S. Labor Dept. of Publications (adult)
   a. Found Locally at Chief of Guidance and Counseling
   b. ASU library
   c. Mesa library
   d. U. S. Labor Dept. of Employment Service
2. Slide series on [illegible], CCD, Mesa (adult)
3. Slide series on [illegible], CCD, Mesa (adult oriented)
4. Encyclopedia Britannica Junior "Occupation"
5. Encyclopedia World Book "Vocational Guidance"

Types of Media Appropriate: movie projector, cassette recorder, chalkboard, books

Sample Test Items:

1. Circle the correct resources identifying career clusters information:
   [✓ 1.] Dictionary of Occupational Titles
   2. Websters Dictionary
   [✓ 3.] Encyclopedia Britannica (Occupation"
   [✓ 4.] World Book Encyclopedia "Vocational Guidance"
   5. Harry gets a job

Feedback Procedures:

The learner will receive feedback from the teacher on his preceding responses.

Bev Cooper
Holmes School

G. S. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CVIE # 12) ON LIFE STYLES

P. O. #110.<u>044</u> The learner will identify a source of information that lists the career clusters and explains each of them.

Activity #110.044<u>50</u> Time: 45 min. Grp: lg., ind.

Teacher Directions:

1. Conduct a group discussion showing several information sources which contain career explanations.
2. Write the names of the sources on a chart or the chalkboard.
3. Assign learners to copy the sources from the chart and read them orally to a partner.
4. Assign the learners to write at least one source from memory.

Learner Directions:

1. Participate in the discussion and examine the information sources.
2. The learner will copy the names of the sources and have them read to him by an adult or another learner.
3. The learner will name orally a source of information about career clusters and identify it in his list.

Enrichment for a fast learner:

1. The learner will bring in a source of his own containing information about career clusters.

Enrichment for a slow learner:

1. The learner will receive help in finding a source of his own containing information about career clusters.

#310.04450

[illegible]:

1. Dictionary of Occupational Titles, U.S. Labor Dept. of Publications (adult)
   a. Found locally at Office of Guidance and Counseling
   b. ASU library
   c. Mesa library
   d. U. S. Labor Dept. of Employment Service
2. Slide series on The Challenge of Career Educ. , CCD, Mesa (adult)
3. Slide series on Mesa Career [illegible] , CCD, Mesa (adult oriented)
4. Encyclopedia Britannica Junior "Occupation"
5. Encyclopedia World Book "Vocational Guidance"

Types of Media Appropriate: movie projector, cassette recorder, chalkboard, books

Sample Test Items: The following question will be on tape or given orally to the students: If the book contains information on career clusters write "yes" following the number:

1. Dictionary of Occupational Titles
2. Websters Dictionary
3. Encyclopedia Britannica "Occupations"
4. World Book Encyclopedia (Occupational Guidance"
5. Harry gets a job

Feedback Procedures:

The learner will receive feedback from the teacher on his preceding responses.

Bev Cooper
Holmes School

C. G. 4110. TO RECOGNIZE THE IMPACT OF [illegible] CAREER [illegible]
([illegible] 412) [illegible]

I. O. 4110.[illegible] The learner will explain [illegible] and the careers held in [illegible], his life style, and his [illegible].

Activity 4110.[illegible] Time: 45 min. Grade: [illegible]

[illegible]:

1. [illegible] teacher assigns each learner to [illegible], including home and school activities. [illegible] each [illegible] as home site and social [illegible] family.
2. The teacher assigns each learner to describe his family's daily schedule including home and work activities in [illegible] essay.
3. The teacher guides an open discussion with the [illegible] focusing upon the relationship of the child's family life styles to that of the children's. The teacher will possibly use the overhead projector during this discussion to emphasize the relationships.
4. The teacher will ask each learner to complete a questionnaire. This questionnaire must contain items which ask the child to show that his activities are dependent on his parents' life style and careers. (Question example: <u>If</u> my mom and dad work at night, <u>then</u> I babysit my brother.)

Learner Directions:

1. The learner will describe in a written essay his daily schedule, including home and school activities.
2. The learner will describe in writing the family's daily schedule, including home and work activities.
3. The learner is involved in an open discussion focusing upon the relationship of the family's life style to that of the child's.
4. The learner will complete a questionnaire which contains items showing that his activities are often dependent on his parent's life style and careers. (Question example: <u>If</u> mom and dad work at night, <u>then</u> I <u>babysit</u>.)

Enrichment for a fast learner:

1. Given a hypothetical situation which describes a parent's life style, the fast learner will describe in writing the possible effects of that life style upon the life style of children in the family.
2. The learner will describe orally or in a written paper the life styles of families he knows and how the children's life styles depend on their parents'.

[illegible] for slow learner:

1. The slow learner will read books depicting family situations. These books will show the children's life [illegible] on the parents. The learner will possibly write [illegible] family.
2. The slow learner will draw illustrations showing life styles of parents and children.
3. The slow learner will discuss his life style with another learner or learners. This discussion will help [illegible] and the relationship of their life style to their parents'.

Resources:

A teacher-developed schedule, which would give examples of daily schedules.

Types of Media Appropriate: overhead projector

Sample Test Items:

1. Tell how your family's life style and their careers affect your life style at home and at school. (Essay)
2. The life style of your parents does not have any effect on your life style. (True or false)

Feedback Procedures:

The learner will obtain feedback from the results of evaluation.

Mike Carroll
Pat Cobb
Holmes School

[illegible]

[illegible]

[illegible] .051 [illegible]
[illegible]
his [illegible], and [illegible]

[illegible] 10.05 [illegible] Time: 45 min. [illegible]

Teacher Directions:

1. The teacher will ask the learner [illegible] his schedule, including home and school activities. The discussion must include items such as [illegible].*
2. The teacher asks each learner to describe [illegible] schedule including home and work activities in an oral discussion.*
3. The teacher guides an open discussion with the learners focusing upon the relationship of the child's family life styles to that of the children's. The teacher will possibly use the overhead projector during this discussion to emphasize the relationships.
4. The teacher will ask each learner to complete a questionnaire. This questionnaire must contain items which ask the child to show that his activities are dependent on his parents' life style and careers. The teacher will ask the learner the questions on the questionnaire himself or have a student helper do this. (Question sample: If mom and dad work at night, I babysit.

* Learners may be asked to make drawings rather than describe.

Learner Directions:

1. The learner will describe in an oral discussion, his daily schedule, including home and school activities.
2. The learner will describe in an oral discussion the family's daily schedule, including home and work activities.
3. The learner is involved in an open discussion focusing upon the relationship of the family's life style to that of the child's.
4. The learner will complete a questionnaire which contains items showing that his activities are often dependent on his parent's life style and careers. The learner will tell his answers to the teacher who writes down the answers on the questionnaire or asks a student helper to do this. (Question sample: If mom and dad work at night, I babysit.)

Enrichment for a fast learner:

1. The fast learner will explain orally to a teacher how other children are affected by the life style of their parents when given hypothetical situations.
2. The fast learner will record on tape to a teacher how other children are affected by the life style of their parents when given hypothetical situations.

[illegible]ent for a slow learner:

1. The slow learner will listen to tapes or records depicting [illegible] parents' life styles and how these life [illegible].
2. The slow learner will draw pictures depicting the careers of parents, showing that the parents' life styles affect the children's.

[illegible]es:

A teacher-develop schedule, which would give examples of daily sc[illegible].

Types of Media Appropriate: record player, tape recorder, overhead projector

Sample Test Items:

1. Tell orally to the teacher or student helper how your family's life style and their careers affect your life style at home and at school.
2. Tell orally to the teacher or student helper whether or not the life style of your parents does or does not have an effect on your life style.

Feedback Procedures:

The learner will obtain feedback from the results of evaluation.

Mike Carroll
Pat Cobb
Holmes School

T. S. 112. TO [illegible] CLUSTERED
([illegible] 12) ON [illegible]

P. O. 110.421 [illegible]

[illegible] #110.40401 [illegible]

Teacher Directions:

1. Develop a form of test [illegible] clustered with one of [illegible].
2. Distribute the test form to the class as a whole.
3. Conduct a large group discussion reviewing careers that cluster together.
4. After the testing period, go over each of the test items and identify the correct response with participation from the group as to why that response is correct.

Learner Directions:

1. Participate in a group discussion reviewing careers that fall within a cluster.
2. Individually respond to each of the 10 test items on the form presented by the teacher.
3. Check individual items in a correcting period with the teacher. Either correct own or another learner's responses.

Enrichment for a fast learner:

Respond to test items involving all 15 career clusters and explain in writing his response.

Enrichment for a slow learner:

After concentrated review of the expected response, the learner will respond to 5 test items.

Resources:

1. Dictionary of Occupational Titles, U.S. Labor Dept. of Publications (adult)
    a. Found locally at Office of Guidance and Counseling
    b. ASU library
    c. Mesa library
    d. U. S. Labor Dept. of Employment Service
2. Slide series on The Challenge of Career Educ., CCD, Mesa (adult)
3. Slide series on Mesa Career Expo, 1971, CCD, Mesa (adult oriented)
4. Encyclopedia Britannica Junior "Occupation"
5. Encyclopedia World Book "Vocational Guidance"

#110.49[illegible]

Type of Media Appropriate: Chalkboard

Sample Test Items:

Circle the career that [illegible] in the [illegible]

1. a lab technician
    - a. carpenter
    - b. secretary
    - c. nurse

Feedback Procedure:

The learner will receive feedback from his responses on the test items.

Bev Cooper
Holmes School

G. S. #110. TO RECOGNIZE THE IMPACT OF [illegible] ON LIFE STYLES.
([illegible] 12)

P. O. #110.404 Given a career, the learner will [illegible] examples of careers, the one which is most similar to the given career and explain why.

Activity #110.40450 Time Grade [illegible]

Teacher Directions:

1. Conduct a large group discussion reviewing careers that cluster together.
2. Develop a tape including the 10 test items for the learner to respond to. The learner will respond 1.c on paper for item number 1 and the correct selection is letter c.
3. The teacher or an adult will correct responses with the individual learner.

Learner Directions:

1. Participate in a group discussion reviewing careers that fall within a cluster.
2. Listen to tape and respond.
3. Go over test item responses with an adult for feedback.

Enrichment for a fast learner:

Respond to a tape including items from all 15 career clusters.

Enrichment for a slow learner:

After concentrated review the learner will respond orally to 5 test items.

Resources:

1. Dictionary of Occupational Titles, U.S. Labor Dept. of Publications (adult)
    - a. Found locally at Office of Guidance and Counseling
    - b. ASU library
    - c. Mesa library
    - d. U.S. Labor Dept. of Employment Service
2. Slide series on The Challenge of Career Educ., CCD, Mesa (adult)
3. Slide series on Mesa Career Expo, 1971, CCD, Mesa (adult oriented)
4. Encyclopedia Britannica Junior "Occupation"
5. Encyclopedia World Book "Vocational Guidance"

Types of Media Appropriate: chalkboard, tape recorder and [illegible]

Sample Test Items:

Name the career that would be in the same career cluster as

1. a lab technician
    a. carpenter
    b. secretary
    c. nurse

Test items may be given orally or recorded on tape.

Feedback Procedure:

The learner will receive feedback from his responses on the taped test items.

Bev Cooper
Holmes School

G. S. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CVTE # 12) ON LIFE STYLES

P. O. #110.415 After a guided group discussion, the learner will name a career cluster and name several careers appropriate to that cluster.

Activity #110.41501 Time: 45 min. Grp: lg, ind

Teacher Directions:

1. In a large group situation, the instructor will guide the group's discussion of career clusters to re-emphasize the idea that careers can be placed into clusters on the basis of their similarities.
2. After selecting a career cluster, the instructor will assign the learners to read about at least five careers that are a part of said cluster. The learner then will produce written evidence that said careers were appropriate for the particular cluster.

Learner Directions:

1. The learner will listen and participate in the group's discussion.
2. The learner will read then prepare a written report about at least five careers that are appropriate members of said career clusters.

Enrichment for a fast learner:

1. Given a list of careers, the learner will find some commonalities so as to devise his own system for clusters.

Enrichment for a slow learner:

1. The learner will manipulate puzzle pieces that are related to careers and career clusters.

[illegible]:

[illegible] to master list of resources [illegible].

Types of Media Appropriate: chalkboard, overhead projector

Sample Test Items:

Which of the following careers are similar or might belong to the same cluster? Mark 3.

____1. carpenter	____4. plumber
____2. mason	____5. reporter
____3. lawyer	____6. doctor

Feedback Procedures:

Learner performance on evaluative instruments and written examples of researched careers.

Connie Bickford
Holmes School

G. S. [illegible]. TO [illegible] THE [illegible] IMPACT OF [illegible]
(CVTE # 12) O[illegible] LIFE [illegible]

P. O. #110.[illegible] After a guided group discussion, the [illegible] a career cluster and name several [illegible] to that cluster.

[illegible] 110.4155[illegible] [illegible] 45 min. [illegible]

Teacher Directions:

1. In a large group situation, the instructor will guide the [illegible] discussion of career clusters to re-emphasize the [illegible] can be placed into clusters on the basis of their [illegible].
2. After selecting a career cluster, the instructor will assign the learners the task of selecting a minimum of five filmstrips on careers that pertain to said career clusters then reporting orally to the group facts that make each career a member of said cluster.

Learner Directions:

1. The learner will listen and participate in the group's discussion.
2. The learner will select at least five filmstrips from a large body of filmstrips that are a part of the given cluster. He then will prepare an oral presentation of his investigation to emphasize the careers which should be in a common cluster.

Enrichment for a fast learner:

1. The learner will prepare a visual display of the similarities that must exist in order that a career be accepted into a cluster.

Enrichment for a slow learner:

1. The learner will illustrate the task of some of the careers he has examined.

[illegible]:

Refer to master list of resources [illegible].

Types of Media Appropriate: filmstrip projector, tapes

Sample Test Items:

1. Examine these pictures of careers, then select those in ________ cluster.
2. Draw three careers in ________ cluster.
3. Orally state at least five jobs in ________ cluster.

Feedback Procedures:

Learner performance in class presentation and/or evaluative instruments.

Connie Bickford
Holmes School

G. S. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CVIS #12) ON LIFESTYLES.

P. O. #110.424 Given names of the career clusters [illegible] of each cluster, the learner will [illegible] to the list of career clusters.

Activity #110.42401 Time: 45 min. Grp: lg, ind

Teacher Directions:

1. The teacher will lead a discussion focusing on career clusters and the careers within each cluster. The teacher will utilize an overhead projector. The transparencies will list all career clusters and specific examples of careers within each cluster.
2. The teacher will assign an essay to the learners on careers and career clusters with the emphasis on identifying and matching careers with their appropriate career clusters.

3. The teacher will give in writing to each learner a career cluster with the basic description of the cluster and ask the learner to name at least three careers which are within the cluster.

Learner Directions:

1. The learner will participate in a guided discussion focusing on career clusters and the careers within them. (The learner may be taking notes.)
2. The learner will write an essay identifying careers with the appropriate career cluster.
3. The learner will identify in writing at least three careers which are within a given career cluster.

Enrichment for a fast learner:

The learner will choose a career cluster, identify at least five careers within that cluster, and in writing explain the commonalities and differences of those careers.

Enrichment for a slow learner:

The learner will read a short essay depicting several careers and match them with their appropriate career cluster.

Resources:

See Master List of Resources.

Types of Media Appropriate: Overhead projector.

Sample Test Items:

Place an x next to 3 careers which would belong to the same cluster.

____ 1. Doctor
____ 2. Carpenter
____ 3. Electrical Engineer
____ 4. Nurse
____ 5. Medical Technician

Feedback Procedures:

The learner will obtain feedback from performance on the instrument used for that particular unit.

Pat Cobb
Mike Carroll
Holmes School

G. S. #110 TO RECOGNIZE THE IMPACT OF [illegible] ON [illegible]
(CVIE [illegible]) ON LIFE STYLES.

P. O. #110.42 Given names of the career clusters with a [illegible] of each cluster, the learner will [illegible] to the list of career clusters.

Activity #110.42450 Time: 45 min. Grp: [illegible]

Teacher Directions:

1. The teacher will lead a discussion focusing on career clusters and [illegible] careers within each cluster. The teacher will utilize an overhead projector. The teacher will explain the overhead overlay, which will list all career clusters and specific examples of careers within each cluster.
2. The teacher will assign an essay to the learners on careers and career clusters with the emphasis on identifying and matching careers with their appropriate career clusters. This essay will be condensed on tape.
3. The teacher orally gives a career cluster, along with its basic description, and asks the learner to verbally identify three careers within that cluster.
4. The teacher assigns the learner a tape identifying career clusters and the learner is asked to draw three examales of a career within that cluster.

Learner Directions:

1. The learner will participate in a guided discussion focusing on career clusters and the careers within them.
2. a. The learner will give orally to the teacher an essay identifying careers with the appropriate career cluster.
   b. The learner will record on tape an essay identifying careers with the appropriate career cluster.
3. The learner will orally respond to the teacher when asked specific questions.
4. The learner listens to a tape and draws three examples of careers within a cluster.

Enrichment for a fast learner:

1. The learner reads illustrated, high-interest, low-vocabulary books depicting a career cluster and several careers which encompass that career cluster.
2. The learner listens to a tape and slide or film strip presentation depicting the relationship between careers and career clusters.

Enrichment for a slow learner:

The learner listens to a tape and slide or filmstrip presentation depicting the relationship between careers and career clusters.

[illegible]

Tapes - Condensed version of essay put on tape [illegible].

Books - See Master List of Resources.

Types of Media Appropriate: overhead projector, slide projector, tape player.

Sample Test Items:

Having been given the question orally or on tape, the learner will respond orally or on tape as appropriate.

1. Identify the 3 careers which would belong to the same cluster:
    1. Doctor
    2. Carpenter
    3. Electrical Engineer
    4. Nurse
    5. Medical Technician

Feedback Procedures:

The learner will obtain feedback from performance on the instrument used for that particular unit.

Pat Cobb
Mike Carroll
Holmes School

C. S. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CVTF # 12) ON LIFE STYLES.

P. O. #110.436 The learner will describe similarities of people within a career cluster as it would pertain to education, training, talent, and life style.

Activity #110.43601 Time: 45 min. Gm: lg, sg, ind

Teacher Directions:

1. The teacher will have three resource people in the room and divide the learners into three groups. Each resource person will tell his group about his education, training, talent, and life style. (The resource people will have different careers within one career cluster.)
2. The teacher will bring the total group together and have the learners ask questions of the resource people. The resource people will focus on the points of similarity between themselves as they answer the questions. (Could be an additional activity.)
3. The teacher will ask each group to talk to the other classmates telling what their group learned about the education, training, talent, and life style of the person who spoke to them.
4. The teacher will ask each learner to write a paper in which he tells how the education of the three resource people is similar, how the training is similar, and how the talents and life styles are similar because they all have careers within one cluster.

Learner Directions:

1. The learner will listen to a resource person as he tells about his education, training, talent, and life style.
2. The learner will participate in a question period, asking the resource people about their careers. (Could be an additional activity.)
3. The learner will report to the class, as a member of a group, telling about what the group learned about the career of the person, focusing on education, training, talent, and life style.
4. The learner will write a paper in which he describes the similarities of education, training, talent, and life style of all three resource people.

Enrichment for a fast learner:

1. The fast learner will interview other people who have careers similar to the people he listened to in class. He will report orally or in writing about the similarities he found. He will focus on their education, training, talent, and life style.
2. The fast learner will choose another career cluster and talk to three people whose careers fit in the cluster. He will then report orally or in writing about his findings of similarity in education, training, talent, and life style.

3. The fast learner will listen to three or more [illegible] as they tell something about themselves and [illegible] have careers that fit in the same cluster.

[illegible]

1. The slow learner will [illegible] three films which [illegible] each of the careers and which emphasize the education, training, talent, and life style of the people.
2. The slow learner will talk individually with one or more of the resource people in order to learn more about their careers.
3. The slow learner will read books which [illegible] these careers. All the books are about careers in the same cluster.

Resources:
Resource People: airline pilot, helicopter pilot, stewardess (possibly a parent)
doctor - local in community
nurse - school nurse
dentist - local in community

Books: (slow) I Want To Be a Nurse by Greene
(slow) I Want To Be a Doctor by Greene
Airline Stewardess - Engeman
About Doctor John - Thompson
Aerospace Pilot - Coombs

See master list of resources on Careers.

Films: Transportation by Helicopter #347 Mesa
Airplanes Work for Us #228 - Mesa
(Check ASU Film Library for films)

Types of Media Appropriate: film projector

Sample Test Items:

1. Write a paragraph telling how the education of the three people who talked to us is similar.
2. Write a paragraph telling how the training of the three people who talked to us is similar.
3. Write a paragraph telling how the talent of the three people who talked to us is similar.
4. Write a paragraph telling how the life style of the three people who talked to us is similar.
5. The people who visited us all went to the same kind of college. (True or false)
6. Choose two sentences that tell about the education of the people who visited us:
   They all went to college.
   They all ski.
   They all learned to work to help people.

Feedback Procedures:

The learner will obtain feedback from the evaluation.

Pat Cobb
Holmes School

G. P. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CVTE # 12) ON LIFE STYLES.

P. O. #110.436 The learner will describe similarities of people within a career cluster as it would pertain to education, training, talent, and life style.

Activity #110.43650 Time: 45 min. Grp: lg, sm, ind

Teacher Directions:

1. The teacher will have three resource people in the room and divide the learners into three groups. Each resource person will tell his group about his education, training, talent, and life style. (The resource people will have different careers within one career cluster.)
2. The teacher will bring the total group together and have the learners ask questions of the resource people. The resource people will focus on the points of similarity between themselves as they answer the questions.
3. The teacher will ask each group to talk to the other classmates telling what their group learned about the education, training, talent, and life style of the person who spoke to them.
4. The teacher will ask each learner to orally describe how the education of the three resource people is similar, how the training is similar, and how the talents and life styles are similar because they all have careers within one cluster. This is to be done to the teacher or student helper.

Learner Directions:

1. The learner will listen to a resource person as he tells about his education, training, talent, and life style.
2. The learner will participate in a question period, asking the resource people about their careers.
3. The learner will report to the class, as a member of a group, telling about what the group learned about the career of the person, focusing on education, training, talent, and life style.
4. The learner will orally describe the similarities of education, training, talent, and life style of all three resource people.

Enrichment for a fast learner:

The fast learner will find pictures that show the education, training, talent, and life style of three or more people whose careers are within the same cluster and display them in a scrap book.

Enrichment for a slow learner:

1. The slow learner will view three films which show the work of three careers and which emphasize the education, training, talent, and life style of the people.

2. The slow learner will talk individually with one or more of the resource people in order to learn more about their careers.

Resources:

Pictures: Write to airline companies, businesses, etc., to ask for pictures. See master list of resources.

Films: Transportation by Helicopter - Mesa #347
Airplanes Work For Us - Mesa #228
(Check ASU film library for films)

Types of Media Appropriate: film projector

Sample Test Items:

The following questions will be asked orally, with oral responses:

1. Describe in a paragraph how the education of the three people who talked to us is similar.
2. Describe in a paragraph how the training of the three people who talked to us is similar.
3. Describe in a paragraph how the talent of the three people who talked to us is similar.
4. Describe in a paragraph how the life style of the three people who talked to us is similar.
5. The people who visited us all went to the same kind of college. (True or false)
6. Choose two sentences that tell about the education of the people who visited us:
    They all went to college.
    They all ski.
    They all learned to work with children.

Feedback Procedures:

The learner will obtain feedback from the evaluation.

Pat Cobb.
Iolmes School

C. G. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CATE # 12) ON LIFE STYLES.

P. O. #110.806 The learner will list to the instructor's satisfaction six related careers and predict a suitable name for that cluster.

Activity #110.80601 Time: 60 min. Grp: lg, sg, ind
(2 30-min. periods)

Teacher Directions:

1. As a review, conduct a large group discussing and naming many careers. Record the results on the chalkboard or a chart. With the help of the group, cluster the careers that are related.
2. Cover the developed list. Assign small groups to list 6 related careers and to write a suitable name for that cluster of careers. The group will choose one spokesman for evaluation.
3. Or, assign each learner to list the 6 related careers and to write a suitable name.
4. Give each small group another group's finished product to evaluate and report to the large group.
5. Regroup in large group. Instruct individual spokesmen to identify the names of the group he is evaluating. Name the careers listed and the predicted name for the cluster. The large group may be invited to respond to the findings.

Learner Directions:

1. Participate in large group discussion naming many careers and clustering the careers that are related.
2. As a member of a small group list 6 related careers and write a suitable name for that cluster. Vote on a spokesman.
3. Individually (as an option) list 6 related careers and write a suitable name for that cluster.
4. Evaluate another group's finished product and report the findings to the large group. Decide if you agree or disagree with their findings.
5. Reassemble in large group. Spokesmen will report to the large group and invite the large group to respond with questions or comments.

Enrichment for a fast learner:

1. Act as the spokesman for the large group evaluation.
2. List 10 or more careers within a cluster.

Enrichment for a slow learner:

Team up with more capable learners while developing the 6 careers.

Resources:

1. Encyclopedia Britannica, Junior "Occupations."
2. World Book Encyclopedia "Vocational Guidance."
3. Dictionary of Occupational Titles
   U. S. Labor Dept. of Publications
   a. Found locally at Office of Guidance and Counseling
   b. ASU library
   c. Mesa library
   d. U. S. Labor Dept. of Employment Service
4. Slide series on <u>The Challenge of Career Education</u>, CCD, Mesa.

<u>Types of Media Appropriate:</u> chalkboard, chart

<u>Sample Test Items:</u> (Nurse, doctor, lab technician)

1. A suitable name for this career cluster would be:
   a. construction
   b. health
   c. business

<u>Feedback Procedures:</u>

The learner will obtain feedback from the results of the group procedure and evaluation.

Bev Cooper
Holmes School

C. G. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CVTE # 12) ON LIFE STYLES.

P. O. #110.806 The learner will list to the instructor's satisfaction six related careers and predict a suitable name for that cluster.

Activity #110.80650 Time: 60 min. Grp: lg, sg, ind
(2 30-min. periods)

Teacher Directions: (Team the non-reading learners with more capable learners)

1. As a review, conduct a large group discussion and naming many careers. Record the results on the chalkboard or a chart. With the help of the group, cluster the careers that are related.
2. Cover the developed list. Assign small groups to list 6 related careers and to write a suitable name for that cluster of careers. The group will choose one spokesman for evaluation.
3. Or, assign each learner to list the 6 related careers and to write a suitable name.
4. Give each small group another group's finished product to evaluate and report to the large group.
5. Regroup in large group. Instruct individual spokesmen to identify the names of the group he is evaluating. Name the careers listed and the predicted name for the cluster. The large group may be invited to respond to the findings.

Learner Directions:

1. Participate in large group discussion naming many careers and clustering the careers that are related.
2. As a member of a small group list 6 related careers and write a suitable name for that cluster. Vote on a spokesman.
3. Individually (as an option) list 6 related careers and write a suitable name for that cluster.
4. Evaluate another group's finished product and report the findings to the large group. Decide if you agree or disagree with their findings.
5. Reassemble in large group. Spokesmen will report to the large group and invite the large group to respond with questions or comments.

Enrichment for a fast learner:

1. Team up with more capable learners for developing list of 10 or more careers within a cluster.
2. Act as spokesman with a helper to read if necessary.

Enrichment for a slow learner:

Team up with more capable learners.

#110.00650

Resources:

1. Encyclopedia Britannica Junior "Occupations."
2. World Book Encyclopedia "Voactional Guidance."
3. Dictionary of Occupational Titles
   U. S. Labor Dept. of Publications
   a. Found locally at Office of Guidance and Counseling
   b. ASU library
   c. Mesa library
   d. U. S. Labor Dept. of Employment Service
4. Slide series on The Challenge of Career Education, CCD, Mesa.

Types of Media Appropriate: chalkboard, chart

Sample Test Items:

Test items to be put on tape: (nurse, doctor, lab technician)

1. A suitable name for this career cluster would be:
   a. construction
   b. health
   c. business

Learner will respond on paper.

Feedback Procedures:

The learner will receive feedback from the results of the group procedure and evaluation.

Bev Cooper
Holmes School

G. S. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CVTE # 12) ON LIFE STYLES

P. O. #110.816 The learner will analyze at least ten careers within a given cluster in terms of their common purposes.

Activity #110.81601 Time: 45 min. Grp: lg, ind

Teacher Directions:

1. In guided group discussion, the class will find some common purposes of a particular career cluster.
2. The instructor will put the information from the class on a chart or an overhead projector. Then each child will be asked to write ten careers that have this particular common purpose. Check and discuss together the criterion for a correct answer.
3. The instructor will assign the students to select and report on a career cluster by determining its common purpose, then reading to find out ten careers that have this common purpose.

Learner Directions:

1. Listen to and participate in class discussion.
2. The learner will write down ten careers that have a common purpose.
3. The learner will determine the common purpose of a selected career cluster by reading about ten careers of that cluster. The learner will prepare a written report on same.

Enrichment for a fast learner:

1. The learner will do research to ascertain the common purpose of each of the fifteen clusters.

Enrichment for a slow learner:

1. The learner will listen to tapes regarding the common purpose of a particular cluster then prepare illustrations of particular careers meeting their common purpose.

G. S. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CVTE # 12) ON LIFE STYLES

P. O. #110.816 The learner will analyze at least ten careers within a given cluster in terms of their common purposes.

Activity #110.81650 Time: 45 min. Grp: lg, sg, ind

Teacher Directions:

1. In guided group discussion, the class will find some common purposes of a particular career cluster.
2. The instructor will put the information from the class discussion on an overhead projector. In "buzz group" fashion, the learners will orally state careers with a particular common purpose. The instructor and learners will examine the list they've compiled, checking the criteria for a correct answer (i.e., does the particular career have this common purpose).
3. After selecting a career cluster, the learner will think of ten careers having this common purpose. He will then interview workers in this career to ascertain if the given purpose is pertinent to this career. After gathering a list of ten common careers, the learner will prepare an oral presentation of his findings.

Learner Directions:

1. Learner will listen and participate in class discussion.
2. The instructor will put the information from the class discussion on an overhead projector. In "buzz group" fashion, the learners will orally state careers with a particular common purpose. The instructor and learners will examine the list they've compiled, checking the criteria for a correct answer (i.e., does the particular career have this common purpose).
3. After selecting a career cluster, the learner will think of ten careers having this common purpose. He will then interview workers in this career to ascertain if the given purpose is pertinent to this career. After gathering a list of ten common careers, the learner will prepare an oral presentation of his findings.

Enrichment for a fast learner:

1. The learner will work with a less able learner to explain common purpose of careers which form career clusters.

Enrichment for a slow learner:

1. The slow learner will arrange to have resource people come to class to discuss their career.

Resources:

Refer to Master List of Resources about Careers

Types of Media Appropriate: overhead projector, chalkboard, recorders, projectors, record players, software

Sample Test Items:

1. All evaluative instruments for the reading may be used orally one-to-one, teacher - pupil or pupil - pupil recorded on tapes.

Feedback Procedures:

Learner performance on evaluative instruments.

Connie Bickford
Holmes School

G. S. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS
(CVTE # 12) ON LIFE STYLES.

P. O. #110.827 Using two career clusters, the learner will predict possible ways of life within these clusters.

Activity #110.82701 Time: 45 min. Grp: lg. sg

Teacher Directions:

1. The teacher will show slides of some life styles of people whose careers fit into 2 career clusters.
2. The teacher will lead a discussion of the two career clusters being emphasized and encourage the children to name the careers within the clusters and tell possible styles of living.
3. The teacher will divide the class into two groups and with the help of a student teacher guide the learners in the development of charts showing possible life styles of the people in a career cluster--one cluster to each group. Charts will be written and illustrated.
4. The teacher will ask each group to display their charts showing illustrations and reading to the class the information on the charts.
5. The teacher will ask each learner to describe some possible life styles of 2 career clusters in writing.

Learner Directions:

1. The learner will view slides on life styles of people in 2 career clusters.
2. The learner will participate in a discussion of the two career clusters being emphasized and identify careers within each cluster.
3. The learner will work within a smaller group developing charts depicting possible life styles of people within one career cluster putting sentences and illustrations on the chart.
4. The learner will help his group explain the charts.

Enrichment for a fast learner:

1. The fast learners will view slides of life styles of 2 career clusters (other than those studied in class) and report orally or in writing about some life styles he noticed.
2. The fast learner will develop charts and explain them to his class after viewing the slides.
3. The fast learner will develop a scrapbook showing pictures of life styles of people in various career clusters.

Enrichment for a slow learner:

The slow learner will draw pictures illustrating life styles of people in one career, helping the fast learner complete his scrapbook.

Resources:

Slides: See master list. Check the resource people section for con[illegible] to check for slides.

Books: See master list for books to help develop the charts.

Types of Media Appropriate: slide projector

Sample Test Items:

1. Define in writing 2 career clusters and describe some possible life styles of people within each cluster.
2. Tell about 2 items on your group chart.

Feedback Procedures:

The learner will obtain feedback from the evaluation.

Pat Cobb
Holmes School

G. S. #110. TO RECOG[illegible]
([illegible] 12) ON LIFE [illegible].

I. O. 110.827 Using t[illegible] clusters, the [illegible] will [illegible] possible ways of [illegible] within those clus[illegible].

[illegible] #110.82750 [illegible] 45 min. [illegible]

[illegible] Directions:

1. The teacher will show slides of some life styles of people whose careers fit into 2 career clusters.
2. The teacher will lead a discussion of the two career clusters being emphasized and encourage the children to name the careers within the clusters and tell possible styles of living.
3. The teacher will divide the class into two groups and with the help of a student teacher guide the learners in the development of charts showing possible life styles of the people in a career cluster--one cluster to each group. Charts will be illustrated only.
4. The teacher will ask each group to display their illustrations on the charts and orally discuss them.
5. The teacher will ask each learner to describe orally some possible life styles of 2 career clusters.

Learner Directions:

1. The learner will view slides on life styles of people in 2 career clusters.
2. The learner will participate in a discussion of the two career clusters being emphasized and identify careers within each cluster.
3. The learner will work within a smaller group developing charts depicting possible life styles of people within one career cluster putting illustrations on the charts.
4. The learner will help his group explain the charts.

Enrichment for a fast learner:

1. The fast learners will view slides of life styles of 2 career clusters (other than those studied in class) and report orally about some life styles he noticed.
2. The fast learner will develop illustrative charts and explain them to his class after viewing the slides.
3. The fast learner will develop a scrapbook showing pictures of life styles of people in various career clusters.

Enrichment for a slow learner:

The slow learner will draw pictures illustrating life styles of people in one career, helping the fast learner complete his scrapbook.

Resources:

See master book list.

Types of Media Appropriate: slide projector

Sample Test Items:
(To be given orally by teacher or student helper)

1. Define 2 career clusters and describe some possible life styles of people within each cluster.
2. Tell about 2 items on your group chart.

Feedback Procedures:
The learner will obtain feedback from the evaluation.

Pat Cobb
Holmes School

G. S. 110. TO RECOGNIZE THE IMPACT OF [illegible]
(C[illegible]) ON LIFE STYLES.

P. O. 110.837 The learner will generalize about the [illegible] have who was employed within a [illegible].

Activity #110.83701 Time: 45 min. Grp: lg, ind

Teacher Directions:

1. The teacher involves the class in an open discussion [illegible] the concept that a career cluster often influences the life style of the individual.
2. The teacher assigns a specific essay to the class clarifying and expanding on the previous discussion.
3. The teacher involves the class in a discussion with the objective of demonstrating how different career clusters necessitate different life styles. The teacher elicits examples from the learners of how their parents' careers have affected the entire family's life style.
4. The teacher will ask each learner to select a career cluster and describe in writing the type of life he might expect to lead.

Learner Directions:

1. The learner contributes to the class discussion generalizing on how specific careers often shape the life style of the individual (possibly taking notes).
2. The learners read the assigned essay focusing on the concept discussed previously.
3. The learner discusses and gives examples of how their parents' career(s) influence the life style of the family.
4. The learner will select a career cluster and describe in writing the influence that career might have on his life style.

Enrichment for a fast learner:

1. The learner will select a career, describe the life style one might expect to lead, and give ten specific examples of how that life style would be changed.
2. Bring in a worker from the world of work to describe and discuss how his life has been changed because of his career choice.

Enrichment for a slow learner:

1. The learner will select a career and write an essay on how that career would alter his life style.
2. Bring in a worker from the world of work to describe and discuss how his life has been changed because of his career choice.

[illegible]

Readings: See master list of resources for books.

Resource People: See master list of resources.

Types of Media Appropriate: none.

Sample Test Items:

1. List three ways that your father's occupation affects the life style of family members. Your list can include working hours, mobility, location of occupation, living restrictions.

Feedback Procedures:
The learner will obtain feedback from the results of the inventory and teacher assistance.

Mike Carroll
Holmes School

G. S. #110. TO RECOGNIZE THE IMPACT OF VARIOUS CAREER CLUSTERS ON LIFE STYLES.
(GOAL #12)

P. O. #110.837 The learner will generalize about the kinds of life one might have who was employed within a single career cluster.

Activity #110.83750 Time: 45 min. Grp: lg, ind

Teacher Directions:

1. The teacher involves the class in an open discussion focusing on the concept that a career cluster often influences the life style of the individual.
2. The teacher assigns a specific essay to the class which has been condensed on tape clarifying and expanding on the previous discussion.
3. The teacher involves the class in a discussion with the objective of demonstrating how different career clusters necessitate different life styles. The teacher elicits examples from the learners of how their parents' careers have affected the entire family's life style.
4. The teacher will ask each learner to select a career cluster and describe orally or on a tape player the type of life he might expect to lead.

Learner Directions:

1. The learner contributes to the class discussion generalizing on how specific careers often shape the life style of the individual.
2. The learner listens to the condensed essay on tape focusing on the concept discussed previously.
3. The learner discusses and gives examples of how their parents' career(s) influence the life style of the family.
4. The learner will select a career cluster and describe orally or on tape the influence that career might have on his life style.

Enrichment for a fast learner:

1. Bring in a worker from the world of work to describe and discuss how his life has been changed because of his career choice.
2. The learner reads an illustrated, high-interest, low-vocabulary essay depicting the changes in a life role as he changes or becomes involved in a career.

Enrichment for a slow learner:

1. Bring in a worker from the world of work to describe and discuss how his life has been changed because of his career choice.
2. The learner describes one of his parent's career, orally or on tape, stating how the career affected the family's life style.

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[illegible]

Resource People: See master list of resources.

Resource Books: See master list of resource books.

Types of Media Appropriate: tape recorder.

Sample Test Items:

1. Identify three ways that your father's occupation affects the life style of family members. Your list can include working hours, mobility, location of occupation, living restrictions. (Question given orally.)

Feedback Procedures:

The learner will obtain feedback from the results of the inventory and teacher assistance.

Mike Carroll
Holmes School

G. S. #110. TO RECOGNIZE THE IMPACT OF W[illegible] ON LIFE STYLES
(CVIE #12)

P. O. #110.247 Using the components of an individual's career, [illegible] daily schedule, [illegible], [illegible] learner will predict the [illegible] individual.

Activity #110.84701 Time: 40 min. [illegible]

Teacher Directions:

1. The instructor will involve the group in a discussion which focuses in on the relationship between career and life style.
2. The instructor will assign a specific reading assignment which exemplifies the career-life style relationship.
3. After return to the large group situation for discussion of the material read, the learners will volunteer specific examples of said relationship.
4. The instructor will provide the learner with the task of matching a given set of careers with probable life styles.

Learner Directions:

1. Learner will listen and participate in the group's discussion.
2. Learner will read the specific assignment.
3. Learner will listen and participate in group discussion.
4. The learner will complete assigned task.

Enrichment for a fast learner:

1. Bring in a resource person from W.O.W. to discuss the relationship between life style and careers.
2. The learner will read a high interest, low vocabulary book relating to a specific career and life style and will describe in writing how that life style fits the chosen career.

Enrichment for a slow learner:

1. Bring in a resource person from W.O.W. to discuss the relationship between life style and careers.
2. The learner, given a specific example of career cluster, will describe in writing five possible changes that might occur if he were to assume that role.

[illegible] - See Master List of Resources

[illegible] People - See Master List of [illegible]

Types of Media Appropriate:

Sample Test Items:

1. Careers do not affect a person's life style. (True or false)

Feedback Procedures:

The learner will receive feedback from the test instrument and instructor conferences.

Connie Bickford
Mike Carroll
Holmes School

[illegible] #110. TO [illegible] IMPACT OF [illegible]
([illegible]) ON LIFE STYLES

P. O. #110.847 Using the components of an individual's career, [illegible] his daily [illegible], his home site, [illegible], the learner will predict the most suitable life style for that individual.

[illegible] #110.84722 [illegible]: 45 min. Grp: lg, ind

Instructor Directions:

1. The instructor will involve the group in a discussion which focuses in on the relationship between career and life style.
2. The instructor will play a recording or tape which exemplifies the career-life style relationship.
3. The instructor will guide the discussion of the audio material to point out the life style as it pertains to careers.
4. The instructor will provide an opportunity for the learner to volunteer his knowledge of life styles and careers from examples in his life.
5. The instructor will provide the learner with the task of orally matching a given set of careers with their probable life styles.

Learner Directions:

1. The learner will listen and participate in the group's discussion.
2. The learner will listen to the audio material.
3. The learner will participate in the group's discussion of the tape.
4. The learner will volunteer his information regarding life style and careers.
5. The learner will complete the oral task assigned by the instructor.

Enrichment for a fast learner:

1. The learner will interview several members in two differing career clusters to ascertain the life styles of each worker as it relates to his career.

Enrichment for a slow learner:

1. Given a specific career, the learner will illustrate his probable life style on and off the job as it relates to that career.

Resource People - See Master List [illegible]

Types of Media Appropriate: tape recorder, record player

Sample Test Items:

1. Careers do not affect a person's life style. (True or false question read by the teacher or a tape recorder and answered orally)

Feedback Procedures:

The learner will receive feedback from the test instrument and instructor conferences.

Connie Bickford
Mike Carroll
Holmes School

[illegible] 13. TO [illegible] THE IMPACT OF [illegible]
[illegible] 12) ON [illegible]

[illegible] 10.EE2 [illegible] discussion, the [illegible]
[illegible], the life style, [illegible]
clust[illegible].

[illegible] #110.037.1 [illegible] 45 min. [illegible]

[illegible]:

1. The teacher will ask two resource people [illegible] different [illegible] to the class about [illegible] will emphasize the differences between their life styles.
2. The teacher will [illegible] the learners read [illegible] the life style of people who are in the same [illegible] resource people.
3. The teacher will lead a discussion to encourage the learners to focus on the differences of life styles of the people they talked to and read about.
4. The teacher will ask the learner to identify in writing or orally at least four differences in life style between the two people who visited or they read about.

Learner Directions:

1. The learner will listen to two people talk to the class about their careers.
2. The learner will read about two people whose careers are the same as the visiting speakers.
3. The learner will participate in a discussion in which the focus point is the differences in life style of the visitors and the people they read about.
4. The learner will in writing identify at least four differences in life style between the two careers discussed.

Enrichment for a fast learner:

1. The fast learner will view two films on two different careers (other than the ones discussed in class) and discuss orally or in writing some differences in life style.
2. The fast learner will interview two other resource people (whose careers are different from those discussed in class) and ask them about differences in their life style.
3. The fast learner will write a paper or tell orally why he thinks people who work in contrasting career clusters have different life styles.

Enrichment for a slow learner:

1. The slow learner will view two films on two different careers.
2. The slow learner will draw some differences in life style of the two people who visited the class.

[illegible]s:
[illegible] - [illegible], [illegible]
[illegible], [illegible]
[illegible] - [illegible] C. B. C. [illegible]
[illegible]
Films - [illegible] - [illegible] - [illegible]
Your [illegible] - 536 - Mesa Public Schools
(last [illegible])
[illegible] - 250 - Mesa Public Schools
Transportation [illegible] - 347 - Mesa Public Schools
Airplanes [illegible] - 278 - Mesa Public Schools
Resource People - Mesa Post Office
Allied, or North American Truck Services
Teacher Resources - Encyclopedia Britannica Jr. - "occupations"
World Book - "vocational guidance"

Types of Media Appropriate: film projector

Sample Test Items:

1. List four differences in life style of the two people who visited us or of the people you read about.
2. People who work in contrasting career clusters usually ____________ ____________________________________ (Essay.)

Feedback Procedures:

The learner will obtain feedback from the evaluation.

Pat Cobb
Holmes School

C. G. #110. [illegible]
(#110.12) [illegible]

P. O. #110.[illegible] [illegible]
in [illegible]
ci[illegible]

[illegible] #110.857[illegible] [illegible]

[illegible] Directions:

1. The teacher [illegible] different [illegible] will emphasize the differences [illegible] their life styles.
2. The teacher [illegible] the differences [illegible].
3. The teacher will hold a discussion to encourage the learners to focus on the differences of life styles of the people they talked to and read about.
4. The teacher will ask the learner to identify orally at least four differences in life style between the two people who visited or they read about.

Learner Directions:

1. The learner will listen to two people talk to the class about their careers.
2. The learners will view two films that emphasize the differences in life style of two contrasting careers.
3. The learner will participate in a discussion in which the focus point is the differences in life style of the visitors and the people they read about.
4. The learner will orally identify at least four differences in life style between the two careers discussed.

Enrichment for a fast learner:

1. The fast learner will view two films on two different careers (other than the ones discussed in class) and discuss orally some differences in life style.
2. The fast learner will interview two other resource people (whose careers are different from those discussed in class) and ask them about differences in their life style.
3. The fast learner will write a short story telling what he knows about the life style of the visiting people with help from the teacher or a student helper.

Enrichment for a slow learner:

1. The slow learner will choose the pictures that show two contrasting careers and write sentences about the pictures with the help of the teacher.

[illegible] Trucks and Trains - [illegible] - Mesa Public Schools
Your Postal Service - [illegible] - Mesa Public Schools

[illegible] People - Mesa Postal Service
Allied, [illegible] Mesa Truck [illegible]

(Fast Learner)
Films - Oceanography - [illegible] - Mesa Public Schools
Transportation by Helicopter - 347 - Mesa Public Schools
Airplanes Work for Us - 223 - Mesa Public Schools

Types of Media Appropriate: film projector

Sample Test Items:

1. List four differences in life style of the two people who visited us or of the people you read about. Give orally to teacher or student helper.
2. People who work in contrasting career clusters usually______________________________.
(Give orally to teacher or student helper.)

Feedback Procedure:

The learner will obtain feedback from the evaluation.

Pat Cobb
Holmes School

MASTER RESOURCE LIST

BOOKS:

The Pilot of a Plane. Chace, Haile

The Captain of a Ship. Chace, Ha

Soldiers and Sailors. Greene, Carla

The Real Book about Whales and Whaling. Reinfeldt, Fred

What Does a Veterinarian Do? Compton, Grant

The Trucks That Haul By Night. Stevens, Leonard

Read about the Busman. Slobodken, Louis

Hunting for Boys. McNally, Tom

The Story of Printing. Simon, Irving B.

Royal Canadian Mounted Police. Neuberger, Richard

About Policemen Around The World. Landin, Les

Read about the Policeman. Slobodkin, Louis

I Know A Mayor. Williams, Barbara

Park Ranger. Colby, C. B.

About Doctor John. Thompson, Frances

Let's Go to a Police Station. Sootin, Laura

Conrad the Policeman. Dobbins, John B.

I Want to be a Doctor. Greene, Carla

I Want to be a Farmer. Greene, Carla

I Want to be a Librarian. Greene, Carla

I Want to be a Fireman. Greene, Carla

U. S. Peace Corps. Susan Whellesey

Dictionary of Occupational Titles. U.S. Labor Dept. of Publications

BOOKS: (contd)

Night People. Colby, C.B.

A Man's Work. Myers, Donald

What Does a Congressman Do? Lavine, David

A Colby Book - Air Force Academy. Colby, C.B.

Army Engineers. Colby, C. B.

Aerospace Pilot. Coombs, Charles

Project Sealab - Navy. Terry Shannon, Charles Payzant

Woodcarving for Beginners. Graveney, Charles

The First Book of Acting. Schuon, Karl

The First Book of Ballet. Streatfield, Noel

Railroad Engineers and Airplane Pilots. Greene, Carla

Radio and Electronics. Morgan, Alfred

Read About a Fireman. Slobodsen, Louis

The City and Its People. Schwartz, Alvin

Let's Go to the Post Office. Buckheimer, Naomi

Read About the Postman. Slobodsen, Louis

Airline Stewardess. Engeman, Jack

What Does a Secret Service Agent Do? Hyde, Wayne

Secret Service. Colby, C. B.

Racers and Drivers. Yates, Brock

The First Book of Photography. Hoke

The Real Book about Easy Music Making. Leeming, Joseph

A Child's Book of Music Makers. Frost

BOOKS: (cont'd)

Meet The Orchestra. Suggs

Ballet For You. Wyndham, Lee

House Construction. Wilkinson

Magic of Steel and Oil. Webb

The New World of Iron and Steel. Tracy

Steel Mill. Green

The Story of Iron and Steel. Petersham

The Story of Iron and Gold. Petersham

Zoo Doctor. Bridges

Secret Service. Colby

Read About The Postman. Slobodken

What Does a Policeman Do. Johnston

I Know a Policeman. Williams

SAC. Colby

FBI. Colby

Someday I'll be a Doctor. Splaver

Someday I'll be an Aerospace Engineer. Splaver

Railroad Engineers and Airplane Pilots. Greene

Read About the Busman. Slobodkin

I Know A Truck Driver. Evans

About the Driver of a Bus. Phillips

I Want to be a Musician. Greene

I Want to be a Nurse. Greene

BOOKS: (contd)

I Want to be a Storekeeper. Greene

I Want to be a Truck Driver. Greene

I Want to be a Space Pilot. Greene

I Want to be a Ship Captain. Greene

I Want to be a Baker. Greene

I Want to be an Airplane Hostess. Greene

I Want to be a Road Builder. Greene

I Want to be a Homemaker. Greene

I Want to be a Restaurant Owner. Greene

I Want to be a Fisherman Greene

I Want to be a Scientist, Greene

I Want to be a Postman. Greene

I Want to be a Bus Driver. Greene

I Want to be a Ballet Dancer. Greene

I Want to be a Baseball Player. Greene

I Want to be a Carpenter. Greene

I Want to be a Mechanic. Greene

I Want to be a Train Engineer. Greene

I Want to be a Truck Driver/ What do they do? Greene

Casey at the Bat. Thayer, Ernest L.

Casey Jones. Rounds, Glen

I Know a Lot of Things. Rand, Ann and Paul

BOOKS: (contd)

Johnny Appleseed. American Folklore

Social Studies	Publishing Company
Billy's Neighbors	Follett
Billy's Friends	Follett
Learning About Our Families	Allyn & Bacon
Learning About Our Neighbors	Allyn & Bacon
Learning About Our Country	Allyn & Bacon
Families And Their Needs	Silver Burdett
At School	Scott, Foresman
In The Neighborhood	Scott, Foresman
In City, Town, and Country	Scott, Foresman

Encyclopedias

Encyclopedia Brittanica Jr. - "occupations"

World Book - "vocational guidance"

FILMS:

Airplanes and How They Fly	156
Airplanes Work for Us	228
Oceanography	258
Transportation by Helicopters	347
Trucks and Trains	229
Your Postal Service	536

FILMSTRIPS:

People Who Work For Our Health

People We Meet When We Travel

People Whose Work Is Important To Us

Helping Our Town Government

<u>Slides</u>

Slide series on <u>The Challenge of Career Education</u> - C.C.D., Mesa - 1st St. & Hibbert

Slide series on <u>Mesa Career Expo 1971</u> - C.C.D., Mesa, 1st St. & Hibbert

RESOURCE PEOPLE:

Mesa Post Office, 26 North MacDonald, Mesa

Mesa Citrus Growers, Assn., 254 W. Broadway, Mesa

Mesa Police Department, 53 North Macdonald, Mesa

Carnation Dairy, 4140 North Central, Phoenix

Borden Co. Dairy, 224 South Third Avenue, Phoenix

Santa Fe Railroad, Downtown Phoenix Station to Glendale Station

Mesa Fire Department, 64 North Center Street, Mesa

Tempe Post Office, Mill Avenue and 5th Street, Tempe

Holsum Bakery, 408 South 23rd Avenue, Phoenix

Bird Banding Station, 202 E. 7th Street, Tempe

Phoenix Tropical & Goldfish Co., 3148 North 37th Street, Phoenix

Phoenix Zoo, 60th Street and East Van Buren, Phoenix

Children's Zoo, 6232 N. 7th Street, Phoenix

Swift Ice Cream Company, 2702 W. Camelback, Phoenix

Greyhound Bus Station, 383 N. First Street, Phoenix

Ancient Indian Canals, Maps can be obtained from Salt River

Mesa Public Library, 59 East 1st Street, Mesa

Valley National Bank, 66 West Main Street, Mesa

Williams Air Base, Williams Field Road, Chandler

Rock Park, 5050 East Van Buren, Phoenix

Salt River Project, 313 North 3rd Avenue, Phoenix

Mesa Citrus Growers Association, 254 West Broadway, Mesa

Kindness Hospital, 2518 North 16th Street, Phoenix

Rosaritas Mexican Food, 310 South Extension Road, Mesa

ASU Experimental Farm, McClintock and Elliot Road, Tempe

U of A Experimental Farm, Mesa-Tempe Highway

City of Mesa, 55 North Center, Mesa

Pueblo Grande Museum, 4619 East Washington, Phoenix

Daniel's Jewelry, 142 West Main Street, Mesa

Arizona State Fair, 1826 West McDowell

Valley Bank, Main Office-141 North Central, Phoenix

Western Indian War Museum, 132 West Indian School Road, Scottsdale

Heard Museum, 22 East Monte Vista Road, Phoenix

Wax Museum, 98 West Stetson, Scottsdale

Phoenix College Observatory, 18th Avenue & Thomas Road, Phoenix

Hayden Flour Mills, 119 Mill Avenue, Tempe

Phoenix Police Department, 2nd Avenue & Washington

Library, City of Phoenix, 12 East McDowell

Sky Harbor Tower

PICTURES:

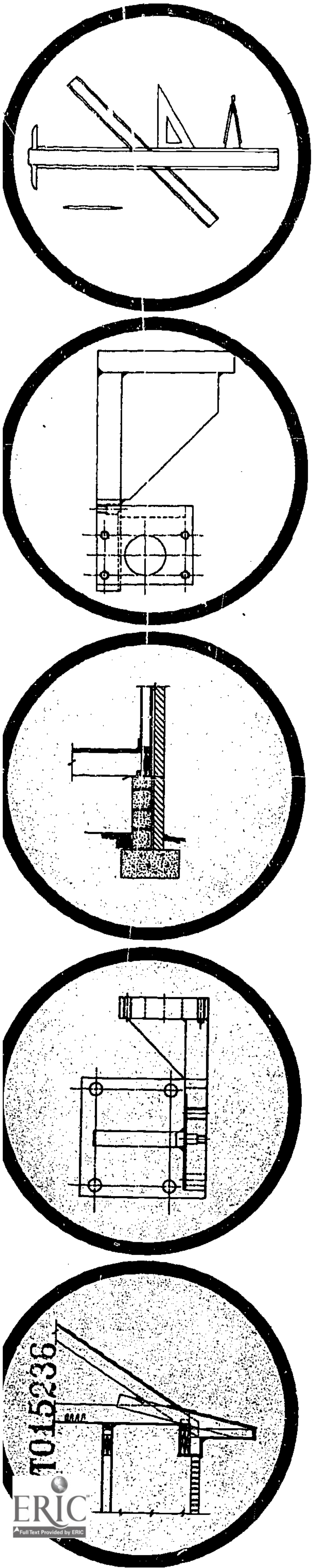
Home and Community Helpers, David Cook Publishing, Elgin, Illinois

VT 015 236
NEWBY, HOWARD L.
SECONDARY VOCATIONAL INDUSTRIAL DRAFTING. A TEACHER'S OUTLINE FOR USE IN ORGANIZATION AND MANAGEMENT OF INSTRUCTION.

MISSISSIPPI RESEARCH COORDINATING UNIT FOR VOCATIONAL-TECHNICAL EDUCATION, STATE COLLEGE.;MISSISSIPPI STATE DEPT. OF EDUCATION, JACKSON. DIV. OF VOCATIONAL AND TECHNICAL EDUCATION.
MF AVAILABLE IN VT-ERIC SET.
TRAD-INDUS-EDU-PUB-9000
CURRICULUM COORDINATING UNIT, P.O. DRAWER DX, STATE COLLEGE, MISSISSIPPI 39762 ($2.50)
PUB DATE - 71 98P. 1971 REVISION.

DESCRIPTORS - INSTRUCTIONAL MATERIALS; SECONDARY GRADES; *STATE CURRICULUM GUIDES; *CAREER EDUCATION; BIBLIOGRAPHIES; *TEACHING GUIDES; CURRICULUM GUIDES; *TRADE AND INDUSTRIAL EDUCATION; INSTRUCTIONAL AIDS; REFERENCE MATERIALS; *DRAFTING; TRAINING OBJECTIVES; PROGRAM CONTENT; COURSE CONTENT; COURSE OBJECTIVES; RESOURCE MATERIALS

ABSTRACT - DEVELOPED BY A CURRICULUM COMMITTEE OF DRAFTING INSTRUCTORS FOR USE IN MISSISSIPPI LOCAL VOCATIONAL HIGH SCHOOLS AND AREA VOCATIONAL HIGH SCHOOLS, THIS TEACHING GUIDE HAS BEEN AUTHENTICATED BY AN INDUSTRIAL COMMITTEE FOR USE IN THE STATE VOCATIONAL TRAINING PROGRAMS. THE COURSE OUTLINE FOR A 2-YEAR, 1080-HOUR PROGRAM IS PRESENTED SEPARATELY FOR EACH YEAR, IN A 2-COLUMN FORMAT OF TRADE PRINCIPLES AND TRADE PRACTICES AIMED AT PREPARING TRAINEES FOR ENTRY LEVEL JOBS IN THE FIRST YEAR OF CLASSES AND IN THE SECOND, FOR PROGRESS ON THE JOB. DIRECTIONS TO THE INSTRUCTOR FOR USING THE GUIDE, A SHORT JOB DESCRIPTION AND A COURSE DESCRIPTION EMPHASIZE THE GENERAL OBJECTIVES, THE PREREQUISITES, THE COURSE CONTENT, AND THE NATURE OF THE TRAINING. A 3-PAGE BIBLIOGRAPHY INCLUDES TWO TEXTBOOKS RECOMMENDED BY THE CURRICULUM COMMITTEE AND 14 SOURCES FOR VARIOUS OTHER SUGGESTED REFERENCES. A PREFACE PROVIDES A RATIONALE FOR THE COURSE CONTENT. AN APPENDIX INCLUDES A PROGRESS CHART, DRAFTING EXERCISES, A SUGGESTED LAYOUT FOR A DRAFTING CLASSROOM, A LIST OF SUPPLIES, AND SAMPLES OF JOB SHEETS, OPERATIONS AND INFORMATION SHEETS AND ASSIGNMENT SHEETS. (AG)



SECONDARY
VOCATIONAL
INDUSTRIAL DRAFTING

A Teacher's Outline
for Use in the
Organization and Management
of Instruction

SECONDARY VOCATIONAL INDUSTRIAL DRAFTING

A TEACHER'S OUTLINE FOR USE IN ORGANIZATION AND MANAGEMENT OF INSTRUCTION

Published by
Mississippi State University
CURRICULUM COORDINATING UNIT
FOR
VOCATIONAL AND TECHNICAL EDUCATION
State College, Mississippi

In Cooperation With
Division of Vocational and Technical Education
State Department of Education
Jackson, Mississippi

Trade and Industrial Education Publication Number 9000

1971

Revised 1971
by
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State College, Mississippi 39762

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ACKNOWLEDGMENTS

The Curriculum Committee for Vocational Industrial Drafting met on the campus of Mississippi State University on November 3 and 4, 1967. After reviewing a description of the draftsman, the committee members made a trade analysis by identifying the operations, or skills, and the knowledges. Then, jobs were suggested for training activities. Next, a listing was made of equipment, tools, and supplies necessary to carry out the training. As their last activity, the committee members framed several statements to further characterize the training, including a general objective, levels of abilities to be developed, and desired prerequisites.

The following men and their institutions are to be commended for contributing their efforts and time during the workshop:

Woodfin Breland, Instructor
Perkinston Junior College, Perkinston

James Downes, Instructor
Hancock North Central School, Pass Christian

Leal McMullen, Instructor
Higgins High School, McComb

Edwin L. Smith, Instructor
Copiah-Lincoln Junior College, Wesson

Charles A. Welch, Instructor
Amory High School, Amory

The staff of the Curriculum Coordinating Unit expresses appreciation to Mr. B.C. Messer of the State Department of

Education, Vocational and Technical Division, for his attendance and contributions during the authentication conference. Also in attendance at this conference were Mr. Edwin L. Smith, Copiah-Lincoln Junior College, and Mr. Rodney D. Walker, Meridian Junior College, who assisted in interpreting our program to industry.

Following the workshops, the staff of the Curriculum Coordinating Unit compiled, expanded, edited, and printed the materials. The staff added certain items such as the bibliography, sample progress charts, and instructional sheets.

The staff also wishes to extend its appreciation to Mr. W. I. Davis of West Point, Mississippi; the architectural details used on the cover of this publication were taken from his drawings.

AUTHENTICATION COMMITTEE

The material in this publication was reviewed and endorsed as being appropriate and adequate for the training of beginning industrial draftsmen. Members of the committee and their positions are as follows:

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Endorsement by this committee in no way obligates the individual organizations or associations represented.

The Staff of the Curriculum Coordinating Unit wishes to commend these men for their efforts in the review of this publication and the constructive manner in which suggested changes were offered.

We are further indebted to the businesses and associations represented for their interest in Mississippi education, as evidenced by their cooperation and participation.

PREFACE

In vocational education, instructional content is determined by identifying knowledges and skills essential to successful employment. This course of study was developed for teachers of vocational-level industrial drafting, an occupation having many areas of specialty.

The time allotted this course is too short for teaching all the areas of specialty. Consequently, an alternative was found by raising and answering the following questions:

1. Are there knowledges and skills common and essential to all specialty areas in drafting?
2. Can specialties be identified which offer opportunity for employment in all areas of the state?

Inquiries in two areas were made to answer these questions. The results of these inquiries were weighed, and a course of study was designed within the framework of the Type B Shop.

The first inquiry involved a careful review of printed material in the specialty areas. It revealed that there definitely are knowledges and skills common to all specialties. Furthermore, once skill in the use of drafting instruments in geometric construction is achieved and basic techniques are acquired (such as dimensioning, sectioning, and revolutions), specialization becomes primarily a matter of gaining new knowledges and applying already learned skills in a modified sequence.

For this reason, the course of study for the first year outlines the fundamental knowledges and skills, sheet metal drafting, and drafting media and reproduction. This is justified because the overwhelming majority of drafting opportunities require these basic competencies. Sheet metal drafting is included for practice in visualizing plane surfaces of solid geometric figures, and for application of the principles of geometric construction. Electrical drafting has been omitted entirely because adequate training requires more time than could be allotted to a single block.

HOW TO USE THIS PUBLICATION

1. Note major sections in the TABLE OF CONTENTS; read and study carefully the entire guide.
2. Begin a shop library, using the BIBLIOGRAPHY.
3. Adapt, (with the help of an advisory committee) course content to your local situation by sequencing, add, and/or delete suitable jobs and related information.
4. Make and post a progress chart (see APPENDIX for example).
5. Plan well-in-advance what to teach. Choose the job from the right hand column of the COURSE OF STUDY. Develop instruction sheets (see APPENDIX for samples). Do not attempt to teach directly from this course of study.
    - 5a. Select several references from the shop library.
    - 5b. Prepare a lesson plan from which to present the trade principles that apply to the trade practice (job), and/or demonstrate the performance of the job. These principles are found in the course content opposite the job.
    - 5c. Prepare an assignment sheet which covers the information, in the text or references, to be taught in the lesson presentation.
    - 5d. Prepare a job sheet which explains <u>what</u> is to be done.
    - 5e. Prepare operation sheets which explain <u>how</u> to do those steps in completing the job with which the student is not familiar.
    - 5f. Prepare information sheets if the student needs additional, clarifying information to complete the job.
6. Acquire or prepare visual aids called for an instruction sheets.
7. Make assignments with assignment sheets prior to presenting the lesson. After the lesson information has been presented and/or the demonstration completed, pass out the appropriate job sheet and the necessary operation and information sheets.

8. Assign jobs only after fully teaching principles necessary for safety and efficient completion of the job. Some students will not progress as rapidly as others and will need more attention and time.

9. Evaluate student's progress (as shown on the sample instruction sheets). Mark each student's progress, and give a new assignment.

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COURSE OF STUDY

DESCRIPTION OF THE VOCATIONAL INDUSTRIAL DRAFTSMAN

The draftsman prepares clear, complete, and accurate working plans and detail drawings from rough or detailed sketches or notes, according to specified dimensions.

The draftsman makes final sketches of proposed drawings. He checks dimensions of parts, materials to be used, the relationship of one part to another, the relationship of various parts to the whole structure; makes any adjustments or changes necessary or desired; and draws the finished design. He attaches tracing paper to the drawing and traces the original in ink.

The draftsman utilizes knowledge of various machines, manufacturing processes, engineering practices, building materials, and mathematics and science to complete drawings. He exercises skill in the manipulation of triangles, T square, and other drafting tools. He is also highly skilled in lettering, both freehand and with lettering instruments.

Additional information may be found in the Dictionary of Occupational Titles, third edition, under DRAFTSMAN, MECHANICAL (professional and kindred) 007.281, DRAFTSMAN, ENGINEERING (professional and kindred) 005.281, DRAFTSMAN, ARCHITECTURAL (professional and kindred) 0[illegible].281, DRAFTSMAN, TOPOGRAPHICAL (professional and kindred) 017.281, photocartographer, DRAFTSMAN, STRUCTURAL (professional and kindred) 005.281, and others.

The U.S. Office of Education has assigned this occupation number 1300.

COURSE DESCRIPTION

GENERAL OBJECTIVE

To assist the trainee in developing knowledge and skills for employment as a draftsman on an advanced learner's level.

ASSUMPTIONS

1. That those enrolling in training have had no previous experience in drafting
2. That trainees have a vocational commitment to drafting
3. That a guidance and screening process has determined that those enrolled possess aptitudes in the perception of spacial relationships and in the manipulation of drafting instruments

DESIRABLE PREREQUISITES

1. Command of arithmetic fundamentals
2. One year of algebra and one semester of plane geometry

NATURE OF TRAINING

1. The duration of training is normally three hours per day, five days per week, thirty-six weeks per year for two nine-month periods; or six hours per day, five days per week, thirty-six weeks per year for one nine-month period - a total of 1080 clock hours of training

2. Related instruction by lecture, demonstration, the use of audiovisuals, etc. immediately precedes application by the trainees in the drafting room; instruction and its application are correlated as closely as possible at all times; and the major allotment of time is given to the development of manipulative skills in the representation of drafting details.

3. No instruction directly related to the trade is offered outside the drafting room.

LEVELS OF KNOWLEDGE

1. A thorough knowledge of the types of drafting equipment and reproduction media used in industry

2. Command of the fundamentals of geometric construction

3. Command of the fundamentals of such areas as orthographic

projection, pictorial drawing, multiview drawing, sectioning, dimensioning, and working drawings

4. A general knowledge of the conventional types of lettering
5. A high degree of visualization
6. Knowledge appropriate to the entry-level draftsman in the selected area of specialty, i.e., architectural, or machine

LEVELS OF SKILLS

1. Full use of drafting instruments
2. Ability to produce quality line work
3. Ability to adapt drafting fundamentals in areas of specialty
4. High ability to letter vertical and inclined Gothic, upper and lower case
5. Basic skills in using certain modern reproduction machines

INSTRUCTIONAL BLOCKS

Each of the following instructional blocks carries a contact hour allotment. These allotments indicate relative emphasis and are not to be strictly adhered to.

		Contact Hours
I.	Fundamentals of Drafting	370
II.	Machine Drafting	170
III.	Advanced Machine Drafting*	190
IV.	Architectural Drafting*	350

*During the 540 hours allotted the second year, the learner is faced with two alternatives-either to gain an understanding of the two areas starred above, or to elect a specialty and develop a significant level of proficiency.

FIRST YEAR

I. FUNDAMENTALS OF DRAFTING
(*Contact hours 270*)

Trade principles	*Trade practices*
A. Introduction to drafting	
1. Background statements	
a. Drafting: the language of industry	
b. Historical sketch of drafting	
2. Specialized areas in drafting	Examine samples representative of each of the specialized areas in drafting.
a. Mechanical or machine	
b. Architectural	
c. Topographic	
d. Sheet metal	
e. Structural	
f. Others	
3. Instrument drafting contrasted with freehand drawing	Contrast examples of drafting with art emphasizing the various points.
a. Line work	
b. Shading	
c. Color	
d. Media or materials	
e. Other	
4. Equipment and supplies	Examine drafting equipment, including drafting machines, instruments, triangles, irregular curves, scales, templates, pencils, pens, ink, paper types, cleaning equipment, and etc.
a. Standard drafting instruments	
(1) Tracings	

- (a) Selection of tracing paper and method
- (b) Selection of pencils
- (c) Pencil tracings
- (d) Ink tracings
  - (i) Use of ruling pen
  - (ii) Other instruments
  - (iii) Correct line intensity
- (e) Erasing

(2) Blueprint

- (a) History
- (b) Principle
- (c) Types

(3) Daizo

- (a) Daizo-moist
- (b) Daizo-dry

(4) Xerox

(5) Photographic: microfilm, positive

(6) Computer graphics

b. Drafting media

(1) Characteristics desired

- (a) Translucency
- (b) Surface quality and tooth
- (c) Paper strength

(2) Drawing paper

(3) Vellum

(a) Description

(b) Comparison to other tracing materials

(c) Preconditioning

(4) Film

(a) Description

(b) Coatings

(c) Comparable use

(d) Preconditioning

(5) Tracing-cloth

(a) Description

(b) Preparation

(c) Advantages and disadvantages

(6) Glass cloth

c. Short cuts and new techniques used in drawing reproduction

(1) Use of "zip-strips" and decals

(a) Preparation

(b) Application procedures

(2) Use of "paste-ups"

(a) Preparation

(b) Application procedures

            (3) Scribing (as in map making)
                (a) Scribe coating
                (b) Gravers
                (c) Base sheets
                (d) Advantages and disadvantages

    5. Alphabet of lines
        a. Widths of lines
        b. Meaning of lines
            (1) Visible or object lines
            (2) Invisible or hidden lines
            (3) Center lines
        c. Proper method of drawing

Develop line technique, including coding and width.

    6. Sheet layout
        a. Typical sheet sizes
        b. Borders and title blocks
        c. Arrangement of lettering

Lay out various borders and title blocks. Calculate placement of these for various paper sizes.

B. Lettering
    1. Styles
        a. Goth
        b. Roman
        c. Other
    2. Types

Develop a border system, title and record strip, and guide lines. These layouts are to be used in the exercises to be assigned in lettering practice.

Typical counter circuits are simple combinations of diodes, resistors, and capacitors. They are classified as positive and negative, depending on the polarity of the pulse they are designed to accept. In frequency dividers, the counting diodes develop output voltages by the process called step-by-step counting.

A detailed description of counting circuits is contained in Basic Electronics.

CHAPTER 10

DIGITAL COMPUTERS

Automatic digital computers are becoming a common part of operational weapons systems. With many new ships, aircraft, and trainers, technicians are faced with a collection of electronic equipment which will have a digital computer as an integral part of the system. To understand anything about the operation of these sophisticated systems, it is necessary to have some degree of acquaintance with digital computers and their terminology. Basic Electronics, NavPers 10087-B, and Digital Computer Basics, NavPers 10088, contain material on digital computers.

Digital computers are presently being used in many complex training devices. The AN/USQ-20 digital computer system is the heart of the avionics system simulator of the 2F67 (A-6A) Weapon System Trainer. The digital System performs the necessary functions for the tactics portion of the weapon system trainer. Digital computers are also used to store the complex data needed for the operation of the FBM trainer.

BASIC PRINCIPLES

The unfortunate connotation usually ascribed to the word "computer" sometimes raises the image of a complicated thought process being accomplished by some sort of giant "brain." Contrary to popular belief, computers cannot think. In general, they can only add, subtract, multiply, and divide. Their value is in the speed at which they operate. For example, one digital computer, which has been used in a military operation, can multiply six-digit numbers at speeds of 60,000 multiplications per second.

In contrast to analog computers, digital computers use discrete values to represent the digits 1 and 0, and the computations are performed by simple electronic switches and circuits. A fundamental difference between the two types is that the analog computer is continuously presenting a solution to the problem, while the digital computer performs each computation separately. In other words, when one of the factors in a problem changes, the solution presented by the analog computer changes continuously as the inputs change. In a digital computer, the entire computation must be performed again after each increment of change in the input.

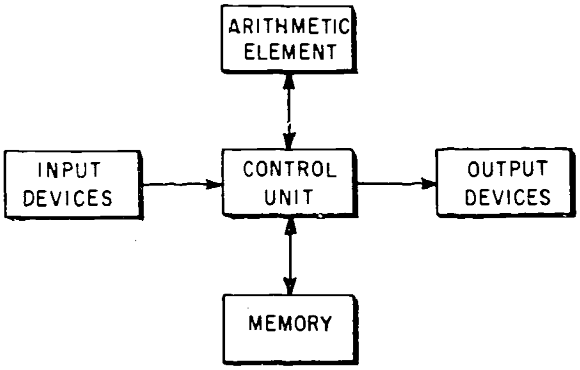
An automatic digital computer does more than a desk calculator in that the computer can perform long sequences of operations without a human operator. The computer can even make decisions which may affect its future operations. However, no problem can be solved without someone first specifying every detail of the operation. The sequence of instructions which prescribes the problem solution is called the program.

Most of the computers used in naval equipments are part of control systems where time is a factor in the problem. The computer receives information from radar and other sources, and makes decisions, which are presented at the output to control some specific operation, such as an airborne interception.

An automatic digital computer generally consists of five major units: input, control, memory, arithmetic, and output. A simple block diagram appears in figure 10-1.

INPUT UNIT

For a computer to perform a specified series of operations, it must be fed both the instructions and the data to be used in the computations. Many different devices are used to properly present the information to the computer—for example, modified electric typewriters, punched card and punched tape readers,



TD. 554

Figure 10-1.—Digital computer elements block diagram

magnetic tape readers, and manual input components such as pushbuttons or toggle switches. In most applications, the most common input device is the analog-to-digital converter which changes the proportional voltage and current analogs into the digital form required by the numbering system used in digital computers.

CONTROL AND ARITHMETIC UNITS

The control unit in a digital computer interprets the instructions of the program and controls the actions of all other sections of the computer. It prescribes the exact sequence of events for all operations.

All of the mathematical operations are performed in the arithmetic unit of the computer. Addition, subtraction, multiplication, and division are performed when specified in the program, under the direction of the control unit. Results of these operations can then be put in the memory for future use.

MEMORY UNIT

The memory or storage section of the computer is used to store the information which is used during the computational process. It stores both the program instructions and the data used in the computation. The memory can be used to hold both intermediate and final results as the computer goes through the program. Common memory devices include: magnetic cores, magnetic drums, magnetic tapes, ultrasonic delay lines, and flip-flops.

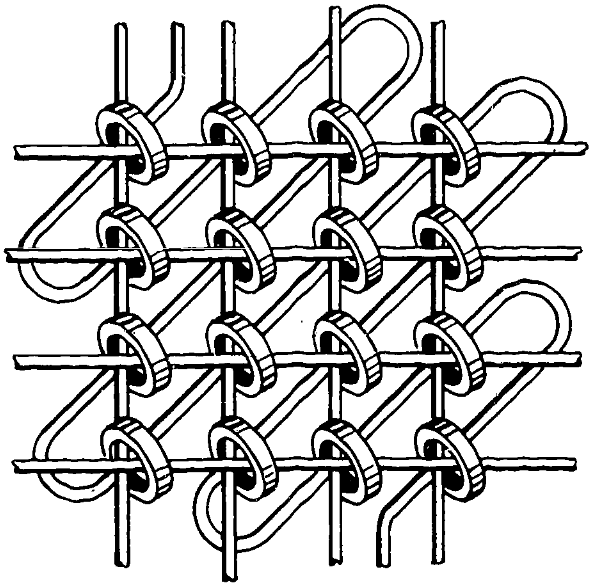
Figure 10-2 shows a magnetic core memory. Each core can be magnetically saturated to either the 1 or the 0 polarity. Therefore, each core can hold just one bit of data at a given time.

Regardless of the type of memory employed, it is divided into a number of locations, each of which is identified by an address. When the control unit calls for an instruction from the program or a piece of information which is stored in the memory, it acquires the information by using the proper address to establish the path to the appropriate memory element and the data stored there. The normal construction of storage devices makes any address accessible. However, the length of time required to obtain the information is determined by the type of storage device.

The information stored at each address is referred to as a "word." Each word is represented by a number of pulses or signal voltage levels. The storage can be accomplished on tape, magnetic devices, or special circuits. A word can represent either a numerical quantity or a computer instruction, but only one word can be stored in any given address.

OUTPUT UNIT

After the computer has performed the computations, there must be some method of communicating the results to the operator. The



TD. 555

Figure 10-2.—Magnetic core memory cell.

devices used to "readout" the results are similar to those used in the input: punched cards or tape, magnetic tape, and so forth. Specialized output units include audio or video displays and digital to analog converters.

Several special facilities are included in digital computers. When an operation is to be performed in an arithmetic unit, only one word at a time can be transferred from the memory unit. To perform an operation with two words, the first word must be stored momentarily while the second word is being transferred. For this function, the arithmetic unit has a special memory cell called an accumulator.

The accumulator is one of a class of memory devices called registers. A register is simply a means of storing temporarily a certain amount of information. The methods of storage may be the same as those used in the memory, but the register can only store one word at a time. Other registers are used in the computer, such as the instruction register associated with the control unit which allows reference to the instruction being interpreted during the time control signals are being set up.

SEQUENCE OF OPERATIONS

Before a computer can do any problem solving, the steps for the solution must be written down in the form of a program and then translated into machine language (coded). The coded instructions in digital form are placed in the correct locations in the memory and the computer is ready to operate.

Assume that the computer starts in compliance with the program, with the control unit reading the instruction stored in the first storage location, address 01. The digits at this address might tell the computer to "take the number in storage location 12 and put it in the arithmetic unit." After following the instruction, the control unit cycles to the next step, address 02. The instruction at this address might be, "take the number at storage location 22, divide it by the number in the arithmetic unit, and leave the answer in the arithmetic unit." The next instruction, at address 03, might be to "take the number in the arithmetic unit (the result of the above division) and put it in storage location 36."

The final instruction in the sequence of operations would provide for the readout of the result.

NUMBER SYSTEMS

The familiar decimal number system is not suitable for high speed electronic computations. No electronic device has been developed which can reliably and economically represent all of the 10 digits. However, there are many devices which can be used to represent two states of nature: switches, relays, transistors, or tubes. Each of these can be operated in such a manner as to be clearly classified as "off" or "on." In other words, they are bistable devices. The numbering system which represents only two states is called the binary system.

Numbers written in the binary system use only the symbols 0 and 1, called bits, just as the ten symbols in the decimal system are called digits. The number of symbols used in any system is called the base or radix of the system. Thus, the decimal system has a radix of ten, and the radix of a binary system is two. Many different bases are used, such as 12 in the duodecimal system for counting by the dozen and relating inches to feet. The base is used in any number system to determine positional value of each digit. For example, in the decimal system, (where the base is ten) 6,346 actually means $(6 \times 10^3) + (3 \times 10^2) + (4 \times 10^1) + (6 \times 10^0)$. (Remember that any number raised to the 0 power is equal to 1.) Similarly, in the binary system, (where the base is two) 1011 actually means $(1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0)$, or 11 in the decimal system. The binary equivalents of the first 10 decimal numbers are:

Decimal		Binary
1	=	1
2	=	10
3	=	11
4	=	100
5	=	101
6	=	110
7	=	111
8	=	1000
9	=	1001
10	=	1010

The arithmetic manipulation of this system is discussed in Basic Electronics.

Words are memorized by the computer as binary numbers. A word is composed of a series (or train) of 1 and 0 signal voltage levels, or pulses. The number of bits (1 or 0 symbols) in the word is called the length of the word. The speed of a computer is denoted by the rate at which the pulses pass a given point, or equivalently by the pulse repetition frequency. The circuits which manipulate the pulse trains are called gates, logic circuits, or digital switching circuits.

All the pulses in a computer are normally synchronized with respect to each other by means of a clock pulse, which is driven by an oscillator whose frequency is an integral multiple of the speed of the computer.

Figure 10-3 shows a typical word and the waveform of its associated pulse train. In this case, the length of the word is seven bits. The corresponding clock pulse train is also shown. In this figure, a pulse represents a 1, and the lack of a pulse represents a 0 symbol.

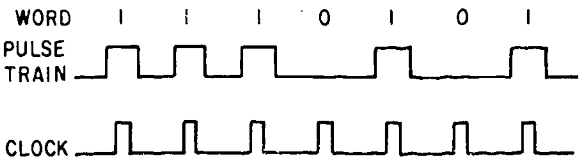
SYMBOLIC LOGIC

The operations performed by a digital computer are based on a logical reasoning process. Since the rules for the equations and manipulations employed by the computer differ from the ordinary rules of arithmetic, understanding this subject requires some discussion of the basic concepts involved.

Probably you will recall, from your review of Basic Electronics, NavPers 10087-B that the symbolic operations utilized in digital computers are based on the investigations of George Boole, and the resulting algebraic system is called Boolean algebra. It is similar to the algebra with which we are all familiar, but it follows different rules.

To understand Boolean notation, the technician must ignore some of the things he has learned about the arithmetic use of the dot and plus connectives, as their use in logical operations is different from the arithmetic usage.

The equations which characterize Boolean algebra are given in table 10-1. Notice that some of the rules are quite different from those of ordinary algebra.



TD. 556

Figure 10-3.—Waveform of seven-bit word and its clock pulses.

The three basic functions needed for representation of expressions such as those in table 10-1 are the AND function, the OR function, and the NOT function. The meanings of these are discussed in Basic Electronics.

Electronic circuits which are used in mechanizing the AND, OR, and NOT functions are described in the following paragraphs. Closely related to these are the INHIBITOR circuit and the EXCLUSIVE OR circuit, which are also discussed.

LOGIC CIRCUITS

Logic circuits are the hundreds of high speed electronic switching circuits of a digital computer that store information signals and perform logical operations on the information signals. In the first case, the pulse trains representing information are stored temporarily in circuits such as registers, which can be made up of multivibrators. In the second function, circuits such as the basic NOT, OR, and AND types perform logical operations. These circuits sense the input conditions and produce an output only if certain input conditions exist. This is one of the reasons for their names. They can also be generally classed as gate circuits.

A digital computer generally contains a great many of these logic circuits, but the types of circuits contained are limited to the smallest number that can perform the required functions. This improves maintainability. The circuits may use vacuum tubes, transistors, diodes, tunnel diodes, silicon rectifiers, or other elements such as magnetic cores. No attempt is made to cover all variations of all types of logic circuits. Coverage is limited to a representative few of each type in order to present an idea of their nature and use. Also emphasis is on circuits using semiconductors rather than vacuum tubes.

NOT FUNCTION

The NOT circuit, also known as an inverter circuit, is probably the simplest of all. It is nothing more than a normal gate amplifier stage that produces an inversion (negation) of the input signal and has unity gain. Figure 10-4 is such a vacuum tube circuit.

Table 10-1.—Equations of Boolean Algebra.

1. $A + A = A$

2. $A \cdot A = A$

3. $A + B = B + A$

4. $A \cdot B = B \cdot A$

5. $(A + B) + C = A + (B + C) = A + B + C$

6. $(A \cdot B) \cdot C = A \cdot (B \cdot C) = A \cdot B \cdot C$

7. $A \cdot (B + C) = A \cdot B + A \cdot C$

8. $A + A \cdot B = A$

9. $A + B \cdot C = (A + B) \cdot (A + C)$

$$\left.\begin{array}{l} 10.\ \overline{A \cdot B} = \overline{A} + \overline{B} \\ 11.\ \overline{A + B} = \overline{A} \cdot \overline{B} \end{array}\right\} \text{DeMorgan's Theorems}$$

12. $A + 1 = 1$

13. $A \cdot 1 = A$

14. $0 + A = A$

15. $0 \cdot A = 0$

16. $A + \overline{A} = 1$

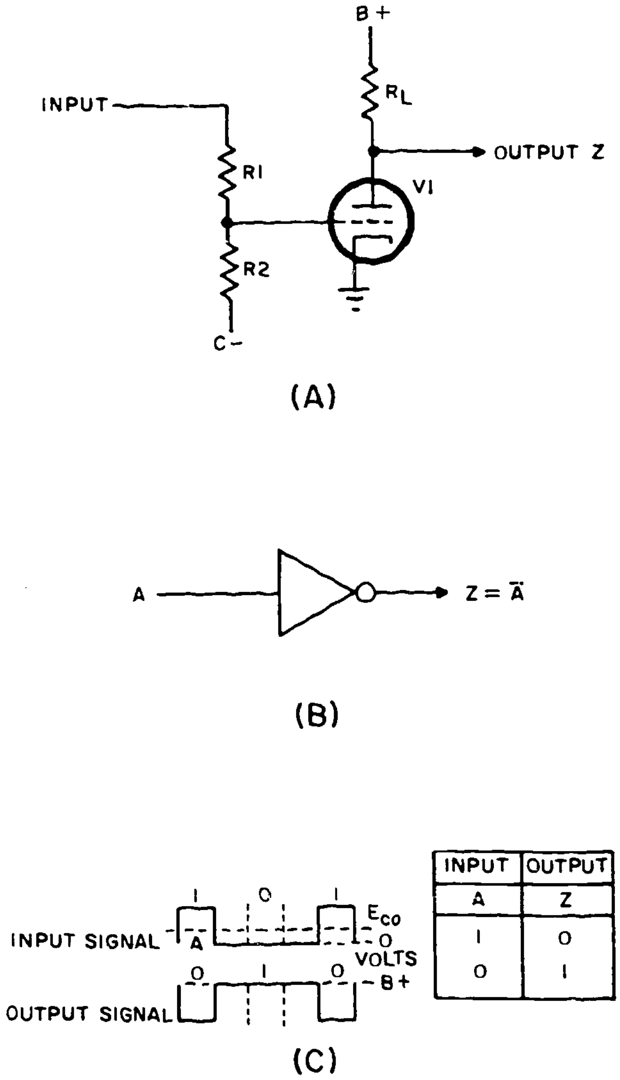
17. $A \cdot \overline{A} = 0$

18. $A + \overline{A} \cdot B = A + B$

19. $A \cdot B + B \cdot C + C \cdot A = (A + B) \cdot (B + C) \cdot (C + A)$

20. $A \cdot \overline{B} + A \cdot C + B \cdot C = A \cdot \overline{B} + B \cdot C$

21. $\overline{\overline{A}} = A$



INPUT	OUTPUT
A	Z
1	0
0	1

TD.557
Figure 10-4.—(A) NOT circuit; (B) block diagram symbol; (C) waveforms and related truth table.

The triode V1 is biased beyond cutoff, and the positive input signal shown is applied. (The stage would be biased for heavy conduction if a negative signal were applied to the input.) The voltage divider (R1 and R2) in the grid circuit is for the purpose of limiting the circuit gain to unity. Note that the input-output table (truth table) shows that the circuit produces an output which is the opposite of the input. This is the negation function. The Boolean algebra expression is

$$Z = \bar{A}$$

which is read

"Z equal A-NOT."

Transistor Circuit

Figure 10-5 is a NOT circuit employing a PNP transistor in a common emitter configuration. When no signal is applied, Q1 is biased to cutoff by the voltage divider, consisting of R2 and R3, which makes the base positive with respect to the emitter. The input signal is divided by R1 and R2, making the circuit gain equal to unity. Note that the input signal must be negative to cause conduction and that the output developed across Q1 is the opposite of the input. The block diagram symbol, Boolean algebra expression, and truth table of figure 10-4 would also apply to figure 10-5.

Note that any device or circuit that inverts a signal between the input and output with unity gain meets the definition of a NOT circuit. One commonly used NOT circuit device is the transformer.

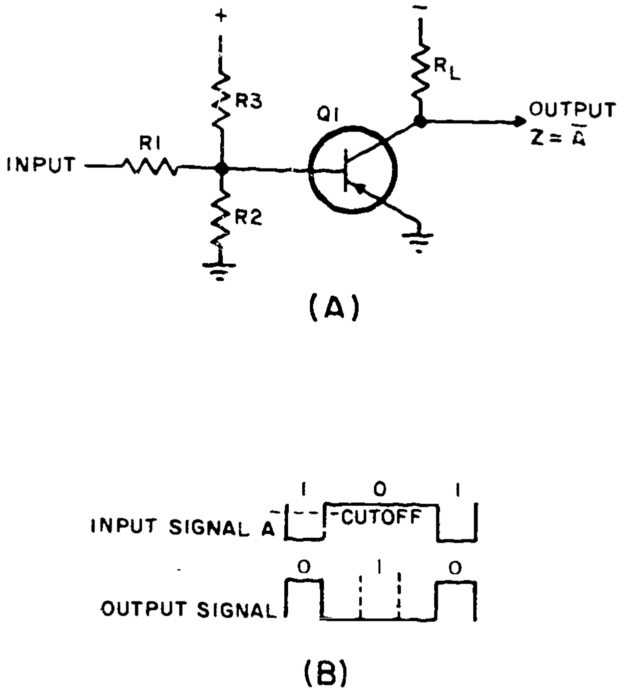
OR FUNCTION

An OR circuit is a logic circuit that has two or more inputs and produces an output if any or all inputs are applied. It is very similar to an audio mixer stage, since several inputs can be applied from different sources without interaction upon the sources; and any input signal produces an output signal.

Vacuum Tube Circuit

Figure 10-6 shows a vacuum tube OR circuit with four inputs, the block diagram symbol, and the truth table. In the truth table, a signal is represented by a 1, and the lack of a signal is represented by a 0.

Each input signal is applied to the grid through a resistance voltage divider to reduce the interaction between sources when more than one input is applied. Since the stage is a cathode-follower, the output is taken from the cathode without signal inversion. Positive or negative signal pulses (either of which could be designated to represent a 1 at the same time the other represents a 0) can be applied, with all input sources supplying like polarity signals for 1's or 0's.



TD. 558

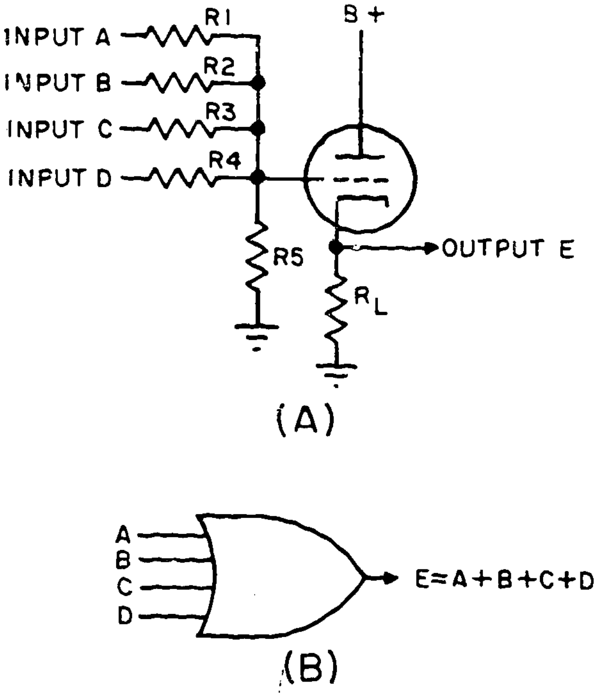
Figure 10-5.—(A) Transistor NOT circuit; (B) waveforms showing inversion between input and output.

It is assumed that each 1 pulse is of sufficient amplitude to cause heavy conduction if the signal is positive or to cause cutoff of the tube in case the 1's are represented by negative signals. Therefore, if two 1-signals are applied simultaneously, an output signal of standard amplitude is still obtained.

Diode Circuit

The simplest of all OR circuits is probably a diode circuit such as figure 10-7. Again, four inputs are shown; and it is assumed that the signals are positive with respect to ground. In that case, each diode will conduct heavily through R_L and the source circuit (not shown) when a positive pulse greater than about 3 volts occurs.

The output is taken from across R_L and is not inverted. The block diagram symbol and truth table of figure 10-6 are applicable to this circuit. The circuit, by reversing the diodes and the polarity of the 3-volt source, will function for bit pulses that are negative with respect to ground.

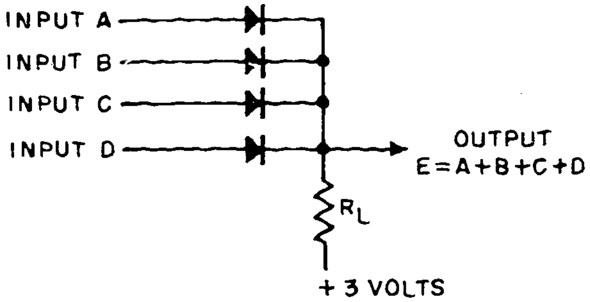


INPUTS				OUTPUT
A	B	C	D	E
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

(C)

TD. 559

Figure 10-6.—(A) Vacuum tube OR circuit; (B) block diagram symbol; (C) truth table.



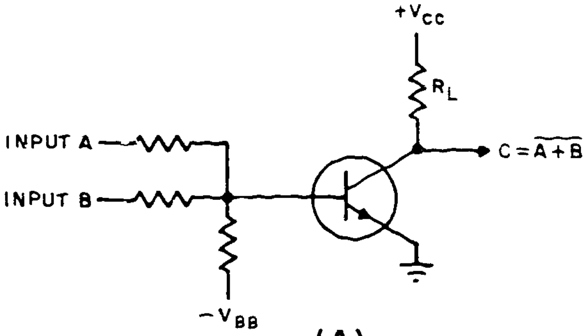
TD.560

Figure 10-7.—Diode OR circuit.

Transistor Circuit

Figure 10-8 shows a transistor type OR circuit that also includes the negation function of a NOT circuit. A circuit that performs both logic functions is sometimes called a NOR circuit.

With no input signal applied, the NPN transistor (fig. 10-8) is biased to cutoff by the negative bias applied between base and emitter. A positive input pulse causes saturation conduction of the transistor, producing a negative output pulse at the collector. The truthtable shows the NOT and OR functions tabulated for various input conditions that may exist. Similar circuits could be arranged for negative input signals by biasing an NPN transistor to saturation conduction or by biasing a PNP transistor to cutoff.



(A)

INPUTS		OUTPUT
A	B	C
1	0	0
1	1	0
0	1	0
0	0	1

(B)

TD.561

Figure 10-8.—(A) Transistor OR circuit; (B) truth table.

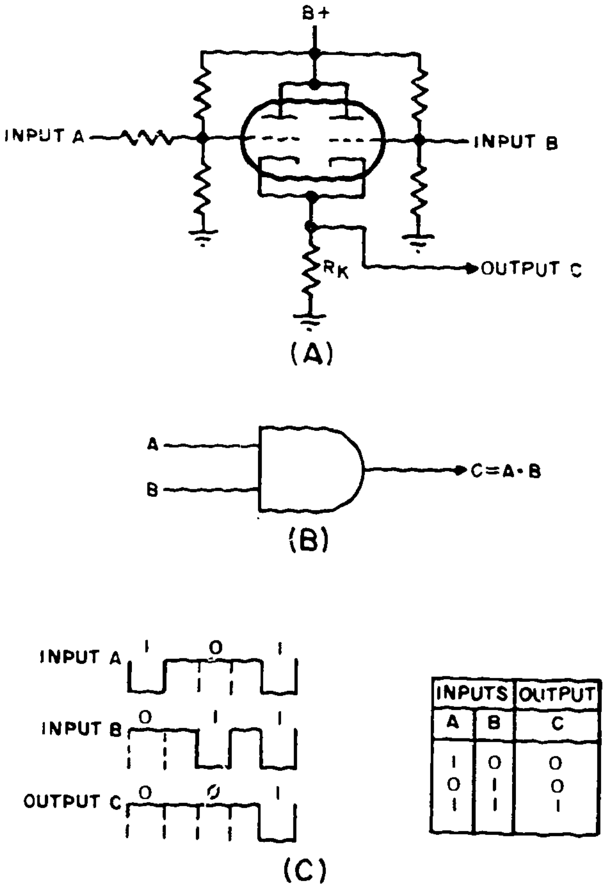
AND FUNCTION

An AND circuit is very similar to the familiar coincidence circuit which has been used in other electronic equipment for many years. All input signals must be alike (representing either all 1's or all 0's) and occur at the same time to produce a useful output. Therefore, AND circuits find wide use in interpreting control instructions and performing logical operations upon signals in the arithmetic portion of the digital computer. Several circuit configurations are possible, using various circuit elements.

Vacuum Tube Circuit

Figure 10-9 is a vacuum tube AND circuit that uses a dual-triode. Assume that each negative-going portion of the input and output signals represents a binary 1 and that both sections of the tube conduct heavily during the binary 0's of the input signals. During the first binary 1 signal of input A, the conduction of the left-hand section is reduced. However, the right-hand section is still conducting heavily; and there is no noticeable output signal produced across R_K. During the first binary 1 signal of input B, a similar result is obtained because the left-hand section will be conducting heavily. But when inputs A and B both represent binary 1 signals, both sections of the tube are driven to cutoff; and a binary 1 is produced across R_K. The truth table summarizes the conditions for the three combinations of input signals. Note that this circuit functions as an AND circuit for negative signals only. It will not function as an AND circuit for positive signals, no matter what static bias conditions exist.

There are at least two other commonly used AND circuits that employ vacuum tubes. The circuit of figure 10-9 could be arranged to perform the dual functions of AND and NOT if the load resistor were placed in the plate circuit. A pentode tube having two grids that control the tube's conduction can function either as an AND circuit or as a combination AND and NOT



INPUTS		OUTPUT
A	B	C
1	0	0
0	1	0
1	1	1

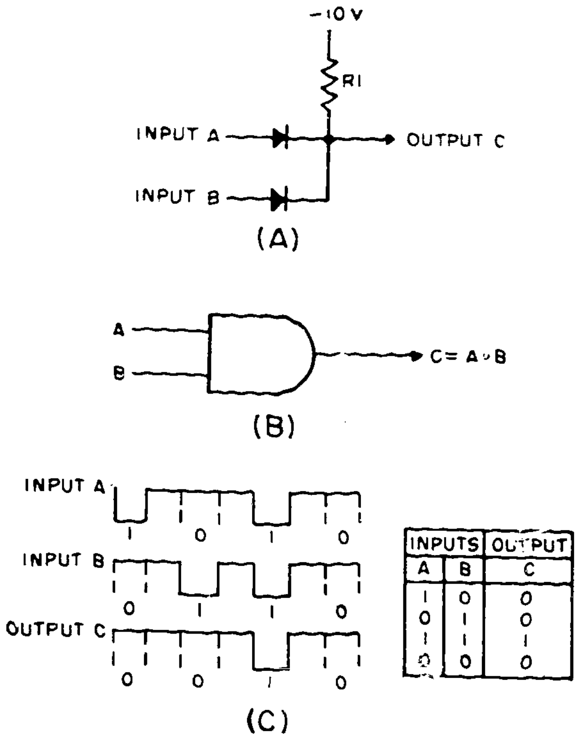
TD.562

Figure 10-9.—(A) Vacuum tube AND circuit; (B) block diagram symbol; (C) waveforms and related truth table.

circuit, depending on whether the output is taken from the cathode or plate circuit. Such a combination is sometimes called a NAND circuit.

Diode Circuit

The circuit of figure 10-10 uses two diodes to perform the AND function. Under static signal conditions, or with binary 0 input for both A and B, the diodes are conducting heavily through R1 and the resistances of the input circuits (not shown). The output level is therefore near zero volts. R1 is much larger than the input circuit resistance of the conduction path, and nearly all of the -10 volts is dropped across R1 because the diodes have very little forward resistance.



INPUTS		OUTPUT
A	B	C
1	0	0
0	1	0
1	1	1
0	0	0

TD.563

Figure 10-10.—(A) Diode AND circuit for negative signals; (B) block diagram symbol; (C) waveforms and related truth table.

When input A is a 1 and input B is a 0, the diode of input A is cut off. However, there is no output, because the diode in input B is conducting and essentially short circuits diode A.

When inputs A and B both represent 1's, both diodes are cut off. The output terminals then goes negative about 10 volts. This is the third set of conditions shown in the truth table; with the signals and conditions shown, none of the other signal conditions will produce a useful output from the circuit.

By reversing the diodes and the -10 volts, an AND circuit can be produced that will handle and produce signals of exactly the opposite polarity. Also, in either case, the circuit is not limited to two input signals; three, four or five inputs are common in almost all logic circuits except the simple NOT circuits.

Transistor Circuits

Four transistor AND circuits, the first three of which include the NOT function, are shown in figure 10-11. These are not the only circuits possible; however, they are illustrative of the wide range of AND circuit configurations possible.

The AND circuit in figure 10-11 (A) uses two PNP transistors that are initially biased for saturation conduction by the negative-base to emitter voltage. If both bases are driven to cutoff at the same time by positive signals, both transistors stop conducting; the collector output signal thus goes in a negative direction, producing the AND NOT (NAND) function. Remember, this means an output pulse (negative, in this case) is produced only if both A AND B are NOT negative.

The two NPN transistors of figure 10-11 (B) are also statically biased for saturation conduction by the positive-base to emitter voltage. When two negative input signals are applied simultaneously, both transistors are driven to cutoff; the collector output thus increases in a positive direction. If only one base is driven negative at a particular time, the other transistor continues to conduct; this keeps the output terminal at practically ground potential. The circuit thus performs as an AND NOT circuit.

The circuit of figure 10-11 (C) is somewhat different. Statically, each transistor is cut off. During operation, all three must conduct together. If any transistor remains cut off, the others cannot conduct because the emitter-collector conduction paths of the three are in series. If all three transistors are driven into conduction by negative signals applied to the bases, there is conduction; and the collector voltage at the output terminal will increase in a positive direction. The circuit thus performs as an AND NOT circuit.

Four PNP transistors are connected together at the collectors and emitters (fig. 10-11 (D)) to form an emitter-follower type circuit. However, there are four separate input terminals for the base signals. Initially, all four transistors are in saturation conduction and nearly all of the collector voltage is dropped across R_L. Again, all transistors must be cut off together to reduce the voltage drop across R_L. The application of four positive input signals to the bases will cut off each transistor, and the output terminal voltage will go in a positive direction. Note the lack of the NOT logic function; that is, the circuit does not perform as an AND NOT circuit.

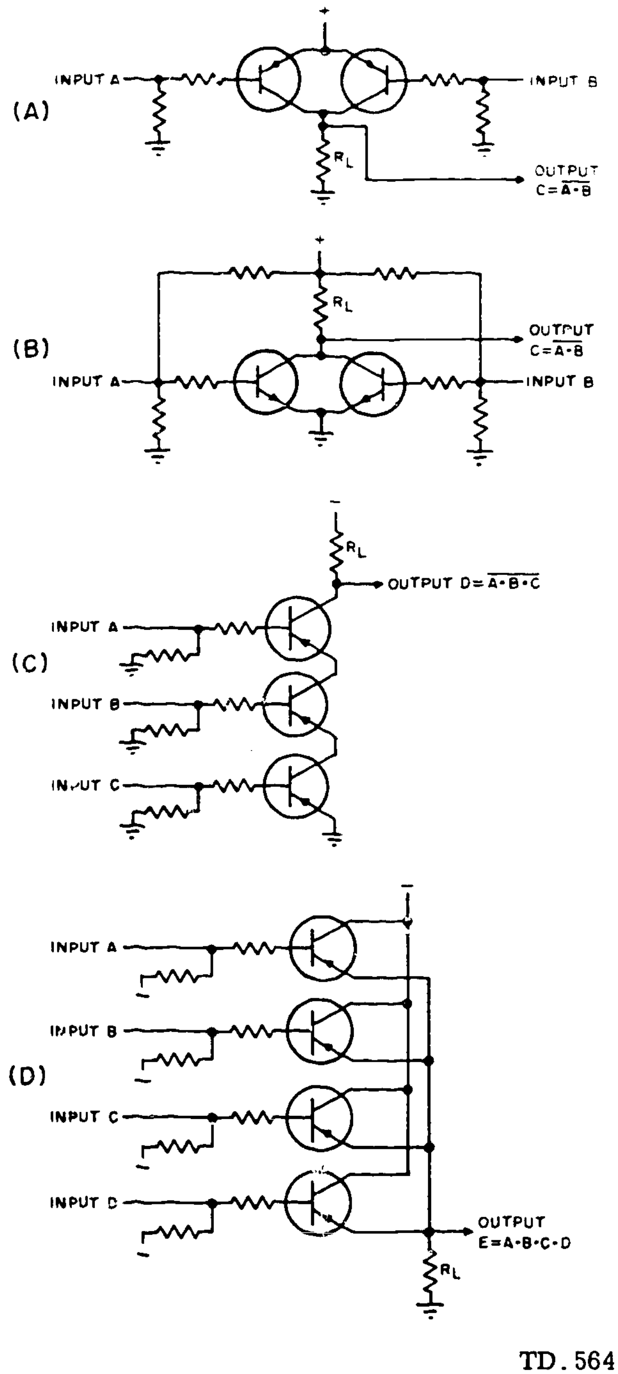


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Figure 10-11.—Examples of transistor AND circuits.

INHIBITOR CIRCUITS

The combination of an AND and a NOT circuit in which the NOT circuit is inserted between one input terminal and the AND circuit is called an INHIBITOR circuit. Figure 10-12 (A) shows the functional arrangement of the combination. Figure 10-12 (B) shows a more commonly used block diagram symbol, where the inhibit signal input to the block is through a half circle. The NOT and AND circuits can take the forms of any circuits described previously; the only requirement for the NOT circuit is that it inverts its input signal.

The circuit in figure 10-12 (B) produces an output under the following conditions only: One or more regular input signals are applied, but no input signal is applied to the inhibit terminal.

EXCLUSIVE OR CIRCUIT

An EXCLUSIVE OR circuit is a combination of circuits which has two input signal terminals but produces no output when two signals of like polarity are applied simultaneously. However, if only one input signal is applied, an output is produced.

Two combinations of circuits that can be used to form the EXCLUSIVE OR circuit are shown in figure 10-13. For the circuit of figure 10-13 (A), input signal A will pass through the OR and INHIBITOR circuits to the output if no signal from the AND circuit reaches the inhibitor terminal. But if a signal is applied to input B, which operates the AND circuit, a signal reaches the inhibit terminal and prevents any output. In figure 10-13 (B), two simultaneous input signals will prevent an output from both of the INHIBITOR circuits, and the OR circuit will thus produce no output.

Signals A and B are signals that occur simultaneously and are alike for the conditions of no output. Because of this characteristic, the circuits can be used to compare two pulse trains and to produce an alarm signal output when the two trains are not always identical. In this manner, two corresponding circuit points of two identical computers can be constantly examined for errors.

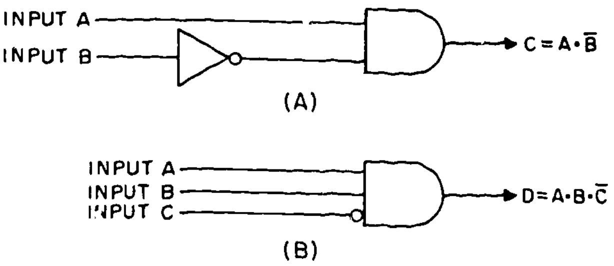

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Figure 10-12.—INHIBITOR circuits. (A) Two inputs; (B) three inputs.

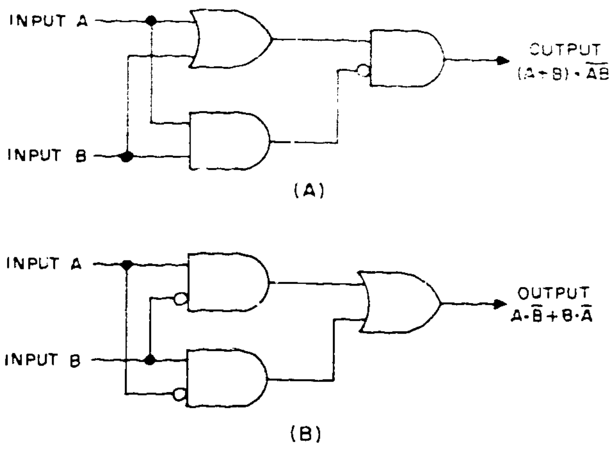

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Figure 10-13.—Two forms of EXCLUSIVE OR circuits.

PULSE RESHAPING CIRCUITS

Although reshaping circuits do not, strictly speaking, perform a logic function, they use circuits that are classed as logic circuits. Their function is the reshaping of pulse trains that may have deteriorated in shape and amplitude beyond further usability. As pulse trains pass through various circuits of a computer, the rise and fall times of the pulses usually increase; the amplitude may decrease; and the pulses are delayed in time.

The clock pulses, which are usually available at several points in the computer, are used with a reshaping circuit to restore the shapes of numerical or instructional information pulses within the computer.

If the information pulses to be reshaped occur at the same time as an available clock pulse, a simple AND circuit can be used to reshape the pulse. Figure 10-14 (A) shows clock pulses and deteriorated pulses applied simultaneously to terminals A and B, respectively, of an AND circuit. In a properly designed circuit, the output is produced only during the time interval t_1 to t_2. The rounded top of the output pulse can be clipped in a succeeding amplifier stage.

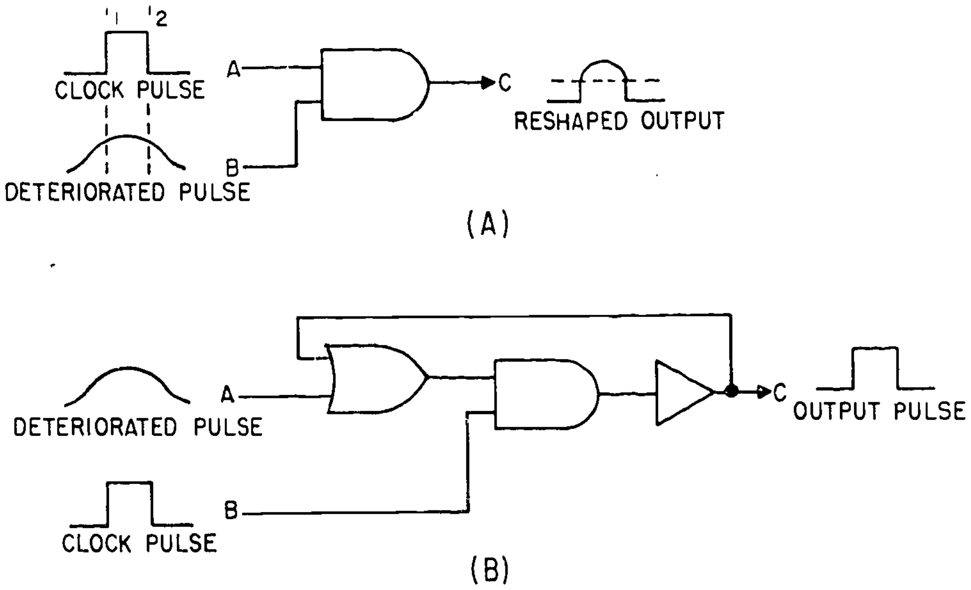

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Figure 10-14.—Block diagram of pulse reshaping circuits.

Instances will occur where the deteriorated pulses to be reshaped are no longer in time synchronization with the clock pulses. In these cases, the circuit shown in figure 10-14 (B) can be used to reshape the pulses.

The deteriorated pulses and clock pulses are applied to terminals A and B, respectively. The deteriorated pulses pass through the OR circuit and, together with the clock pulses, cause an output from the AND circuit during the portion of the time that they occur simultaneously.

If there were no regenerative (positive) feedback from the amplifier output, the output would be representative of only the overlap time of the deteriorated and clock pulses. However, the positive feedback and the clock pulse keep the AND circuit functioning, producing an input to the amplifier until the clock pulse ends. This produces an output pulse that is identical to the clock pulse. Note that this circuit allows a pulse that is not in exact time sequence with a clock pulse to be reshaped, but there must be some overlap in the duration of the two pulses.

ARITHMETIC CIRCUITS

An automatic digital computer is a vastly complicated machine with a great many electronic circuits. Although the number of circuits is high, the variety is small. That is, it consists of a large number of a few types of gate circuits. Many of the types found in the arithmetic unit were discussed in the preceding section as logic circuits. An additional type of logic circuit not previously discussed, the Eccles-Jordon multivibrator, known as a flip-flop (FF), is in wide use in the binary counters and the registers of the control and arithmetic units.

The following paragraphs discuss how the FF and other logic circuits are combined to form counters, registers, and adders; and how they perform the temporary storage, addition, subtraction, multiplication, and division functions of the arithmetic unit.

FLIP-FLOPS

In most cases, the registers in the arithmetic unit and the binary counters in the control unit are composed of FF's constructed with vacuum tubes or transistors. Where a register in the arithmetic unit uses an associated binary counter, the counter is also composed of FF's. The basic functions of a counter or register are to totalize the numbers of bits and to provide temporary storage for this information. Once a number of bits has been fed into the counter or register, the information is retained until the circuit is cleared by a reset (clear) signal or the power is removed from the circuit.

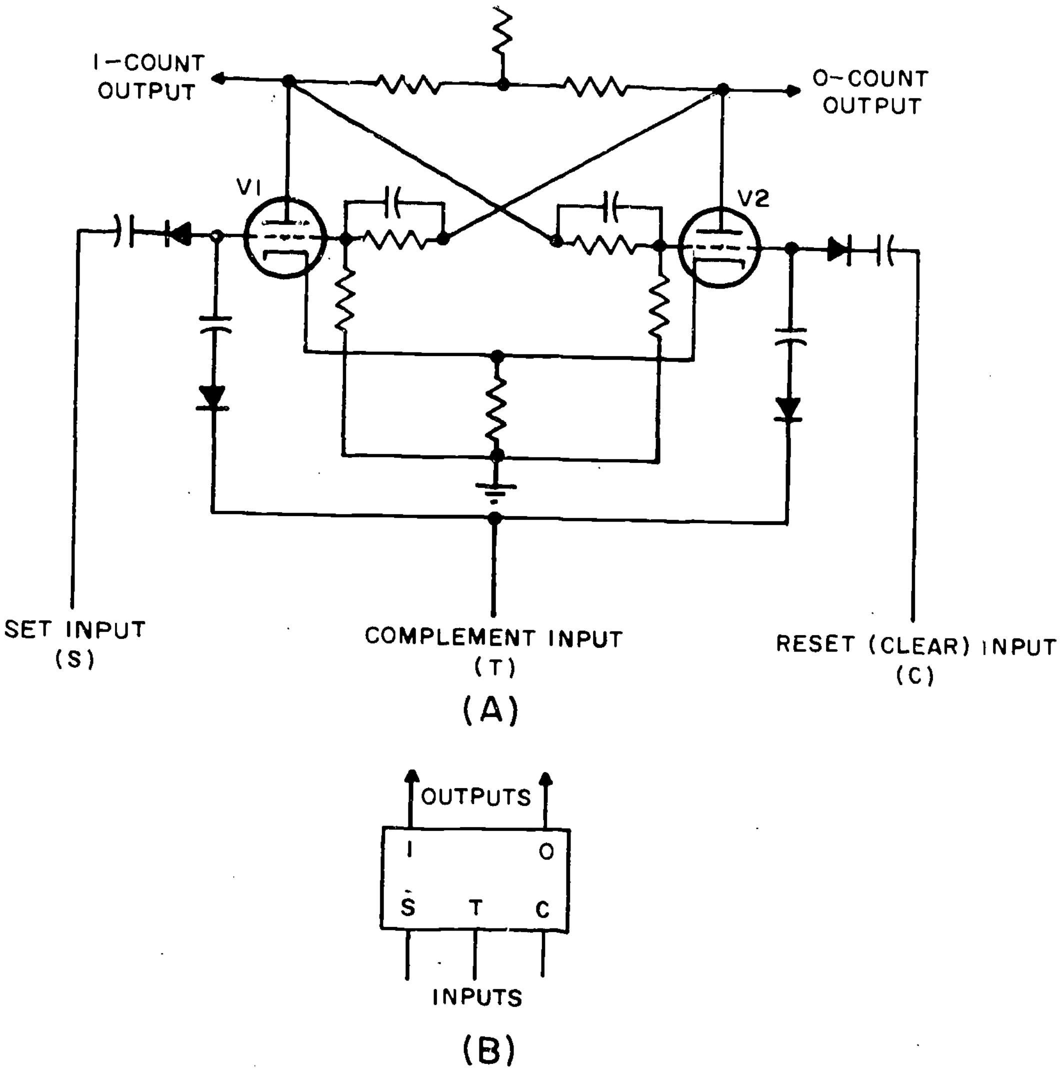

Figure 10-15.—(A) FF using vacuum tubes; (B) block diagram symbol.

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Figures 10-15 and 10-16 show two FF's, one composed of vacuum tubes and the other of transistors. Other devices that are capable of two states of operation (for example, tunnel diodes or magnetic core coils) can also be used in the construction of FF's. A block diagram symbol commonly used to represent the FF in computers is also shown in figure 10-15.

In the following discussion, it is assumed that the technician is familiar with the operation and general use of the FF circuit. (The basic FF circuit is discussed in Basic Electronics.) In digital computers, the FF circuit can have several inputs and two outputs. The circuit shown in figure 10-15 (A) has three input signals: a reset input, a complement input, and a set input. Their functions are described below.

A reset input signal sets the stage to a 0 condition or clears the previous 1 count if one was present. If several stages in a counter are

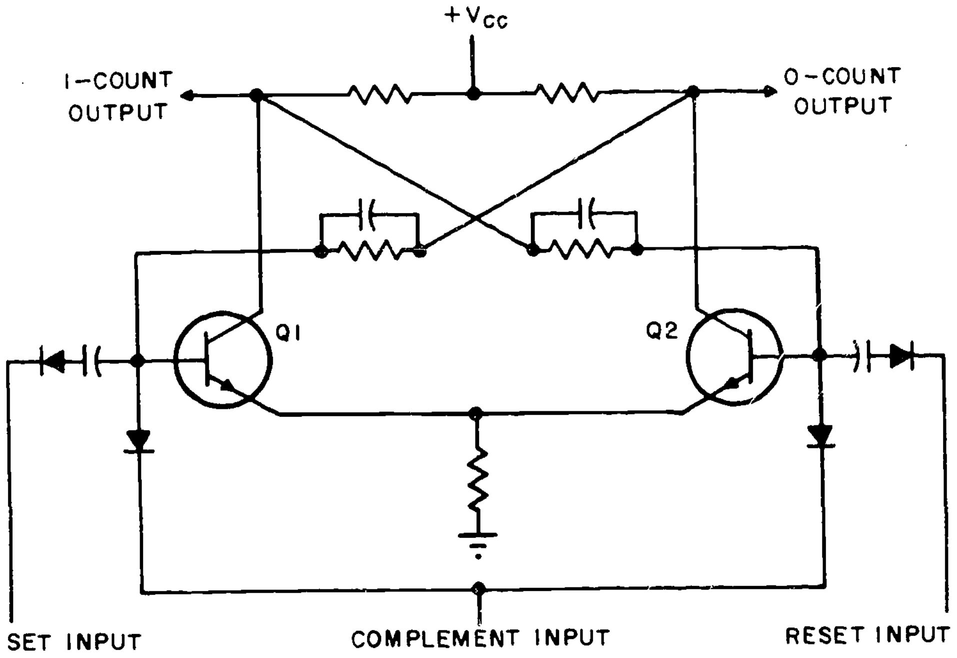

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Figure 10-16.—FF using transistors.

cascaded, the reset signal is generally connected to all stages; they are all reset to 0 simultaneously.

The complement (trigger) input is applied to both halves of the FF, and a signal causes the stages to change from a 0 to a 1, or vice-versa. In registers, the complement signal is generally a single pulse that is applied to all stages simultaneously. It produces the 1's complement of the binary number held by the register. In a counter, the complement input of only the first stage could be used as the signal input for the pulses to be counted. The signal and complement inputs can also be applied symmetrically in the plate or collector circuits.

In case the stage is in the 0 state, the set input signal flips it to the 1 state. In most counters, instead of using the complement input, the reset and set inputs of the first stage are paralleled and used for the input signals.

The three inputs use negative signals, to cause a change of state in the FF. It is sometimes desirable to design the stage for positive signals, but an FF stage can be more precisely controlled if it is switched from a state of heavy conduction than from a cutoff state. Note that each stage counts to a scale of 2, but indicates a maximum count of only 1, a 0 would be indicated for a second input pulse.

Counters

Most large computers can handle a maximum of about 34 bits, the equivalent of a 10-digit decimal number. The maximum scale for a binary counter is equal to 2^n, where n is the number of FF's. However, the maximum decimal equivalent count that the indicators will show is 2^{n-1}. Figure 10-17 shows four FF's that make up a binary counter capable of counting to the binary equivalent of decimal 16. If indicators are provided that read in the binary number system, a count equal to 15 in the decimal system is indicated as 1111. The next count, which is decimal 16, changes all the indicators to 0.

The decimal positional coefficients of binary 1111 are 1, 2, 4, and 8, read from right to left. The least significant bit (LSB) is the last 1. For a count of binary 1, the binary indicators would read 0001; for this reason the drawings for binary counters and registers sometimes show the input pulses applied to the righthand side of the chain and the signal and count progressing to the left. However, an oscilloscopic

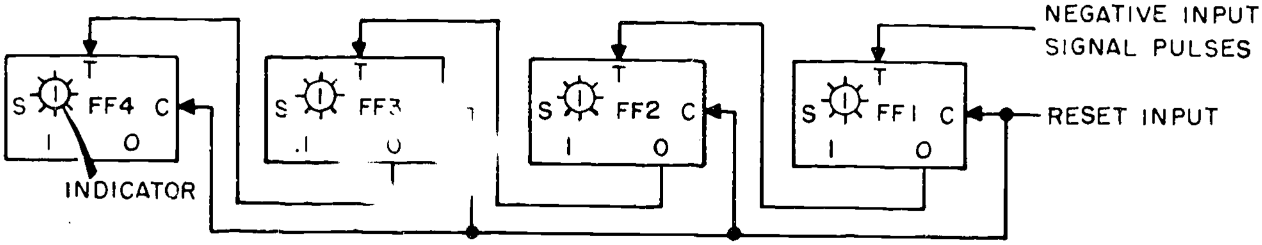

Figure 10-17.— Binary counter at a count of 1111 (decimal 15).

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presentation of the input pulses will show the pulse that represents the LSB as the pulse which is furthest to the left on the oscilloscope screen.

A counter similar to the one shown in figure 10-17 is explained in detail in Basic Electronics. That explanation should be reviewed before continuing with the present discussion.

It is easy to convert the counter in figure 10-17 into a step counter (fig. 10-18) by the addition of 3 AND gates. A step counter is a circuit with input and output connections so arranged to give a decreasing rather than the normal increasing count.

A set input fed to the counter circuit could be used to set up any quantity by controlling the points of set or reset. For illustration purposes a 10 decimal or 1010 binary will be used.

The set input causes FF4 and FF2 to be set and FF3 and FF1 to be reset.

The AND gates have one input coming from the zero plate of FF3, FF2, and FF1 respectively.

With FF1 reset, AND gate No. 3 has a high input coming into it from the zero plate of FF1. An input fed to the "T" input of FF1 is also felt at AND gate No. 3. AND gate No. 3 is qualified and the signal passes through to the input of FF2 and the AND gate No. 2. This AND gate has a low input from FF2. This signal complements FF2 and FF1 at the same time, indicating 1001 (binary equivalent of decimal 9) as FF1 goes from reset to set and FF2 goes from set to reset.

The next pulse input to FF1 will not pass through the AND gate, but will change the stage from set to reset. Two pulses have caused the indicated count of the flip-flops to go from 1010 to 1000; it has counted down from 10 to 8 with two pulses.

Each input pulse keeps the counter counting down one bit at a time until all flip-flops indicate zero. A stop pulse is applied to keep the counter from starting over at 15 and counting down.

An additional set input pulse applied to the counter would set the counter to 10 and count down could start again.

Types of Input

Binary words are fed into the logic and arithmetic circuits in either of two different forms, serial or parallel, or in a combination of the two. In serial form the bits follow one another sequentially on a single input line. In parallel form, all the bits of the word are applied simultaneously over a number of paths equal to the number of bits in the word. Figure 10-19 illustrates both methods.

Each method has advantages and disadvantages. The method used in a particular computer depends on whether extremely high speed arithmetic operations are needed or whether economy and machine simplicity are more important.

A machine with serial operation is much more economical. For example, in the case of a counter or register, a word representing decimal 15 (1111 in binary) can be handled by four FF's; and, as will be shown later, there is no limit to the word length a serial adder will handle.

A parallel counter or register for handling binary 1111 also requires four FF's, but its speed of operation is four times faster than the speed of a serial counter or register. However, 30 FF's would be required for a parallel 30-bit word. In a parallel adder, a separate adder is required for each bit of both the addend (the number that is to be added to another) and

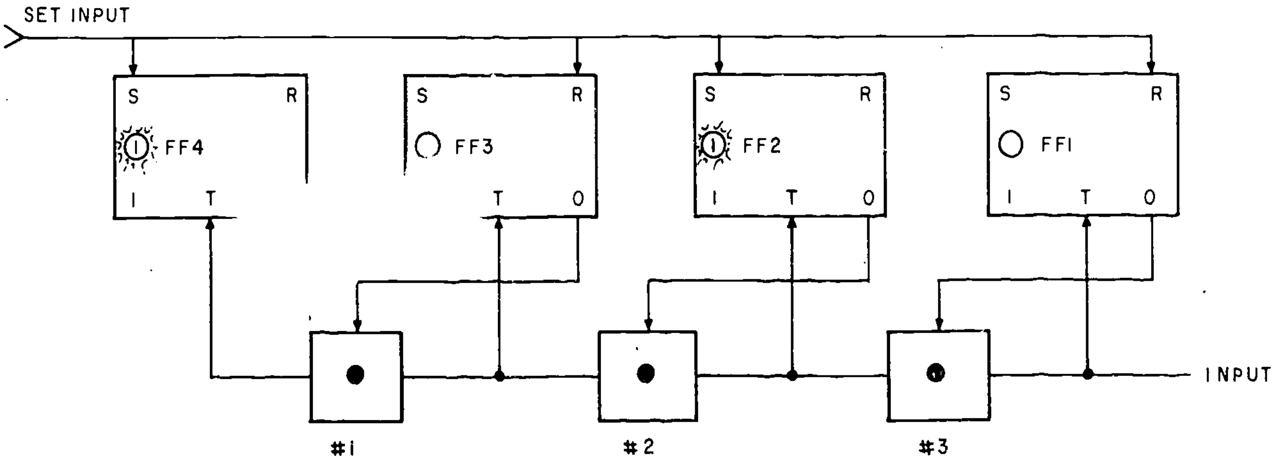

Figure 10-18.—Step counter at a count of 1010 (decimal 10).

augend (the number to which another is to be added). However, the addition is completed in the same time a serial adder requires to add one-bit addend and augends. The complexity of a parallel arithmetic unit over a serial unit is multiplied by the word length.

Registers

A register is a device that provides temporary storage of a binary word during computation. Registers are composed of FF's and are generally found in the control and arithmetic units of digital computers. There may be several in a large computer; however, an arithmetic unit may contain only one or two. The number depends on the amount and variety of other storage facilities that are included. It is also somewhat dependent upon the speed with which the computer is designed to operate. A relatively long time is required for readout of a word from a magnetic drum memory; a shorter readout time is possible with magnetic core matrix and sonic delay line type memory units. Generally, one or more arithmetic registers can be used to advantage in speeding up the computation.

Remember that a word is a group of pulses; each pulse, or lack of one, represents a bit; each bit represents a binary digit of 1 or 0. The chain of bits can be of almost any length; the maximum is usually about 34 bits. This group of pulses at the input unit can represent instructions, constants, and variables for the problem. In the actual arithmetic circuits, the pulse chains that represent the constants and variables for the problem are present. The instruction portion of the word is used to program the computer.

STORAGE REGISTER.—A storage register is used to store a word temporarily. Storage registers consist of a group of FF's capable of storing the maximum word length expected; they operate in the same fashion as counter FF's. Figure 10-20 represents a storage register which is capable of handling a four-bit word. The lower group of FF's comprise the register, and the upper group form an associated counter. Between the two is a group of AND circuits. Note that the input to the counter is in serial form and the input to the register is in parallel form; therefore, it also forms a serial to parallel converter for the word. (The counter is included in the set because of this function as a converter.) First, the word is applied to the counter. Later a read pulse is applied to the AND circuits. If the read pulse and the voltage at the 1 output of a particular counter FF agree in voltage levels, a 1 pulse is transmitted to the corresponding register FF. No signal is transmitted to a register FF if the 1 output of the corresponding counter FF is at a 0 voltage level, or, in any case, until there is a read pulse applied.

Each register FF can store a signal bit, representing a 1 or 0. Note that at the same time a 1 is represented by a 1 level of voltage at the 1 output terminal, a 0 voltage level is

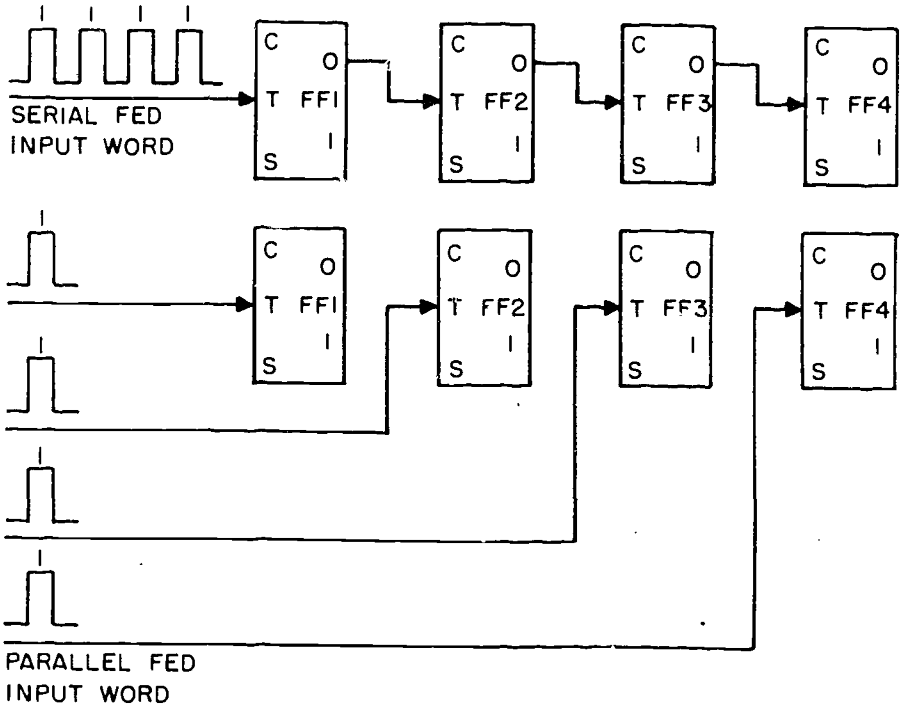

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Figure 10-19.—Examples of serial and parallel inputs.

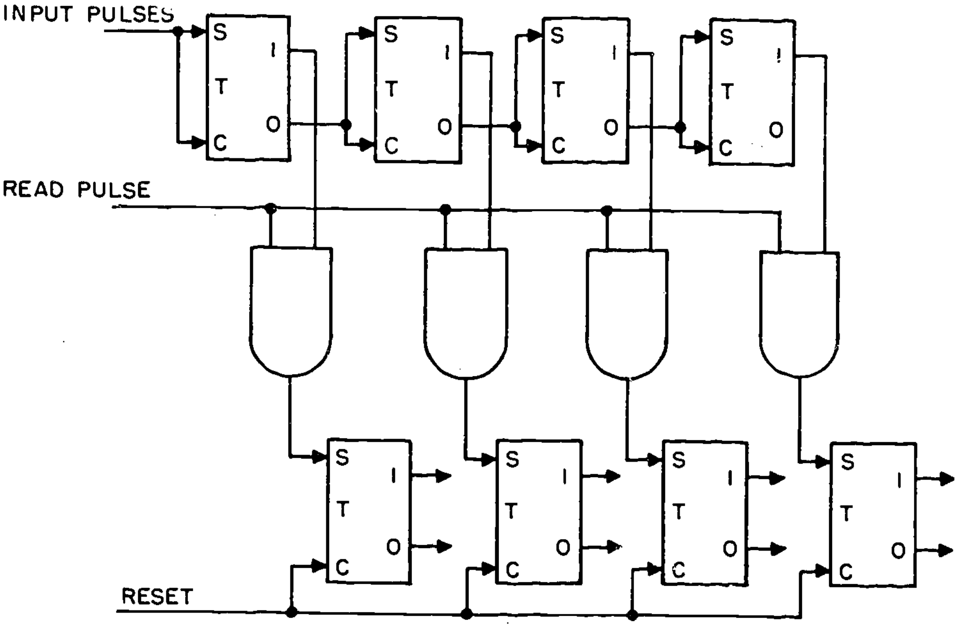

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Figure 10-20.—A four-bit register and associated counter.

represented by the 0 output terminal. In other words, if a 1 output represents A, the 0 output represents $\bar{A}$. The output from the lower FF's (fig. 10-20) might be applied to the augend or addend terminals of a parallel adder circuit, the other word being supplied by similar means. If both the 1 and 0 leads are connected to other circuits, the condition is known as "double lead transfer" of information.

An extra bit is included in an information word to indicate the sign of the binary number. A three-bit word such as +110 would be fed into the counter or register as 0110, where the first 0 (MSB) would indicate a positive number. A negative 110 would be 1110. Therefore, the circuits that handle signed words must have an extra FF to handle the sign bit.

A storage register and serial to parallel converter that does not use an associated counter are shown in figure 10-21. Delay lines (D) are used in this instance to provide the conversion from serial to parallel. Each delay line introduces a delay equal to the input pulse spacing. Therefore, the first input pulse (the one on the left) arrives at A4 at the same instant that the last bit pulse is applied at A1. The input pulse spacing is the same as that of the clock pulses for serial form. Therefore the read pulse would be taken from the clock, but it would not be applied to the AND circuits before the last input pulse was applied to A1. With the exception of the delay line feature, the circuit is the same as the one in figure 10-20.

SHIFT REGISTER.—A shift register is a storage register in which the stored number can be shifted left or right with a shift pulse. (See fig. 10-22.)

The shift pulses are applied continually, and they have the same spacing as the bits of the word. But since the FF would be upset if a shift pulse and a bit pulse occurred simultaneously, the shift pulse is applied midway between bit pulses. The FF's are so coupled that any particular one is set to a 1 state only if the preceding one was reset to 0 by the shift pulse. The delay lines (which may be RC circuits) have a delay that is only a small portion of the spacing between pulses. The operation of the shift register is discussed in the following paragraphs.

Assume that the binary word 1101 (decimal 13) is to be stored. The first 1 bit is applied and sets FF1 to 1. This does not affect FF2. A shift pulse then occurs that resets (clears) FF1 to 0; and FF2 receives, after a short delay, a pulse from FF1 that sets it to 1. Then the second 1 bit is applied to FF1, setting it to 1 again. Now both FF1 and FF2 are set to 1; and

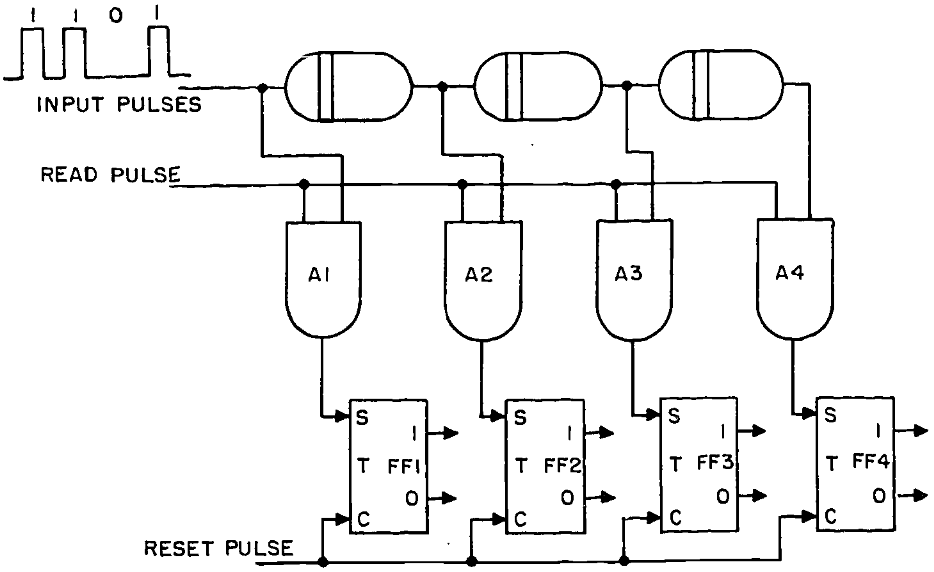

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Figure 10-21.—Storage register using delay lines.

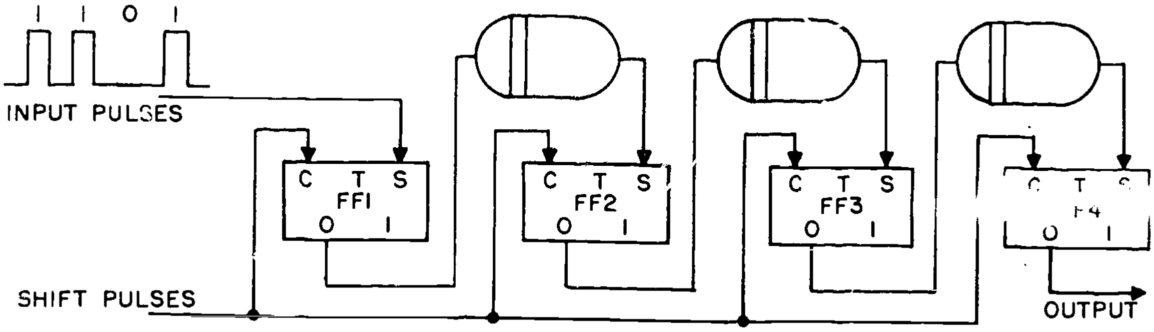

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Figure 10-22.—Shift register.

another shift pulse occurs, resetting them to 0. Shortly thereafter, FF2 and FF3 are set to 1. The next bit in the word is a 0 and has no effect on FF1. The following shift pulse resets FF2 and FF3 to 0; later, FF3 and FF4 are set to 1. FF1 and FF2 now read 0. The last bit sets FF1 to 1. Shift pulses are stopped at this point, and binary word 1101 has been stored.

The application of four additional shift pulses causes the stored word to be read out the left side of the register. The contents can be read out to additional FF stages, to the memory unit, or to adder circuits. The output might also be returned to the input, through pulse reshaping amplifiers, to form a dynamic (circulating) type register.

If the register contains many more stages than there are bits in the stored word, the stored word can be shifted to the left and its changing value doubled by each successive shift. For example, if the word 1101 (decimal 13) is shifted to the left by 1 bit, the register will read 11010 (decimal 26). If 11010 is shifted to the left again, the register will read 110100 (decimal 52). Therefore, each left shift multiplies the register word by binary 10 (decimal 2). Note that the decimal point location in this particular register does not shift. In this case, it remains at the input terminal, or to the right of the last stored bit.

Additional stages must be switched into the right-hand side of the register before the word 1101 can be shifted to the right. Assume that 1101 is stored and it is desired to shift it to the right. The decimal point is fixed at the input terminal point. Now, additional FF's are switched into the right side of the register, and a shift pulse is applied. The register will now read 110.1 (decimal 6.5). Thus the stored word has been divided by binary 10. Another shift pulse would produce 11.01 (decimal 3.25).

ACCUMULATOR.—Of the various types of registers found in an automatic digital computer, the type which is most important has the capacity to store a word, then receive additional words and sum the total. A register with these features is defined as an accumulator. It will most likely also incorporate left and right shifting features and be capable of dynamic operation. It must be able to provide this additional feature while handling the maximum computer word length.

Figure 10-23 presents a simplified block diagram of a serial arithmetic unit and indicates the importance of the accumulator. The accumulator can receive or send information to the memory unit; the stages of the shift register can be added to the accumulator to form a double length accumulator during multiplication and

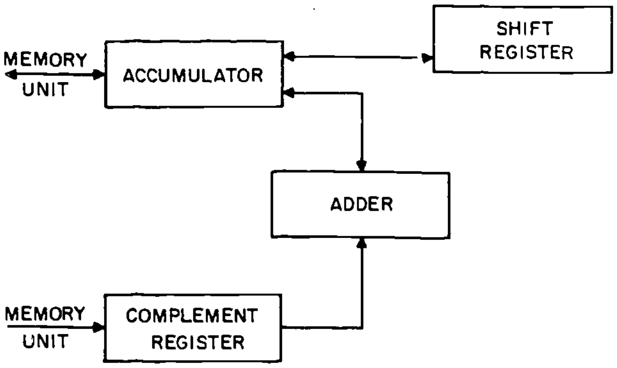

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Figure 10-23.—Simplified block diagram of a simple serial arithmetic unit.

division; and the complement register can be complemented and its contents added to the contents of the accumulator. The importance of the relationship displayed by this block diagram will become clear during a discussion of adders and the computational processes.

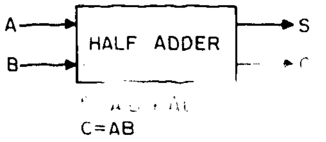
ADDERS

It has already been pointed out that a counter can total the number of pulses in a word and store the word temporarily. It was also mentioned that the accumulator is very flexible in this respect; it can receive several words, add them, shift them right or left, and store them. However, the counter and the accumulator are limited in the word lengths they can handle or store. A serial adder has no word length limitations; it is limited only by the storage capacity of the memory unit.

These adder units do not contain new kinds of circuits; they are made up of the basic logic circuits that have already been discussed.

Serial Adders

The half adder is the basic adder circuit for binary addition. It is called a half adder because it performs only the lowest order of addition—it has no input terminal for a carry. Remember, a carry (C) is generated when 1 and 1 are added to given a sum (S) of 0, producing a C of 1. Figure 10-24 is the block diagram and input/output table for a half adder.



INPUT		OUTPUT	
A	B	S	
	1	0	1
1	0	1	0
0	1	1	0
0	0	0	0

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Figure 10-24.—Half adder block diagram and input/output table.

Notice, in figure 10-24, that the S (sum) output is in the 1 state only when A and B are unlike. This is expressed by the equation $S = A'B + AB'$, where A' and B' have the same meaning as $\bar{A}$ and $\bar{B}$. This is the EXCLUSIVE OR function discussed earlier, and can be mechanized as shown in figure 10-25.

Assume that A = 11 and B = 101. The first two bits of each word are applied simultaneously and produce a 1 output from the OR and AND circuits, but the S output is 0 because of the inhibit action. The 1 from the AND circuit is the C output. The next set of bits, a 1 and a 0, produce an S output of 1. The last set of bits, a 0 and a 1, produce an S output of 1. Checking the S output, the result is seen to be 110, with a C output of 1. This could be considered a wrong answer; but, if the carry could be utilized during the addition process, the correct answer of 1000 would be produced.

To utilize the carry during the addition process, two half adders and a delay line can be employed as shown in figure 10-26. This combination is known as a full adder. Each half adder (fig. 10-26) consists of an EXCLUSIVE OR circuit.

The first two 1 bits of A and B produce only a C1 carry of 1 from the first half adder, and S1 is 0. C1 is delayed by an amount equal to the bit spacing before being applied to the second half adder. The second set of A and B bits are a 1 and a 0, respectively. This results in

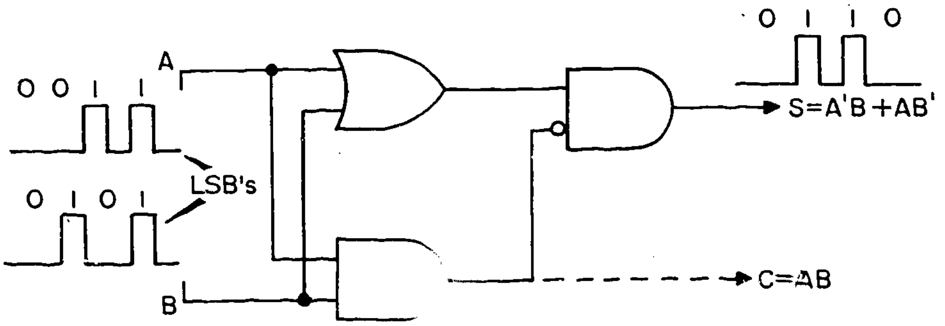

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Figure 10-25.—Half adder (EXCLUSIVE OR) circuit.

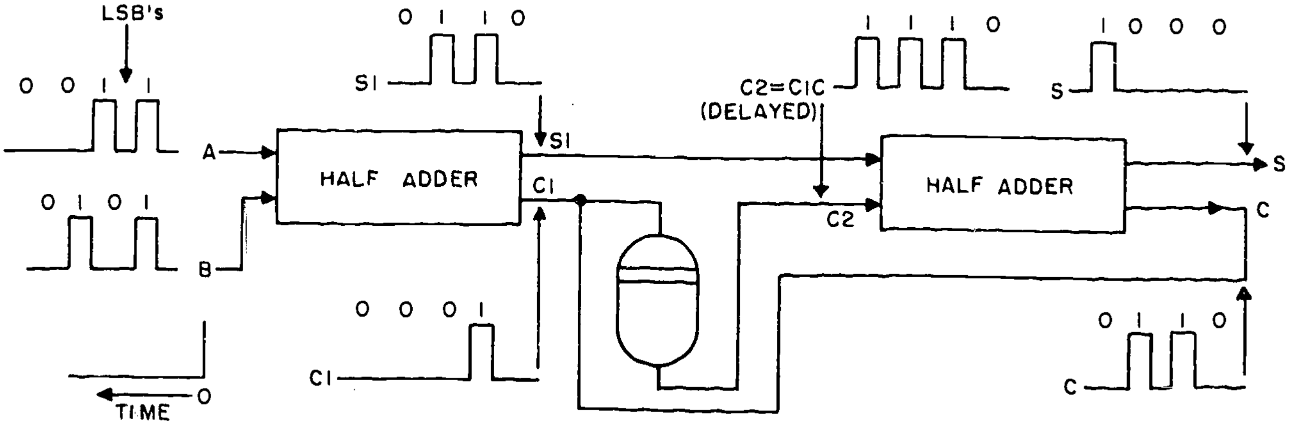

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Figure 10-26.—Full adder block diagram and bit trains.

an S1 of 1 and C1 of 1 being applied to the second half adder, producing an S output of 0 and a C output of 1. This 1 of the C output is fed back, delayed, and applied to the second half adder. At the same time, an S1 output of 1 is produced in the first half adder and applied to the second half adder. This results in another 0 at the S output and a 1 at the C output. Now this C is delayed and applied to the second half adder again. A and B are 0 at this time, and the second half adder receives an S1 of 0. This causes the second half adder to produce an S output of 1 and a C output of 0. The result of the addition is now correct:

A = 11
B = 101
S = A + B = 1000

Note that this is strictly arithmetic addition of binary numbers 11 and 101, not Boolean algebra addition.

Parallel Adders

Parallel addition is used where computational speed is important or for adding binary coded decimal (BCD) words. Figure 10-27 shows the block diagram of a parallel adder, which is nothing more than four full adders with parallel inputs and the carry applied serially between stages.

Assume that two decimal numbers, 3471 and 1318, are to be added as BCD numbers, using the 8421 code for conversion into BCD. The decimal 3471 would become

A1	A2	A3	A4
0011	0100	0111	0001

and 1318 would become

B1	B2	B3	B4
0001	0011	0001	1000

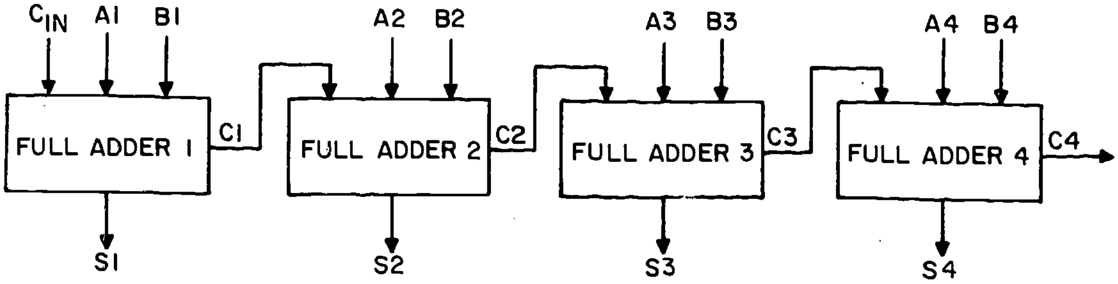

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Figure 10-27.—Parallel adder.

The bits in each group A1, B1, etc., are applied serially to the correspondingly designated terminals, but each group is applied simultaneously. The C_{in} comes from a previous adder, the C4 and the sums would be A or B inputs to a higher order adder if it were necessary to add three decimal numbers. This adder could also be used to add two four-bit pure binary words or for the parallel-bit addition of four serial words.

One point needs clarification. It was assumed that each partial carry was produced with no delay between bit input and carry output. This cannot be achieved in practice; therefore, the A and B inputs down the chain must be delayed enough to allow the respective carry to appear at the time the A and B inputs are applied down the chain.

Adder-Subtractor

An arrangement of logic circuits is possible that will perform either addition or subtraction. The half adder-subtractor form of such a group is shown in figure 10-28. It is composed of one AND gate, two INHIBITOR gates, and one OR gate. A carry is generated by the AND circuit and used during addition. During subtraction of binary numbers a case occurs where there is a borrow of 1. This can be borrowed from the output of one of the INHIBITOR circuits.

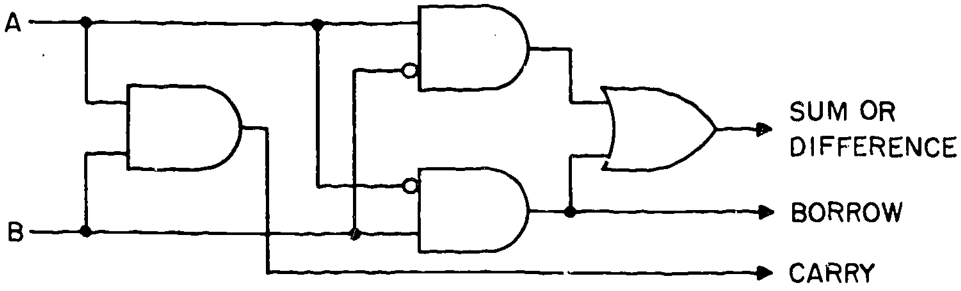
Two half adder-subtractor circuits can be used to form a full adder-subtractor, with an additional OR circuit and a delay line having a delay equal to bit spacing in the words, as shown in figure 10-29. Addition uses the carry output of the first half adder and the feedback from the second one for application to the OR circuit. During subtraction, the borrow output of the first half adder-subtractor is applied, via the OR circuit and delay line, to the second half adder-subtractor, and the borrow from the second one is fed back to the first one.

COMPUTATION

The actual computational details—addition, subtraction, multiplication, and division—vary from computer to computer because different models have different circuitry in the arithmetic, memory, control, and output units. The registers and adders will also vary in different models. Therefore, since it is impossible to describe all circuit variations and the ways that they function, only a general description of possible computational processes will be given.

Addition

The general idea and methods of addition should be clear at this point. A word, called



INPUTS		OUTPUTS			
A	B	SUM	DIFFERENCE	CARRY	BORROW
0	0	0	0	0	0
1	0	1	1	0	0
1	1	0	0	1	0
0	1	1	-1	0	1

TD.581

Figure 10-28.—Half adder-subtractor and input/output table for addition and subtraction.

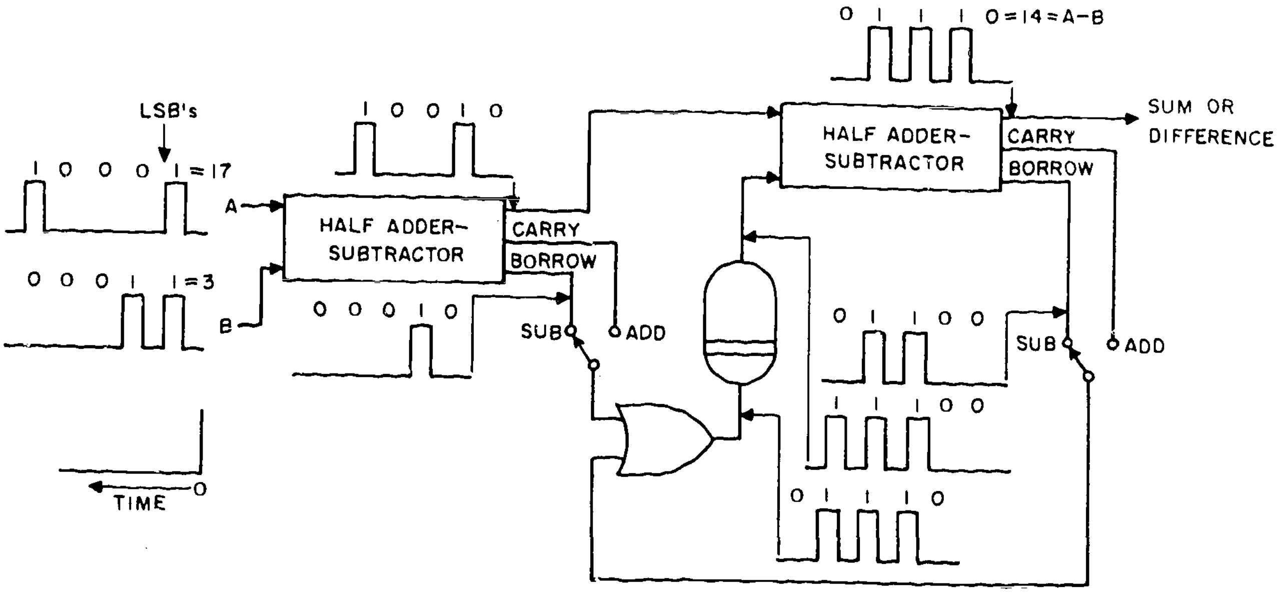


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Figure 10-29.—Full adder-subtractor, with waveforms for the subtraction of decimal 3 from decimal 17.

the augend, is taken from the memory and put into a register, generally, the accumulator. A second word, the addend, is taken from the memory and added to the augend. The result is stored in the accumulator, sent back to the memory, or used for addition to another word. The adders will be used for words whose length exceeds the accumulator's capacity.

Subtraction

Subtraction can be performed by complementing the addend and adding it to the augend. Registers generally have provisions for complementing their contents. Some computers use the 1's complement, which is found by substituting a 1 for each 0 and a 0 for each 1 in the digits (bits) of the binary number; others use the 2's complement. The adder-subtractor can also be used to find the difference between two words.

Multiplication

Multiplication is really repeated addition, shifting left, or a combination of both. The accumulator is usually a register whose contents can be shifted left or right; or a second shift register can be used, and the accumulator can be used to store the result. Circuitry is provided to count the number of additions, which will be equal to the number of bits in the multiplier.

Division

In about the same manner that multiplication is accomplished by repeated addition and shifting left, division is performed by repeated subtraction and shifting right. In case the last subtraction results in a negative remainder, this is detected by special circuitry; and the last subtracted amount is restored. The subtraction part of the division process can also be done by complementing and adding.

A SAMPLE ARITHMETIC UNIT

The primary function of the arithmetic unit as previously mentioned is to perform the mathematical operations dictated by the program. These operations are usually programed, utilizing methods that allow them to be manipulated arithmetically. The distinguishing characteristic of arithmetic operations lies in the fact that numerical quantities form the elements of the calculation. The arithmetic unit also performs operations that are not usually considered to be arithmetic, such as comparing numbers, shifting right or shifting left.

Digital computers are usually designed to perform all operations by modifications of the addition process. The following paragraphs describe the basic requirements of an arithmetic unit and develop the logic necessary for its primary operations. The arithmetic unit described performs all of its operations by addition.

The requirements of an arithmetic unit are described with reference to the block diagram in figure 10-30. The unit shown is capable of adding, subtracting, and multiplying. The number of additional elements that would be required for division make it impractical to show the divide operation. However, the requirements for division are discussed, making it fairly easy to visualize what additional components would be necessary to perform the operation.

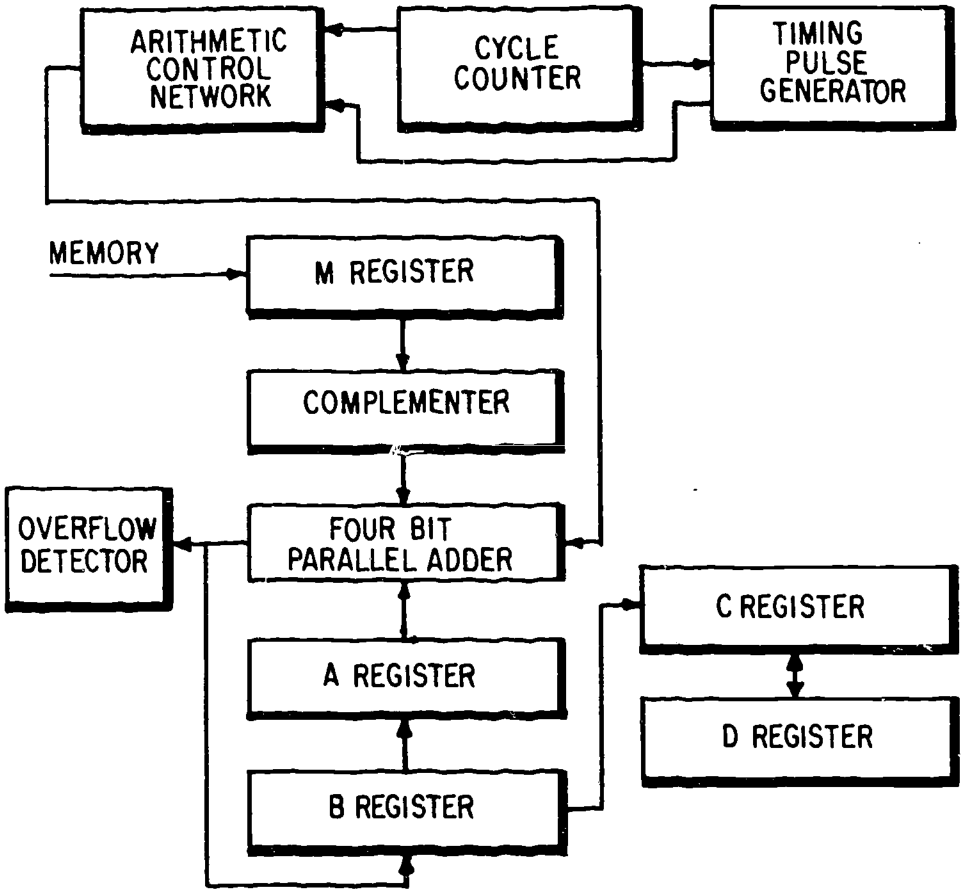
The block diagram shows a four-bit parallel adder, five registers, a complementing network, an overflow detector, a cycle counter, a timing pulse generator, and a control network. The timing generator is not a physical part of the arithmetic unit; it is included here to help clarify the way that a sequence of steps required to perform an arithmetic operation is controlled.

Adders

The adders used in this unit are full adders. Each adder is designed to accept the addend, augend, and a carry from the previous order to produce a sum and a carry output.

Registers

The registers contain all the information necessary for a given arithmetic operation and



TD. 583

Figure 10-30.—Sample arithmetic unit block diagram.

for storing the result of the operation. The unit shown uses five registers: the M, A, B, C, and D registers. All information taken from the memory passes through the M, or main, register. The M, A, and B registers are used for the add and subtract operations; multiplication operations use all five registers. The transfer gates used to convey information from one register to another are not shown on the diagram since they do not directly affect the logic.

Complementing Network

A number is applied to the adder in either its true or its complemented form, depending upon the arithmetic operation being performed. Figure 10-31 shows a simple complementing network. In a sophisticated complementing register one network is needed for each bit in the word.

The circuit consists of two AND gates and an OR gate. The true and complement inputs determine whether or not the information bit contained in the flip-flop is complemented. A true input applied to GA2 will allow an output of 1 from the complementer if the flip-flop is in the one state. If the flip-flop is in the zero state when the complement input is present, there is an output from GA3, indicating a binary one. The conditions for a true or a complement input are determined by the control gates for the operation being performed.

Overflow Detector

The overflow detector provides an indication when the result of an arithmetic operation exceeds the word length the unit is capable of handling. The word length of this sample unit is four bits. If the sum of two numbers has more than four bits, the overflow detector provides an output which can be used to give an alarm or stop a sequence of operations. The logical operation of the overflow detector when addition and subtraction are performed by the sample unit is discussed.

Cycle Counter

Multiplication and division can be accomplished by a sequence of additions. Each step in the sequence is called an iteration, and the cycle counter keeps track of the number of iterations. In the unit shown, the cycle counter is a down counter. At the beginning of the multiplication operation, the counter is set to the number of add cycles required to complete the operation. At the completion of each add cycle, the count in the counter is reduced by one. Decoded outputs are taken from the counter and applied to control gates so that a completed operation is indicated. Other gates are controlled by the cycle counter during the multiply operation (as is seen in the discussion of the logic).

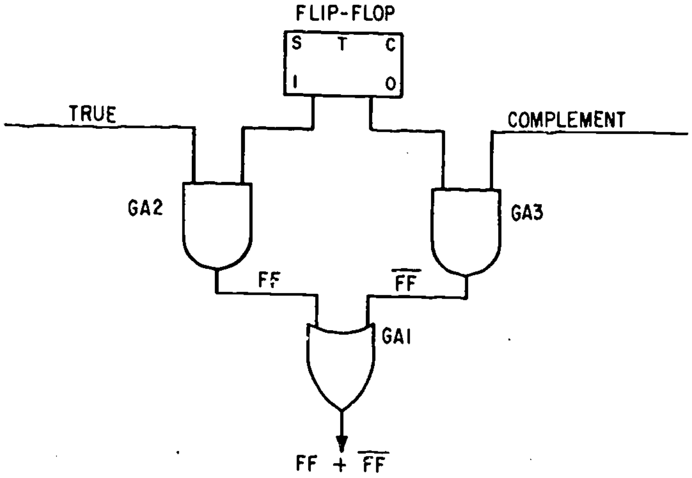


Figure 10-31. —Complementing network.

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Timing Pulse Generator

The timing pulses for this sample arithmetic unit are generated by a ring counter synchronized with the basic timing of the computer. The counter initiates the transfer shift, clear, and other necessary commands in a definite order so that the desired arithmetic operation is performed. A ring counter is useful here because the counter generates only one high output at a time from its stages. Each output can initiate a separate operation. A four-stage ring counter is illustrated in figure 10-32.

The timing chart in figure 10-32 shows that flip-flops 1, 2, 3, and 4 are set to the one state sequentially. All of the gates shown perform the AND function. Initially FF1 is set to the one state while 2, 3, and 4 are in the zero state. The output from the one side of FF1 is fed back to the zero input gate of FF1 and forwarded to the one input gate of FF2. The first clock pulse through these gates sets FF2 to the one state and resets FF1 to the zero state. The second clock pulse sets FF3 to the one state and resets FF2. The third clock pulse sets FF4 and resets FF3. The one output of FF4 is applied to the one input gate of FF1, so that the fourth clock pulse sets FF1 and resets FF4, completing the cycle.

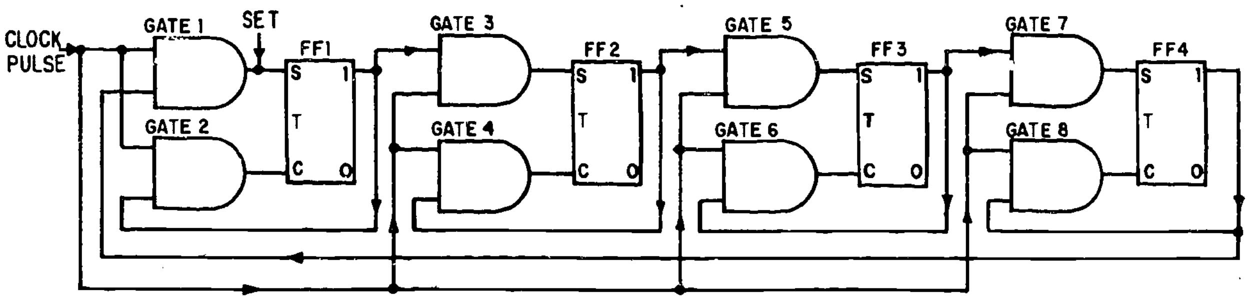
The timing pulse generator used in the sample unit is shown in figure 10-33. The counter is a ten-state device used to generate nine pulses, numbered t1 through t9. The output of the first stage is not used. The design of this device allows the use of either a complete sequence initiated by t1 and terminated by t9 or only the t6 through t9 portion of the sequence. The complete cycle is called a major cycle; the abbreviated count, a minor cycle. The gates controlling the major and minor cycles are shown in figure 10-33. The output of FF1 is applied to either FF2 or FF7, depending upon whether a major-cycle or a minor-cycle control pulse is present. If the output of FF1 is applied to FF2, the complete count is generated. If the output of FF1 is applied to FF7, the partial count is generated. Minor cycles are used for each successive addition or subtraction in multiplication and division operations which do not require the complete add or subtract sequence of operation.

Instructions

The sample arithmetic unit has the following four instructions:

1. Transfer-clear.
2. Add.
3. Subtract.
4. Multiply.

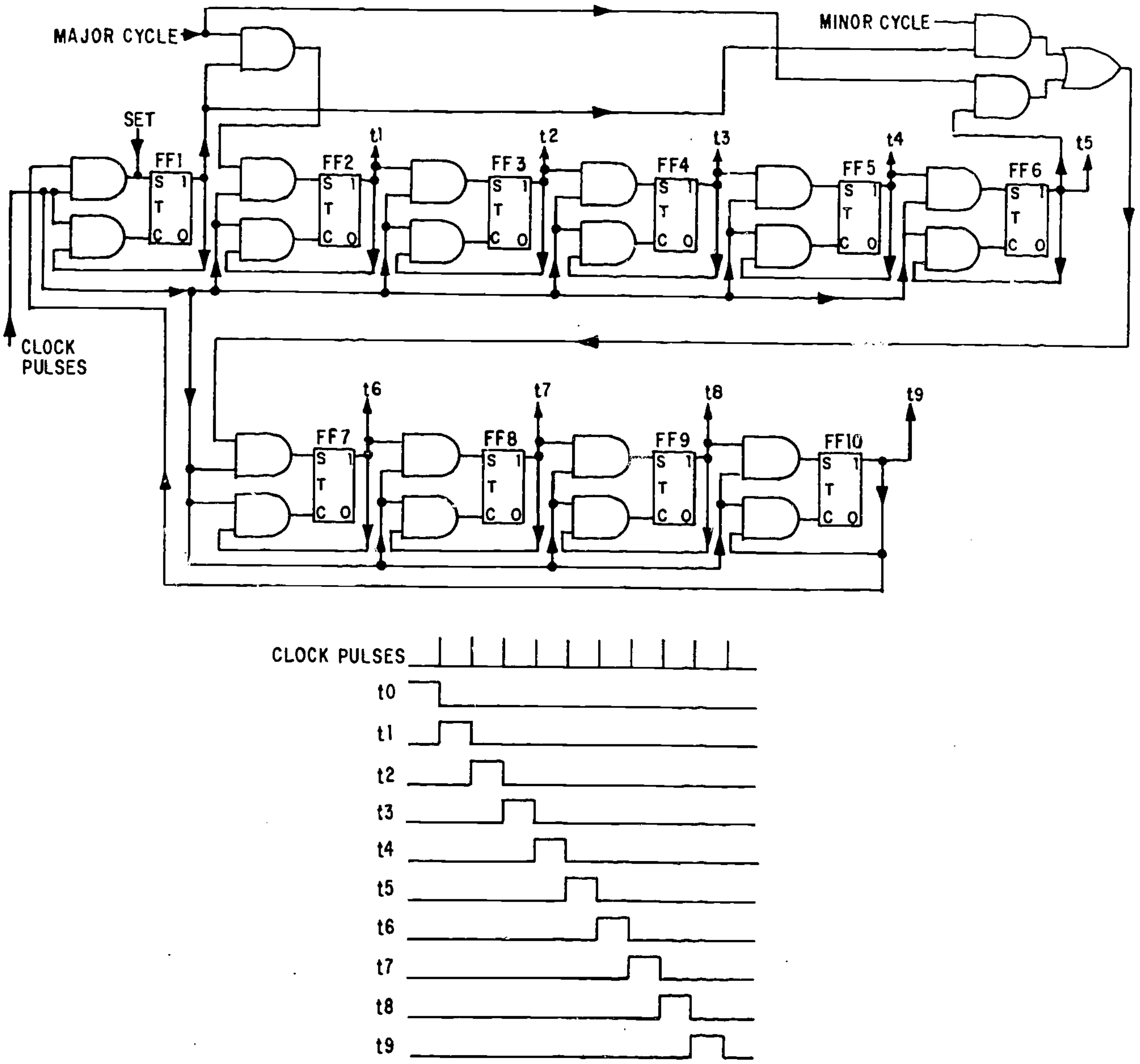
Each instruction is generated by the control unit. For the discussion which follows, it is assumed that the computer is a single address device in which the instruction word consists of the command and the memory location of one number upon which an arithmetic operation is to be performed. Each of the instructions is explained in terms of both the block diagram and the logic.



CP	FF1	FF2	FF3	FF4
0	1	0	0	0
1	0	1	0	0
2	0	0	1	0
3	0	0	0	1
4	1	0	0	0

TD. 585

Figure 10-32.—Four-stage ring counter and timing chart.



TD. 586

Figure 10-33.—Timing pulse generator.

It is impractical to show all of the gates required for each operation, but the essential gates are shown. As soon as an instruction is given, it is executed automatically in the arithmetic unit by the arithmetic timing pulses.

Transfer-Clear

The purpose of this operation is to extract a number from the memory and place it in the arithmetic unit. Specifically, the number is placed in the A register. If the number is positive, the magnitude bits are transferred to the B register in their true form; if it is negative, the magnitude bits are transferred to the B register complemented. In this computer, the most significant bit of the number is the sign bit. If the sign bit is zero, the number is positive; if the sign bit is one, the number is negative. For example, a plus seven is written 0111; minus seven is written 1111.

The reason for placing the contents in the B register can be seen by referring to figure 10-30. The two inputs to the adder are the contents of the A register and the contents of the M register applied through the complementing network. The transfer-clear instruction places the first number in the arithmetic unit. When an add, subtract, or multiply instruction is generated, the second number is extracted from the memory and placed in the M register. All operations are done by addition. The contents of the B register are transferred to the A register to become an adder input. The B register is cleared, and the sum or difference is transferred back into the B register. If successive iterations are required, the transfer from the B register to the A register and the placing of the adder contents in the B register are repeated as many times as required.

In order to follow the logic of the operational steps, refer to figure 10-34. The transfer-clear instruction is essentially an add operation. No other number is in the arithmetic unit at this time; hence the number extracted from the memory is added to 0000, and the sum is placed in the B register. The operational steps are synchronized to the timing pulses shown in figure 10-33, as follows:

1. At t1 time the transfer-clear level is generated by the control unit. This portion of the operation is not shown. An instruction level is a pulse that remains present for the entire operational sequence. This level is applied to the appropriate gates in the arithmetic unit. They are pointed out as the explanation progresses.

2. At t2 time the add-subtract flip-flop is set to the zero state. The transfer-clear level is on OR input gate 63. The output of this gate is an input to gate 20. When t2 occurs, AND gate 20 sets the add-subtract flip-flop to the zero state. The t2 pulse is also applied to the zero inputs of all the flip-flops in the M register, clearing it. This logic is not shown in the diagram.

3. At t3 time, a number is extracted from the memory and placed in the M register. The logic for this operation is not shown. The address of the extracted number is a part of the instruction word generated by the control unit. When the number is extracted and placed in the M register, the sign bit is sampled to determine the polarity of the number. If the number is negative, the magnitude bits are complemented. The sign bit is contained in M4, the most significant flip-flop. The one side output of M4 is applied to gate 2 of the complementing unit CM_4 and the zero output is applied to gate 1. If flip-flop M4 is in the zero state, there is no output from AND gate 1, since the t2 pulse has set the add-subtract flip-flop to the zero state. Consequently there is no output from gate 9. If M4 is in the one state (representing a negative number), gate 2 functions, allowing an output from gate 9. The output of gate 9 activates gate 61, producing an input to gate 62. Gate 62 drives AND gate 65A. The other input to gate 65A is high for all instructions except multiply since it is driven by an inverter. The output of gate 65A drives gates 3, 5, and 7 plus an inverter. The output of the inverter is applied to gates 4, 6, and 8. Therefore, the true level is generated whenever there is no output from gate 65A. CM_3, CM_2, and CM_1 follow the information in M3, M2, and M1. If there is an output from gate 65A, the true sides of the complementing stages are inhibited and the complementing side is activated. The outputs from CM_3, CM_2, and CM_1 are applied to the adders through gates 15, 16, and 17, which are multiply control gates that are enabled by the mul-div control flip-flop. Pulse t2 sets this flip-flop to the one state. The flip-flop remains in the one state during the add and subtract operations. Because of the presence of the transfer-clear level at gate 13, gate 14 would be enabled if the sign bit were a one.

4. Pulse t4 is not used during this instruction.

5. Pulse t5 is not used during this instruction.

6. At t6 time, the sign and magnitude bits are transferred from the B register to the A register. The t6 pulse is applied to gates 23 through 26. The transfer-clear level is applied to gate 23 through OR gate 22. If any flip-flop in the B register contains a one, t6 will transfer it to the associated flip-flop in the A register, CC = 4, a decoded output from the cycle counter, is present when the cycle counter is at four. During the transfer-clear operation, the cycle counter is at zero, making the output of its associated inverter true. Although there is no information present in the B register, the add process is still performed. The contents of the M register are added to all zeros.

7. At t7, the B register is cleared by OR gate 86.

TD.587

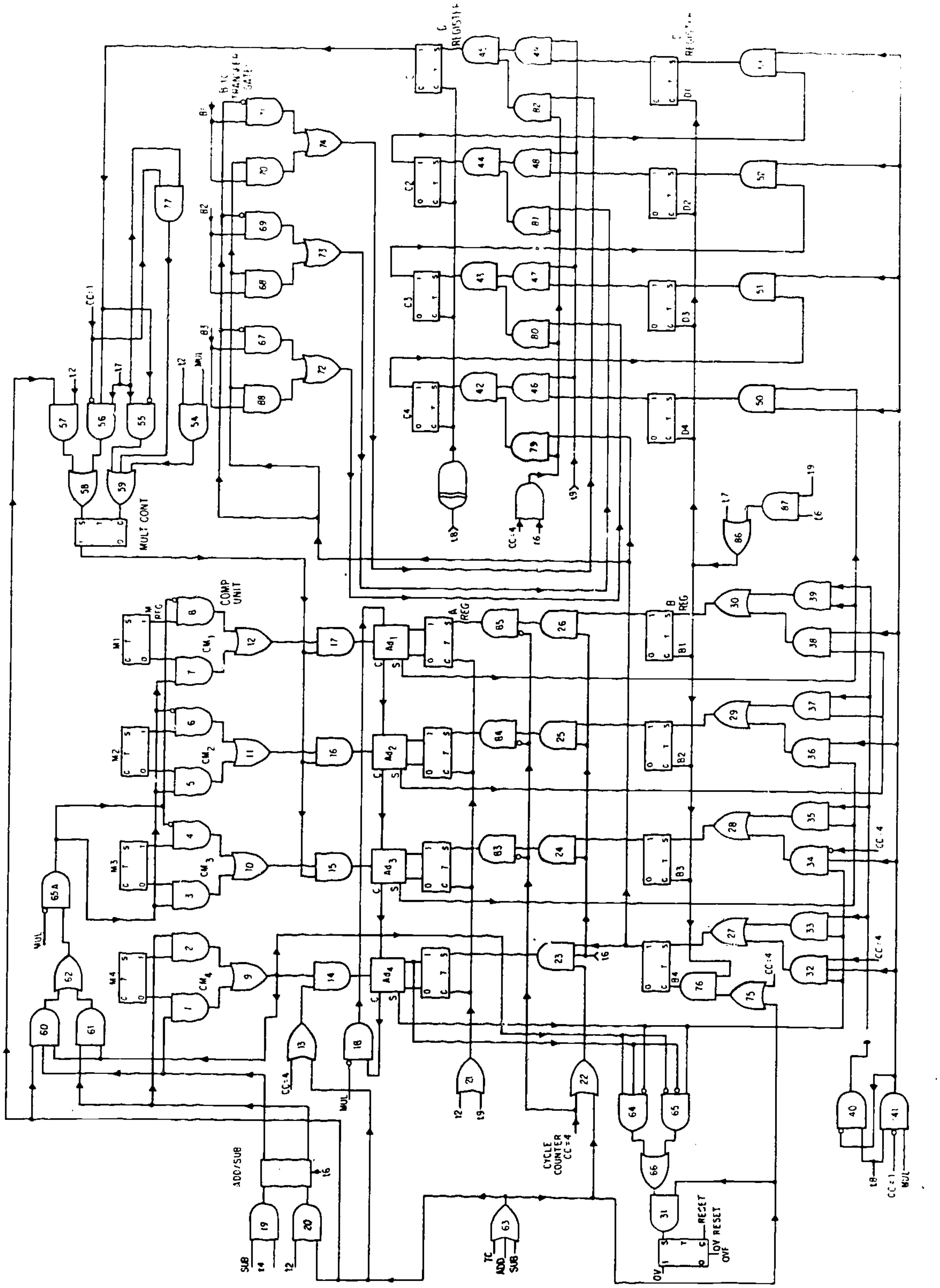


Figure 10-34.—Logical diagram of a parallel arithmetic unit.

8. At t8 time the sum outputs of the adders are transferred into the B register by way of transfer gates 33, 35, 37, and 39. The sum outputs of Ad_4, Ad_3, Ad_2, and Ad_1 are applied to these gates, respectively. The presence of t8 at gate 40 enables these gates to transfer the adder bits to the B register.

9. At t9 time, the A register is cleared and the transfer-clear operation is complete.

Add

The operation of the sample unit during the add instruction is essentially the same as during the transfer-clear operation. The steps in both sequences are alike except that the add level is generated at t1 and the control gates that were actuated by the transfer-clear level are actuated by the add level. To add, extract the number from its storage location and place it in the M register. Add this number to the number placed in the B register during the transfer-clear operation. Store the sum in the B register. If the sum is positive, store it in its true form; if it is negative, store it with its magnitude bits complemented.

EXAMPLES:

1. Assume that -1 is to be added to -2. The number -2 has been placed in the B register during transfer-clear, and the -1 has been extracted from the memory during ADD. The magnitude bits in the B register are complemented so that -2 is represented as 1101. The number -1 is taken from the memory in its true form, 1001, and placed in the M register. The sign bit is sensed and found to be a negative number. The magnitude bits are complemented and passed to the adder. When the B register contents are transferred to the A register, the inputs to the adder are as follows:

M register complemented   1110 = -1

A register   1101 = -2

(Add the one on the left, which is the carry)   1   1011

1   end-around-carry

Adder output   1100 = -3 (magnitude bits comp)

The sum, as a result of adding two negative numbers, is a negative number. Observe that the sum has its magnitude bits complemented, as stated in the description of the ADD sequence.

2. It is possible to add a negative and a positive number. For example, to add +4 and -3, the adder inputs are as follows:

Complementer output   0100 = +4

A register output (comp)   1100 = -3

1   0000

1   end-around-carry

Adder output   0001 = +1

Note that an end-around-carry is shown in each example. This operation is incorporated in the sample unit. In figure 10-34, the carry output from Ad_4 is fed back through gate 18 to Ad_1, the least significant digits adder. Gate 18 is actuated for all except the multiply operation by the inverter in its input. The most significant digit will not change signs as a result of the carry, and the sum is correct as long as the word length capacity is not exceeded. If the word length is exceeded, an overflow indication occurs.

OVERFLOW.—An overflow condition exists if the sum of two numbers is greater than the maximum number that can be held in the register—greater than ±7 in the sample unit. The possibility of an overflow exists only if two positive or two negative numbers are added; addition of one positive and one negative number cannot produce an overflow. The condition can be recognized readily because when an overflow exists the sign of the sum is different from the sign of the two numbers that were added.

EXAMPLES:

a. +3 = 0011
+2 = 0010
0101   sign does not change

b. -3 = 1100 (complemented)
-2 = 1101 (complemented)
——
1 1001
1 end-around-carry
——
1010 (complemented)
sign does not change

c. +5 = 0101
+3 = 0011
——
1000 sign changes;
. . overflow

d. -5 = 1010 (complemented)
-3 = 1100 (complemented)
1 0110
1 end-around-carry
——
0111 (complemented)
sign changes . . overflow

From the examples shown, it is apparent that the equation for an overflow condition is $X_8Y_8\bar{S}_8 + \bar{X}_8\bar{Y}_8S_8 = OVF$. X_8 and Y_8 are the sign bits of the augend and addend; and S_8, the sign bit of the sum.

An overflow flip-flop is shown in figure 10-34. If one of the conditions described by the equation exists, the flip-flop is set to the one state, sounding an alarm, stopping the program, or notifying the operator by some other means that the word limit has been exceeded. The overflow detector network consists of AND gates 64 and 65 plus OR gate 66. Gate 64 is activated by $\bar{X}_8\bar{Y}_8S_8$ and gate 65 by $X_8Y_8\bar{S}_8$.

Subtraction

To subtract, extract a number from the memory and place it in the M register. Substract this number from the number located in the B register. Use the same sign notation in the subtract operation as in the transfer-clear and add operations. The logical operation of the complementer during the subtract instruction is different from the logical operation during the add instruction.

Subtraction is performed by the complement and add method. The following examples illustrate complementing requirements.

EXAMPLE 1: Substract +5 from 0:
0 = 0000 0000
-(+)5 = 0101 complement sign and magnitude of subtrahend and add. 1010
——
-5
——
1010

In the above example both the sign and magnitude of the subtrahend were complemented so that the result in signed magnitude notation is -5 (1010). This number is then stored in the B register consistent with the form of the sample unit.

EXAMPLE 2: Subtract -5 from 0:

0 = 0000 0000
-(-)5 = 1101 complement sign of subtrahend 0101
——
+5
——
0101 = + 5

In this example only the sign bit was complemented to indicate +5. The basic conditions and rules of subtraction for the sample unit are:

1. The minuend is in the B register as a result of a previous operation.
2. The subtrahend is extracted from the memory and applied to the adder by way of the M register and the complementer.
3. If the subtrahend is a positive number, both sign and magnitude are complemented.
4. If the subtrahend is a negative number, only the sign bit is complemented.

The subtract sequence with respect to timing pulses and the logic in figure 10-30 are as follows:

1. At t1 time, the subtract level is generated and applied to the proper gates.
2. At t2 time, the add-sub flip-flop is set to the zero state. The M register is cleared.
3. At t3 time, the subtrahend is entered into the M register from the memory.
4. At t4 time, the add-sub flip-flop is set to the one state. The one-side output of the flip-flop is applied to the zero input gate of the sign complementer CM_4, thereby complementing the sign bit of the number in the M register.

Assume that the number in the M register is -3 (1011). According to rule four, only the sign bit is complemented. There is no output from the complementer (CM_4) at this time, indicating a zero. Since there is no output from the sign complementer, there is no output from the magnitude complement control gate 62; and the magnitude bits remain in their true form.

If the number in the M register is positive, CM_4 complements the sign, giving an output from gate 9 which, in turn, complements the magnitude bits via gates 62 and 65.

5. At t5, no operation occurs.

6. At t6, the sign and magnitude bits are transferred from the B register to the A register.

7. At t7 time, the B register is cleared and overflow is sensed.

8. At t8 time, the contents of the adder are transferred to the B register through gates 33, 35, 37, and 39.

9. At t9 the A register is cleared by OR gate 21.

Overflow occurs during subtraction when the absolute magnitude sum of a positive and a negative number exceeds the word length of the sample unit. The overflow conditions that apply to addition also apply to subtraction.

The conditions are again $X_8Y_8\bar{A}_8+\bar{X}_8\bar{Y}_8A_8=$ overflow (OVF), where X_8 and Y_8 are the sign bits of the subtrahend and minuend, respectively, and A_8 is the sign bit of the adders output.

Multiplication

Although multiplication of binary numbers is quite simple with pencil and paper, it is very difficult to mechanize in a computer. Most digital computers multiply by means of the accumulator method. In this method the multiplicand is added if the multiplier digit is a one; but if the multiplier digit is a zero, no addition is performed. The accumulated sum is shifted right one time for each order of the multiplier. The product is formed as a result of repeated additions.

An accumulator unit consists of an adder unit and a register. In the sample unit, the B and C registers are the accumulator registers for the multiplication operation. Assume that 0110 is to be multiplied by 0101. The multiplicand 0110 is contained in the M register, and the multiplier 0101 is contained in the C register. The multiplier bits are shifted out of the C register, and the product that is the result of accumulated additions is held in the B and C registers. The contents of the B and C registers as the multiplication process progresses are shown in table 10-2. The M register is not shown.

Initially the B register is reset to zero, and the multiplier is contained in the C register. The least significant bit of the multiplier is sensed to determine whether addition should occur. After each sense and add sequence, the contents of the B and C registers are shifted right one place. The LSB in the C register is lost at each shift. This is of no consequence since this bit has been used. After the last bit of the multiplier has been sensed and the shift operation has been performed, the product is contained in the B and C registers.

The data flow can be followed in figure 10-34. The bits in the most significant positions of the two numbers are the sign bits. To determine whether the product is a positive or negative number, the sign bits alone are added. If a negative and a positive number are multiplied, the sum of the sign bits is one, indicating a negative number. If two negative or two positive numbers are added, the sum placed

Table 10-2.—Sequence of operations during multiplication.

	Register		
	B	C	
Initial	0000	0101	
Add 0110	0110	0101	
Shift right	0011	0010	
Add 0000	0011	0010	
Shift right	0001	1001	
Add 0110	0111	1001	
Shift right	0011	1100	
Add 0000	0011	1100	
Shift right	0001	1110	= correct product

in the B register is zero, which indicates a positive product. The result is stored in the most significant position of the B register. After this initial addition, the most significant position of the B register is no longer used. Only the magnitude bits that are accumulated in the B register are added.

In general the following steps are involved in the multiplication process:

1. Transfer the multiplicand out of the memory into the M register.
2. Transfer both the sign and magnitude bits of the B register to the C register. Transfer the sign bit of the B register to the A register.
3. Add the sign bit of the M register to the sign bit of the B register. Store the sum in the most significant bit position of the B register.
4. Sense the least significant bit of the C register; if it is a one, add the magnitude bits of the M register to the magnitude bits of the B register. The contents shifted right one place are transferred from the adders to the B register. The least significant bit of the adder Ad_1 is placed in D_1. The contents of the C register are shifted right one place in the D register and then transferred back into the C register.
5. The LSB of the C register is again sensed and the cycle is repeated. The mechanics for addition are carried out each time even if the multiplier is a zero. In that case, the contents of the M register are prevented from being applied to the adder; hence the magnitude bits of the B register are added to zero. The add and shift sequence is repeated until all multiplier bits have been sensed. This is controlled by the cycle counter.

The multiply sequence with reference to the timing pulses is as follows:

Sequence 1

1. At t1 time, the multiply level is generated.
2. At t2 time, the multiple control flip-flop is set to the zero state by gate 54. The cycle counter is set to four (logic not shown). The cycle counter is a down-counter used to keep track of the number of add sequences the computer must perform. Since the multiplier in this problem has four digits, four add sequences must be performed.
3. At t3 time, the multiplicand is transferred from the memory to the M register. This logic is not shown.
4. At t4 time no operations occur.
5. At t5 time no operations occur.
6. At t6 time the sign bit is transferred from the B register to the A register by gate 23. Both sign and magnitude bits are transferred to the C register by the B to C transfer gates. The count of four is decoded from the cycle counter and is applied to gate 22 in the B to A transfer network. The inverted cycle counter signal is applied to gates 83, 84, and 85, inhibiting the transfer of the B register magnitude bits to the A register when t6 occurs. The t6 pulse resets the add-sub flip-flop to the zero state. The presence of CC = 4 at gate 13 activates gate 14, allowing the MSB of the M register to be applied to the adder. If both sign bits are ones, the "end around carry," to the LSB of the adder is prevented by the presence of the multiply level at gate 18. The magnitude bits of the M register are not applied to the adder because the multiply control flip-flop is in the zero state.
7. At t7 time, the B and D register are cleared by gate 86. The least significant bit in the C register is sensed. This is the first multiplier digit. If the LSB is a one, the magnitude bits of the M register are applied to the adder. The one side output of C1 is applied to gate 56 along with t7, switching it on. Its output, in turn, switches the multiply control flip-flop to the one state via gate 58. Gates 15, 16, and 17 are activated, allowing the magnitude bits of the M register to be transferred to the adder. If the LSB of the C register is a zero, the multiply flip-flop continues to inhibit the inputs to the adder from the M register.
8. At t8 time, the sign bit from the adder is transferred into B4 by activating gate 41. The sum magnitude bits are transferred into the B register shifted one place to the right.

The multiply level at gate 41 allows transfer pulse t8 to pass. The output of Ad_4 is applied to gates 32, 33, and 34. The count of four in the cycle counter enables gate 32 if the sign bit is a one. Gate 33 is inhibited by gate 40, and gate 34 is inhibited by the inverted CC = 4 pulse. Thus, the sign bit is transferred into B4.

The output of Ad_3 is applied to B2 through gate 36; Ad_2 is applied to B1 through gate 38, and Ad_4 is applied to D4 through gate 50. The magnitude bits are therefore transferred from the adder, shifted right one place and the LSB is the MSB of the D register.

The enabled output of gate 41 also activates gates 51, 52, and 53. These gates allow the C4, C3, and C2 flip-flops to shift their bits one place to the right into the D register.

9. At t8 time, a delayed t8 pulse clears the C register.

10. At t9 time, the contents of the D register are transferred, unshifted, into the C register. This is done by activating gates 46, 47, 48, and 49. The A register is cleared by gate 21. The cycle counter is stepped from a count of four to a count of three, completing one add-and-shift sequence.

Sequence 2

Only a part of the sequence has to be repeated to sense the next multiplier digit. The ring counter starts counting at t6 utilizing the "minor cycle." Although not shown, the minor cycle level is controlled by the cycle counter, which will initiate a minor cycle as long as it does not contain a count of four or zero. The minor cycle operation is as follows:

1. At t6 time, the magnitude bits of the B register are transferred to the A register. The absence of CC = 4 uninhibits gates 83, 84, and 85, and prevents the transfer of the B register bits to the C register as was done in sequence one to obtain the initial multiplier. Gate 78 is blocked, inhibiting gates 79, 80, 81, and 82.

2. At t7 time, C1 is sensed. If it is a zero, the multiply flip-flop is reset to zero. The magnitude bits in the M register are removed from the adder inputs since gates 15, 16, and 17 are no longer enabled. Gate 14 prevents the sign bit M4 from entering the adder. If C1 is a one, the conditions are the same as they were in sequence 1.

3. At t8 time, the transfer-shift operation is performed. Since the cycle counter does not have a count of four, the sign bit in Ad_4 is shifted right one place into B3 by the activated gate 34. The adder's magnitude bits are shifted right into the B and D registers as previously described. The contents of the C register are transferred and shifted right into D.

4. At $t8_D$ time, the delayed t8 pulse clears the C register.

5. At t9 time, the contents of the D register are transferred to the C register. The cycle counter is stepped to two, completing sequence two.

Sequence 3

The minor cycle is again repeated for the third multiplier digit. The contents of C1 is sensed. If it is a one, the magnitude bits of the M register are added to the contents of the B register and a shift is performed. If C1 is a zero, the contents of the B register are added to zero and a shift is performed. The various transfer functions are then performed and the cycle counter is set to one, completing sequence three.

Sequence 4

The three magnitude bits of the multiplier were sensed and shifted in the first three sequences. In sequence four, the bit contained in C1 is the sign bit of the multiplier. It was originally placed in C4. The sign bit of the multiplier should not be considered as a multiplying digit. The CC = 1 input blocks gate 56 and activates gate 55 at t7 time, setting the multiply control flip-flop to the zero state and inhibiting gates 15, 16, and 17. Therefore, the contents of the M register cannot be added to the bits in the B register during CC = 1. The last transfer-shift cycle is then performed, producing the correct product in the B and C registers.

MULTIPLICATION OF NEGATIVE NUMBERS.—The logical diagram does not show all the gates that are needed to multiply by a negative number. If the multiplier originally contained in the B register were a negative number, the magnitude bits would be complemented. They would have to be changed to their true form before being sent to the C register.

ROUNDOFF.—The word length of the product frequently exceeds the capability of the machine. When it does, a roundoff procedure is generally used, and only the bits in the B register are retained since they are the most significant digits. If the bits in the C register are 1000 or more, a one is added to the least significant bit in the B register. It must be remembered that a practical computer has a word length much longer than four bits. Therefore, the bits lost during roundoff in a practical computer have much less significance than those in this sample machine.

Division

As mentioned in the introduction, division is not performed in this sample machine The number of additional elements required make showing the divide operation impractical. An examination of the division process shows the requirements of the arithmetic unit.

Binary division can be performed by using the longhand method in the same manner as decimal division, as shown in the example below:

Decimal	Binary
$\begin{array}{r} 3 \\ 4\,\overline{)12} \\ \underline{12} \\ 0 \end{array}$	$\begin{array}{r} 11 \\ 100\,\overline{)1100} \\ \underline{100} \\ 100 \\ \underline{100} \\ 0 \end{array}$

In both the decimal and binary systems, division can also be performed by successive subtractions. The total number of subtractions required is the quotient.

Decimal

$$\begin{array}{rl} 12 & \\ \underline{-4} & \\ 8 & \text{1st subtraction} \\ \underline{-4} & \\ 4 & \text{2nd subtraction} \\ \underline{-4} & \\ 0 & \text{3rd subtraction} \end{array}$$

Binary

$$\begin{array}{rl} 1100 & \\ -\underline{100} & \\ 1000 & \text{1st subtraction} \\ -\underline{100} & \\ 100 & \text{2nd subtraction} \\ -\underline{100} & \\ 0 & \text{3rd subtraction} \end{array}$$

The mechanized process combines characteristics of both of these methods. In binary division:

1. Each time a subtraction leaves a positive remainder, a one is placed in the quotient.
2. Each time a subtraction leaves a negative remainder, a zero is placed in the quotient.
3. The remainder is shifted left one place with respect to the divisor after each subtraction.

Using these rules, the solution of the sample problem is as follows:

Dividend	1100
Divisor	100
Remainder	0100
1st quotient bit	1
Shift remainder left	1000
Divisor	100
Remainder	0
2nd quotient bit	1

Therefore, the total quotient would be 11. A comparison of this method and longhand division shows that the relative positions of the divisor and the dividend are the same. In the longhand method, 100 is first divided into 110 (the three most significant bits in the dividend). In the successive subtraction method, 100 is subtracted first from the three most significant digits since they are divisible by 100. Since the divisor is smaller in value than the first three digits, the first quotient bit is a one.

In the longhand method, the remainder as a result of the first subtraction is 10, and the next dividend digit is brought down so that the new remainder is 100. The divisor is divided into this remainder, and the result is one. In the successive subtraction method, the same relative positions of the divisor and remainder must be maintained in the computer. Hence, the remainder is shifted left one place before the next subtraction is performed. Since the divisor is not larger than the remainder, the second quotient bit is one.

In the previous example no zero was generated in the quotient. The following case illustrates what steps are taken to generate a zero. Divide 45 by 9 using the longhand method.

$$\begin{array}{r} 101 \\ 1001\quad\overline{)101101} \\ \underline{1001} \\ 1001 \\ \underline{1001} \end{array}$$

Bringing down the next digit results in a remainder that is smaller than the divisor, calling for a zero to be placed in the quotient.

The successive subtraction method on the same problem results in the following:

Dividend	101101
Subdivisor	1001
Remainder	001001
1st quotient bit	1
Shift remainder left	010010
Subdivisor	1001
	101110
2nd quotient bit	0
Restore-add	101110
	1001
	010010

Shift remainder left	100100
Subdivisor	1001
	0
3rd quotient bit	1

Again the total quotient is 101.

The results of the first subtraction is a positive number. The remainder is shifted left one place, but is still smaller than the divisor. After the subtraction is performed, a negative remainder results. The computer detects this by noting that the MSD will require a borrow. This excess borrow is called an "overdraw."

When an improper subtraction is performed, the remainder must be restored to its original value before the next operation. This is accomplished by adding the divisor to the remainder before the next shift occurs. This is called a restore-add operation.

Division Mechanization Problems

Three mechanization problems arise in division operations: determining the correct position of the divisor with respect to the dividend, detecting an overdraw, and storing the quotient.

The initial problem is to determine the correct position of the divisor with respect to the dividend. If a binary 25 were divided by a binary 5, the relative positions would be:

```
11001
101__
```

However, if the divisor were a binary 7, the positions would have to be:

```
11001
0111_
```

One method of solving this problem is to aline the most significant bits of the dividend and the divisor; then subtract. If an overdraw occurs in this initial subtraction, the relative positions are incorrect, and an additional order of the divisor must be used.

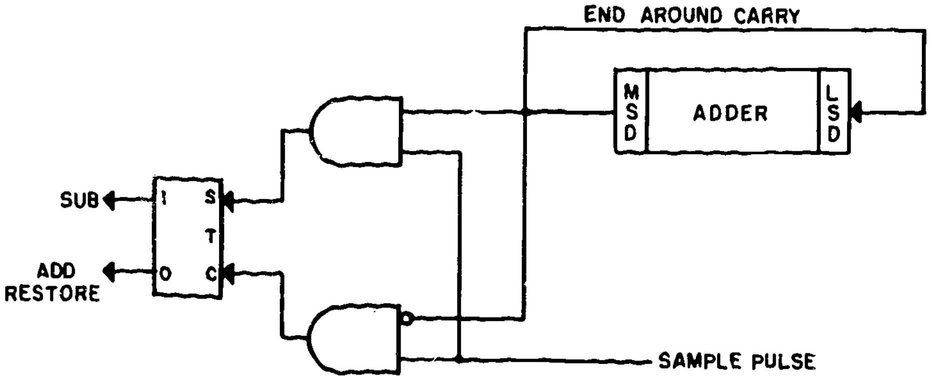
To obtain the proper order, a restore-add operation is performed, shifting the divisor one place to the right. Subtraction is then repeated. If no overdraw occurs, the order is correct.

Detecting an overdraw is the second problem. Subtraction is usually performed by complementing and adding. Whenever the subtrahend is smaller than the minuend, an end-around-carry develops when the subtrahend is complemented and added to the minuend. No carry develops if the minuend is smaller. When there is no end-around-carry, an overdraw has occurred.

In figure 10-35, a carry allows an overdraw control flip-flop to be set to the one-state when a sample pulse occurs. The absence of a carry allows the flip-flop to be reset to the zero state. The state of the flip-flop determines whether the following sequence is to be a subtract sequence or a restore-add sequence.

A third problem is the storage of quotients. The quotient bits can be stored in a shift register. A quotient sampling pulse allows a one to be placed in the least significant position of the shift register if the overdraw flip-flop is in the one state as result of a successful subtraction. A subsequent shift pulse places the bit in the next position of the register and the cycle is ready to start again.

In the problem above, the final remainder was always zero. In a practical problem this



TD. 588

Figure 10-35.—Overdraw detect network.

is rarely the case. The division process is repeated as many times as necessary on the remainders to the right of the binary point to produce the desired accuracy, limited, of course by the bit handling capacity of the particular unit being used.

MEMORY UNITS

The kind of storage employed by an automatic digital computer is decisive in determining the form a computer may take. A computer's storage or memory is sometimes referred to simply as a store.

LEVELS OF STORAGE

Internal storage refers to storage which the programer, or coder, would normally use. It is located within the arithmetic unit or main storage, and is characterised by high speed and low capacity.

Secondary storage is cheaper and slower in access, but it has larger capacity—perhaps hundreds or thousands of times as much. Access time could be as small as milliseconds for nagnetic drums or up to minutes for magnetic tapes. Blocks of secondary storage are normally referred to the arithmetic unit as required, instead of direct reference to a specific storage location of a specific stored word.

External storage refers to punched cards, punched tapes, and magnetic tapes stored in files or cabinets, which the computer does not have direct access to. External stored information is in a form which the computer can use, but it is physically separate from it.

The capacity of a store is measured by the amount of information in bits or (binary) decisions it can store. The storage capacity of a flip-flop is one bit. A register can store one word at a time, but an array or matrix of magnetic cores may store 10,000 words with fairly small bulk (each core may have an outside diameter of only 50 mils). The storage capacity of magnetic tapes used for external (slow access) storage may be essentially without limit.

Access time refers to the time required to write in and read out information from storage, including the time to communicate with the storage location. If destructive readout is employed, the "destroyed" information must be written back in before the cycle is complete. Random access is said to occur if access to any storage location is independent of the storage address of the previous word. Access is said to be cyclic if the access time depends on the location of the previous word, as in the case of a rotating magnetic drum. (With a rotating magnetic drum, the addresses available at any given instant depend on the instantaneous drum position.)

Random access time for internal storage may be typically a few microseconds, but for secondary storage, milliseconds to minutes are required.

Static or dynamic storage refers to whether the information changes location or not (when it is not being used). Examples of static storage devices are flip-flops and magnetic cores. Examples of dynamic memory devices are delay lines (with circulating pulse trains) and rotating magnetic drums.

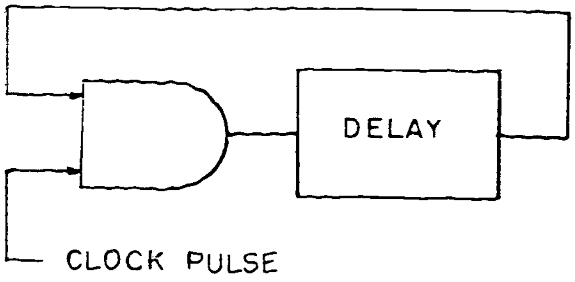
Erasable storage is widely used in computers since it is essential in many instances to be able to store different words at different times at the same storage location. Examples of erasable storage include magnetic drums and magnetic tapes. Examples of nonerasable storage are punched cards and punched tapes.

Volatility relates to the loss or alteration of stored information due to an unintentional power loss. Regeneration or the periodic reinforcement of stored information, which is a common practice in dynamic storage, usually results in a volatile situation.

Serial (series) or parallel access refers to reading or writing one bit at a time or simultaneously. When all bits of a word are transferred in the same cycle, operation is said to be parallel. Only the smaller binary computers are entirely serial in storage access; on the other hand, very few computers use parallel storage systems altogether. Most use a series parallel arrangement. A parallel arrangement provides high speed at the cost of a great amount of additional equipment. On the other hand, a completely serial situation is usually too slow.

RECIRCULATING STORAGE

Dynamic storage requires by definition that the stored information be moving. Therefore, it becomes necessary to recirculate the signal over a given path to prevent running out of path if storage is required for more than a very short length of time. Presented in its most basic terms, the situation in figure 10-36 applies.



TD. 589
Figure 10-36.—Basic storage unit, block block diagram.

Clock Pulses

An idea which is basic to most digital computation is that of a uniform rate of counting (operating) or synchronous operation. To obtain this, a clock, or master clock as it is sometimes called, is employed. This clock controls the rate of, or produces, clock pulses. The spacing between these pulses defines the interval during which an event can occur.

If the signal is delayed for n (clock pulse) intervals and is fed back to the input of the AND circuit as shown, it is continuously regenerated by the action of the AND circuit, thus storing n bits of information in the loop. The AND circuit produces an output signal only when both inputs are present, that is, in the 1 condition. When the delayed signal is in the 0 condition, the output is a 0 signal. The delay can be any convenient length and may store hundreds or thousands of digits. Accordingly, such a scheme is rather economical.

DIGITAL MAGNETIC TECHNIQUES

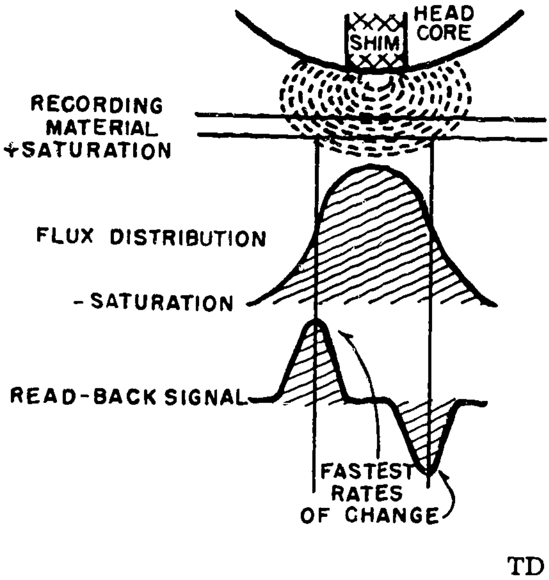
The process of recording a 0 or a 1 on a magnetic medium (consider tape, for example) appears straightforward enough, and is; but the techniques used vary considerably from those used for the more familiar recording of speech. The two opposing problems are to obtain the highest packing density (the number of stored bits per inch of recording tape) and to maintain reliability. To obtain a reasonably high packing density, it is obvious that some distortion can be tolerated.

To record digital data efficiently, a saturation amplitude signal is normally employed. This results in a memory output signal which is a gross distortion of the pulse being recorded. In fact, the signal which is read back is essentially the derivative of the pulse which is read in, or recorded. This is true because, when the magnetic medium is saturated, the output winding "sees" no change in flux and therefore produces no signal. The only time a signal is produced, then, is when going into or coming out of saturation. (See fig. 10-37.)

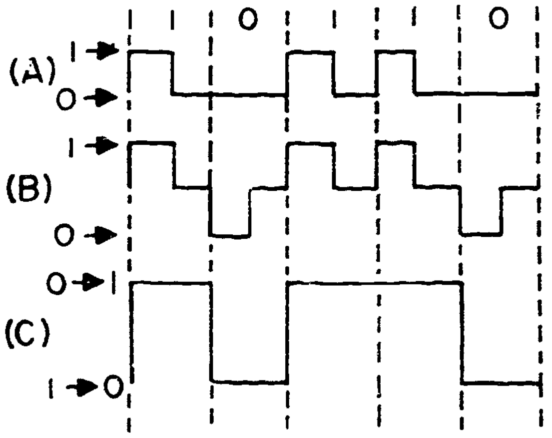
The amplitude of signals recorded may be two-level or three-level, depending on whether a condition of zero magnetization is allowed to occur other than instantaneously. See waveforms (A) and (B) of figure 10-38. Sometimes nonreturn to zero techniques are used so that a waveform such as that shown as waveform (C) of figure 10-38 occurs. Notice that no change of output level occurs when succeeding digits are the same (two successive 1's, for instance). This means that no playback signal (pulse) would appear at this time. With a long series of 1's, it becomes apparent that timing pulses become a necessity; otherwise counting the time intervals would become very difficult.

In fact, it is generally necessary to devote a recording track to the sole purpose of recording timing or synchronizing signals (pulses).

Since the playback (readout) signal waveform is usually of a different shape than that of the readin signal, it is often processed to restore it to the original shape.



TD. 590
Figure 10-37.—Magnetically recording a pulse.



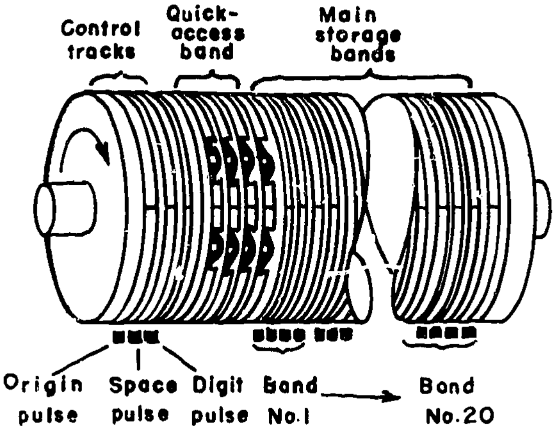
TD. 591

Figure 10-38.--Waveforms for binary number 10110. (A) A two-level system; (B) a three-level system; and (C) a nonreturn to zero system.

MAGNETIC DRUMS

A magnetic drum is the cheapest form of internal storage for a small computer; the data stored on the drum is erasable but nonvolatile (not lost when power is turned off).

The magnetic surface of a rapidly rotating drum such as that shown in figure 10-39 is a very economical main store for a small computer. Rotating at a speed of several thousand rpm, a track spacing of several tracks per inch may be obtained. Each track has the capacity of storing many bits, normally in the thousands, depending on the drum size, speed, and so forth.



TD. 592

Figure 10-39.—Magnetic drum.

Heads for writing on or reading from the drum, figure 10-40, are mounted so that the drum rotates past and in close proximity to them.

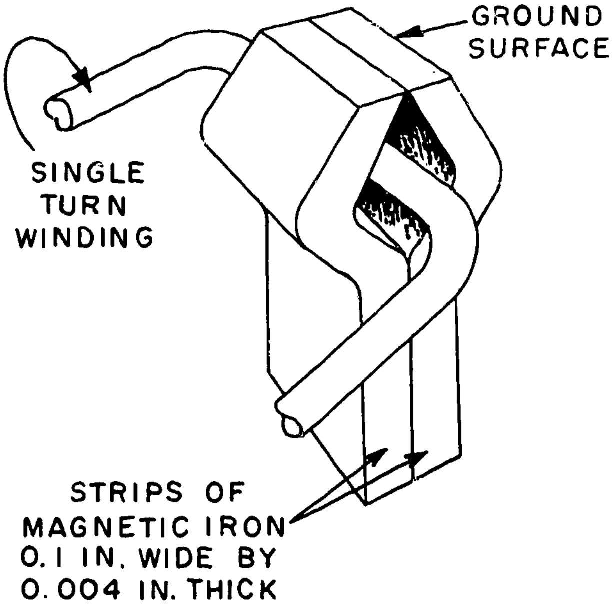
Access to data stored on the drum depends on the rotational speed and the location of the particular data desired. When the desired data has just passed the head, access time is maximum—one revolution. If the desired data is under the head, access time is nearly zero. Thus, for the general case, average access time is half of a drum revolution, but by "optimum programing" this can be reduced.

The drum shown in figure 10-39 includes a quick access band, each track of which is composed of several recirculating loops. These loops waste the portion of track, if any, which is not between the two heads that comprise a loop.

Magnetic drums vary greatly in capacity and operating speed. Speeds of 3,000 to 17,000 rpm and diameters of 4 to 12 inches result in average access times of 2 to 10 milliseconds.

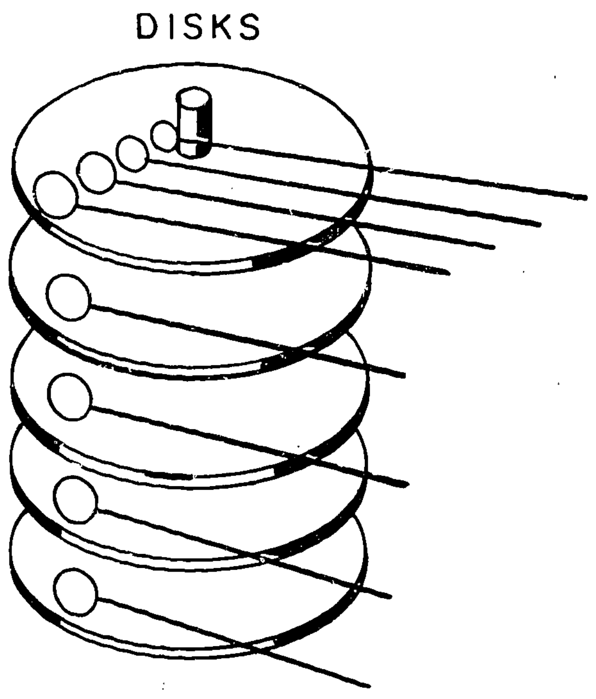
MAGNETIC DISK

The magnetic disk, figure 10-41, is similar to a phonograph record except that the tracks are circular instead of spiral. The spacing of



TD. 593

Figure 10-40.—Magnetic drum head.



TD. 594

Figure 10-41.--Magnetic disk diagram.

the recording heads is maintained by an "air bearing." A very high storage capacity is characteristic of this type of storage. Its low mechanical inertia makes it appealing for airborne applications. Disk storage has been built with 100 concentric tracks on each side of each disk.

MAGNETIC TAPE

Perhaps the most familiar type of storage to the Navy technician is magnetic tape. The materials used may be the same as those used for audio recording, except that very high quality tape is required to avoid missing an occasional bit.

Seven channel tape is usually one-half inch wide. Its recording density is normally from 100 to more than 500 characters per inch of tape. Thus a 2,400-foot roll can store about 3 to 16 million characters. This is less than the apparent maximum because the gap between recorded sections of tape may be from 1/2 to 2 1/2 inches. Obviously, the tape must be brought up to speed before reading or writing is begun. A 26,400-foot tape with 200 characters per inch holds as much data as 25,000 cards, each 80 columns wide. Tape speed may be as high as 240 inches per second.

Under ordinary operating conditions, magnetic tape is usable up to 50,000 times; data on a used tape may, of course, be transferred to a new tape. Temperature and humidity variations may cause the oxide surfaces to crack, and dust may cause a signal to be missed. Oil or moisture from manual handling may encourage the collection of dust.

MAGNETIC CORES

Large computers employ many small toroidal (ring or doughnut shaped) cores made of ferrite, each of which can store one bit of information by becoming magnetized. The magnetizing force required is modest, since a single conductor passed through the core will suffice to perform the function of a winding. An array of such cores, typically each only about one-twentieth of an inch in outside diameter, was mentioned previously.

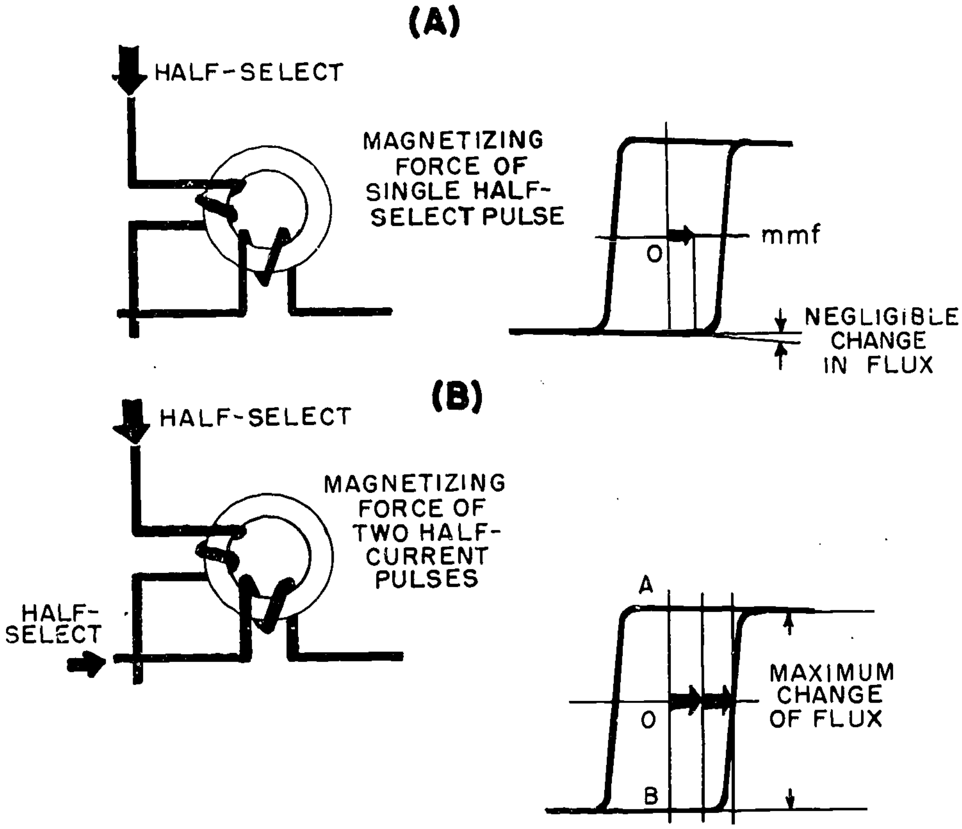
By arranging these cores in a rectangular matrix or array, very short access times are common because parallel access is practical with the use of modern high speed semiconductor switches. Access times of less than 10 microseconds are practical and commonplace.

By coincident current techniques, any single core may be selectively readin or readout. That is, by passing a current through a given core, the two fluxes may be made to add and to exceed the threshold value necessary for switching the selected core. (See fig. 10-42.)

The use of a third winding permits sensing the switching of a core. That is, if interrogated by two coincident (additive) half-select pulses, the core switches and the change of flux induces a pulse into the output winding. Obviously, half-select pulses are passed through a core often when reading into or writing out of adjacent cores, but these should cause no harm. Readout causes the core to switch; this is destructive and requires that the information regenerated if it is not to be lost.

Hysteresis Loops

The hysteresis loop of a ferrite core is essentially square, as depicted in figure 10-42. However, the heavy line which indicates this loop applies only for the case where a symmetrical magnetizing force is applied—certainly



TD. 595

Figure 10-42.—(A) A single half-select pulse; (B) coincident (additive) half-select pulses.

not the general computer use situation. A much more realistic representation of the hysteresis phenomena is shown in figure 10-43.

A family of curves such as shown in figure 10-43 illustrates what occurs in a magnetic circuit when excited in anyway other than the simplest way. The solid lines apply when the variable, positive magnetizing force, H, is increasing flux in a positive direction (from P to Q to P'). The dash lines apply when it is decreasing.

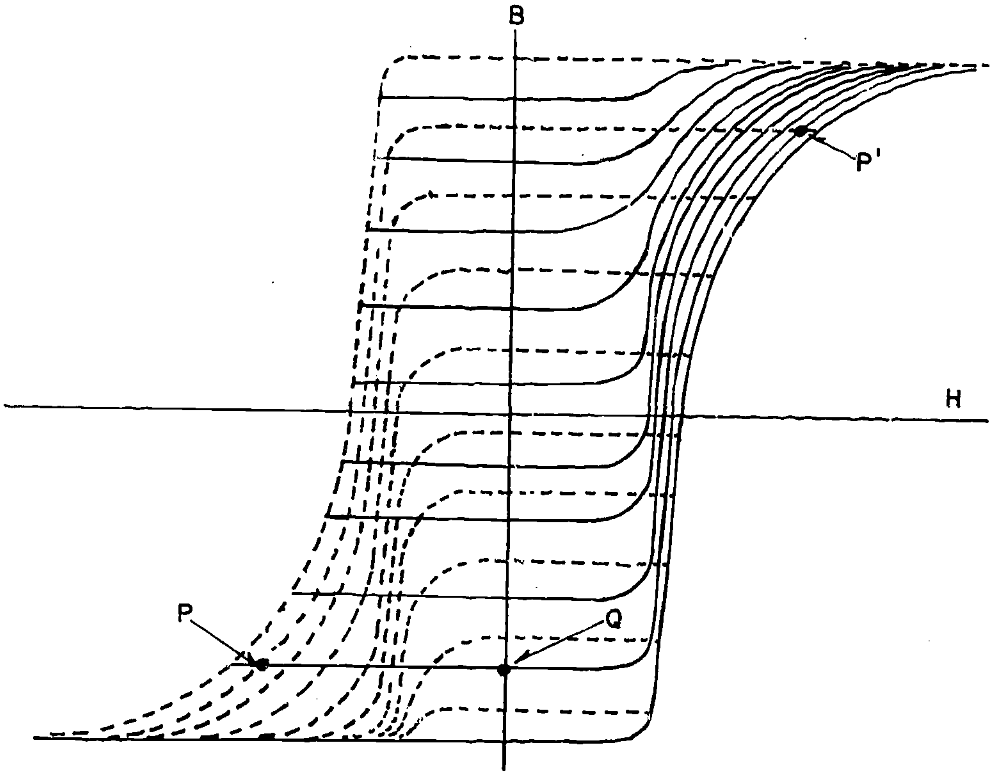
Actually, a complete representation would have to show that successive B-H loops do not exactly close; but each time a new loop is formed, it more closely approaches the previous loop, until the difference becomes undetectable after a few cycles.

Testing

A testing waveform of current is used to determine the cumulative effect of half-select pulses on cores. Ideally, of course, a half-select pulse will have negligible effect on a core. In practice, this is not entirely true, as may be suspected.

To determine the effect of many half-select pulses on a given core, the waveform shown in figure 10-44 is applied to a core to be tested. A pickup winding is used to sense the response of the core to this testing waveform, and its signal is applied to an oscilloscope which is synchronized with the testing waveform.

The testing waveform (fig. 10-44) is essentially divided into two parts. Part (a) consists of a write pulse, w, followed by a single disturbing pulse, d, and a read pulse, r. Part (b) is similar, but includes several disturbing pulses. The response to the two reading pulses is a measure of the disturbance caused by the several disturbing pulses (b) as compared with the single pulse in (a). If the response to disturbance pulses is excessive, the cores must be rejected.



TD.596

Figure 10-43.—Magnetic hysteresis loops.

OTHER MAGNETIC UNITS

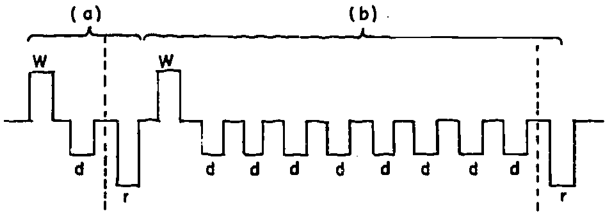
A nondestructive readout device with characteristics similar to the ferrite core just described is called the transfluxer, figure 10-45. In this case, a second, smaller aperture is employed to allow sampling and possible switching of only that portion of flux around the small hole for readout, a procedure which does not switch all of the flux contained by the core.

A thin film dot array memory (fig. 10-46) promises very fast, compact and probably inexpensive switching for the future. The feasibility of a cycle time of 0.2 microsecond has been demonstrated.

The magnetic characteristics of this thin magnetic surface (fig. 10-46) are directional in nature. That is, the film is easy to magnetize in one direction, but hard in a direction at right angles to the easy direction. The magnetization characteristic in the hard direction is essentially without hysteresis (instead of a B-H loop, it collapses to a line), but the B-H characteristic in the easy direction is the familiar square loop characteristic.

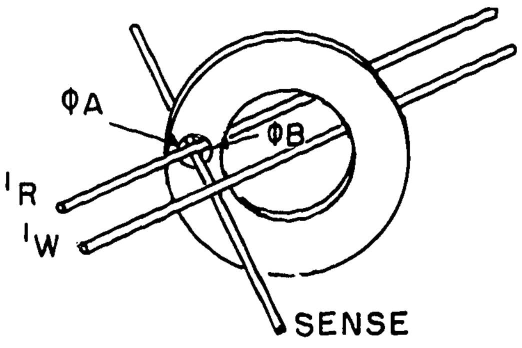
ACOUSTIC STORAGE

As previously mentioned, delay lines in combination with an AND circuit provide the basic mechanism of dynamic storage. Because, for a given amount of time delay, acoustic (pressure wave) delay lines are less unwieldy



TD.597

Figure 10-44.—Testing waveform for territe cores.

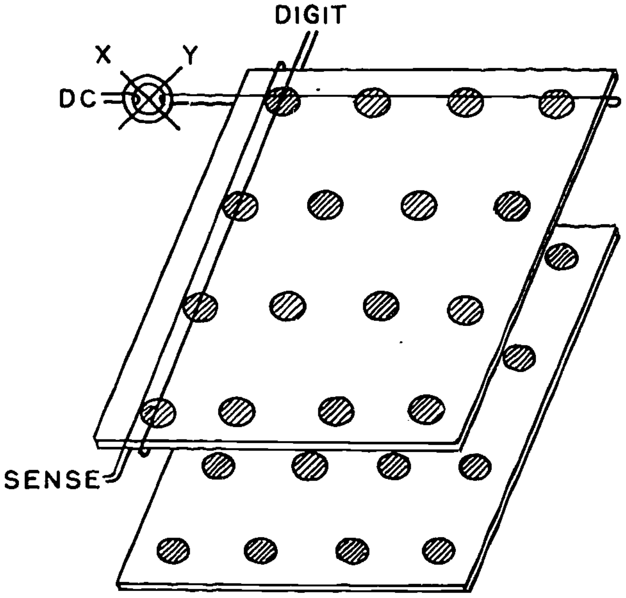


TD. 598

Figure 10-45. —Transfluxer, multiaperture ferrite core.

(than electromagnetic types), their use has been exploited to a considerable degree. Liquids were first used, including mercury, but many difficulties appeared, even for ground operation. As a result, solid delay media have received much attention.

Quartz delay lines have been in the field for quite some time. The piezoelectric effect is employed to impart the signal to the crystal and to recover it. For critical application, such as this, an oven is employed to stabilize against the effects of temperature variations.



TD.599

Figure 10-46. — Film dot array memory.

A frequent problem with quartz delay units is that more than one type of wave may be propagated. Further; these several waves may have different velocities and polarizations.

Small nickel wires or thin-walled tubes have the advantage of propagating a wave very nearly purely longitudinal in form. Magnetostrictive excitation is employed, as indicated in figure 10-47. The ends of the wire or tube are terminated in some manner to absorb unwanted waves, sometimes clamped by a rubber pad or embedded in a tube of grease.

Excitation directly by pulses is employed. The pulse duration may be a few microseconds. For a given delay, the attenuation is somewhat less than with a mercury tank. The wire can be bent, which is quite important, since the velocity of propagation of a pressure wave through a solid is considerably faster than through a liquid.

Waveform distortion of considerable consequence occurs with this device. The transducer coils must be physically configured to be compatible with the duration of the transmitted pulse.

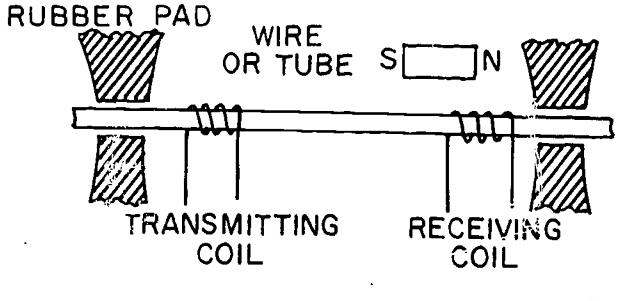
Electrostatic storage has been used, but is not expected to have airborne applications.

STORAGE REGISTERS

The internal storage requirement for a very fast-essentially zero-access (and operation) time device with limited storage capacity is accomplished by the use of a register or shift register, which is typically electronic but can be magnetic and may be devised by multiple cascading of flip-flop circuits (multivibrators).

(The usage of the term flip-flop refers to the bistable circuits that make up a shift register.)

The principle of a register is indicated in block diagram form by the string of flip-flops, A, in figure 10-48. Each flip-flop may be set independently and simultaneously by set pulses which may cause each one to assume the 0 or 1 condition to correspond with the binary digits of the particular (binary) number being stored. Thus each bit of a binary word is positionally related to its corresponding flip-flop. Consider that each flip-flop is driven by the one to its left and drives the one to right in such a manner that, when triggered, the succeeding flip-flop will assume the condition (1 or 0)



TD.600
Figure 10-47.—Nickel wire as delay.

previously held by its driving circuit. Thus, introducing a pulse representing a 1 or a 0 to the flip-flop on the left causes it to assume the corresponding 1 or 0 condition as ordered, and consequently shifts the condition of each flip-flop to the right one "notch," so that the number which is stored is shifted one notch or flip-flop. What has been described is series shifting. The value of this process may be visualized by remembering that long hand multiplication requires the addition of shifted numbers as a final step in obtaining the product.

Another mode of operation is actually depicted by figure 10-48—namely, parallel shifting. In such a case, the number under consideration is transferred from one register, A, directly to a second, B. It may then be returned to A along an oblique path, thus displacing (shifting) it either to the right or to the left, depending on which kind of shift was desired. (In this case, the string of flip-flops, A, are not sequentially connected to each other, nor are those of B.) The output bistable circuit may be fed back to the input to complete the loop, thus accomplishing a circulating loop which may be used to recirculate the stored number or word indefinitely.

INPUT AND OUTPUT UNITS

The input and output units provide the means of communication between the computer and the operator/evaluator. In order to solve problems and process data, the data and instructions must be inserted into the computer, and the computer must deliver the results of its calculations. The problem is to provide the computer with information at a speed which uses the tremendous speed of the computer. The units which provide the information and read the results obtained from the computer vary with the particular installation.

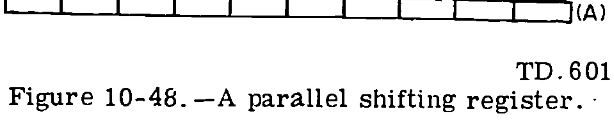
A program is written which describes the sequence of calculations which the machine is to perform. The problem data are collected and inserted into the computer which reads the program plus the data and stores this information. Having stored the necessary program and data, the computer is then started. After completing the series of calculations which it must perform, the computer produces the results which must be converted into indications (indicators or readable information).

The methods of providing the information for the computer varies with the requirements for the computed information. Mechanical changing information must be converted into digital language (analog to digital conversion). If the computed results are recorded on an indicating device, conversion from digital back to analog is necessary. Computer information will also come from units which prepare punched and magnetic tape and punched cards.

DATA CONVERSION

All converters are essentially counting, weighing, or reading devices. The output of the converter should be compatible in form and time availability with the computer that is to use it. The speed, precision, and accuracy required of the measurement determine the type converter used. Since the majority of inputs to airborne computers are available in analog form, the analog to digital converter type input is used extensively. Devices of this type are available to convert most analog inputs to digital form with almost any desired degree of accuracy.

If it were necessary to determine each of the required quantities for a given problem, to convert it into digital form, to encode it and determine the program, and to apply these to the computer, the computer speed would be of no significant value in one-time solutions. The value of computers in actual flight situations



TD.601
Figure 10-48.—A parallel shifting register.

lies in the automatic and repetitive nature of the computer. Specifically, this includes the following abilities:

1. To accept the required data automatically, provided only that it be included in the program and that it be in the proper form for use by the computer.
2. To perform the programed computations with great speed.
3. To perform the same computations over and over.
4. To make corrections during each computation cycle, as the situation requires, reflecting any change in values that may have occurred since the last previous cycle.
5. To store the result of the last previous calculation for use in the next computation.

ANALOG TO DIGITAL COVERTERS

During a flight, all variable quantities probably originate in analog computers. Since a digital computer accepts only binary quantities, the analog data must be routed through a converter and changed into digital form for insertion into the computer.

A typical problem involving changing quantities is the question whether the remaining fuel is sufficient to allow the aircraft to reach a given destination. Almost all factors applicable to such a problem are variable—time, fuel, airspeed, groundspeed, drift, altitude, fuel consumption rate, etc. Analog computers determine the present value of each quantity and supply it to the converter, which then converts the data into digital form. The computer may have a program outlined by which all the variables are considered in calculations that finally result in a YES or NO answer. The YES answer might cause a green indicator to light, and NO might cause a red indication. The computer must cycle the program continually, correcting the various quantities as needed, and temporarily storing the rate of change of each quantity, as well as the value of the latest computed quuntity. With this arrangement, computations based on latest available data can continue in the event of interruption of operation, and the margin of error is decreased in that event.

The limit of accuracy of a computer is the least significant digit. There is no advantage in having an analog device more accurate than the control data available to it. As an example, a servo positioned by a five-digit binary control signal can indicate angles no closer than 1/32 ($2^5 = 32$) of a revolution, or approximately 11.3°, regardless of the precision of the servomotor itself. The precision of output devices should be matched to the stored data, or at least to the level of accuracy required in the output application.

Angular converter outputs may be matched in reference to a defined 0° reference, or in reference to the last previously indicated angle. Many analog to digital converters utilize a wheel, a ring, or a spiral shaft encoder which is electrically or mechanically positioned by the quantity being measured. Several general types are discussed below.

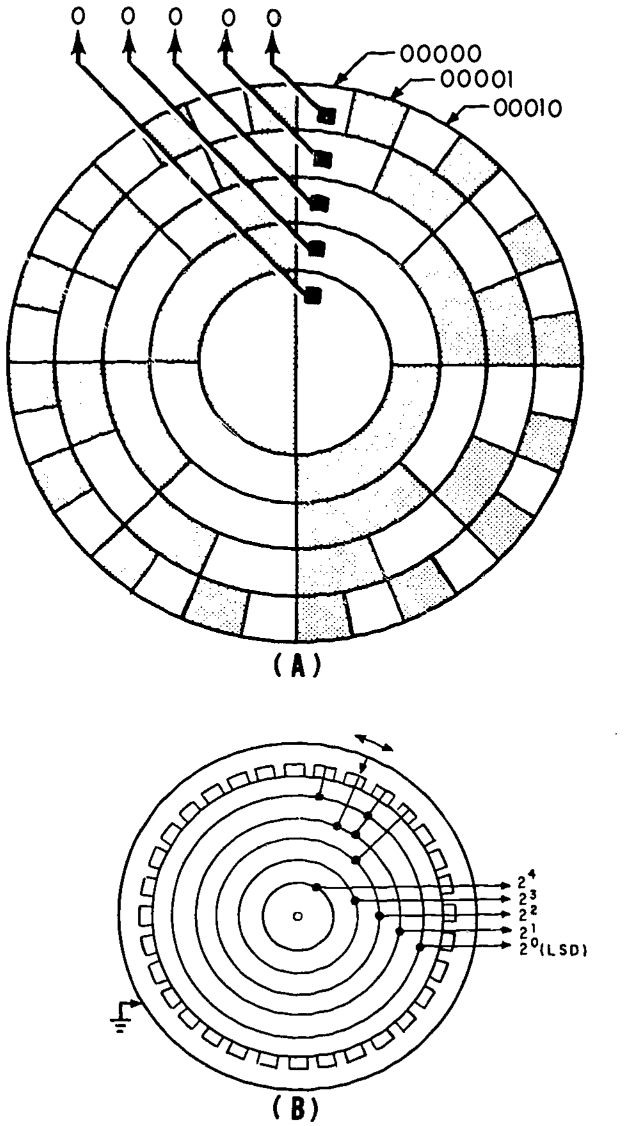
Mechanical Converters

SIMPLE BINARY WHEEL.—The binary wheel is a flat disk composed of concentric circles with each ring divided into twice as many sectors as the adjoining inner ring. Thus a properly coded wheel divides a circle into sectors, with the number of rings determining the accuracy of the device. Figure 10-49 (A) shows a five-bit shaft encoder of the general type just discussed.

Instead of the concentric rings, parallel bands on the wheel perimeter could be marked and used to perform the same function. Coding could then be based on conducting and nonconducting layers, magnetic and nonmagnetic segments, transparent and opaque segments, or raised and lowered segments which operate to open and close electromechanical switching devices. (See fig. 10-49 (B).)

SINGLE BRUSH SHAFT ENCODER.—A modification of the shaft encoder consists of a single brush on the shaft, making contact with multiple tabs on the perimeter of a wheel. These tabs are connected to buses in a nonrepeating binary code. Since the tabs are all on the perimeter of the wheel, only one brush is required, regardless of the number of points which are to be indicated. This results in the following three major advantages:

1. The rings need not be concentric or coplanar, but simply electrically insulated.
2. Identical printed wafers with distinctive tab codes could be stacked to form the switch.
3. A 14-digit encoder could be built using the same size case, housing, etc., as a five-bit unit.



TD.602

Figure 10-49.—A simple five-bit shaft encoder. (A) With five output requirements; (B) with a single output required.

GEAR DRIVE SHAFT ENCODER.—Most angular to linear conversion devices introduce a positional uncertainty which must be eliminated, either by limiting the permissible angle or by using two conversion units. The gear drive does not have this problem; it may be designed to represent any angle. The limits imposed are the minimum angular resolution and the maximum permissible size of the components. The minimum angular resolution is determined by the number of teeth per revolution. (See fig. 10-50.)

Electrical Converters

LINEAR POTENTIOMETER.—A potentiometer may be used with its two ends connected to fixed reference potentials. The angular position of the slider may be represented by the unloaded voltage at the slider. Any variation in the reference voltage, or any current in the sensed voltage, can introduce errors into the reading. The voltage can be used directly (analog), or it may be supplied as a scaled voltage to the converter. For digital applications, a tapped rather than continuous potentiometer may be used, with the output then encoded to binary form for input to the computer.

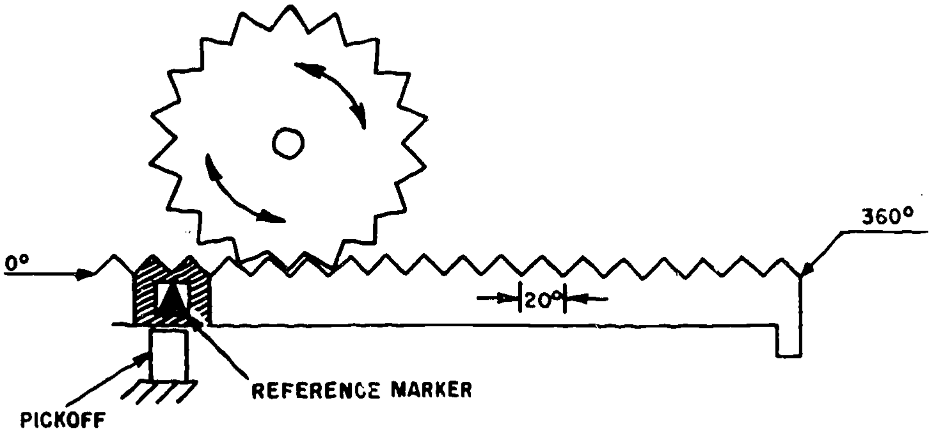
VOLTAGE TO NUMBER CONVERSION.—Electrical analogies (analogs) of most measurable quantities have been developed, with most instrumentation presenting its output as a scaled voltage (1 volt = 100 miles, 1 volt = 1,500 gallons, etc.). It is necessary to convert both the voltage level and the scale factor into terms usable by the computer. It is not always necessary that the scale factor be inserted, as long as the computer has it stored at a unique address.

Examples of voltage to number converters are the digital voltmeter and the self-centering potentiometer used in angle to number conversion.

VOLTAGE TO TIME TO NUMBER CONVERSION.—A converter of the voltage to time to number type, in its simplest form, is very useful in scaled systems. The converter may require clock pulses, a linear sawtooth of voltage (ramp), a voltage comparison circuit; and a voltage that is to be measured.

Digital conversion is provided by starting a digital counter that has been synchronized with the sweep, and stopping it when the sweep voltage and the unknown voltage are equal. The clock pulses are counted, and the voltage change per unit time (Δ E/t) factor is applied, so that the output reading is converted into a number. There is one counted output for each sweep as long as the unknown voltage is within the calibrated range of the sawtooth.

Accuracy of this system is limited by the slope of the sawtooth, by the accuracy of the timing system, and by the precision of the voltage comparison system. Making the same measurement concurrently (using two or more



TD. 603

Figure 10-50.—Gear drive shaft encoder.

converters) and averaging the results decrease the inaccuracies of the system.

The system indicates an instantaneous value; nothing is shown concerning the behavior of the input voltage before or after its intersection with the sawtooth. The sawtooth need not be linear, provided that its voltage as a function of time is known and used in the calculation.

SELECTIVELY ADD-SUBTRACT SYSTEM.—The operating principle of this system is the same as that of an equal arm balance, where an unknown weight in one pan is balanced by selectively adding or subtracting known weights in the other pan. The limit of accuracy, disregarding friction, is ±1/2 the smallest balance weight available. Similarly, a voltage balance analog system, selectively adding or subtracting scaled resistors until balance is obtained, may be used. The advantage of this system is that the voltage may be larger or smaller than the reference voltage. A simple example is a balanced bridge with binary adjustments. The system may start either from a fixed point or from the last used point, with switching automatically sequenced and controlled by the computer.

DIGITAL TO ANALOG CONVERTERS

It is often necessary for the digital output to be converted to analog quantities in order to actuate a servo or some other device of an analog nature. Again, a converter is required; but in this case, it must be a digital to analog converter.

Practically any encoder (analog to digital converter) can be used as a decoder (digital to analog converter), either directly or in combination with a null-seeking driver. Frequently the only modification required is reversing the input and output functions of the device.

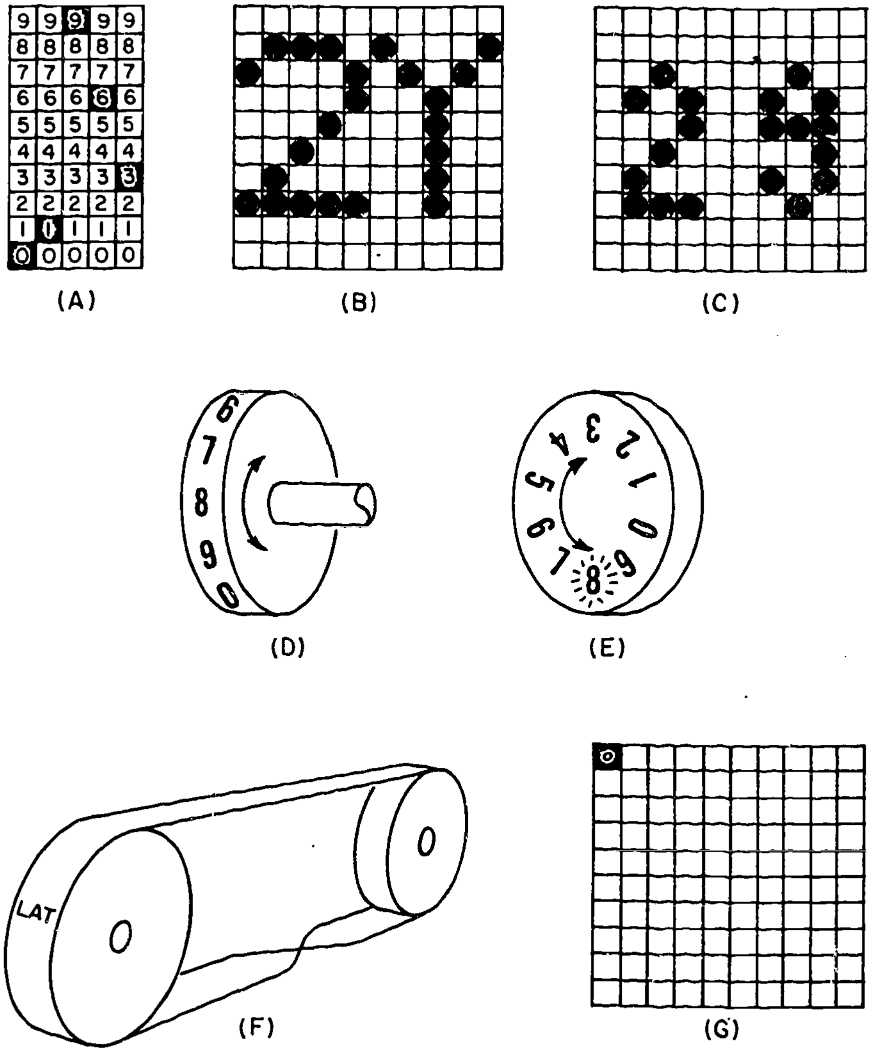
READOUT DEVICES AND METHODS

Symbolic displays are generally employed for immediate use. The display system (matrix) may be formed by an array of individual lights; it may be based on variations of intensity or color on a CRT; or it may represent the locus of points on an X-Y plotter or on a DRT plotter table. Computer output voltage levels and data rates can be adapted to produce any of these displays. The specific type selected will depend primarily on the application.

Timing and retentivity (or recording) may be selected to provide a display similar to that of an oscilloscope, of a radar indicator, or of a television set. The data can be arranged in alphanumeric, graphic, or photographic form. Multiple displays, using combinations of several individual display systems, are used in most airborne and military computers, both digital and analog. Figure 10-51 illustrates several common readout devices.

Lights

Each individual light may be considered as the equivalent of a binary stage: ON—true or



TD.604

Figure 10-51.--Readout display matrices. (A) Positional illuminated display; (B) 5 x 7 alphanumeric display; (C) 3 x 6 dot display; (D) side display; (E) perimeter display; (F) tape display; (G) Cartesian coordinates display.

one; OFF—false or zero. Lights are used to display such discrete data as failsafe, on-off, and warning. They may be used in groups and in conjunction with ring counters to form binary to decimal conversion displays. Each individual light is sequenced and illuminates the appropriate digit when switched on by the counters. (See fig. 10-51 (A).)

MULTIFILAMENT LIGHTS.—These lights may display numbers, letters, symbols, or combinations of these. Filaments may "edge light" lucite cards to illuminate engraved symbols, or may actually be shaped in the form of the symbol and glow when switched on. (Note fig. 10-51 (B) and (C).)

Lights require appreciable current—greater than that which is normally available directly from the computing circuits. Therefore, a buffer or amplifier stage is usually required to furnish the additional current. Since a single display illuminates multiple symbols and requires at least one terminal for each, it may require its own counter circuits to convert from binary code to the display code, or it may share a common converter with several other circuits. On the other hand, the individual filaments may be prewired to a printed circuit board, and the appropriate display selected and switched by computer circuitry.

The value or quantity being measured may be represented by a positioned display of multiple filament lights. The digital voltmeter is a fairly common example of the use of these lights.

Wheel Displays

Any one of the angle to number converters previously described can be connected as an output device, either to furnish an angle signal or display (pointer or servo signal) or to mechanically position a particular symbol on a wheel display. The symbol to be displayed can be any arbitrary number, letter, word, or other symbol selected by the designer.

The wheel can be positioned by a servomotor, by a step counting switch, by a digital to analog converter coupled with a motor, etc. The only limitation on the positioning system is that it must be able to drive the wheel until the correct symbol is displayed.

The display may be generated by wheels geared together in a fixed ratio (as in an odometer) or with each wheel individually driven and positioned. A disadvantage of the second system is the increased space required to accommodate the separate drive mechanisms. The number of symbols to be displayed is limited by the size of the wheel and by the number of discrete positions that can be selected. (See fig. 10-51 (D) and (E).)

TAPE DISPLAYS.—Rather than increasing the size of the wheel to increase positional accuracy and to increase the number of symbols that can be displayed, tape displays are frequently used. The small wheel simply acts as an idler wheel for a tape bearing a large group of symbols. This system has several advantages, but the primary advantage is that it provides a clearly legible (precise) display in a minimum of space.

Many "games" can be played with the tape system to increase packing density. The digits of several tapes may be alined and projected. The depths of the tapes can be staggered, making it possible to package the drive mechanism in line with the tapes. The tape can be coded and may actually carry the control wiring for its own positional drive motor, simplifying external wiring.

The tape (if of a sufficient free length-to-width ratio) may be formed into a "Mobius band," permitting doubling the number of symbols on a band of given length and/or permitting staggering the symbols so they can be trans-illuminated (projected). (See fig. 10-51 (F).)

Plotters

Digital computers frequently use plotters to represent two properties of a variable: latitude and longitude, altitude and bearing, amplitude and time, etc. Most digital plotters are simply plotters which already exist for analog systems, with the computer merely furnishing signals (through digital to analog converters) as the input signals.

The plotter may be either the recording or the nonrecording type. The digital data displayed (plotted) are a series of discrete values. If the points are readily distinguishable from each other, more than one curve may be plotted at one time. The plot if affected by the number and type of recording heads, the speed of response, and the rate of travel. Since it requires no motion, the nonrecording CRT is one of the fastest plotting systems, and is one of the most commonly used. If a permanent record is required, a scope camera can be installed.

Another common system, the moving ribbon recording oscillograph, uses Xerography or photography, pencil or pen on regular or graph paper, pressure-sensitive paper, electrosensitive paper, or waxed paper. The motion of the paper generates one dimension (generally the time, control, or X coordinate), while the lateral motion of the recording device generates the second dimension.

In other systems the recording device is moved in both the X and the Y coordinates over a stationary surface. This is the principle of the oscilloscope and the DRT table. A direct digital control divides the X-Y plane into discrete points, determined by the matrix. A buffer stage may be necessary between the measured voltage and the converter, in order to insure sufficient power to drive the mechanical device. The buffer may be gated to accept a signal only upon command from the computer, or it may be gated continuously.

Selection of the type plotter for use is frequently made on the basis of the input signal. Slowly varying signals may use a mechanical device, while rapidly varying signals may require a more rapid system. Figure 10-51 (G) illustrates a display of Cartesian coordinates by means of individual lights.

Operational Circuits

Another set of outputs commonly used in military computers are the operational outputs, actual command and control signals to other systems or subsystems. They may be in any of the forms previously discussed.

PROGRAMING

A digital computer can add or subtract almost indefinitely, and with lightning speed. For this speed to produce meaningful results, the computer must be supplied with complete instructions, including what, when, where, and why, before each operation. The speed, accuracy, and versatility of the computers are determined by the type of instructions provided and the manner in which they are given.

The last portion of this chapter is roughly titled Programing; roughly, because programing is technically only one part of preparing a problem for solution by a computer. Actually there are four major steps as shown in figure 10-52: numerical analysis, programing, coding, and checking. These jobs are frequently referred to collectively as programing.

NUMERICAL ANALYSIS

Essentially, numerical analysis is the first step—the definition, in proper mathematical terms, of the problem to be solved. It is the science, or frequently the art, of reducing real problems into terms, quantities, and equations that a digital computer can accept. In all but the simplest problems, extensive numerical analysis may be required before the program can be written. How does one represent an integral or differential, a cosine, or a quality? Numerical tricks, approximations, and even arbitrary values must be used in order to translate these concepts into the individual numerical values required by the computer.

PROGRAMING

Normally problems are too long and too complex to encode directly from the mathematical analysis. Programing provides the shorthand, or guide, which makes it possible to translate the mathematical operations into the step-by-step operations required by the specific computer to be used. Programing is primarily the task of drawing flow charts, or block diagrams, and planning memory allocations.

A flow chart (fig. 10-53), essentially an annotated block diagram, is an organizational convenience. In addition to depicting the overall system logic, it shows the sequence of logic operations, the result of each choice, and the time and entrance point of all new data.

Although it is intended principally as an aid in writing the computer code, the flow chart is also an excellent troubleshooting and testing device. It has symbols to describe the various functions to be performed, to indicate a logical choice or optional sequence, and to show when a sequence is changed by new or modifying instructions. Additional symbols and conventions are generally used to simplify the diagram and to make it a more complete instrument for aiding the man writing the code. These symbols are not standard, but they are consistent in a given set of charts. Their sole purpose is to transfer information from the designer to the coder or other users of the computer.

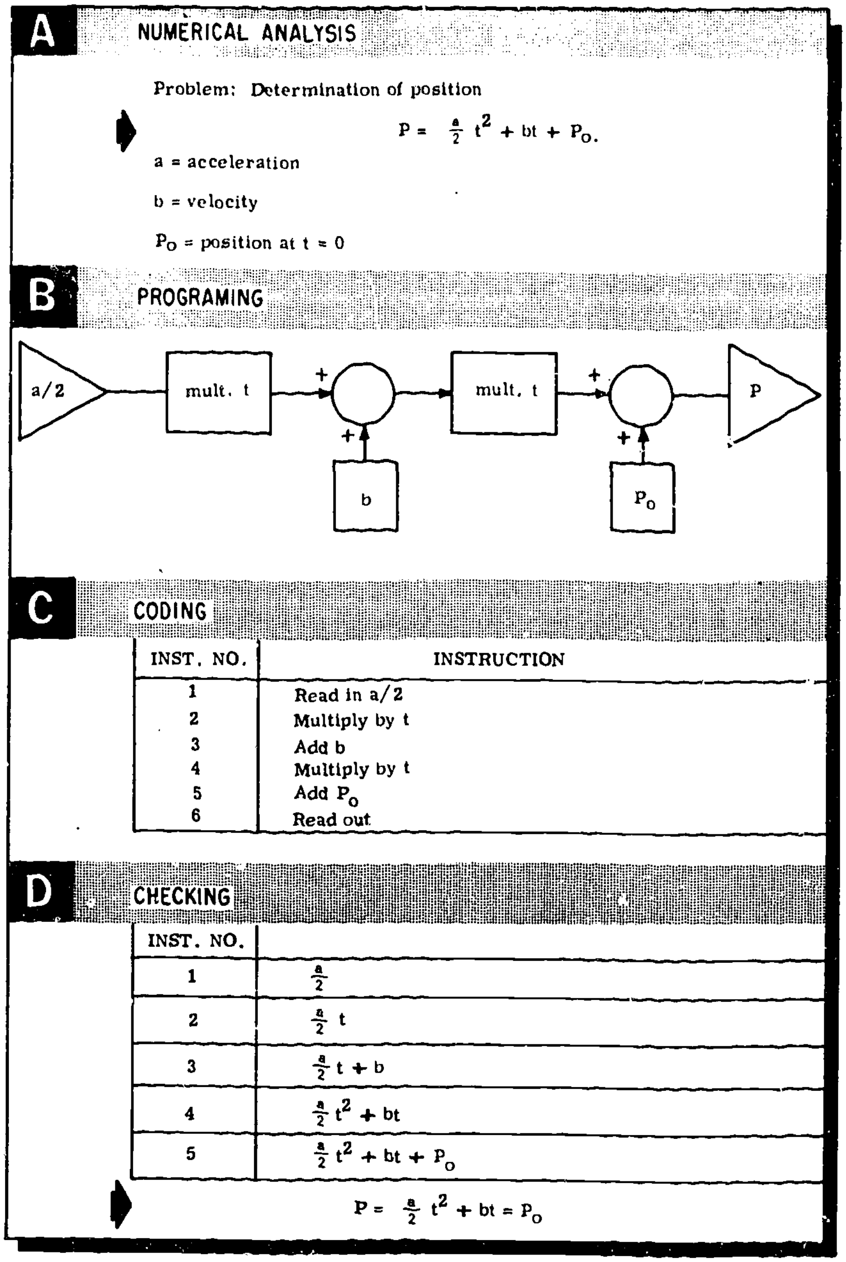
CODING

Coding is the step-by-step transformation of the problem, as mapped out by the flow chart, into a final program written in the language of a particular computer. Coding is essentially a painstaking precise bookkeeping operation: each address, each digit, and every single command must be correct.

The coder, unlike the man who writes the flow chart, needs little knowledge of mathematics; he does not even need to understand computers. The only absolute requirement is that he adhere inflexibly to the rules as established by the design of the computer. Generally, in transferring from one type or model of computer to another, the coder must learn a new set of rules, a new language, or a new code.

CHECKING

Checking, or verifying, is the final step in what might be called the training of a computer. It is frequently performed automatically. The sole purpose of this step is to insure that the coder has made no errors. The program prepared by the coder may be stored internally or



NUMERICAL ANALYSIS

Problem: Determination of position

$$P = \frac{a}{2} t^2 + bt + P_o.$$

a = acceleration

b = velocity

P_o = position at t = 0

PROGRAMING

CODING

INST. NO.	INSTRUCTION
1	Read in a/2
2	Multiply by t
3	Add b
4	Multiply by t
5	Add P_o
6	Read out

CHECKING

INST. NO.	
1	$\frac{a}{2}$
2	$\frac{a}{2} t$
3	$\frac{a}{2} t + b$
4	$\frac{a}{2} t^2 + bt$
5	$\frac{a}{2} t^2 + bt + P_o$

$$P = \frac{a}{2} t^2 + bt = P_o$$

TD. 605

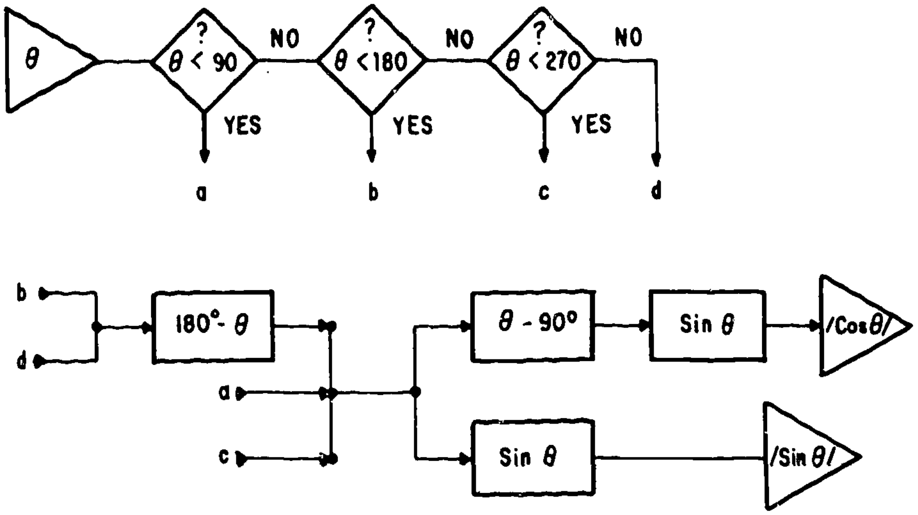
Figure 10-52.—Four steps of programming.

externally. Storage is semipermanent or permanent depending upon the purpose and application of the computer.

SAMPLE PROBLEM

The following example represents a simple subroutine in a single address computer. This example was selected because it is fairly short and quite representative of one method of coding.

The problem is to determine the sine and cosine of an angle which is supplied to the computer in binary form. The first step of the subroutine will arbitrarily be called step one, although the subroutine could appear anywhere



TD. 606

Figure 10-53.—Flow chart: determination of sine and cosine.

in the complete program. If it had to be moved, moving it would be a simple matter of renumbering each step, being certain to maintain the proper sequence.

The operations and operation codes, not addresses, used in this computer are listed in table 10-3. (For this computer, an address is defined only in connection with an operation; for instance, address 8 with operation 06 means "transfer the contents of the accumulator (AC) to memory register (mr) four"; and address 8 with operation 07 means "read input data at address 8 into the input register (IR)." Address 8 is not used with any other operation.)

This particular system is very useful in developing a high speed special purpose computer; however, changing an address-operation combination requires a physical modification of the computer.

Now, with the addresses and instructions given and the flow chart as shown, the actual program is ready to be written. The first step, read in angle theta, is arbitrarily numbered instruction one. Remember, as stated above, it could appear anywhere in the program.

For the next instruction, compare theta against 90°, it may be necessary to supply the 90° as another input or it may be moved into the register from storage in memory. In a special purpose computer the digital representation for 90° can be easily stored: the method of representation depends on the computer. Assuming that the angle theta is represented by a seven-bit binary number in which the most significant digit represents 180° and the least significant bit represents 2.8°, if a 1 is supplied to only the second most significant digit position (0100000), the effective angle input is 90°.

Since both of the angles involved are positive, the compare operations simply supplies the difference to the accumulator. If theta is greater than 90°, the sign is positive; if it is less than 90°, it is negative.

Rather than go through an extensive writing process, the coder, or programer, uses a tabular bookkeeping form which varies with the type of computer and the code being used. Since this example is to be coded for a special purpose computer, it is permissible to take a few short cuts: addresses are wired in; input and output connections are permanent; and all data concerning type of quantity and units of measure are "remembered" by location. Thus for a particular operation and address combination, the digital shaft encoder (or other angular indicating device) automatically supplies the angle theta to the accumulator at the proper time.

In the single address code, as shown in table 10-4 the operation specifies the quantity or quantities and the method of combination. The address tells where the result is to go. For example, instruction three says to subtract the absolute value of the contents of the input register from the contents of the accumulator. It further states that if both values were

Table 10-3.—Code table.

Operation code	Operation
01	Add (AC) + (mr) → AC
02	Subtract (AC) - (mr) → AC
03	Multiply (mr) · M/DR → AC
04	Divide (mr) + M/DR → AC

05	Compare
	if (AC) ≥ (mr), sign AC = +
	if (AC) ≤ (mr), sign AC = -
	if sign of (AC) = + and sign of (mr) = +, AC - mr → AC

06	Serial transfer AC → mr or mr → AC
07	Read in in → IR

Table 10-3.—Code table—Continued.

Operation code	Operation
08	Read out AC → OR
09	Conditional jump if sign AC = -, J → PR
10	Conditional jump if AC = 0, J → PR
11	Unconditional jump J → PR
12	Enter subroutine PR → TPR, J → PR
13	Exit subroutine TPR+1 → PR
14	Read into memory register K(i) → mr
15	Recycle/stop J → PR

positive (which they must be in this case), the result will carry a positive sign if, and only if, the magnitude of the accumulator value is greater than that in the input register.

This single address code thus gives:

1. The first quantity.
2. The operation to be performed.
3. The second quantity.
4. The directions for storage or use of the result of the operation.

Its advantages are speed and simplicity—one instruction per operation. Building such devices becomes progressively more difficult as the number of operations, instructions, or addresses is permitted to increase, since each permissible combination of quantities, storage addresses, and functional operations must have a different operation and address code. The instruction itself may obtain the code. In other words, the binary representation of the instruction may be wired to connect and operate the proper gates.

The coder need not worry about these items, his code books enable him to write the code directly from the flow chart. Thus he reads in theta, then compares it against 90° (0100000), which may have been stored in one of the memory registers permanently, or temporarily, as part of this subprogram. In step three, compare, it has been assumed that the constant was already available. The compare function is permitted against any of the memory registers. Step four, the conditional jump, is represented by the decision box in the flow chart, while step three is represented by the contents of the box. Therefore, four means: if the result of step three is positive, proceed to the next step; if the result is negative, skip (jump) to step number—. Ordinarily the coder will fill in the number of this step when he completes the program and determines where in the sequence the particular step appears.

When the code has been completed and checked for accuracy and consistency, the program is ready to be wired in. After this has

Table 10-4.—Sample coding sheet.

Instruction	Code		Operation
	Oper	Add	
1	08	08	8 → 1R
2	06	10	1R → AC
3	05	10	/AC/-/1R/ → AC
4	11		AC = -? Jump to step 15

been done, any change of operation or sequence will necessitate modifying the computer.

If the problem discussed were prepared for solution by another type of computer, it might be programed in an entirely different manner. It is entirely conceivable that complete sine and cosine tables might be stored directly in memory, eliminating the need for this subprogram. It is more likely that in another computer, inputs would be supplied in terms of the sine and cosine of angle theta rather than the angle itself, again eliminating the need for this subprogram.

The previous discussion covers a tremendously simplified view of the total programing problem. To design, build, and program a military digital computer requires attacking the design problem on all fronts at once: how many specific equations are to be solved, how many and what kind of inputs will be supplied, what type of outputs will be required, what speed and accuracy will be required, and how much weight and space may be devoted to the computer. These factors are all independent and greatly affect the particular course taken in developing the program.

CHAPTER 11

MAINTENANCE OF DIGITAL COMPUTER (USQ-20(V))

The digital computer circuitry, as described in the previous chapter, contains many interconnecting individual circuits. The maintenance of this type of equipment presents a formidable problem to maintenance personnel.

Most circuits found in computers are basic electronic circuits easily understood. The problem area is found to be the mathematical operations which require the changing of the interconnections between individual circuits. The differences between computers are the manner in which they achieve a solution.

One of the Tradevman's problems is to decide the validity of the answer of the computer. If the solution appears to be incorrect, the Tradevman must decide if the computer is functioning properly or if the program or programmer is at fault. Since the computer will only process the information fed into it, an incorrect input will result in an incorrect output.

This chapter presents information on maintenance techniques that are applicable to all digital computers. It also discusses some specific information on the USQ-20(V), which is the digital computer used in many training devices. While the information is orientated toward the USQ-20(V), it is applicable to other digital computers, since all have tests and maintenance checks that are similar to the ones used on this computer.

This chapter discusses maintenance of the USQ-20(V) only in so far as necessary to present an overall representative picture of the types of checks and tests made on digital computers. It is not meant to be a thorough breakdown on the USQ-20(V). For detailed information on the USQ-20(V) refer to the technical manual for the USQ-20(V), NavShips 94101.

USQ-20(V)

The USQ-20(V) is a digital data computer capable of processing large quantities of complex data very rapidly. The computer performs arithmetic and logical functions by manipulating binary numbers in automatic or manual modes of operation.

OPERATIONAL UNIT

The computer is made up of the following four sections: control, arithmetic, input/output, and memory.

Control Section

The control section of the computer is made up of registers, modifying circuits, designator circuits, and timing circuits. This section senses an instruction and initiates properly timed command signals that control the execution of the instruction.

Arithmetic Section

The arithmetic section of the computer consists of five registers and a modifying circuit called the adder. The purpose and function of the arithmetic section is to perform addition, subtraction, multiplication, division, shifts, and logical operations according to instructions. It also provides temporary storage for the results.

Input/Output Section

The input/output (I/O) section serves as the communication link between the other computer sections and any external equipment. Communication with the computer is carried on in a 30-bit parallel mode. The computer is provided with 14 input and output channels. Both the input and output channels are divided into 12 normal and 2 special channels. The 12 normal channels communicate only with external equipment and the 2 special channels normally communicate only with external computers. The I/O section has its own control functions and timing which are, essentially, independent of the main computer control. The I/O section has the capability of indicating real time.

Memory Section

The computer memory section is a large capacity, magnetic-core storage system. It is a high-speed, random-access, nonvolatile storage system. That is, its speed of operation is compatible with the computer; its data words may be referenced in a nonsequential manner; and it retains data words through normal power sequencing.

Major Operational Features

Major features of the computer include the following:

1. An internal, high-speed, magnetic storage with a cycle time of 8 microseconds and a capacity of 32,768, 30-bit words.
2. A repertoire of 62 instructions, most of which provide for conditional program branches.
3. Average instruction execution time of 13 microseconds.
4. A word length of 30 bits.
5. Optional operation with 15-bit half words.
6. Internally stored programs.
7. Parallel, one's complement, subtractive arithmetic.
8. Single-address instructions with provisions for address modification via seven index registers.
9. Internal 7-day real-time clock for initiating operations at desired times.
10. Twelve input and 12 output channels for rapid data exchanges with external equipment.
11. Two input and two output channels for intercomputer data transfer.
12. An auxiliary wired 16-word memory, for storage of critical instructions and constants, provides facility for automatic recovery in event of program failure and for automatic initial loading of programs.

TROUBLESHOOTING

Troubleshooting procedures can be divided into three general groups as follows: sensory, nonfunctional, and functional. Each of these methods is discussed in greater detail in the following paragraphs. Normally it is advantageous to troubleshoot equipment in the same procedures as presented in this course.

1. SENSORY. The senses are used to detect an overheated or malfunctioning component. Obvious sensory indications such as smell of burned insulation, burned out selenium rectifiers or transformers often lead directly to the component. A close visual inspection of the equipment will often reveal components that have been overheated and opened, loose connections, components not properly seated in their sockets, and numerous other faulty conditions. The importance of a good sensory check cannot be overemphasized; it will often prove to be a "shortcut" to the trouble and save manhours.
2. NONFUNCTIONAL. Nonfunctional testing consists of checking voltage inputs, power supply outputs, proper waveshapes, correct frequency, etc. Nonfunctional testing also includes semiconductor testing, resistance testing, and card testing to verify the faulty element.
3. FUNCTIONAL. Functional testing consists primarily of executing the maintenance routines, which are commonly referred to as diagnostic routines. When the routines have been loaded into the computer, the control routine takes command and runs all tests that check the various sections of the computer. When a malfunction occurs, during the running of a maintenance routine, the section being checked causes an error typeout.

Maintain a record of all operating time, failures, repair time, and failure analysis. The more complete the record or logbook, the more help it is in future planning, budgeting, and maintenance.

Electrical Tests

Electrical tests, which are nonfunctional tests, consist of testing the voltage output of the power supplies contained in the computer. In the following paragraphs, a list of USQ-20(V) voltages an tolerances is presented. This list is intended to point out representative voltages and tolerances that may be encountered in troubleshooting any digital computer.

Requirements for logic chassis power supplies A1A1 through A8A1 are as follows:

1. A-c input; 115 volts ±2 percent, 3-phase, 400 hertz.
2. D-c output; filtered -15 volts +10 percent -5 percent having a ripple voltage of less than

0.2 volts peak-to-peak at maximum and 12 amperes of current.

3. D-c output; filtered + 15 volts + 10 percent -0 percent having a ripple voltage of less than 0.1 volts peak-to-peak at maximum and 1.5 amperes of current.

4. D-c output; regulated -3 volts ±5 percent clamp voltage. The clamp voltage will supply as much as 8 amperes when tied to the clamp bus. With the marginal check switch at HIGH, the clamp voltage should be -3.4 volts ±5 percent. With the switch at LOW, the clamp voltage should be -2.4 volts ±5 percent. The voltage input to the regulator circuit is from a source external to the logic chassis.

Requirements for memory chassis, 9 through 13, power supplies are as follows:

1. A-c input; 115 volts ±2 percent, 3-phase, 400 hertz.

2. D-c output; filtered -15 volts +10 percent -0 percent having a ripple voltage of less than 0.2 volts peak-to-peak.

3. D-c output; 15 volts +10 percent -0 percent having a ripple voltage of less than 0.1 volts peak-to-peak.

4. An additional reference power supply provides 3.3 volts ±3 percent having a ripple voltage of less than 0.05 volts peak-to-peak.

5. A -10 volt regulator provides -10 volts adjustable ±10 percent through use of a resistor (R11) on chassis 9 through 13.

Requirements for the computer console power supplies are as follows:

1. A-c input; 115 volts ±2 percent, 3-phase, 400 hertz.

2. A-c input; 115 volts, 3-phase, 400 hertz (unregulated).

3. D-c output; a single phase half-wave pulsating d.c. producing -90.5 volts ±10 percent rms unfiltered.

4. D-c output; a filtered -54 volts ±10 percent.

5. D-c output; a filtered -15 volts ±10 percent.

6. D-c output; a filtered -26.5 volts ±10 percent.

7. D-c output; a filtered -20 volts ±10 percent.

As can be seen from the previous listing, a digital computer has many different voltages that should be checked for value and tolerance, during the nonfunctional troubleshooting procedure.

Instructions Demonstration

To demonstrate that the computer can perform all operations according to the repertoire of instructions, a demonstration of the instructions and transmissions must be made. The demonstration of performance according to instructions is accomplished through a series of diagnostic programs which check the various transmission paths. All programs must be executed as follows.

1. Load and run the P1, P2, P3, P4, and [illegible] to Z tests.

2. Load and run the EXEC (executive) routine.

3. Load and run any other tests which are necessary.

There are many tests that are programed for the USQ-20(V), each designed to test a certain section or function. In this chapter only a few are discussed to show a representative picture of what can be accomplished with maintenance routines. There is a routine programed for each and every section and function of the USQ-20(V). These can be found in the Technical Manual, NavShips 94101.

The following list is prepared to discuss some of the routines programed and what they are programed to check.

1. INPUT/OUTPUT TIMING TEST. A demonstration of input/output timing characteristics may be made. In the demonstration a check should be made to insure that the waveform that an output circuit applies to any line must not have a transition slope greater than 5 volts-per-microsecond. The maximum transition time must be 6 microseconds. The binary "one" state of an output amplifier is 0 volts (±1.5 volts) and a binary "zero" state is -13.5 (+3.5 volts, -4.0 volts.)

2. MAGNETIC CORE STORAGE TESTS. This series of routine tests demonstrate the capacity of memory, the ability for individual addresses to be manually altered, and sensitivity to internally generated noise. Memory capacity is 32,768 30-bit words. It should be possible to manually alter individual addresses. Memory should function properly, remaining insensitive to internally generated noise.

3. INPUT/OUTPUT TESTS AND DEMONSTRATIONS. The object of this program is to exercise and test the input/output section of the computer. Separate routines have been included to test the various functions in the input/output

section such as data transmission, buffer operation, buffer termination, and externally and internally generated interrupts.

4. LOGIC TESTS AND DEMONSTRATIONS. The object of this program is to demonstrate the ability of the computer to perform transmissions, commands, and evaluations. The tests consists of subexecutive routines run in sequence as ordered by the main executive routine, or individually as required by the operator for checking a specific suspected malfunction.

Memory Section Troubleshooting

If a chassis (sections are broken down into numerous chassis) is not performing properly, the trouble can usually be isolated to one of three sections (drive line, inhibit, or sense). If the read and write waveforms are correct, the trouble is probably in the sense or inhibit sections. The inhibit section can be checked by observing the inhibit waveforms for each bit while writing zeros. If these waveforms are correct, the one section remaining, the sense section, is probably at fault. Once a trouble is pinpointed to a certain section, a block-to-block check of waveforms may be made to pinpoint the trouble to a card or component.

DRIVE LINES.—The drive lines are used to control the application of current which creates the magnetic field that switches the cores to one of two stable states. During the read portion of the memory cycle, all cores receiving coincident current are switched to a zero state unconditionally. During the write portion of the memory cycle, all cores receiving coincident current tend to switch back from a "zero" to a "one." An inhibit pulse occurring during this write portion prevents a core from switching to a "one." The drive line circuits can be split into two sections: the read/write transformer and the selector circuits. The read/write transformer translation takes place externally to the memory chassis and determines which of the 8X by 8Y transformers is selected. The proper selector (1 of 32X or 32Y) completes the drive line section; that is, which X and Y lines are receiving the switching currents. Translation for the proper selector also takes place on a logic, rather than a memory chassis. Timing from the memory timing chain initiates all action and controls the switching of current through the selected stack cores. This timing chain is external to the memory chassis.

INHIBIT LINES.—The inhibit lines prevent selected cores from being switched to a "one" state during the write portion of the memory cycle, if a zero was sensed during the read portion. Translation for the inhibit lines is accomplished on a logic chassis and current is switched through the selected inhibit line if the Z register has a zero for a given bit rather than a one. Inhibit lines run parallel to either an X or a Y drive line and the current is in the opposite direction to the drive line current. This effectively cancels half of the drive line current. Thus, coincident current is not obtained for the selected cores, and a "one" is not written.

SENSE LINES.—The sense lines thread through each core and detect core flux changes as an induced voltage. If this voltage is 10 millivolts or less, the sense amplifier ignores it. If the voltage is 60 millivolts, the sense amplifier accepts it as a one. Since a core requires 1.2 microseconds of time to switch, a "one" from a switched core occurs later in time than a "zero" which occurs only when a core fails to switch. Because of this delay, a 0.4 to 0.5 microsecond strobe pulse is initiated approximately 0.8 to 1.0 microsecond after a read pulse is initiated. The bit register can accept an input from the sense amplifier only during this strobe pulse. In this way, zero noise from the cores is isolated from the bit register. The bit register feeds the Z register which holds the data obtained from the memory reference. Figure 11-1 shows the timing relationships of the various memory pulses. Figures 11-2 and 11-3 are block diagrams of the X and Y drive line circuits.

PREVENTIVE MAINTENANCE

Maintenance procedures used with computers differ from the normal procedures used with other electronic equipment. Computer maintenance requires a logical analysis of a malfunction rather than an electronic analysis. It is essential that maintenance personnel become familiar with transmission paths within the computer. This is helpful in determining the failing area of the computer by taking note of the visual indications on the console when a malfunction occurs. It is also essential that maintenance personnel become familiar with the programs and routines being run in the computer to check the failing area.

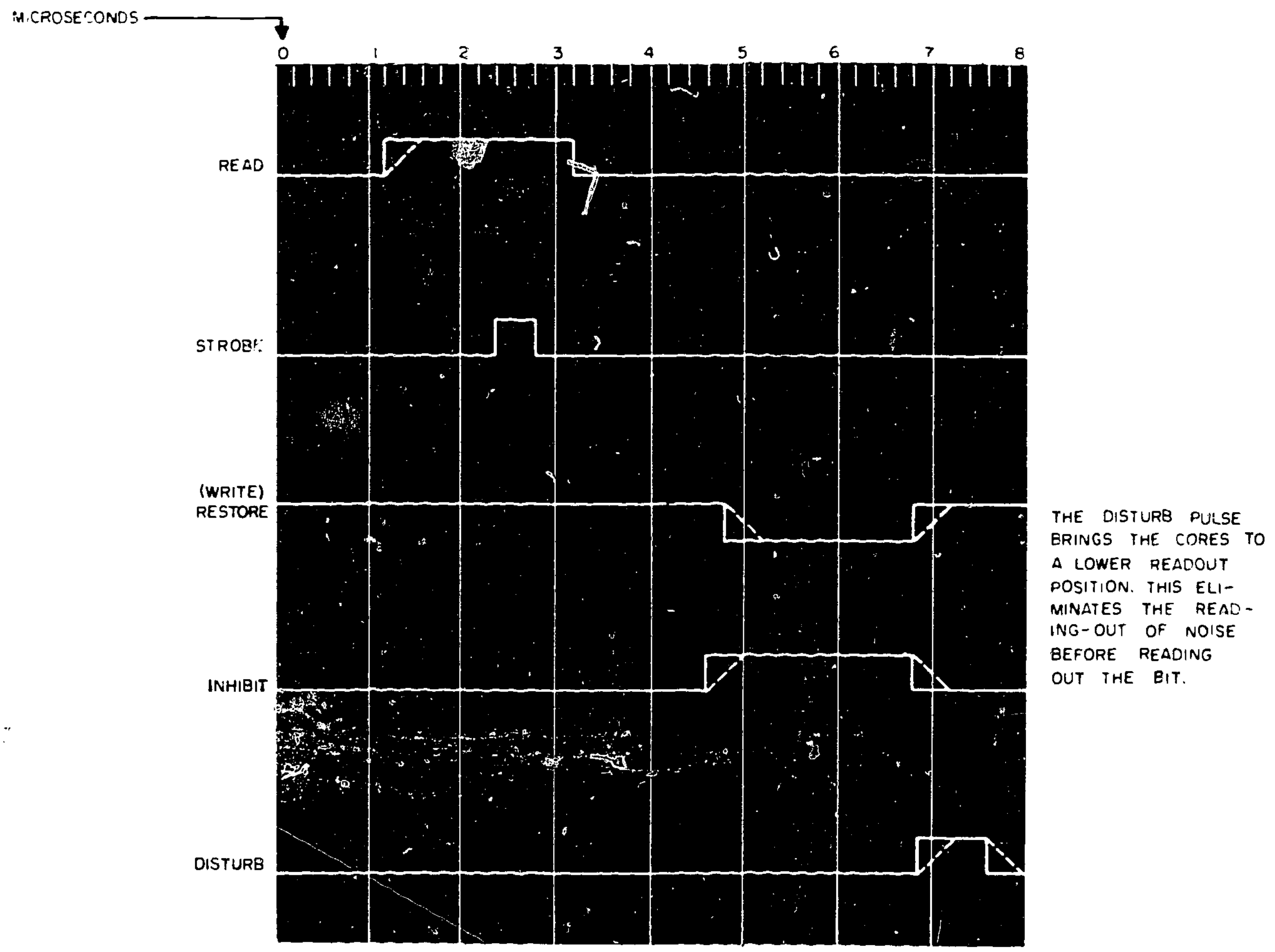


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Figure 11-1.—Memory timing cycle.

The maintenance routines isolate the malfunctions to a particular section or functional part of the computer. When a malfunction is isolated to a particular section, it can be further isolated to a printed circuit card or cards by using an oscilloscope and a multimeter.

The routines discussed earlier in this chapter are used for preventive maintenance on the computer. When the routines have been loaded into the computer, the control routine takes command and runs all tests that check the various sections of the computer. All sections of the computer should be checked on a daily basis except I/O which should be checked weekly.

DAILY TESTS

The routines used for daily preventive maintenance are run at normal clock frequency, normal clockpulse width, and normal bias voltages. The following routines are used for daily preventive maintenance:

1. Control.
2. Arithmetic.
3. J,K, Command.
4. Brainwash.

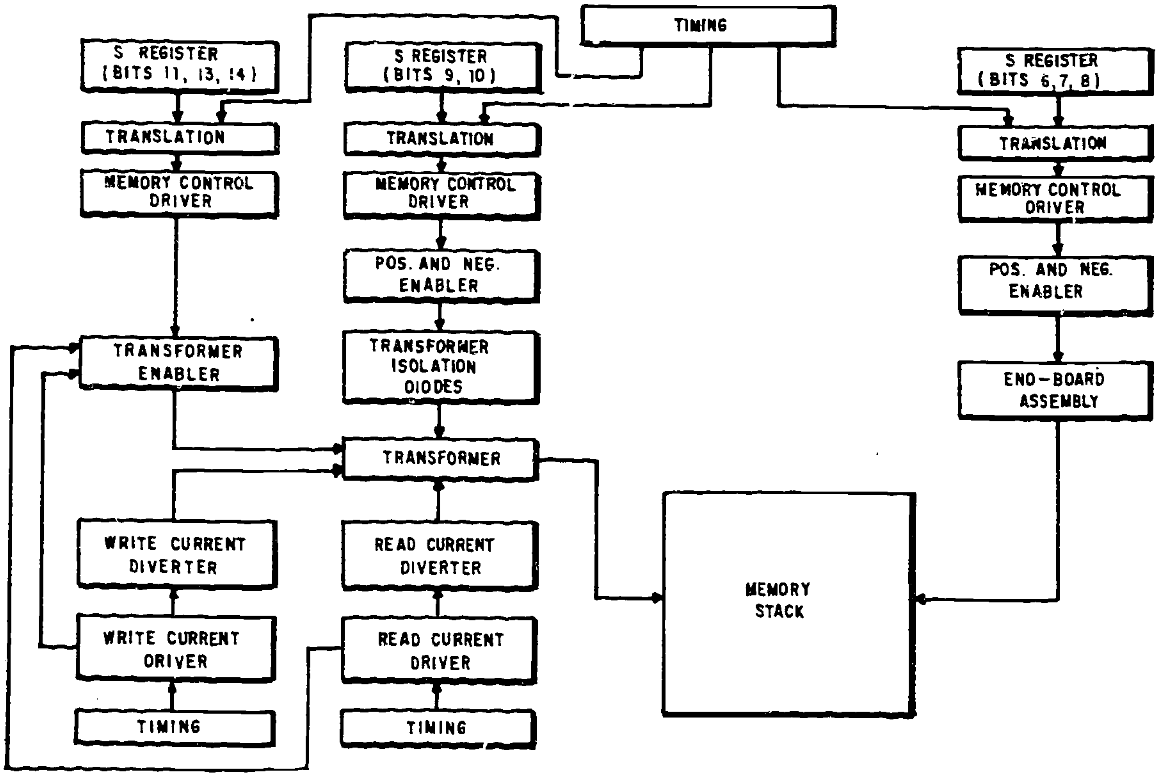

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Figure 11-2.—X drive line circuits.

WEEKLY TESTS

The I/O test is run weekly in either of two ways:

1. By single cable.
2. By multiple cables.

Using the single cable method, the program scans different possible connections until it finds the I/O channels that are connected together by a jumper cable. The program then proceeds to check the flow of data through this jumper cable.

Using multiple cable connections, the method of checking data flow is the same as for the single cable method except that the computer checks all channels that have cables connected to them.

Marginal checking of memory must be performed on a weekly basis. Either Brainwash or a pattern containing "1's" and "0's" should be run. The two marginal conditions are as follows:

1. HIGH BIAS AND NORMAL FREQUENCY. This condition detects any possibility of bit dropout. When a pattern of "1's" is written into memory, and a core fails to return a "1," bit dropout is indicated.

2. LOW BIAS AND FAST FREQUENCY. This condition detects any possibility of bit pickup when a pattern of "0's" is moved around in memory.

The bias on each memory chassis (fig. 11-4) is changed by a switch, mounted on the front of each memory chassis. The master clock frequency is increased by operating the Fast/Normal switch to the Fast (up) position. When fast frequency is used, the clock pulse width should be narrow, since on a normal pulse width, the clock pulses are liable to overlap. The clock pulse width is changed by switches S2 and S3., mounted on the front of chassis 6 (fig 11-5).

Marginal checking of each logic chassis must also be performed on a weekly basis. The marginal checks are performed while running the

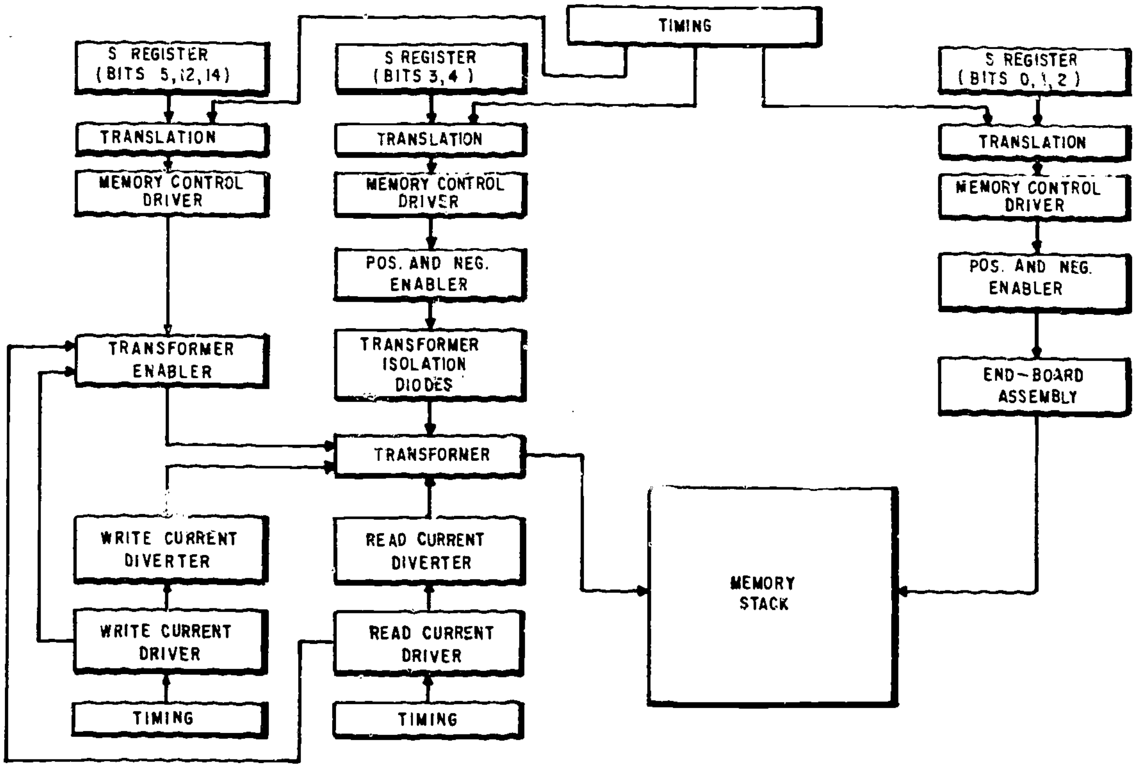

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Figure 11-3.—Y drive line circuits.

daily preventive maintenance routines. The two marginal conditions are as follows:

1. NARROW CLOCK AND LOW CLAMP VOLTAGE. This condition detects any stability problems in transistor switching.

2. NARROW CLOCK AND HIGH CLAMP VOLTAGE. This condition increases the storage time of a transistor.

The clock pulse width is changed as explained in the topic on the marginal checking of memory. The clamp voltage on each logic chassis is changed by a switch, mounted on the front of each logic chassis (fig 11-5).

By using marginal checks, any cards or components deteriorating from age or usage can be detected before an actual failure occurs. This tends to reduce the actual downtime of the computer. When a malfunction occurs during marginal checking, the defective component should be replaced immediately. If time does not permit an immediate replacement of the defective part, operation of the computer can be attempted under normal operating conditions until time allows for the replacement of the defective part.

ADJUSTMENTS

Accessible adjustments on the computer are kept to a minimum. There are no accessible operational adjustments on the logic chassis. There is a potentiometer, R1, on the -3 VDC regulator card located on each logic chassis.

This 20-ohm potentiometer (R1) adjusts the base reference voltage of Q1. It is adjusted at the factory before shipment. Because of its location on the chassis, R1 cannot be adjusted while the chassis is in the computer. Any adjustment must be made by the trial-and-error method with the chassis removed from the computer. Adjustment should only be attempted when the regulated -3 VDC is not within tolerance (+5 percent). This voltage is measured at test point J19B8 on each logic chassis. There is also a similar type of adjustment on the memory chassis. A potentiometer, R4, on the -3.3 VDC reference card is located on each memory chassis.

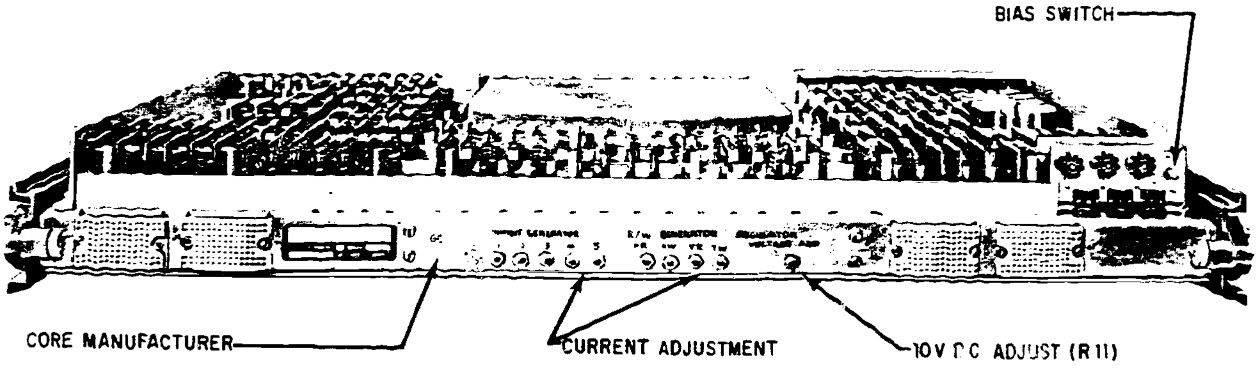

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Figure 11-4.—Memory chassis (front view).

This 500-ohm potentiometer (R4) adjusts the base reference voltage of Q1. It also must be adjusted by the trial-and-error method. Adjustment should only be attempted when the -3.3 VDC reference voltage is not within tolerance (±3 percent). This voltage is measured at test point J7B8 on each memory chassis.

The actual operational adjustments are located on the front of each memory chassis (fig. 11-4). Provisions are made for adjusting the X drive line read/write currents, the Y drive line read/write currents, the inhibit line currents, and the regulated -10 VDC. The adjustments are accomplished in two steps as follows:

1. The currents and voltages are set at nominal values.
2. The currents and voltages are carefully adjusted for minimum noise at the output and sense amplifiers.

The initial adjustments are made while the computer is running a 55 test. Use a multimeter and an oscilloscope to make all measurements. The nominal values of currents given in table 11-1 are for a core temperature of 25°C (77°F). When the temperature is higher or lower than 25°C (77°F), the currents must be set inversely proportional to the temperature variation. The approximate change in current for each degree variation is 1.0 to 1.5 milliamps.

Notice that the values of current differ for the two core types as shown in table 11-1. Each separate memory chassis uses cores from only one manufacturer. The core manufacturer is stamped on the front of each memory chassis (fig. 11-4).

The following steps should be used when making the initial memory adjustments:

1. Run a repeated 55 (F = 55) instruction in the computer using normal operation (no marginal conditions).
2. Measure -10 volts d.c. at test point J7C7 with a multimeter and set R11 for an exact -10 volts d-c reading.
3. Set up the oscilloscope using AC FAST with EXT. TRIG. Use the output from 8J141 as the trigger source. Use a direct probe to measure the X read/write currents. Measure between the test points listed in table 11-2 and ground. Set the adjustments so that the current values obtained at all test points are as close as possible to the valus listed in table 11-1. Figure 11-6 illustrates a typical X read/write waveform.

NOTE: The test points listed in table 11-2 and referred to during this discussion are not shown. The purpose of this discussion is to show typical memory waveforms and adjustments.

4. Repeat step 3 for the Y read/write currents. Figure 11-7 illustrates a typical Y read/write waveform.
5. Unground the oscilloscope. Measure the inhibit current for each bit plane between the test points listed in table 11-2. Adjust each variable resistor to obtain the values listed in table 11-1. Figure 11-8 illustrates a typical inhibit waveform.
6. Repeat steps 1 through 5 for each memory chassis.

After each memory chassis has been adjusted according to the previous topic, the following

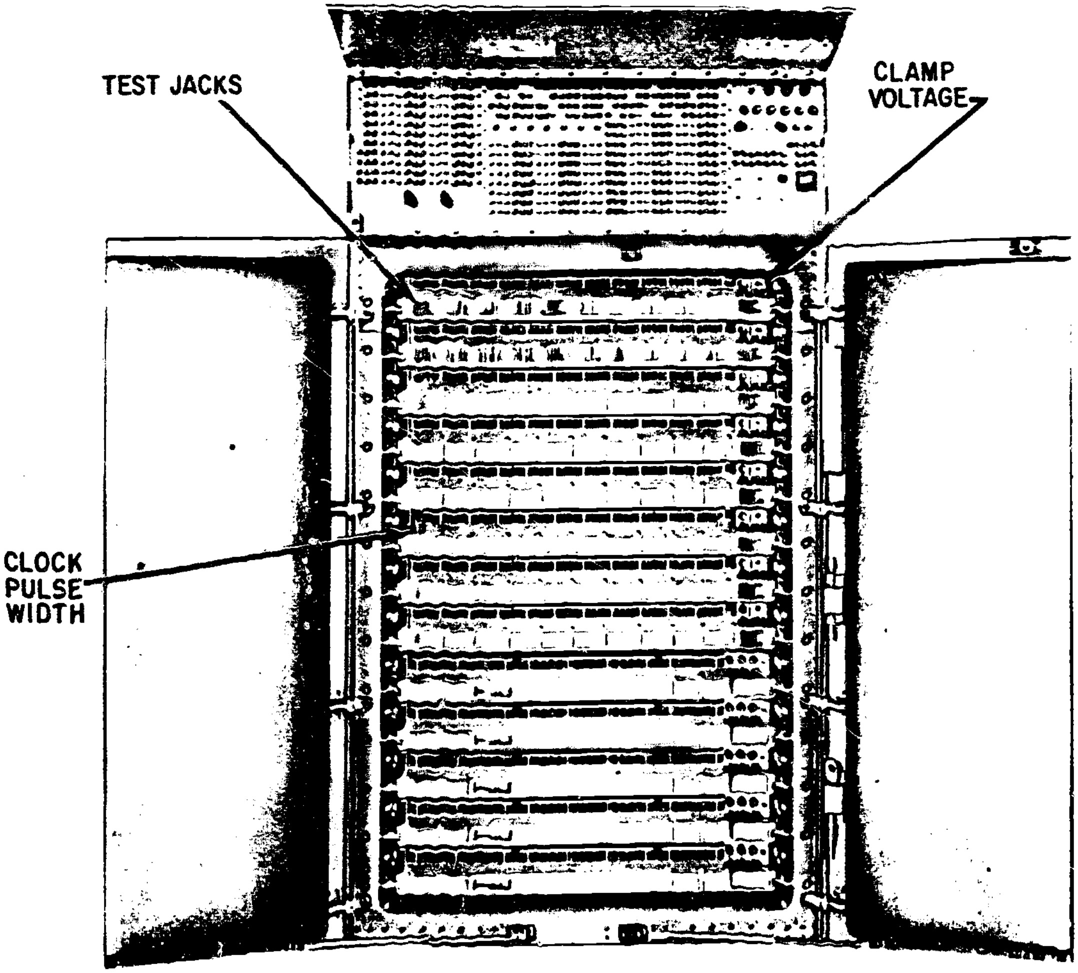

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Figure 11-5.—Computer (front view).

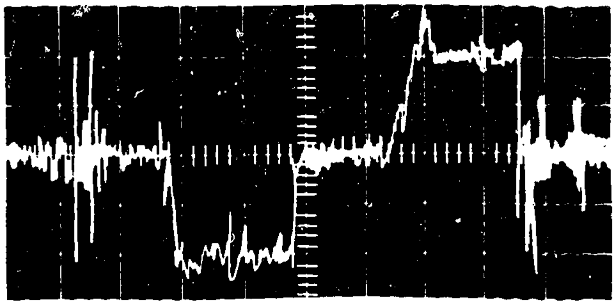

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Figure 11-6.—X read/write.

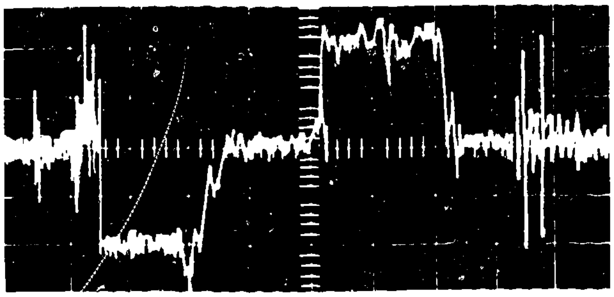

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Figure 11-7.—Y read/write.

Table 11-1.—Nominal memory current values.

	Cores	
	General ceramics	[illegible] magnetics
X READ	190 ma	210 ma
X WRITE	195-200 ma	215-220 ma
Y READ	190 ma	210 ma
Y WRITE	195-200 ma	215-220 ma
INHIBIT	180 ma	190 ma

Table 11-2.—Memory test points.

X Read/ write	Y Read/ write	Inhibit	Sense amplifiers
J5C5	J4F5	J7J2-J7J3 (Bit 5)	J7C2
J5D1	J4I1	J717-J718 (Bit 4)	J7C3
J6E2	J4J7	J714-J715 (Bit 3)	J7D2
J6E6	J4L5	J4B8-J4C1 (Bit 2)	J7D3
J407	J7E7	J4B1-J4B2 (Bit 1)	J7E2
J5A8	J7D7	J4A2-J4A7 (Bit 0)	J7E3
J6B8	J7K1		
J5D6	J7B7		
J5E2	J5C5		
J6G6	J4G7		
J6G8	J415		
J6A8	J4K3		

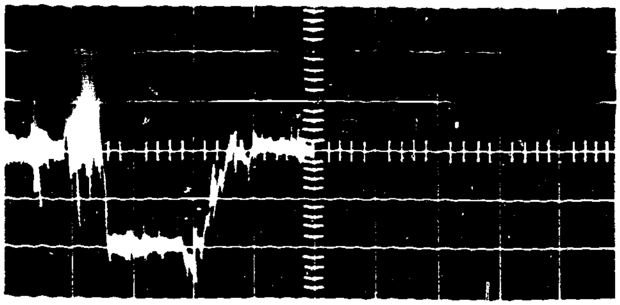

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Figure 11-8.—Inhibit.

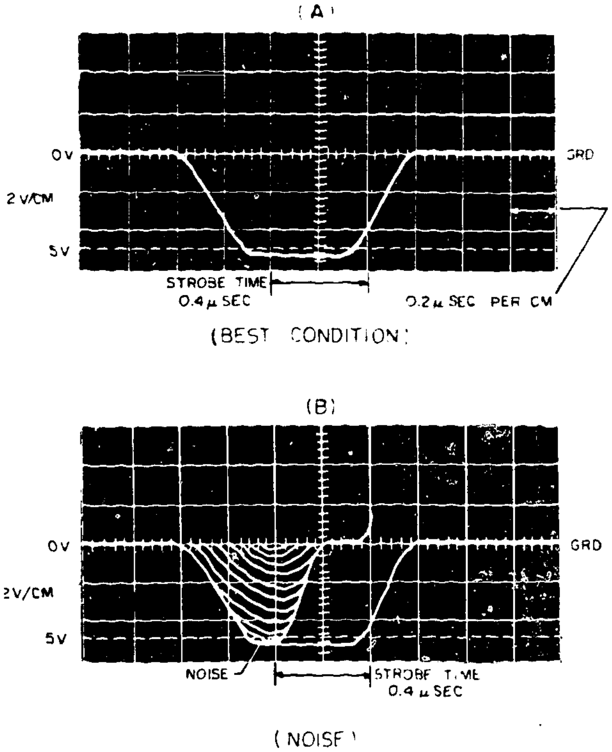

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Figure 11-9.—Sense amplifier output. (A) Best condition; (B) noise.

steps should be used to make the final adjustments:

1. Perform the Worst Pattern test in the computer.

2. Set up the oscilloscope using AC FAST with EXT. TRIG. Use the output from 8J14H2 as the trigger source. Measure the output from the sense amplifiers at the test points listed in table 11-2. Measure between the test point and ground.

3. Observe the amount of noise on the waveform. Figure 11-9 illustrates a typical noise waveform.

Readjust the X read/write currents, the Y read/write currents, the inhibit currents, and the -10 volts d.c. for minimum noise. This procedure may be time consuming but must be done carefully and thoroughly. Figure 11-9 (A) illustrates a typical waveform for the best condition.

4. Repeat STEP 3 for each memory chassis.

5. After all adjustments have been made, check the settings by running memory under marginal conditions. Run both the fast clock-low bias and the normal clock-high bias margins. If there is any failure, repeat STEP 3 for the failing chassis.

REPAIRS

Servicing the computer consists mainly of removing and replacing defective card assemblies. Other repairs may consist of replacing defective wiring or components.

Since the card assemblies are classed as nonrepairable items, no attempt is made to outline a procedure for component replacement on any card. When attempting any repairs, always make a thorough visual inspection of the chassis, card jacks, and associated wiring. When replacing blown fuses, determine the cause of failure before installing a new fuse.

All the card assemblies in the computer are color coded according to type number. The colored plastic tape on the top edges of each card gives the last four digits of the card type. The color code used is the standard JAN resistor code. For example, a 25<u>0010</u> card is color coded black, black, brown, black. A 25<u>1010</u> card is color coded, brown, black, brown, black. In this way a cross-check can be made between the chassis maps, the functional schematics, and the computer chassis to insure the correct placement of card assemblies.

NOTE: Do not install fuses having a current rating greater than that listed in the parts list. When making continuity checks with an ohmmeter, observe polarity of the probes so as not to damage any transistors.

Logic Chassis

When a failure occurs in any of the eight logic chassis, it is usually indicated by a typeout during a maintenance routine or the failure of a programed routine to run. Once the defective area of the computer is isolated, the defective circuit or circuits must be isolated.

Use a multimeter to measure the voltage levels at all test points. On all logic chassis, exclusive of the input/output lines, the voltage levels measured at the output of each logical circuit must be 0 volts d.c. for a "0" and -3 volts d.c. for a "1." If the voltage measured at any test point does not correspond to the assigned levels, the card on which the circuit is located should be removed from the computer. It should then be checked in the AN/USM-142 (Module Test Set) to verify the failure. If the failure is verified, a new card should be installed.

The voltage levels on the input/output lines measured at the input to any input amplifier or the output from any control line or data line driver must be 0 (+1.5) volts d.c. for a "1" and -13.5 (+3.5, -4) volts d.c. for a "0." If the voltage measured at a test point does not correspond to the assigned levels, the card should be removed from the computer. It must then be checked on the test set because, in this case, the external equipment could be at fault.

Memory Chassis

When a failure occurs in any one of the five memory chassis, a typeout will occur during a maintenance routine or incorrect information will appear in registers during the running of a regular program. Once the defective area of the memory chassis has been isolated, the failing section or sections must be isolated. These sections are the drive line, inhibit, and sense. An oscilloscope should be used to check the waveforms for each section. Refer to figures 11-6 through 11-9 for typical waveforms. When a waveform does not correspond to the typical waveform, remove the card on which the circuit is located. Check the card in the test set to verify the failure. Make replacements as necessary.

CORRECTIVE MAINTENANCE

The first important aspect of general upkeep is regularity. A schedule should be established that includes a complete checkout of the installation within a given time period. Unless this is accomplished, only the easy or interesting work will probably be performed, while the dull or unpeasant work may be neglected. A well-timed maintenance schedule and checklist are generally available in the manufacturer's manuals.

EXTERNAL

External upkeep is concerned with the area in which the computer is installed. As far as possible this area should be conditioned for the installation. This should include equipment for producing temperature control, humidity control, air filtering, and control of other conditions required for proper operation. These specified conditions should be maintained as constant as possible, from the time of installation throughout the life of the equipment.

The area in which the computer has been installed should be uncluttered and clean. The equipment area should be used only by the personnel actually concerned with the computer. The exterior of the computer should be kept clean and free of dust. All bolts, retaining screws, and other items of hardware should be returned to their original places after interior repair or maintenance work has been completed. Drip proof equipment should be kept sealed and watertight equipment should be kept watertight. Shockmounts are used to reduce vibration and must be kept free from paint and dirt.

INTERNAL

The first and foremost preventive maintenance requirement is cleanliness. The computer cabinets should be thoroughly cleaned at scheduled intervals. A vacuum cleaner (handled with caution), a soft bristled brush, and a good commercial cleaning solvent will aid in this job. While the process of blowing out a computer with clean dry air does remove a great deal of dirt, it often packs more dirt into sensitive areas that may be difficult to reach.

Air filters are designed to keep dirt out of the equipment. However when dirty, they tend to reduce the circulation of air. A commercial filter can normally be cleaned by removing it, washing it in detergent and warm water, drying it thoroughly, and then coating it with a prescribed type of light oil.

There have been many occasions when a strange, intermittent trouble symptom has finally been localized as being caused by a loose terminal-board connection or a dirty component socket. All terminal-board screws should be tightened, and tube sockets, plugboards, jacks, switch and relay contacts, etc. should be burnished or periodically cleaned with a good specified solvent.

Many computers are built to provide rapid and easy access to the individual components. Sections of the cabinet swing out to facilitate inspection and maintenance. They should be checked for abnormal frictional restrictions that could indicate contact with cables and other components. A cable run may become unclipped and rub against a movable section or drawer. Cables should be kept in place, and drawers should be checked to insure that no rubbing or forcing is taking place.

LUBRICATION

Correct lubrication procedures are usually specified by the manufacturer and should be performed in accordance with these instructions. Caution should be exercised to avoid both carelessness and overlubrication.

Spilled lubricant and lubricant that has been thrown by moving mechanical parts, form dangerous and troublesome dirt and dust collectors. Unfortunately, some lubricants also produce a deteriorating effect upon insulating materials and can be responsible for the formation of high resistance connections on contact surfaces. Great caution should always be observed when using lubricants.

TOOLS

Effective maintenance can only be maintained by using the proper tools. Digital computers require special tools as prescribed by the computer manufacturer. An accurate inventory of these tools should be maintained. The Tradevman should develop the habit of using the correct tool for each job. If a tool breaks or mars the part being worked on, the proper tool was not used.

TRANSISTORIZED CIRCUITS

The development of transistors has advanced electronics by providing a more reliable replacement for the vacuum tube. The development of equipment containing more circuits in a smaller package has been aided by the smaller size of the transistor. The principles of the transistor are contained in Basic Electronics, NavPers 10087-B.

Digital computers contain hundreds of transistors mounted on printed circuit boards. One board may contain several transistors, the associated components, and wiring.

A great deal has been published about exercising care in soldering transistors, especially to provide a heat sink to avoid damage to the transistor. Other precautions should be followed including procedures for inserting and removing transistors from their sockets. Insert and remove transistors from their sockets only when the current is turned OFF. To do otherwise may damage it. Removing the load from a transistor circuit may affect the current drawn through the transistor, with the possibility of an overload causing damage.

MINIATURIZED COMPONENTS

The development of complex circuits has required that more circuits be mounted in as small a unit as possible and has fostered a technology known as miniaturization. Miniaturization has produced smaller components such as electronic components, motors, relays, transformers, etc.

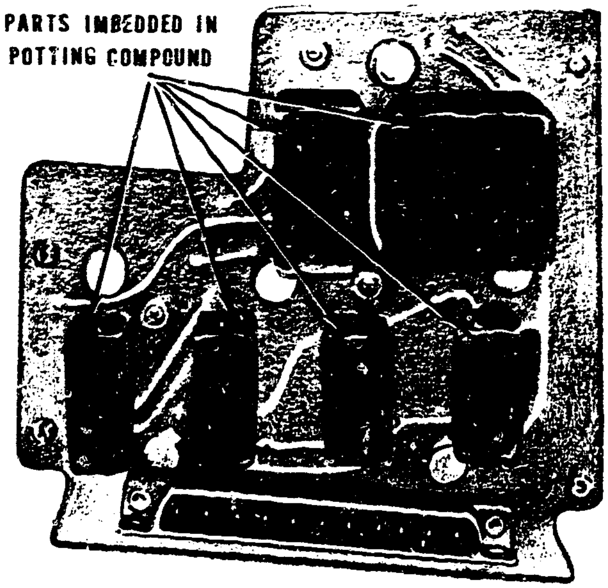
Miniaturization in the field of electronics has developed entire circuits, including transistors, resistors, capacitors, and all connecting linkages built into one rock-like solid state unit. These units are sometimes called microcircuits. Some of these solid state circuits are so small that a magnifying glass is required for visual inspection.

MODULES AND POTTED COMPONENTS

The packaging of components into one small unit is called a module. Modules are easily removed from specially designed racks which provide mounting slots to hold the modules and receptables to electrically connect the circuitry into the equipment. By identifying a malfunctioning module, the Tradevman can quickly extract the module from its rack and insert a good module, thereby decreasing maintenance time.

Potting of circuit boards is used because the operating time between repairs can be considerably increased by its use. The sealing of components prevents their exposure to moisture. The potting is first done by the manufacturer at the time of installation of the components. Portions of the components are potted together as a unit and are mounted on the circuit board (fig. 11-10).

Maintenance of potted components begins with the necessity of removing the potting compound. This problem should be minimized by the fact that most potted sections do not require repair. The manufacturer's maintenance manual should provide the decision whether or not to remove the potting. If the removal is necessary, the manual should contain illustrations and instructions of the sections to be repaired. The potting compound on some assemblies is easily removed because the assembly was enclosed in a plastic bag prior to potting. In this manner the assembly is potted but the compound is prevented from flowing around or adhering to the detail parts. Circuit boards which are potted in this manner can be cleared by cutting a parting line around the edge of the lamination and removing the two halves.



TD.616

Figure 11-10.—Potting.

The repair of this type of assembly is the same as that required of all circuit board assemblies, except for the additional problems created by the potting materials. After repair has been performed, the potting material must be restored in accordance with the instructions contained in the manufacturer's maintenance manual.

PRINTED CIRCUIT MAINTENANCE

The maintenance of printed circuit board assemblies requires a suitable work area and adequate tools, equipment, and materials. The work area must be large enough to accommodate workbenches, storage cabinets, test equipment, and materials, and still leave adequate space to provide uncrowded work areas. The area should be further divided into a specific area for troubleshooting, repair and replacement, protective coating application, and storage. The area should be enclosed and air conditioned to prevent the contamination of the circuit board assemblies by dirt and moisture.

Cleanliness and humidity control are two very important factors in circuit board maintenance. Lighting is another important requirement. Due to the miniaturization and close spacing of circuits and components, maintenance requires good overhead lighting with provisions for adjustable lighting on the workbenches.

The storage area is used for the storage of circuit board assemblies, tools, equipment not in use, materials for the protective coating process, records, related maintenance publications, and materials and parts required for the repair operation. Storage for the circuit boards must be capable of holding the circuit boards in a vertical position. The parts are exposed and easily damaged; therefore, they should be stored separately and in a vertical position. The storage of some protective materials may require refrigeration.

The troubleshooting and repair area should consist of a bench area equipped with an adjustable light fixture with magnifying glass and a pegboard (or similar fixture) for storing tools in an easily accessible manner. A complete assortment of handtools, soldering irons (with desoldering accessories), soldering aids, and a variety of heat sink tools are required for printed board maintenance. A suitable holding fixture should be available for holding the circuit board during repair.

The area set aside for the application of the protective coating should include a bench area with an adjustable holding fixture with suitable lighting. It should also include an exhaust fan or hood over the bench area and a low pressure source (15 psi) of filtered air. An assortment of small items such as mixing cans, stirring paddles, brushes, dipping vats, lint-free cloth, spray guns, etc., will be needed. The extent of the provisions is determined by the type of protective coating prescribed by the manufacturer. A washbasin should be provided for the purpose of washing off any of the materials used in the coating process which come into contact with the skin. Some of these materials are possible irritants to the individual.

Although the troubleshooting procedures for printed circuits are similar to those for conventional circuits, the repair of printed circuits requires considerably more skill and patience. Printed circuits are small and compact; thus personnel should become familiar with the special servicing techniques required.

In all instances, it is advisable to first check the defective printed circuit before beginning work on it to determine whether any prior servicing has been performed. Not all personnel having access to this type of equipment have the skill and dexterity required; hence some preliminary service may be necessary. By observing this precaution a great deal of time and labor may be saved.

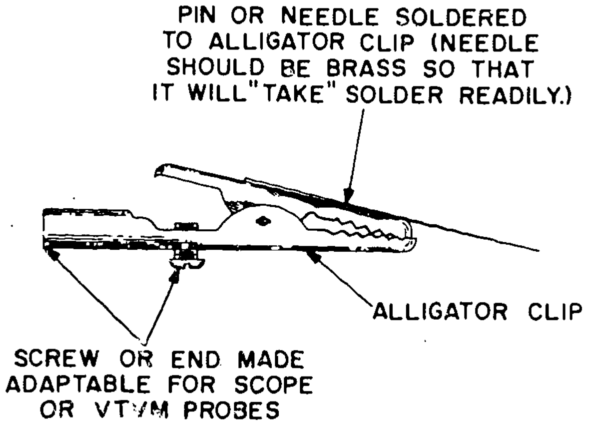
The defective part should be pinpointed by a study of the symptons and by careful and patient analysis of the circuit before attempting to trace trouble on a printed circuit board. Ascertain whether the conducting strips are coated with a protective lacquer, epoxy resin, or similar substance. If so, carefully scrape it away or, better still, use a needle or chuck type needle probe, as shown in figure 11-11, which will easily penetrate the coating for continuity check.

Breaks in the conducting strip (foil) can cause permanent or intermittent trouble. In many instances, these breaks are so small that they cannot be detected by the naked eye. These almost invisible cracks (breaks) can be located only with the aid of a powerful hand- or stand-held magnifying glass, as illustrated in figure 11-12.

The most common cause of an intermittant condition is poorly soldered connections. Other causes are broken boards, broken conducting strips, fused conducting strips, arc-over, loose terminals, etc.

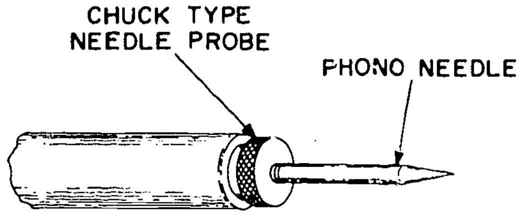
To check out and locate trouble in the conducting strips of a printed circuit board, set up a multimeter (one which does not pass a current in excess of 1 ma) for making point-to-point resistance tests, as shown in figure 11-13, using needle point probes. Insert one point into the conducting strip, close to the end or terminal, and place the other probe on the terminal or opposite end of the conducting strip. If the multimeter indicates an open circuit, drag the probe along the strip (or if the conducting strip is coated, puncture the coating at intervals) until the multimeter indicates continuity. Mark this area and then use a magnifying glass to locate the fault in the conductor (fig. 11-12).

CAUTION: Before using an ohmmeter for testing a circuit containing transistors or other voltage-sensitive semiconductors, check the current it passes under test on all ranges. Do not use a range that passes more than 1 ma.



IMPROVISED NEEDLE POINT PROBE

(A)

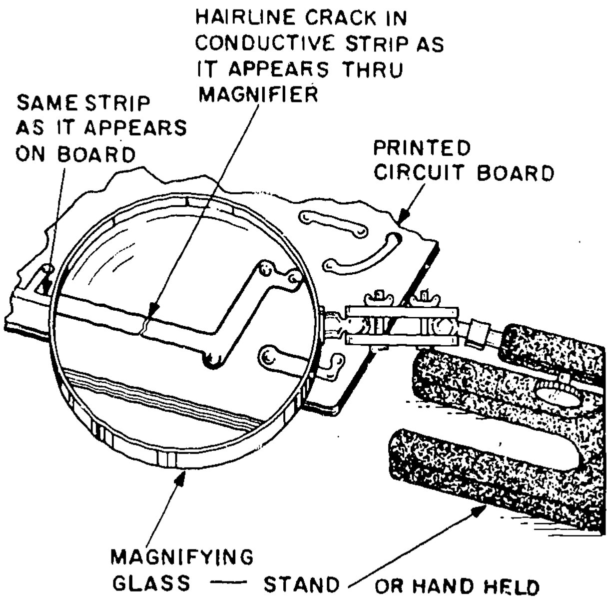


COMMERCIAL TYPE NEEDLE POINT PROBE

(B)

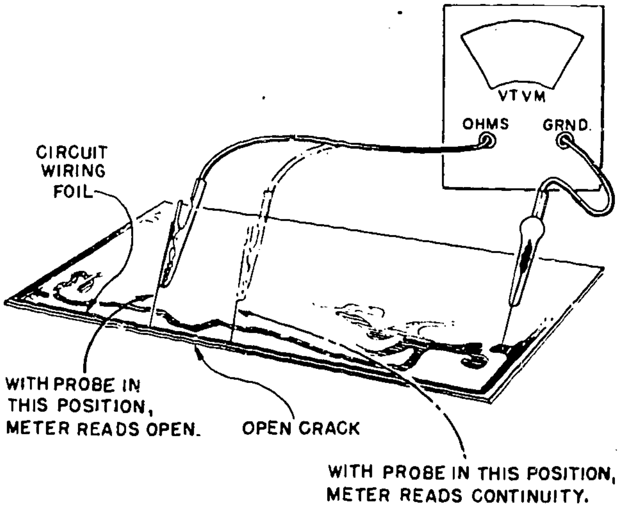
AE.248

Figure 11-11.—Needle probes.



TD.617

Figure 11-12.—Using a magnifying glass to locate a hairline crack.



TD.618

Figure 11-13.—Using a VTVM to locate a break in a conductive strip.

If the break in the conducting strip is small, lightly scrape away any coating covering the area of the conducting strip to be repaired. Clean the area with a firm-bristle brush and approved solvent (Handbook of Cleaning Practices, NavShips 250-342-1), then repair the cracked or broken area of the conducting strip by flowing solder over the break (fig. 11-14 (A)). If there is any indication that the strip might peel, bridge the break with a small section of bare wire (approximately 2 inches) by the method shown in figure 11-14 (B). Apply solder along the entire length of the wire to bond it solidly to the conducting strip. Considerable care must be exercised in applying the solder to prevent it from flowing onto or near an adjacent strip. Keep the solder within the limits of the strip that is being repaired.

If a strip is burned out, or fused, cut and remove the damaged strip. Connect a length of insulated wire across the breach or from solder point to solder point (fig. 11-14 (C)).

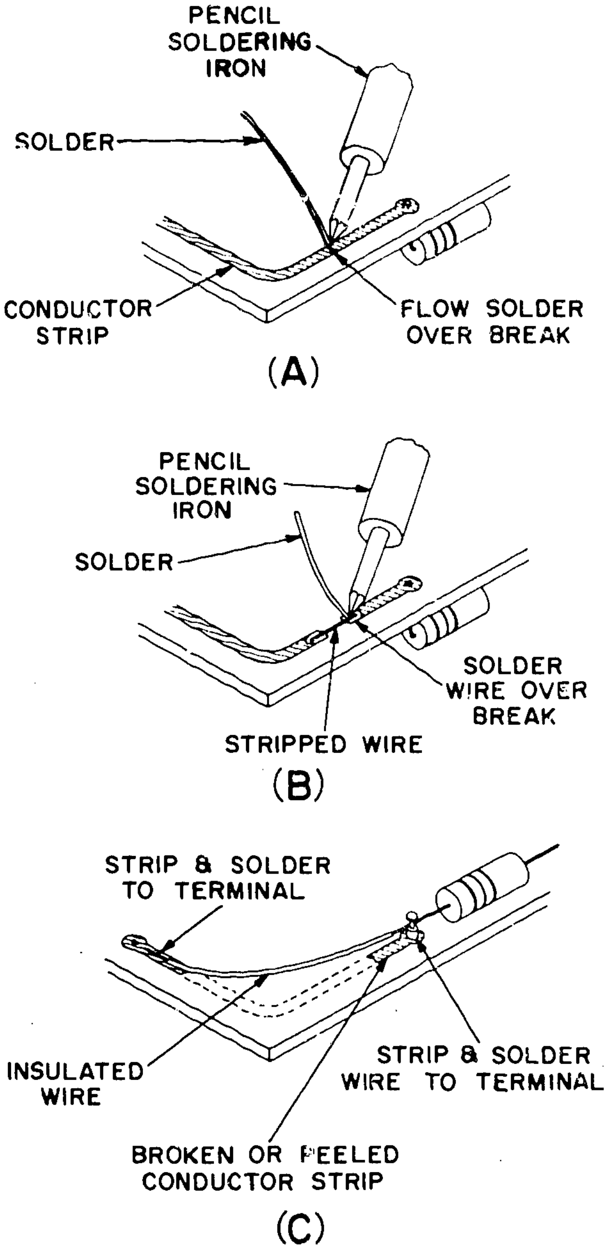
It is best not to glue or bond a conducting strip that has been lifted or peeled from the board at a terminal or solder point. Instead, clip off the raised section and replace it with insulated hookup wire from solder point to solder point.

Printed circuit boards are frequently subject to leakage and shorts, especially if the spacing between conductors is very close, or by the careless formation of a solder bridge between the conducting strips during soldering. NOTE: After repairs, always scrutinize the board for solder droppings that may cause possible shorts.

Frequently, a low-resistance leakage path is created by moisture and/or dirt that has carbonized onto the phenolic board. This leakage can be detected by measuring the suspected circuit with a multimeter. To overcome this condition, thoroughly clean the carbonized area with solvent (methyl chloroform GM 6810-664-0387) and a stiff brush. If this does not remove it, use a scraping tool (spade end of a solder aid tool or its equivalent) to remove the carbon, or drill a hole through the leakage path to break the continuity of the leakage. When the drilling method is used, be careful not to drill into a part mounted on the other side.

Occasionally, a conductor will rupture or fuse, usually because of a current overload. Generally, the rupture, or fusing, is the result of limited spacing and narrow conductors. Do not try to repair this type of damage, other than to bridge the rupture or fused area, with a length of insulated wire (fig. 11-14 (C)).

Most printed circuit boards have areas of conduction, known as grounding conductors, at each edge of the board or on the parts-mounted side of the board. These grounding conductors are conducting strips, used for grounding parts and as a mounting contact for the chassis or common ground. Sometimes an intermittent condition will result if the grounding screws or mounting screws become loose. If this occurs, tighten the screws and then solder a good bond directly from the grounding strip to the chassis or equipment ground. If this is not practical, bond the screws (after tightening) with an epoxy resin or similar compound.



TD.619

Figure 11-14.—Three methods of repairing broken conducting strips.

The most common cause of broken boards is droppage. Some boards are broken because of careless handling by service personnel while the equipment is under repair. Be extremely careful at all times while handling a board. Do not flex the board indiscriminately; be especially careful when removing the board or replacing parts; do not force anything associated with the board.

A printed circuit can be flexed to a certain extent; however, flexing may break the board which must then be replaced at a considerable loss of time. To prevent this possibility, it is always a good policy to use a chassis-holding jig or vise when servicing printed boards.

Before repairing a broken printed circuit board, assess the damage. Inspect the condition of the board and the extent of the break. If the board is not too complicated or the damage not too extensive, the board can probably be repaired.

After the repairs are completed, clean the repaired area with a stiff brush and solvent. Allow the board to dry thoroughly, and then coat the repaired area with an epoxy resin or similar compound. This coating not only will protect the repaired area but will help to strengthen it.

NOTE: When a board is broken, it is much better to replace the entire board. The repair techniques given above are only for temporary repairs.

Special Techniques

It is always desirable to replace parts on a printed circuit board without applying heat directly to the conducting strip. This procedure prevents damage to the printed circuit conductors, feed-through devices, eyelets, or terminals, and saves time in repair. It also prevents damage to semiconductors and other heat-sensitive parts that may be in proximity to the part being repaired.

Replacing parts requires that each type of part mounting be considered individually for the best method of removal.

A part to be removed may be too close to a heat-sensitive semiconductor or other part to allow the hot pencil soldering iron to be applied. A quick test to determine this safe distance is to place your finger between the semiconductor (or heat-sensitive part) and the part to be removed. Place the hot soldering iron in the position to be used. If the heat is too great for your finger it is too hot for the semiconductor. After determining that the heat-sensitive part is too close, place a shield (asbestos or like substance) between the parts before applying the hot soldering iron, and place heat sink clamps on all leads from the heat-sensitive part.

Solid-state parts and their associated circuitry are extremely sensitive to thermal changes. Therefore, particular care must be taken to prevent exposing them to heat. Heat sink and shunts must be applied with shields inserted to protect the associated parts any time repair or removal of a part requires the use of a hot soldering iron. Solid-state parts and associated assemblies require the same care in handling and skill of repairing that is applied to assemblies in equipment of unitized or modular construction containing transistors, tantalum capacitors, crystals, etc.

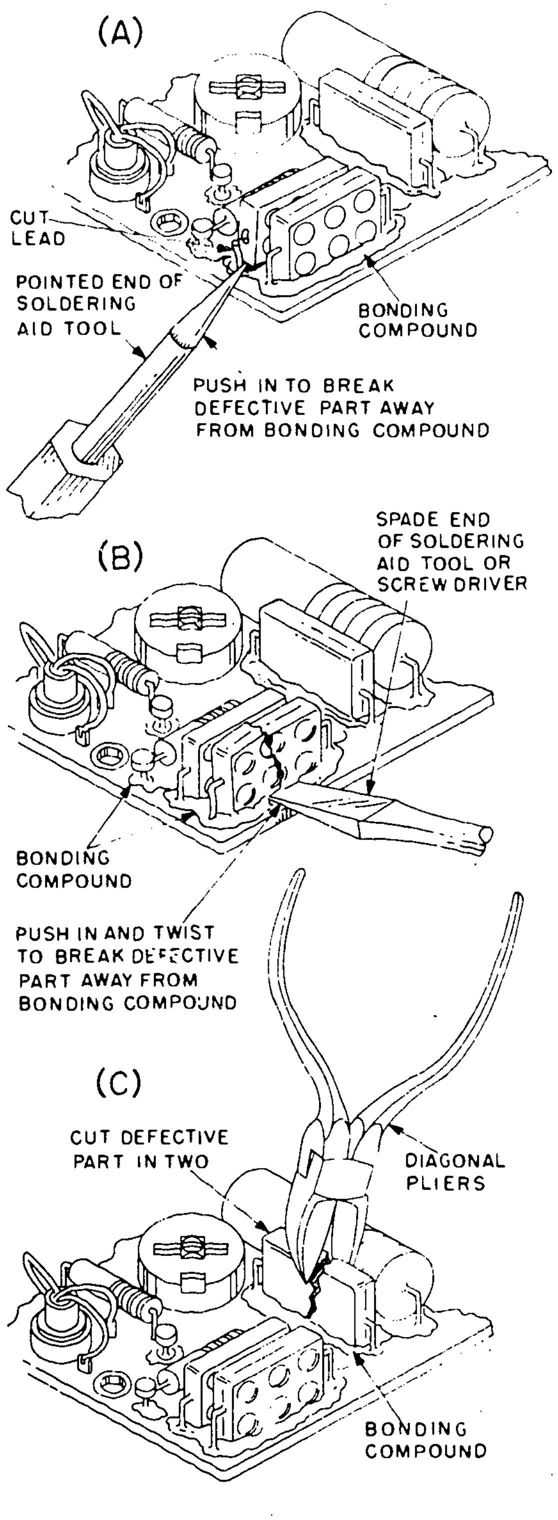
Removal of an axial-lead part that has been bonded to a printed circuit board (with an epoxy resin or similar compound) can be accomplished by breaking the defective part or by applying heat to the bonding compound. The method to be used depends upon the part itself and its location.

If the defective axial-lead part cannot be removed by heat, cut or break the part away from the bonding compound. Figure 11-15 illustrates two different methods of breaking the part away from the bonding compound where the part is too close to other parts to use cutting pliers. In some instances, the part to be replaced is so closely positioned between other parts that one lead must be cut close to the body of the defective part to permit application of the prying tool. Wherever possible, cutting the defective part with end cutting pliers or diagonals, as shown in part (C), is the preferred method to use.

Regardles of which tool is employed (round-pointed or spade type), great care must be used in its application to prevent the printed circuit board or other parts from being damaged or broken. Apply the point of the tool against the bonding compound, between the part and the printed circuit board. Use the tool in such a manner that it works away the bonding compound from the part to be broken away until enough has been removed for the tool to exert pressure against the part. Keep the leverage surface area of the tool flat against the surface of the printed circuit board; this helps to prevent the tool from gouging or breaking the board.

CAUTION: Never apply much pressure against a printed circuit board.

After the defective part has been removed from the bonding compound, remove the leads or tabs from their terminals on the printed circuit board. Clean the area thoroughly before installing the new part. Do not remove the compound left on the board under the removed part unless its condition requires it. The mold left



TD.620

Figure 11-15.—Removing a defective from bonding compound.

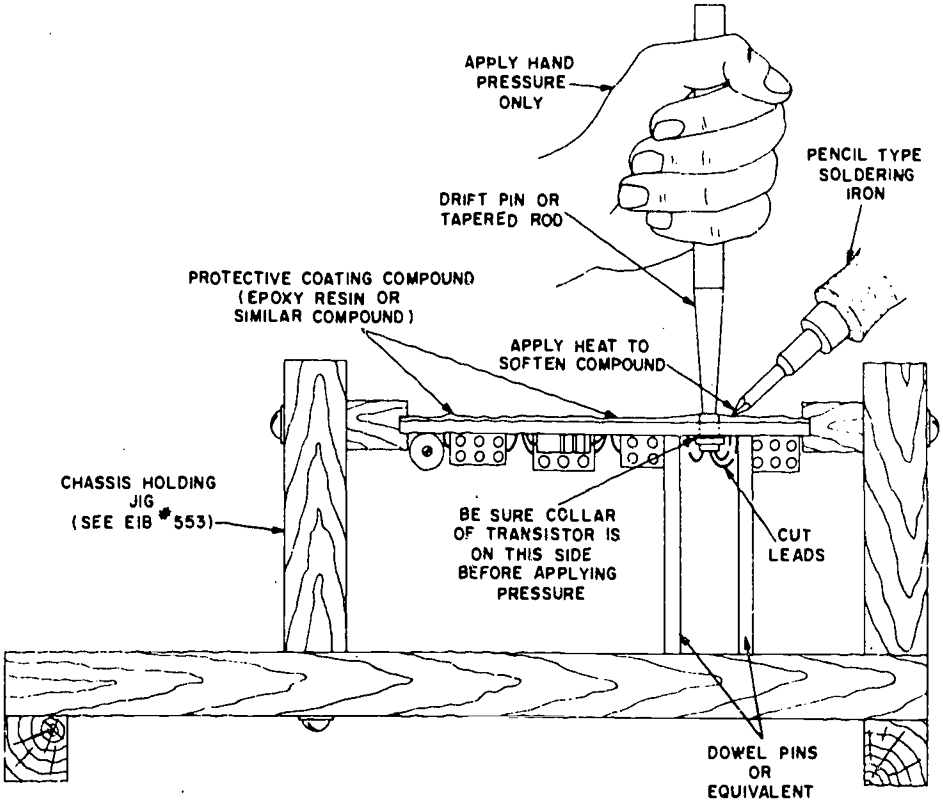
in the compound should be the same as the new part; thus, inserting the new part in this mold helps to secure it from vibration. After the repairs have been completed and the circuit tested, spray the newly soldered area with an insulating varnish or equivalent. Coat the new part or parts with a bonding compound (ECCOBOND "55" relix-R-313, or equivalent).

To replace a proven defective transistor, first cut all of its leads, and then remove it from the assembly. Transistors are mounted on circuit boards in many different ways; thus it is necessary to study how a particular transistor is secured before attempting to remove it. A transistor with a clamp type mounting requires only a pointed tool between the clamp and the transistor to remove it. A transistor mounted in a socket may have a wire or spring clamp around it. Remove this clamp before pulling the transistor out of the socket. In some instances the transistor is bolted through the board. Remove the nut and washer, then remove the transistor. Where vibration is a prime factor, the manufacturer mounts the transistor through the circuit board and bonds it (with epoxy resin or similar compound). For this type, a flat-ended round-rod type tool (drift punch) of a diameter less than that of the transistor case is required. Be sure that the printed circuit board on which the transistor is mounted is secured in a proper device, and in such a way that pressure exerted against the board is relieved by a proper support on the other side (fig. 11-16). Apply a hot pencil soldering iron to the bonding compound and simultaneously apply the drift punch against the top of the transistor, exerting enough pressure to remove the transistor from the softened compound, and then on through and out the other side of the board (fig.11-16).

Before installing the new transistor, great care must be taken to prepare the part for installation.

Test the transistor in a transistor tester before installing. This precaution will assure that the transistor is good before it is installed. For several reasons transistors can and do become defective in storage. Therefore, always check them before installation.

Preshape and cut the new transistor leads to the shape and length required for easy replacement. Use sharp cutters, and do not place undue stress on any lead entering the transistor. The leads are fragile, and are therefore susceptible to excessive bending or too sharp a bend. Shape any bend required in a gradual



TD.6

Figure 11-16.—Removing a transistor that has been through-board mounted.

curve, and at least 1/4 inch to 3/8 inch from the base of the transistor. A safety measure which can be taken to insure that the lead will not break off at the base is to use two pairs of needle nose pliers. With one pair grasp the lead close to the transistor base, while shaping the rest of the lead with the other pair.

NOTE: The above procedure and precaution should be applied to any and all semiconductors, tantalum capacitors, and other miniaturized parts in equipment of modular or unitized construction.

After the remaining pieces of the defective transistor-terminal leads have been removed and the terminals on the board cleaned and prepared, connect the new transistor to its proper terminals.

REMEMBER: Handle any semiconductor or miniaturized part carefully; be gentle and be precise.

When the defective transistor is removed from a bonded through-board mounting, care must be taken that the new transistor clears the hole before it is connected to its terminals. If the hole is too large, shim it with a tl plastic sleeve (fabricated). If the hole is t small, ream it to accept the new transistc Rebond the fitted transistor after testing t repaired circuit, and it is proven to be oper tive. CAUTION: Do not use heat to rebond r placed semiconductors.

To remove and replace a multilug part, su as a transformer, choke, filter, or other simil potted, canned, or molded part, release the pa from its mounting before disconnecting or cutti its conductors. Before applying pressure to r move such a part, inspect it carefully to be su that the part is completely free of all its cc nections to the printed circuit board, and tl all bent or twisted mounting lugs have be straightened; otherwise, the board may be br ken. Never wrench or twist a multilug part free it, because this will cause the conducti strip to become unbonded from the board. Wc this type of part in and out in line with its lug while applying a hot pencil soldering iron (f 11-17 (A)), using a bar type tiplet adapter similar desoldering tool.

Whenever possible, cut the conducting or mounting leads and lugs of the defective multilug part on the mounting side of the board (fig. 11-17 (B)). Heat and straighten the clipped leads with a hot pencil soldering iron and slotted soldering aid tool (or slotted soldering iron tiplet adapter or similar desoldering tool) applied to the circuit side of the board; pull the leads or tabs through with pliers as shown in part (C) of figure 11-17.

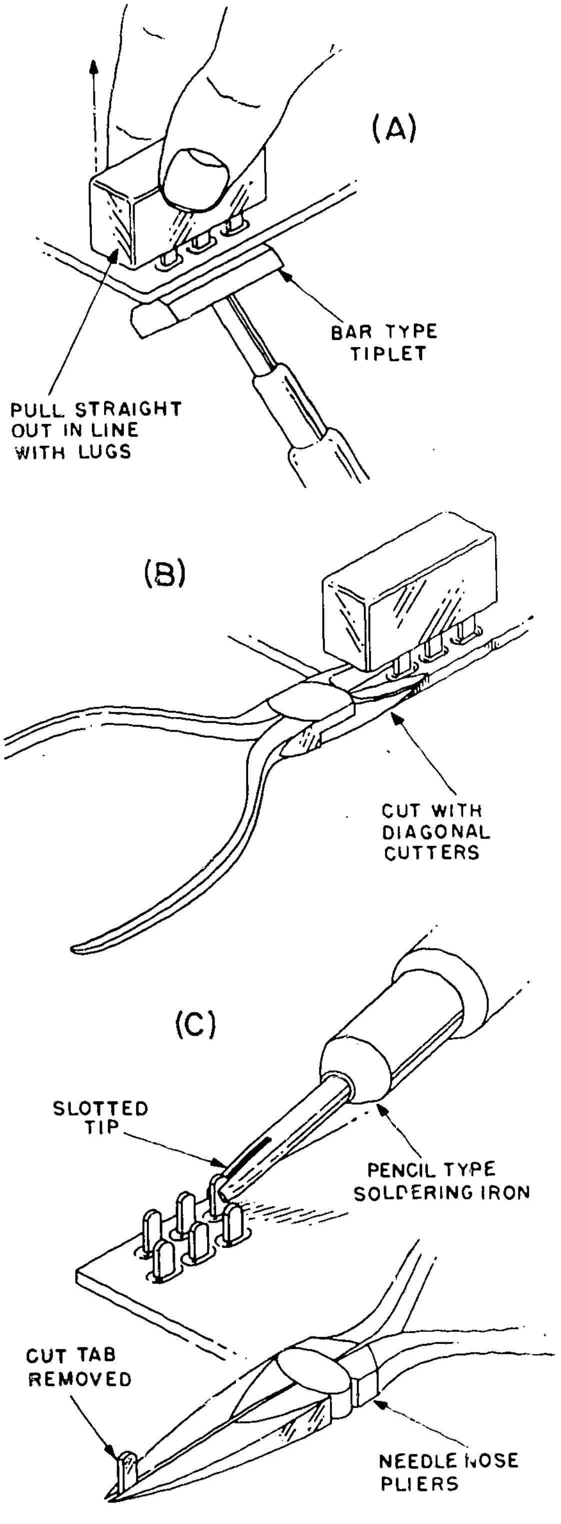
To replace the new multilug part, check to be sure that all of the lead holes or slots are free and clean, allowing easy insertion of the multilug part. Do not force any part into position on a printed circuit board, because the board might break or the printed circuit strip and eyelet terminal lift. If the part does not position easily, check and rework the terminals and holes (or slots) until it does seat freely; then proceed to solder.

Be very careful when replacing defective parts that have leads terminating on standoffs, feed-through terminals, etc. In most instances, standoffs and feed-through terminals, are very small, and mounted on a thin phenolic board; thus they are susceptible to damage by heat and undue pressure.

Emergency Techniques

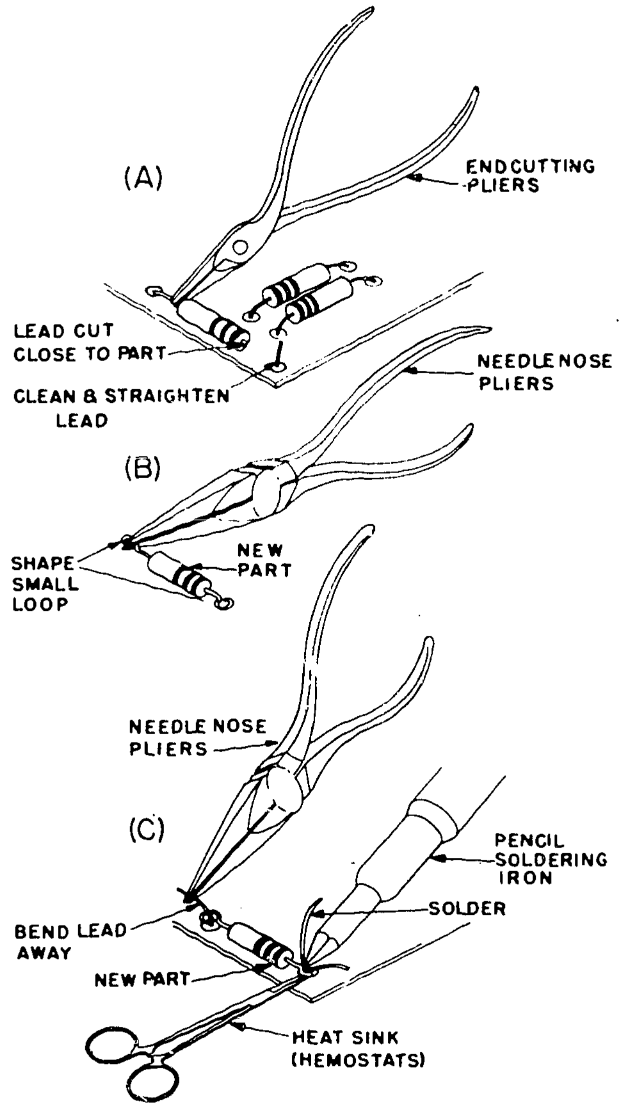
In many instances there is a need for a time-saving technique and procedure for electronic assembly emergency repair. It is desirable, when making an emergency repair, to avoid unnecessary disassembly to expose the defective part when testing and/or repairing. In many instances this can be accomplished by removing only the cover from the assembly.

To remove and replace an axial-lead part (a part mounted by leads that extend from each end, such as a common resistor or capacitor), cut the leads as close as possible to the body of the part, and then connect the leads of the replacement part to the leads remaining on the board. The cutting is accomplished with a pair of end cutting pliers (fig. 11-18 (A)). Clean and straighten the leads remaining on the board. Fashion small loops in the leads of the replacement part (fig. 11-18 (B)), making the loop size and lead length such that the loops slip easily over the leads projecting from the board. Secure these connections by bending the old leads away from the part. Place a heat sink clamp on the lead from the board, between the board and the connection to be soldered, and then solder the connection (fig. 11-18 (C)). The heat sink prevents



TD.622

Figure 11-17.—Removing a defective multilug part.



TD.623

Figure 11-18.—Replacing a defective part by cutting its leads.

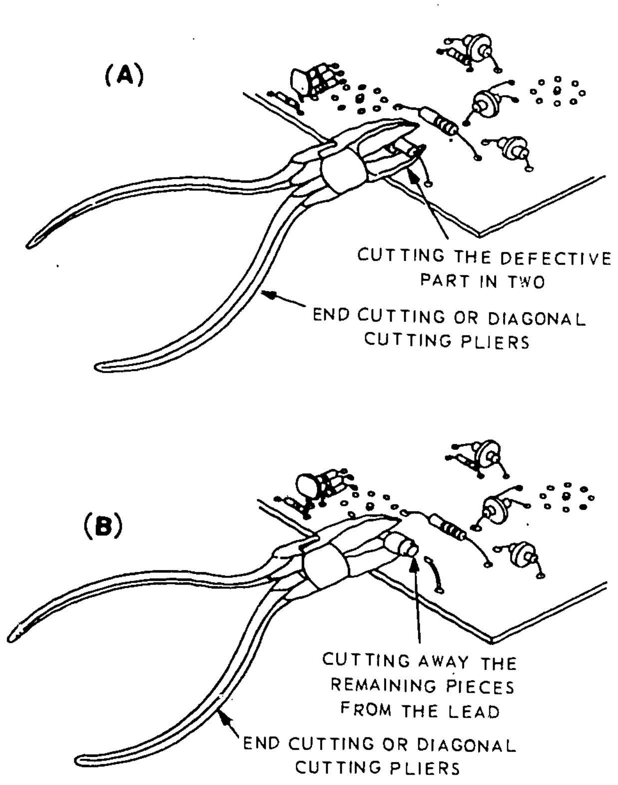
the leads connected to the board from becoming unsoldered and causing a short, or open circuit. Always check to be sure that the old leads are properly connected to the conducting strip.

If cutting the leads of a defective axial-lead part would result in leads that are too short for the replacement part to be connected properly, cut the faulty part in half with a pair of diagonal or end cutting pliers (fig. 11-19 (A)). Then carefully cut away the pieces of the part from each lead (fig. 11-19 (B)). This will yield leads of sufficient length to permit the replacement part to be fitted and soldered as shown in figure 11-18 (C).

Considerable care must be taken when replacing a defective part that terminates on miniaturized standoffs, feed-through terminals, etc. These small terminals break easily from applied pressure, or they may melt loose from excessive application of the hot soldering iron. Do not attempt this type of repair on an assembly unless there is no replacement available.

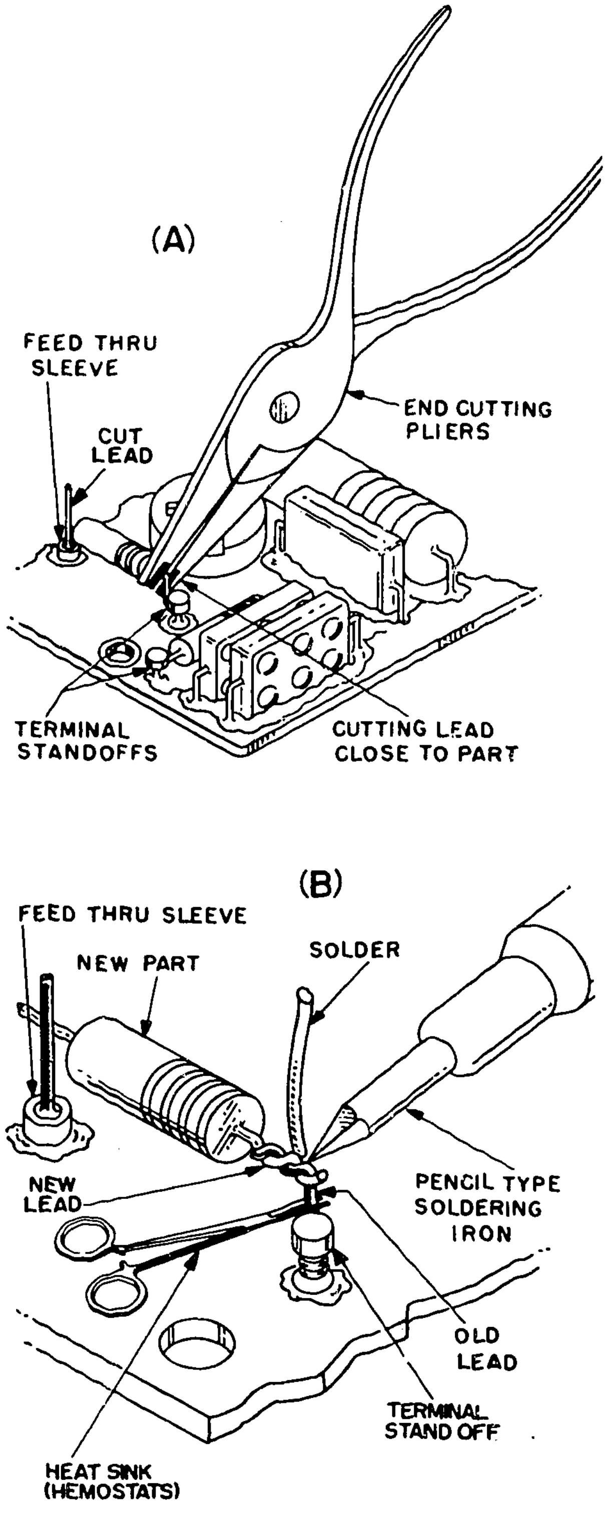
For emergency or temporary repair purposes, the following techniques may be used. Cut the lead close to the defective part (fig. 11-20 (A)). Use a heat sink clamp (or pliers) next to the terminal, then solder a spliced lead from the terminal to the new part (fig. 11-20 (B)).

A helpful heat control technique is to place a small piece of beeswax on the terminal behind the heat sink. When the beeswax melts, the



TD.624

Figure 11-19.—Cutting the defective part maximum lead length.



TD.625

Figure 11-20.—Removing a defective part from a miniature standoff terminal.

temperature limit has been reached. This is a warning to remove the source of heat immediately. Allow the area to cool thoroughly before attempting to complete the soldering of the connection. Apply a new piece of beeswax to the terminal, repeating this procedure until the connection is satisfactorily soldered.

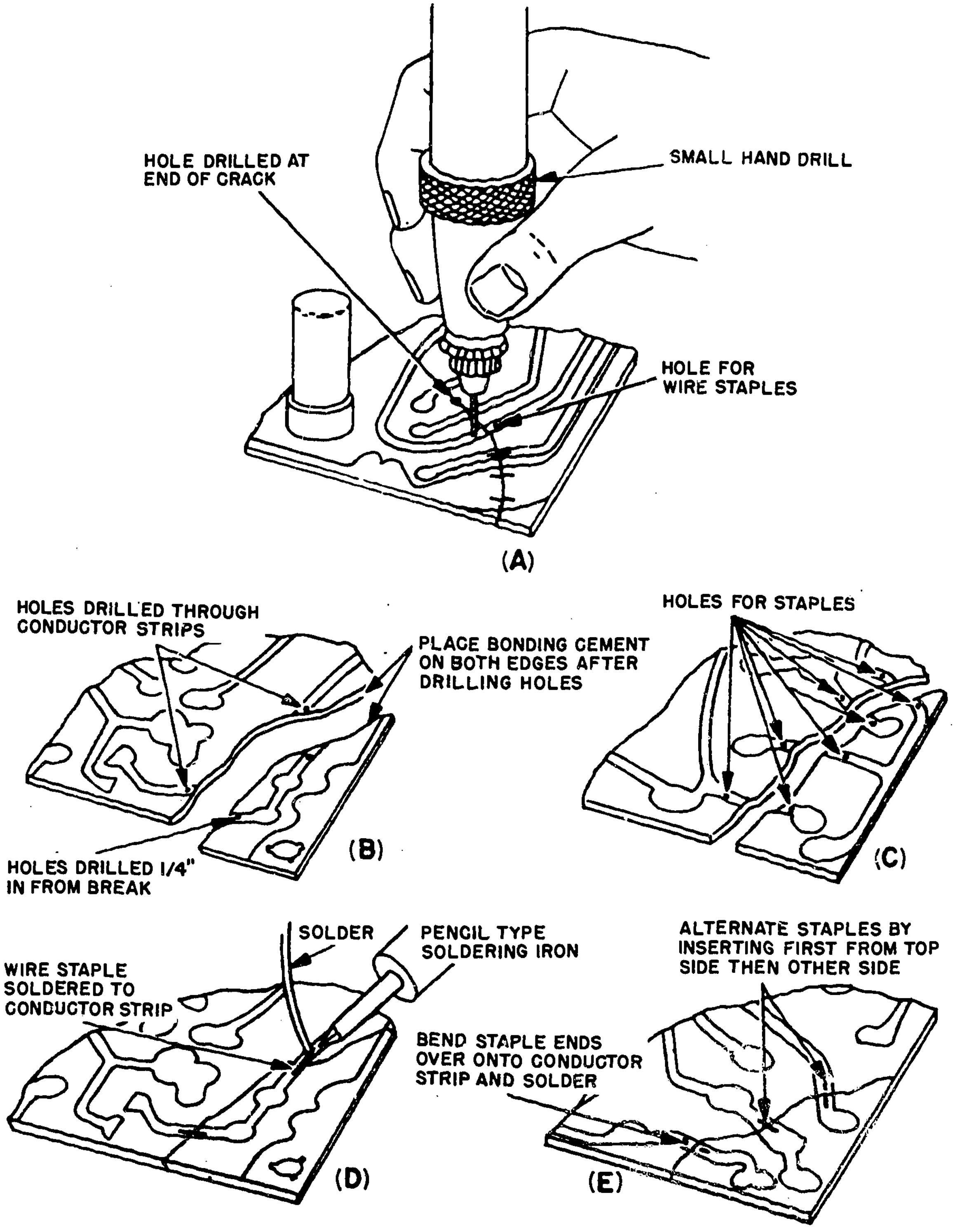
It is best not to glue or bond a conducting strip on a printed circuit board that has been lifted or peeled from the board at a terminal or solder point. Instead, clip off the raised section and replace it with insulated hookup wire from solder point to solder point. However, for temporary or emergency repair, a loose or peeled strip may be bonded back onto the board, using a non-conductive bonding compound ECCOBOND "55" epoxy adhesive, or its equivalent. A silver conductive paint or similar material can also be used to repair printed circuit conductive strips. This technique is satisfactory for temporary or emergency repair, but is not satisfactory for permanent repair.

A broken printed circuit board may have to be repaired in an emergency where no replacement is available. Before repairing the broken board, assess the damage for the extend of the break and the amount of damage to the parts involved. If the board is not too complicated or the damage too extensive, the board can probably be repaired.

If a small portion or corner of the board is broken off, it may be rebonded to the larger section with a nonconductive cement or its equivalent. If cementing is not feasible or does not hold satisfactorily, the pieces can be fastened together with wire staples cut from solid conducting wire of the diameter and length required, depending on the width of the conducting strip to be repaired.

To insert the staples, drill holes about 1/4 inch in from each side of the break (fig. 11-21). The holes should be just large enough to accommodate the wire used for stapling. (This may vary, depending on the width of the conductive strip to be repaired.) Drill the holes through the conducting strips so that the staples will provide a good electrical contact across the break; this method will permit the use of sufficient staples to hold the pieces together without danger to shorts between conductors. If the break is sufficiently large, position additional staples at all points possible to give the board more support.

Where the adhesive and stapling method described above does not provide structural



TD.626

Figure 11-21.—Repairing a broken printed circuit board.

strength or sufficient rigidity, splints or a doubler may be used. Strips of thin card material are glued across the fracture with a nonconductive adhesive. Where needed, additional strength may be obtained by gluing a plate of the card material to the splints with the nonconductive adhesive.

Rebond any loose conducting strips with a nonconductive bonding cement; then apply nonconductive cement to both sides of the break, and join the sections together (fig. 11-21 (B)). Insert half of the measured and precut wire staples from top to bottom, and the other half from bottom to top, bending the ends flush against the board (fig. 11-21 (E)). Solder these staples to the conducting strip (fig. 11-21 (D)).

If the board is not completely broken but is only cracked, drill a hole at the end of each crack (fig. 11-21 (A)) to prevent further lengthening of the break. Then repair the crack in the same manner as the complete break discussed above.

After the repairs are completed, clean both sides of the repaired area with a stiff brush and solvent. Allow the board to dry thoroughly, then coat the repaired area with an epoxy resin or similar compound. This coating not only will protect the repaired area, but will help to strengthen it.

NOTE: The repair techniques given above are ONLY for emergency repair.

Safety Precautions

The only hazards involved in the maintenance of printed circuit boards are those that would be encountered in any electrical/instrument maintenance activity. However, the solvents and some of the materials used in the protective coating process require the following precautions:

1. Flammable liquids must be stored in approved containers and enclosures.
2. Some liquids are possible irritants and somewhat volatile. Do not allow liquids to come into contact with the skin. If it happens accidentally, wash the area immediately with soap and water. Use an apron and gloves.
3. Use solvents and coating materials under a hood or exhaust fan to avoid inhalation of fumes.

CHAPTER 12

TACTICAL TRAINERS

The rapidity with which the military research and development program is moving demands new and more effective methods of training men in highly complex skills. The variety and the complexity of skills to be learned by military personnel within the pressing time limits present a formidable training problem. However, training time can be substantially reduced by the use of adequately designed and properly utilized training devices. One method of training individuals or groups is by the use of synthetic trainers.

The training of individuals or groups while utilizing methods and equipment to create and present actual operational or combat conditions is called synthetic training. Fleet and air maneuvers, battle practice, drills, and exercises may be considered part of a synthetic training program that has been used for years to prepare the Navy for actual operational emergencies and for combat. The equipment used in synthetic training to simulate emergency and combat conditions are referred to as simulators or tactical trainers.

A simulator or tactical trainer may be described as the equipment which accurately computes and simulates the conditions and functions encountered by personnel in performing their tactical mission. A simulator may be a small black box which activates the operational equipment, thus providing an operator with the indications necessary to solve a tactical problem. In another instance the simulator may be a full size model of a submarine or aircraft in which the crew may operate equipment identical to that in the operational vehicle. A training device which provides training of a complete crew in a complete system simulator is called a weapon system trainer.

The descriptions of the trainers contained in this chapter are presented to show the application of operational tactics in completely simulated training spaces. A detailed description of the equipment is beyond the scope of this training manual but can be found in the individual trainer's utilization and maintenance manuals.

WEAPONS SYSTEM TRAINER SET DEVICE 2F-85

The Weapon System Trainer Set Device 2F85 is the trainer that simulates the F4D aircraft. The F4D aircraft is a later improvement on the F4 Phantom aircraft. The F4D aircraft carries a crew of two and was originally designed to meet a Navy requirement for a high performance, all weather interceptor, but, has since evolved into a weapons system capable of high and low altitude bombing, reconnaissance, and air-to-air combat. It will carry either conventional or nuclear weapons.

PURPOSE

Device 2F85 can realistically duplicate any mission of the F4D aircraft. Students initially transitioning to the Phantom, as well as experienced crews, can utilize the WSTS for training in any particular type of mission. All aircraft systems are simulated and the WSTS cockpit contains all the flight controls, aircraft instruments, engine instruments, and bombing and target intercept equipment found in the aircraft.

DESCRIPTION

The 2F-85 is an exact replica of the aircraft cockpit and is mounted on a 3-degrees-of-motion system to give the same sensations received if the particular maneuver were being performed in the aircraft. The motion system provides vertical translation 12 inches up and

5 inches down, a pitch attitude range of 10.5 degrees nose up to 4.5 degrees nose down, and a roll envelope of plus or minus 7.5 degrees.

Engine sound, wheel rumble, aerodynamic noise, missile control system sounds, and tire screech are sounds generated to add to the realism of the WSTS simulation. The effects of scattered sunlight and cloud effects on missile aural tone are simulated.

Sunlight, darkness, broken clouds and lightning can be presented by varying the background light entering the translucent cockpit windows and by using rough air inputs from the motion system as appropriate.

Environmental simulation includes the oxygen and anti-g pressure suit systems, all using a common compressed air supply.

APPLICATION

This device allows the crew to fly a complete mission over enemy territory, reach the target, take action against the enemy defenses, and return without ever leaving the ground. This allows the crew to learn, refine, and polish their procedures before being exposed to the actual hazards of the mission.

Tactics simulation is accomplished through the use of radar landmass and target generation techniques. Radar landmass utilizes a factored transparency system to present simulated radar returns with the correct reflectivity and terrain information on the radar scopes. The map terrain reproduced on the transparency is affected by video signal effects such as directivity, target breakup, reflectivity variation, earth curvature, shadow, and aspect angle. Transparencies are available for a number of geographical areas, each covering 1,250 nautical miles square at a scale of 1:5,000,000. This method enables a wide variety of missions over different types of terrain. During a simulated bombing run, terrain from a particular area and a target are generated as video by the radar landmass system and appear on the missile control system radarscopes.

Depending on the type of bomb run, inputs from the bombing systems and aircraft's velocity, heading and altitude are processed by the computer and cause the video presentation on the scope to appear as it would in the real world. By following his instrument indications, the student flies the aircraft over the target and releases his weapons. Simulation of the radar presentation includes ground clutter, inversion effects, and target breakup.

The simulator can generate a single maneuverable target, a four-target formation, or both simultaneously. During an air intercept problem, the computer compares preprogramed target data such as velocity, position, direction, range, azimuth, and elevation with aircraft present position, velocity, and heading and displays this information on the gunsight system. The student then maneuvers into proper relationship to the aircraft until it is "scrubbed" or the student lets it get away.

Jamming is a target generation function, and the simulator is able to display sweep and barrage jamming, angle and range deception, multitarget jamming, forward fired chaff and decoy drones.

A flight and tactics instructor are present for each mission. Two jump seats are provided on the cockpit exteriors, permitting direct observation of the trainees. The instructor station (fig. 12-1) includes repeater instruments, indicator lamps and controls, enabling the instructors to monitor the progress of the simulated mission from start of engine to postlanding, including the pilot's selection of all phases of arming and release or firing of weapons. Numerous malfunctions can be introduced by either instructor, such as flameout, afterburner failure, oil pressure variation, airspeed/Mach meter failure, runaway stabilizer, and generator failure. Four station locators, all using punched card readers, are provided to permit simulation of TACAN, GCA, and UHF communications and automatic direction finding.

The situation display indicator, utilizing a 24-inch cathode-ray tube, provides the tactics instructor with a display of the entire tactical area, normally a 400-nautical-mile square. Each target is identifiable by a special symbol. A "V" represents the position of the simulated aircraft, a circle represents the primary target, and a group of four spots represents the position of the formation targets. A 100-mile scale is also available.

A ground track recorder presents an additional indication of the flight, with one pen representing the fighter and another the airborne target. The recorder permits training in GCA procedures and can also be used, together with the scoring recorder, to debrief students after the flight. The scoring recorder is a strip chart recorder with three analog channels and one event marker channel. The analog channels

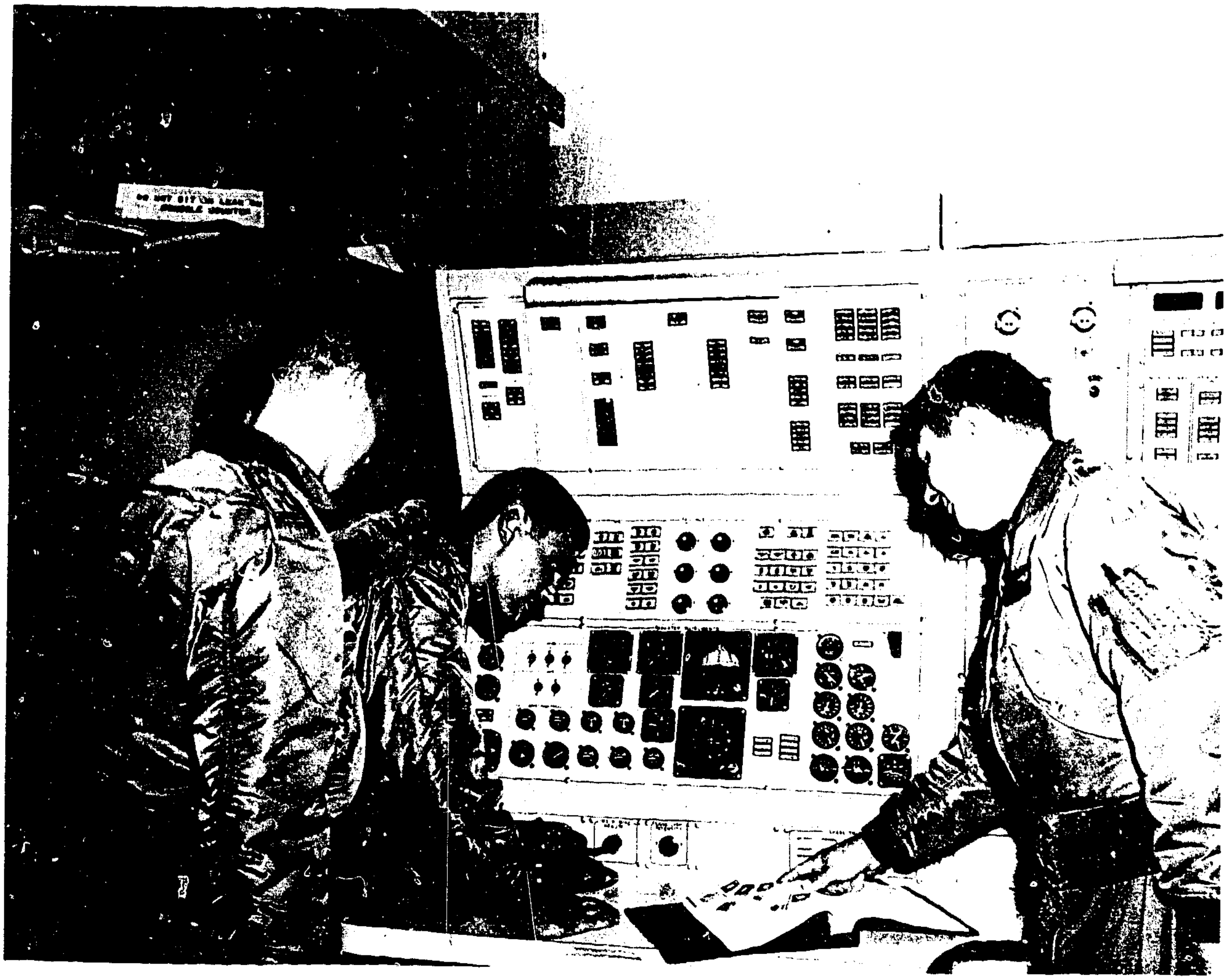


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Figure 12-1.—Instructor's station, device 2F-85.

record parameters such as elevation and azimuth steering errors, altitude and heading deviations, or g and yaw-roll errors. The event marker channel can identify up to ten events such as bombing mode selected, pickle switch actuation, pull-up signal and bomb release, missile misfires, and "in IR pattern".

The computer utilized for this device is basically a d-c analog computer. For those operations requiring extremely accurate coordinate conversion, and for great circle heading and range computations, 400-hertz carrier a-c analog computational methods are used. Simulated aircraft performance is based on a mathematical model that is implemented to provide for full 360 degrees of freedom about each inertial axis.

The F-4D Weapons System Trainers Set is also produced in an Air Force version indentified as Type A/F37U-T3.

RADAR SCOPE INTERPRETATION TRAINER, DEVICE 15C4E

Device 15C4E, a radar interpretation trainer for the F-4 type Phantom II aircraft, will be utilized by the Navy, Marine Corps, Royal Navy, and Royal Air Force to provide basic and advanced mission training for Radar Scope

Interpretation Officers (RIO's) in the use of the aircraft missile control system (MCS) for all weather, air-to-air intercept problems and air-to-ground attack problems.

CAPABILITIES

Basic classroom training is provided for five trainees in the interpretation of dynamic radar presentations with a continuous solution to the intercept problem displayed on a 7-square-foot projection screen. Students are taught to recognize types of bogeys (fighter or bomber) by appearance and effects on the radar display. The trainee is also taught to recognize the appearance and effects of electronic, chaff, and deceptive types of jamming, and how to apply available counter-countermeasures in the various ECM environments.

All training problems are unprogramed and are under the complete control of a single instructor who "flies" the student RIO's interceptor aircraft as well as all the target aircraft. The instructor can also position the surface targets, control the simulated ECM by an enemy target, and operate the RIO's radar. At any time during the training session the instructor can turn over the operation of the radar set to the student RIO, who occupies a simulated cockpit station where he acquires actual experience in radar operation.

Simultaneously, while the student RIO is at the radar controls, other students can be trained by the lecture-demonstration method. This technique is made possible by a closed circuit television system, which permits the other students to observe a special plotter display projected on a large screen. Thus, the students can grasp fully the spatial relationships of the aircraft and relate them to the radar presentations. The instructor can "freeze" a problem at any time to give the RIO additional instructions or to explain procedures to the observers.

MCS familiarization at a simulated RIO station includes the operation of the radar set, data link, and built-in test controls. This device affords the experienced RIO an opportunity to develop operation skills in the use of the MCS against multiple air targets which have the capability of generating electronic countermeasures. F-4 personnel team training is available when the pilot "takes control" of the high performance aircraft at the instructor's station.

DESCRIPTION

Figure 12-2 depicts a trainee at the RIO station (extreme left position of the instructor-RIO console) and an instructor with his hand on the interceptor "flight control." The basic display rack shown in the upper center of the photograph presents an enlarged high-resolution picture of the student RIO's radar scope for viewing by the classroom observers and instructor. Also shown in the upper center is the computer rack, a completely transistorized 400-Hz analog simulation system with modularized plug-in units. The artist's portrayal of an F-4 Phantom II aircraft firing a missile at the bogey represents the fusing of dynamic classroom training into combat experience. Device 15C4E can be transported by air and can be readily installed in a room as small as 400 square feet.

S-2E WEAPON SYSTEM TRAINER, DEVICE 2F66A

Device 2F66A simulates all the crew stations in the S-2E Tracker aircraft, a four-place twin engine aircraft. The aircraft simulated is the primary fixed wing aircraft used by the Navy for aircraft carrier antisubmarine warfare. The function of the aircraft is to search for, detect, track, localize, and destroy enemy submarines under all weather flight conditions. The device is housed in two semitrailers; one contains the computing and electronic equipment required to provide the simulation to all the operational and synthesized equipments. The other trailer contains trainee stations for two pilots, two tactical operators, and instructors.

The pilot's compartment contains all controls, switches, instruments, and cockpit furnishings contained in the aircraft. All that affect simulation of actual aircraft flight or concern as ASW mission are functional and operate in the same manner as in the aircraft, creating, or reflecting the same action or reaction. As nearly as possible all control forces are duplicated and all maneuvers that are flown in the aircraft can be flown in the trainer. The realistic simulation is carried out even through the pilot's seat.

The major difference between the simulation and the duplication of the actual conditions encountered in the aircraft is that the trainer

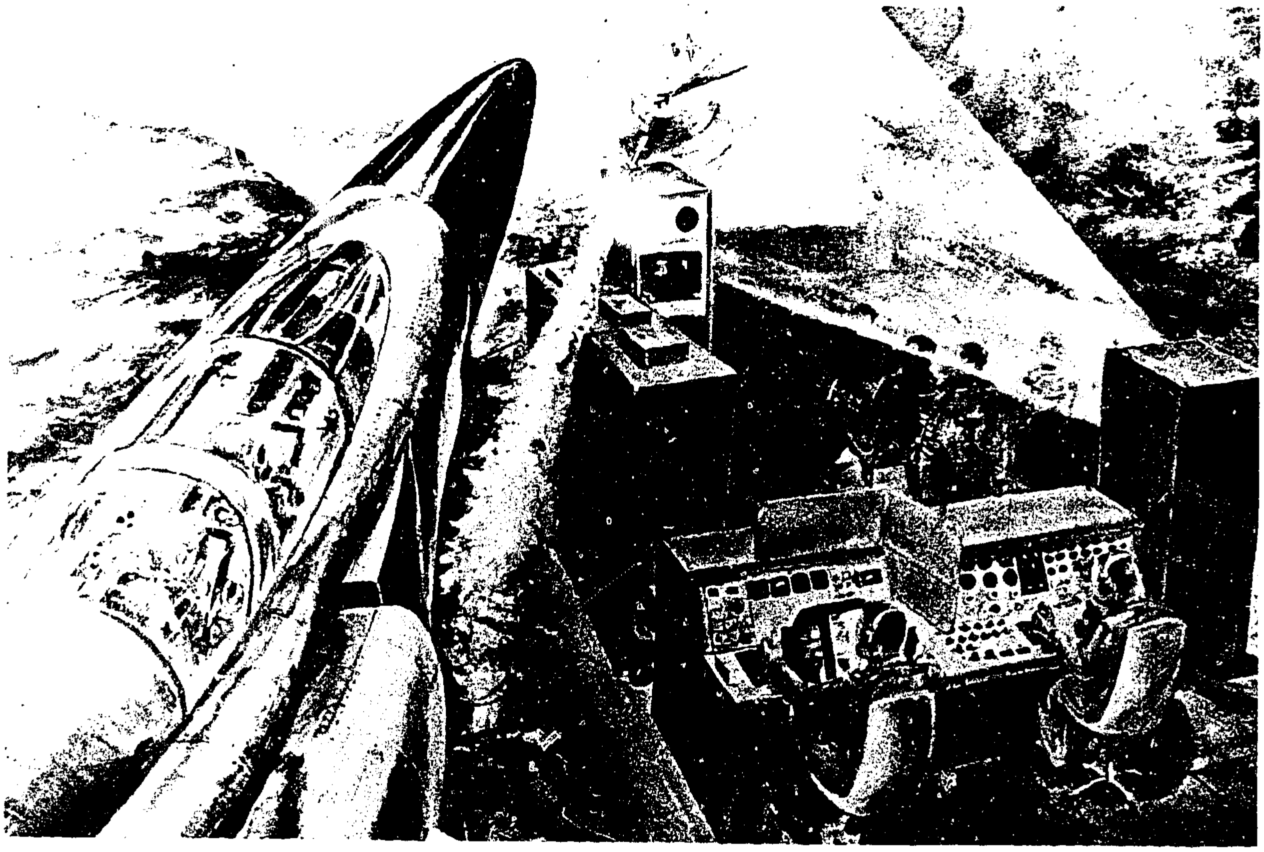

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Figure 12-2.—Radarscope Interpretation Trainer, Device 15C4E.

must be flown under instrument conditions at all times.

There is no visual simulation except for the simulation of storm conditions in which the pilot is confronted with the turbulence and lightning encountered in an actual storm. All navigation equipment and radio aids are functional. Training in cross-country instrument flight and instrument letdown, including radar controlled approaches, is provided.

The copilot, acting as a tactical coordinator, can monitor the actual tactical situation on the large tactical display indicator mounted on the center panel between the pilots. The copilot has at his disposal the same tactical computer functioning the same as in the aircraft.

The instructor stations contain systems for monitoring the entire tactical ASW problem as it is conducted. This is accomplished by the use of television monitors in the pilot's compartment. By monitoring the tactical display indicator, instructors are able to monitor the position of the aircraft and submarines on a tactical plotter mounted in the instructor compartment. (See fig. 12-3.) From their station they are able to provide emergencies that require reaction and train the pilots in coping with them. They can control the readings of the various acoustic and nonacoustic detection equipments used by the tactical operators and controls for directing the course and speed of the various submarine targets. There are also controls for varying the type and quality of information furnished to the tactical operator stations in order to train them realistically in conditions that they may expect under operational conditions. The instructors have the capability of "freezing" the problem at any time to explain a situation to the trainees or to

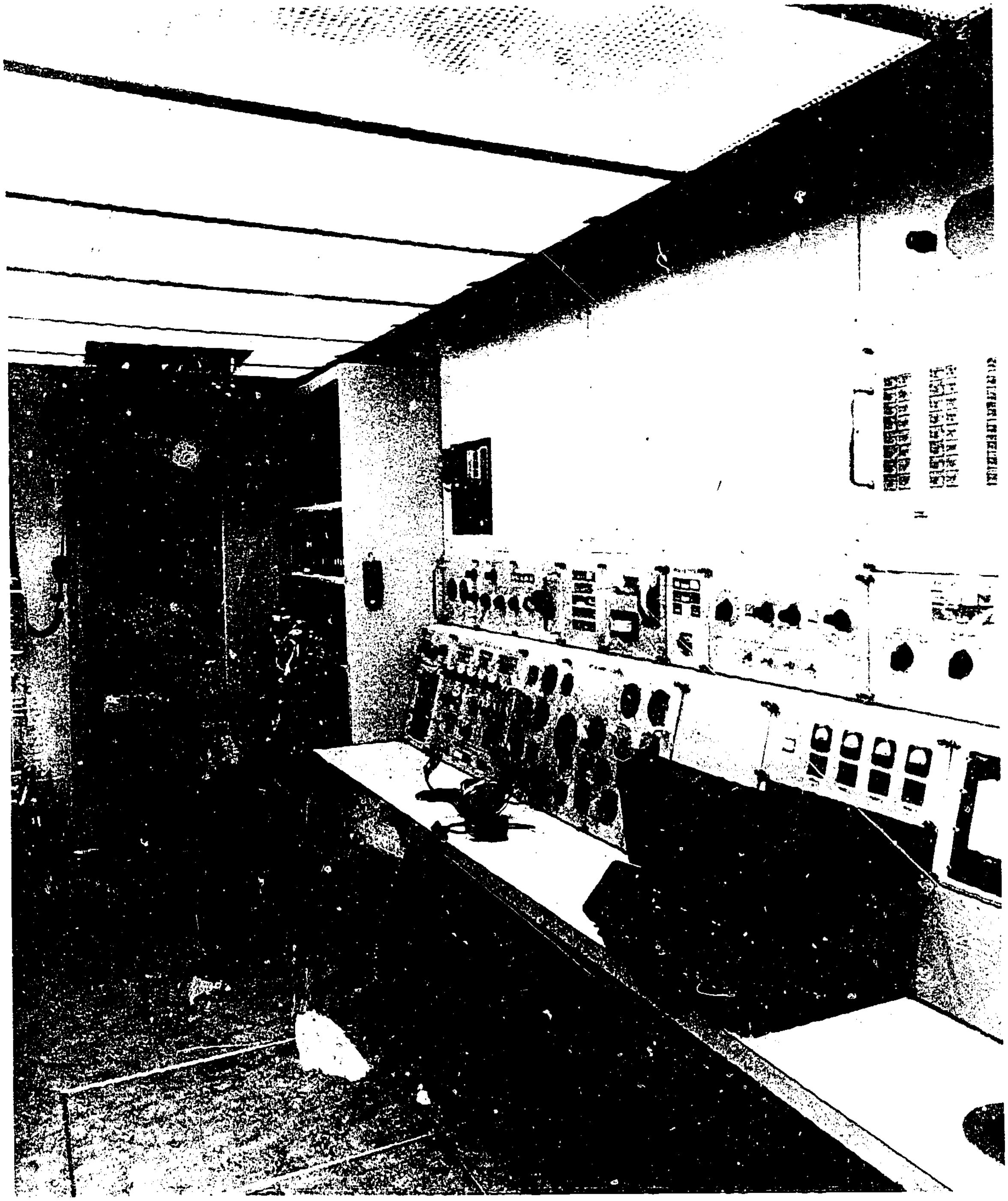

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Figure 12-3.—Instructor's station, device 2F66A.

get it back on the track without starting the entire problem again. This is one of the most important capabilities of the trainer. The tactical operators have completely simulated positions with all the various detection capabilities, such as radar, magnetic anomaly detection, Julie, and Jezebel that are found in the S-2E operational aircraft. This portion of the trainer can be operated without the pilot's compartment being occupied to provide training for both tactical operators or to provide individual training for either.

MARINE TACTICAL DATA SYSTEM TRAINER DEVICE X15A19

PURPOSE

Device X15A19 is designed to provide training for radar operators and weapons controllers within a Tactical Air Operation Center (TAOC) of the Marine Corps Tactical Data System (MTDS). The TAOC is the principal data acquisition center of the MTDS. Functions accomplished at this center include acquisition, processing, computing and displaying data concerning the air situation, identification, threat evaluation, weapon assignment and control, and enroute air traffic control.

At the TAOC data from multiple search radars and IFF equipment is processed to provide a continuous up-to-date display of the air situation within an assigned sector of responsibility. Additional data permitting functions to be accomplished at the TAOC is derived from other sources such as crosstell data from adjacent TAOC's acknowledgement and status data from airborne interceptors, and activity data from surface-air Hawk missile batteries.

The data display and evaluation facilities of the TAOC comprise operator consoles (fig. 12-4) upon which current weapon information is displayed. When evaluating the displays, a weapons controller makes decisions concerning the conduct of combat air operations in his assigned sector of responsibility. Crosstell and handover data are transmitted to adjacent TAOC's on those targets and/or interceptors which will soon enter the center's sector of responsibility.

The X15A19 trainer provides a changeable tactical environment which may vary from a simple presentation of a few targets to a complex tactical situation of up to 60 aircraft, four missile batteries, and two other TAOC's with associated symbology.

This device simulates, by digital computer programs, a radar environment of up to 60 aircraft, 12 of which have IFF/SIF capability and can be manually controlled, and three of which can have ECM capability. The trainer also simulates voice and data link responses of two other TAOC's, four SAM Missile batteries, and air-ground communications. Data link, crosstell, and handover functions may be accomplished automatically by the simulation program or controlled manually by the missile battery/interceptor data link console.

The positional information of both preprogramed targets and maneuverable aircraft is updated by the CP-808 general purpose digital computer. The computer converts these positions to radar coordinates for transmission to the trainer electronics, which processes, in real time, up to 60 simultaneous targets for the 2D and 3D radars. The computer also responds to input messages from the instructor and interceptor consoles for real-time changes in environmental data. The instructor console has controls, indicators, and a display which allows the instructor to control and monitor the training exercise, modify certain parameters associated with the training exercise, and coordinate the exercise through voice communications with assistant instructors in the TAOC operator huts, at the missile battery/data link console, and with the interceptor console operators.

DESCRIPTION

The X15A19 consists of an instructor's console (from which to control and change the problem); 12 interceptor operator consoles (from each of the 12 manually controllable interceptors is flown); and a simulation electronics cabinet, which houses the input/output processor, effects generator, and two landmass simulators (one each for 2D and 3D radars). It also includes a communications electronics cabinet, containing electronics which processes data link messages in real time (missile battery, ground-air intercenter), a radio set control assembly for UHF communications, and a d-c power supply cabinet with 12 d-c power supplies.

In addition to the hardware items, a real-time simulation program provides control of the operation of the device. It performs all computations required for target maneuvering, interceptor control, effects of ECM, and processing associated with data link communications

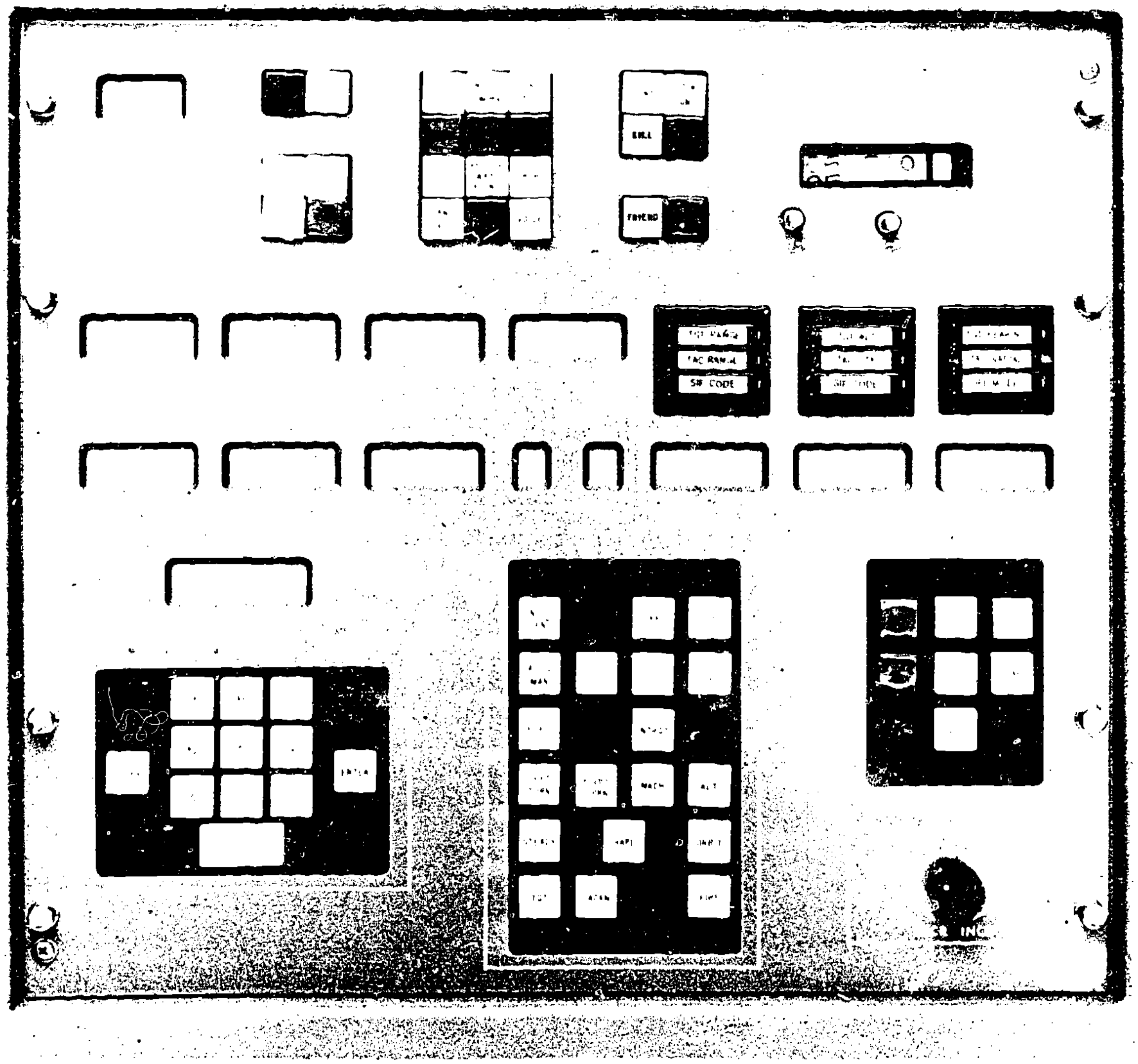

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Figure 12-4.—Interceptor operator consoles, device X15A19.

between ground and air, four missile batteries, and two other TAOC's.

The tracks of up to 48 preprogramed targets can be prepared prior to the start of the training mission. The targets can be preprogramed to whatever practical training is desired with the degree of complexity controlled during the preprogramed phase.

Integrated circuits are used extensively in the system logic of the trainer and provide ease of maintenance in addition to economy of space and weight.

APPLICATION

The capability of the X15A19 to inject realism into TAOC indoctrination, coupled with the Marine Corps training program at Communications/Electronics Schools, sends the Marine TAOC operator/controller into the field fully prepared to monitor, control and defend the airspace assigned to him.

ASROC/ASW EARLY ATTACK WEAPON SYSTEM TRAINER (DEVICE 14A2A)

The ASROC/ASW Early Attack Weapon System Trainer, Device 14A2A is a shorebased training device capable of indoctrinating and training ASW surface ship crews in ASW tactics. The trainer utilizes either the Mk 111 or Mk 114 fire control system with the AN/SQS-23B Sonar System.

It is an attack teacher and simulates modern up-to-date weapons such as antisubmarine rockets (ASROC), drone antisubmarine helicopters (DASH), and Mk 37 Mod 1 torpedoes. The type of training that can be performed includes the following:

1. Basic team training on operation of individual subsystems.
2. Basic team training on communication and coordination requirements in tactical situations.
3. Advanced team training covering tactical procedures in both normal and casualty modes and tactical problems under stressful operational conditions.

The trainer has the capability of reproducing the tracks and movements of seven vehicles (instructor controlled) plus "own ship" (student controlled). This includes two target submarines (conventional or nuclear characteristic programed into the computer), two support ships (destroyer or cruiser characteristics programed), and three aircraft (search or ASW fixed wing, manned helicopter, and DASH). Any desired combination of aircraft is available for simulation, and DASH control is handled in the Combat Information Center. All tracking data is provided to trainees at various stations as it would normally be received aboard ship, and at the discretion of the instructors operating the instructor console group.

The instructor's console group provides the instructor control and override capability. The instructor controls communications, environmental conditions (wind and sea), the seven previously mentioned vehicles (with control of depth or altitude (as appropriate)), course, speed, acceleration, deceleration, and advance and transfer (by types) for all seven vehicles. Sonar target information and weapons that the trainee may utilize are readily provided through the instructor's consoles.

OWN SHIP STATIONS SIMULATION

The four primary control areas of the own ship which must be faithfully simulated in order for training to be carried out effectively are as follows:

1. Conning Station (CONN).
2. Combat Information Center (CIC).
3. Underwater Battery Plot (UBP).
4. Launcher Captain's Control Station (LCCS).

A mockup of the conning station provides the means to train the following personnel:

1. Conning officer. Responsible for ship's movement and position and provides information on anticipated ship's movement to various locations as required.
2. Helmsman. Responsible for steering the ship in accordance with instructions from the conning officer.
3. Lee helmsman. Provides a standby helmsman in case of emergency; also serves as talker to maintain communications as required.
4. Position indicator operator. Activates "Permission-To-Fire" switch upon direction of conning officer; also serves as talker to maintain communications as required.

A CIC mockup is provided with means to train the following personnel:

1. CIC officer. Supervises dead reckoning tracer (DRT) plot. Assists in target classification through radar plan position indicator (PPI) repeater.
2. DASH control officer. Operates DASH control station and vectors DASH drone to the target.
3. Mk NC-2 plotter operator. Maintains a plot of own ship, target, and DASH drone.
4. DRT plotters (two). Maintain by means of telephone, constant plot of all ships and targets in the area.
5. Summary board plotter. Transfers dead reckoning tracer information onto a vertical summary plot board.
6. Talker. Maintains communications as required.

A UBP mockup is provided with the means to train the following personnel:

1. Sonar officer. Provides supervision for the SQS-23 sonar operators and assists in classification of targets.
2. Sonar operator. Searches designated area; notifies all stations of contact; maintains track of all contacts.

3. ASW officer. Supervises the attack control operator and the weapon control operator.

4. Attack control operator. Activates the ASROC system when ordered; switches system to Director-Control mode when possible; monitors the attack problem on the geographic plotter.

5. Weapon control operator. Selects type of ASW system operation; sets in initial search depth and ocean floor settings, maintains air density input; monitors for safe range of depth charge or torpedo; selects the missile to be fired; provides firing pattern by offset of range and angle; observes missile condition, and manually operates firing switch.

6. Position keeping computer operator. Selects type and mode of Mk 37 torpedo firing and when in the wire guide mode, steers the torpedo to the target.

7. Talkers (two). Maintains communications as required.

The LCCS mockup is provided with the means to train the following personnel:

1. Launcher control captain. Operates the launcher control captain's control panel and monitors missile set-in orders when in the ASROC mode of operation.

2. Talker. Maintains communications as required.

The computing and interface equipment consists of various analog and digital equipment which is needed to activate the training areas and the instructor's console.

In order to provide adequate training for the aforementioned personnel, a realistic external and internal environment is created. The external environment consists of operating area, own ship, targets, and weapons moving through this area, and the properties of the media on information signals such as radar and sonar energy. The internal environment consists of a simulation of the systems normally found in operating areas aboard ship. Operational shipboard instruments are used where feasible in order to present a typical shipboard installation to the trainee. Examples of equipment which can be operational type equipment are ship's course and speed indicator, wind speed and direction indicators, ASW alarm switch bells, dead reckoning tracer Mk 6, and the NC-2 plotting system.

SUBMARINE FBM TRAINING FACILITY, DEVICE 21A37/4

The second increment of the FBM Training Facility has been developed to provide team training for the members of submarine attack center crews. The trainer, housed in a permanent three-story building at the Naval Submarine Base, New London, Connecticut, is used to train personnel in the coordinated operation of the periscope, sonar, radar, fire control, navigation, and plotting equipment normally used in the specific submarine attack centers.

The training facility is equipment to simultaneously train three fire control parties from three different class nuclear submarines. The SSB(N) 598, GEORGE WASHINGTON; SSN 578, SKATE; and SSN 593, THRESHER class submarines are represented (See fig. 12-5.)

This training device is the first to make use of a general-purpose digital computer to maintain and provide a real-time environment while reacting to responses made or ordered by the attack center crews and instructors.

FACILITY COMPONENTS

Three attack centers are located on the first floor of the building as follows:

Attack center No. 1 consists of equipment simulating the attack center of the SSB(N) 598 GEORGE WASHINGTON class FBM Submarine (fig. 12-6) and an instructor's station.

Attack center No. 2 simulates the attack center for a SKATE class (SSN 578) nuclear submarine (fig. 12-7).

Attack center No. 3 simulates the attack center for a THRESHER class (SSN 593) submarine (fig. 12-8).

A fourth room, located on this floor, is provided for the addition of a fourth attack center. Each attack center contains simulated radar, periscope, sonar, communications, and own ship instrumentation. This equipment is activated to provide the necessary information to the fire control team for a complete and realistic presentation of a torpedo fire control tactical problem.

A general-purpose digital computer (fig. 12-9) generates the problem and controls the entire system. The computer is located on the second floor along with the conversion system for linking the computer to the simulation equipment. The periscope simulation projection systems are also located on the second floor.

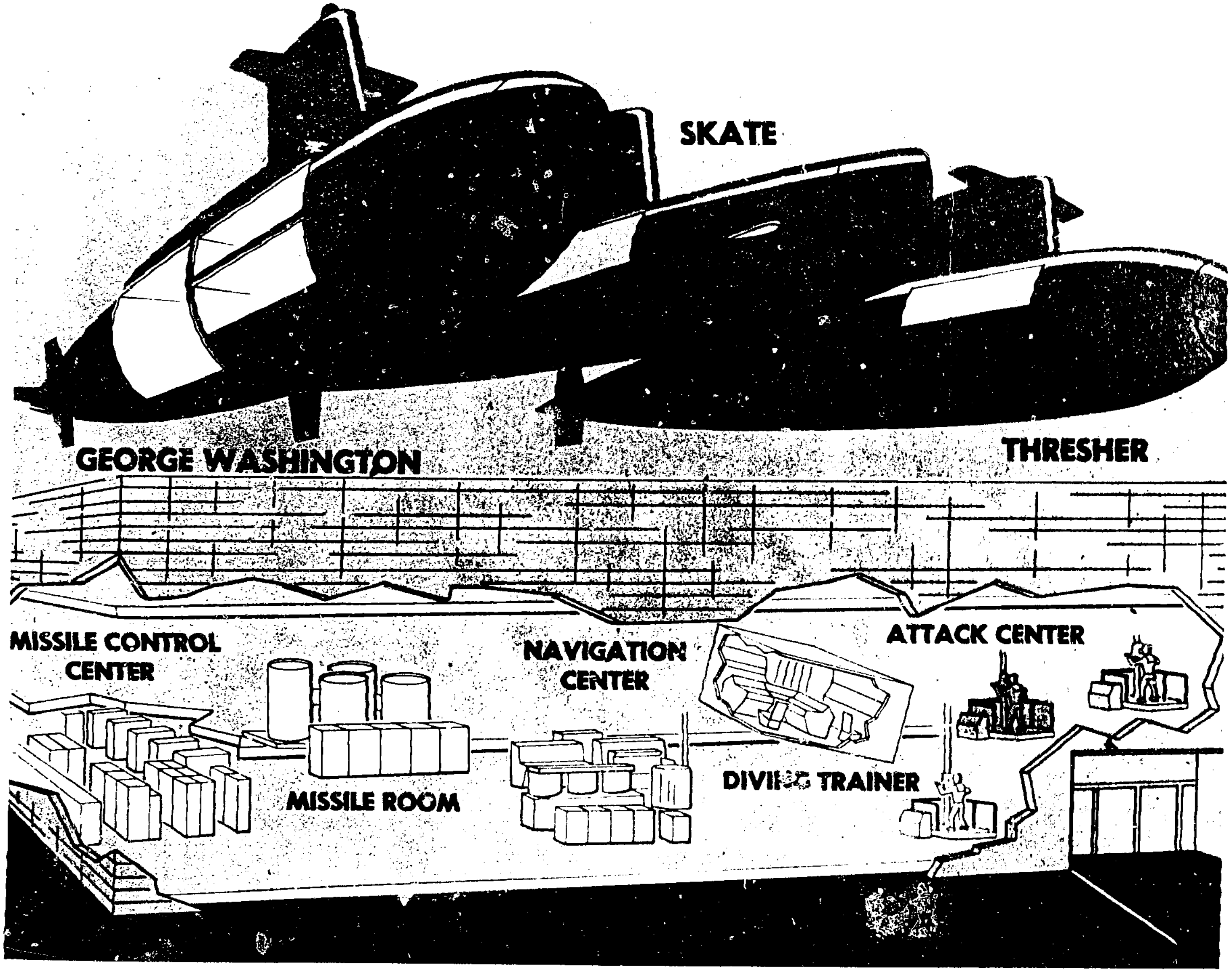

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Figure 12-5.--Submarines represented.

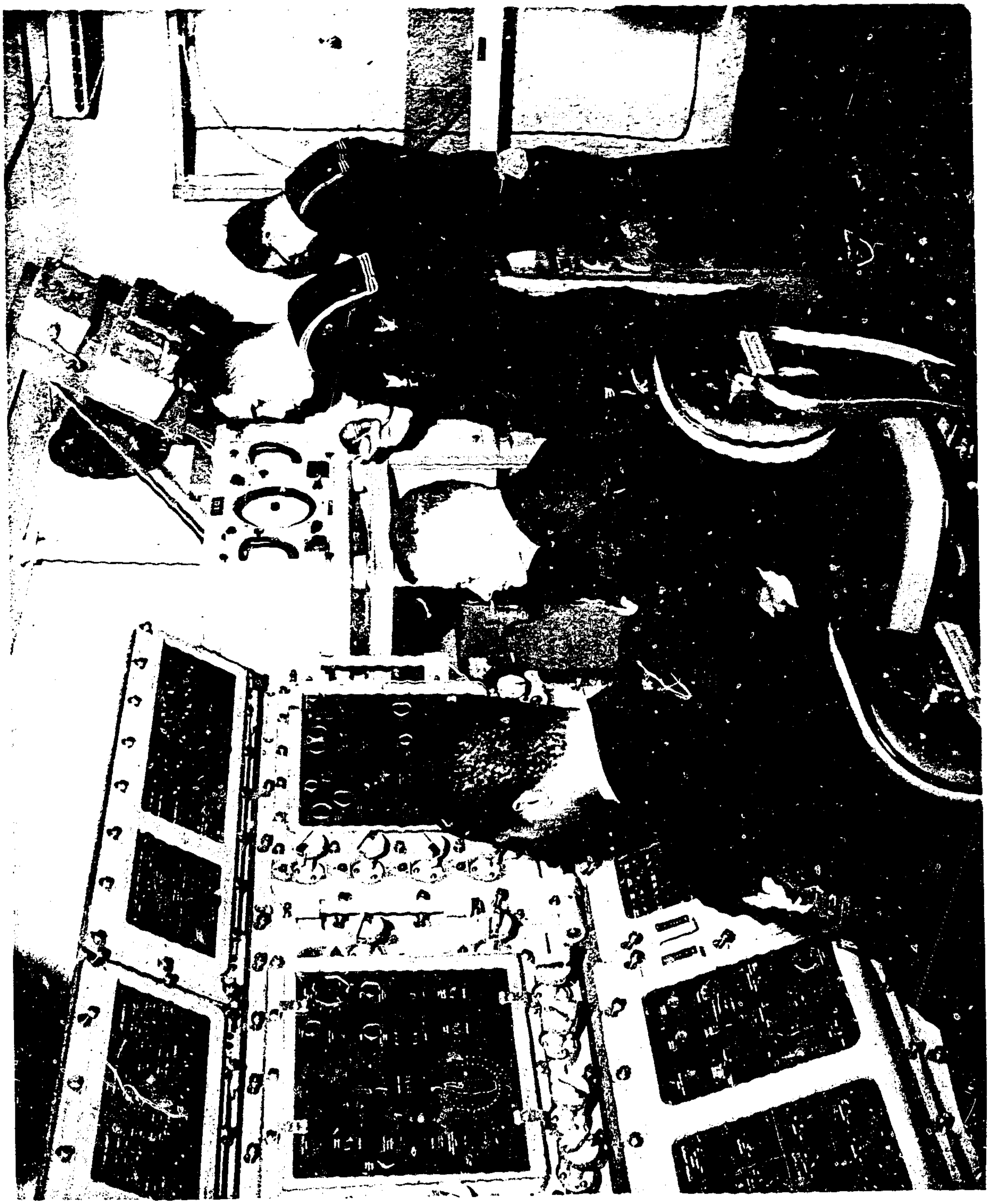

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Figure 12-6.--Attack center No. 1, device 21A37/4.

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Figure 12-7. —Attack center No. 2, device 21A37/A.

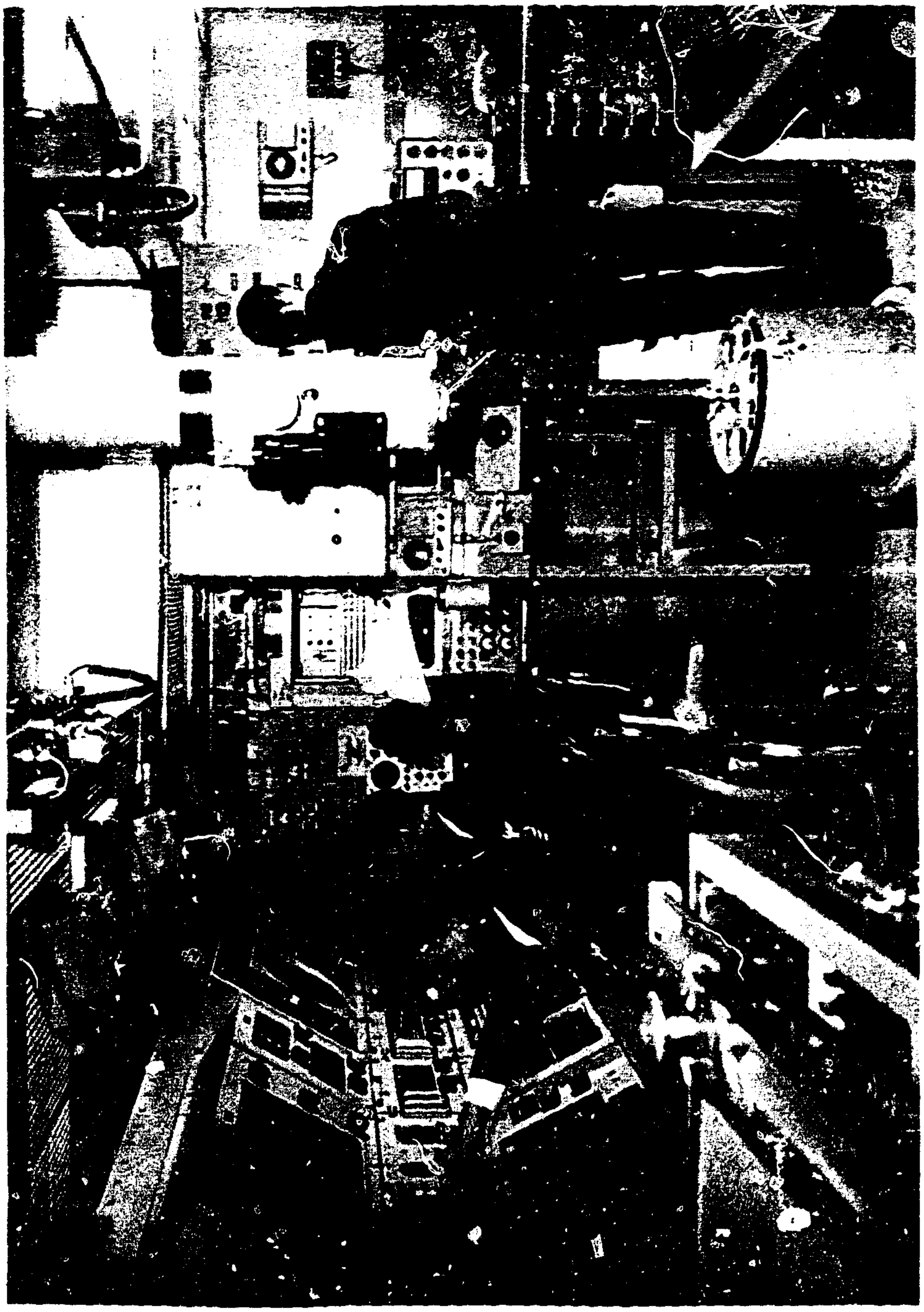

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Figure 12-8. —Attack center No. 3, device 21A37/4.

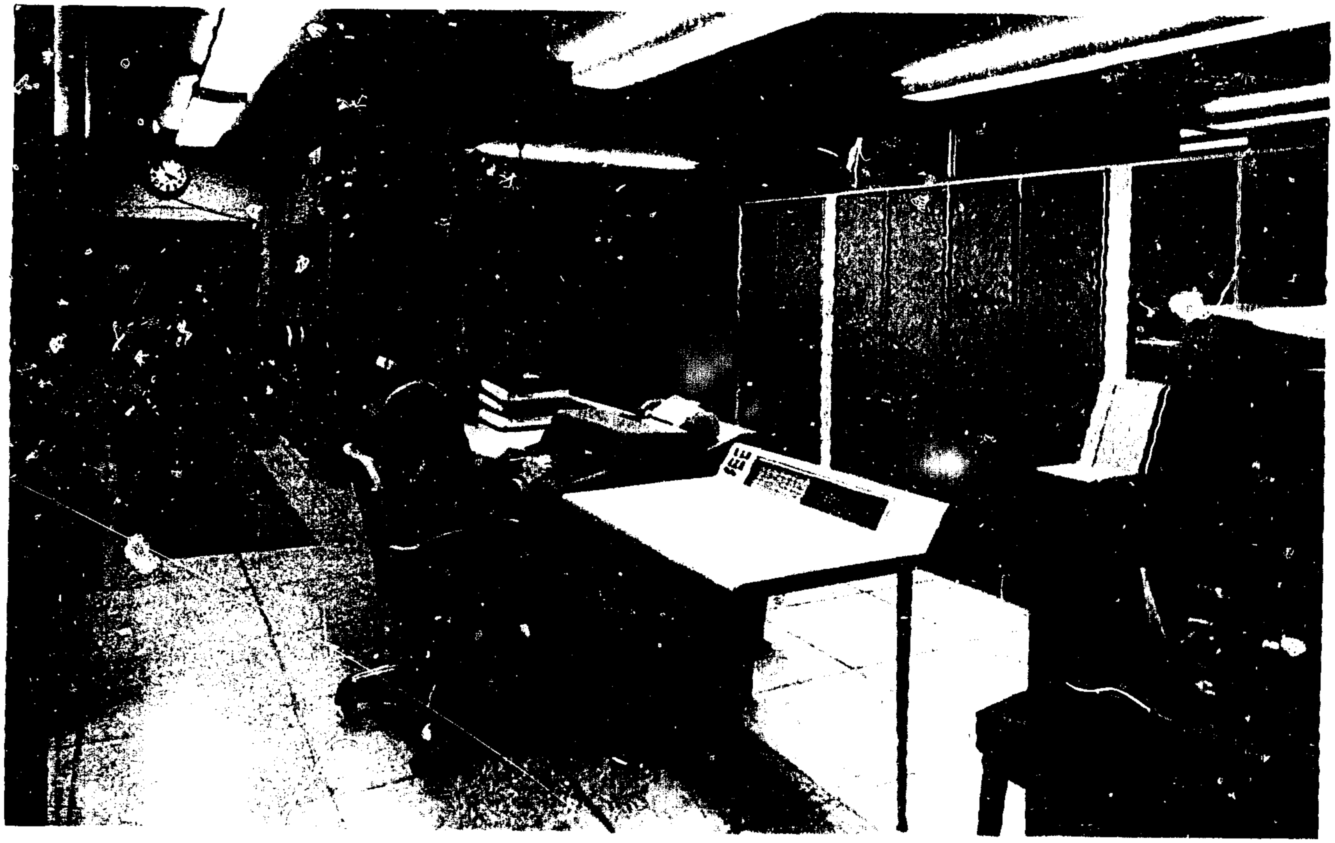

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Figure 12-9. —Computer room, device 21A37/4.

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Figure 12-10.—Tactical display room, device 21A37/4.

A tactical display room is located on the third floor. This room consists of a comprehensive data display system to provide information to command-level personnel or observers interested in the tactical problems being conducted in the attack centers. The tactical display room additionally has the capability of displaying tactical operations independent of the attack center training (fig. 12-10). A master instructor's station and two command centers are also located in the tactical display room area.

SYSTEM OPERATION

The training problem can be envisioned as being contained in a three-dimensional section of the ocean. The problem is generated in an area of ocean 500 miles by 1,000 miles and ranging in depth from the surface to beyond the maximum operating depth of the nuclear submarines.

Located in this block of ocean are the three submarines (own ships). A variety of 12 targets can be used for enemy targets or friendly forces. Eight more targets are available for use only in the tactical display room operation.

The generation of simulated motion and the computation of problem geometry for the targets and attacking submarines are accomplished by means of the digital computer. Orders are received by the computer from operator's consoles in the form of position coordinates, course, speed, and rudder orders. The computer accepts these orders and establishes the position of the ship within the simulated ocean area, generates tracks for targets and own ships, and realistically modifies these tracks in response to the input commands. The simulated motions are in accordance with the characteristics of the ships designated. The computer transmits data for own ships and targets to the appropriate indicating devices and monitoring displays. In addition to the motion and absolute position computations, the computer determines the ranges and bearings of each target and of the other two submarines with respect to each of the attacking submarines. This relative position and motion data is transmitted from the computer to the appropriate sensory and fire control equipment, and the display equipment at the instructor's consoles and in the tactical display room.

In addition to the computation of submarines and targets parameters, the computer also generates weapon tracks and calculates whether hits occur. To generate weapon tracks, the computer receives information from the fire control equipment which designates the type of weapon, the gyro angles ordered by the fire control, enabling run, and other information pertinent to the individual weapon. The weapons simulated include wire guide as well as conventional torpedoes and a capability of future SUBROC simulation.

Sonar equipment characteristics and the effects of the ocean in attenuating, scattering, and delaying sound (as functions of range and sea conditions) are included in the computer program.

The digital computer program is designed so that changes can be easily made to simulate the wide variety of sea conditions which occur in actual operations. Special computations are made within the computer to modify the true target range and bearing that the computer generates to the apparent target range and bearing which the sonar sees because of the finite velocity of sound in water.

The configuration of the problem being generated by the computer is entirely flexible. Individual problems can be generated for each attack center. This means that three different training problems with three different crews can be run simultaneously. By combining attack centers, coordinated problems may be run. For instance, two of the attack centers can work in consort to attack the third, or all three can independently attack a group of targets in a wolf-pack type operation. In addition any combination of the attack centers can be used in the tactical display room operation by presenting

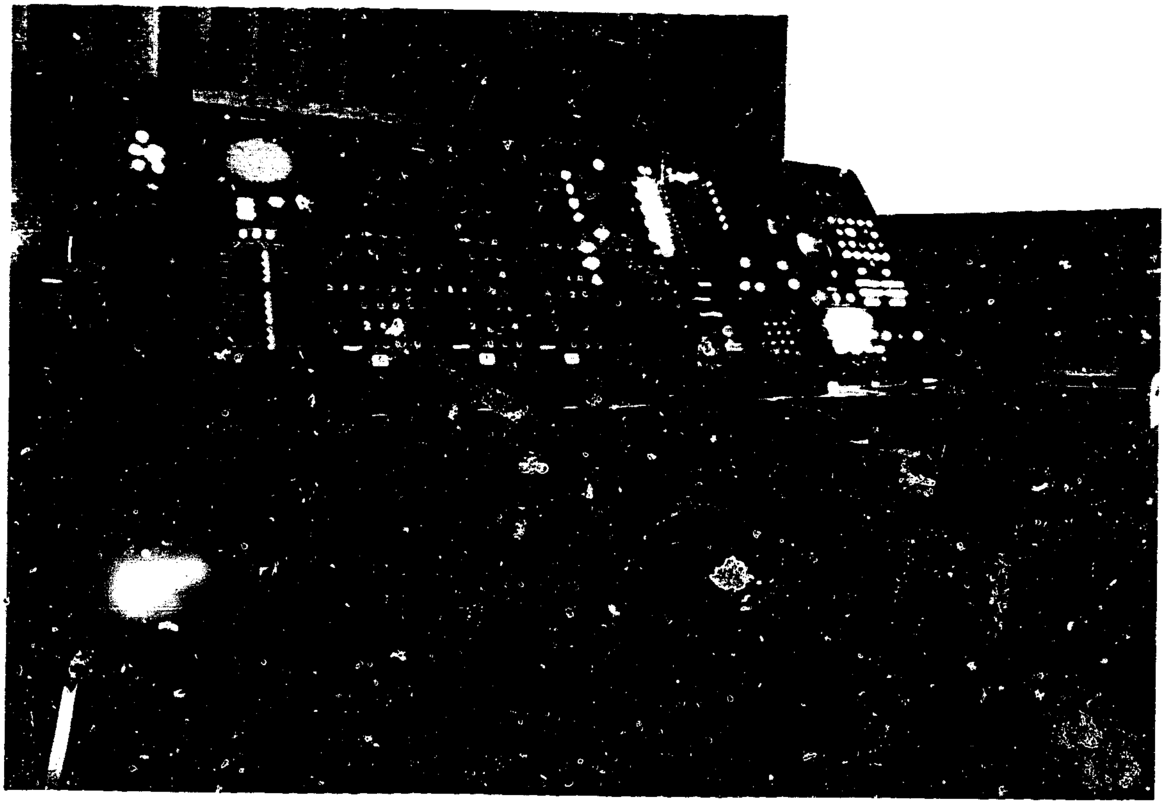

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Figure 12-11.—Program operator's station, device 21A37/4.

their data to the displays in the room. The tactical display room can also act independently of the three attack centers using the eight targets available only to the tactical display room, or any of the targets which have not been assigned for use by the attack centers.

The problem thus generated by the computing system is utilized to activate the simulated sensory equipment in the attack centers, the fire control systems, and the various data displays. Each attack center realistically simulates all the equipment that is normally manned in the attack center of the submarine. The principal equipment to be found in the attack center is the operational fire control system and associated sensory equipment including sonar, radar, periscope, communication system, underwater sound telephone, and navigation and plotting equipment.

INSTRUCTOR STATIONS

In order for an attack center to function effectively, a program operator's station is required (fig. 12-11). In the program operator's room, adjacent to each attack center and separated from the attack center by a folding wall, an operator's console is provided which will be manned by two people, one acting as the program operator, and the second as assistant who will also act as a sonar operator. Complete control of the problem assigned to that particular attack center is accomplished at the program operator's console. A keyset control board enables the program operator to direct orders to the computer for execution, thereby keeping the problem current. He has displays which enable him to monitor the actions of the trainees in the attack center.

A complete problem status display, including decimal readout devices, is presented to the operator. The operator can "call up" displays of any combination of four targets, weapons, and other own ships. The data presented includes: position in the ocean, course, speed, depth, turn and depth rates, relative bearing, range, and aspect angle. The sonar operator's console to the left of the program operator's console presents similar information for any one target or other own ship and includes apparent range and bearing data.

A track projection system is also located in the program operator's station. This projection system displays target tracks and provides a continuous current geographic display of the own ship, all targets, own-ship weapons, time marks, and symbols on a screen located in front of the program operator's console. This track display enables the trainees to review their performance upon completion of the problem, or at any point during the problem when the instructor desires to hold a critique.

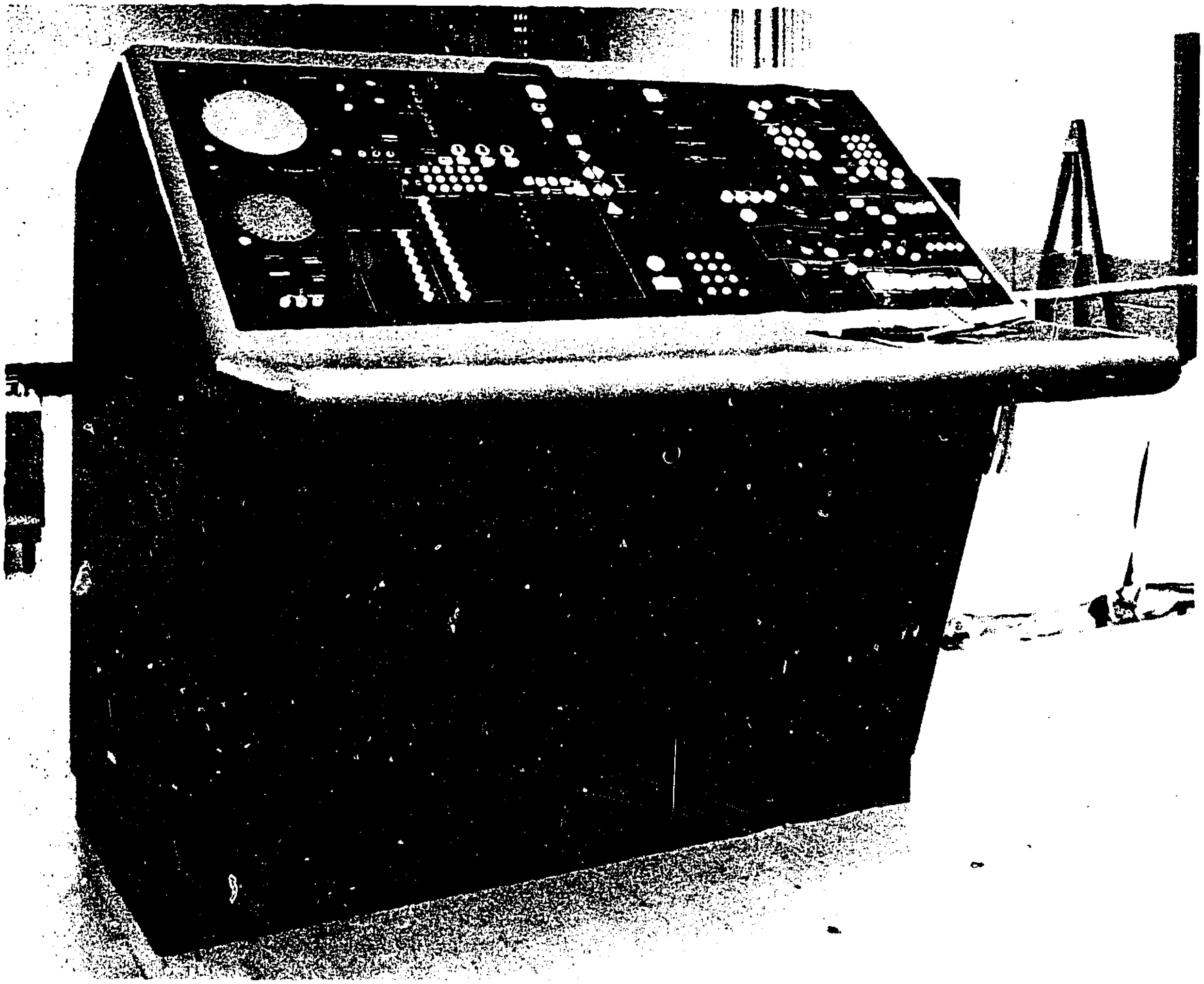
Sonar presentations include the PPI and BPI video displays and the bearing recorders. Video noise, propeller beat effects, sea noises, and realistic simulation of the targets are included in the video effects to be displayed. The inputs to the fire control system normally emanating from sonar equipment are generated in the digital computer and controlled at the assistant program operator's station.

The master program operator's station is located in the tactical display room (fig. 12-12). Overall control of the entire training facility is available at this console. This includes assignment of targets to the individual attack centers and monitoring the status of any target or ship in the entire complex. The master instructor's console is similar to the program operator's console and is provided with decimal readout displays which can be selectively switched to present the status of any vehicle.

A communication system, which is designed to be completely flexible, links the entire training facility. In addition, each attack center duplicates the internal fire control communications normally found aboard the submarine.

TACTICAL DISPLAY ROOM

The tactical display room is provided with a large projection system and screen for presentation of all the targets, tracks, and problem status information from any one or all three attack centers. In a coordinated problem all the tracks of each attack center and of all the targets would be simultaneously presented. In individual or uncoordinated problems, where each attack center is operating independently, the projection system could be used to monitor any one of the attack center displays individually. In addition to the track projection screen, status



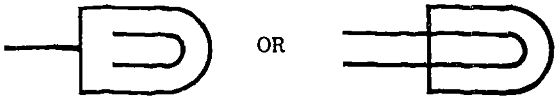
TD.638

Figure 12-12.—Master instructor's console, device 21A37/4.

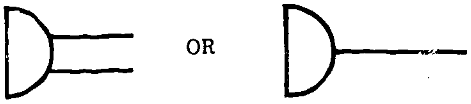
board displays are provided where the problem **status is presented** as numerical readouts continuously being updated by the computer. Information such as weapon type and hits, and ranges and bearings from each attack center to the targets with which it is working, is available on these displays.

Communication provisions connect tactical display room personnel with the two command centers on the tactical display room floor, and to the master instructor's console. Task Force commanders in the two command centers can communicate with the master instructor's station and any one of the attack centers.

INDICATOR LAMP



MICROPHONE



CRYSTAL

QUARTZ CRYSTAL;
PIEZOELECTRIC CRYSTAL
UNIT.

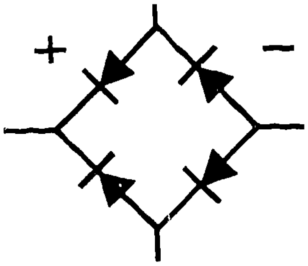
KEY

RECTIFIER

GENERAL

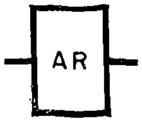
SEMICONDUCTOR

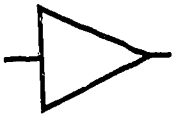
NORMAL CURRENT FLOW IS AGAINST THE ARROW



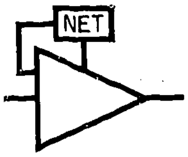
FULL WAVE BRIDGE TYPE

AMPLIFIER





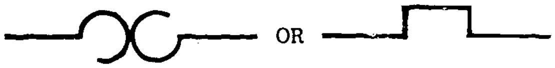
TRIANGLE POINTS
IN DIRECTION OF
TRANSMISSION
(SIGNAL FLOW)



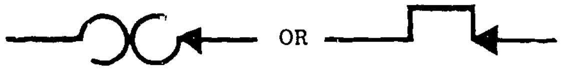
AMPLIFIER WITH
EXTERNAL
FEEDBACK PATH

BASIC SYMBOL INDICATES ANY METHOD OF AMPLIFICATION EXCEPT THAT OPERATING ON THE PRINCIPLE OF ROTATING MACHINERY.

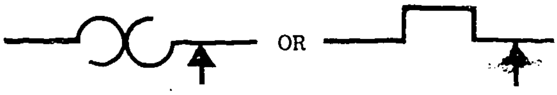
THERMAL ELEMENTS

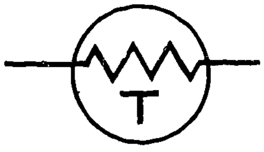


THERMAL RELAY WITH
NORMALLY CLOSED
CONTACT.

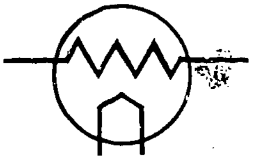


FLASHER; THERMAL CUTOUT





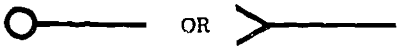
THERMISTOR



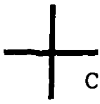
WITH INTEGRAL
HEATING ELEMENT

TEMPERATURE-MEASURING THERMOCOUPLE
(DISSIMILAR METAL DEVICE)

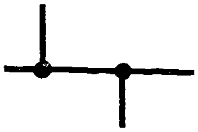
INPUTS (NONSTANDARD)



PATH, TRANSMISSION



CROSSING NOT
CONNECTED



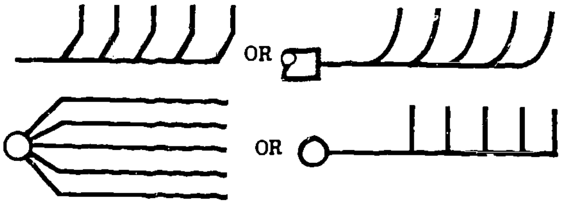
JUNCTION CONNECTED

TWISTED PAIR

AIR OR SPACE PATH

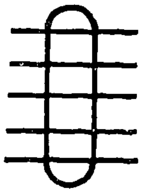
COAXIAL

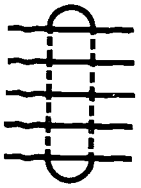
GROUPING OF WIRES IN BUNDLES

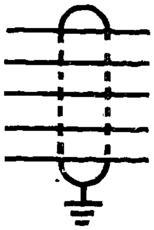


GROUPING OF WIRES IN CABLES

CABLES


FIVE-CONDUCTOR CABLE


SHIELDED FIVE-CONDUCTOR CABLE


GROUNDED SHIELD

NUMBER OF CONDUCTORS MAY BE ONE OR MORE AS NECESSARY

SWITCHES


GENERAL (SINGLE THROW)

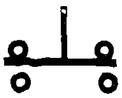

GENERAL (DOUBLE THROW)


TWO POLE DOUBLE THROW SWITCH

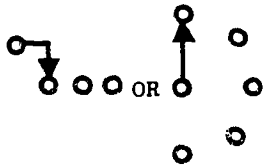

KNIFE SWITCH


PUSHBUTTON (MAKE)


PUSHBUTTON (BREAK)


PUSHBUTTON TWO CIRCUIT

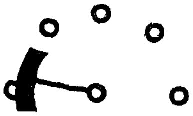
SELECTOR SWITCHES

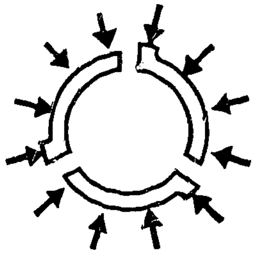


GENERAL

ANY NUMBER OF TRANSMISSION PATHS MAY BE SHOWN. ALSO BREAK BEFORE MAKE SWITCH.

MAKE BEFORE BREAK





WAFER, TYPICAL 3-POLE, 3-CIRCUIT SWITCH. VIEWED FROM END OPPOSITE CONTROL KNOB. FOR MORE THAN ONE SECTION, #1 IS NEAREST CONTROL KNOB.

CIRCUIT RETURNS

CHASSIS CONNECTION

(THE CHASSIS OR FRAME IS NOT NECESSARILY AT GROUND POTENTIAL.)


GROUND

CONTACTS (ELECTRICAL)


SWITCH


MOMENTARY SWITCH


LOCKING

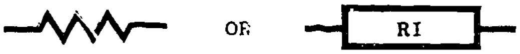

NONLOCKING

FOR JACK, KEY, RELAY, ETC.

APPENDIX I

SYMBOLS

RESISTORS:



GENERAL

TAPPED

ADJUSTABLE TAP

CONTINUOUSLY VARIABLE

NONLINEAR

INDUCTIVE COMPONENTS:

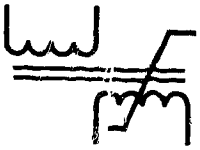
GENERAL

MAGNETIC CORE

TAPPED

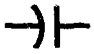
ADJUSTABLE

ADJUSTABLE OR CONTINUOUSLY ADJUSTABLE



SATURABLE CORE REACTOR

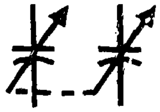
CAPACITORS:



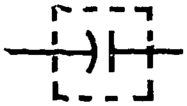
FIXED

VARIABLE

TRIMMER



GANGED

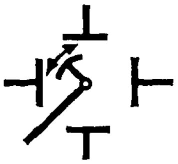


SHIELDED

SPLIT-STATOR

FEED-THROUGH

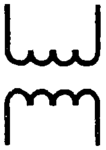
DIFFERENTIAL



PHASE SHIFT

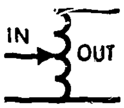
(WHEN CAPACITOR ELECTRODE IDENTIFICATION IS NECESSARY, THE CURVED ELEMENT SHALL REPRESENT THE OUTSIDE ELECTRODE IN FIXED PAPER-DIELECTRIC AND CERAMIC-DIELECTRIC, THE NEGATIVE ELECTRODE IN ELECTROLYTIC CAPACITORS, THE MOVING ELEMENT IN VARIABLE AND ADJUSTABLE CAPACITORS, AND THE LOW POTENTIAL ELEMENT IN FEED-THROUGH CAPACITORS.)

TRANSFORMERS

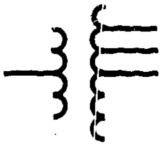


GENERAL

MAGNETIC CORE TRANSFORMER



AUTOTRANSFORMER



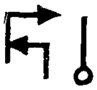
WITH TAPS, SINGLE-PHASE

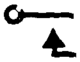
PERMANENT MAGNET

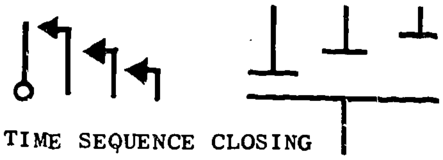
CONTACTS (ELECTRICAL) (Continued)

CONTACT ASSEMBLIES

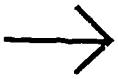

CLOSED CONTACT
(BREAK)

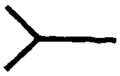

MAKE BEFORE
BREAK


OPEN CONTACT
(MAKE)


TIME SEQUENCE CLOSING

DISCONNECTING DEVICES

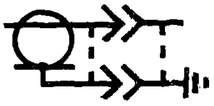

MALE
(PIN CONTACT)


FEMALE
(SOCKET CONTACT)


ENGAGED
(PIN-TO-SOCKET)

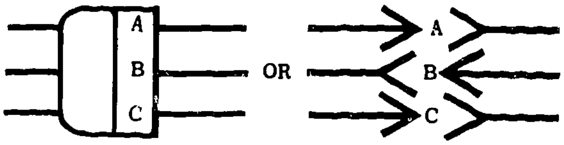

COAXIAL
(MALE)


COAXIAL CONNECTORS
MATED


COAXIAL CONNECTED
TO SINGLE CONDUCTOR

THE CONNECTOR SYMBOL IS NOT AN ARROWHEAD. IT IS LARGER AND THE LINES ARE DRAWN AT A 90° ANGLE.


SPLICE

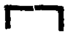


CONNECTOR ASSEMBLY (GENERAL)

ELECTRON TUBES

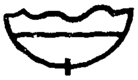
COMPONENT TUBE SYMBOLS


DIRECTLY-HEATED
(FILAMENTARY)
CATHODE


INDIRECTLY-HEATED
CATHODE


COLD
CATHODE

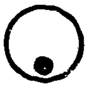

GRID


POOL CATHODE


ANODE OR
PLATE


PHOTOCATHODE

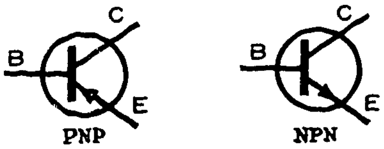
ENVELOPE (SHELL)


GAS FILLED
ENVELOPE

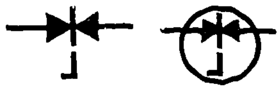

SPLIT ENVELOPE

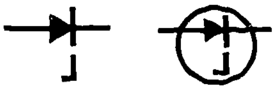
SEMICONDUCTOR DEVICES

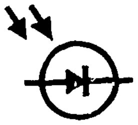

DIODE



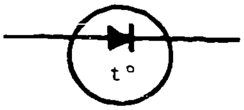
TRANSISTORS


BREAKDOWN DIODE,
BIDIRECTIONAL


BREAKDOWN DIODE,
UNDIRECTIONAL
(ALSO BACKWARD DIODE)

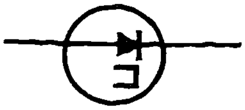

PHOTODIODE

SEMICONDUCTOR DEVICES: (Continued)



TEMPERATURE
DEPENDENT DIODE

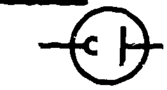
PNPN SWITCH



TUNNEL DIODE

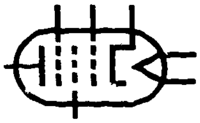
TYPICAL ELECTRON TUBES:

COLD CATHODE
GAS TUBE



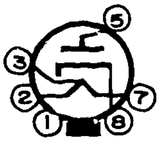
PHOTOTUBE SINGLE
UNIT, VACUUM

DIODE

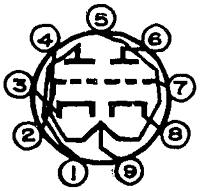


PENTODE

TWIN TRIODE
ILLUSTRATING
ELONGATED ENVELOPE

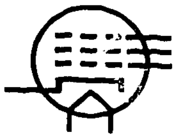


DIODE SHOWING BASE
CONNECTIONS

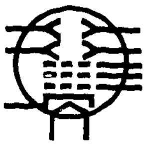


TWIN TRIODE WITH TAPPED HEATER

TYPICAL CATHODE RAY TUBES



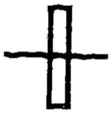
MAGNETIC DEFLECTION



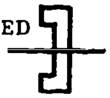
ELECTROSTATIC
DEFLECTION

WAVEGUIDES

CIRCULAR



RECTANGULAR

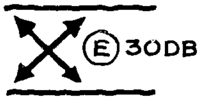


RIDGED

ROTARY
JOINT

DIRECTIONAL COUPLERS

GENERAL



E PLANE APERTURE
COUPLING, 30 DB
TRANSMISSION LOSS

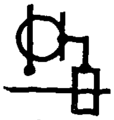
COUPLING METHODS

GENERALLY USED FOR COAXIAL
AND WAVEGUIDE TRANSMISSION.

COUPLING BY APERTURE WITH AN OPENING OF LESS THAN FULL WAVEGUIDE SIZE. TYPE OF COUPLING WILL BE INDICATED WITHIN CIRCLE (E, H, OR HE).

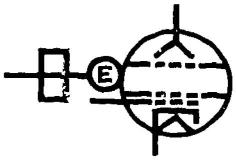
COUPLING BY LOOP TO SPACE

COUPLING BY LOOP TO GUIDED
TRANSMISSION PATH

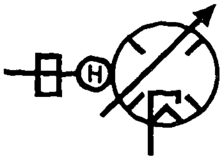


COUPLING BY PROBE FROM COAXIAL TO RECTANGULAR WAVEGUIDE WITH DIRECT-CURRENT GROUNDS CONNECTED

TYPICAL MAGNETRONS AND KLYSTRONS

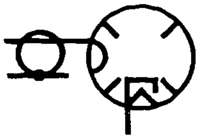


REFLEX KLYSTRON,
APERATURE COUPLED

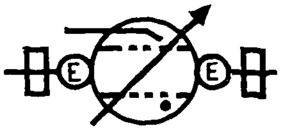


TUNABLE MAGNETRON,
APERTURE COUPLED

TYPICAL MAGNETRONS AND KLYSTRONS (Continued)



RESONANT TYPE WITH COAXIAL OUTPUT



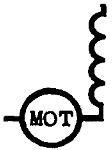
TRANSMIT-RECEIVE (TR) TUBE GAS FILLED, TUNABLE INTEGRAL CAVITY, APERTURE COUPLED, WITH STARTER

ROTATING MACHINES

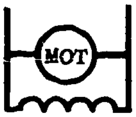
MOTOR

GENERATOR

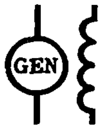
TYPES OF WINDINGS



SERIES



SHUNT



SEPARATELY EXCITED

DYNAMOTOR

WINDING SYMBOLS

SINGLE-PHASE

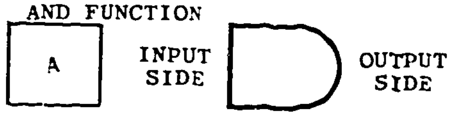
TWO - PHASE

THREE-PHASE (WYE)

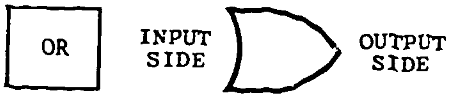
THREE-PHASE (DELTA)

LOGIC FUNCTIONS

AND FUNCTION



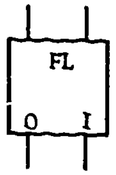
INCLUSIVE OR FUNCTION



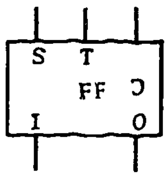
EXCLUSIVE OR FUNCTION

FLIP-FLOPS

LATCH



COMPLEMENTARY

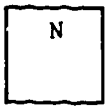


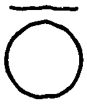
S-SET T-TRIGGER C-CLEAR

NEGATION

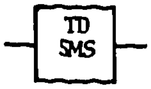
O

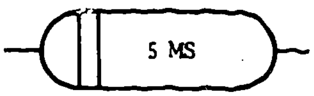
ELECTRIC INVERTER

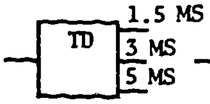


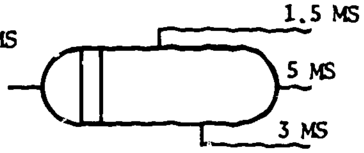


TIME DELAY



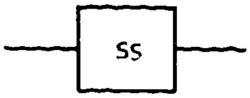




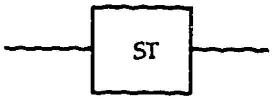


LOGIC FUNCTIONS (Continued)

SINGLE SHOT



SCHMITT TRIGGER



OSCILLATOR

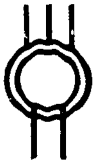
SYNCHROS

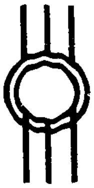

GENERAL

A LETTER COMBINATION FROM THE FOLLOWING LIST MAY BE PLACED ADJACENT TO THE SYMBOL TO INDICATE THE TYPE OF SYNCHRO:

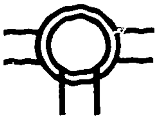
TX - TORQUE TRANSMITTER
TDX - TORQUE DIFFERENTIAL TRANSMITTER
CX - CONTROL TRANSMITTER
CDX - CONTROL DIFFERENTIAL TRANSMITTER
TR - TORQUE RECEIVER
CT - CONTROL TRANSFORMER

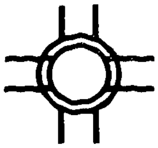
SYNCHROS (Continued)


TRANSMITTER, RECEIVER, OR CONTROL TRANSFORMER

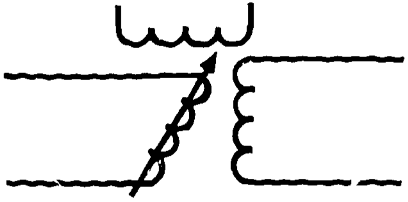

DIFFERENTIAL TRANSMITTER OR RECEIVER

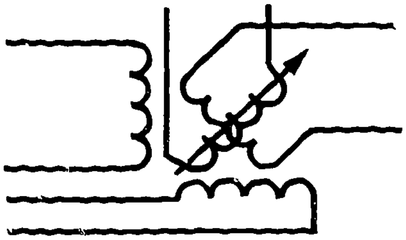
RESOLVER (SYNCHRO)


SINGLY-WOUND ROTOR

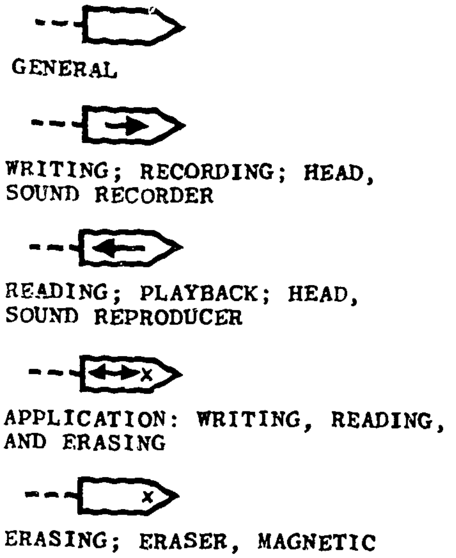

DOUBLY-WOUND ROTOR

RESOLVER

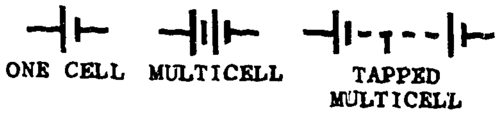

SINGLY-WOUND ROTOR


DOUBLY-WOUND ROTOR

PICKUP HEADS

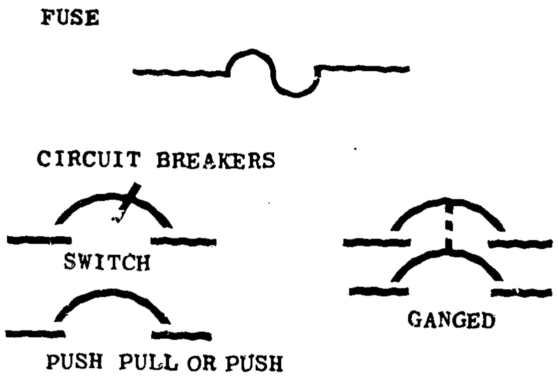


BATTERIES

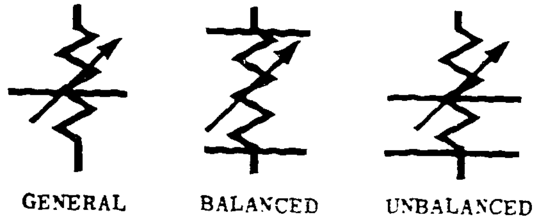


(LONG LINE IS ALWAYS POSITIVE)

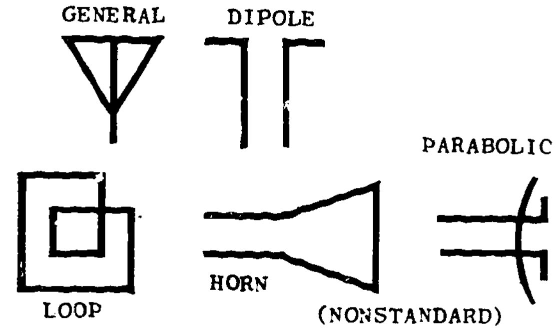
CIRCUIT PROTECTORS



ATTENUATORS



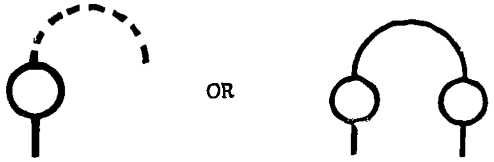
ANTENNAS



METERS

A - AMMETER
CRO - OSCILLOSCOPE
G - GALVANOMETER
MA - MILLIAMMETER
OHM - OHMMETER
V - VOLTMETER

HEADSET



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☆U. S. GOVERNMENT PRINTING OFFICE : 1970 394-050/23

VT 016 534
HUBBARD, GERALD D.
POWER EQUIPMENT CURRICULUM GUIDE FOR
CALIFORNIA COMMUNITY COLLEGES.

WEST HILLS COMMUNITY COLL., CALIF.;CALIFORNIA
COMMUNITY COLLEGES, SACRAMENTO. OFFICE OF THE
CHANCELLOR.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
CALIFORNIA COMMUNITY COLLEGES, OFFICE OF THE
CHANCELLOR, 825 FIFTEENTH STREET, SACRAMENTO,
CALIFORNIA 95814
PUB DATE - 72 44P.

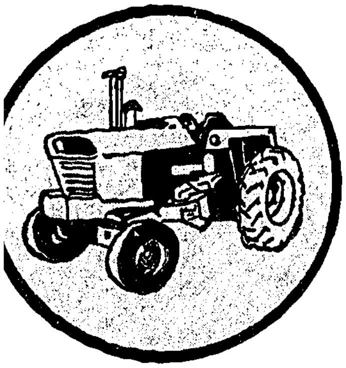
DESCRIPTORS - *CURRICULUM GUIDES; *POWER MECHANICS; MECHANICAL EQUIPMENT; *TRADE AND INDUSTRIAL EDUCATION; *POST SECONDARY EDUCATION; *COMMUNITY COLLEGES; EDUCATIONAL COORDINATION; UNITS OF STUDY (SUBJECT FIELDS); PHOTOGRAPHS; PROGRAM DEVELOPMENT; CURRICULUM DEVELOPMENT; BIBLIOGRAPHIES; PRODUCER SERVICES; EMPLOYMENT OPPORTUNITIES
IDENTIFIERS - POWER EQUIPMENT; VOCATIONAL EDUCATION ACT OF 1968; CAREER AWARENESS; AGRICULTURAL ENGINEERING

ABSTRACT - TO ASSIST THE COMMUNITY COLLEGES IN CALIFORNIA IN THE CURRICULUM PREPARATION AND EVALUATION OF POWER EQUIPMENT PROGRAMS, THIS CURRICULUM GUIDE SUGGESTS THREE ALTERNATIVE APPROACHES TO ADAPTING AN APPROPRIATE POWER EQUIPMENT PROGRAM TO A POST-SECONDARY INSTITUTION. INCORPORATING THE CONCEPT OF UTILIZING INSTRUCTIONAL COORDINATION AMONG SEVERAL DEPARTMENTS, THIS BOOKLET CONTAINS DESCRIPTIONS OF THE PROGRAM SCOPE AND EMPLOYMENT OPPORTUNITIES, GUIDELINES FOR PROGRAM INITIATION AND CURRICULUM DEVELOPMENT AND IDEAS FOR SETTING UP AND EVALUATING THE PROGRAM. THE APPENDIXES INCLUDE A LIST OF TYPICAL JOB OPPORTUNITIES IN POWER EQUIPMENT AND A BIBLIOGRAPHY. A WIDE RANGE OF PHOTOGRAPHS ILLUSTRATES THE TEXT, DEVELOPED BY AN AGRICULTURE MECHANIC INSTRUCTOR AT A COMMUNITY COLLEGE. (AG)

VT 016 534

POWER EQUIPMENT
CURRICULUM GUIDE

CALIFORNIA COMMUNITY COLLEGES



AGRICULTURE

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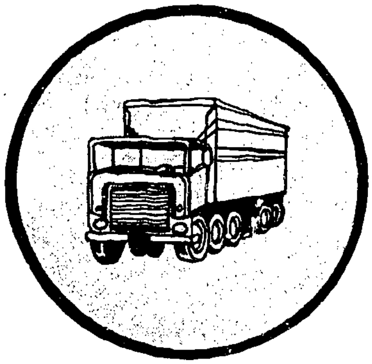

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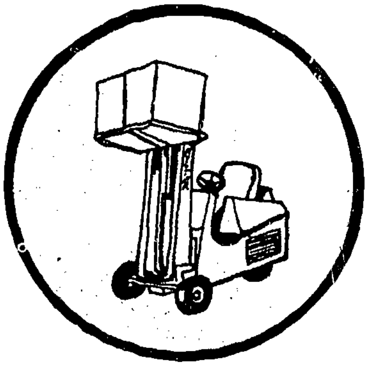

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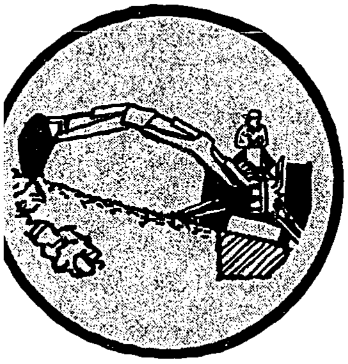
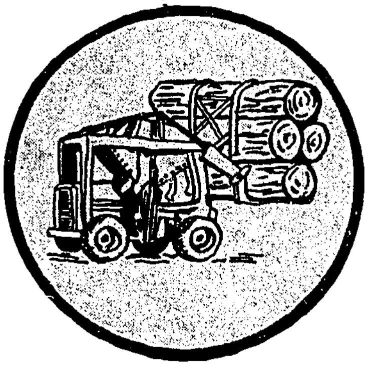
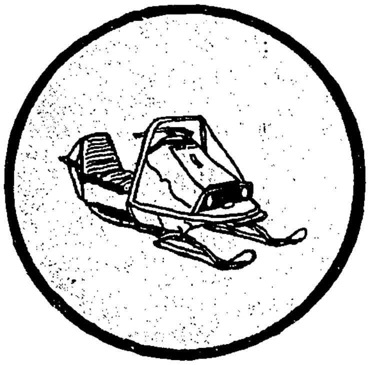


CONSTRUCTION

ORNAMENTAL HORTICULTURE



FORESTRY



RECREATION

CALIFORNIA COMMUNITY COLLEGES
OFFICE OF THE CHANCELLOR
1972

1074

POWER EQUIPMENT

CURRICULUM GUIDE

for

California Community Colleges

by

GERALD O. HUBBARD
Agriculture Mechanic Instructor
West Hills Community College

This publication was prepared by West Hills Community College in cooperation with California Community Colleges pursuant to a funding under the Vocation Educational Act of 1968 (Public Law 90-576).

1075

FOREWORD

In concert with the expanding supportive activities in other forms of business and industry in California, the field of Power Equipment has experienced a broad diversification of its responsibilities. Recognizing this changing role, we have arranged for a team of recognized leaders develop this curriculum guide for Power Equipment.

Uses for this curriculum guide have been anticipated to be in both curriculum development and redesigning of current program offerings. Throughout the publication numerous references are made to the merits of involving available resource people to assure the development of curriculum designs appropriate for local Community College needs.

This guide is an effort on our past to help Community Colleges interested in establishing new programs in Power Equipment and to help those who want to strengthen Power Equipment programs already in operation.

S. W. Brossman

SIDNEY W. BROSSMAN, CHANCELLOR
CALIFORNIA COMMUNITY COLLEGES

PREFACE

Recent manpower projections indicate a continued growth of the employment opportunities in the Power Equipment occupations. These projections apply to the agricultural, forestry, construction, manufacturing, and transportation industries. For this reason, this publication has been developed to assist the Community Colleges in California in the curriculum preparation and evaluation of Power Equipment programs. The curriculum guide suggests three alternative approaches to adapting an appropriate Power Equipment program for most of the Community Colleges in California.

This guide incorporates the concept of utilizing a coordinated instructional effort on the part of several departments in the operation of the Power Equipment program. The success of such a coordinated effort naturally requires the constant evaluation and updating of the program by all of the staff that is involved in it.

The Office of the Chancellor expresses its appreciation to the author, Gerald Hubbard of West Hills College, for his work on this publication and to the ad hoc committee that assisted him. The ad hoc committee consisted of Don Vieira of the College of the Sequoias, Ken Waters of the College of the Desert, Ken Heupel of Merced College, James Beardsley of San Joaquin Delta College, R. Stanley Hill (Secretary-Manager) of the Far West Equipment Dealers Association, and Stan Hodges of Modesto Junior College. William Anderson, Specialist in Technical Education, and Ralph Matthews, Specialist in Agricultural Education, from the Office of the Chancellor also assisted the author in the development of this publication.

We hope that all Community Colleges in California will benefit from this Power Equipment Curriculum Guide.

Leland P. Baldwin
LELAND P. BALDWIN
ASSISTANT CHANCELLOR
OCCUPATIONAL EDUCATION
CALIFORNIA COMMUNITY COLLEGES

Robert A. Annand
ROBERT A. ANNAND
PRESIDENT
WEST HILLS COLLEGE

1977

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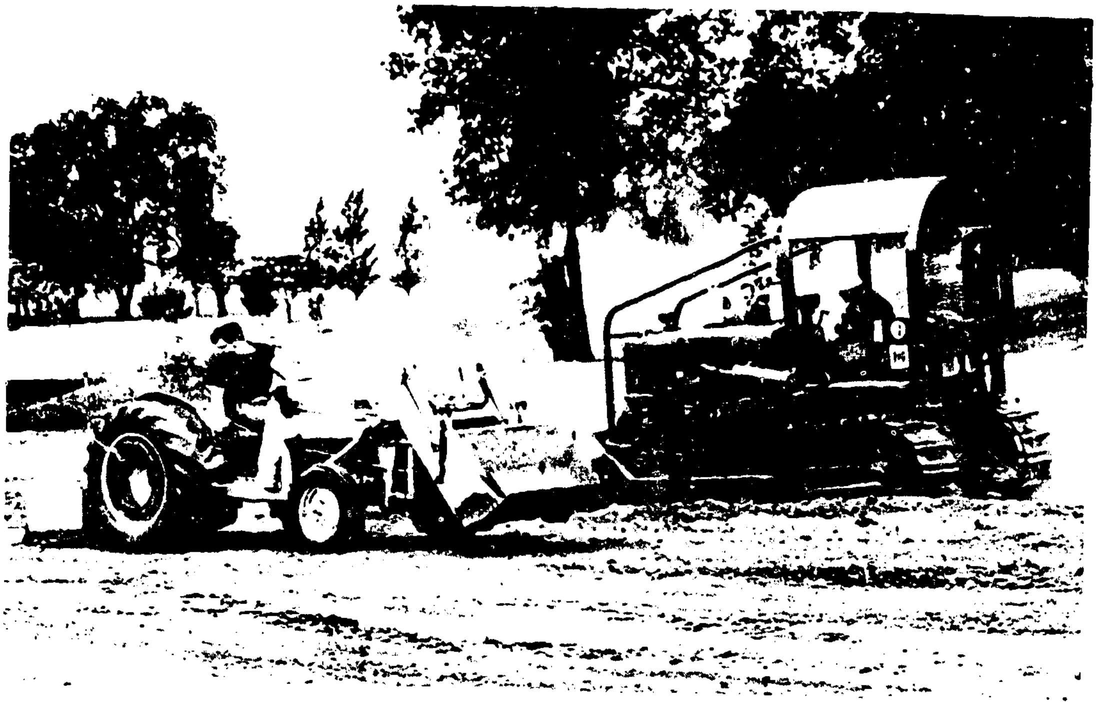


Skiploader and Crawler Tractor (Photo - Butte Community College)

Introduction

According to recent surveys and reports, there is a definite shortage of qualified Power Equipment personnel. Some of the areas of need include Equipment Salesmen, Small Engines Mechanics, Diesel Mechanics, Light and Heavy Duty Equipment Operators, Parts Salesmen, Equipment Fabrication, Welders, and Machinery Mechanics.

These occupations are found in the following industries: Agriculture, Recreation, Forestry, Construction, Ornamental Horticulture, Manufacturing, Transportation and Processing.

One of the most recent surveys conducted by University of California at Davis reports that:

> "The second-largest group of year around jobs, and the second-largest group of predicted new jobs comprises titles associated with the equipment operation, maintenance, repair, and construction." 1

> "The equipment operation, maintenance and repair-job group offers one of the highest potential labor demands for new employees. It contains the jobs for which it is most difficult to find qualified employees, and acquiring the skills and knowledge needed in this field was listed as an important part of preparation by 44 per cent of 4,593 employees interviewed." 2

In discussions with people in the various industries and according to survey reports, there is a serious lack of qualified personnel to fill the jobs due to retirement and expansion growth of these industries. Many industries expressed that they are definitely limited to growth due to lack of finding qualified employees.

Therefore, it seems that California Community Colleges, where appropriate, have the responsibility for providing the curriculum necessary to meet the needs of industries.

There also appears to be a serious lack of communications with people in the industries looking for qualified personnel and the institutions that have training programs.

In the initial development of this curriculum guide it became very difficult to select a title for this guide. The traditional Agriculture Mechanics, Mechanized Agriculture, or Agriculture Engineering title did not completely identify with many of the new mechanics and equipment programs that have developed in such areas as Forestry and Ornamental Horticulture. Hence, a major effort of the Ad-Hoc Committee was to try to find a title that would cover all areas of instruction. The "Power Equipment" title was suggested by the Secretary-Manager of the Far West Equipment Dealers Association. It is quite adaptable as it does not identify itself with any one industry, as the traditional titles did indicate. Yet, it seems descriptive of our training programs both old and new. Examples: Power Equipment Mechanics, Power Equipment Operators, etc.

The feeling of the committee is that the title can lead to new directions and give more prestige to established programs and to new programs.

It is not expected that all programs would wish to adopt the title that was used in the development of this guide; but some sincere thought should be given to it.

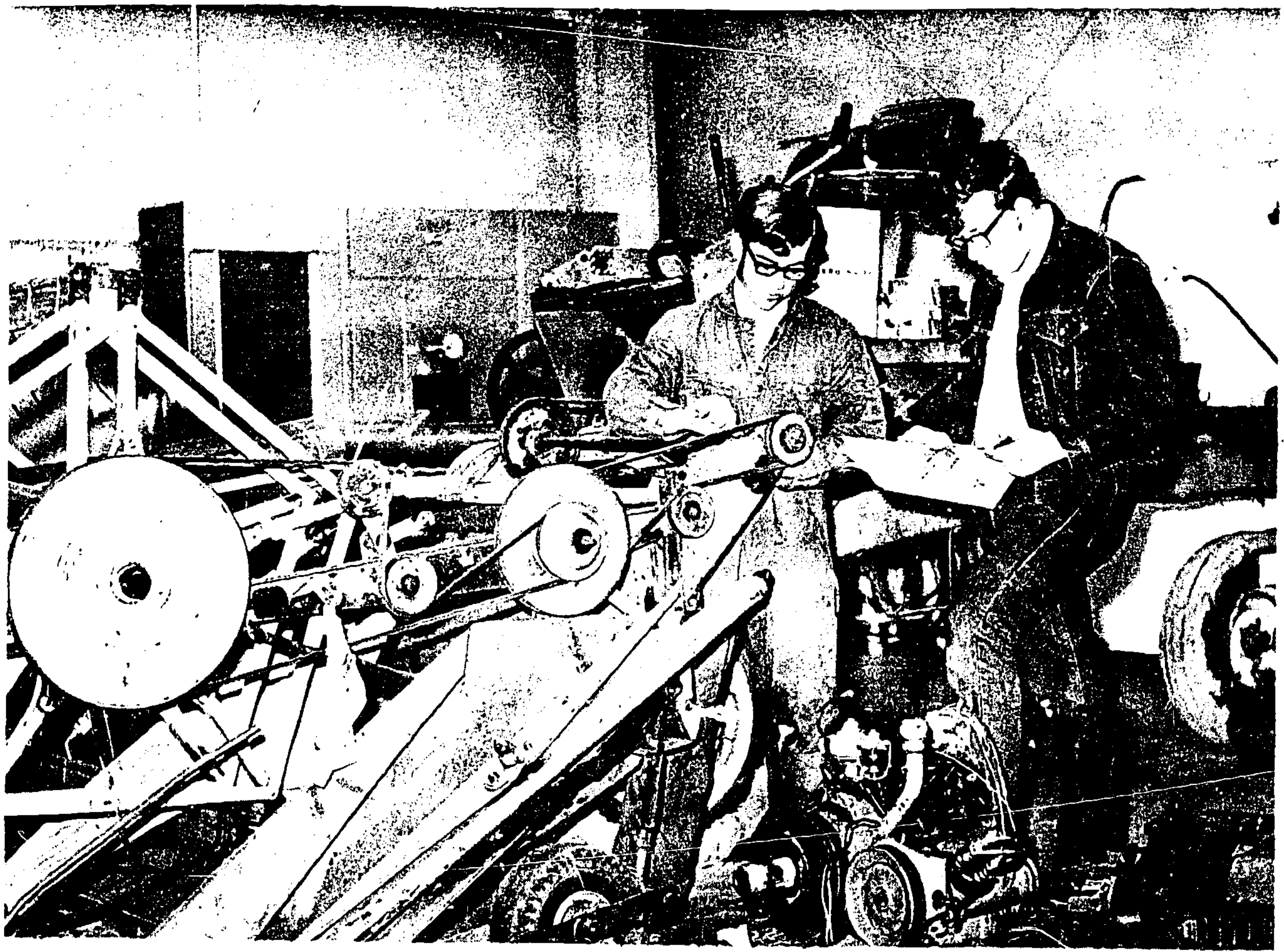
---

1 Thompson, Orville E. and staff. Education in Agriculture in California (Occupation Needs and Future Demands) Department of Behavioral Sciences. College of Agriculture and Environmental Sciences. University of California at Davis, California 95616. August 1971

2 Ibid

With the above problems in mind the "Power Equipment" Curriculum Guide was developed to:

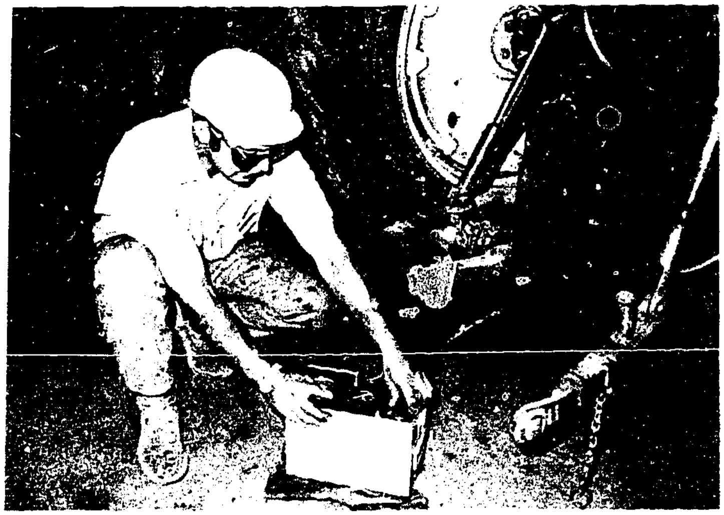
1. Aid in up-grading current programs.
2. To establish new training programs.
3. Meet industrial employment needs.
4. Promote the training programs to the industries within the area and to keep the industries informed that now trained personnel will be available.



Working on a Swather (Photo - West Hills Community College)

Program Scope

The scope of a Power Equipment program is tremendous when you consider the fields of industries it can serve. California is the number one state in terms of Agricultural production. The machinery is rapidly becoming very complex. Hydraulic, electronic, and fluidic components are becoming quite common on many machines.



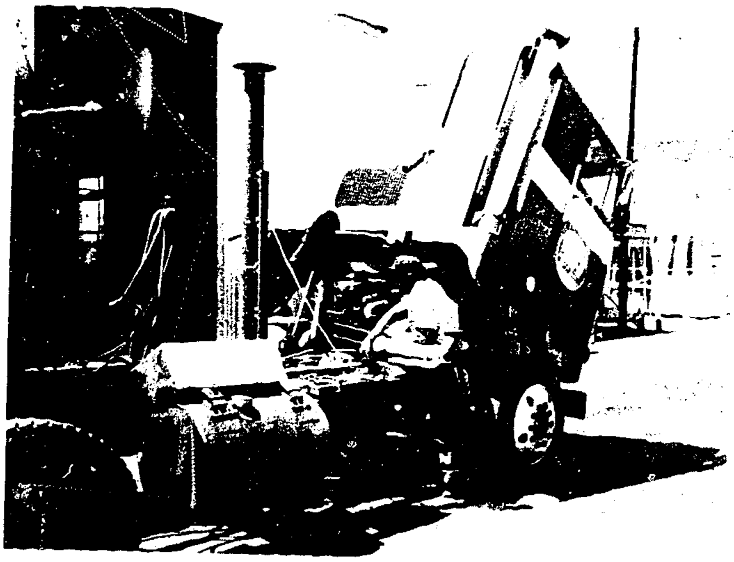
(Photo: West Hills Community College)

The Forestry and Ornamental Horticulture industries are expanding and are highly mechanized. These two industries utilize heavy and light tractors that are also very common to the Agriculture industry.

(Photo: West Hills Community College)

The Recreation industry is experiencing a rapid growth. The utilization of small engines in this industry has been tremendous. Their repair and maintenance has opened up many opportunities in about every town and city in the country.

The Construction, Manufacturing, Processing, and Transportation industries are already highly mechanized and expanding in growth as the state population and economy expand.



(Photo: West Hills Community College)

(Photo: West Hills Community College)

Employment Opportunities

As was pointed out in the Introduction, there is currently a great need for Power Equipment trained personnel. As the various industries expand and continue to mechanize, there will be a critical shortage of trained power equipment personnel in some areas of the state.

Power Equipment Dealerships as far back as 1969 reported:

> "The rising number of employees it takes to run a dealership presents problems of finding enough qualified personnel to do the job, and maintaining satisfactory and productive employee relations." 4

Most advisory committees that were contacted reported a need for qualified Power Equipment trained personnel especially in the mechanics technician level with skills in Diesel Engine Reapir, Hydraulics, Testing Components, Welding, and Equipment Operators.

Reports from institutions that have Power Equipment training programs or similar programs indicate they have no problem in placing students. Many report their biggest problem is locating enough potential students to enter the programs and to complete them.

Several Power Equipment dealers interviewed for information as to job opportunities stated outright, "You send over qualified students and we can hire up to 4 or 5 immediately."

One dealership in Southern San Joaquin Valley has a standing order to take all the mechanics one institution can supply.

It appears quite obvious that "Jobs are Available" for properly trained Power Equipment students. See Appendix A for typical job opportunities by areas of specialization.

4 "Survey Reveals Western Dealership Trends". Western Farm Equipment, 251 Kearny Street, San Francisco, California 94108. July 1969.

A combination of a Power Equipment program and a Business program provides many opportunities in parts and equipment sales occupations.
(Photo - West Hills Community College)

Up-Grading or Initiating the Program

Program Assistance

The up-grading or development of any Power Equipment program (curriculums) includes many complex facets. Any California Community College interested in initiating such a curriculum should contact:

SPECIALIST IN TECHNICAL EDUCATION
CALIFORNIA COMMUNITY COLLEGES
OFFICES OF THE CHANCELLOR
825 Fifteenth Street
Sacramento, California 95814

SPECIALIST IN AGRICULTURE EDUCATION
CALIFORNIA COMMUNITY COLLEGES
OFFICES OF THE CHANCELLOR
825 Fifteenth Street
Sacramento, California 95814

Other sources of information and assistance are community colleges that now offer Power Equipment programs or similar programs. (See List below.)

American River College
4700 College Oak Drive
Sacramento, 95814
916-484-8011

Bakersfield College
1801 Panorama Drive
Bakersfield, 93305
805-871-7120

Butte College
2239 Midway
P. O. Box 566
Durham, 95938
916-345-2481

College of the Desert
43-500 Monterey Avenue
Palm Desert, 92260
714-346-8041

College of the Redwoods
Eureka, 95501
707-443-8411

College of the Sequoias
915 South Mooney Boulevard
Visalia, 93277
209-732-6810 (Farm)

Columbia College
P. O. Box 1849
Columbia, 95110
209-532-3141

Hancock (Allan) College
800 South College Drive
Santa Maria, 93454
805-922-7711

Imperial Valley
P. O. Box 158
Imperial, 92251
714-352-8320

Los Angeles Trade-
Technical College
400 West Washington Boulevard
Los Angeles, 90015
213-746-0800

Merced College
3600 M Street
Merced, 95340
209-723-4321

Modesto Junior College
College Avenue
Modesto, 95350
209-524-1451

Mt. San Antonio College
1100 North Grand Avenue
Walnut, 91789
213-339-7331

Orange Coast College
2701 Fairview Road
Costa Mesa, 92626
714-834-5712

Porterville College
900 South Main Street
Porterville, 93257
209-781-3130

San Joaquin Delta College
3301 Kensington Way
Stockton, 95214
209-466-2631

Sierra College
5000 Rocklin Road
Rocklin, 95677
916-624-3333

West Hills College
300 Cherry Lane
Coalinga, 93210
209-935-2041 (Farm)
209-935-0801

Reedley College
Reed and Manning Avenues
Reedley, 93654
209-638-3641

Shasta College
1065 North Old Oregon Trail
Redding, 96001
916-241-3523

Ventura College
4667 Telegraph Road
Ventura, 93003
805-642-0161

Yuba College
Beale Road at Linda Avenue
Marysville, 95901
916-742-7351

Community Relations

In order for an education program to be most effective it should have strong community support. The staff should be encouraged to become involved in activities to promote this support. These activities require a considerable amount of faculty time. When and where necessary, faculty time should be allocated to carry out these activities. See examples of activities below:

- Prepare regular news and radio releases.
- Conduct regular meetings with the advisory committee
- Participate in related community activities.
- Host meetings for related associations and professional groups.
- Guide local associations, organizations, and dealers toward providing scholarships or grants to students.
- Present educational programs to public and civic organizations. (Work shops, special programs, etc.)
- Encourage the college staff to provide and direct continuing education programs.
- Encourage local businesses to assist in the work experience education program.
- Provide college facilities to dealers and associations for meetings or joint programs.
- Organize field trips in conjunction with class work.

Advisory Committee

In establishing and conducting an educational program an advisory committee is highly recommended. This is a real opportunity to promote strong community relationships. Some ways by which Advisory Committees can help are as follows: They assist in presenting new ideas in the educational program planning; they help in identification of skills and knowledge that should be in the program: they can provide information so educational programs can keep up with the needs of the industries.

> "Lay advisory groups have no administrative or legislative authority and cannot establish policy to take the place of the administrator or the board of education. The function of an advisory committee is to provide a two-way system of understanding and communications between the school and community. School administrators should request and solicit the democratic assistance of representative advisory groups building a vocational educational program which is responsible to the changing needs of each community." 5

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5 "Guide for Establishment and Conduct of Local Advisory Committee for Vocational Agriculture Departments". Vocational Education Productions, California State Polytechnic College, San Luis Obispo, California 93401.

Advisory Committees should be established with the following suggestions in mind:

- The advisory committee is responsible to the board.
- The advisory committee should work closely with the program staff.
- Nominations for the advisory committee should be made by the president or superintendent, the head of the program staff and the chairman of the college board. The college board should then give final approval of appointees to the committee.
- The advisory committee should be truly representative of the district.
- Members should have had recent, successful, firsthand, practical experience in the program they are serving.
- Members should be representative of the occupational areas being served by the program. College administrators and program staff should not serve as committee members but as liaison to the committee.
- Select members that have time, and of course, are willing to serve.
- Committee size: Seven to twelve persons are suggested, with perhaps nine as a desirable medium.

An Advisory Committee can provide a wealth of knowledge and experience for developing a program that is orientated towards occupational goals.

(Photo - College of the Sequoias Community College)

Departmental Considerations

Curriculum development and implementation has been found to be most effective when all available expertise is utilized. Many factors need to be taken into consideration to promote a harmonious relationship within the department or between the departments. Those involved should acknowledge that the real objective of this curriculum activity is that of providing the skills, competencies, and understandings necessary for the job preparation in order that the following concerns will be alleviated:

Intradepartmental Concerns
- Harmonious use of facilities
- Appropriate scheduling to minimize course conflicts
- Adequate student advising

Interdepartmental Concerns
- Harmonious use of facilities
- Resolve jointly which instructional design will best serve your school.
- Involve all departments affected in the consideration of new courses.
- Consider the possibility of offering a course jointly with another department or division.
- Maintain a close association with instructors in related instructional areas.
- Jointly evaluate existing courses or programs on a regular basis.
- Arrangement of schedules to minimize course conflicts.

Developing the Curriculum (Guidelines)

"A well-planned curriculum, incorporating the multi-media approach for the use of instructional material, will enable the vocational-technical teacher to provide the kind of learning experiences and opportunities for the student to achieve the education objectives most effectively and efficiently. The curriculum serves as the teacher's roadmap. It charts the paths of learning that lead to attainment of the desired objectives with a minimum of degression." 1

The following recommendations should be utilized as a guide in curriculum development:

- "Developing of curriculums should be based upon occupational analyses and on preparation for entry into labor market and/or successful advancement in employment on a career-materix.
- Curriculums should be oriented to the individual needs of the diverse groups they will serve and should provide for entry into employment at different occupational levels.
- Advisory groups should be involved in the planning of curriculums and in validating content material.
- Curriculums should provide for the social and economic needs of the students as well as the necessary skills and related knowledge.
- Subject content in curriculums should be determined by the demands of the occupation for which the training is provided and should be appropriate to the learner's abilities and needs. Curriculums should include information as to requirements for physical facilities, equipment, and instructional aids." 2
- Work Experience Education should be an integral part of the curriculum development. (See page 20.)

"To prepare a youth for entry into an occupation, the requirements for a successful worker in that occupation must be identified. The first step in the process of curriculum development is an occupational analysis to determine the knowledge required of a successful worker, the abilities he must possess, and the behavior characteristics he must display. A broad pattern for analyzing an occupation where appropriate should include a review of the following major items:

- Occupational practices and skills
- Support courses
- Appropriate equipment, tools, instruments, materials
- Safety practices and work precautions
- Occupational terminology

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1 A Guide for the Development of Curriculum in Vocational and Technical Education, Division of Vocational Education, University of California, June, 1969, pp. 9-15.

2 Ibid

- Relevant specifications, charts, tables, graphs, and drawings
- Suitable work habits and attitudes
- Interpersonal relationships
- Physical capabilities [3]

Curriculum Programs

Educational programs should be developed for one or more of the following levels:

In-Service Training

Provides training for up-grading Power Equipment personnel presently employed who lack all or part of this training. (Includes workshops and special short courses.)

Pre-Technical Program

Provides the basic knowledge and training to students with limited background in order to assure their success in the technical programs.

Certificate Program (usually 1 year)

Normally consisting of 20 to 32 semester units in a training program as determined by the student and advisor based around certain minimum prescribed courses to qualify for the certificate. Based upon community and industrial needs, the department will determine which specific skills are necessary then offer the required courses. (Work experience usually is one of the required minimum courses.)

Associate of Arts or Associate of Science Degree and/or Technician Certificate (usually 2 years)

Provides basic education and training which will qualify the student for employment at entry-level technician or apprentice positions. Also provides a broadening of student's knowledge through some required work experience and general education. Helps to encourage students to seek positions of increased responsibility and authority or supervision.

Transfer Program

A student desiring ultimate enrollment in a transfer program should consult the catalog for specific requirements of the respective college to which the transfer is intended. Instructors and school counselors have an abundant supply of information relative to articulation with various colleges.

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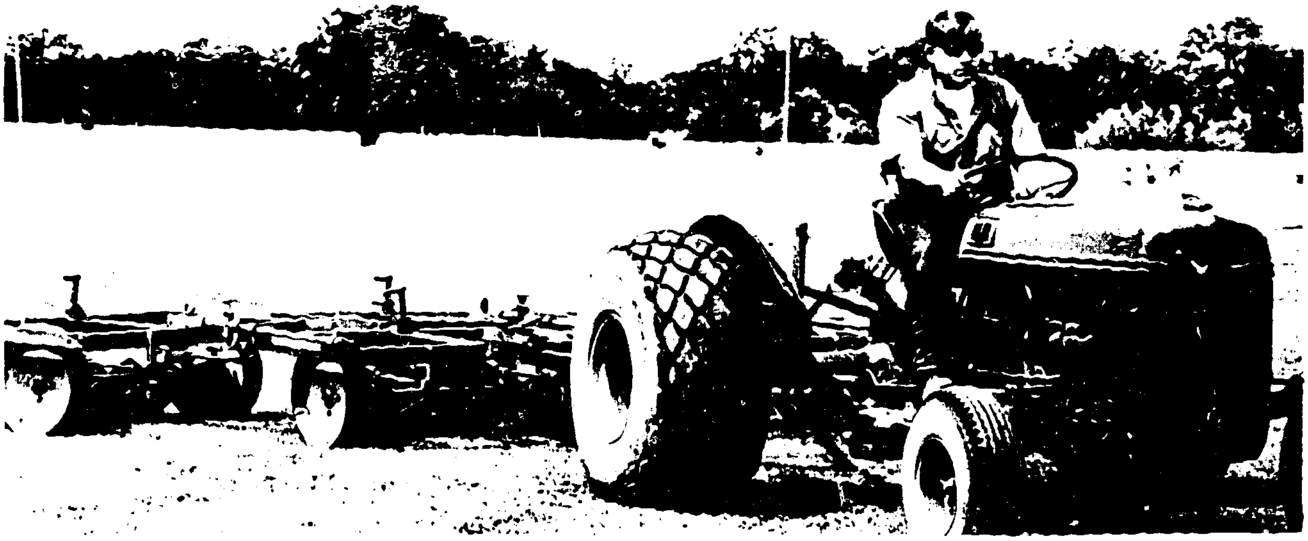
[3] A Guide for the Development of Curriculum in Vocational and Technical Education. Division of Vocational Education, University of California, June, 1969, pp. 9-15.

Curriculum For Power Equipment Technicians (2 year) Suggested Core, Options Areas of Specialization and/or Electives

The courses listed in the following chart should be provided wherever possible to further qualify students for industrial jobs in the fields of Agriculture, Recreation, Forestry, Construction, Processing, Ornamental Horticulture, Manufacturing, and Transportation. See Appendix A for a listing of typical jobs available to those with this training.

In situations where staffing is a problem, refer to the Instructional Resources, page 17, for a more complete description of interdepartmental arrangement of courses.

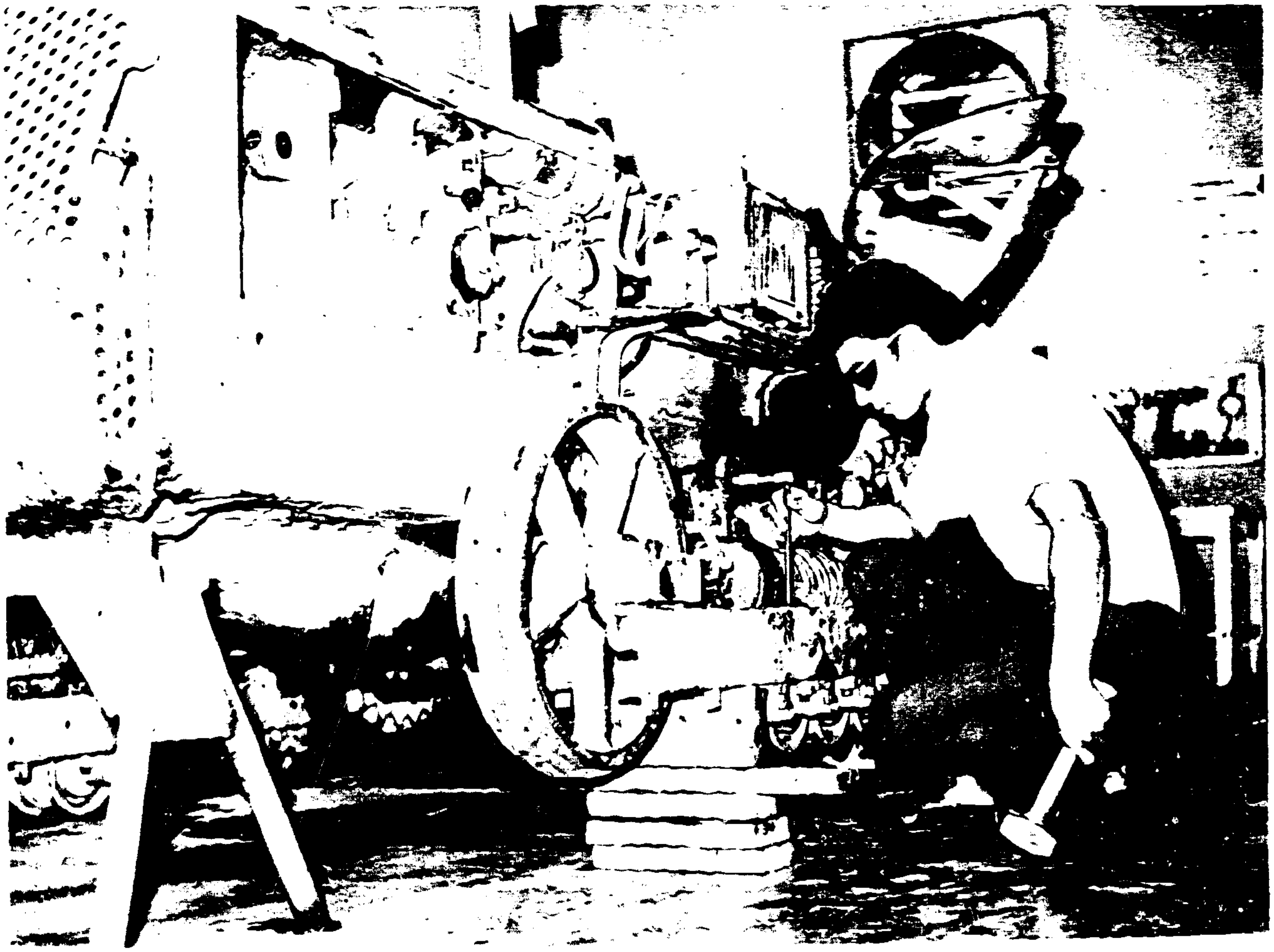
This guide has been developed assuming the need for a student to complete the minimum state requirements in general education. Colleges with additional academic requirements will need to design courses and program sequences most beneficial to the functional competence necessary for the student.



Equipment Operation in the Ornamental Horticulture industry requires competence and precision driving control. A combination of courses in Power Equipment programs can provide the proper training.

(Photo - Butte Community College)

	Agriculture	Natural Resources	Forestry	Construction	Ornamental Horticulture	Manufacturing	Transportation
Core Courses: (See Page 15 for Descriptions)							
Mechanical Skills	x	x	x	x	x	x	x
Welding Fundamentals	x	x	x	x	x	x	x
Hydraulics Fundamentals	x	x	x	x	x	x	x
Equipment Operation and Maintenance	x	x	x	x	x	x	x
Principles of Engines and Components	x	x	x	x	x	x	x
Power Transmission	x	x	x	x	x	x	x
**Communications (Reading, Writing, Speech, Records)	x	x	x	x	x	x	
Mathematics	x	x	x	x	x	x	x
Work Experience Education	x	x	x	x	x	x	x
Total 20-32	x	x	x	x	x	x	x
Options: (Course description not included)							
Welding (Advanced)	x		x	x	x	x	x
Hydraulics (Advanced)	x		x	x	x	x	x
Equipment Operation and Maintenance (Advanced)	x	x	x	x	x		x
Equipment Set-up Adjustment	x		x	x	x		
Equipment and Structures Construction	x	x		x		x	
Power Units, Fuel Systems, Gas, LP & Diesel	x		x	x	x		x
Power Units, Electrical Systems	x		x	x	x		
Irrigation Principles and Systems	x	x			x		
Surveying	x	x	x	x	x		
Drafting	x	x		x	x		
Small Engines	x	x	x	x	x	x	x
Total 9-22	x	x	x	x	x	x	x
Areas of Specialization and/or Electives:							
Agriculture	x						
Natural Resources		x					
Forestry			x				
Construction				x			
Ornamental Horticulture					x		
Manufacturing						x	
Transportation							x
Total 3-20							
General Education Requirements: (15 Total, See **)	x	x	x	x	x	x	x
Total 60-70	x	x	x	x	x	x	x



The Student interested in Construction Equipment repair can get a variety of experiences and skill in a Power Equipment program.

(Photo - West Hills Community College)

Core Course Descriptions

CORE:

MECHANICAL SKILLS

The familiarization and safe use of common hand and power tools that are found in mechanics trades.

WELDING FUNDAMENTALS

Fundamental skills development by using welding equipment and materials.

HYDRAULICS FUNDAMENTALS

Basic theory, technical language, functions, applications, and applied maintenance of hydraulic systems.

EQUIPMENT OPERATION AND MAINTENANCE

The selection and operation of tractors and equipment in conditions as similar as possible to those found in the industries that use power equipment.

PRINCIPLES OF ENGINES AND COMPONENTS

Theory and applied practice in gas, LP and diesel engines, and their components.

POWER TRANSMISSION

A study of the fundamentals and principles used in the transmission of power that are found common to today's power equipment. Examples: V-belts, drive shafts, chains and sprockets, p.t.o. shafts, hydraulics and electrical controls.

COMMUNICATION SKILLS

A course designed to promote greater competence in reading, writing, talking, and listening. (Where possible, classes should be occupation orientated.)

MATHEMATICS

A course in mathematical problems commonly encountered in Power Equipment technology. It includes a review of arithmetic and a study of elementary geometry and business calculations, use of the slide rule, and solution of typical Power Equipment problems.

OPTIONS:

NOTE: Optional Course Descriptions are not listed here. For further information contact the Specialist or colleges listed on page 6.

The Forestry industries provide many opportunities for students with Power Equipment skills and knowledge: Equipment operation, maintenance, etc.

(Photo - Butte Community College)

Instructional Design (Program Alternatives)

The first prerequisite in offering a Power Equipment program is to provide the basic core courses and whenever possible provide as many of the Power Equipment Options as possible.

Following are three suggested program alternatives, showing the core, the options and interdepartment courses.

1. A Concentrated Effort in the Power Equipment program.

Power Equipment Program

Core:

Mechanical Skills
Welding (fundamentals)
Hydraulics (fundamentals)
Equipment Operations and Maintenance
Principles of Engines & Components
Power Transmission
Work Experience Education

Options:

Welding (Advanced)
Hydraulics (Advanced)
Equipment Operation & Maintenance (Adv.)
Equipment Set-up Adjustment
Equipment & Structures Construction
Power Units Electrical Systems
Irrigation Principles and Systems
Surveying
Small Engines

Other Department:

English Program

Communications

Math Program

Mathematics

Engineering Program

Drafting

Areas of Specialization:

Agriculture
Forestry
Ornamental Horticulture
Recreation
Construction Trades
Manufacture Trades
Transportation
Processing

(Photo - West Hills Community College)

2. A Joint Effort between the other Departments.

Power Equipment Program

Core:

Mechanical Skills
Hydraulics (fundamentals)
Equipment Operation and Maintenance
Power Transmission
Work Experience Education

Options:

Hydraulics (Advanced)
Equipment Operation & Maintenance (Adv.)
Equipment Set-up Adjustment
Equipment & Structures Construction
Power Units Fuel Systems Gas LP & Diesel
Irrigation Principles and Systems
Small Engines

Other Department:

English Program

Communications

Math Program

Mathematics

Welding Program

Welding (Basic)
Welding (Advanced)

Engineering Program

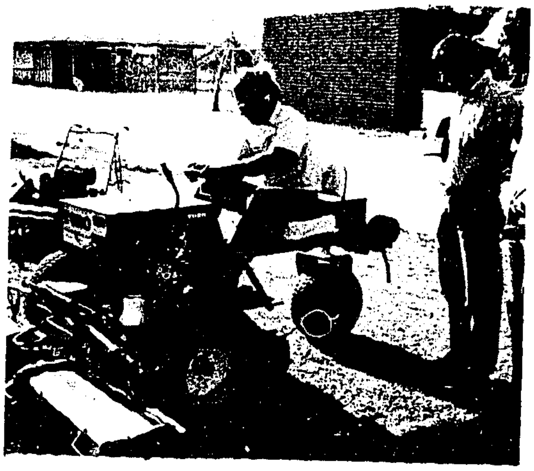
Drafting
Surveying

Automotive Program

Principles of Engines & Components
Power Units Electrical Systems

Areas of Specialization:

Agriculture
Forestry
Recreation
Construction Trades
Ornamental Horticulture
Manufacturing Trades
Transportation
Processing



Toro Lawn Mower
(Photo - Orange Coast Community College)

3. A Concentrated Effort in the Other Departments. This approach may serve well as a transitional means when developing a Power Equipment Curriculum with a limited staff.

Power Equipment Program

Core:

Mechanical Skills
Hydraulics (fundamentals)
Equipment Operation and Maintenance

Options:

Hydraulics (Advanced)
Equipment Operation & Maintenance (Adv.)
Equipment Set-up & Adjustment
Equipment & Structures Construction
Irrigation Principles and Systems
Small Engines

Agriculture classes such as Weed Control Practices can provide experiences and skills that would be necessary for an equipment operator.
(Photo - West Hills Community College)

Other Department:

English Program

Communications

Math Program

Mathematics

Welding Program

Welding (Basic)
Welding (Advanced)

Engineering Program

Drafting
Surveying

Automotive Program

Principles of Engines & Components
Power Transmission
Power Units Fuel Systems Gas, LP, and Diesel
Power Units Electrical Systems

Areas of Specialization:

Agriculture
Forestry
Recreation
Construction Trades
Ornamental Horticulture
Manufacturing Trades
Transportation
Processing

Work Experience Education Programs

The primary purpose for developing this program is the development of on-the-job competence in students. Ideally, the work experience training station should reflect realistic work education and experience. The learned skills would be adaptable to future employment.

The program should be initiated and supervised by one or more of the staff that is directly involved with the Power Equipment program development and instruction.

Essentially the program is to utilize the work station as a continuation of his college laboratory practices.

"Objectives of the program include the following:

1. To prepare each student for gainful employment in an occupation in his field of interest.
2. To provide the student with the opportunity to:
   a. gain a sense of responsibility for a job.
   b. develop positive on-the-job personality traits.
   c. apply in practice the theory and knowledge gained in the classrooms and laboratories.
   d. learn to cooperate and work with fellow employees and customers.
3. To provide students with an opportunity to gain knowledge and experience in aspects of the job not available at the college.
4. To enlist cooperation of prospective employers to insure an effectively supervised training program." 5

The program should be constantly evaluated, and an organized system of student follow-up should be maintained.

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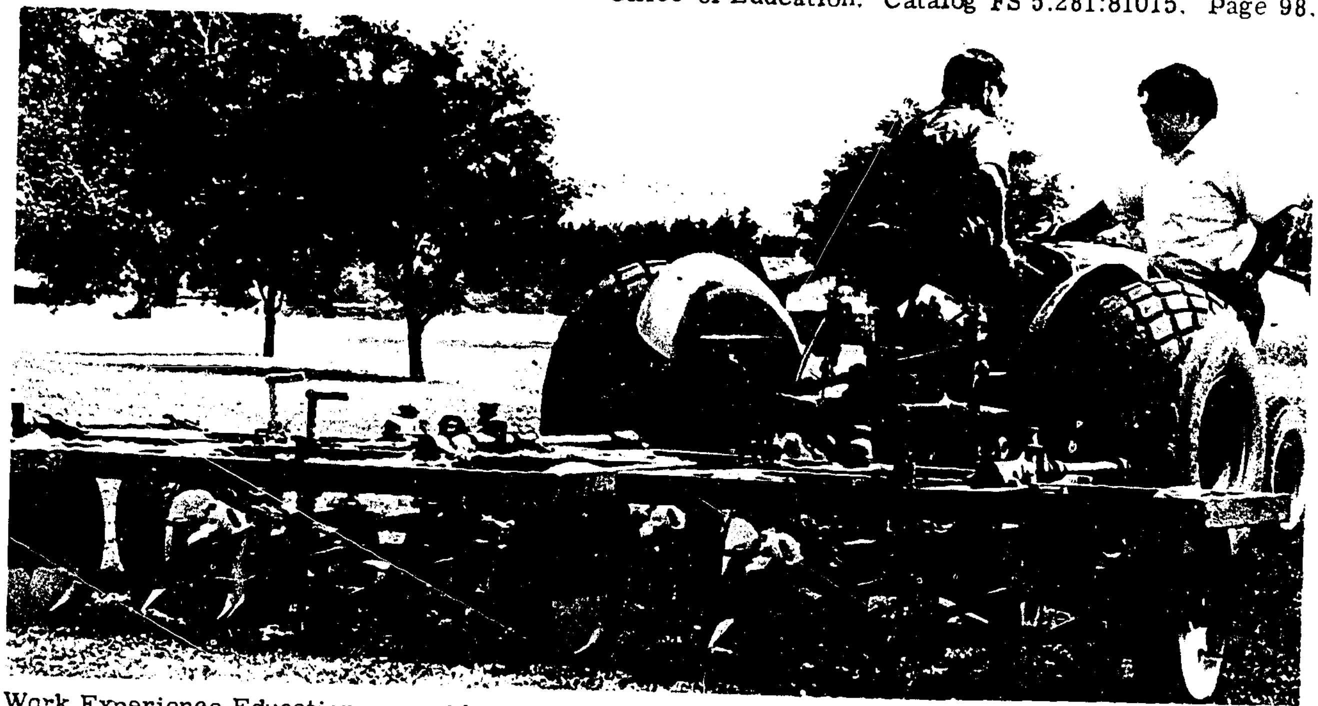
5 "Agriculture Equipment Technology A Suggested 2-year Post High School Curriculum". U. S. Department of Health, Education & Welfare Office of Education. Catalog FS 5.281:81015. Page 98.



Work Experience Education provides many opportunities for practical skills training and working with people.

(Photo - Butte Community College)

The Chancellor's Office of California Community Colleges has a booklet entitled "Guidelines for Community College Work Experience Education (1972)"; it contains suggestions under the following headlines:

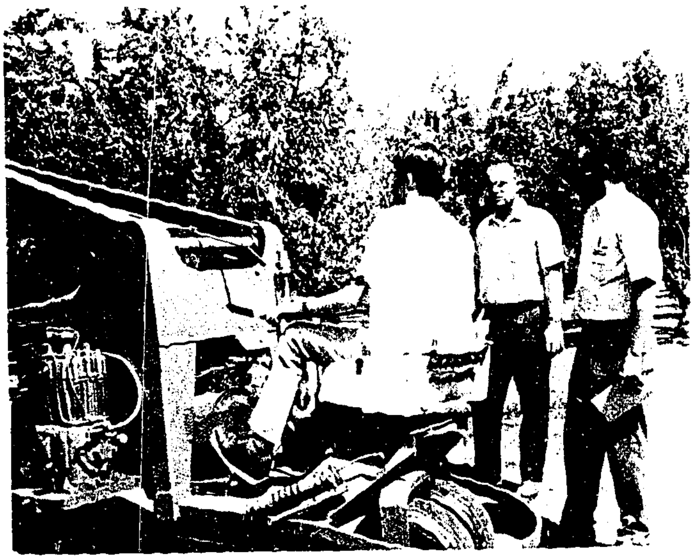
- Work Experience Education--Why?
- Types of Cooperative Work Experience Education
- Planning a Work Experience Education Program
- Organizing the Work Experience Education Program
- Guidelines for the Coordinator
- Work Experience Education Program Guidelines
- Benefits of Work Experience Education
- The Future of Work Experience Education in Community Colleges

Community College districts are authorized to establish and maintain work experience programs under the provisions of sections 193, 197, 5985 through 5992 of the Education Code. In accordance with the Education Code, the Board of Governors of the California Community Colleges has established standards and guidelines for the development of work experience programs. (Sections 54020-54027, Article 3, Subchapter 6, Chapter 1, Part VI, Title 5 of California Administrative Code.)

"Progress and evaluation records should be completed for each student and filed with the permanent student records at the college. The following information should be included:

- Employer's rating report based on skills and knowledge.
- Instructor's rating report based on skills and knowledge.
- Visitation reports.
- Copies of training plan.

(Photo - West Hills Community College)



(Photo - Butte Community College)

- Copies of training agreement
- Evaluation forms'' 6

The joint effort between the college and the cooperating business is a highly effective means of job preparation for the student.

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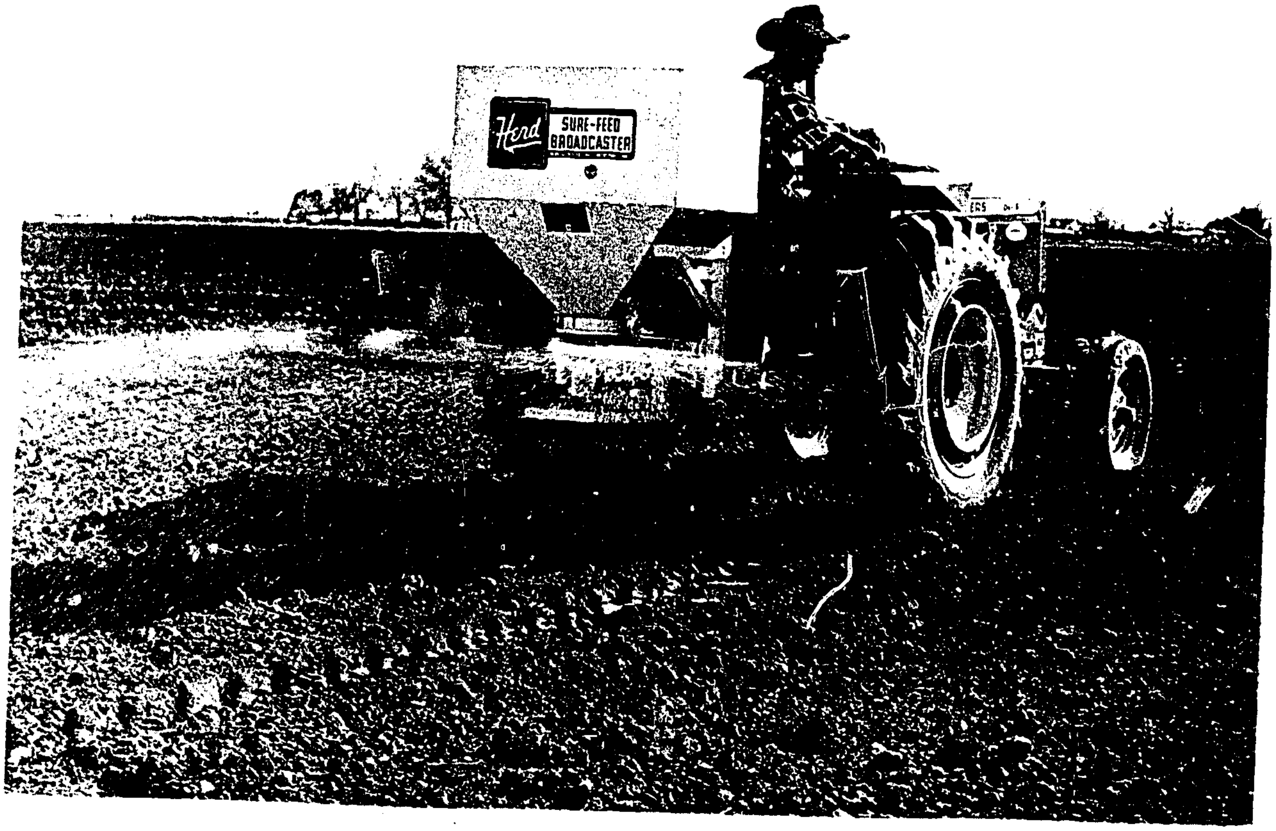
6 ''Agriculture Equipment Technology A Suggested 2-year Post High School Curriculum''. U. S. Department of Health, Education & Welfare Office of Education. Catalog FS 5.281:81015. Page 98.



(Photo - West Hills Community College)

Developing the Program

Selecting Instructors

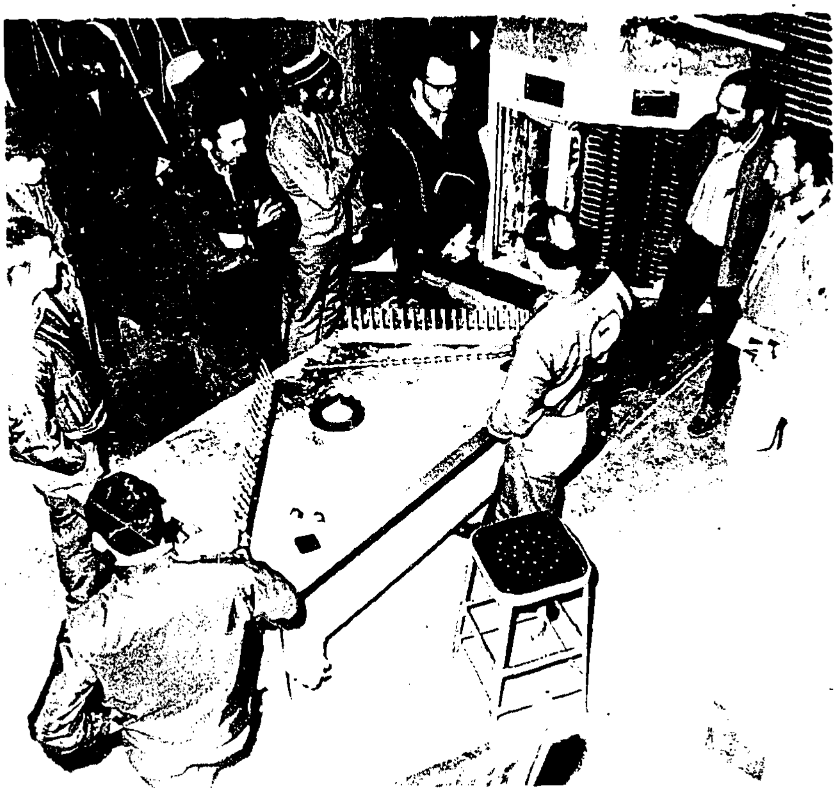
To teach a graded class in a California Community College, the instructor must qualify for one of the credentials as prescribed in Sections 52000-52825 of the California Administrative Code. Title 5, Education. In addition to these qualifications, all vocational instructors must meet the requirements for the California Plan of Vocational Education.

By using any of the sources cited below, the college can save time in securing qualified instructors who are or can be properly credentialed within the prescribed framework.

Specialist in Agricultural Education
Division of Vocational Education
The California Community Colleges
825 Fifteenth Street
Sacramento, Calif. 95814

Specialist in Technical Education
California Community Colleges
825 Fifteenth Street
Sacramento, Calif. 95814

Individuals with a specific competency can frequently be found in the community.



(Photo - West Hills Community College)

Certain classes for adults may be taught on a limited basis by persons with a demonstrated proficiency. The Dean of the evening college of the local Community Colleges can provide credential information for instructors of evening classes.

Instructor-student ratio is very important to over all success of the program. Due to the nature of the instructional skills and knowledge involved, the following is recommended as a staffing load in laboratory situations:

"For best learning conditions, the number of students in laboratory sections should be limited. Twelve to fifteen students in any one laboratory section usually are all that can obtain valuable experience with one instructor. If the instructor has an assistant, the laboratory section may be enlarged." 7

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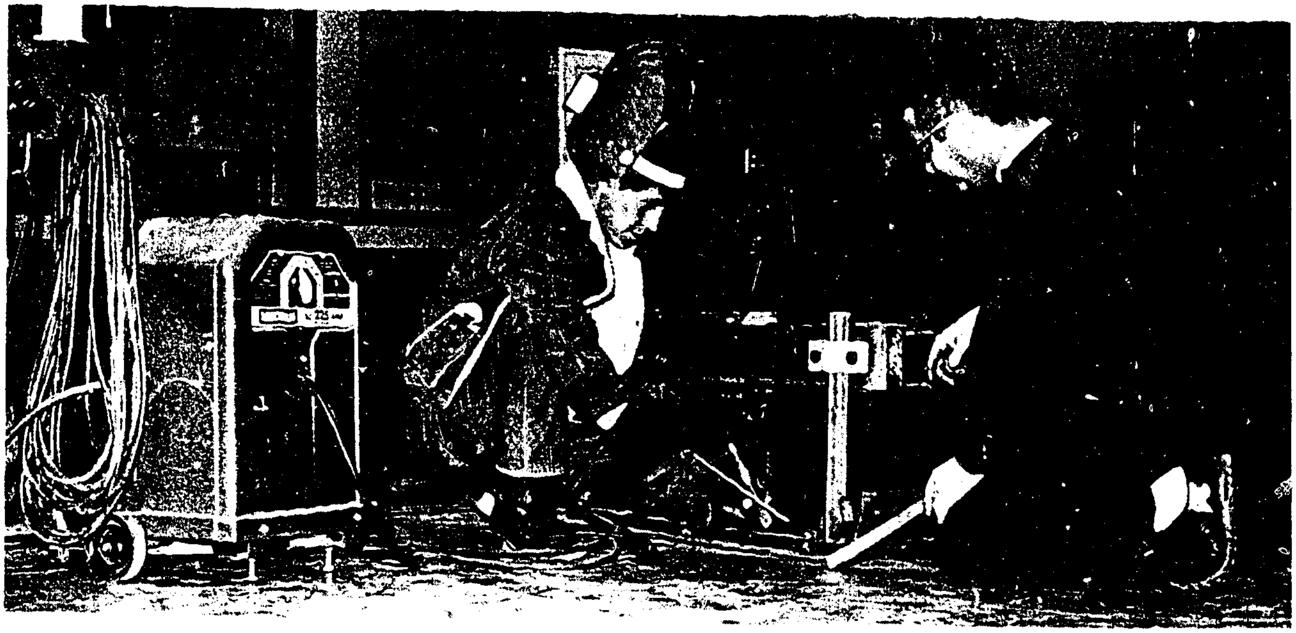
7 "Agriculture Equipment Technology A Suggested 2-year Post High School Curriculum." U. S. Department of Health, Education & Welfare Office of Education. Catalog FS 5.281:81015.



(Photo - West Hills Community College)

General Planning of Facilities

Laboratory and related classrooms, offices, and storage facilities for teaching a Power Equipment program do not present special or unusual conditions. Any well-constructed building with suitable utilities may be used. However, if a building is to be constructed to house the program, plans should provide for maximum use of portable equipment in order to acquire the greatest flexibility and use of space.

When establishing or selecting facilities, consideration should also be given to the availability or access to a minimum of 5 to 10 acres for the Tractors and Equipment Operators classes. Some of this acreage can be used for storage of larger pieces of equipment.

Adequate laboratory and physical facilities are vital to the program. There must be sufficient space to teach the basic principles of machines common to the industries outlined earlier in the curriculum guide.

For information on facilities and utilization it is recommended that initial contacts be made with:

1. Associate Construction Analyst
Division of Vocational Education
California Community Colleges
825 Fifteenth Street
Sacramento, Calif. 95814

2. Specialist in Agricultural Education
Division of Vocational Education
California Community Colleges
825 Fifteenth Street
Sacramento, Calif. 95814

3. Specialist in Technical Education
California Community Colleges
825 Fifteenth Street
Sacramento, Calif. 95814

(Photo - West Hills Community College)

Equipment Supplies

The following equipment list should only be considered as a guide. A more detailed list of equipment for Core and Option courses can be found in: Agriculture Equipment Technology, a suggested 2-year Post High School Curriculum. Catalog No. FS 5.281:81015. U. S. Department of Health, Education and Welfare. Washington, D. C. 1970; Diesel Service, A suggested 2-year Post High School Curriculum. Catalog No. FS 5.287:87045. U. S. Department of Health, Education, and Welfare. Washington, D. C. 1969; Architectural and Building Construction Technology, A suggested 2-year Post High School Curriculum. Catalog No. FS 5.280:80062. U. S. Department of Health, Education, and Welfare. Washington, D. C. 1969; and Fluid Power Technology, A suggested 2-year Post High School Curriculum, Fluid Power Foundation, Inc., 600 Old Country Road, Garden City, New York 11530, January 1972.

MECHANICAL SKILLS LABORATORY

Safety Equipment
Wood working tools (hand & electrical)
Concrete tools
Electrical tools
Fence building tools
Table saw
Grinders
Drill press
Steel saw
Basic tool sets
Socket sets
Basic electrical testing equipment
Basic Measuring Devices
Audio-Visual Equipment

WELDING FUNDAMENTALS LABORATORY

Safety Equipment
Arc Welders (10 station minimum)
Oxy-acetylene manifold (10 station minimum)
Cutting Torches
Shear for cutting metal (1/2" x 5" capacity minimum)
Shear for cutting metal (16 gauge capacity minimum)
Weld Testing Equipment
Audio-Visual Equipment

EQUIPMENT OPERATION AND MAINTENANCE LABORATORY

Trucks
Wheel Tractors
Crawler Tractors
Forklift
Wheel Loaders
Specialized Industry Equipment (Lawn Mowers,
  Harvesters, Roto-Tillers, etc.)
Lubrication and Maintenance Equipment
Tool Sets Equipment
Dynamometer
Audio-Visual Equipment

PRINCIPLES OF ENGINES AND COMPONENTS LABORATORY

Small Gas Engines
Multi-Cylinder Engines
Tool Sets
Engine Testing Equipment
Engine Stands
Engine Test Equipment
Audio-Visual Equipment

POWER TRANSMISSION LABORATORY

Various Components of Power Train Systems
Transmissions Systems Set-up for Laboratory use
Equipment that apply various methods of Power Transmission
Tool Sets
Testing Equipment
Measuring Devices
Hydraulic Press
Audio-Visual Equipment

COMMUNICATIONS SKILLS:

Use of methods and material that are occupation orientated.

MATHEMATICS:

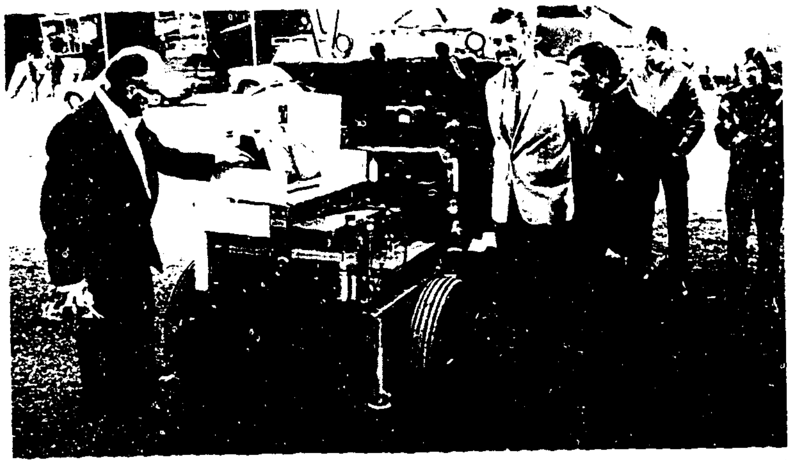
Use of methods and material that are occupation orientated.

Promoting the Program

Most young people are not aware of the opportunities in Power Equipment fields of employment. Therefore, every possible means should be explored to promote the training program. An extended effort must be made to inform students, parents, and counselors of opportunities in this field. The instructors will have to keep continually abreast of new developments in the industries and should expect to disseminate this information to students, parents, counselors, and others interested in the program.

A few suggestions to aid in the recruitment of students and the dissemination of information are listed here:

- Maintain constant liaison with industry and secondary school counselors and their mechanics departments.
- Sponsor educational field days for secondary school students.
- Conduct annual counselor orientation programs.
- Prepare and distribute college program and career brochures on power equipment training.
- Offer department scholarships.
- Present programs on Power Equipment training program.
- Have a graduate of the Power Equipment training program speak to high school classes.
- Conduct an open house career night.
- Participation in the college freshman orientation program.
- Work with community youth groups.
- Participate in college and community programs.
- Sponsor short workshop classes for dealers, etc.



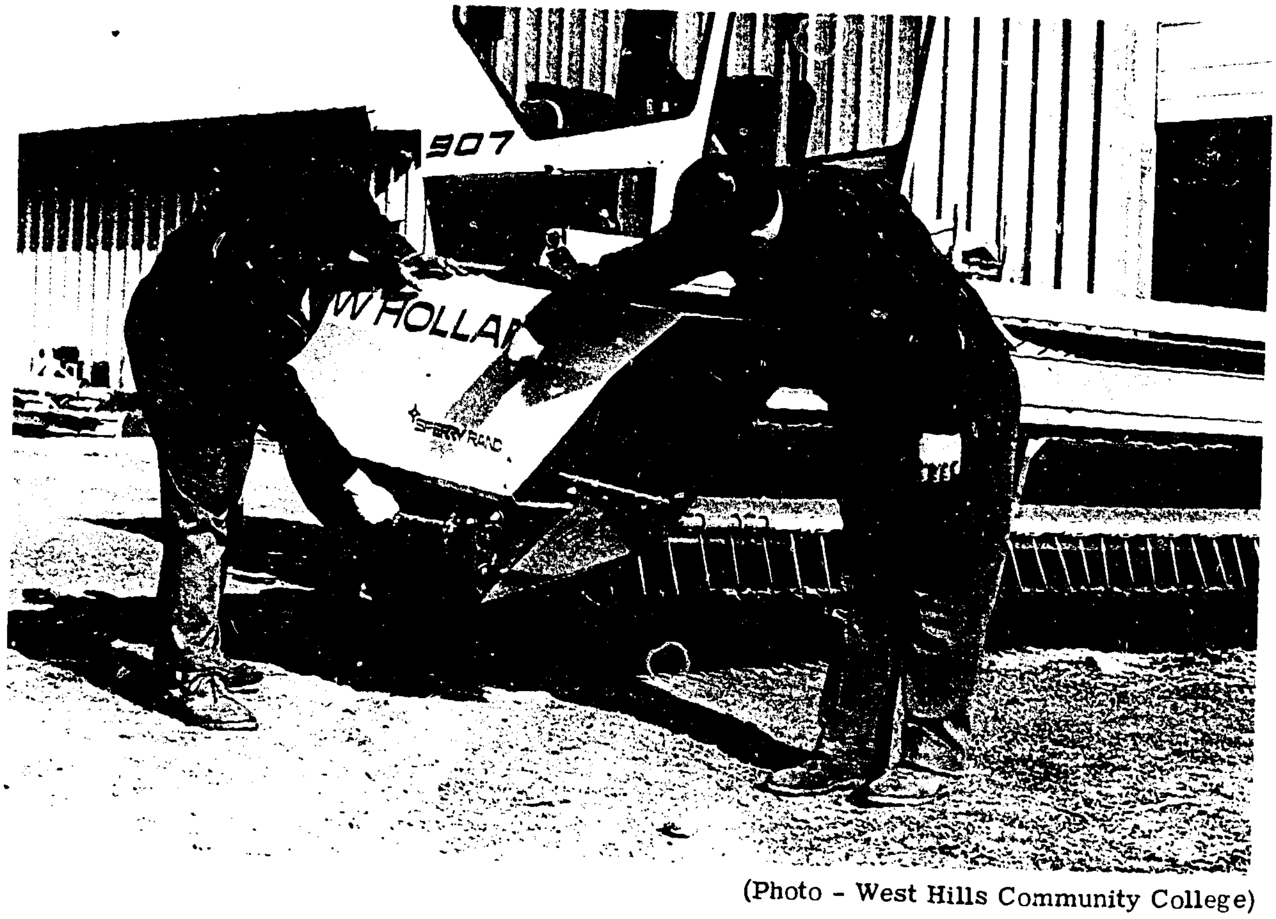
(Photo - Butte Community College)

Up-Dating the Instructors' Knowledge and Teaching Ability

The Board of Trustees of the Community College District should make it possible for the instructors to have some release time so they can become involved in activities that will improve their teaching ability. Some Community College Districts allow salary increments for in-service training in lieu of formal academic courses. Technology and advanced methods of mechanization are increasing rapidly. Instructors must be aware of this, so they can teach up-to-date methods.

A few ways instructors can help accomplish the up-dating of the instructional program:

- Attend work shops sponsored by the industry and state department of education.
- Participate in work experience jobs with industry.
- Attend In-Service training programs.
- Attend professional meetings and conferences.
- Attend industry sponsored meetings and conferences.
- Visit industry-business and become acquainted with owners, managers, mechanics, etc.



(Photo - West Hills Community College)

Placing the Graduate

In addition to having instructors available during the summer for work experience education, a community college should provide placement service for power equipment students. The college could assist in ascertaining the needs of the Power Equipment labor force and also assist in conducting the necessary evaluations of the jobs available for these students.

The instructional staff should be responsible for establishing liaison between the college and the businesses seeking graduates. To establish good working relationships with industry, the instructors should attend industrial meetings and be articulate with local Power Equipment people. The relationship developed will aid in the placement of well-trained students who have completed the program.

Frequently, the placement service is organized and conducted through the college job placement officer. Inquiries from the labor market about candidates for job openings should be directed either to his office or to the chairman of the training department. Job candidates should apply at the college placement office for information concerning job opportunities in the various industries for Power Equipment personnel. The placement officers, working closely with the instructional staff can set up a sound placement service. Through contacts with the State Department of Human Resources and Development personnel and newspapers, the college can keep up-to-date regarding the need for personnel, the skills required for the jobs available, the salaries being paid, and advancement possibilities.

(Photo - Butte Community College)

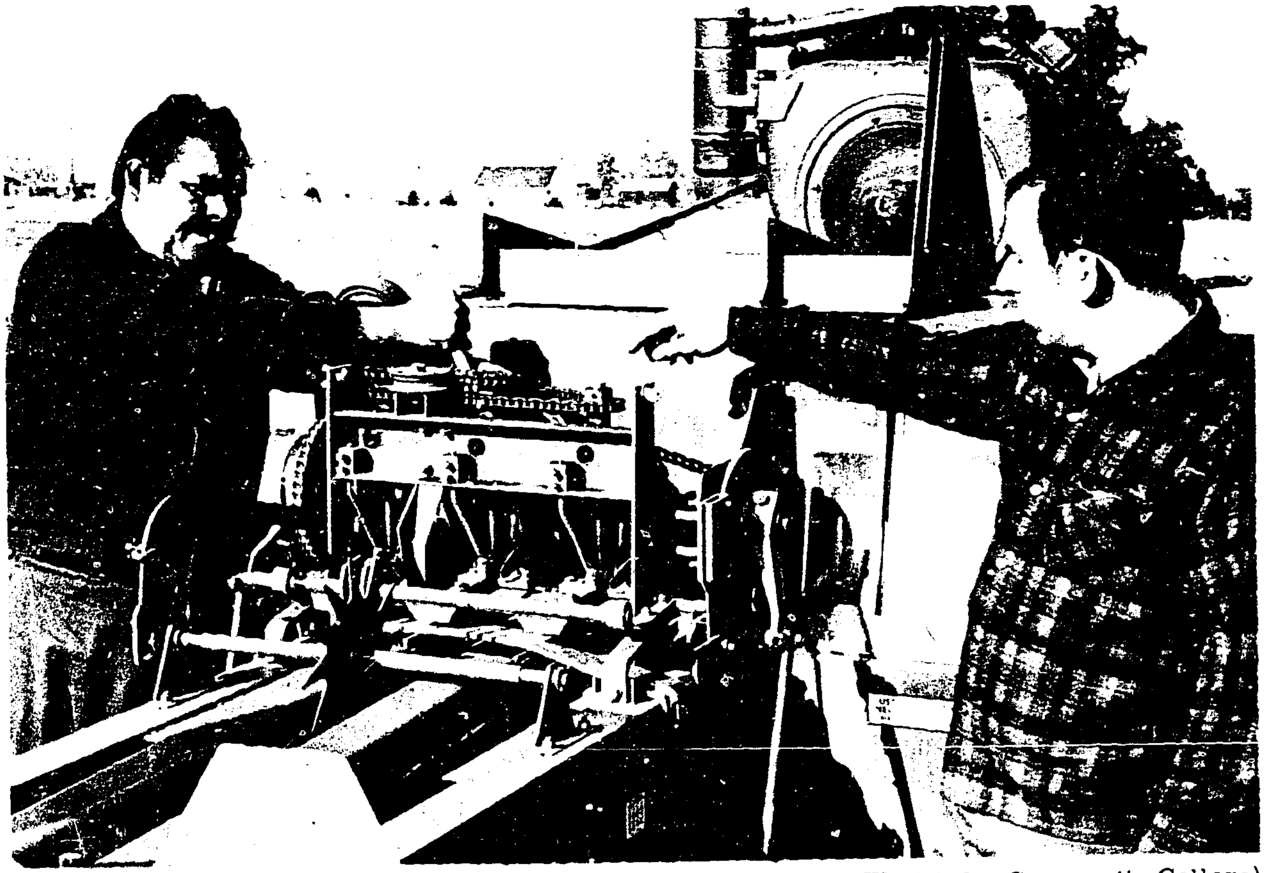
Follow-up of Graduate

The faculty members responsible for the instructional program must accept the responsibility for conducting follow-up studies which will provide the necessary data for evaluating the curriculum. The effectiveness of the instruction is demonstrated primarily by the knowledge and skills exhibited by the students on the job. Many colleges do a follow-up of their graduates in a variety of ways: e.g., by encouraging them to write about their experiences in their jobs, by talking with local employers who have hired graduates, by observing graduates at work; and by obtaining reports from employers and others in the field. Information obtained from the follow-up of students is one of the most realistic guides for curriculum evaluation.

Each college should develop a systematic follow-up procedure. Follow-up information should consist of the graduate's name, address, place of employment, job title, pay scale and other similar data. Students should be asked about changes in occupation or job responsibilities since the last follow-up study was conducted, skills used in their work, evaluation of the training they received in college, new skills or training needed, and other information desired by the local department or college. It is recommended that a standard form be developed and data processing methods, where available, be used to compile and store information. The department should retain a folder on each former student. This folder should contain a record of: work experience, college work, follow-up information, and teacher evaluations.

The effectiveness of any follow-up is proportionate to the amount of conscientious effort devoted to it. The vocational coordinator in many schools has assumed the follow-up responsibility and works closely with the training department in completing this evaluation.

(Photo - Reedley-State Center Community College District)



(Photo - West Hills Community College)

Evaluation of Program

The California State Plan for Vocational Education states that:

> "A system for evaluating shall be developed to determine how the program meets its stated objectives. This system shall be on-going and shall provide for modification resulting from appraisal from students, employers, and the advisory committee. Evaluation statements shall be specific and must include suggestions for improvement directly related to recommendations of local advisory committees. Every system of evaluation must provide for specific follow-up information on each person who has completed or who has left an occupational preparation program offered at a secondary, adult, or community college levels. Such information shall include, but shall not be limited to, employment of education status following completion or departure from the training program."

To relate this specifically to an overall evaluation of the training program the following approaches may be used:

1. Comparison of those that entered the training program vs. those that entered employment for which the training program was designed.

2. Follow-up data on graduates, at one, three, and five year intervals.
   a. retention on job
   b. employment in related jobs
   c. additional education and training taken or needed
   d. unemployment history
   e. income, advancements, job duties

3. Impact of the program on drop-out and youth unemployment rates.

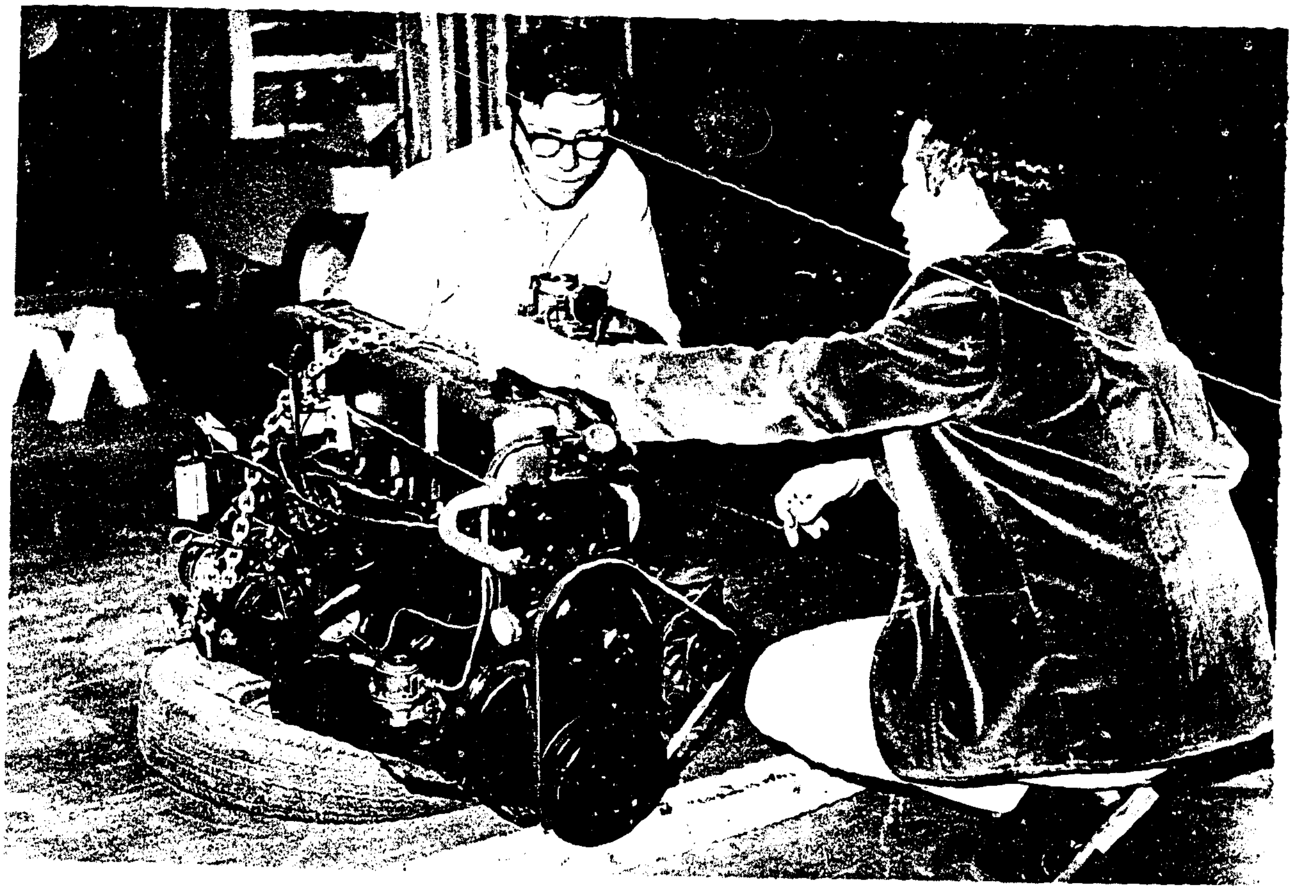
4. Comparison of total labor market needs and those that could be filled by Power Equipment trained students.

5. Evaluation by employers of the job performance of graduates as compared to other groups.

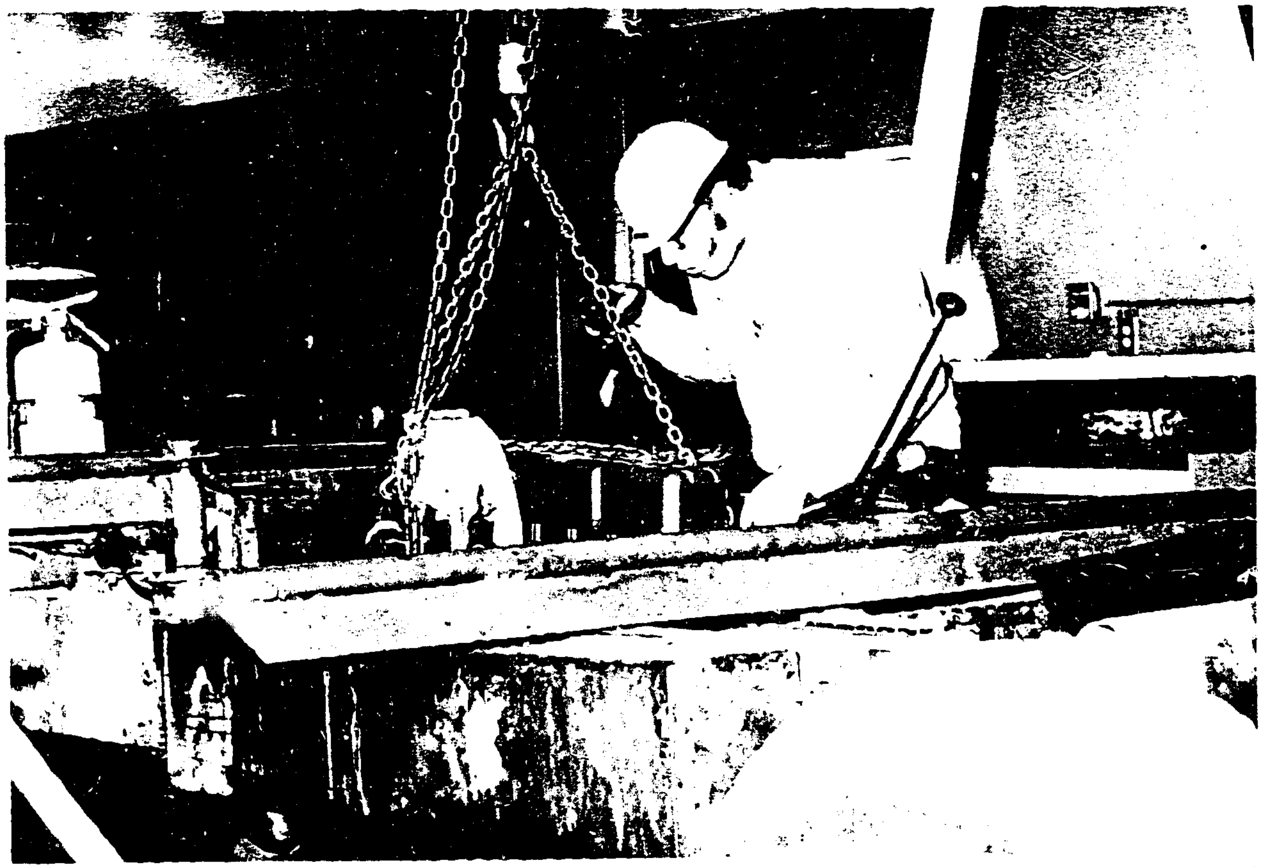
6. Success of transfer students.
   a. articulation of courses
   b. success while attending transfer institution
   c. success in placement after graduation

7. Advisory committee reaction to students' adaptability to existing jobs.

Throughout the entire evaluation process, emphasis must be placed on determining whether or not the program effectively meets its stated objectives.

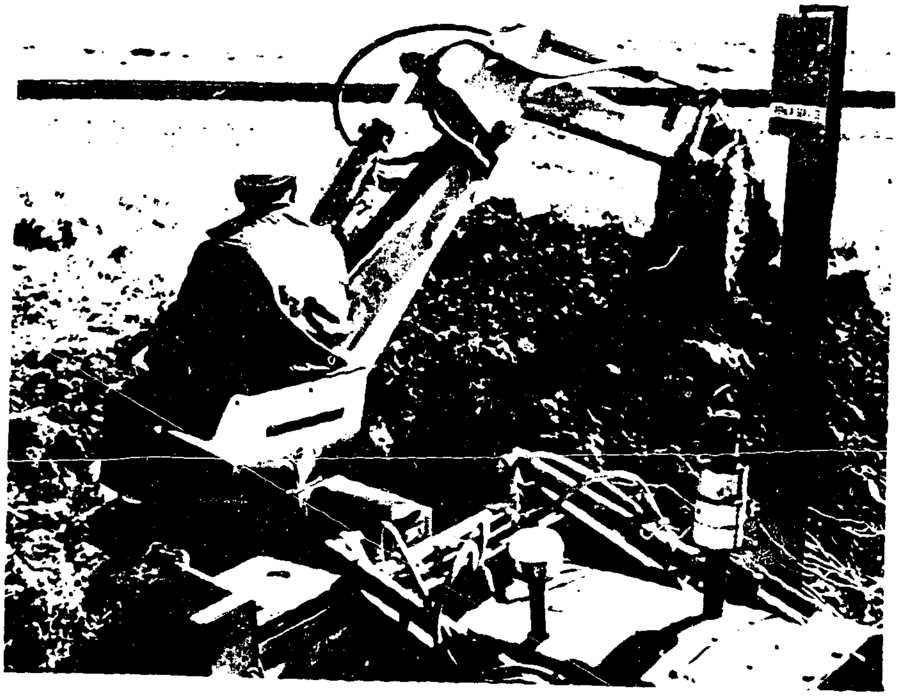


(Photo - West Hills Community College)



(Photo - West Hills Community College)

Appendices



(Photo - Butte Community College)

A--Typical Job Opportunities by Areas of Specialization

AGRICULTURE

Diesel Mechanic
Equipment Operator
Equipment Maintenance
Farm Equipment Mechanic
Heavy Duty Mechanic
Partsman
Rod and Chain Man
Surveyor
Truck Mechanic
Welder
Field Serviceman
Field Lubrication Serviceman
Equipment Demonstrator
Small Engines Serviceman
Pump Mechanic
Equipment Dispatcher
Equipment Maintenance Foreman
Equipment Sales
Equipment Application Specialist
Field Representative
Shop Foreman
Ranch Foreman
Research Technician
Service Manager
Custom Operator
Equipment Set-up Mechanic
Truck Driver
Hydraulic Serviceman
Warehouse Man
Maintenance Mechanic

RECREATION

Equipment Operator
Small Engines Repairman
Boat Repairman
Service Mechanic
Motor Cycle Repairman

FORESTRY (Lumber and Products Industry, Rangers, Firefighters, Forest Service)

Heavy Equipment Operator
Timber Cutter
Bucker (Timber)
Forest Products Gatherer
Chip Operator
Debarker
Shop Sorter
Edger Man
Green Chain Operator
Millright
Planner Man
Pony Operator
Resaw Operator
Sorting Chain Operator
Power Saw Mechanic
Forklift Operator
Truck Driver
Diesel Mechanic
Serviceman
Equipment Maintenance
Heavy Duty Mechanic
Welder
Small Engines Serviceman
Equipment Maintenance Foreman
Equipment Sales
Hydraulic Serviceman
Warehouse Man
Rod and Chain Man
Saw Mill Mechanic

CONSTRUCTION

Heavy Equipment Operator
Diesel Mechanic
Highway Equipment Maintenance Operator
Equipment Salesman

Forklift Operator
Truck Driver
Welder
Structural Steel Worker
Hydraulic Serviceman

ORNAMENTAL HORTICULTURE (Landscape Maintenance, etc.)

Small Engines Serviceman
Equipment Salesman
Equipment Maintenance Repair

Equipment Operator
Irrigation Equipment Salesman

MANUFACTURING AND PROCESSING

Forklift Operator
Welder
Assembler
Machinist

Machine Tool Operator
Maintenance Mechanic
General Maintenance Mechanic
Hydraulic Serviceman

TRANSPORTATION

Log Truck Driver
Cattle Truck Driver
Shop Serviceman
Shop Foreman
Diesel Mechanic
Small Engines Mechanic
Truck Driver (Heavy)

Electrical Specialist
Sales and Service
Hydraulic Specialist
Welding
Truck Serviceman
Truck Driver (Light)
Truck Mechanic

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VT 016 594
KEEFE, BETTY MILES
ANALYSIS OF A NEW CONCEPT AND IMPLEMENTATION IN COOPERATIVE HEALTH TRAINING.

GALVESTON COLL., TEX.;TEXAS EDUCATION AGENCY, AUSTIN. DEPT. OF OCCUPATIONAL AND TECHNICAL EDUCATION.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - ND 338P.

DESCRIPTORS - CURRICULUM GUIDES; *PROGRAM GUIDES; TRAINING TECHNIQUES; SCHOOL SURVEYS; *CURRICULUM DESIGN; *HEALTH OCCUPATIONS EDUCATION; JUNIOR COLLEGES; *COMMUNITY COLLEGES; *SPECIAL DEGREE PROGRAMS; FIELD EXPERIENCE PROGRAMS

ABSTRACT - "THE GALVESTON PLAN," AN INNOVATIVE CONCEPT IN EDUCATION, IS SURVEYED IN THIS DOCUMENT. THIS NEW APPROACH TO EDUCATION, ORIGINATING IN GALVESTON, TEXAS, HAS AS ITS MAJOR OBJECTIVES TO PROVIDE OCCUPATIONAL EDUCATION IN SPECIALIZED AREAS FOR PERSONS WHO WISH TO FIND EMPLOYMENT UPON PROGRAM COMPLETION, AND FOR STUDENTS WHO HAVE ASSUMED ADULT RESPONSIBILITIES AND MUST ATTEND SCHOOL ON A PART-TIME BASIS. THE PROGRAM OF EDUCATION OF HEALTH CARE PERSONNEL TO ACHIEVE ASSOCIATE DEGREE TO PROFESSIONAL STATUS IS A RESULT OF THE COOPERATIVE EFFORTS OF THREE AGENCIES, GALVESTON COMMUNITY COLLEGE, THE UNIVERSITY OF TEXAS MEDICAL BRANCH, AND THE TEXAS EDUCATION ASSOCIATION. CONTENTS OF THE REPORT INCLUDE: (1) AN INTRODUCTION, (2) A DISCUSSION OF ACCREDITATION STANDARDS, (3) AN EXPLANATION OF THE ORGANIZATION AND CONTENTS OF THE CORE YEAR CURRICULUM AND THE SECOND YEAR CURRICULUM, INCLUDING INDIVIDUAL STUDY TRACKS, (4) A DISCUSSION OF THE STUDENTS, THEIR INPUT, COUNSELING PROGRAMS, EVALUATIONS, AND ORGANIZATIONS, AND (5) THE FINANCIAL ASPECTS OF THE PROGRAM. (SN)

VT 016 594

The Galveston College Plan

Associated Health Occupations

ANALYSIS OF A NEW CONCEPT AND IMPLEMENTATION IN COOPERATIVE HEALTH TRAINING

GALVESTON COLLEGE
4015 Avenue Q
GALVESTON, TEXAS 77550

Division of Occupational Research and Development
Department of Occupational and Technical Education
Texas Education Agency

PREFACE

This document was authorized by the Texas Education Agency for the purposes of reporting on the progress of a new concept in health education as well as to assist other college in determining if similar programs could be established along the same guidelines.

The optimum has been achieved--that of a Junior College and a medical educational facility affiliating for this goal. It is felt; however, that a like program could develop between an educational institution and a nearby medical facility. This survey and evaluation of The Galveston Plan of Galveston College sets forth the guidelines, the essentials and the equipment and personnel needed for the planning of such an AHO program.

A word of caution. The information contained herein is to be used as guidelines for new programs only. Each college will have to develop its own proposals to suit the needs of the individual community. Also, to stress again as in the document, this program is not to be hastily prepared. Hindsight from the Galveston College planners is that at least one year of planning with a qualified, full-time department chairman is essential. Also, in selecting this department chairman, one qualification should be the ability to determine if professionals within the medical facility are capable of teaching students and if not, to be able to instruct these professionals in "how to teach".

Many persons have assisted in the compilation of this survey. It is difficult to name them and keep from the sins of omission. One person not named in the survey but who was instrumental in the development of the program was Carl Fairman, loaned from the State Mental Health-Mental Retardation to assist in the early planning and to teach the first AHO courses. Paul Peck, Director of Research and Development, James Frazier Dean of Occupational Education; J. Laurence Cantwell, Department Chairman for AHO and Dr. Robert Bing, Dean of the School of Allied Health Sciences, were those who entered into frank discussions of problems and solutions which made the research most complete. Bert Markham, Director and Miss Sue Alder, Chief Consultant, Health Occupations Education at the Texas Education Agency, thanks also to you.

But this would not be complete without recording for history the names of my most enthusiastic supporter, Tom Keefe, and my cheering section, Leslie Denise, Patrick and Allyson.

Betty Miles Keefe
Principle Investigator

May 30, 1972

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

This is a record of junior college curriculum pioneering . . . a chronicle of "The Galveston Plan", an innovative concept in the education of health care personnel to achieve Associate Degree and associate, assistant or registered professional status. It encompasses "career-ladder", "latticing", and baccalaureate goals. The plan utilizes a multi-health-occupation program of instruction based on a common core curriculum and specialized clinical education.

At the time of the Galveston Plan's inception, the Texas Education Agency had standards for post-secondary education, but none established for this type of program. This document will show the evolution of the new concept from its approval by the Texas Education Agency through the curriculum revisions necessitated to conform to national professional standards for individual study tracks. It encompasses the TEA guidelines for constituting the program, financing, an in-depth study of students. and an on-going evaluation of the program by faculty and students.

Step by step development is outlined to show "previously trodden ground". It is the hope that a college wishing to undertake the Galveston Plan could use this analysis as a guide to determine local feasibility as well as to plan, develop and implement the unique program of instruction. The Galveston Plan is successful because of the mutual respect and dedicated cooperation between Galveston College, The University of Texas Medical Branch and the Texas Education Agency.

DEPARTMENT OF ASSOCIATED HEALTH OCCUPATIONS

History

When citizens of Galveston passed a bond issue to create a junior college in December, 1966, administrators at both Galveston (Community) College and The University of Texas Medical Branch began to consider the possibility of joining in a cooperative program for health-related education.

Two objectives of Galveston College were (1) to provide occupational education in specialized areas for those students who wish to become employable upon program completion and (2) to provide, through continuing education, opportunities for students who have assumed adult responsibilities and must attend school on a part-time basis.*

The University of Texas Medical Branch had a baccalaureate degree program in nursing and was undergoing development of a School for Allied Health Sciences from which baccalaureate degrees would be awarded in physical therapy, medical technology, occupational therapy, medical records administration and a certificate non-credit program awarded in radiologic technology. Administrators at the Medical Branch had long discussed the possibility of education for the semi-professional, with the objective of upgrading the work and status of employees involved in ancillary departments.

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* Galveston Community College Catalog, 1968-1969, p.14.

Therefore, it was generally accepted that the two institutions could accomplish the goal of qualified paraprofessional manpower by working together -- Galveston College offering the academic work with affiliation of the Medical Branch for clinical facilities (training stations) and qualified health personnel required for the programs.

Galveston College contacted the Texas Education Agency to determine the standards for accreditation of a health-related education program. An explanation of the initial standards and their fulfillment will be discussed in Chapter II; however, it is noted that these standards became the basis for the development of the program. One of the first points was to determine if there was a need for health-related personnel in Galveston County and the surrounding areas. The Medical Branch had already indicated that need, but Galveston College also gathered specific statistics from 55 area hospitals, clinics and nursing homes. From this survey, it was determined that there was a need for allied health personnel in the area, and TEA indicated that Galveston College could pursue the development of a program.

This program which evolved was unique in that several professional programs would be offered; all students would be taking common curriculum courses (called core courses) and then would branch into specialization after having the opportunity to serve time in clinical situations (clerkships) to determine which field of study they wished individually to pursue.

On July 10, 1968, Galveston College submitted to TEA an "Application - for Approval of a New Technical-Vocational Program for Health Occupations." There were five such applications submitted -- those for Inhalation Therapy Technology, Occupational Therapy Technology, Physical Therapy Technology, Mental Health Technology, and Clinical Associate Technology. Because there was no category which was all-inclusive for the several health areas, the entire set of programs was listed officially under Inhalation Therapy Technology. In 1971 the title was officially changed and distributed in TEA literature as Associated Health Occupations (TEA Code: 62 Technical, 16 A.H.O.)

Acceptance came from the Texas Education Agency for the programs of Inhalation Therapy, Physical Therapy, Occupational Therapy and Mental Health. The Associated Health Occupations Program at Galveston College began to function. Meetings between College and Medical Branch officials were held daily. The telephone and "gentlemen's agreements" helped to open the program in time for the 1968 fall semester. Both institutions had immediately recognized that, if a program of this magnitude were to be realized, it would require a co-equal, intense dedication and a uncommon spirit of cooperation. As the Associated Health Occupations program grew this dedication and cooperation became even more significant to the ultimate success of the program. Letters of agreement, contracts and financing will be discussed in Chapter VI.

The program was offered in the fall of 1968. Initial recruitment was accomplished by one of the proponents of the new program talking with students before they entered the registration lines at Galveston College. Eight students joined the first class.

Innovations in curriculum were initiated even before the first student was admitted to class; however, all these changes received the approval of the Texas Education Agency. Subsequent revisions were made to conform to accreditation standards established by national professional associations.

Curriculum changes continue to be made to upgrade the educational experience of each student. These changes and standards will be discussed in the Core Year and Individual Study Track chapters.

The Associated Health Occupations program is now in its fourth year at Galveston College. It has increased from a part-time faculty member in 1968 to a full-time departmental chairman with five area technical directors of education. There are 71 students currently enrolled. Future plans are to initiate the clinical training into other medical facilities when the need arises. Its scope is no longer experimental. It is an accepted part of post-secondary education in Texas and provides a new basis for the creation of other such centers of learning throughout the state and the nation.

Objectives

1. To utilize effectively and conserve health manpower and educational resources in the community.
2. To develop an "education-plus-application" model which can lead directly to the implementation of health career ladders.

   This program is so designed that students wishing to further education beyond the Associate Degree level may do so with a minimum amount of additional prerequisite study. The courses are so structured that credits can be readily transferred to another college or university offering baccalaureate degrees. In Galveston, the School of Allied Health Sciences (with which the AHO program is affiliated) at the Medical Branch would be the next logical educational endeavor. Students wishing to pursue a course of additional study in line with their associate degree work or in an entirely different field can still have the professional status to "put themselves through college" with rewards both in job experience and direct salary benefits. "Latticing" also incorporated in the Galveston Plan permits lateral movement into another A.H.O. study track with minimal loss of time or credit.

3. To provide students with opportunities to explore the wide range of available careers in the health service industry and

4. To develop experimental application in professionally supervised clinical settings.

   The initial AHO course during the first fall semester is dedicated to offering the AHO student the opportunity to learn of the various careers available in the health care system and how these health specialties cooperatively interact among themselves. A clerkship is given in all clinical areas which are utilized the the AHO curriculum. Thus the student is able to analyze the duties and responsibilities of each area and to evaluate for himself the clinical climate of each profession before he decides upon his own choice of a career.

The curriculum for this program has been designed for implementation at the junior college level to:

1. Lead to Associate in Applied Science degrees in selected occupations, for immediate employment and acceptence for certification and procedures of national organizations.
2. Provide partial pre-professional education leading to allied health sciences baccalaureate study.
3. Prepare for future vocationally oriented, continuing education to increase potential employees' skills in entry level health occupations.

ASSOCIATED HEALTH OCCUPATIONS

J. Laurence Cantwell, M.P.O.T., Department Chairman

Directors of Technical Education

Dorothy Denn, O.T.R., Occupational Therapy Assistants
Janice Toms, B.S., P.T., Physical Therapy Assistants
Roy J. Mentz, A.R.I.T., Inhalation Therapy
Gloria Haywood, M.S.S.W., N.A.S.W., Community Health Worker
Juaneva Novak, R.N., Encephalographic Technology
Mary A. Sanderson, R.T., Radiologic Technology

GALVESTON COLLEGE

History

The Galveston Junior College District was originally created by the Galveston Independent School District in 1935, and their boundaries are coterminous. On December 3, 1966, an election was held to establish a maintenance tax for the operation of the College. An annual ad valorem tax was authorized at a rate not to exceed $0.27 per each $100 valuation of taxable property within the College District.

During the interim period of development of the College, the Board of Trustees of the Galveston Independent School District served as the governing body. The original Board of Regents of the College was appointed on September 21, 1966, by the School District trustees.

In February of 1967, Dr. David G. Hunt was selected as first President of the College. He assumed office March 1, 1967, and immediately began to formulate plans for opening the College in September of the same year.

The college opened for its first semester of operation on September 18, 1967, with an enrollment of 705. The College has grown to 1435 students enrolled for the fall semester of 1971.

Melvin M. Plexco, Vice President and Dean of the College was elected the second president on April 11, 1968, following the death of Dr. Hunt, and serves in this capacity at the present time.

Objectives

The primary objective of Galveston College is to provide educational opportunities of high quality and diversity to the citizens of the District which supports the college. Educational opportunities are extended to citizens living outside the District, insofar as the capabilities of the District permit.

Specific objectives of the College are:

1. To provide an effective program of student personnel services and counseling.
2. To provide, through general education, opportunities for personal growth and development.
3. To provide university parallel course work designed to transfer to senior colleges and universities toward the baccalaureate degree.
4. To provide occupational education in specialized areas for those students who wish to become employable upon program completion.
5. To provide, through continuing education, opportunities for students who have assumed adult responsibilities and must attend school on a part-time basis.
6. To provide, through seminars, lectures and discussion groups, programs of worthy leisure value, usually on a non-credit basis.

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Carl Cook, Registrar
B.S., M.Ed.

Paul V. Peck, Director of Research and Development
B.Mus., M.Mus.

THE UNIVERSITY OF TEXAS MEDICAL BRANCH
AT GALVESTON

History

The School of Medicine had its first beginnings in 1860; however, it was 1881 when the Legislature authorized creation of The University of Texas and the School of Medicine. Popular vote decided their respective locations.

It was not until 1890 that the first Medical College building was completed. This building still stands today, and although officially named Ashbel Smith Building, it is affectionately know as "Old Red."

The College of Pharmacy was established in 1893, the School of Nursing in 1897 (distinguishing it as the first nursing school in the United States to be an integral part of a university). The present $11 million John Sealy Hospital and R. Waverley Smith Pavilion were completed by 1954.

Other buildings erected during the recent ten-year building program were Sealy-Smith Professional Building, Shriners Burns Institute (the first facility of its kind in the world), the 175 bed Jennie Sealy Hospital, animal care quarters, the Clinical Sciences Building and the Libby Moody Thompson Basic Sciences Building. The Moody Memorial Library and administration building are now under construction. Expansion of John Sealy Hospital will begin within two years.

The Medical Branch has kept pace with new developments in medicine with the opening of the Marine Biomedical Institute, and the Departments of Genetics, Family Medicine, and Aerospace Medicine.

In an effort to meet ever increasing manpower demands, the School of Allied Health Sciences was created and began its educational program in July of 1968. Since its inception the Associated Health Occupations program of Galveston College has been affiliated with this school for functions within the Medical Branch.

Objectives of School of Allied Health Sciences

1. To educate and train personnel for allied health careers through undergraduate and graduate programs all leading toward appropriate degrees.
2. To provide students in the allied health sciences with comprehensive educational-clinical experiences which will prepare them for varied positions in their chosen professions.
3. To collaboratively maintain, in cooperation with The University of Texas Medical Branch Hospitals, those allied health science clinical programs which serve as a basis for the education of Medical Branch students.
4. To develop and maintain programs of investigative studies and research within the allied health science disciplines.
5. To provide consultative services to hospitals, rehabilitation centers, community agencies and other appropriate health-related institutions within the State of Texas.
6. To offer continuing educational programs of short duration for professional personnel.

THE UNIVERSITY OF TEXAS MEDICAL BRANCH AT GALVESTON

General Administration

Charles A. LeMaistre, B.A., M.D., Chancellor of The University of Texas System, Austin.

Everitt Donald Walker, M.B.A., C.P.A., Deputy Chancellor for Administration of The University of Texas System, Austin.

William H. Knisely, Ph.D., Vice-Chancellor for Health Affairs, The University of Texas System, Austin.

Truman G. Blocker, A.B., M.D., President, The University of Texas Medical Branch at Galveston.

Academic Administration

Joseph M. White, B.S., M.D., Vice President for Academic Affairs and Dean of Medicine.

Spencer G. Thompson, B.S., M.D., Associate Dean and Coordinator for Sponsored Programs.

Richard F. Timmer, M.D., Ph.D., Associate Dean and Coordinator for Curricular Affairs.

Edward N. Brandt, Jr., M.D., Ph.D., Dean of the Graduate School.

Robert K. Bing, B.S., M.A., Ed.D., Dean, School of Allied Health Sciences

E. Gene Powell, B.A., M.Ed., Director of Admissions and Student Personnel Services.

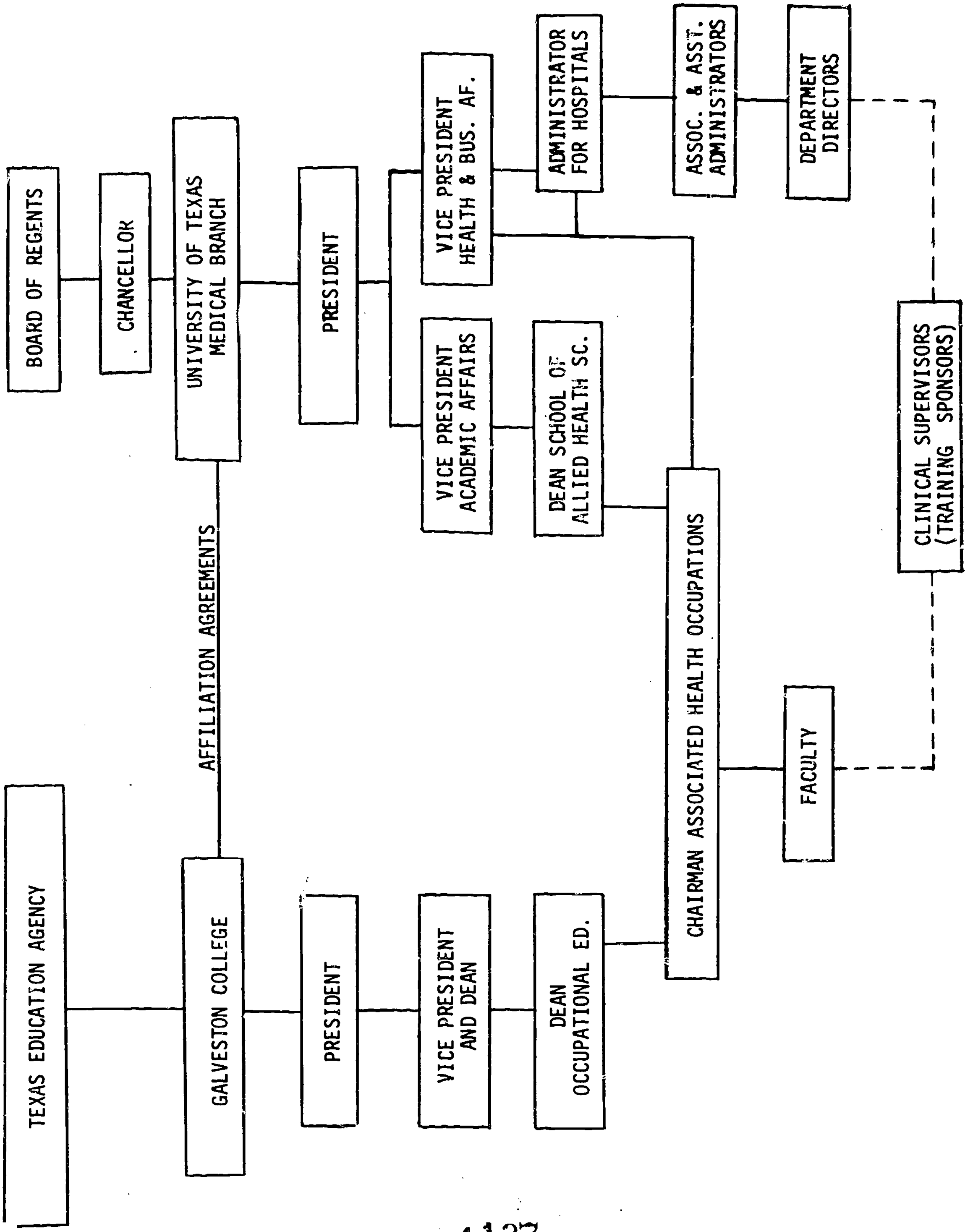
C. Lee Jones, B.A., M.L.S., Director, Medical Branch Library.

Hospital Administration

David E. Hoxie, B.S., M.H.A., Administrator of Hospitals.

Business Administration

Vernon E. Thompson, B.B.A., Vice President for Business Affairs and Hospital Services.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PRESIDENT
VICE PRESIDENT HEALTH & BUS. AF.
ADMINISTRATOR FOR HOSPITALS
ASSOC. & ASST. ADMINISTRATORS
DEPARTMENT DIRECTORS
VICE PRESIDENT ACADEMIC AFFAIRS
DEAN SCHOOL OF ALLIED HEALTH SC.
CLINICAL SUPERVISORS (TRAINING SPONSORS)
AFFILIATION AGREEMENTS
CHAIRMAN ASSOCIATED HEALTH OCCUPATIONS
FACULTY
TEXAS EDUCATION AGENCY
GALVESTON COLLEGE
PRESIDENT
VICE PRESIDENT AND DEAN
DEAN OCCUPATIONAL ED.

CHAPTER 2

ACCREDITATIONS

This chapter will deal primarily with the steps taken to receive approval of the Associated Health Occupations program from the Texas Education Agency. Prior approval by this agency is necessary for the implementation of any post-secondary program in Texas as well as for fulfilling standards of professional associations.

The Guide for Planning Post Secondary Occupational Education and Technology Programs in Texas (revised through 1971) is used as the basis for formulating and executing the Associated Health Occupations program. Single spacing of lines will indicate direct quotations. Where applicable, explanations of how Galveston College fulfilled these guidelines will follow. Although the Galveston Plan was established under the 1968 guidelines, the current stipulations will be used to assist institutions in formulating proposals for a like program.

For clarification of certain requirements, portions of the Texas State Plan for Vocational Education, Fiscal Year 1971 will also be quoted.

The following accrediting agencies are listed for both Galveston College and for The University of Texas Medical Branch. The associations which give accreditation will be part of any proposal submitted not only to the Texas Education Agency, but also to national professional organizations for program approval.

ACCREDITATIONS

GALVESTON COLLEGE

Southern Association of Colleges and Schools

American Association of Junior Colleges

Association of Texas Colleges and Universities

Approved by: Texas Education Agency

Coordinating Board, Texas College and University System

DEPARTMENT OF ASSOCIATED HEALTH OCCUPATIONS

Council on Medical Education of the American Medical Association

in collaboration with:

American Occupational Therapy Association

American College of Radiology

American Physical Therapy Association (application submitted)

American Inhalation Therapy Association (application submitted)

THE UNIVERSITY OF TEXAS MEDICAL BRANCH

Southern Association of Colleges and Schools

Council on Medical Education of the American Medical Association

Executive Council of the Association of American Medical Colleges

THE UNIVERSITY OF TEXAS MEDICAL BRANCH HOSPITALS

American Medical Association

Joint Commission on Accreditation of Hospitals

American College of Physicians

American College of Surgeons

American Hospital Association

The Department of Occupational Education and Technology, Texas Education Agency, has set forth standards which apply to the Vocational Education Act of 1963 as amended. These standards with a brief explanation are as follows:

1. The program of instruction will develop skills and knowledge required for entry into the occupation for which instruction is being provided. The program will combine and coordinate related instruction with field...laboratory...or other occupational experience which is of sufficient duration to develop competencies for employment.

When the Associate Degree program was established for AHO, the various health related professions were reviewed as to their relation to this type of educational experience. Since baccalaureate degrees were required for occupational therapists, physical therapists and orthotists, the assistant level for national certification standards was reviewed and made a part of the AHO program. Other certificate programs not requiring Associate Degrees but falling into the time range and scope of junior college work were the radiologic technologist, electroencephalographic technician, mental health worker, inhalation therapist and management assistant.

2. The program of instruction will be developed and conducted in consultation with potential employers and other individuals or groups of individuals having skills in and substantive knowledge of the occupation which are in keeping with the educational program objective.

Two surveys of health occupation needs for the Galveston area helped in the formulation of courses of study.

In 1967 a need for educating health related personnel was documented with the release of "A Survey of Allied Health Personnel Needs in Houston Area Hospitals." This survey was conducted by the Hospital Personnel Association of the Houston Area in cooperation with the Allied Health Regional Medical Program associated with the Baylor University College of Medicine and The Methodist Hospital.

Findings showed that "a substantial increase in hospital patient beds is expected in the next ten years." Survey respondents expect a 27 percent expansion, "Fifty four percent more allied health personnel will be required in the surveyed occupations in 1977. A critical shortage of qualified applicants will exist," and "The survey indicates that planning is needed to meet allied health personnel needs. The most critical need involves strengthening and developing new opportunities for education and training."

Positions considered by Houston areas personnel directors to have priority as to availability, present needs and future needs were, in order of greatest need: Registered Nurse, Licensed Vocational Nurse, Laboratory Medical Technologist and/or Laboratory Technician, Inhalation Therapist, X-Ray Technician, Dietitian, Orderly, Operating Room Technician, Physical Therapist, Medical Record Librarian, Medical Secretary, Radioisotope Technician, Medical Typist, Dietary Aide, Electronic Monitoring Technician. Among other positions listed also indicating a need were the Psychiatric Caseworker, Mental Health Worker, Occupational Therapist and E.E.G. Technician.

At that time it was noted that there were only twelve Registered Inhalation Therapists in the State, that only one Junior College had established a program, and it was less than a year old.

One of the recommendations of the survey was...

"High schools, junior colleges, senior colleges and universities are all around us. They are the 'mainstream' of education. If we are going to have quality allied health personnel in sufficient numbers to meet our needs, it is necessary to work with these institutions and help them fulfill their and our responsibilities. This will require a willingness to develop new patterns, modified approaches, shedding trappings of tradition, melding discipline 'judgment' relative to manner utilized in the education and training of allied health personnel."

In the spring of 1968, Galveston College sent a survey to 55 hospitals, clinics and nursing homes in the surrounding area. The survey is reproduced in Exhibit I with the results in Exhibit 2. Although the completed survey did not show needs for the occupations now offered by Galveston College in great numbers, there was a need for the following types of personnel: EEG technicians - 3; Occupational therapy assistants - 2; Physical therapy assistants - 11; Social work assistants - 3; Inhalation therapists - 44; and Radiologic technologists - 29. These statistics were projected throughout a three year period.

The Medical Branch had the desire to enter into the program wit Galveston College and had the technically qualified instructors already employed. It may be that a medical facility indicates it would like to train students in a particular field; however, the instructional personnel may lack the TEA qualifications necessary to teach health care courses. This is one of the first standards to meet when curriculum planning is in the early stages.

3. Classrooms, libraries...laboratories, instructional equipment, supplies, teaching aids and other materials will be adequate in supply and quality to enable those who are to be trained to meet the occupational objective for which the education is intended.

For Galveston College to furnish the medical equipment and teaching aids necessary for the training of a small number of students, the costs would be prohibitive. However, the Medical Branch had these requirements in use which the students could utilize in their clinical training. Another facet is the example with the electroencephalography program. A maximum of four students may be in the program at one time because there are four machines in the department.

4. The instruction will be conducted and supervised by properly qualified teachers and supervisors.

The instructors at Galveston College are certified through the College. Clinical faculty also must conform to standards which are established by the professional organizations or by the AHO program itself.

5. Evaluation of the program of instruction will be made periodically on the State level and continuously on the local level with the results being used for necessary change or improvement in the program.

The curriculum and teaching methods are constantly undergoing evaluation within the AHO program. These will be discussed in later chapters; however, it briefly is noted that students submit diaries covering all the experiences they have had and instructors periodically submit evaluations on the students and on the level of teaching within the program. Curriculum changes and course content restructuring have resulted from these critiques.

SERIES 1000 - PROGRAMS

Application for New Programs - 1020

Application for new programs will be made on Texas Education Agency form No. VJE-001 entitled "Application for Approval of a New Technical-Vocational Program."

The application form has changed only slightly since the applications were made for the first AHO programs. The new application is given as Exhibit 3 but contains the data from one of the original applications made from Galveston College. Because this was an entirely new concept in post-secondary education, there were many meetings between Galveston College administrators and the Texas Education Agnecy. The application was the culmination of this work. The Agency was much more informed about this new program than is shown on the application. It is best to discuss a proposed program with the Texas Education Agency before beginning any official action.

Each program application must contain the recommendations of the local advisory committee.

In the TEXAS STATE PLAN FOR VOCATIONAL EDUCATION, program advisory committees are defined:

> Any vocational program shall be operated with the advice and counsel of an advisory committee, and will be composed of representatives of employers and employees from the occupations or industries related to programs being conducted or proposed to be offered.

The first Advisory Committee was composed of four representatives from Galveston College and two from the Medical Branch. Dr. Robert Bing, Director of Allied Health Programs at the Medical Branch, then in process of consolidating baccalaureate programs into one school, along with Frank

Alverez, Pulmonary Technician, was responsible for establishing the clinicial situations within the Medical Branch. Ruth Bender, director of the Associate Degree Nursing program, and Dr. J. O. Ross, Dean of Galveston College contributed administrative and educational program ideas. J. H. Frazier, director of occupational education was the coordinator for the program and TEA liaison. Gene Moore, director of Student Personnel Services, represented the vocational counseling required by the TEA.

The current advisory committee membership is:

Robert K. Bing, Ed.D., Dean, School of Allied Health Sciences

James Frazier, M.Ed., Dean of Occupational Education, Galveston College

Dorothy J. Denn, OTR, Director of Technical Education, Occupational Therapy Assistant

Janice Toms, B.S., P.T., Director of Technical Education, Physical Therapy Assistant

Roy J. Mentz, A.R.I.T., Director of Technical Education, Inhalation Therapy

Gloria Haywood, M.S.S.W., N.A.S.W., Director of Technical Education, Community Health Worker

Juaneva Novak, R.N., Director of Technical Education, Encephalography Technology

Mary A. Sanderson, R.T., Director of Technical Education, Radiology

J. Cantwell, M.P.O.T. Chairman, Department of Associated Health Occupations, Galveston College and School of Allied Health Sciences

Robert N. Cooley, M.D., Chairman Department of Radiology

Melvin Schrieber, M.D., Radiologist

John A. Jenicek, M.D., Associate Professor, Anesthesiology

In addition to this AHO Advisory Committee, there are advisory committees for each study track. These committees are composed of the Director of the AHO program, AHO faculty members and heads of departments in which the AHO program is administered. The duties of these committees are:

1. Continuous evaluation of content and presentation of both the core curriculum and the study track curricula.
2. Evaluation of student's performance in the core curriculum as acceptable for admission into the individual study track curriculum.
3. Review of student's performance in the study track curriculum prior to granting of degree and certificate of proficiency.
4. Study investigate and determine the feasibility of adding new curricula to the Associated Health Occupation program.

The committee meets monthly with the additional meetings when needed.

Each course proposed for a program for which application is being made must be fully described so that its major content can be determined. The number of hours of instruction in lecture and laboratory must be shown for each course.

Each application submitted for individual study tracks contained information on all courses to be given (see Exhibit 3 for pulmonary therapy example). Before school opened, the TEA had sanctioned some changes in the curriculum; subsequent changes have been made with TEA approval.

It is essential that these proposals be submitted at least four months in advance of the proposed beginning date.

Although the final submission of the application and approval of the program occurred one month from the college fall term opening much groundwork had been laid, and the TEA had been closely following the planning of this curriculum. It is the feeling of the AHO program advisory commitee that a year should be allotted for the planning and implementation of a program which has been approved. Since this program was new and no guidelines were established, it is only now in retrospect that this provision should be enforced.

Student Contact Hours - 1031

> A student contact hour is one hour in which a student has contact with an instructor. Lecture and laboratory hours are counted in the same manner. In cooperative programs, the hours a student spends in a training station or internship, which is supervised by a college coordinator or instructor are counted as student contact hours. The minimum number of contact hours for any program is specified by the curriculum standards for that program.

Within the AHO program, contact hour requirements are given for each study track. The reason for the separation is that professional accreditation standards call for different clinical hours. Radiologic technology requires 2153 contact hours in hospital practicum; inhalation therapy, 2000 hours; occupational therapy, 750 contact hours; physical therapy, approximately 750 hours.

In clinical areas, student contact hours are set up and maintained by the faculty member in charge of the individual study track program. Students, as well as their immediate instructors, keep record of the time spent in the clinical situations. When students are in their individual study tracks, these hours are clocked with no excused absences. Students must make up hours missed to conform to the total number of hours required for professional certification.

Curriculum Sequence - 1032

> In any two-year program, the sequence of the curriculum will be such that students will develop some basic marketable skills during the first year.

Because the students who dropped out of the AHO program at the end of the first year did so with suspension or probation for scholastic failure, the effectiveness of the curriculum cannot be documented. However, since nursing skills, medical terminology, ethics and group dynamics are part of the core curriculum, students could be eligible to enter a health care facility as a nurses aide or orderly, working in child or gereatric care centers, or perhaps with a knowledge of office skills, could seek employment in a doctor's office.

Preparatory Classes - 1050

> Classes may be integrated or specialized in terms of subject matter. For example, students may attend a number of specialized content classes or block-of-time approach may be followed in which students receive all their instruction from one instructor during a multi-hour session.

First semester classes of Interdisciplinary Health Concepts and Interdisciplinary Health Practices are given concurrently. These classes are scheduled for three hours, three times a week. By the end of the semester, the specified number of hours of lecture and lab (clerkships) fulfill requirements for the courses. Subject matter for the two courses are combined to give the lecture and the laboratory experience continuity.

> Class size will not exceed 24 students for lab except in those experimental or other type programs having prior approval of the Texas Education Agency. If fewer than 24 student stations are provided, enrollment will be limited to the number provided.

The problem with numbers is not with the academic courses, but with laboratory situations. When students in their initial year are rotated through various hospital departments, the number of students which can be effectively handled (since the hospital is in operation and the students are there as observers only) may be only five or six. Therefore, rotation periods are set up, and the class is divided into groups. As in physical therapy, part of the students may be viewing operation of the Hubbard tank while others are in the mat room, the gym, or the treatment room. Then they are all rotated so they experience the entire clinical setting.

> Classes will be presided over by teachers meeting the qualification requirements set forth in Series 3000 (Local School Personnel).

There are some deviations to this stipulation in the clinical areas. Discussion will be in the Series 3000 part of this chapter.

> All students will be placed in classes on the basis of a formal program of evaluation.

Students entering the AHO program are required to furnish entering credentials to the college (high school diploma/GED, ACT scores and transcripts of previous college work, if any). They also undergo vocational counseling at the College. Upon completion of the above and upon recommendation of the vocational counselor, the student wishing to enter the AHO program must undergo an interview and evaluation with one or more faculty members of the AHO program. These students are also required to have a physical examination.

> Lecture classes will be limited to a size which is comensurate with the type of program, the adequacy of the lecture facility, and the method of presentation. The vocational dean or director must use discretion in establishing maximum limits.

To this point, there have been no classes which have exceeded the physical limits of classroom space. When this does occur, there will be more than one class offered. At this time, limitations are not set by classroom space but by the numbers of students which the Medical Branch can accommodate in the clinical areas of the separate study tracks.

Maximum student capacity in the clinical areas is as follows

Occupational Therapy - 10

Physical Therapy - 2

Inhalation Therapy - 10

Radiologic Therapy - 40

Mental Health Worker - 4

Orthotics Technician - 2

Management Assistant - 4

Electroencephology - 4

The occupational objective of each student in full-time preparatory training will be a matter of school record. The objective may be either for a specific occupation or a family of closely related occupations.

The permanent record of any student in this program, for the first year, states the field of study in AHO. The second year this is changed to the individual study tract, i.e. Physical Therapy, Orthotics, Community Health, etc.

Internship - 1052

In an internship, cooperative, practicum, or other meaningful work experience program, the hours of internship should normally be between 8:00 a.m. and 6:00 p.m., Monday through Friday. If the student works before 8:00 a.m. and after 6:00 p.m. or on Saturday, Sunday or holidays, the time may be counted as internship only if a full-time faculty member, fully qualified in the program, is on duty and coordinating the work experience of each student.

The study tracks involving x-ray and inhalation therapy do involve students at work on Saturday, Sunday and holidays. To achieve the minimum number of contact hours required for accreditation by national organizations, it is necessary to schedule clinical activity during these times.

A full-time faculty member is not on duty on weekends; however, the student still achieves meaningful work experience because (1) the student works directly with a registered or qualified professional (one who has consented to be a member of the faculty without salary ((training sponsor)) as part of national registry standards and (2) the diaries of the students and evaluation by the faculty member (training sponsor) indicates the quality of experience, which the technical director constantly checks.

For example, a student in radiologic technology would report in his diary if he were left unsupervised or if he were made to stay in the darkroom if his clinical assignment was for another area. The registered technologist in his evaluation would report if the student did not perform as he should. The technical director then is able to evaluate the experience of each student and can correct any deficiencies of performance from teacher and student alike.

Additionally, the program advisory committee feels that, since health care is not limited 8 to 5, Monday through Friday, the student should experience the "real world's" occupational conditions. Not more than eight percent of the student's total clinical time is spent in weekend and after-hours work.

> Part-time instructors will not be approved to coordinate the internship or work experience of students.

In the AHO program, the salaries of all full-time technical directors are paid by Galveston College and by the Medical Branch. The AHO Director and technical directors then are accountable to both institutions. Clinical instructors (training sponsors) are interviewed for employment by AHO staff and are hired with the concurrence of both facilities. Depending upon the size of the program in a study track, it is possible the Medical Branch Technical Director can also function as the AHO Technical Director (i.e. electroencephalography).

> Students who are employed full-time or who have previous work experience may receive advanced standing credit or placement in lieu of the internship portion of a program. Advanced standing examinations will be chosen or developed by the post-

secondary institution granting advanced standing.

There are 17 employees at the Medical Branch who have professional certification (i.e. radiologic technologists) and who are enrolled in Galveston College classes to take academic courses required in the AHO Associate Degree program. When academic work is completed, they will be given a challenge examination (advanced standing) which covers the courses. Should they succeed in passing this examination, the internship will be waived, and the Associate Degree in Applied Science awarded.

Priorities - 1070

> In developing new programs, consideration will be given primarily to the occupational needs of students within the community. Secondary consideration will be given to the employment needs of the community and the state.

Galveston was fortunate to have a health occupations education program within the high school. The desire to students to pursue a health career future was apparent. Also, the employees in health facilities had expressed the wish to have education available to them that would help them to better themselves without having to leave Galveston. Most of them could not afford to do this anyway. The survey of health care needs of the area indicated a need for trained semi-professional and professional employees.

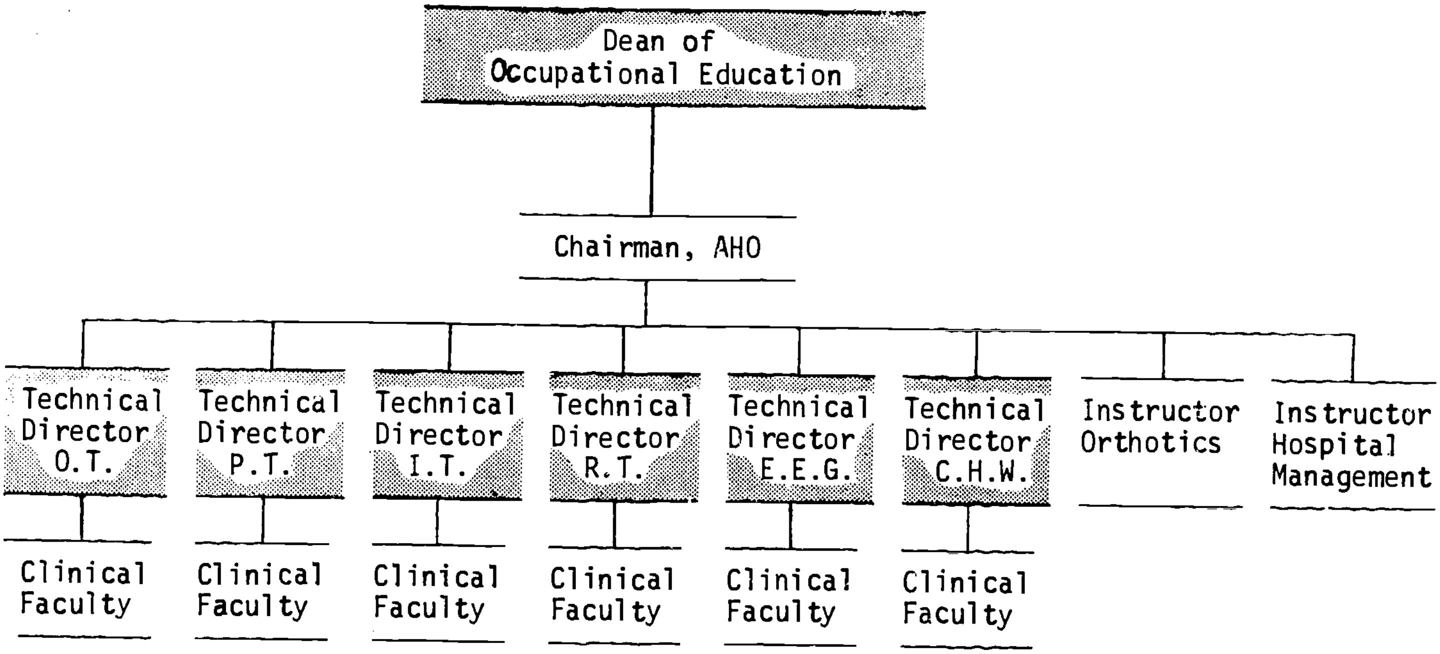
Health Occupations - 1700

> All health occupations programs must prepare the student to be licensed or certified by the statutory licensing board or agency of Texas or by an organization with a reputable or widely recognized certification when State licensure is not required.

When establishing the curriculum for AHO, the requirements for training of licensing or certification associations were studied and each requirement was met or exceeded in the total training program (see individual study track chapters). 1152

SERIES 3000 - LOCAL SCHOOL PERSONNEL

The requirements for Series 3000 - Local School Personnel are followed by the Associated Health Occupations Program; however, since this is a new concept, there is a new position between the "Dean, Director or Supervisor" and the "Instructional Personnel." The following chart shows the positions listed by the TEA (shaded areas) as well as the positions which have been created to allow the AHO program to function efficiently.



Ancillary Personnel Approval - 3101

> Each school must obtain prior approval of the Department of Occupational Education and Technology of the Texas Education Agency before employing individuals as administrators, supervisors, counselors, or in other positions if any part of their salaries is to be paid from funds appropriated for vocational education.

Qualifications of Local Deans, Directors or Supervisors - 3120

> Deans, Directors or Supervisors of Vocational Education shall hold a minimum of a master's degree from an accredited college or university, shall have at least 3 years of successful experience in business or industry, and shall be knowledgeable in and have an understanding of the vocational education program of the state. Deans, Directors or Supervisors of Vocational Education shall also have at least three years of teaching or administrative experience in vocational education.

These are the qualifications set forth by the TEA for Deans of Post-Secondary Institutions who are in charge of all the vocational education programs. It does not necessarily have to apply to the AHO Department Chairman.

Instructional Personnel Approval - 3201

> Each school must obtain prior approval of the Department of Occupational Education and Technology of the Texas Education Agency before employing individuals as teachers if any part of their salaries is to be paid from funds appropriated for vocational education. This requirement applies to both full-time and part-time teachers.

Qualifications of Teachers of Health Occupations - 3230

> Teachers of other health occupations shall be professionally prepared in the occupational area, have a baccalaureate degree from a recognized college or university with not less than two years recent successful experience beyond basic professional education. They shall also be licensed or certified by the recognized licensing board or agency of Texas or by an organization designated by the United States Commissioner of Education as a nationally recognized accrediting agency or association when State Licensure is not required.
>
> Experience may be counted in lieu of a baccalaureate degree. The applicant will be evaluated on individual merit and ability when the health occupation does not require college preparation.

All technical directors and paid instructional personnel have received the approval of the TEA. (See Exhibit 4 and Exhibit 5 for a sample application and letter of approval respectively). Those in the clinical setting who are faculty without salary are selected utilizing the above TEA require-mental Technical Directors and clinical faculty (training sponsors) and communicate to them the policies of the administration.

6. To assist in evaluation of instruction.
7. To work with the teaching faculty and the librarian in the acquisition and use of instructional media and materials.
8. To assist in recruiting instructors.
9. To assist in preparing the program of classes and final examination schedules.
10. To assist in assigning instructors to classes.
11. To teach classes as needed.
12. To prepare reports as requested.
13. To assume special responsibilities on assignment by their supervisors.

Duties of Instructional Personnel - 3204

1. Working with guidance counselors, instructional personnel may interview prospective students to determine their interests and potential to profit from a specific instructional program.

The student wishing to enter AHO must have an interview with one or more faculty members. A report on each interview is made by the faculty member. This report(s) is reviewed at the time the student is evaluated for acceptance in the program. Although the faculty member is trained in only one AHO track, the interview is conducted with the entire program paramount, and no preference is shown except perhaps by the student.

2. Shall carry out an instructional program designed to develop vocational skills, technical knowledge, or to impart other desirable knowledge, in accordance with an organized course of study based on an analysis of the occupation taught or knowledge needed in relation to the occupation.

Using the requirement of Galveston College Associate Degree program and the standards of accrediting professional organizations, the Dean of Occupational Education and Departmental Chairman design the course of study with the Technical Director. The checks and balances (student diaries and faculty evaluations) assure the student of quality instruction and supervision.

> 3. May provide consultative and/or technical assistance or instruction to ... other groups in the service area of the school.

Time is a factor with clinical instructors when giving consulting or technical assistance. The clinical faculty is part of the Medical Branch and requests must be channeled through administration, since many such appeals are outstanding.

> 4. Shall cooperate with guidance and counseling officials and local employment agencies in providing such data and information on students as may be needed in the occupational placement of graduates.

Each profession has its own methods of locating and placing personnel. At this point the student who graduates has not required the services of a local employment agency. Should this occur, it is reasonable to assume that this information will be forthcoming.

> 5. Shall, when appropriate to the occupation or program taught, supervise and coordinate the practical work experience of students receiving training.

This is the duty of the Technical Director who is responsible to the Department Chairman for this part of the program.

> 6. May provide leadership, direction and supervision to vocational youth organizations which may be operated in the school.

The Department Chairman serves as sponsor of the Associated Health Occupations organization at Galveston College. Within each study track the students also organize into groups under the sponsorship of the Technical Director. In some cases, these AHO students are in the same organization as those students studying for baccalaureate degrees. This arrangement is encouraging since it helps to show interaction between the therapist and the assistant.

Additionally, the responsibilities of instructors (Technical Directors) at Galveston College are as follows:

1. To teach assigned classes in accordance with the course description in the College catalog and the approved course outlines.
2. To maintain accurate attendance and scholastic records and to submit reports as requested by College officials.
3. To maintain office hours for consultation with students.
4. To attend faculty meetings as scheduled by College officials.
5. To participate in student academic advisement.
6. To participate in the student activity program.
7. To participate in student registration.
8. To present recommendations to the College concerning improvement of the educational program.
9. To participate in the overall development of the College.
10. To participate in the formulation of the College budget.
11. To participate in College planning.
12. To enforce rules and regulations pertaining to use of, and conduct in, their assigned classrooms.
13. To assume special responsibilities upon assignment by the College administration or Department Chairman.

EXHIBIT 1

HEALTH OCCUPATION SURVEY
for
THE GALVESTON COMMUNITY COLLEGE
and
THE GALVESTON AREA

PURPOSE OF THE SURVEY:

To acquire information for:

General information for student use in making plans for Occupational Careers.

Better understanding of the community and area and its occupational needs by the College.

Improvements of existing Health and Para-medical Programs.

Justifying the structure of new health and para-medical programs to meet the needs of the students and Health Occupations.

GALVESTON COMMUNITY COLLEGE
Paramedical Admisory Committee

HEALTH MANPOWER SURVEY

Confidential Information: To be used by Galveston Community College Staff to determine Health Manpower.

1. Hospital or institution: ________________ Date __________

   Respondent: __________________ Title __________

2. Population of Community: ________ Distance from Galveston _____

3. Census:

   Bed Capacity: ________ Out-Patient Visits per Year ________
   Emergency Room Visits per Year: ________
   Planned or Projected Increases:
   One Year ____________
   Five Years ____________
   Ten Years ____________

4. Methods of Recruitment of Personnel: ________________

   Where: ________________

5. Planned - Projected Development or Expansion of Hospital/Institution Departments:

   Department: __________ Date ________ Description

   of Development-Expansion: ________________

   ____

6. Most Urgent Personnel Needs:

   Category ____________ Approximate Number ________

7. Recommendations - Comments Regarding Health Manpower Survey:

   ____

   ____

8. If you desire a compiled result of the Survey, please indicate:

   Yes ______ No ______

HEALTH MANPOWER SURVEY

Confidential Information: To be used by Galveston Community College to determine health occupational programs.

Occupational Category	Total Presently Employed	Immediate Employment Needs	Projected Employee Needs		
			12 mo	24 mo	36 mo
Nursing service					
Professional nurses					
LVN's or vocational nurses					
Surgical technical aide					
Nursing assistants					
Aides, orderlies					
Attendants					
Other					
Diagnostic Services					
Medical technologist					
Laboratory assistants					
Cytotechnologists					
Histologic technicians					
EKG technicians					
EEG technicians					
Other					
Therapeutic Services					
Occupational therapists					
Occupational therapy assistants					
Occupational therapy aides					
Physical therapists					
Physical therapy assistants					
Physical therapy aides					
Social workers					
Social work assistants					
Health Manpower survey					
Recreation therapists					
Recreation therapy assistants					
Inhalation therapists					
Inhalation therapy assistants					
Rehabilitation Counselors					
Speech pathologists & audiologists					
Prosthetics					
Orthotics Technology					
Other					

Occupational Category	Total Presently Employed	Immediate Employment Needs	Projected Employee Needs		
			12 mo	24 mo	36 mo
Radiology					
Radiologic technologists					
X-ray assistants					
X-ray aides					
Radiation therapy technologists					
Radiation therapy assistants					
Other					
Medical Records					
Medical record librarians					
Medical record assistants					
Medical record aides					
Medical secretaries					
Medical assistants					
Medical Records typist					
Others					
Clerk I					
Clerical assistants					
Dietary					
Dietitians					
Food service managers					
Others					
Supervisors					
Head Chef					
Baker					
Pharmacy					
Pharmacists					
Pharmacy assistants					
Others					
Pharmacy Technicians					
Dental					
Dentists					
Dental assistants					
Dental lab technicians					
Dental hygienist					
Others					
Clerical					
Medical secretaries					
Clerks					
Receptionists					
Others					
Clerk typist					

Occupational Category	Total Presently Employed	Immediate Employment Needs	Projected Employee Needs		
			12 mo	24 mo	36
Other hospital personnel					
Medical Illustrator/photographer					
Mental health worker					
Medical writer					
Public information/ public relations officer					
Food service workers					
Laundry					
Housekeeping					
Maintenance					
All others not listed					
Unit Managers					
Unit Clerks					

Spring, 1968

EXHIBIT 2

HEALTH OCCUPATIONS SURVEY

conducted by

Galveston Community College
and
Galveston Community College Advisory Committee
for
Health Occupations

The Health Occupations Survey was mailed out to 55 hospitals, clinics and nursing homes in the surrounding area. Only 15 per cent of these responded to the survey. Five health services were contacted on Galveston Island, and the response was 100 per cent.

The survey results for Galveston Island reflected 73 occupational categories in the professional health and allied health occupations. Of the occupational categories listed, the four year professional programs will not be computed, as the Community College is only interested in the two year or less than two year terminal type program.

A need was indicated for only nine of the seventy-three categories listed on the survey, and only those results are shown:

Galveston

Occupational Category	Total Presently Employed	Immediate Employee Needs	Projected Employee Needs 12 mo	24 mo	36 mo
Professional nurses	332	104	303	280	272
LVN's	294	89	302	288	268
Surgical technical aide	32	3	29	34	34
Aides, orderlies	429	126	214	240	180
Laboratory assistants	112	6	13	5	5
Food service workers	202	58	50	64	70
Laundry	75	21	18	30	20
Housekeeping	237	49	25	68	30
Maintenance	233	34	16	46	16

Surrounding area

Occupational Category	Total Presently Employed	Immediate Employee Needs	Projected Employee Needs 12 mo	24 mo	36 mo
Professional Nurses	136	14	19	20	15
LVN's	168	23	21	25	25
Surgical technical aides	6	1	2	3	3
Aides, orderlies	251	7	32	39	39

Occupational Category	Total Presently Employed	Immedi Emp Nee	jected loyee ds		
			2 mo	24 mo	36 mo
Laboratory assistants	11	-	3	2	3
Food service workers	81	-	3	-	5
Laundry	37	-	5	2	3
Housekeeping	48	2	3	5	8
Maintenance	40	1	-	-	2
<u>Galveston and surrounding area</u>					
Professional nurses	468	118	321	300	287
LVN's	462	112	323	313	293
Surgical technical aide	38	4	31	37	37
Aides, orderlies	680	133	246	279	219
Laboratory assistants	123	6	16	7	8
Food service workers	283	58	53	64	75
Laundry	112	21	23	32	23
Housekeeping	285	51	28	73	38
Maintenance	285	35	16	46	18

EXHIBIT 3

Submit in quadruplicate to:
Joseph D. Godsey, Director
Division of Post Secondary
Occupational Education and
Technology

Texas Education Agency
Occupational Education and Technology
Austin, Texas 78711

APPLICATION FOR APPROVAL OF A NEW VOCATIONAL-TECHNICAL PROGRAM

Galveston College
Post-Secondary Institution

Galveston
County

for a program in
- Agriculture ☐
- Homemaking ☐
- Distribution & Marketing ☐
- Health Occupations ☒
- Office Occupations ☐
- Technical Education ☐
- Industrial Education ☐
- Community Services ☐

Inhalation Therapy, to begin operation September 1st, 1968.
Name of Program (Welding, LVN, Electronics, etc)

Number contact/~~credit~~ hours per student for total program requested 20.25 per mo.

Length of program: 24 months/~~semesters~~. Degree or certificate conferred or awarded at completion: Associate in Applied Science Degree.

1. Estimate the number of youth and adults who would be enrolled in the program.

15 Full-time or day enrollment. ______ Part-time or night enrollment.

2. What method was used in determining the estimated number that would be enrolled?

Consultation with the University of Texas Medical Branch School of Allied Health

3. Give the aims and objectives of the proposed training program.

To train individuals to enter the health occupations as inhalation therapists.

4. List Advisory Committee consulted in development of this program.

Name	Title	Company or Employer
Frank Alvarez	Pulmonary Technician	UofT Med. Br, Galveston
Dr. Robert Bing	Dr. Allied Helath Programs	UofT Med. Br.,Galveston
Ruth Bender	Dir. ADN Program	Galveston College
Dr. J.O. Ross	Dean	Galveston College
J.H. Frazier	Dir. of Occupational Ed.	Galveston College
Gene Moore	Dir. of Student Personnel Servs.	Galveston College

5. Has there been a recent Texas Education Agency-assisted occupational survey for your school? Yes_____ No__x__.

6. Has the Texas Employment Commission conducted a manpower forecast in the area served by the school? Yes_____ No_x___.

7. Has training offered in this proposal been identified in either the survey or forecast listed above? Yes_____ No__x_. (In the absence of this identification in a valid survey or forecast, has need been established in some other way [for example, training requested by specific businesses or industry]? If so, please show on an attachment how this need was established.) Need was established after consultation with St.Mary's Hospital,U.S.Public Helath Hosp.& UTMB Hosp at Galveston and School AHS.

8. Describe briefly the facilities and equipment that are or will be made available for this training. Facilities and equipment required for all laboratory work will be provided by the University of Texas Medical Branch at Galveston, Texas, and classrooms by Galveston College.

9. Estimate of cost:

Instructional cost first year (future cost $8,400)	$1,100.00
Cost of major and minor equipment, and supplies (attach list with realistic per item estimate)	No cost for 1st yr. operation
Supervision and administration (if part-time supervisor is to be used)	No cost for 1st yr. operation
TOTAL	$ $1,100.00

10. Attachments:

a. The proposed vocational course of study, or

b. The proposed curriculum with a description of each course for which reimbursement will be requested. Attachment "A": Curriculum Outline and Course Descriptions

Funds for the operation of this program are provided in the state appropriation for the local education agency and from contingency funds which may be available.

Date of Application July 10th, 1968 M. M. Plexco
President

Recommended for Approval __________, 19___ __________
Director, Division of Post Secondary Occupational Education and Technology

Approved for State Board __________, 19___ __________
Associate Commissioner for Occupational Education and Technology

ATTACHMENT "A"

INHALATION THERAPY TECHNOLOGY

First Year

First Semester

Engl. 131	Composition and Grammar	3-0	3
Biol. 143	Anatomy and Physiology	3-3	4
AHS 131	Introduction to Patient Care	3-0	3
AHS 161	Introduction to Allied Health Sciences	5-6	6
			16

Second Semester

Engl. 132	Composition and Rhetoric	3-0	3
Biol. 131	Microbiology	3-0	3
AHS 132	Advanced Patient Care	3-0	3
Sv.SC.131	Survey of Physical Science	3-0	3
I.T. 141	Pulmonary Therapy Funaamentals I	3-6	4
			16

Summer School

I.T. 164	Pulmonary Therapy Fundamentals II	2-30	6
Soc. 131	Intro to Sociology	3-0	3
			9

Second Year

First Semester

Psyc. 131	Introduction to Psychology	3-0	3
I.T. 241	Pulmonary Therapy Principles I	1-8	4
I.T. 243	Pulmonary Therapy Techniques I	1-8	4
I.T. 246	Clinical Application I	1-8	4
			15

Second Semester

Govt. 131	Survey of Government	3-0	3
I.T. 242	Pulmonary Therapy Principles II	1-8	4
I.T. 244	Pulmonary Therapy Techniques II	1-8	4
I.T. 247	Clinical Application II	1-8	4
			15

Summer School

I.T. 264	Clinical Practice	2-30	6

ALLIED HEALTH SCIENCE COURSES

AHS 131 INTRODUCTION TO PATIENT CARE

Definition of patient care and how it is provided; the patient-centered therapeutic environment; the establishment of a therapeutic relationship; basic fundamentals of patient care.

Credit Hours 3

AHS 132 ADVANCED PATIENT CARE

Basic patient care in common conditions; variations in patient needs relative to age and mental status; affecting the team relationship.

Credit Hours 3

AHS 161 INTRODUCTION TO ASSOCIATED HEALTH SCIENCES

Orientation to hospitals and health care concepts; history, philosophy and scope of disciplines being considered; other health care professions; ethics and professional responsibilities; legalities; other community agencies; assistant's role; overview of future plans; team concepts; medical terminology.

Credit Hours 6

AHS 162 HEALTH CONCEPTS WITH CLINICAL PRACTICE

Normal physical growth and development; normal personality development; medical aspects of physical and psycho-social dysfunction; emergency care (first aid); safety precautions; team concepts; the community's role in health and disease; clinical practice to include clinical conditions, how to observe; skill instruction in major media; practical experience in clinical work.

Credit Hours 6

SV SC 131 SURVEY OF PHYSICAL SCIENCES

Understanding the physical world; basic theories and principles; basic physics and chemistry, mechanics; temperature, sound, electricity and light; chemical change; classification; inorganic and life chemistry; mathematics, including basic algebra and trigonometry; the exponential system.

Credit Hours 3

IT 141 PULMONARY THERAPY FUNDAMENTALS I

Cerebrospinal stimulants, depressants; adrenergic drugs; pathophysiological basis for humidification and aerosol therapy; physical factors of deposition; methods of production of aerosols and humidifications; administration of humidity and aerosol therapy; specific clinical problems.

Credit Hours 4

IT 164 PULMONARY THERAPY FUNDAMENTALS II

Mechanics of respiration; central chemical regulation physiological basis for oxygen; carbon dioxide and helium therapy; diagnostic procedures; complications of airway maintenance; gases supply systems; flow regulating apparatus; analysis of gases; specific clinical problems; beginning practical experience in the inhalation therapy clinic.

Credit Hours 6

IT 241 PULMONARY THERAPY PRINCIPLES I

Respiratory mechanics in resuscitation; pulmonary and systemic circulation in resuscitation; cardiopulmonary resuscitation; techniques for use of IPBM apparatus; physiotherapy (respiratory); hazards to IPPB therapy; special conditions and specific therapy.

Credit Hours 4

IT 243 PULMONARY THERAPY TECHNIQUES I

Control ventilation; controlled versus assisted ventilation; ventilators classifications; techniques in clinical application; respiratory acidosis and alkalosis; methods of blood-gases analysis; physiological basis for spirometry; techniques in use for spirometry; equipment; application and interpretations.

Credit Hours 4

IT 246 CLINICAL APPLICATION I

Cleaning and sterilizing agents; cleaning and sterilization of pulmonary therapy equipment; electrical principals, mechanical principals; maintenance and repair of pulmonary therapy equipment; communication skills; basic record keeping; ethics; the role of the PT assistant and his relationship to the profession.

Credit Hours 4

IT 242 PULMONARY THERAPY PRINCIPLES II

Symptoms and signs of respiratory diseases; history assessment; physical examination; radiological assessment; clinical-pathological assessment; pulmonary functional assessment; bronchial diseases: pulmonary vascular diseases; cardio-respiratory insufficiency, suction technique; chest drainage; methods and therapeutic hypothermia; techniques of electrocardiogram and interpretations.

Credit Hours 4

IT 244 PULMONARY THERAPY TECHNIQUES II

Organization in emergencies, clinical evaluation; pharmocology; oxygen therapy; tracheotomy; ventilation; patient care; complications of pregnancy and delivery relation to pulmonary therapy; pathophysiology of the cardiopulmonary system in fetus, newborn, and adolescent; respiratory problems and therapy for newborns and adolescents.

Credit Hours 4

IT 247 CLINICAL APPLICATION II

Preoperative and postoperative pulmonary therapy care; effects of anesthetics on respiration; pulmonary complications postoperative and therapy; specific care in general; thoracic and neurological postoperative patients; clinical applications.

Credit Hours 4

IT 264 CLINICAL PRACTICE

Therapeutic exercise for specific patient problems; massage; practical experience in specialized areas; techniques of teaching; elements of supervision; physical patient management; body mechanics; care of equipment.

Credit Hours 6

July 19th, 1968

Mr. Joe Godsey, Director
Post Secondary Program Development
Texas Education Agency
Austin, Texas 78711

Re: New Programs in Health Occupations

Dear Mr. Godsey:

Enclosed are the five new Health Occupations, Para-medical programs. These programs are included in our annual contract as we discussed. Regarding item nine of the contract, the '68-'69 instructional cost will be as shown, as we have included the future instructional cost.

Our plan for the first year is to limit enrollment to 30 students. For the future, we hope to develop a complete core curriculum for health and para-medical programs as we anticipate our enrollment in the health areas to increase 10 to 20 per cent per annum for the next several years. In fact, we estimate a total enrollment in all health programs to reach approximately 350 plus by '69-'70. Other programs are now being planned for next year and the future.

If further information is needed regarding these five programs, please call on us.

Sincerely,

J. H. FRAZIER
Director of Occupational Education

JHF:bn
CC: Mr. Plexco
✓Dr. Ross

EXHIBIT 4

Level of Interest
Secondary ☐
Post-Secondary ☐
Assignment Interest
Teacher ☐
Supervisor ☐
Counselor ☐
Administrator ☐
Area of Interest

____
(Subject or Program)

TEXAS EDUCATION AGENCY
DEPARTMENT OF OCCUPATIONAL EDUCATION
AND TECHNOLOGY
201 East 11th Street
Austin, Texas 78701

Attach

Picture

Here

Statement of Qualifications

1. ____________________
Last Name First Name Middle Initial Social Security Number

2. ____________________
Street Address City State Zip Code Phone Number

3. American Citizen: Yes ______ No ______ Male ______ Female ______ Married ______ Other ______

Date of Birth: ____________________

4. Exact position for which you wish to qualify: ____________________

5. Name of occupation in which you have had most experience: ____________________

6. Does this occupation require a license or registration? ______ If so, give name of license or registration, number, and State: ____________________
(Teacher, Nurse, Master Plumber, Etc.)

Wage-earning experience in occupational field for which application is being made: ____________________

7. Teaching Experience: In field for which application is made ______ years. In other fields ______ years. Attach a copy of Teacher Service Record, TEA Form FINANCE 076 (Revised '63).

8. Education: High School Attended: ____________________
Name of School City State

9. Did you Graduate? ______ When? ______

10.

Trade School, College or University Attended	Dates	Semester Hrs. Completed	Degree-Date

11. Bachelor's Degree: Major ____________________ Minor ____________________

12. Master's Degree: Major ____________________ Minor ____________________

13. Doctor's Degree: Major ____________________ Minor ____________________
(Attach transcript of all college work completed.)

14. If a member of a labor, technical, civic, professional, or other organization indicate names: ____________________

____

15. Describe experiences with young people in clubs, such as Y.M.C.A., church, scouting, etc.,: ____________________

____

PLEASE NOTE: READ CAREFULLY THE NOTARY ACKNOWLEDGMENT ON THE LAST PAGE BEFORE PROCEEDING

16. Do you type? Yes______ No______ Speed______ w.p.m. Do you take dictation? Yes_____ No_____ Speed______ w.p.m. List any other business machines you operate: ____________________________________ List the languages other than English that you: Speak ☐, Read ☐, Write ☐ ____________________________ Are you willing to come to a designated location for a personal interview and examination covering your specific occupational experiences? ________________

17. Vocational Teacher Training and/or other Specific Occupational Courses which help Qualify you for this Position:

Institution	Courses Completed	Date Completed	Clock Hours

NOTE: *On an attachment you may wish to describe in-service, company training courses, or apprenticeship programs that you have completed.*

18. **Instructions:** Starting with the present date list in reverse order all trade and/or occupational experience *including full-time teaching acquired since leaving high school.* Use a separate line for each employer where you had a regular job. *If you were regularly employed by two separate employers at the same time, list the full-time employment on one line and the part-time employment on the following line.*

Dates of Employment				Length of Employment (In Months)	Average Hours Per Week	Name and Address of Employer	Monthly compensation	Name of Employer or Immediate Supervisor	Trade or skilled work* personally performed by you.
From		To							
Month	*Year*	*Month*	*Year*						

(*Continue occupational experience below.*)

• Be specific: List machines operated, skilled work or services performed, subject taught, and supervisory experience (number of employees supervised).

19. Indicate below the names of three persons qualified to speak concerning your wage-earning experiences other than teaching:

Name__________ Address__________ Occupation__________

Name__________ Address__________ Occupation__________

Name__________ Address__________ Occupation__________

TEACHING CERTIFICATES HELD

Regular ______________________________ ______________
List All Certificates Other Than Vocational — Certificate Number

Vocational ____________ Subject ______________ Kind ____________ ______________
Date Issued — Temp. or Perm. — Certificate Number

NOTARY'S ACKNOWLEDGMENT

State of Texas

______________ County

I, ______________________________ (Name in Full), swear that (1) the above information is to the best of my knowledge a true statement of facts concerning date and place of birth, education, occupational experience and teaching experience; (2) I understand any deficiency found in this Statement of Qualifications may disqualify me for consideration as a vocational teacher in a public school or junior college; and (3) I understand that one requirement for Vocational-Technical Teachers is to complete specialized teacher-training courses at an approved educational institution, or workshops conducted or sponsored by the Texas Education Agency.

Signed ______________________________
(Name in Full)

Sworn to me this __________ day of

______________________, 19______ Notary Public

____

TO BE COMPLETED BY EMPLOYING INSTITUTION

If approved by the Texas Education Agency, this applicant will be considered for employment in the position for which approved. Employment to begin ______________________

Date ______________ Signature of ______________________________
Local Administrator of Vocational-Technical Programs, Superintendent of Schools, President of Junior College.

______________________________ Name of employing institution

DO NOT FILL IN BELOW THIS LINE

Considering personal characteristics, occupational experience, educational attainment, and other factors, indicate your evaluation of this person to become a successful vocational education teacher:

(1) Above Average ______________ (2) Average ______________

(3) Below Average ______________ (4) Very Poor ______________

Signed ______________________________
(Committee Chairman or Interviewer)

RECORD OF EXAMINATION

Examining Committee	Results of Examination
1. ______________	PRACTICAL ______________ *State Satisfactory or Unsatisfactory*
2. ______________	TECHNICAL ______________ *State Satisfactory or Unsatisfactory*
3. ______________	REMARKS ______________
4. ______________	

Date ______________ Approved by ______________________________
Vocational Program Director of TEA

EXHIBIT 5

Texas Education Agency

• STATE BOARD OF EDUCATION
• STATE COMMISSIONER OF EDUCATION
• STATE DEPARTMENT OF EDUCATION

201 East Eleventh Street
Austin, Texas
78701

Re:

Position:

Dear Sir:

A Statement of Qualifications for the above named person has been received and processed.

☐ The individual meets all the requirements established for this position by the State Plan for Vocational Education and is approved.

☐ The individual does not meet all of the requirements established for this position by the State Plan for Vocational Education. Subsequent approval will be contingent on the person's

- ☐ Securing additional acceptable work experience.
- ☐ Securing additional acceptable formal education.
- ☐ Other ______________________________

  ____

☐ The person does not meet the requirements established for the position by the State Plan for Vocational Education and is not approved.

☐ ______________________________

____

____

Sincerely,

Elbert Marcom

Elbert M. Marcom, Director
Health Occupations Education

EMM:ag

drive friendly

CHAPTER 3

THE CORE YEAR

The Associated Health Occupations Program was founded with the idea that several students in different fields of health care study could come together for common classes in related subjects. This would eliminate duplication of teaching in the separate fields as well as to satisfy minimum enrollment requirements for academic courses at Galveston College.

These common courses or the core curriculum has been carefully designed to offer the student the opportunity to investigate the fields of health care available in the AHO program, to give the student a basic health care background so he can interrelate with professionals for a more rewarding learning experience, and to expose the student to the psychological and sociological factors which are prevalent whenever there is illness.

Included in the core curriculum are those courses required for graduation from Galveston College. The flexibility of the AHO program permits the student to decide his future and establish his degree plan for an Associate in Arts (A.A.) Associate in Sciences (A.S.) or Associate in Applied Science (A.A.S.) degree. Counseling before and during the student's tenure helps him to choose his individual route. The A.A. and A.S. degrees are for those students wishing to continue their education beyond the junior college level and require courses which are transferrable to other institutions. Although additional time may have to be invested toward the A.A. degree, it is still conceivable that the student can graduate after an additional summer or one more semester. The same is true of the A.S. degree; however, there is one free semester during the summer that the student could possibly complete the additional requirements.

The Associate in Applied Science degree is the curriculum the AHO program generally follows, and this plan will be used in discussions of the core year.

The three plans and required semester credit hours, contained in AHO are shown as follows:

Associate in Arts

		AHO	NEEDS
English	6 composition and rhetoric	6*	
	6 literature		6
American History	6		6
Government	6	6	
Foreign Language	14		14
Natural Science	16 or 8 and	16**	
Mathematics	6		
Physical Ed	2	2	
Elective	6 - 8	8	
			26 hours

Associate in Science

		AHO	NEEDS
English	6 composition and rhetoric	6	
	6 literature		6
Engineering Majors	3 composition and rhetoric	3	
	3 literature	3*	
American History	6		6
Government	6	6	
Natural Science	8	8	
Mathematics	6		3
Physical Ed	2	2	
Electives	24	24	
			15 hours

---

* students may take the second semester of composition and rhetoric or literature instead of technical writing.

** depending upon study track this can be fulfilled since there are 15 hours in natural science and 6 hours in math offered.

Associate in Applied Science

		AHO
Communications	6	6
Government 233 or Govt. 231 & 232		3 or 6

The core courses also serve to satisfy some requirements for certification by national agencies which govern professions of physical therapy, occupational therapy, radiologic technology and inhalation therapy (the other study tracks do not have national certification requirements). When the certification requirements are listed side by side, the similarities are show below:

	Physical Therapy	Occupational Therapy	Radiologic Technology	Inhalation Therapy
Orientation	x	x	x	
Administration		x		x
Ethics		x	x	x
Anatomy and Physiology	x	x	x	x
Emergency Care		x		
Nursing Procedures			x	x
Terminology			x	
Psychology	x	x		x
Sociology	x			

Because all these subjects would tend to "round out" the student's abilities and knowledge for a health care employment, it was decided to incorporate these requirements into the core curriculum and these courses are shown below:

COURSE	SUBJECT
AHO 141 - Interdisciplinary Health Concepts - Introduction to Health Occupations	(Orientation, Administration and Ethics)
AHO 132 - Interdisciplinary Health Practices - Specialized Clerkships	(Orientation, Administration and Ethics)

COURSE	SUBJECT
AHO 143 - Interdisciplinary Health Concepts	(Emergency Care, Nursing Procedures, Terminology)
AHO 134 - Interdisciplinary Health Practices	
BIO 143 - Anatomy and Physiology BIO 144	(Anatomy and Physiology)
PSY 131 - Introduction to Psychology	(Psychology)
SOC 131 - Introduction to Sociology	(Sociology)

Therefore, the core curriculum is as follows:

Core Curriculum Outline

First Semester

AHO 141	Interdisciplinary Health Concepts - Introduction to Health Occupations
AHO 132	Interdisciplinary Health Practices - Specialized Clerkships
BIO 143	Anatomy and Physiology
ENG 131	Composition and Grammar
SOC 131	Introduction to Sociology

Second Semester

AHO 143	Interdisciplinary Health Concepts
AHO 134	Interdisciplinary Health Practices - Introduction to Patient Care
BIO 144	Anatomy and Physiology
COMM 132	Technical Communications (or ENG 132)
PSYC 131	Introduction to Psychology

First Summer Session

Option courses, make-up or courses toward A.A. or A.S. degrees, or free time.

Second Summer Session

AHO 155 Applied Health Concepts in Practice

SECOND YEAR

First Semester

GOVT 322 Survey of American and Texas Government and Constitution

Study tracks also require other college courses. These are listed as option courses since they are specifically for one or more areas and cannot be considered as a requirement for the general health care knowledge of all students.

Option courses are:

College Algebra 141 or Business Mathematics 133

Psychology 231, Child Growth and Development

Chemistry 141 or Physical Science 231 and 232, Physical Science for Health Occupations

Biomedical Physics 231 and 232

Microbiology 135

Psychology 232, Social Psychology or as specified by the individual study track

General Courses

All courses with the exception of the AHO courses, are taught at Galveston College as part of the general curriculum offerings of the institution. With the structuring of the AHO courses which are Monday, Wednesday, and Friday, 1-4 p.m. at the Medical Branch, most of the students have the same class schedules; however, they are not required to attend the same classes at the college.

Almost half the AHO students enrolled in the program since its beginning had taken previous college courses, and if they had already taken courses comparable to those required, these student either took other courses toward the A.A. or A.S. degrees or none in addition.

To satisfy the requirements for national certification, the AHO department chairman checks with the instructors of the general courses to be certain the subjects needed by the students are covered in the courses. National standards require that course syllabi be submitted with survey material compiled for acceptance of an accredited teaching facility.

Since every national certifying association requires Anatomy and Physiology, the course syllabi are shown in Exhibits 1 and 2.

AHO COURSES

FIRST SEMESTER

The first semester of AHO courses is designed to acquaint the student to the world of health care and to give him an idea of what his profession of choice will involve. The courses, AHO 141 and AHO 132 are given concurrently, MWF, 1-4 p.m.

The courses are divided into lecture (AHO 141) and laboratory or clerkships (AHO 132) (Exhibit 3 & 4). Although the course content has been basically the same, the presentation of the material and related clerkships have been changed.

The students were the ones to alter the presentation of the subject matter. Their input into the program is welcomed by the faculty, and whenever deemed pertinent, the faculty adjusts to student desires.

In 1968, the students were in classroom lectures for the entire first semester and the first part of the second. At the end of the second semester, they rotated in the various departments. The students wanted to get "where the action was" earlier. Some showed disenchantment with the program because they were not certain what they wanted to do or be, and they had to go two semesters to have a first-hand learning experience in the hospital setting.

The courses were restructured, and in 1969 and 1970, the courses were divided; the first part of the semester were the lectures and the last eight weeks were the clerkships. This proved more successful; however, there was another factor which again changed the courses -- the medical facility itself.

The AHO program enjoys the distinction of having heads of departments and hospital administration willing to participate in the lectures and clerkships. It was felt; however, that the rotation coming during the last eight weeks put an undue strain on the department, (after all, it primarily functions to help the sick) because employees were having to spend considerable time with small AHO groups for almost two months.

The faculty then developed the plan whereby all the students would only spend two weeks with a department -- generally the first week the students hear lectures about the profession and the second week, they are taken directly into the clinic to see the correlation between what was said in lecture and what they experienced in the clinics. The students go into the clinical situation in small groups or a student is individually assigned to be with one of the professionals. They are rotated through the department so all achieve the same type orientation. (Exhibit 5)

Now, the departments use this opportunity to demonstrate the students on their professions and spend more time planning the two-week clinical experience, the lectures and clerkships are better related, and the student achieves an immediate overview of the work of each department. At the end of each department's segment, the students are tested on what they have learned and experienced.

Too often the students complain that they are not given enough time in the clinics. They are intensely interested in the application of these professions. When a student desires to visit a clinic in which he is interested, additional time may be given to him, usually during the Christmas holidays. The students are made to feel that they are important and that their choice of a study track is important. In this way, the student is able to feel that being sent from clinical area to another clinical area is not the only contact he will have until he begins his study track work. Also, the faculty gains a better insight into the abilities and temperament of the student with this more personalized visit. That the students do not spend enough time in the clinics is advantageous. The time span is long enough to get the idea of the clinical situation to the student and rarely is long enough to bore any student who is not interested in the area.

The faculty still has this restructuring under study and will not make a determination as to its permanence until possibly late spring when the students will have had the opportunity to show how they relate the knowledge they gained during the first semester.

There is a great amount of participation in this first year by administrators, department heads and the professionals under them, and by the AHO instructor. This gives the student the opportunity early in his schooling to make observations of people and surroundings and to begin writing "reports" which he will probably be required to do the rest of his working life.

At the end of each time period with a department, the students write Reaction Papers (Exhibit 6). They are warned not to use words as "nice" and "wonderful" and not to answer questions with a "yes" or a "no". They may either answer the questions individually or write a report which incorporates all the points. The AHO instructor is then able to determine if the students learned anything from the lectures, if they found fault with the lecturers, and when in clinical situations, did they observe what they expected to see or did they find out that things were different.

Clinical situations are unpredictable. Some days a department may be swamped with work and other days they will have slack time. Students are not promised that they will see anything because one cannot be sure just what will be happening or scheduled. As stated, previously, the clinical departments are there to serve the patient and the physician. When a student goes into a study track he will be certain of experiencing situations, but as observers, the AHO students are only able to see what happens to be scheduled as part of the hospital procedure during their class time. Two reaction papers covering the same lectures and clinical experience are given in Exhibits 7 & 8. It is apparent they are individual opinions.

The reaction papers serve to record the progress of a student's skills in observation. The more mature student will describe the surroundings and his relation with other people, the less mature student may also report on his feelings, stressing how <u>he</u> was treated. The reaction papers are kept by the AHO Chairman and are used at the end of the second semester to assist the technical director of a department in choosing candidates for his study track.

At the end of the first semester, the student is asked to make a tentative decision on his choice of a study track. This decision is in no way binding. It serves as a guide for the faculty to determine the possible make-up of the study tracks for the next year. Also, some students are allowed to enter the program at the beginning of the second semester. They are called "Alternates" and enter the program with a definite field in mind, one which is indicated to have openings. Should the alternate wish to enter a study track at the end of the semester other than the one he indicated, he may do so if there is an opening.

The alternates have missed the first two AHO courses and are required to make them up by a challenge examination which is given between the first and second semesters of the following year.

The faculty had determined that alternates operate under a slight disadvantage. The two-year course is so structured that very little time is available for make-up work. Therefore, students have to double up or take an extra semester or courses. There have been eighteen students who were alternates. Ten of these students have been successful in the program, one having graduated; one has completed AHO course work and needs to complete courses at Galveston College, and of the seven who have dropped out of AHO, all but one did so after the first semester, the other going for one summer. Of those who do succeed, the faculty does not see any real difference in their work and ability to adjust to demands of clinical studies.

SECOND SEMESTER

The second semester the AHO courses are structured to lay a firm foundation in health care-giving. The student learns about the nature and temperament of the sick, how he will fit into the total health care team concept, and will gain a basic knowledge of medical terminology.

The two courses are taught concurrently again, Monday, Wednesday and Friday, 1-4 p.m. They also are taught at the Medical Branch because lecturers are drawn from the hospital personnel. The lectures consist of guest speakers, training films, and clinical visitations as well as the regular classroom work.

Although didactic study is important during this semester, the primary objective of the courses is to turn out individuals who have a basic knowledge and understanding of working together -- students who are able to recognize personality and character traits not only of the patient but also of peers and supervisors. The students learn through applied group dynamics.

Nursing

The faculty believes that fundamental nursing knowledge and abilities are important for an AHO student to take his place with the health care team. Therefore, a third of the semester is devoted to this all-encompassing subject. Films serve to introduce the units, guest lecturers give the students the specifics, and again the students are required to furnish their reaction papers.

Since psychological factors are prevalent in health care facilities, the students are introduced to anxieties within the sick patient and the care and comfort of the dying patient. The section is taught by AHO faculty, nursing, and hospital chaplaincy.

Again the students are introduced to ethics, but from the standpoint of law. Study tracks become more specific on liability; however, the student learns of basic hospital, physician, nurse and technologist legal responsibilities. They are made aware of consent forms, who signs them, and when.

Epidimiology is also taught to introduce the student to how infection is transmitted and what can be done to limit its spread. The specific precautions are more fully discussed in study tracks. Emergency Care covers first aid and cardio-pulmonary resuscitation.

Several lectures are devoted to the history of psycho-social patient care. There is a natural bridge then into the next large section which is Group Dynamics.

Group Dynamics

During the first semester, the students are molded into a "group". This is done without the students knowinq the planning and techniques involved. The first days the students are asked to orally present biographical sketches so they can know each other and begin to identify with each other. The lecturer stresses that they are an elite group and that they are responsible for their group image. They are assured that their input will have a meaning and that the changes they recommend (through their reaction papers) will be for others who follow. Uniforms are also issued to identify as a group and to be recognized in the hospital setting.

The second semester the students analyze what happened to them the first year -- their problems and solutions. They then are led into the field of group dynamics. The student learns his place in the health care group (team). He is taught to recognize the various types of personalities which compose a group and how they can predictably interact with others. Thus the student is able to ascertain for himself the kind of team he is associated with, the way each person thinks and reacts and why, and how he can contribute to the enrichment of the group.

Terminology

Students are introduced to the health care language they will be using during their careers. Although specific terminology indigenous to a study track is taught the next year, the students acquire the basic terminology upon which the study tracks build. They are exposed to the foreign language technique of teaching. They spend a great amount of time learning base words and are asked to define words which are "built" by the instructor using these basic words.

When AHO students graduate, they will have had 54 hours of terminology. The baccalaureate students are given 10 hours; and it is interesting to see the AHO student helping the baccalaureate student with terminology when they are together in the clinical settings.

The instructional guide for these two AHO courses are given in Exhibits 9 and 10. The flexibility of the lectures and the subject matter are good in that individual classes are able to set their own pace for the three major units, and just how they are taught is up to them, especially when the group dynamics section is offered.

OPTING FOR COURSES

Near the close of the second semester, each student is asked to decide first and second choices for the study track(s) he wishes to enter. He then must write a paper stating why he chooses to enter this particular field. The reasons he gives and how he presents them are important since this paper is read by the faculty advisory committee. The committee reviews the paper to determine dedication, choice by logical reasoning, ability to communicate thoughts and grammatical presentation.

Each study track may have additional requirements for entry since some are governed also by national registry standards. These requirements will be discussed in the individual study track chapters.

Counseling of each student is ongoing during this time. Since the student has already made a tentative committment during the first semester, the faculty has had time to follow the progress of the student and to assist him in keeping with his original choice or steering him into another area for which he is better qualified.

Before the student completes the second semester, he is notified what study track he will be entering. He then has time to check his degree plan to determine if any additional courses at Galveston College are necessary to the completion of the program.

By this time it is usually obvious to a student if the AHO program is not what he is really interested in and will drop out. The chapter on students will discuss the reasons for the drop-outs; however, it is noted that the majority of those leaving the program have done so because of the lack of sufficient grade points.

THE CORE YEAR REVIEWED

RESTRUCTURING IN 1971-72

The previous discussion concerns policies in practice. The following is a discussion of changes which the faculty feels are beneficial to the program:

Toward the close of the second semester, the student is asked to opt for the first and second choices of the study tracks. He is then counseled by the individual study track faculty members, and before the close of the semester, the student knows which study track he will be entering during the second summer session.

The faculty wants to try the process differently this year. It is felt that more counseling needs to be done with students for their study track. Therefore, at the end of the first semester, the student will put down his first and second choices for the study track. The faculty then have time to review the choices and to get the student into the clinical area again for more counseling.

Experience has proven that students know their choice of a study track by the end of the first semester. Those who do change their minds do so because of peer pressure. Perhaps one friend has chosen one track and he persuades an undecided student that he should go into the same track. The undecided student possibly has ideas about which track to enter, but the pressure of a friend holds sway. In most instances, the undecided student is not able to cope with the course, and the pressuring friend possibly has dropped out of the program, leaving the remaining student frustrated.

Hopefully early counseling can assist these undecided students to make a decision that is theirs alone with outside pressures brought to a minimum.

Another innovation of the clerkships which will be tried next year will be the structuring of the lecture, clerkship and wrap-up sessions. There has been less group interaction this year because they have not been brought together for reaction sessions. This bringing together of the group is important because of the group dynamics section in the second semester AHO courses which teach the student the meaning of working together. Therefore, the next year the structure will be five three-hour sessions for each department with the last session devoted to group discussion and reaction. It will be as follows:

Monday	Wednesday	Friday
Lecture	Lecture	Clinical Experience

Monday	Wednesday	Friday
Clinical Experience	Clinical Experience	Group Session

FACULTY EVALUATION

The AHO technical directors are satisfied that the courses taught in the first year are adequate to allow second year students to enter the study track and operate effectively as junior college students. They have expressed the desire for some changes which are beyond the control of the program, but ones which are common in many cases to the educational system today.

These instructors have pointed out that the basic courses especially in mathematics and English are insufficient or not pertinent to the teaching of technically-related subjects.

The math, algebra and physics courses taught in the junior college just do not progress far enough to keep the instructors in the study tracks from again re-teaching them. The fault does not lie with the courses taught in the junior college. Rather, the courses are not comprehensive enough in the high school to allow for the effective teaching of post-secondary math and physics. So, in actuality, the freshman physics or math course is designed to bring all students to a common base of exposure. The AHO technical directors have expressed the desire to have the math and physics so advanced that there would be little extra to teach during the study track year and that a student could gain other skills and knowledge which would enhance the student's abilities.

English is also another problem area. The reaction papers visibly show the lack of a common education in the secondary schools. Many of these students are unable to communicate, especially those who have the language barrier. Students need to learn English which will assist them in their work. These students who are only taking six hours of English should be given a most concise and comprehensive course which contributes to their future job security and their advancement. Fortunately, Galveston College has a department chairman in English who is in process of restructuring content to be more relevant to those taking technical courses. It is commendable to know and recognize poetry, however, it is more important that the student is able to read and follow directions and able to record reactions and feelings pertaining to himself in a manner which is acceptable to an employer.

EXHIBIT 1

INSTRUCTIONAL GUIDE

Course Title : Human Anatomy

Course Number : Biology 143

Course Description : Anatomy is a study of the structure of man's major body systems. Material studied includes cells, skin, skeleton, articular system, muscles, and nervous system.

Objectives :

1. To develop a sound working knowledge of the structure of the human body.
2. To understand how the structure of the body interrelates with the functions of the various systems.
3. To develop a basic understanding of the major body systems in relation to normal life activities.
4. To prepare the student for further studies related to anatomy and physiology in occupational health science programs.

Teaching Procedure : This course will be covered in three hours of lecture and three hours of laboratory work per week. Supplementary instructional aids will consist of laboratory equipment, films, models, and slides.

Content Outline :

I. Introduction to cells, tissues, organs and organ system.

II. The Skin

III. The Skeletal System

IV. The Muscular System

V. The Nervous System

VI. Sense organs, eye, ear, and other sense organs.

Text and Laboratory Manual : Jacob, S.W. Structure and Function in Man, W.B. Saunders Company, 1970.

Chaffee, Ellen. Laboratory Manual in Physiology and Anatomy, J.B. Lippincott Company, 1969.

EXHIBIT 2

INSTRUCTIONAL GUIDE

Course Title : Human Anatomy and Physiology

Course Number : Biology 144

Course Description : This course continues the study of the structure of the human systems and emphasizes their physiology. The body systems included are circulatory system, lymphatic system, respiratory system, digestive system, urinary, endocrine, fluids and electrolytes, and reproductive.

Objectives :

1. To convey a practical working knowledge of the human body, both its structure and function.
2. To develop a basic understanding of the major body systems in relation to normal life activities.
3. To correlate the structure of the systems with their function.

Teaching Procedure : This course will be covered in three hours of lecture and three hours of laboratory work per week. Supplementary instructional aids will consist of laboratory equipment, films, models and slides.

Content Outline :

I. The Circulatory System
II. The Respiratory System
III. The Digestive System
IV. The Urinary System
V. The Endocrine System
VI. Fluids and Electrolytes
VII. Reproductive System

Text and Related References : Jacob, S.W. Structure and Function in Man, W.B. Saunders Company, 1970.

Chaffee, Ellen. Laboratory Manual in Physiology and Anatomy. J.B. Lippincott Company, 1969.

EXHIBIT 3

INSTRUCTIONAL GUIDE

Course Title : Interdisciplinary Health Concepts

Course Number : Associated Health Occupations 141

Course Description : This course is designed to provide a comprehensive survey of careers within the Health Service Industry, including introductory information on such categories as "medical, psychiatric, diagnostic, rehabilitative, therapeutic, radiologic, administrative, pharmaceutical and environmental" service occupations. Attention will be directed to emerging supportive roles for associate and technician level personnel. Concepts of lateral mobility and upward mobility, career patterns in the health fields, and the importance of educational and training standards will be emphasized. Related aspects of medical terminology, supervision and ethics will be explored along with legal aspects of practice and professional affiliations.

The student will gain specific knowledge about health occupations, their role in the delivery of services and developing linkage of resources. through field observations, demonstrations and guest faculty presentations, the student will be exposed to varied health personnel functions, health teams, institutions and organizations and community services as elements of comprehensive health care.

Objectives :

1. To develop basic knowledge about the health service industry and its professional, technological and occupational components.
2. To increase student awareness of the uniqueness of health service occupations, delivery systems, processes in comprehensive health care, and the importance of working within occupational differences as an effective member of the health team.
3. To gain specific knowledge about fundamental principles or characteristics of se-

lected health occupations reflecting the student's personal, vocational or pre-professional goals.

4. To engage the student in skills development in observation, effective listening, information gathering and the application of these skills in the organization and presentation of new material in an understandable manner.

5. To examine the concepts of "career ladders", "professions", "competition and insulation". and manpower as related to "continuum of care".

Teaching Procedure : This course will be covered in nine hours of lecture per week, for eight weeks, with selected guest faculty lectures as appropriate to a comprehensive examination of the proposed content and objectives.

Content Outline : I. Orientation, presented by J. Cantwell

- A. Overview of course plan.
- B. Curriculum, resources, and student requirements.

II. Associated Health Occupations Lectures:

Hospital History, presented by Thomas Keefe

Hospital Organization, presented by Bob Lewis

Medical Legalities, presented by Bill Murray

History of Inhalation Therapy, presented by Roy Mentz

Techniques of Inhalation Therapy, presented by John A. Jenicek, M.D.

Equipment and Techniques of Inhalation Therapy, presented by Dee Gusta

Clinical Application of Inhalation Therapy, presented by Roy Mentz

History and Functions of Social Service, presented by Gloria Haywood

Social Service in a Specific Facility (Shriners Burns Institute), presented by Ann McKinley

Psychiatric Social Work, presented by Amy Talley

Pediatric Social Work, presented by Alfred Hartley

Galveston County Welfare Department, presented by Dorothy Morris

Vocational Rehabilitation Sources, presented by Basil Jones

History and Progress of Community Mental Health Program in Galveston County, presented by Mary McKay

The Role and Function of Occupational Therapy, presented by Inez Hunting

The Role of Occupational Therapy in Pediatrics, presented by Elizabeth Evans

The Role of Occupational Therapy in General Medicine and Surgery/Orthopedics, presented by Valerie Wilson

Psycho-Social Dysfunction, presented by Susan Kessler

History of Radiologic Technology, presented by Roberto DeLaGarza

Role and Function of the Radiologic Technologist, presented by Roberto DeLaGarza

Radiologic Equipment, presented by Clarice Davis

Demonstration of Radiologic Techniques, presented by Roberto DeLaGarza

Tour of Radiologic Department, presented by K. Everling

Introduction to Physical Therapy, presented by Mary Kolderic

History of Physical Therapy, presented by Janice Toms

Discussion With Patients Present, presented by Dorthea Everett

Role and Function of Electroencephalography, presented by Juaneva Novak

Medical Ethics, presented by Bill Murray

Guest Lecturers:

Hospital Administration

Thomas Keefe, Associate Administrator, UTMB

Jim Jones, Administrative Resident, UTMB

Bill Murray, Assistant Administrator, UTMB

Inhalation Therapy

Roy Mentz, A.R.I.T., Associate Technical Director, Inhalation Therapy, UTMB

John A. Jenicek, M.D., Medical Director of Inhalation Therapy, UTMB

Dee Gusta, A.R.I.T., Technical Director of Inhalation Therapy, UTMB

Social Service

Albert Hartley, N.A.S.W., UTMB

Gloria Haywood, N.A.S.W., UTMB

Ann McKinley, N.A.S.W., UTMB

Amy Talley, N.A.S.W., UTMB

Dorothy Morris, Galveston County Welfare Department

Dianne Dunnaway, Department of Public Welfare

Basil Jones, Texas Rehabilitation Commission

Mary McKay, Director, Mental Health and Mental Retardation Program, Galveston County

Occupational Therapy

Mrs. Bailey, COTA, UTMB

Mrs. Brown, COTA, UTMB

Miss Fernandez, OTR, UTMB

Mrs. Fitzsimons, COTA, UTMB

Miss Sander, COTA, UTMB

Miss Compean, COTA, UTMB

Miss Christian, OTR, UTMB

Radiologic Technology

Roberto DeLaGarza, RT, ARRT

Joseph Sirno, RT, ARRT

Clarice Davis, RT, ARRT

L.C. Ruiz, RT, ARRT

K. Everling, RT, ARRT

Physical Therapy

Mary Kolderic, PT, UTMB

Janice Toms, PT, UTMB

Dorthea Everett, PT, UTMB

EXHIBIT 4

INSTRUCTIONAL GUIDE

Course Title : Interdisciplinary Health Practices

Course Number : Associated Health Occupations 132

Course Description : This course is designed to provide students who have general or specific interest in health occupations to experience supervised observation in several clinical areas related to the associated health occupations. This clerkship is intended to introduce the student to unique theories, concepts and practices of selected health professions, their group processes, and under professional guidance, the execution of assigned technical tasks of entry level calibre. The student is additionally expected to refine observational skills, work attitudes, behaviors and other characteristics appropriate to future entry into the health service industry.

Objectives :

1. To develop fundamental skills, understanding and attitudes which reflect the vital importance of standards, quality and responsible behavior in the health management of the "lives" of others.
2. To expand student tolerance of individual differences, appreciation of the needs of others and respect for the impact of illness, injury or disabling conditions on behavior.
3. To gain knowledge about selected procedures utilized in caregiving, related terminology employed in communicating such procedures, and awareness of resources and methods of delivery for health services.
4. To examine the concepts of "teamwork", "cooperation", "guidance", and "supervision", as essentials of technical performance in associated health occupations.

Teaching Procedure : This course will be covered in nine hours per week, for a period of eight weeks, of clerkships in the following clinical areas:

- Occupational Therapy
- Physical Therapy
- Inhalation Therapy
- Radiology Technology
- Community Health
- Electroencephalography
- Shriners Burns Institute

Students rotate through each of the specified clinical areas for a period of eight weeks. Supervision in each clinical area will be provided by designated personnel, who are members of the staff in each area.

Designated Supervisors : Occupational Therapy, Dorothy Denn, O.T.R.

Physical Therapy, Madeline Baker, P.T.

Inhalation Therapy, Roy Mentz, A.R.I.T.

Radiologic Technology, Roberto DeLaGarza, A.R.R.T.

Community Health, Gloria Haywood, N.A.S.W.

Shriners Burns Institute, Barbara Willis, O.T.R.

Electroencephalography, Juaneva Novak, R.N.

EXHIBIT 5

MONDAY	WEDNESDAY	FRIDAY
August 30 Orientation	September 1 Biographical	September 3 Biographical
September 6 History of Medicine	September 8 Hospital Organization and Medicine Law	September 10 Medical Law and Medical Ethics
September 13 Electroencephalography Orientation	September 15 E.E.G. Orientation	September 17 E.E.G. Orientation
September 20 E.E.G. Clerkship	September 22 E.E.G. Clerkship	September 24 E.E.G. Clerkship
September 27 Radiologic Technology Orientation	September 29 R.T. Orientation	October 1 R.T. Orientation
October 4 R.T. Clerkship	October 6 R.T. Clerkship	October 6 R.T. Clerkship
October 11 Physical Therapy Orientation	October 13 P.T. Orientation	October 15 P.T. Orientation
October 18 P.T. Clerkship	October 20 P.T. Clerkship	October 22 P.T. Clerkship
October 25 Inhalation Therapy Orientation	October 27 I.T. Orientation	October 29 I.T. Orientation

MONDAY	WEDNESDAY	FRIDAY
November 1 I.T. Clerkship	November 3 I.T. Clerkship	November 5 I.T. Clerkship
November 8 Occupational Therapy Orientation	November 10 O.T. Orientation	November 12 O.T. Orientation
November 15 O.T. Clerkship	November 17 O.T. Clerkship	November 19 O.T. Clerkship
November 22 Shriner Burns Institute Tour	November 24 Central Supply Tour	November 26 Thanksgiving
November 29 Community Health Orientation	December 1 C.H. Orientation	December 3 C.H. Orientation
December 6 C.H. Clerkship	December 8 C.H. Clerkship	December 10 C.H. Clerkship
	FINAL EXAMINATIONS	

EXHIBIT 6

Name ____________________

Date ____________________

Clinic __________________

Guide for Reaction Papers

1. State concisely your reaction to:

   The clinical environment
   The clinical personnel
   Types of patients undergoing treatment

2. Did you consider yourself to be treated as a mature individual during this clinical rotation? If not, please explain.

3. Did you feel that the clinic had planned for this initial clinical visit? If not, please explain.

4. Did you consider the lectures for this clinic to be adequate? If not, please explain.

5. Did you understand the material as it was being presented?

6. Did the lecturer present the material in an interesting manner?

7. Were questions concerning this clinical material answered to your satisfaction?

8. State concisely your reaction to:

   Content of lectures
   Method of presentation

9. Are you interested in this area as a possible career choice? If not, why?

10. Do you understand the purpose of EEG?

<u>Do not write on this guide</u>

EXHIBIT 7

REACTION PAPER FOR ELECTROENCEPHALOGRAPHY

The clinical environment was clean, but there were not enough chairs. The background was noisy. There was a radio and the music was too loud. The personnel acted as if we were supposed to know all the answers. They looked kind of funny when you asked questions. There was this patient who acted as if he was mentally disturbed. The other one was on dope and his waves were much different.

I considered myself to have been treated like a mature individual during the clinical rotation. I did not feel that the clinic had planned for the clinical visit because there weren't enough seats and Mrs. ________ was late and a little confused.

I am not interested in this area as a future of study because I don't want to work with people's brains. Except for her speaking too softly and she was chewing gum and talking at the same time. No she didn't present the material in an interesting manner because she expected you to know the information.

Note: This student has opted for this study track.

EXHIBIT 8

REACTION PAPER FOR ELECTROENCEPHALOGRAPHY

The clinical environment was very good. The sound of music could be heard in the clinic which I am sure was not only placed there for the personnel's pleasure but also to serve as a method of relaxing a patient who is waiting to have an EEG test.

The clinical personnel which I came in contact with seemed to be very friendly. They were also willing to answer any questions.

The types of patients undergoing treatment were:

(1) A fellow AHO student.

(2) A young man who was using marijuana.

(3) A settle age woman who had some sort of vision disorder.

(4) Another settle age woman who had undergone some sort of operation. She was brought in on a stretcher. Mrs. ________ commented that the clinic had a portable EEG machine which was used when patients were not able to come to the clinic.

I was also able to observe another patient from where I was sitting during the lecture. The patient was a young man who had epilepsy. He seemed to be in good spirits as the electrodes were being placed on his head.

I feel that I was treated as a mature individual during the clinical rotation. Everything was superb. No, I really don't feel that the clinic had planned for the initial clinical visit, but I can truthfully say that there were no errors or blunders made. Personally, I feel that there was no need for planning, just by following the normal everyday schedule made it possible to observe the clinic as it really is. I also feel that what I was able to observe and the information I received from the students and staff was really great.

No I am not interested in EEG as a future area of study. I considered the lectures for the clinical to be adequate. I felt it brought out many aspects of EEG such as the background, use, etc., and I also felt that the clinical observation made each detail clearer.

I felt the content of the lectures were relatively short compared to the previous lecture. After going to the clinic I feel that explaining EEG is one thing but observing EEG is the key to all explanations. In other words the facts which seemed to be complex in the lectures were very clear after the visit to the clinic.*

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* In a footnote, the student said the clinical presentation was so interesting she spent some time reading up on it.

EXHIBIT 9

INSTRUCTIONAL GUIDE

Course Title : Interdisciplinary Health Concepts

Course Number : Associated Health Occupations 133

Course Description : This course is designed to provide students with an introduction to illnesses and other handicapping conditions. Emphasis will be placed on developing a practical understanding of those aspects of illness or disability which are most pertinent to associate level health manpower and with which such personnel would most likely come into contact. Exploration of health problems will be within the context that the associate works under medical and/or professional supervision. Concepts of emergencies, special precautions, continuity of care, physical and mental fitness and related terminology will be included.

Objectives :

1. To develop fundamental skills, understanding and attitudes which reflect the vital importance of standards, quality and responsible behavior in the health management of the "lives" of others.

2. To expand student tolerance of individual differences, appreciation of the needs of others and respect for the impact of illness, injury, or disabling conditions on behavior.

3. To gain knowledge about selected procedures utilized in care giving, related terminology employed in communicating such procedures, and awareness of resources and methods of delivery for health services.

4. To examine the concepts of "teamwork", "cooperation", "guidance", and "supervision", as essentials of technical performance in associated health occupations.

Teaching Procedure : I. Orientation

A. Overview of the course plan

B. Instructional guides, resources and student requirements

II. Health Care Resources

A. Hospitals and their functions

B. Changes in health care since World War II

C. Health resources and services in the Community

D. Standards and quality in caregiving

III. Fundamentals of Caregiving

A. Health, illness, stress and anxiety

B. Hygienic, comfort and dietary needs

C. Communication and learning needs

D. Movement and exercise needs

E. Spiritual needs

F. Overall rehabilitative needs

IV. Therapeutic Relationships

A. Human relationships in caregiving

B. Determination of patient needs

C. Care of patients with special needs

V. Medical Terminology

A. Word building from Greek and Latin prefixes, suffixes, word roots, and combining forms.

B. Recognizing medical words from Greek and Latin parts

C. Correct pronunciation of medical terms

D. Correct spelling of medical terms

E. Usage of a medical dictionary

Texts* and Related References :

Kozier, B.B., and DuGas, B.W., Fundamentals of Patient Care, W.B. Saunders Company, 1967.*

Anderson, J.C., Basic Patient Care. A Programmed Introduction to Nursing Fundamentals, W.B. Saunders Company, 1967.

Hoffman, C.P., Liplin, G.B., and Thompson, E.C. Simplified Nursing, J.B. Lippincott Company, 1968.

Brown, E.L., Newer Dimensions of Patient Care, Russell Sage Foundation, 1961.

U.S. Department of Health, Education and Welfare, Elements of Progressive Patient Care, Washington, D.C., U.S. Government Printing Office, Public Health Service Publication No. 930-C-1, 1962.

American Hospital Association, Classification of Health Care Institutions, American Hospital Association, Chicago, 1966.

American National Red Cross, First Aid Textbook, Doubleday and Company, Inc., 1967.

Davis, Phyllis E., and Smith, Genevieve Love, Medical Terminology. A Programmed Text, John Wiley and Sons, Inc., 1967.

EXHIBIT 10

INSTRUCTIONAL GUIDE

Course Title : Interdisciplinary Health Concepts (Interpersonal and Group Relationships)

Course Number : Associated Health Occupations 134

Course Description : This course is designed to provide the student with an introduction to group processes and study of individual interaction as they relate to the delivery of quality health services, as well as utilization of groups in the treatment of specific patients. Emphasis is placed on understanding the principles of group development, how and why groups form, structure, composition, and forces which can influence productive or non-productive performance. The student will examine his own ability as a contributing member of a group, with attention to effective listening, communication and observation. Attention will be directed to study of productive groups rather than the ill-defined aggregations, although contrasts and similarities between the two may be made. Examiniation by the class will include individual roles, confrontation, cooperation, leadership and "team" skills.

Objectives :

1. To develop a basic understanding of the importance of human relationships as sensitivity to the needs of others in achieving successful patient, staff or interdepartmental relationships in the health services.

2. To gain specific knowledge about group processes; how and why groups form; components of leadership, membership, power, communication and roles; and events which can change or terminate group interaction.

3. To examine individual roles in relationship to the composition of groups, gain experience and skill in adjusting individual roles, analyzing problems and possible solutions in order to accomplish specific tasks or increase the member's contribution.

4. To investigate the relatedness of group purpose, membership, ideology, and individual influences which can assist or deter a group in achieving its goal, overall functioning or quality of performance.

Teaching Procedure : The course will be covered in three hours lecture per week, plus the study of selected topics combining discussions, self-study, programmed materials, clinic assignments, student presentations, and guest faculty as appropriate to a comprehensive examination of the proposed content and objectives.

Content Outline : I. Overview of group processes, introduction and definitions.

II. Formation, Growth and Change in Groups.
  - A. Formation
    - 1. How, why, types, and goals
    - 2. Therapeutic groups/staff groups
  - B. Growth and Development
    - 1. Stages
    - 2. Manifestations of growth
    - 3. Processes of chance and termination

III. Composition of Groups
  - A. Power components
  - B. Leadership components
  - C. Communications components
  - D. Role and membership components
  - E. Sociometric components
  - F. Ideological components

IV. Group Functioning and Interaction
  - A. Individual Behavior

1. Motivation for membership

2. Perception of role

3. Group influence on individual behavior

B. Group Behavior

1. Selection of membership and leadership

2. Contract and constitutions

3. Goals and purposes

4. Communications and feedback

V. Leadership in Groups

A. Definition, emergence and function

B. Styles

C. Limitations, quality, and technique

VI. Membership in Groups

A. Member responsibilities

B. Growth, sharing, and "role" practice

C. Observation of groups

D. Contribution to groups

Texts* and Related References : Berne, Eric, M.D., *The Structure and Dynamics of Organizations and Groups*, Grove Press, 1966*.

Berne, Eric, M.D., *Games People Play*. *The Psychology of Human Relationships*. Grove Press, 1967*.

Robinson, Alice M., R.N., *The Psychiatric Aide*. J. B. Lippincott Company, 1964.

Levine, B., *Fundamentals of Group Treatment*. Whitehall Company, 1967.

Sussman, M. B., Editor. *Sociology and Rehabilitation*. American Sociological Association, 1965. (Chapter 6, Rehabilitation as an Interpersonal Process).

Benne, K.D., and Sheats, P., "*Functional Roles of Group Members*", Journal of *Social Issues*, IV, 2, Spring, 1948*.

National Commission on Mental Health Manpower. Chapter I, "*The Psychiatric Team*". *Careers in Psychiatry*. The MacMillan Company, 1968.

CHAPTER

STUDY TRACKS

General Statement

The unique aspect of the Associated Health Occupations program is the second-year concentrated study toward a particular field of health care, and the ability of a student to change his choice of career during the first year of foundation studies. This chapter will take the student from the time he elects to enter a particular study track until the time he graduates.

The chapter will contain a general overview of the structure of the second year and then will discuss the study tracks individually. In each study track evaluation will be the curriculum, course descriptions, clinical conditions, compliance with national certification education standards, and student evaluations.

The hours for each class, laboratory hours, the credits earned and the total contact hours are given to show the amount of time students spend in the classroom and in the clinical environment. Also included are equipment requirements which were compiled by the Faculty Advisory Committee and some of the study tracks and requirements listed by national associations as necessary for teaching. The other equipment lists are suggested to indicate the type and quantity needed to operate a clinical facility.

The study tracks and the descriptions for the courses are most definitely flexible and are established by the local educational institution. The national standards do not, in many cases, indicate what is to be taught when, but only that the student experience a certain amount of time in a particular study. The classroom and clinical times and contents are established by the individual study track's Advisory Committee. Only those in the clinical setting can have any idea of how students can be scheduled into the work routine of the facility and when certain clinical conditions may occur for their experience.

The University of Texas Medical Branch at Galveston is a teaching institution. It is the site of the School of Allied Health Sciences which teaches many of the same health fields on the baccalaureate level. In some cases, the AHO students are learning along with the baccalaureate level students. They learn the role of the assistant in relation to the therapist and vice versa. In some instances (medical terminology, for example), the AHO student has a better grasp of the meaning of words because of having spent more hours in this study. AHO students have also been invited to participate in the student organization of a particular baccalaureate study area, giving them an opportunity to interrelate with others in the same field.

Course Structure

The curriculum outline for the second year courses have the same numbers for all study tracks. Each study track has its own course description and syllabus which encompasses part of the essentials for accreditation. In general terms, they are as follows:

AHO 155 - Applied Health Concepts in Practice (2-*) Credit: 5

Prerequisite: AHO 134-143 and acceptance by clinical admissions committee

Assignment to the student's area of clinical interest including instruction in specialized concepts and theory, supervised application of procedures and techniques, and individual student development of basic technical skills.

AHO 241 - Interdisciplinary Health Concepts (2-*) Credit: 4

Prerequisite: AHO 155 and acceptance by clinical admissions committee

A combination of lectures and practicum in the students chosen area of specialization; instruction in specialized concepts and theory; supervised application of procedures and techniques; individual student development of basic technical skills.

AHO 242 - Advanced Application - Health Concepts and Practices (2-12) Credit: 4

Prerequisite: AHO 155 and acceptance by clinical admissions committee

Assignment to the student's area of clinical interest for supervised application of techniques and individual student development of intermediate technical skills.

AHO 243 - Advanced Application - Health Concepts and Practices (2-12) Credit: 4

Prerequisite: AHO 241-242 and acceptance by clinical admissions committee

Assignment to the student's area of clinical interest including specialized instruction in advanced concepts and theory, independent application of technical skills with professional consultation or supervision, and responsible participation as a member of the health team.

AHO 232 - Special Problems and Techniques (3-4) Credit: 3

Prerequisite: AHO 241-242 and acceptance by clinical admissions committee

Individualized clinical or preceptor assignments for directed experience and/or instruction in specialized procedures unique to selected health occupation.

AHO 244 - Advanced Interdisciplinary Health Concepts (2-4) Credit: 4

Prerequisite: AHO 241-242 and acceptance by clinical admissions committee

Assignment to the students area of interest for advanced instruction in highly unique procedures or techniques essential to meet standards of selected health occupations.

AHO 256 Applied Health Concepts in Practice I (*) Credit: 5

Prerequisite: AHO 243-244 and acceptance by clinical admissions committee

Assignment to the student's area of clinical interest for additional instruction or supervision in highly unique procedures or techniques essential to meet standards of selected health occupations.

AHO 267 Applied Health Concepts in Practice II (*) Credit: 6

Prerequisite: AHO 256 and acceptance by clinical admissions committee

Assignment to the students area of clinical interest for additional instruction or supervision in highly unique procedures or techniques essential to meet standards of selected health occupations.

AHO 268 Applied Health Concepts in Practice III (*)* Credit: 6

Prerequisite: AHO 267 and acceptance by clinical admissions committee

Assignment to the students area of clinical interest for additional instruction or supervision in highly unique procedures or techniques essential to meet standards of selected health occupations.

* Class and clinical hours to be arranged.

The courses which are part of the general college curriculum are given below. Not all these courses are required by each study track.

PSYC 231 - Child Growth and Development
PSYC 233 - Psychology of Personality
PSYC 232 - Social Psychology
MATH 141 - College Algebra
MATH 133 - Business Math
ACCT 241 - Principles of Accounting I
ACCT 242 - Principles of Accounting II
BUS 231 - Business Law
GOVT 233 Survey American and Texas Governments
PSYS 231 - Survey of Biomedical Physics
PSYS 232 - Survey of Biomedical Physics
PSYS
SC 231 - Physical Science for Health Occupations
BIO 135 - Microbiology

The following chart shows the courses taken by each study track. These courses will be described in detail in each section.

COURSES REQUIRED FOR STUDY TRACKS

	AHO 155	AHO 241	AHO 242	AHO 243	AHO 232	AHO 244	AHO 256	AHO 287	PSYC 231	PSYC 233	PSYC 232	MATH 141	MATH 133	ACCT 241	ACCT 242	BUS 231	GOVT 233	PSYS 231	PSYS 232	PSYS SC 231	BIO 135
OCCUPATIONAL THERAPY ASSISTANT	X	X	X	X	X	X			X	X			X				X				
PHYSICAL THERAPY ASSISTANT	X	X	X	X	X	X			X		X		X				X				
RADIOLOGIC TECHNOLOGIST	X	X	X	X	X	X	X	X				X					X	X	X		
INHALATION THERAPY ASSISTANT	X	X	X	X	X	X	X	X				X					X			X	X
E.E.G.	X	X	X	X	X	X	X		X	X			X				X				
COMMUNITY HEALTH	X	X	X	X	X	X			X	X			X				X				
ORTHOTICS ASSISTANT	X	X	X	X	X	X	X		X	X			X				X				
MANAGEMENT ASSISTANT	X	X	X	X	X	X								X	X	X	X				

It is the responsibility of the Director of Technical Education to establish the course outlines for each study track. There are two guidelines which the Department Chairman has requested be utilized in order to evaluate the program from the standpoint of the student as well as the quality of education. Exhibits 1 and 2 are the Clinical Facility Rating Sheet which the student completes in the form of a report and the Clinical Experience Evaluation Report which the Technical Director of Clinical Supervisor(s) completes at times determined within the study track.

In some areas, the Director of Technical Education for Galveston College is not the actual Clinical Supervisor since the baccalaureate program in the School of Allied Health Sciences has a clinical director who coordinates the clinical learning experience of all students in a department. This situation will be discussed in the study tracks. However, the AHO Director of Technical Education is able to ascertain that requirements for certification are met by reading of the student's experiences and can determine if a student is functioning properly and learning by the faculty evaluations.

Also, these forms can be revised by individual study tracks according to the standards to be met by particular courses. This certainly is acceptable; however, all study tracks must submit the two evaluations periodically to the Department Chairman.

When a student submits his paper declaring his desire to enter a particular study track, the Department Chairman gives the student's name to the appropriate Director of Technical Education. This director has the authority to take the student's file for evaluation by the study track's admissions committee. Included in the file are all the pre-registration forms, the health examinations, all the clinical evaluation papers from the first semester, the test papers from the beginning of their courses in AHO and the Credit Record (Exhibit 3) which is begun at the close of the first semester the student is in the program or was initiated upon entry into college.

Some study tracks require additional testing or other stipulations before a student can be interviewed for acceptance. These factors are discussed in the study tracks.

Throughout the two years a student is in the program, he is held responsible for maintaining his credit record and for seeking counseling to determine if he has the required courses for graduation. No diploma is awarded from Galveston College unless all AHO courses are completed; no certificate of proficiency is awarded by The University of Texas Medical Branch unless all courses at Galveston College are successfully completed, and no national registry certification is awarded (even though a student may have taken the examination and passed) until graduation and proficiency certifications have been officially declared. Some students have completed the AHO courses and have taken registry examinations; however, they may not graduate until their college courses are passed. The national registry will not certify them until they are notified to do so by the College. The students may work in the field of their study; however, they have to be treated still as students and cannot function independent as registered professionals.

EXHIBIT 1

ASSOCIATED HEALTH OCCUPATIONS PROGRAM

GALVESTON COLLEGE

Clinical Education

Clinical Facility Rating Sheet

Name ______________________________ Date ____________________

1. Was the orientation adequate? Give reasons for your answer.

2. Did you know what was expected of you throughout your affiliation? Explain your answer.

3. Did you have a fair sampling of the different types of patients treated at the facility? If not, explain.

4. During the affiliation, did you apply a variety of modalities or use a variety of techniques normally used at the facility? If not, explain.

5. Did you have time to practice skills begun in the classroom? If not, explain.

6. Did the staff assist you when necessary? More than necessary? Give reasons for your answers.

7. Was there opportunity to discuss the patient's treatment rationale with your supervisor? If not explain.

8. Did you feel you were supervised adequately? If not, explain.

9. Did you feel your patient load was appropriate? Explain.

10. Do you feel you were corrected or advised in a manner that helped you to learn? Explain.

11. Were you "at ease" in work situations? If not, explain.

12. Were the evaluations of your student performance thorough? Did they include explanations? Give examples or reasons for your answers.

13. Was the library adequate for your needs? If not, explain.

14. Did the additional activities presented to you expand your classroom studies? Were they repetitions of classroom work? Would you have preferred less additional activities and more patient care practice? Explain your answers.

15. Did you feel you were really being taught instead of just evaluated? If not, explain.

16. What one learning experience, to you, was more important than the rest?

17. Is there any part of the affiliation that you would like to see changed? Why?

18. If you were offered a position at the facility, would you accept it? Why?

EXHIBIT 2

ASSOCIATED HEALTH OCCUPATIONS PROGRAM

GALVESTON COLLEGE

CLINICAL EXPERIENCE EVALUATION REPORT

Date ______________________

Student ______________________

Number of weeks assigned ________

Clock hours assigned ______ ______

Clinical area ______________

Absences: Number of days __________

Reasons ______________________

Amount of time made up ____________

Supervisor ______________________

The purpose of this report is to promote professional growth in the student.

Section A

Code: F = failing; W = weak; A = acceptable; G = good; VG = very good; E = excellent.

Consider each statement separately since no student performs on the same level in all aspects of his behavior.

Observations should be specific rather than on a general basis in order to achieve accurate reporting.

	F	W	A	G	VG	E
1. Student checks on results of instructions.						
2. Student familiarizes himself with processes of activities to be used (own initiative)						
3. Student gives clear explanations to patient or personnel						
4. Student presents instructions at the patient's level						
5. Student expresses himself convincingly in oral communications						
6. Student expresses himself convincingly in written communications						
7. Student reports accurately concerning patient						

	F	W	A	G	VG	E
8. Student uses correct grammar						
9. Student uses correct spelling						
10. Student uses terminology correctly						
11. Student assumes responsibility in his area with little or no additional instructions from instructors						
12. Departmental personnel have confidence in the student						
13. Student recognizes which decisions require the supervisor's approval						
14. Student thinks things through before acting						
15. Student begins day with adequate preparation (Supplies, equipment, etc.)						
16. Student adjusts approach to meet the patient's needs						
17. Student deals effectively with attitudes displayed by patients						
18. Student is appropriate in initial contact with patient						
19. Student maintains friendly but objective attitude with patient						
20. Patients accept direction from student						
21. Student uses discretion when conversing with patients						
22. Student demonstrates the ability to use a variety of minor skills						
23. Student grasps and retains instructions in skills						
24. Student indicates desire to improve his previously acquired skills						
25. Student shows initiative in learning new skills						
26. Readily learns to use equipment or instruments and develops good working knowledge of it						
27. Leaves equipment, accessories and radiographic room clean and in good working order after use						
28. Is able to perform procedures AFTER first time with ease, accuracy, and minimum of help						

	F	W	A	G	VG	E
29. Has maintained adequate and steady level of consistency of work throughout this rotation, or if problem and trouble (Unsatisfactory work) do arise, shows definite improvement before finishing rotation.						
30. When necessary uses proper radiographic shielding and protection for patient and self - (such as gloves, coning, aprons, etc.)						
31. Secures radiology room before leaving						
32. Arrives at department and assigned area on time and begins work promptly. (Note: Consider not only arrival but also return from lunch periods and coffee breaks.)						
33. Special requests for unplanned short absences have been minimal or non-existent						
34. Completes assignments (procedures) within a reasonable period of time, and is not distracted while working (does not readily allow such things as conversations, other students, etc. to interrupt him.)						
35. Abides by established student and administrative policies						
36. Uses proper identification on radiographic films						
37. Personal appearance is exemplary: clean shoes and uniform and personally neat						
38. Pleasant to be around and work with; fits in well with people and routine in radiology lab						

ADDITIONAL COMMENTS ABOUT STUDENT PERFORMANCE:

EXHIBIT 3

CREDIT RECORD OF A.H.O. STUDENTS

Name ______________________________
Study Track _________________________
Date ______________________________

Semester I - Freshman Year

Course		Cr. Hrs	Grade	GPs
Biol.143	Anatomy and Physiology	4		
Soc. 131	Introduction to Sociology	3		
Engl.131	Composition and Grammar	3		
AHO 141	Interdisciplinary Health Concepts - Intro to Health Occupations	4		
AHO 132	Interdisciplinary Health Practices-Intro to Patient Care	3		
Summer Session I				
*Math 133	Algebra or Bus Math	3		
*Psych231	Child Growth and Development	3		
Semester I - Sophomore Year				
Govt.233	Survey Amer. & Texas Govt.	3		
*Chem141	Chemistry	4		
*Physics131	Biomedical Physics	3		
AHO 241	Interdisciplinary Health Concepts	4		
AHO 242	Adv.App.Health Concepts & Practices	4		

Semester II - Freshman Year

Course		Cr. Hrs	Grade	GPs
Biol.144	Anatomy and Physiology	4		
Psych.131	Introduction to Psychology	3		
Engl. 132	Composition and Grammar	3		
AHO 143	Interdisciplinary Health Concepts	4		
AHO 134	Interdisciplinary Health Practices	3		
Summer Session II				
AHO 155	Applied Health Concepts in Practice	5		
Semester II - Sophomore Year				
Psych 233	Psychology of Personality	3		
*Physics131	Biomedical Physics	3		
AHO 232	Sp. Problems and Techniques	3		
AHO 243	Interdisciplinary Health Concepts	4		
AHO 244	Adv.Health Concepts and Practices	4		
Biol.135	Microbiology	3		

*Options are specified according to study track

Course	Cr. Hrs	Grade	GPs	Course Course	Cr. Hrs	Grade	GPs
Summer Session I				Summer Session II			
AHO 256 Applied Health Concepts in Practice I Radiology, Orthotics, E.E.G. and Inhalation Therapy only	5			AHO 267 Applied Health Concepts in Practice II Radiology, and Inhalation Therapy only	6		
Semester I - Sophomore Year add							
AHO 268 Applied Health Concepts in Practice III Radiology and Inhalation Therapy only	6			Totals Col. 1			
				Col. 2			
				Grand Total			
Minimum Requirements for Graduation							
Occupational Therapy Asst.							
Physical Therapist Asst.							
Inhalation Therapy				Courses completed before enrollment in AHO program			
Radiologic Technologist							
Community Health Worker							
Orthotics Assistant							
Electroencephalography							
Management Assistant							
Grading System							
A = 4 Grade Points Per Sem. Hr.				Courses completed to meet AHO requirements (after)			
B = 3 Grade Points Per Sem. Hr.							
C = 2 Grade Points Per Sem. Hr.							
D = 1 Grade Point Per Sem. Hr.							
F = 0 Grade Points Per Sem. Hr.							

COMMUNITY HEALTH

History

Although this program was one of the first accepted by the Texas Education Agency, it was not until July of 1970 that a student applied and was accepted for admission into the study track. Several factors for the lack of interest in the program were involved, and they are important since the difficulty was a misunderstanding of what the term Mental Health Worker encompassed. Until 1971, the program was called Mental Health Worker. Although it encompassed all the areas of community services which the students could enter upon graduation, the students felt the program was only for those people interested in working with the mentally ill.

The program was reviewed, and the name was changed to Community Health Worker, a title which seemed to be the most clearly understood job description to date . Still, there has been no watering down of the psychology and humanities courses, since a community health worker has to deal with all types of people and strive to understand them. Since the name has changed, there have been more students willing to investigate the program, and three students have applied for entrance into the study track for the summer of 1972.

The Community Health Worker study track was designed to remedy the shortage of workers in health and community service agencies. Since that time, other programs have been established to which the community health worker may apply. Basically, the Community Health Worker aids the professional social worker in completing task assignments, allowing the professional to do a more skilled type of service in the areas of casework, group work and community organizations. This position has been recognized on a national level, but there are no certifying organizations as yet.

Curriculum

In the GUIDE FOR ASSOCIATE DEGREE PROGRAMS IN THE COMMUNITY AND SOCIAL SERVICES published by the Council on Social Work Education in cooperation with the American Association of Junior Colleges, the job most nearly fitting the description of the Galveston College Community Health Worker is that of the Community Services Technician.

The curriculum (which the Guide describes) is designed to prepare students for entry into a variety of agencies which provide community and social services. Upon completion of the program, which leads to the Associate in Arts degree, the graduate is prepared for employment as an assistant in welfare agencies, municipal recreation programs, social development projects, rehabilitation agencies, church-sponsored youth programs, and other private or public enterprises of a human welfare nature. The student is also prepared to continue his education.

Because the Galveston College program is directed to an Associate in Applied Science degree, the curriculum of the schools differ somewhat. The philosophy at Galveston College is that understanding the medical reasons for individual behavior and social problems is important in the training of a community health worker. The humanities courses taught in college courses are supplemented by case studies and lectures along with student experiences in various community agencies.

The following are required elective courses as set forth for the Community Services Technician as compared with Galveston College students in the Community Health Worker track.

COMMUNITY SERVICES TECHNICIAN (62-68 credits)	COMMUNITY HEALTH WORKER (70 credits)
Orientation	Orientation
Statistics or Math Elective	Business Mathematics
Freshman Composition	Basic Composition
Biology or Science Elective	Anatomy and Physiology
English Literature	Composition and Rhetoric
American Government	Survey of American and Texas Government and Constitutions
General Psychology	Introduction to Psychology
Principles of Sociology	Introduction to Sociology
Principles of Economics	
Humanities	
Public Speaking	
	Associated Health Occupations
	Introduction to Health Occupations
(Two courses from among)	Introduction to Patient Care
The Family	Child Growth and Development
Abnormal Psychology	Psychology of Personality
Black Culture in America	
Psychology of Children	
Psychology of Adolescence	
The Culture of Poverty	
Racism	
Juvenile Delinquency	
Student works two days per week, September-June in the County Social Services Agency, the Community Action Program or the Family and Children Service. Will be assigned a faculty tutor who will supervise his work on the job and grade him on methods of social service. In addition the tutor will assign readings and grade the student in Social Service Theory. Students will be divided into three seminar groups, meeting twice weekly through the academic year in two-hour sessions, covering "The Community and Social Services--History, Philosophy, Organization,Issues and Problems."	Student trains July-June three days per week in Social Service Department, U.T.M.B.; Community Services - Housing Project, Early Childhood Learning Center, various social and welfare agencies. In addition there are lecture sessions to prepare the student to enter each agency. Student also learns medical and psychiatric disorders. Technical Director grades student from evaluations of supervisors in respective agencies.

GALVESTON COLLEGE
DIVISION OF OCCUPATIONAL EDUCATION

ASSOCIATED HEALTH OCCUPATIONS

COMMUNITY HEALTH WORKER
(Meets Associate in Applied Science Degree Requirements)

FIRST YEAR

First Semester

				Hours		
			Class	Lab	Credit	Contact
AHO	141	Interdisciplinary Health Concepts - Introduction to Health Occupations	3	3	4	96
AHO	132	Interdisciplinary Health Practices - Specialized Clerkship	3	0	3	48
BIOL	133	Anatomy & Physiology	3	0	3	
BIOL	113	Anatomy & Physiology Lab	0	2	1	
ENGL	131	Basic Composition	3	0	3	
SOC	131	Introduction to Sociology	3	0	3	
		Total Hours	15	5	17	144

Second Semester

			Class	Lab	Credit	Contact
AHO	143	Interdisciplinary Health Concepts	3	3	4	96
AHO	134	Interdisciplinary Health Practices	3	0	3	48
BIOL	134	Anatomy and Physiology	3	0	3	
BIOl	132	Anatomy and Physiology Lab	0	2	1	
ENGL	132	Composition and Rhetoric	3	0	3	
PSYC	131	Introduction to Psychology	3	0	3	
		Total Hours	15	5	17	144

Second Summer Session

			Class	Lab	Credit	Contact
AHO	155	Applied Health Concepts in Practice	2	16	5	288
		Total Hours	2	16	5	288

SECOND YEAR

First Semester

			Class	Lab	Credit	Contact
AHO	241	Interdisciplinary Health Concepts	2	8	4	160
AHO	242	Advanced Application - Health Concepts and Practices	2	8	4	160
BM	133	Business Mathematics I	3	0	3	

COMMUNITY HEALTH WORKER
(continued)

				Hours	
First Semester(continued)		Class	Lab	Credit	Contact
GOVT 233	Survey of American and Texas Government and Constitutions	3	0	3	
PSYC 231	Child Growth and Development	3	0	3	
	Total Hours	13	16	17	320
Second Semester					
AHO 232	Special Problems and Techniques	3	0	3	48
AHO 243	Advanced Application - Health Concepts and Practices	2	8	4	160
AHO 244	Advanced Interdisciplinary Health Concepts	2	8	4	160
PSYC 233	Psychology of Personality	3	0	3	
	Total Hours	10	16	14	368

Total Semester Credit Hours in Program: 70

COMMUNITY HEALTH WORKER

Course Descriptions

AHO 155
APPLIED HEALTH CONCEPTS IN PRACTICE

The student is introduced to the concepts and principles of Social Work, its skills and methods. Case histories are reviewed and beginning interviewing techniques practiced.

AHO 241
INTERDISCIPLINARY HEALTH CONCEPTS

A review of community resources clarifying their role in attempting to deal with problems of the economically disadvantaged, medically indigent, minorities, children and family services, psychologically and physically handicapped.

AHO 242
ADVANCED APPLICATION - HEALTH CONCEPTS AND PRACTICES

Student learns how to conduct interviews and take case histories. Visits community agencies to learn their procedures. Student may review case studies and accompany professionals on home visits and planned community meetings.

AHO 232
SPECIAL PROBLEMS AND TECHNIQUES

Student is assigned to certain areas of Social Services within UTMB and spends time in a field of his choice in the community under the supervisision of professional staff.

AHO 243
ADVANCED APPLICATION - HEALTH CONCEPTS AND PRACTICES

Will focus on Comprehensive Health Care and Planning -- Philosophy and Practice. Goals and objectives -- the role of the team.

AHO 244
ADVANCED INTERDISCIPLINARY HEALTH CONCEPTS

Student reviews overall learning, both theoretical and practical, determines strengths and weaknesses within himself and prepares for entry into the community health field of his choice.

GOVT 233
SURVEY OF AMERICAN AND TEXAS GOVERNMENT AND CONSTITUTIONS

Study of the institutions of government and their functions from the local level to the national with particular emphasis on the city, county and state governments. Examines in detail and on a comparative basis the United States and Texas Constitutions.

PSYC 231
CHILD GROWTH AND DEVELOPMENT

Human psychological development from birth to adulthood. The birth of the baby; from organism to person; the infant; the toddler; the preschool child; the middle years of childhood; adolescence; disturbances in development; the study of children.

BM 133
BUSINESS MATHEMATICS I

A study is made of fundamental mathematical processes, fractions, decimals, percentage in business, business equations, and simple interest.

PSYC 233
PSYCHOLOGY OF PERSONALITY

A study of major factors and conditions related to personality development, including parent-child relations, personality defense mechanisms, methods of personality measurement, and behavioral pathologies and their treatments.

When students enter the study track in the summer, they spend several hours a day in clinical conditions lectures with other study track students. Within their own study track, the students cover the introduction to social work, its concepts and principles, as well as the skills and methods which are involved. Case records are reviewed to acquaint the student with the various problems as well as the agencies within the community that can be utilized to assist in solving them. Interviewing, and how to obtain information, is also discussed in depth.

By fall, the student is aware of the scope of social work services. At this time the students are given case assignments under the supervision of the Technical Director at The University of Texas Medical Branch. Sometimes the patients requiring assistance are known to various social agencies in their community. The Technical Director strives to give the students local cases so they may visit the agencies involved in order to learn what role the agency is playing in specific case situations. The students are rotated throughout the departments within the hospital to gain knowledge and experience of that service under the direction of trained social workers assigned to specific areas (surgery, psychiatry, children and youth project, and internal medicine).

About mid semester, when the Technical Director feels a student has grasped the fundamentals of the program, this student is sent into the agencies within the community. A two-week rotation under the supervision of the person in charge of each agency is accomplished at the following:

Community Service Division of the Galveston Housing Project
Galveston County Welfare Department
Early Childhood Learning Center

Family Service

ldren and Youth Project - UTMB

An example of coordination between the agencies is that of the Early Childhood Learning Center and Family Service where the latter is the grantee for Social Services for the Early Childhood Learning Center. At Family Service the student may receive case records to understand a particular family problem. At the Early Childhood Learning Center, the student goes on visitations with the professional, usually seeing the family whose case history was studied at Family Service.

Not requiring two weeks but time enough for the student to understand the functions of agencies, the following are part of the community rotation period:

Juvenile Probation Department

YWCA

St. Vincent's Community Center (located in a ghetto area)

These rotations are structured so the student may experience the workings of a sophisticated agency one week and the next week be amid unstructured problems of the ghetto areas.

Special on-going assignments are (1) community meetings to see how group dynamics concepts previously studied are applied and (2) volunteer work in a community project of the student's choice so the student can better understand the role and attitudes of the volunteer.

By the end of the fall semester, the student has completed rotation throughout the community agencies. The student then comes back to The Medical Branch for concentrated "feedback" sessions with the other students.

Their experiences are discussed in depth, and the application of methods and skills are evaluated.

The students are then assigned to departments within the Medical Branch for case work experience. Should a student show deficiencies in one or more areas, as determined by the Technical Director and the supervisors in charge of rotations at the community agencies, this time is utilized for individual assistance.

Then, the latter part of the spring semester, the student who so wishes may request additional time at a certain agency. This is the field the student may wish to enter upon graduation.

Supervision of students in this study track is handled initially on a group basis, but later a one-to-one basis with the Technical Director.

Students

One student joined the program, but left without completing college courses. This student has since returned to Galveston College and is working on all college academic courses. She had successfully passed her clinical work.

She is now employed with the YWCA Youth Services Bureau in Galveston on a part-time basis. She is involved with a beach project which is focused on prevention of drug abuse and dealing with runaways.

Equipment

Facilities and equipment needs would include a desk for every student, preferably one which affords privacy for interviewing. Dictating equipment is also desirable. Students also should have access to the latest periodicals and journals which would help them to stay abreast of developments in the field.

ELECTROENCEPHALOGRAPHY

The fall of 1971 is the first year students have been admitted into the AHO Electroencephalography Technicican program. It was approved for AHO by the Texas Education AGency on July 6, 1971, on a two-year trial basis. A letter from the TEA to Galveston College stated:

> To continue the program on a regular basis beyond the initial two years, you will be required to submit for review an evaluation of the program made immediately after the first class is graduated. This evaluation should include the level of continuing need for the program, types of positions and salary levels available to graduates, trends in development of two years training for EEG technicians nationally, etc.

No standards for training of EEG technicians have been adopted by the American Medical Association (although at the printing they may have been). Those candidates for registry are required to pass a certifying examination encompassing written, oral and laboratory sections. An AMES committee is now meeting to set requirements for uniform education and training.

In lieu of these standards, the AHO program has a curriculum established by the EEG study track faculty which embodies the thinking of the AMES as well as fulfills requirements the AHO faculty deems pertinent.

SUGGESTED NATIONAL STANDARDS	CLOCK HOURS	GALVESTON COLLEGE AHO CURRICULUM COURSE DISTRIBUTION	SEMESTER	CLOCK HOURS
1. <u>Orientation</u>				
A. Introduction to Course		AHO 141 - Interdisciplinary Health Concepts	Semester I	9
B. To Electroencephalography		AHO 141 - Interdisciplinary	Semester I	18
1. history				
2. role and function		AHO 132 - Interdisciplinary Health Practices	Semester I	
3. ethics				
C. Administration (hospitals)		AHO 141 and 132	Semester I	18
1. Physiaal Therapy				18
2. Inhalation Therapy				18
3. Occupational Therapy				18
4. Social Service				18
5. Radiologic Technology				18
D. Medicine and the Law		AHO 141 - Interdisciplinary Health Concepts		3
			TOTAL ---	135
2. <u>Health Concepts</u>				
A. Medical Terminology		AHO 143 - Interdisciplinary Health Concepts	Semester II	54
B. Normal Growth and Development, including:		Psychology 231 - Growth and Development	Semester IV	54
1. childhood				
2. adolescense				
3. senescence		Psychology 131 - Introduction to Psychology	Semester II	54

SUGGESTED NATIONAL STANDARDS	GALVESTON COLLEGE AHO CURRICULUM COURSE DISTRIBUTION	SEMESTER	CLOCK HOURS	
4. physical 5. personality and development				
C. Anacomy and Physiology	Biology 143 and 144	Semester I Semester II	108 108	
D. Abnormal Growth and Development	Psychology of Personality	Semester III	54	
E. Emergency Care	AHO 134 - Interdisciplinary Health Practices	Semester II	30	
			Lecture	Clinic
3. <u>ELECTROENCEPHALOGRAPHIC TECHNOLOGY</u>	AHO 241 - Interdisciplinary Health Concepts (Electroencephalography)	Summer I	1	40
Theory and Application	AHO 242 - Advanced Application Health Concepts and Practices (Electroencephalography)	Semester III	5	90
		TOTAL ---	6	130

SUGGESTED NATIONAL STANDARDS	GALVESTON COLLEGE AHO CURRICULUM COURSE DISTRIBUTION	SEMESTER	CLOCK HOURS	
			Lecture	Clinical
4. SKILLS				
A. Developing skill in interpersonal relationships.	AHO 241 - Interdisciplinary Health Concepts (Electroencephalography)	Semester III	1	9
			1	9
B. Techniques of Teaching 1. Teaching 2. Learning	AHO 242 - Advanced Application Helath Concepts and Practices (Electroencephalography)	Semester III	4	16
C. Communication 1. Establishing Rapport 2. Organic Disease 3. Mental Illness 4. Adult 5. Adolescence 6. Child 7. Infant				
		TOTAL ---	6	36
5. SUPERVISED CLINICAL EXPERIENCE IN LAB				
A. Electrodes Placement 1. Rudiments of brain structure 2. Applying electrodes	AHO 242 - Advanced Application Health Concepts (Electroencephalography)	Semester III	5	

SUGGESTED NATIONAL STANDARDS	GALVESTON COLLEGE AHO CURRICULUM COURSE DISTRIBUTION	SEMESTER	CLOCK HOURS	
			Lecture	Clinical
3. Measuring resistance 4. Cleaning electrodes	AHO 242 - Advanced Application Health Concepts (Electroencephalography)	Semester III		30
B. Artifacts 1. Electrode Artifacts 2. Non symmetrical electrode placement 3. Outside electrical interference 4. Defects in the Electroencephalograph 5. Movement 6. Physiologic Artifacts	AHO 155 - Applied Health Concepts in Practice and AHO 242 - Advanced Application Health Concepts and Practices	Summer I Semester III		38 30
		TOTAL	5	98
C. Recording 1. Controls on the electroencephalograph 2. Montages 3. E.E.G. descriptive terminology (duration, wave forms, phase, frequencies, waking, and sleeping)	AHO 155 - Applied Health Concepts in Practice and AHO 242 - Advanced Application Health Concepts and Practices	Summer I Semester III	10	90 300

SUGGESTED NATIONAL STANDARDS	GALVESTON COLLEGE AHO CURRICULUM COURSE DISTRIBUTION	SEMESTER	CLOCK HOURS Lecture	CLOCK HOURS Clinical
4. Activation procedures 5. Physiologic and pharmacology factors 6. Seizure Management 7. Technician's description 8. Daily review of clinical e experience and technical description 9. Medicolegal 10. History taking	and AHO 243 - Advanced Application Health Concepts and Practices	Semester IV		300
		Total	10	690
D. Non Lab Recording 1. Intensive Care Units 2. Patients Bedside	AHO 232 - Special Problems and Techniques	Semester IV	4	10
E. Administrative 1 1. Electroencephalographer report 2. Filing 3. Scheduling 4. Purchasing	AHO 155 - Applied Health Concepts in Practice	Summer I	1	4
F. Unsupervised Practical Experience	AHO 256 - Applied Health Concepts in Practice I	Summer II		100
G. Clinical Experience in Lab	AHO 232 - Special Problems and Techniques	Semester IV		150
	AHO 244 - Advanced Interdisciplinary Health Concepts	Semester IV		150

	CLOCK HOURS	
	Lecture	Clinical
Total	5	438
GRAND TOTAL	32	1392

GALVESTON COLLEGE
DIVISION OF OCCUPATIONAL EDUCATION

ASSOCIATED HEALTH OCCUPATIONS

ELECTROENCEPHALOGRAPHY TECHNOLOGIST
(Meets Associate in Applied Science Degree Requirements)

FIRST YEAR

		Hours			
First Semester		Class	Lab	Credit	Contact
AHO 141	Interdisciplinary Health Concepts - InIntroduction to Health Occupations	3	3	4	96
AHO 132	Interdisciplinary Health Practices - Specialized Clerkship	3	0	3	48
BIOL 133	Anatomy & Physiology	3	0	3	
BIOL 113	Anatomy & Physiology Lab	0	2	1	
ENGL 131	Basic Composition	3	0	3	
SOC 131	Introduction to Sociology	3	0	3	
	Total Hours	15	5	17	144

Second Semester

AHO 143	Interdisciplinary Health Concepts	3	3	4	96
AHO 134	Interdisciplinary Health Practices	3	0	3	48
BIOL 143	Anatomy & Physiology	3	0	3	
BIOL 114	Anatomy & Physiology Lab	0	2	1	
ENGL 132	Composition and Rhetoric	3	0	3	
PSYC 131	Introduction to Psychology	3	0	3	
	Total Hours	15	5	17	144

Second Summer Session

AHO 155	Applied Health Concepts in Practice	2	16	5	288
	Total Hours	2	16	5	288

SECOND YEAR

First Semester

AHO 241	Interdisciplinary Health Concepts	2	8	4	160
AHO 242	Advanced Application --Health Concepts and Practices	2	8	4	160
BM 133	Business Mathematics I	3	0	3	
PSYC 233	Psychology of Personality	3	0	3	
	Total Hours	10	16	14	320

Second Semester			Class	Lab	Hours Credit	Contact
AHO	232	Special Problems and Techniques	3	0	3	48
AHO	243	Advanced Application - Health Concepts and Practices	2	8	4	160
AHO	244	Advanced Interdisciplinary Health Concepts	2	8	4	160
GOVT	233	Survey of American and Texas Government and Constitutions	3	0	3	
		Total Hours	10	16	14	368

First Summer Session						
AHO	256	Applied Health Concepts in Practice I	2	16	5	288
		Total Hours	2	16	5	288

Total Semester Credit Hours in Program: 72

ELECTROENCEPHALOGRAPHY TECHNOLOGIST

COURSE DESCRIPTIONS

AHO 155
APPLIED HEALTH CONCEPTS IN PRACTICE

A. A brief resume of the history and development of electroencephalography.
B. Terminology - To orient the student to standard electroencephalographic terminology used in the profession.
C. Elementary Principles of Instrumentation - To introduce the student to the use and care of the electroencephalograph, including calibration, standardization, filtration, amplification, and care and preventive maintenance of the machine.
D. Methodology and Artifacts - To provide the student with knowledge and skills necessary to obtain a readable record. Including the preparation of the patient, electrode application, labeling tracings, activation techniques, and recognition of artifacts.
E. Clinical experiences, supervised, as deemed applicable.

AHO 241
INTERDISCIPLINARY HEALTH CONCEPTS

This course provides the student with the basic knowledge of brain structure and its relationship to electroencephalography.

AHO 242
ADVANCED APPLICATION - HEALTH CONCEPTS AND PRACTICES

This course is designed to provide the student with the opportunity to apply practical skills and develop proficiencies in application of techniques to obtain electroencephalograms under clinical conditions. It includes patient contact and practical application in routine encephalography of all age groups. In addition, the student will learn descriptive terminology in interpretation of electroencephalograms which will be reviewed by an electroencephalographer.

AHO 243
ADVANCED APPLICATION - HEALTH CONCEPTS AND PRACTICES

Assignment to the student's area of clinical interest, including specialized instruction in advanced concepts and theory, independent application of technical skills with professional consultation or supervision, and responsible participation as a member of the health team.

AHO 232
SPECIAL PROBLEMS AND TECHNIQUES

This course provides the student with the opportunity to develop skills in handling special or unusual problems such as isolation techniques, coma patients, psychotic or retarded patients, management of seizure patients, portable tracings (coronary care unit, intensive care unit, operating room and emergency room), isoelectric tracings, and research problems. In addition, the student will learn the medico-legal aspects and responsibilities of an electroencephalography technologist. This is also a period for the refinement of work habits, attitudes and administrative activities which will aid the student in making the transition from student to professional.

AHO 244
ADVANCED INTERDISCIPLINARY HEALTH CONCEPTS

This course is designed to provide for additional instruction or supervision in highly unique procedures or techniques essential to meet standards of existing certification bodies for electroencephalography.

AHO 256
APPLIED HEALTH CONCEPTS IN PRACTICE I

This course is designed, upon completion of formal classroom lectures, to allow the student to function independently as an electroencephalographist in unsupervised laboratories. Upon satisfactory completion of this independent work period, the student will be examined by written and oral examinations and in the actual laboratory performance by the Board of the American Medical Electroencephalography Society for certification by that society. (Depending upon outcome of AMA EEG credentials committee, this course may have to be altered).

MATH 133
BUSINESS MATHEMATICS I

A study is made of fundamental mathematical processes, fractions, decimals, percentage in business, business equations, and simple interest.

PSYC 233
PSYCHOLOGY OF PERSONALITY

A study of major factors and conditions related to personality development, including parent-child relations, personality defense mechanisms, methods of personality measurement, and behavioral pathologies and their treatments.

GOVT 233
SURVEY OF AMERICAN AND TEXAS GOVERNMENT AND CONSTITUTIONS

Study of the institutions of government and their functions from the local level to the national with particular emphasis on the city, county, and state governments. Examines in detail and on a comparative basis the United States and Texas Constitutions.

PSYC 231
CHILD GROWTH AND DEVELOPMENT

Human psychological development from birth to adulthood. The birth of the baby; from organism to person; the infant; the toddler; the preschool child, the middle years of childhood; adolescence; disturbances in development; the study of children.

The Technical Director for EEG previously had conducted a certificate program in EEG (which involved six months of study before a student could take national registry examinations). The feeling of the Technical Director as well as the Electroencephalographer was this time was insufficient to produce a highly-trained technician. They established the current program through the AHO department.

The objectives of the AHO study track are (1) to graduate students who will pass the EEG registry examinations and (2) because the field is so new and very few training centers are available for students, the faculty believes these students graduating with AAS degrees will be among the better-educated EEG technicians and will be called upon to teach. Therefore, the EEG faculty has established this curriculum and training to give these students a wide range of experiences including a special confidence-building examination to prepare them for thier work as technicians and possible instructors.

Curriculum

Students wishing to enter the EEG study track are interviewed by the Technical Director. Although there are no set standards for entrance, the director prefers to consider students who have had a low record of absences during the first year, have maintained at least a C average, and preferably have had previous employment (part-time work included). The director feels that a student who indicates the ability to be successfully employed and who is conscienticus about employment is possibly more trainable than the person who has a high scholastic average with no experience in a work situation.

The nature of administering electroencephalograms requires a person with patience, one who is able to relate to people and manage them, and who is capable of working alone since most health facilities have only one EEG technician on the staff. Those students who have a desire to experience the new and different throughout their work-life undergo more intense counseling since the EEG technician's work is basically routine after skills and technique have been attained.

The first six weeks is spent in observation of the procedures and familarization with the equipment and the language. During this period, the student is not required to obtain knowledge which will be tested. The reason for the orientation session is that the standard texts for EEG technicians begin with so much technical language, the student will soon become confused unless he has had the opportunity to see and basically to understand what is presented in the text.

Students begin their experience on a one-to-one ratio with a licensed EEG technician. Lectures and clinical application are interrelated, the instructor lecturing on a particular subject, and then the students experiencing their new knowledge with the patients and at the machines. Lecture times are not structured; therefore, the students are free to take the time they need to learn a segment. They are tested individually on the things they have learned. For example, a student taking a test will be given parts of EEG tracings which she administered and had explained to her. All students will have experienced the same readings by the time the course is completed. The first summer and fall semesters, statistics reveal the students took an average of 131 tracings.

Because of the relative isolation of an EEG technician in a health care facility, the students are also taught basic electronics of the EEG machine. At the present time there are no district representatives for EEG machines, and the technician must function as a mechanic by circumstance.

The students are graduated at the end of July during the second summer of their studies. They are required this extra time because of the number of tracings they must complete as well as their spending time alone in a medical facility as part of the final examination. As previously stated, most EEG technicians function as a staff of one in a health facility.

For this reason, the students undergo a special one-month testing period. Each student is taken to a nearby hospital which employs an EEG technician (St. Mary's Infirmary). The student becomes familiar with the facility for a period of two weeks. Then, by arrangement with the hospital, the staff EEG technician from St. Mary's rotates to John Sealy Hospital, and the student is left alone in the dpartment for a month. The student will be able to call the Technical Director if problems arise; however, no physical assistance will be given me the student is there. After having successfully comple St. Mary's, the student will have successfully passed the final examination for the course.

Students

Four students have been accepted into the program. They will complete their clinical experience in July. Of the four, one student has made special arrangements because of illness. This student had initially entered the AHO program in the fall, 1969, and had dropped from radiologic technology during the first summer session. Her reason for leaving was the discovery of a brain tumor. After one year's absence, the student again asked to be admitted into the program in the EEG study track. She again became ill during the fall semester, and she was forced to be absent even though she was maintaining a 3.0 in her EEG work. She has now recovered sufficiently to again be present.

The other three students have already shown their accomplishments. Entering the program, one student had a 2.4 composite grade average, another a 2.0 average, and the third, a 2.3. At the end of the fall semester, all students made the Dean's List at Galveston College. Those making this list achieve a grade point average of 3.0 to 3.4 in the semester.

Five medical facilities have contacted the Technical Director, indicating positions available to the graduates. One is within a forty mile radius of Galveston; the rest are in Texas. The lowest salary offered was $500 a month, and one facility indicated the salary was open. One of the positions is for teaching as well as for technical work.

Facilities

The equipment needed to equip a laboratory for the teaching of EEG technicians should be in sufficient quantity to permit the students to function when they are in the clinics and not have to wait for facilities to become available.

Suggested equipment for 15 EEG students in a laboratory would be five electroencephalograph machines, one photo stimulator and five reclining chairs.

INHALATION THERAPY

Inhalation Therapy (Pulmonary [illegible]) was the first study track to be approved by the Texas Educa[illegible]gency. Because the Agency did not have a designation at that time for this type of program, the entire AHO grouping of courses was under the section of Inhalation Therapy. This was changed in 1971.

There were no ongoing programs of inhalation therapy at The University of Texas Medical Branch as there were in other study tracks (radiologic technology, physical therapy, occupational therapy). This program was developed because of the need for trained inhalation therapists and because facilities and manpower were available for training students. In another part of this chapter will be a listing of the equipment needed for the training of these students, since it is necessary that a fully-equipped and staffed clinical setting be available.

The curriculum was planned according to the requirements established by the Joint Review Committee for Inhalation Therapy Education of the American Medical Association. In every case the required hours of study for an essential have been exceeded by the hours established at Galveston College. The provisional accreditation of this program with the stipulation of a site visit within a year was announced in January, 1972.

Curriculum

Because of the requirement of clinical hours, the study track is extended beyond the usual two years, and most students complete their clinical hours by the end of October during their third year. The following is the curriculum and course descriptions for inhalation therapy with the chart showing the compliance with AMA standards.

DISTRIBUTION OF SPECIFIC INHALATION THERAPY ASSISTANT SUBJECT MATTER AS STIPULATED BY THE "STANDARDS" OF THE AMERICAN PHYSICAL THERAPY ASSOCIATION, ACCORDING TO REQUIRED COURSES.

AMA ESSENTIALS	CURRICULUM DISTRIBUTION	CR	SEMESTER	CLOCK HOURS
A. APPLIED SCIENCES				
1. Anatomy	Biology 143	4	I	108
2. Microbiology	Biology 135	3	III	54
3. Chemistry	Chemistry 141	4	III	108
4. Pathology	AHO 155 Applied Health Concepts in Practice	*5	Summer I	40
5. Pharmacology	AHO 155 Allied Health Concepts in Practice		Summer I	35
6. Physiology	Biology 144	4	II	108
7. Psychology	Psychology 131 Introduction	3	I	54
8. Physics	AHO 242 Advanced Application - Health Concepts and Practices	*4	III	75
TOTAL		27		582

*Courses so designated show college credit only once due to the fact that several units of Essentials may be presented in a course.

AMA ESSENTIALS	CURRICULUM DISTRIBUTION	CR	SEMESTER	CLOCK HOURS
B. PROCEDURES				
1. Analysis, Gas	AHO 243 Interdisciplinary Health Concepts &	*4	IV	60
	AHO 232 Special Problems and Techniques	*3	IV	
2. Airway Management	AHO 241 Interdisciplinary Health Concepts	*4	III	30
3. Administration, Oxygen	AHO 241 Interdisciplinary Health Concepts		III	80
4. Administration, Other Gases	AHO 241 Interdisciplinary Health Concepts		III	55
5. Humidification and Aerosols	AHO 155 Applied Health Concepts in Practice		*Summer I*	120
6. Ventilation. Assistance and Control	AHO 243 Interdisciplinary Health Concepts		IV	205
7. Resuscitation	AHO 241 Interdisciplinary Health Concepts		III	40
8. Lung Physiotherapy	AHO 244 Advanced Application, Health Concepts and Practices		IV	25
9. Spirometry	AHO 232 Special Problems and Techniques		IV	30
10. Equipment, Maintenance	AHO 155 Applied Health Concepts in Practice		I	120

	AMA ESSENTIALS	CURRICULUM DISTRIBUTION	CR	SEMESTER	CLOCK HOURS
11.	Blood Gases	AHO 232 Special Problems and Techniques		IV	40
	TOTAL		11		747
C.	CLINICAL APPLICATION				
1.	Emergency	AHO 256 Applied Health Concepts in Practice I (a clinical preceptorship)	*5	Summer II	60
2.	Medicine				135
3.	Obstetrics				30
4.	Pediatrics				100
5.	Surgery, General	& AHO 267 Applied Health Concepts in Practice II (a clinical preceptorship)			85
6.	Surgery, Thoractic				85
7.	Neurosurgery	& AHO 268 Applied Health Concepts in Practice III (a clinical preceptorship)			45
8.	Outpatient Clinic				45
	TOTAL		13		585
D.	ETHICS AND ADMINISTRATION	AHO 131 Interdisciplinary Health Concpets			47

AMA ESSENTIALS	CURRICULUM DISTRIBUTION	CR	SEMESTER	CLOCK HOURS
E. NURSING ARTS	AHO 144 Interdisciplinary Health Practices			138
TOTAL CLOCK HOURS IN INHALATION THERAPY PROGRAM (This does not include orientation courses and other general educational courses required of students enrolled in the Associated Health Occupations Program)				2099

GALVESTON COLLEGE
DIVISION OF OCCUPATIONAL EDUCATION

ASSOCIATED HEALTH OCCUPATIONS

INHALATION THERAPIST

(Meets Associate in Applied Science Degree Requirements)

FIRST YEAR

First Semester			Hours			
			Class	Lab	Credit	Contact
AHO	141	Interdisciplinary Health Concepts - Introduction to Health Occupations	3	3	4	96
AHO	132	Interdisciplinary Health Practices - Specialized Clerkship	3	0	3	48
BIOL	133	Anatomy & Physiology	3	0	3	
BIOL	113	Anatomy & Physiology Lab	0	2	1	
ENGL	131	Basic Composition	3	0	3	
SOC	131	Introduction to Sociology	3	0	3	
		Total Hours	15	5	17	144

Second Semester			Class	Lab	Credit	Contact
AHO	143	Interdisciplinary Health Concepts	3	3	4	96
AHO	134	Interdisciplinary Health Practices	3	0	3	48
BIOL	134	Anatomy & Physiology	3	0	3	
BIOL	114	Anatomy & Physiology Lab	0	2	1	
ENGL	132	Composition and Rhetoric	3	0	3	
PSYC	131	Introduction to Psychology	3	0	3	
		Total Hours	15	5	17	144

Second Summer Session			Class	Lab	Credit	Contact
AHO	155	Applied Health Concepts in Practice	2	16	5	288
		Total Hours	2	16	5	288

SECOND YEAR

First Semester			Class	Lab	Credit	Contact
AHO	241	Interdisciplinary Health Concepts	2	8	4	160
AHO	242	Advanced Application - Health Concepts and Practices	2	8	4	160
MATH	141	College Algebra	3	2	4	
PHSC	241	Physical Science for Health Occupations	4	0	4	
		Total Hours	11	18	15	320

INHALATION THERAPIST
(continued)

Second Semester

			Hours		
		Class	Lab	Credit	Contact
AHO 232	Special Problems and Techniques	3	0	3	48
AHO 243	Advanced Application - Health Concepts and Practices	2	8	4	160
AHO 244	Advanced Interdisciplinary Health Concepts	2	8	4	160
BIOL 135	Microbiology	3	0	3	
GOVT 233	Survey of American and Texas Government and Constitutions	3	0	3	
	Total Hours	13	16	17	368

First Summer Session

		Class	Lab	Credit	Contact
AHO 256	Applied Health Concepts in Practice I	2	16	5	288
	Total Hours	2	16	5	288

Second Summer Session

		Class	Lab	Credit	Contact
AHO 267	Applied Health Concepts in Practice II	2	16	6	288
	Total Hours	2	16	6	288

THIRD YEAR

First Semester

		Class	Lab	Credit	Contact
AHO 268	Applied Health Concepts in Practice III	0	35	6	560
	Total Hours	0	35	6	560

Total Semester Credit Hours in Program: 89

INHALATION THERAPY

Course Descriptions

AHO 155
APPLIED HEALTH CONCEPTS IN PRACTICE CREDIT: 5

This course is designed to provide the student with the initial concepts of procedures and techniques, and an overview of inhalation therapy in action. In addition to an introduction to the inhalation therapist's role and function in major medical areas, the student will experience, under the supervision of an inhalation therapist, the application of those procedures being learned. The student will gain basic skills and procedures as applied to inhalation therapy. Emphasis is focused upon developing a practical body of knowledge related to a high standard of patient care.

Objectives:

1. To allow the student to examine his own individual abilities through actual participation in procedures and techniques, and to acquaint him with an understanding of proper clinical practices.
2. To allow the student to gain experience in the maintenance of materials and equipment.
3. To allow the student to gain specific knowledge concerning the adjustment of procedures and techniques to individual patient care.
4. To assist the student in learning to analyze problems and possible solutions in order to accomplish specific tasks related to procedures and techniques which are unique to inhalation therapy.
5. To aid the student in developing basic understanding of the utilization of various procedures and techniques of inhalation therapy as they relate to a high standard of patient care.

AHO 241
INTERDISCIPLINARY HEALTH CONCEPTS CREDIT: 4

This course is designed to provide assignment to the student's area of interest, inhalation therapy, including application of techniques, procedures, and individual student development of basic skills. Emphasis is placed upon providing the student with comprehensive information concerning specific aspects of inhalation therapy, including methods of treatment and treatment philosophies.

Objectives:

1. To provide the student with knowledge and understanding of the dynamic concepts, procedures and techniques of inhalation therapy.
2. To provide the student with the knowledge of treatment procedures unique to inhalation therapy.
3. To allow the student to gain specific knowledge of procedures and techniques of inhalation therapy as they relate to a high standard of patient care.

AHO 242
ADVANCED APPLICATION - HEALTH CONCEPTS AND PRACTICES CREDIT: 4

This course is designed to provide the student with knowledge of procedures and techniques unique to inhalation therapy and their direct application to patient care. Emphasis is placed on the individual student's development of intermediate technical skills as applied to inhalation therapy.

Objectives:

1. To aid the student in developing a basic understanding of the pathophysiological basis for intermittent positive pressure therapy and, under supervision, to apply this knowledge in the clinical area.
2. To provide the student with supervised clinical experience in treatment of patients, within all age groups, with respiratory problems.
3. To allow for the individual students development of intermediate technical skills which are unique to the clinical area of inhalation therapy.
4. To develop aims and attitudes which are directive in aiding the student in achieving an understanding of clinical procedures as they relate to a high standard of patient care.

AHO 232
SPECIAL PROBLEMS AND TECHNIQUES CREDIT: 3

This course has been designed to provide the student with the opportunity to explore in greater depth the procedures and techniques used in inhalation therapy. Emphasis is placed on exploration of new areas of techniques, the reinforcement of previously learned skills, and the analysis of procedures and techniques for application to inhalation therapy.

Objectives:

1. To allow the student to explore new areas of procedures and techniques which are unique to inhalation therapy.

2. To allow the student to gain additional experience in the application of procedures and techniques as they relate to patient care.

3. To allow the student to gain greater knowledge of the adjustment of procedures and techniques to inhalation therapy treatment.

4. To allow the student to reinforce previously learned skills in the area of procedures and techniques.

5. To assist the student in developing sound methods of analysis of procedures and techniques for application to inhalation therapy treatment.

AHO 243
ADVANCED APPLICATION - HEALTH CONCEPTS AND PRACTICES CREDIT: 4

This course is designed to provide the student with assignment to the student's area of interest, inhalation therapy, for supervised application of techniques and individual student development of intermediate technical skills as applied to inhalation therapy treatment. Emphasis is placed on actual clinical application, under direct supervision, of proficiencies and compentencies learned in previous didactic courses.

Objectives:

1. To provide the student with supervised clinical experience in treatment of patients, within all age groups, with respiratory problems.

2. To provide the student with direct contact experience, under supervision, with patients of all age groups who have respiratory problems.

3. To develop aims and attitudes which are directive in aiding the student in achieving an understanding of clinical procedures as they relate to a high standard of patient care.

AHO 244
ADVANCED INTERDISCIPLINARY HEALTH CONCEPTS CREDIT: 4

This course is designed to provide assignment to the student's area of clinical interest, inhalation therapy, for instruction in specialized concepts and theory, supervised application of techniques and procedures and individual student development of intermediate technical skills. Emphasis will be placed on providing the student with comprehensive information concerning the aspects of blood gas analysis, pulmonary functions, spiometry, and chest physiotherapy as applied to the specialized area of inhalation therapy.

Objectives:

1. To provide the student with knowledge and understanding of the specialized concepts as they apply to inhalation therapy.

2. To provide the student with the knowledge and understanding of these specialized concepts as they relate to patients with respiratory problems.

3. To allow the student to gain specific knowledge concerning the adjustment of procedures and techniques as they relate to patient care.

AHO 256
APPLIED HEALTH CONCEPTS IN PRACTICE I CREDIT: 5

This course is designed to provide assignment to the student's area of clinical interest for additional instruction or supervision in highly unique procedures or techniques essential to meet standards of selected health occupations. Emphasis will be placed on providing the student with comprehensive information concerning the aspects of theoretical management of patients in selected areas for directed experience utilizing special procedures unique to inhalation therapy.

Objectives:

1. To provide the student with knowledge and understanding of the specialized concepts as they apply to inhalation therapy.
2. To provide the student with the opportunity to apply these specialized concepts in directed experience in patient care.
3. To allow the student to gain specific knowledge concerning the adjustment of procedures and techniques as they relate to individual patient care.

AHO 267
APPLIED HEALTH CONCEPTS IN PRACTICE II CREDIT: 6

This course is designed to provide assignment to the student's area of clinical interest, inhalation therapy, for additional instruction or supervision in highly unique procedures or techniques essential to meet standards of selected health occupations. Emphasis is placed on providing the student with the opportunity to apply skills and knowledge in actual patient care in the specialized area of inhalation therapy.

Objectives:

1. To provide the student with actual application of the procedures and techniques learned in preceding course work.
2. To allow the student to refine techniques essential to treatment of patients with respiratory problems.
3. To allow the student to gain specific experience in the adjustment of procedures and techniques as they relate to a high standard of patient care.

AHO 268
APPLIED HEALTH CONCEPTS IN PRACTICE III CREDIT: 6

Continuation of AHO 267

MATH 141
COLLEGE ALGEBRA CREDIT: 4

An introduction to the basic concepts of modern algebra. Topics are taken from logic and theory, the development of the number systems, relations, functions, equations, inequalities, determinants, and matrices, probability and mathematical induction.

PHSC 241
PHYSICAL SCIENCE FOR HEALTH OCCUPATIONS CREDIT: 4

Theory of matter, structure of atoms and molecules, valence and binding, oxidation and reduction, nature of acids and basis, heat and the states of matter. The atmosphere, its constituents, the gas laws, diffusion, and laminar and turbulent flow of fluids.

BIOL 135
MICROBIOLOGY CREDIT: 3

General principles; asepsis, disinfection and sanitation, infection, immunity and allergy; bacteriology; general pathology.

GOVT 233
SURVEY OF AMERICAN AND TEXAS GOVERNMENT AND CONSTITUTIONS CREDIT: 3

Study of the institutions of government and their functions from the local level to the national with particular emphasis on the city, county, and state governments. Examines in detail and on a comparative basis the United States and Texas Constitutions.

When a student chooses to apply for the inhalation therapy study track, he is interviewed by two or three persons in inhalation therapy, usually the Medical Director, the Associate Technical Director for Education and the Technical Director of the Pulmonary Therapy Service.

There is no set interview form which they utilize since they are at liberty to interview the student in their own manners to bring out the following:

1. Depth of interest in a subject. This does not necessarily have to be related to inhalation therapy, but to show that a student has a curiousity for education. Inhalation Therapy contains a great amount of detailed training, and it is necessary that a student have the ability to think through problems as well as the tenacity to investigate all possibilities before coming to a decision.
2. Facility with hands and ability to think under stress. The student who displays an interest in using his hands by hobbies or previous employment merits consideration since this occupation is concerned with these attributes. The thinking under stress could be brought out by having the student relate an incident requiring quick-thinking, and what the student did in that moment is what they want to determine.
3. An interest in science and mathematics has to be part of the student's background since so much depends upon the student's abilities in these fields. A "C" or better in math courses is a requirement, hopefully the student has made better than a C.

When the student enters the program in the summer, he spends most of his time in lecture for the first weeks. The student is exposed to the science and math he will be encountering as well as the equipment. Only after the equipment is explained in the classroom will the student be allowed to accompany a therapist in the clinic. Therefore, the summer is approximately 70% instruction and 30% patient contact.

After the equipment is covered didactically, the students are then exposed to patient treatment in the classroom. After a lecture on a subject, the students then accompany the therapist into the clinic to see that particular procedure. The ratio of instruction to clinical experience begins to tend toward 50% - 50% by the time the fall semester has been completed.

Also during this time the student is learning physical science and getting basic algebra in the college studies. To have these courses completed by the beginning of the fall semester is the ideal situation for the clinical faculty. Time has to be spent teaching areas which have not yet been covered in physical science in order to keep the clinical training schedule according to the essentials.

By the time the spring semester has begun, the students have been exposed to the equipment and most of the treatments. Their didactic and patient treatment are now covered together, utilizing whatever patients are "in the house."

Then, in June until the student completes clinical training at the end of October, the student is placed in a clinical preceptorship. He is exposed to highly unique procedures or techniques essential to meet the AMA standards. He is rotated through specified clinical areas of emergency room, medicine, obstetrics, pediatrics, general surgery, thoracic surgery, neurological surgery, recovery room, out-patient clinic, shock therapy, renal dialysis, cardiac catherization and x-ray diagnostic areas.

Upon successful completion of required hours and didactic study, the students are then eligible to take the certifying examinations for registered inhalation therapists.

Should a student make below a C in any of the units of study, those units must be made up. Because of the other essentials to be met, there is not time to repeat a unit during the school year, and the student will have to be placed on a space-available basis the following year.

The progress of the student both academically, clinically and mentally is followed by the interested faculty members by reading student diaries. The diary is developed by the student and turned in at monthly intervals. Problems requiring individual answers or discussions are included. It is also considered as their sounding board for teaching abnormalities requiring correction.

Checks are made periodically to determine the subject matter covered in relation to essentials with on-going analysis of lectures and clinical applications.

Perhaps the most important written portion of the student's training is the case histories which they are required to write on assigned aptients. These were devised by the department to train the students to be thorough and to follow-through. Case histories are turned in for credits and grades.

Once a week there is an informal seminar. It is primarily conducted by the students who research topics and report on them. Some subjects have been congenital heart problems and stress of newborns. The seminar is, of course, to give the student in-depth knowledge, but the underlying factor is the development of self-confidence within the student and the student's ability to communicate with others.

Students

The first class of students in inhalation therapy numbered two. Neither finished the program because they were improperly prepared educationally and emotionally unable to handle the needs and stress of the program. Although they tried very hard, notes the instructor, they were unable to succeed even though one could have succeeded scholastically.

The second class enrolled the maximum number allowed, ten students. One dropped temporarily for physical reasons and two others were on scholastic probation and could not handle the studies. Although a good C student is acceptable to most AHO programs, it is necessary that the student have a better than average background in science and math since much depends on academic success in these fields. The program cannot be slowed to help those weak in those subjects or the clinical time would have to be extended beyond the period now stipulated.

The students currently in the program (7) range in grade and motivation from excellent to a little above average. From an evaluation by the Medical Director on these students:

"The one with the highest grades is not clinically conscientious and is not yet aware of the real challenge of physiology involved."

"One student is scholastically and clinically competent and over conscientious -- needs personal assurance to avoid being up-tight.

"One student is scholastically competent as well as clinically adept, but has yet to become opinionated or scientifically argumentative about anything -- too permissive."

"Three students are good 'plodders' and on their own are fulfilling in some background they need. These three have a need to succeed -- they have a goal -- and merely need guidance and repetition for learning what they need."

"One student is scholastically in the above average class, but is as yet too superficial because of past 'life experience' -- the student should not be so, but is a combination of curiousity and sometimes hypochondria toward all patients, which doesn't really affect ability (except negatively) in this area."

These notes were made in November of 1971. The following are the notes made on the same students having achieved some six more months of training:

"The student who had the highest grades no longer has these. As the course material became more difficult, his depth became less in some areas and his correlation does not come easy. He is not meeting his challenges in sufficient depth. This is barely beginning to impress him, who likes not repetition."

"The up-tight student has begun to relax and show true ability based on some post practical experience. Filling-in-the gaps is her game now, and this is producing an outstanding result."

"The scholastically competent, but permissive student shows an occasional flash of determination, but not nearly enough."

"The 'plodders' are steady and improving, but slowly. Competence shown in unusual ways sporadically, but it is there."

"The above average hypochondria type still retreats behind excuses, and must be manipulated to show accomplishment, of which the student is capable."

Equipment

The following equipment is suggested to equip a laboratory and clinical training area for 15 students of inhalation therapy:

AREA

200 square feet for lab

50 square foot storage - shelving on wall

15 lockers

15 chairs - counter - two work tables

1 large sink for equipment

Estimated Cost $2,000.00

	EST. COST	# EA.	TOTAL
Equip:			
X Ray view box	$ 200.00	1	$ 200.00
Chalk - magnetic blackboard	200.00	1	200.00
Overhead projector - complete	300.00	1	300.00
16mm projector, sound	700.00	1	700.00
Slide projector 4 x 4 slides	500.00	1	500.00
2 x 2 slide projector - complete	300.00	1	300.00
Tape Recorder, Playback etc.	400.00	1	400.00
Bird 7 Teaching cut-away	25.00	1	25.00
Set Bird slides	25.00	2	50.00
Set Bennett slides	350.00	1	350.00
Set Bird Films (6)	1,500.00	1	1,500.00
Sets Bird manuals, complete	15.00	15	225.00
Brady teaching manual, slides & overlays	300.00	1	300.00
Teaching manual & slides	300.00	1	300.00
Glenn Series	200.00	1	200.00
Set Misell overlays (phys, Anat, etc)	150.00	1	150.00
Tape reserves	100.00	1	100.00
Tape recorder - playback Casette	130.00	1	130.00
Set charts - all systems	500.00	1	500.00
Skeleton	350.00	1	350.00
Set lung (models)	250.00	1	250.00
Resuscianne - complete	1,500.00	1	1,500.00
Intubation mannikin (Laerdahl)	2,000.00	1	2,000.00
Pertinent library books	4,000.00	200	4,000.00
Cryogenie Air Compressor & outlets & tubing & wall adapters	2,700.00	1	2,700.00
Wright Spirometer	300.00	1	300.00

	EST. COST	# EA.	TOTAL
Jone's Pulmonar	$ 600.00	1	$ 600.00
Set ENDO Tubes, adpaters, laryngoscopes and box container - trach tubes	250.00	1	250.00
Bird Mark 7	400.00	8	3,200.00
Bird Mark 8	500.00	4	2,000.00
Bird Mark 10	419.00	4	1,676.00
Bird Mark 14	726.00	4	2,904.00
Mark 1	300.00	2	600.00
Mark 4	600.00	1	600.00
Asthmatic	175.00	2	350.00
Pediatric Model	950.00	2	1,900.00
Bird flow controller	1,250.00	2	2,500.00
Bennett AP IV	440.00	8	3,420.00
AP V	350.00	8	2,800.00
PR I	495.00	4	1,980.00
PR II	625.00	4	2,500.00
TV2P	350.00	4	1,400.00
Oxygen analyzer MIRA	185.00	2	370.00
Beckman	440.00	2	880.00
IMI	795.00	2	1,590.00
Bio-Marine	285.00	2	570.00
OEM	495.00	2	990.00
Flowmeters, wall type			
Thorpe	24.50	8	196.00
Bourdon	24.50	8	196.00
Flowmeter, regulator type			
Thorpe	46.00	8	368.00
Bourdon	56.00	8	448.00
Nebulizers			
Bennett All Purpose	60.00	8	480.00
Mistogen	105.00	8	840.00
Ultra sonic	400.00	4	1,600.00
Humidifiers			
Bennett Bubble Jets	20.00	4	80.00
Defensor	80.00	4	320.00
Cascade	187.50	4	750.00
Air Viva kit	50.00	1	50.00
Ambu kit	50.00	1	50.00
Hope kit	50.00	1	50.00
PMR kit	50.00	1	50.00
Tubing (large bore)	3.00	20	60.00
Tubing (small bore)	.45	50	22.50
O_2 tent	940.00	2	1,880.00
Croupette	400.00	2	800.00
Sub-Total	$30,471.95		$58,850.50

ITEM	PRICE EACH	# EA.	TOTAL
Regulators:			
One-stage (Hcyl)	@ $ 50.00	4	$ 200.00
Two-stage (Hcyl)	@ 60.25	4	241.00
Yoke regulator (E cyl)	@ 42.50	2	85.00
Masks:			
Non-rebreathing	@ 2.00	4	8.00
Partial-rebreath	@ 1.75	4	7.00
High conc. aerosol	@ .40	4	1.60
Aerosol	@ .40	4	1.60
Venturi 24%	@ 2.25	4	9.00
Venturi 28%	@ 2.25	4	9.00
Venturi 35%	@ 2.25	4	9.00
Venturi 40%	@ 2.25	4	9.00
Catheters	@ .25	24	6.00
Cannulas	@ 1.65	24	39.60
Face tents	@ 5.85	4	23.40
Trach collars, adult-pedi	@ 1.50	4	6.00
Stethescopes	@ 10.00	4	40.00
Floor mats	@ 50.00	8	400.00
Wall Clock	@ 25.00	1	25.00
Tools (set)	@ 100.00	4	400.00
Suction unit	@ 200.00	2	400.00
Adjustable (3 gate) bed complete (not electric)	@ 1,000.00	1	1,000.00
TOTAL 1 Ea.	$32,032.50	TOTAL	$61,770.70

Access to - but not immobilized in a Lab.

M.A. I Resp	$ 5,000.00	1	$ 5,000.00
Ohio 560	5,000.00	1	5,000.00
Emerson Resp Adult & Pediatric models	3,000.00	1ea.	6,000.00
Blood Gas Machine	3,000.00	1	3,000.00
Bourne's Resp	7,000.00	1	7,000.00
Gas Sterilizer 4 cu. ft.	4,000.00	1	4,000.00
Cleaning, Pkging & Drying Equip.	5,000.00	1	5,000.00
Incubator	1,000.00	1	1,000.00
ECG Monitor	700.00	1	700.00
Crash Cart	7,000.00	1	7,000.00
O_2 Blender	250.00	1	250.00
TOTAL 1 Ea.	$40,950.00	TOTAL	$43,950.00

MANAGEMENT ASSISTANT

This study track was approved for fall, 1969. No students have enrolled in this program who are taking full-time AHO studies. Evaluations by prospective students in clinical affiliations indicate they do not consider this area to be a health care activity. This concept is held since skills and competencies needed for this area of employment are not patient-centered, but focused on business practices.

This field as a specialty within a health facility is relatively new, and it will take time for it to develop into a professionally-accepted program as are the other study tracks. The supportive services for a health facility -- business wise -- are increasing. With insurance, Medicare and Medicade, the need for more documentation and control over supplies and work hours to keep hospital costs down -- all are connected to a need for qualified personnel not only with business and clerical knowledge, but the knowledge of functions of a medical facility.

The study track was established because persons who already held supervisory or managerial positions within the U.T.M.B. wished to upgrade their skills. These students are attending Galveston College on a part-time basis to complete all academic courses before undertaking the area of clinical study. They are not included in the statistics on students discussed in another chapter. When these students have completed their academic studies, they will probably request a challenge examination for credits in their clinical areas.

The fact that there are no students in this study track does not mean it will be phased out of the curriculum. This study track can lie dormant until a student desires to enter it. It holds no detrimental or restraining force on the AHO program itself, yet is available on a request basis from students within the community the college serves. This study track in itself satisfies the requirements of TEA guidelines:

> In developing new programs, consideration will be given primarily to the occupational needs of students within the community. Secondary consideration will be given to the employment needs of the community and the state.
> (Series 1000, 1070 Priorities)

There are no national guidelines for curriculum; therefore, the study track was established by the Advisory Committee with recommendations from the Department of Unit Management at The University of Texas Medical Branch. The future of the Management Assistant is not confined to Unit Management, and a student could elect to have his field of concentrated clinical study in the business office, central supply, transportation, patient finance, purchasing, housekeeping, laundry, personnel or any other field related in a financial or clerical way to a medical facility. Persons with an Associate of Applied Science and years of experience in a particular field could possibly expect promotion to managerial positions otherwise unattainable.

The curriculum for Management Assistant is given as follows:

GALVESTON COLLEGE
DIVISION OF OCCUPATIONAL EDUCATION

ASSOCIATED HEALTH OCCUPATIONS

HOSPITAL MANAGEMENT ASSISTANT

(Meets Associate in Applied Science Degree Requirements)

FIRST YEAR

First Semester

			Hours			
			Class	Lab	Credit	Contact
AHO	141	Interdisciplinary Health Concepts - Introduction to Health Occupations	3	3	4	96
AHO	132	Interdisciplinary Health Practices - Specialized Clerkship	3	0	3	48
BIOL	133	Anatomy & Physiology	3	0	3	
BIOL	113	Anatomy & Physiology Lab	0	2	1	
ENGL	131	Basic Composition	3	0	3	
SOC	131	Introduction to Sociology	3	0	3	
		Total Hours	15	5	17	144

Second Semester

			Class	Lab	Credit	Contact
AHO	143	Interdisciplinary Health Concepts	3	3	4	96
AHO	134	Interdisciplinary Health Practices	3	0	3	48
BIOL	134	Anatomy & Physiology	3	0	3	
BIOL	114	Anatomy & Physiology Lab	0	2	1	
ENGL	132	Composition and Rhetoric	3	0	3	
PSYC	131	Introduction to Psychology	3	0	3	
		Total Hours	15	5	17	144

Second Summer Session

			Class	Lab	Credit	Contact
AHO	155	Applied Health Concepts in Practice	2	16	5	288
		Total Hours	2	16	5	288

SECOND YEAR

First Semester

			Class	Lab	Credit	Contact
AHO	241	Interdisciplinary Health Concepts	2	8	4	160
AHO	242	Advanced Application - Health Concepts and Practices	2	8	4	160
ACCT	141	Office Accounting I	3	3	4	96
GOVT	233	Survey of American and Texas Government and Constitutions	3	0	3	
		Total Hours	10	19	15	416

HOSPITAL MANAGEMENT ASSISTANT
(continued)

Second Semester			Hours Class	Lab	Credit	Contact
AHO	232	Special Problems and Techniques	3	0	3	48
AHO	243	Advanced Application - Health Concepts & Practices	2	8	4	160
AHO	244	Advanced Interdisciplinary Health Concepts	2	8	4	160
ACCT	142	Office Accounting II	3	3	4	96
BA	231	Business Law	3	0	3	
		Total Hours	13	19	18	464

Total Semester Credit Hours in Program: 72

MANAGEMENT ASSISTANT

Course Descriptions

AHO 155
APPLIED HEALTH CONCEPTS IN PRACTICE CREDIT: 5

Introduces the student to the organization and procedures of the Business Office, the Personnel Office, the Supply Division, the Admissions Office, and Volunteer Services.

AHO 241
INTERDISCIPLINARY HEALTH CONCEPTS CREDIT: 4

Introduces student to the organization and procedures of the following departments: Housekeeping, Laundry, Central Supply and Transportation.

AHO 242
ADVANCED APPLICATION - HEALTH CONCEPTS AND PRACTICES CREDIT: 4

Student learns principles of unit management including organizational and functional relationships with nursing, hospital administration, medical staff, patients, families and visitors; service areas, medical records and para-medical units.

AHO 232
SPECIAL PROBLEMS AND TECHNIQUES CREDIT: 3

Student is introduced to supervisory training including decision making, employee development, interviewing and counseling, grievances, performance appraisal, and methods of improvement.

AHO 243
ADVANCED APPLICATION - HEALTH CONCEPTS AND PRACTICES CREDIT: 4

Student spends individualized practicum in area of occupational choice: Housekeeping, Laundry, Central Supply, Volunteer Services, Transportation, Admission Office, Business Office, Personnel Office, Supply Division and Unit Management.

AHO 244
ADVANCED INTERDISCIPLINARY HEALTH CONCEPTS CREDIT: 4

Student undertakes project with concurrence of Technical Director within the area of occupational choice.

ACCT 141
OFFICE ACCOUNTING I CREDIT: 4

An introductory course to provide the student with a knowledge of bookkeeping procedures which may be encountered in the business world. A study is made of accounting for cash, personal service enterprises, merchandise, notes and interest, the accrual basis of accounting applied to a retail business, payroll accounting, periodic summaries, and adjusting and closing accounts at the end of accounting period.

ACCT 142
OFFICE ACCOUNTING II CREDIT: 4

A continuation of Office Accounting I, with attention given to single proprietorships, partnerships and corporate types of business organizations. The fundamentals of data processing systems and procedures, as applied to accounting, are included.

BA 231
BUSINESS LAW CREDIT: 3

History and role of law in modern business and society; legal institutions and reasoning; framework of basic legal principles; application of basic principles of contract and property law.

GOVT 233
SURVEY OF AMERICAN AND TEXAS GOVERNMENT AND CONSTITUTIONS CREDIT: 3

Study of the institutions of government and their functions from the local level to the national with particular emphasis on the city, county and state governments. Examines in detail and on a comparative basis the United States and Texas Constitutions.

OCCUPATIONAL THERAPY

History

The Occupational Therapy Assistants program was the first to be developed in AHO and the first to be accredited by its national organization. The American Occupational Therapy Association had established guidelines for educating the Certified Occupational Therapy Assistant (COTA) which the AHO program developers utilized for other curricula as well in the early months of planning. It is interesting to note the structure of the AHO curriculum is basically still patterned after the COTA guidelines and still meets the standards of qualifying certification for other AHO programs. Technical courses have been substituted for some behavioral science courses in other curricula.

These standards established by the Occupational Therapy Association, in relation to the establishment of a COTA program in a facility are much the same as the standards established by the Texas Education Agency for the creation of post-secondary programs. Therefore, it was early realized that there would be no basic obstacles encountered in qualifying programs as these with the TEA as well as with national accrediting agencies.

From the American Occupational Therapy Association, Inc. definition and functions of Occupational Therapy comes the following:

> Occupational therapy is the art and science of directing man's participation in selected tasks to restore, reinforce and enhance performance, facilitate learning of those skills and functions essential for adaptation and productivity, diminish or correct pathology and to promote and maintain health. Its fundamental concern is the development and maintenance of the capacity, throughout the life span, to perform with satisfaction to self

and others those tasks and roles essential to productive living and to the mastery of self and the environment.

The function of a Registered Occupational Therapist (OTR) is:

A professionally qualified person who is a graduate of an occupational therapy curriculum approved by the American Medical Association in collaboration with the American Occupational Therapy Association, Inc., and who has passed the national registration examination and maintains registration in AOTA. A therapist functions primarily at the supervisory level commensurate with his experience in a position determined by competency and special interests. The position may involve evaluation and treatment, guidance and counseling and/or administrative or consultancy roles depending upon position level and expertise.

The function of the Certified Occupational Therapy Assistant (COTA) is:

A technically qualified person who has successfully completed a training program approved by the AOTA and is certified by that organization. The COTA works with the professional level occupational therapist and functions in the patient care program within the areas of specific treatment in general activity, supportive and maintenance programs.

The function of the Occupational Therapy Aide (OT Aide) is:

A person who has experienced on-the-job training meeting requirements of the occupational therapy department to which he is assigned. The OT Aide works under the direction and supervision of an OTR or COTA and performs clerical, maintenance and/or patient related tasks as assigned.

In 1970, a survey by the Texas Mental Health and Retardation Department indicated the state had a need for approximately 800 trained OT Assistants. This estimate was based on a 1 to 60 bed hospital ratio in existing facilities and did not include the needs of facilities under construction.

It is quite possible that many OT Aides currently in facilities could achieve the COTA certification if AHO programs were made available to them.

At the time the baccalaureate program for Occupational Therapists was established in The UTMB School of Allied Health Sciences, it was envisioned that COTAs would also be included in the educational structure. Plans were formulated to have the assistant students learn side-by-side with the baccalaureate level students on The Medical Branch campus. In many cases, this original plan has been implemented where facilities permit.

Curriculum

The COTA curriculum was planned from the standards established by the Occupational Therapy Association. The certification of a program of this type by the national association means that the local educational institution is responsible for the training and certifying examinations of its students. There is no nation-wide examination as with other associations (electroencephalography and radiologic technology, for example). For this reason the standards for accreditation of the educational institution require curriculum outlines and course content information which are necessary for the enlightenment of the national survey teams who accredit the school. Final approval for certification is given by the Occupational Therapy Association upon the recommendation of the certifying agency.

The Technical Director for Education in this study track is responsible for standards being met both in student selection and curriculum development. The choosing of students for the program and the maintenance of records of the students' activities and experiences are required to be kept for the accreditation review (which occurs at the end of four years after accreditation and thereafter, every five years). Following are the AOTA standards and how they are met in the AHO program, the curriculum outline and description of courses for the COTA program.

Distribution of Specific Occupational Therapy Subject Matter as Stipulated by "Standards" of the American Occupational Therapy Association, According to Required Courses

AOTA STANDARDS	CLOCK HOURS	GALVESTON COLLEGE AHO CURRICULUM COURSE DISTRIBUTION	SEMESTER	CLOCK HOURS
1. Orientation	30	AHO 131 - Interdisciplinary Health Concepts	Semester I	9
A. Introduction to Course				
1. Purpose				
2. general information				
3. how to study				
B. Man's Need to Work and Leisure		AHO 131 - "	Semester I	3
C. To Occupational Therapy		AHO 131 - Interdisciplinary	Semester I	21
1. history and philosophy		AHO 132 - Interdisciplinary Health Practices		
2. role and function				
3. ethics				
D. Administration (hospitals)		AHO 131 and AHO 132	Semester I	18
1. Physical Therapy		AHO 132		18
2. Inhalation Therapy				18
3. Social Service (including community services)				18
4. Radiology				18
E. Medicine and the Law		AHO 131 - Interdisciplinary Health Concepts	Semester I	3
			TOTAL --	126
2. Health Concepts	110	AHO 133 - Interdisciplinary Health Concepts I	Semester II	54
A. Medical Terminology				
B. Normal Growth and Development, including:		Psychology 231 - Growth & Development	Summer I	42
1. childhood				

AOTA STANDARDS	CLOCK HOURS	GALVESTON COLLEGE AHO CURRICULUM COURSE DISTRIBUTION	SEMESTER	CLOCK HOURS
2. Health Concepts (continued) 2. adolescence 3. Senescence 4. physical 5. personality and development		Psychology 132 (social)	Semester III	54
C. Normal Body Structure and Function		Biology 141-Anatomy & Physiology	Semester I Semester II	108 108
D. Information on/and Management of Clinical Condition Commonly referred to as Occupational Therapy Physical Dysfunction		AHO 223 - Interdisciplinary Health Concepts	Semester IV	32
Psycho-Social Dysfunction		AHO 221 - Interdisciplinary Health Concepts	Semester III	32
E. Emergency Care and Accident Prevention		AHO 134 - Interdisciplinary Health Practices I	Semester II	30
			TOTAL ---	460
3. Occupational Therapy - Theory & Its Application	120	AHO 135 - Applied Health Concepts In Practice	Summer I	14
		AHO 221 - Interdisciplinary Health Concepts	Semester III	55
		AHO 233 - Health Concepts & Practices III	Semester IV	55
			TOTAL ---	124
4. Skills A. Developing skill in Interpersonal Relationships	230	AHO 134 - Interdisciplinary Health Practices I	Semester II	54

AOTA STANDARDS	CLOCK HOURS	GALVESTON COLLEGE AHO CURRICULUM COURSE DISTRIBUTION	SEMESTER	CLOCK HOURS
4. Skills (continued) B. Techniques of Teaching 1. Teaching 2. Learning		AHO 135 - Applied Health Concepts in Practice	Summer I	10
		Psych. 231 - Growth & Development	Summer I	10
C. Activities of Daily Living Self Care Communication Positioning Transfer Homemaking Avocational		AHO 222 - Applied Health Concepts III	Semester IV	10
D. Media 1. Woodworking		AHO 135 - Applied Health Concepts in Practice	Summer I	56
2. Applied Design & Creative Arts 3. Ceramics 4. Leather Work 5. Jewelry & Metal Work		AHO 221 - Interdisciplinary Health Concepts	Semester III	14
6. Sewing, Needle work, Weaving		AHO 232 - Special Problems and Techniques	Semester IV	48
7. Socialization & Recreation 8. Adaptive Equipment		AHO 234 - Advanced Application, Health Concepts & Practices	Semester IV	14
E. Utilization of Volunteers and Community Resources		AHO 131 - Interdisciplinary Health Concepts	Semester I	9
		AHO 231 - Advanced Appl.	Semester III	23
			TOTAL -------	239

TOTA STANDARDS	CLOCK HOURS	GALVESTON COLLEGE AHO CURRICULUM COURSE DISTRIBUTION	SEMESTER	CLOCK HOURS
5. Supervised Practical Experience	250	AHO 135 - Pre-Clinical Experience		50
A. Psycho-Social		AHO 221 - Interdisciplinary Health Concepts AHO 231 - Advanced Application	Semester III	160
B. Physical Dysfunction		AHO 233 - Concepts AHO 234 - Advanced Application	Semester IV	160
			TOTAL ---	370
6. Evaluation and Counseling	10	AHO 135 - Applied Health Concepts in Practice	Summer I	10
Individual and group couseling and a final assessment of each student's knowledge and performance '		AHO 231 - Advanced Application	Semester III	10
		AHO 233 - Concepts	Semester IV	10
			TOTAL ---	30
		AHO 133 - Interdisciplinary Health Concepts I (Therapeutic Relationships)	Semester II	24
	750		GRAND TOTAL ---	1373

GALVESTON COLLEGE
DIVISION OF OCCUPATIONAL EDUCATION

ASSOCIATED HEALTH OCCUPATIONS

OCCUPATIONAL THERAPY ASSISTANT
(Meets Associate in Applied Science Degree Requirements)

FIRST YEAR

First Semester			Hours Class	Lab	Credit	Contact
AHO	141	Interdisciplinary Health Concepts - Introduction to Health Occupations	3	3	4	96
AHO	132	Interdisciplinary Health Practices - Specialized Clerkship	3	0	3	48
BIOL	133	Anatomy & Physiology	3	0	3	
BIOL	113	Anatomy & Physiology Lab	0	2	1	
ENGL	131	Basic Composition	3	0	3	
SOC	131	Introduction to Sociology	3	0	3	
		Total Hours	15	5	17	144

Second Semester			Class	Lab	Credit	Contact
AHO	143	Interdisciplinary Health Concepts	3	3	4	96
AHO	134	Interdisciplinary Health Practices	3	0	3	48
BIOL	134	Anatomy & Physiology	3	0	3	
BIOL	114	Anatomy & Physiology Lab	0	2	1	
ENGL	132	Composition and Rhetoric	3	0	3	
PSYC	131	Introduction to Psychology	3	0	3	
		Total Hours	15	5	17	144

Second Summer Session			Class	Lab	Credit	Contact
AHO	155	Applied Health Concepts in Practice	2	16	5	288
		Total Hours	2	16	5	288

SECOND YEAR

First Semester			Class	Lab	Credit	Contact
AHO	241	Interdisciplinary Health Concepts	2	8	4	160
AHO	242	Advanced Application - Health Concepts and Practices	2	8	4	160

OCCUPATIONAL THERAPY ASSISTANT
(continued)

			Hours			
First Semester (continued)			Class	Lab	Credit	Contact
BM	133	Business Mathematics I	3	0	3	
GOVT	233	Survey of American and Texas Government and Constitutions	3	0	3	
PSYC	231	Child Growth and Development	3	0	3	
		Total Hours	13	16	17	320
Second Semester						
AHO	232	Special Problems and Techniques	3	0	3	48
AHO	243	Advanced Application - Health Concepts and Practices	2	8	4	160
AHO	244	Advanced Interdisciplinary Health Concepts	2	8	4	160
PSYC	233	Psychology of Personality	3	0	3	
		Total Hours	10	16	14	368

Total Semester Credit Hours in Program: 70

OCCUPATIONAL THERAPY ASSISTANT

Course Descriptions

AHO 155
APPLIED HEALTH CONCEPTS IN PRACTICE

This course is designed to provide the student with the initial concepts of media and techniques, and an overview of occupational therapy in action. In addition to an introduction to the occupational therapist's role and function in major medical areas, the student will experience, under the supervision of a registered occupational therapist the application of those procedures being learned. The student will gain basic skills and techniques as applied to occupational therapy. Emphasis is focused upon developing a practical body of knowledge related to a high standard of patient care.

Objectives:

To allow the student to examine his own individual abilities through actual participation in media and techniques, and to acquaint him with the understanding of the properties of materials.

To allow the student to gain experience in the maintenance of materials and equipment.

To allow the student to gain specific knowledge concerning the adjustment of media and techniques to individual patient care.

To assist the student in learning to analyze problems and possible solutions in order to accomplish specific tasks related to the use of media and techniques.

To aid the student in developing a basic understanding of the utilization of various forms of media and techniques as they relate to a high standard of patient care.

AHO 241
INTERDISCIPLINARY HEALTH CONCEPTS

This course is designed to provide assignments to the students' area of clinical interest, psychiatry, including application of techniques and individual student development of intermediate technical skills. Emphasis is placed upon providing the student with comprehensive information concerning all aspects of psychiatry, including types of patients, methods of treatment, treatment philosophies of leaders in psychology, chemotherapy, and the specialized area of occupational therapy.

Objectives:

To provide the student with knowledge and understanding of the dynamic concepts of pathological behavior, as well as personality reactions to physical illness.

To provide the student with the knowledge and understanding of treatment methods; psychotherapy, occupational therapy, and other treatment techniques used in psychiatry.

To allow the student to gain specific knowledge concerning the adjustment of media and techniques to individual patient care.

To aid the student in developing a basic understanding of various forms of treatment in occupational therapy as they relate to a high standard of care for the psychiatric patient.

AHO 242
ADVANCED APPLICATION - HEALTH CONCEPTS AND PRACTICES

This course is designed to provide the student with assignment to the student's area of interest, psychiatry, for supervised application of techniques and individual students development of intermediate technical skills as applied to occupational therapy treatment. Emphasis is placed on actual clinical application of proficiencies and competencies learned in previous didactic courses.

Objectives:

To provide the student with supervised clinical experience in treatment of patients, within all age groups, with psychiatric problems.

To provide the student with direct contact experience, under supervision, with patients of all age groups who have psychiatric problems.

To develop aims and attitudes which are directive in aiding the student in achieving an understanding of clinical procedures as they relate to a high standard of patient care.

AHO 232
SPECIAL PROBLEMS AND TECHNIQUES

This course has been designed to provide the student with the opportunity to explore in greater depth the media and techniques used in occupational therapy. Emphasis is placed on exploration of new area of media, the reinforcement of previously learned skills, and the analysis of media and techniques for application to occupational therapy.

Objectives:

To allow the student to explore new areas of media and techniques that can be innovative, as well as practical.

To allow the student to gain additional experience in the maintenance of materials and equipment.

To allow the student to gain greater knowledge of the adjustment of media and techniques to occupational therapy treatment.

To allow the student to reinforce previously learned skills in the area of media and techniques.

To assist the student in developing sound methods of analysis of media and techniques for application to occupational therapy treatment.

AHO 243
ADVANCED APPLICATION - HEALTH CONCEPTS AND PRACTICES

This course is designed to provide assignment to the student's area of clinical interest, physical dysfunction, including instruction in specialized concepts and theory, supervised application of techniques and individual student development of intermediate technical skills. Emphasis will be placed on providing the student with comprehensive information concerning all aspects of physical dysfunction, types of patients, methods of treatment, and the specialized area of occupational therapy.

Objectives:

To provide the student with knowledge and understanding of the dynamic concepts of occupational therapy treatment in physical dysfunction.

To provide the student with the knowledge and understanding of treatment, the occupational therapy process, and other techniques with patients in the area of physical dysfunction.

To allow the student to gain specific knowledge concerning the adjustment of media and techniques to individual patient care.

To aid the student in developing a basic understanding of various forms of treatment in occupational therapy as they relate to a high standard of care for the patient with problems of physical dysfunction.

AHO 244
ADVANCED INTERDISCIPLINARY HEALTH CONCEPTS

This course is designed to provide the student with assignment to the student's area of interest, physical disabilities, for supervised application of techniques and individual student development of intermediate technical skills as applied to occupational therapy treatment. Emphasis is placed on actual clinical application of proficiencies and competencies learned in previous didactic courses.

Objectives:

To provide the student with supervised clinical experience in treatment of patients, within all age groups, with problems of physical disability.

To provide the student with direct contact experience, under supervision, with patients of all age groups who have problems of physical disability.

To develop aims and attitudes which are directive in aiding the student in achieving an understanding of clinical procedures as they relate to a high standard of patient care.

BM 133
BUSINESS MATHEMATICS 1

A study is made of fundamental mathematics processes, fractions and decimals, percentage in business and simple interest.

Objectives:

To aid the student in mastering the fundamentals of arithmetic.

To teach the student to apply the fundamentals to business-oriented problems and situations.

To acquaint the student with terminology currently being used in business.

To familiarize the student with the mathematical procedures used in dealing with invoices, borrowing and lending money, retail selling, payroll, depreciation, insurance, taxes, stocks and bonds, and managerial control.

GOVT 233
SURVEY OF AMERICAN AND TEXAS GOVERNMENT AND CONSTITUTIONS

Study of the institutions of government and their functions from the local level to the national, with particular emphasis on the city, county and state governments.

Objectives:

To acquaint the student with the broad outline of political science as a discipline, along with its methods of inquiry.

To help each student to develop some understanding of the nature of the political process, of political behavior, and the purpose of government and its role in their state and community.

To arouse an active interest in, and an appreciation of the problems that exist in state and local government levels.

To promote knowledge of, and interest in state and local government.

PSYC 231
CHILD GROWTH AND DEVELOPMENT

This course is designed to provide students with basic understandings concerning the nature of children and youth, how theygrow and develop, and the major influences which contribute to their behavior and learning. Emphasis will be placed on building a functional knowledge of scientific principles about human beings which will assist the student in understanding and explaining one's own, as well as others behavior.

Objectives:

To develop aims and attitudes which are directive in making the individual's growth and development the central focus of education.

To acquire skill in using the scientific method as the most effective and valid way of interpreting behavior.

To employ these skills and this information to improve our ways of working with children and youth.

To demonstrate democratic attitudes in the teaching-learning process which facilitates growth and development.

To provide experiences in the meanings of "acceptance", "student-teacher-planning" and "learning by doing and feeling".

PSYC 233
PSYCHOLOGY OF PERSONALITY

A study of major factors and conditions related to personality development, including parent-child relations, personality defense mechanisms, methods of personality measurement, and behavioral pathologies and their treatments.

When a student opts for the Occupational Therapy Assistant study track, the Technical Director secures his file and becomes acquainted with it for the purpose of informing members of the Admissions Committee. Then one member of the Admissions Committee, and sometimes more, will have individual interviews with the prospective student. Exhibit 1 is the interview schedule which is completed by the interviewer and given to the Admissions Committee. The Committee then meets to discuss the applicants. When a student is accepted into the program, Exhibit 2 is completed and given to the AHO Department Chairman.

Each interviewer uses his own techniques to try to obtain the information required. Most important is the student's understanding of the profession and his commitment to work.

The students begin their studies during the summer session in AHO 155. The Occupational Therapy clinical conditions lectures which are for one hour a day are attended by students from other study tracks. They are orthotics assistants, inhalation therapists, electroencephalography technicians, and community health workers. These lectures are given by members of the teaching staff of The University of Texas Medical Branch to acquaint the students with disabilities, both mental and physical. The lectures cover:

Common Diagnostic Procedures
Plastic Surgery Repairs
Collagen Diseases
Cardiovascular Diseases
Pulmonary Diseases
Strokes
Spinal Cord Injuries
Nutritional Deficiencies
Renal Diseases - Heart Diseaaes
Hemolytic Conditions - Collagen diseases

Endocrine Disorders, Special emphasis on Diabetes

Burns

Orthopedic Conditions (3 lectures)

Sensory Defects (2 lectures)

Neuro-Muscular Disabilities

Results of Inactivity

Maternal Deprivation - Clinical failure to thrive

Neurological Conditions (2 lectures)

Physical Changes in the aging process

Toxic and Metabolic conditions

Psychological Reactions

An additional 30 hours of clinical conditions in psychosocial dysfunction are taken by the occupational therapy assistants, orthotics assistants, electroencephalography technicicans and community health workers.

Also during the summer, the students are taking intensive training in skills of occupational therapy and are beginning to develop their techniques in working with people. They are not allowed to participate in the clinical activities and can only serve as observers during these first months. There are case presentations which are given to the baccalaureate students, and the AHO students also attend.

In learning these skills, the students use an instructional plan for presenting activities, and along with this plan, they are taught to evaluate the work of fellow students, thus giving them insight into their own work and competence. Exhibit 3 is the Instructional Plan which the students follow, and Exhibits 4 and 5 are evaluation sheets which the students utilize.

The summer also initiates the use of the student diary which is one of the most important aspects of the student's training. Following is the Technical Director's explanation and objectives of using the diary system in Occupational Therapy.

Diary - By definition, the diary is a record of daily events, especially a personal record of one's activities, experiences or observations: a journal. (This diary is purchased by the AHO department and is a note holder slightly smaller than notebook size which holds a tablet and has an opposite pocket to hold notes or a completed tablet).

When the Diary is started - The student is instructed in the purposes of the diary and expected to begin its use during the intensive Summer Session. It is due each Friday at 8:00 a.m. and the student is informed that this will comprise part of his grade. It is started in the Summer Session to build in the habit for continuation during the clinical affiliation of the ensuing year.

Purposes of the Diary for the Student -

The student keeps a record of learning experiences both theoretical and practical. It assists in integrating knowledge with experience.

Experience teaches us that students' performances proceed at an individual rate of growth. As a student becomes aware of his own skills and as he recognizes his own areas of weakness in practice, his expression of this awareness becomes signigicant to him in his own progress.

Students practice expressing their experiences in professional terminology. Where there are areas of inadequate or inaccurate expression in the diary, the Technical Director tries to correct these. In a group situation, where one student may respond, opportunity for all has not been met. Therefore, the diary individualizes the expression.

In Health Care Professions where relationships are paramount (e.g. psychosocial dysfunction), we find that awareness of one's self and his reaction to others is a continuous process which needs clarification and expression. We often need to assist a student in realizing his strengths when he becomes overwhelmed by feelings of inadequacy.

By recording experiences consistently, the student is able to see his own accomplishments. When the student reviews his own progress, this is proof positive to him that he has survived some painful experiences.

It gives the student a confidential source of venting his feelings when he can't see "the whole". The Diary reassures the student that he still has a "listening post" in us. After the student gets into the clinical areas, our communication lines are more difficult to keep up--because of distance and pressures of other involvements.

It helps him see the realities of providing health care services when he experiences less than ideal situations. When students find that some authority figures demonstrate "clay feet" or -- "don't walk on water", we think it is helpful to counsel them.

Summary - For the student, then, the Diary is not only or not just a place to vent feelings. The importance for the individual takes on meaning and insight when the individual becomes aware of his own feelings and reactions in ever-changing situations, and he deals with these effectively or ineffectively. Often the enthusiasm and zeal of early professional development is subject to upward and downward swings. When a student finds himself in a downward swing, it helps to recall how he got up before. A written account of his journey is a very effective tool to growth and development of the mature person.

The diary system has proven very successful because the students are scattered throughout The Medical Branch, and the Technical Director is not able to be with them daily during their clinical affiliations. The Technical Director makes comments directly into the diary and only calls the students in for conferences when they request it or the Director feels direct contact is necessary.

The clinical affiliations begin with the fall semester. According to the requirements of the national association, there are three areas they must experience. These are pediatrics, psychosocial dysfunction and physical dysfunction. Because there are two semesters in which the students are in the affiliations, there has been an overlapping of courses at semester break. Exhibit 6 shows the structure of the 1971-1972 school year with the three affiliations.

Another reason for the rotation schedules is the problem of facilities being able to handle the students all at once. There are none, so the students are rotated in groups relative to the number which a facility can accommodate. Also in these facilities are the baccalaureate students, and where the space permits, the assistant students are placed with the baccalaureate students to gain understanding of the roles each have in a clinical situation.

Pediatric Rotation: Students spend one half of their allotted time in the Pediatric Wards at John Sealy Hospital and the other half at Moody School for Multiply Handicapped Children. The students wear their uniforms, but usually come up with clever ways to make them seem more likeable and less frightening to the students. For example, one student made an apron with a big yellow sun smiling. Utilizing these two facilities, the students are able to be in contact with handicapped children as well as those with illnesses, perhaps temporary in nature. Their lectures are related directly to the cases they are assigned.

Faculty members in each rotation are responsible for the lecture and laboratory experiences of the students. They are required to submit lesson plans and other materials which can show what is being taught to the students. Exhibits 7 and 8 are examples of the objectives and responsibilities which are developed for this pediatric rotation.

Psychosocial Dysfunction: In this rotation, the student is required to wear street clothes because of the type of patients encountered. Several age groups are in this rotation with private adults, adolescents, children, and a milieu unit part of the schedule. Lectures include community and social psychiatry which is a new field which is opening to the occupational therapy profession.

Physical Dysfunction: The student is exposed to more terminology in this unit. This terminology is specific to the rotation. One therapist teaches theory and a second therapist is responsible for the student, first for observation and then for assigning patients. In this area, there is an overlapping of physical therapy and occupational therapy which exposes the student to the cooperation of departments within a health facility for the common good of the patient.

All clinical affiliations must be passed with a grade of C or better. Should a student fail to achieve that grade in an affiliation, it must be made up at a future date. At the present time, the staff is taking under study an appropriate time for the make-up work, since limited enrollments could keep the failing student from entering the affiliation the next time it is offered.

Upon successful completion of the affiliations and other course work, an examination is given to the students which serves as the qualifying examination for certification. The student must have passed this examination and completed all academic courses at Galveston College before he may be eligible for certification by the American Occupational Therapy Association. Exhibit 9 is the form which is sent to the national office. It takes about two to three weeks to receive announcement of the accreditation.

Additional Rotation: An additional rotation is available to qualified COTA s which involves orthotic experience in the laboratory at Shrine Burns Institute. Students work directly with the Occupational Therapist in the development of splints to aid in the healing processes of burned patients. This six-week period has been utilized by one student, who has received already a lucrative job offer in Pennsylvania.

Students:

Sixteen students have opted for this study track. The first class had two students. Of these, one obtained certification and the other dropped from the program with an incomplete clinical affiliation.

The second class had five students, with all of them gratuating and being certified.

Currently enrolled are eight students with one student suspended from all college work because of scholastic probation. He plans to reenter the program and the college the following semester.

A follow-up shows the status of the six graduates:

#1 Working at The University of Texas Medical Branch in Physical Dysfunction ($514 mo.)

#2 Working at The University of Texas Medical Branch in Pediatrics ($514 mo.)

#3 Working at The University of Texas Medical Branch at Moody School ($514 mo.)

#4 Working at a geriatrics center in Dallas. This assistant is making $400 monthly but has unusually good benefits (hospitalization and insurance) paid by the institution. This center is also financing her baccalaureate studies in Occupational Therapy at Texas Woman's University. She has the desire to teach other COTA students.

#5 Working at The University of Texas Medical Branch as Coordinator of Afternoon and Evening Teachers program at $250 monthly part-time. She is not functioning as a COTA, but at the time she sought employment, there were no COTA openings available at The Medical Branch.

#6 This COTA was just certified and is looking for a position.

Placement of COTAs is not handled through the AHO program. There is a placement chairman of the Texas District Occupational Therapy Association whom the students contact. Therefore they never have the impression that the AHO program receives job offers for them. The students are assisted in writing their resumes, but they contact the placement chairman for job opportunitities. In addition, they are referred to the District Newsletter and the American Journal of Occupational Therapy which carries a classified section on openings in every issue.

Equipment:

The following equipment is recommended for training 15 Occupational Therapy Assistants:

2	Sewing Machines
2	Copper Enamel Kilns
1	Jig Saw
	Ceramic Molds:
1	Leaf Dish #DM97
1	Ashtray #DM286
1	Pig Bank #DM229
1	Fruit Creamer #DM119A
1	Fruit Cup #DM117A
1	Hen Lid #DM138A
1	Patio Lantern #DM102A
1	Fruit Sugar Bowl #DM120A
2	Hanging Ashtray #DM98A; DM213A
1	Inca Owl #DM239A
1	Butterfly Dish (only half of mold) #DM174
1	Clown #SM1022
1	Student Bells (Broken) #SM993
1	Hoi Toi #84
1	Zodiac Ashtray #DM152A
1	Basket Bowl #115A Lid for Basket Bowl #116A
1	Kiln, Ceramic Studio type

Kiln Furniture:

Triangle		Stilts	
19	1"	28	4"
14	2"	23	5"
11	3"		

Posts

11	1"	12	7"
36	2"	12	10"
24	3"		

Shelves:
8 Whole shelves 16" sq./ 8 Half shelves 8"x16"

Weaving:
10 Peacock Table Looms
2 Structo Artcraft Looms - 4 Harness
3 Floor Looms 2-4 Harness; 12- Harness
Shuttles:
12 25"x1" flat 6-25" Rug
24 14"x3/4" flat
6 16"x1" flat
6 22"x1 1/2" flat

1 Skein Winder

3 Loom Benches

1 Tension Box

Tools:

Leather -
13 Swivel Knives
1 Compass
9 Thomging Chisels (4 prong)
2 Nail Sets
1 Plastic Knife
1 Strip Ease (for cutting belt strips)
2 Thonging Chisels (1 prong)
1 Oblong Punch (1 inch)
1 Safety Beveler (Skiver)
15 Modeling Tools
1 Channel-Stitching Gogue
1 Craft-tool Creaser
3 Lacing Fids
1 Alphabet Stamping kit
Utility Knife Refills
6 Pair Leather Shears
17 Raw Hide Mallets
2 Wooden Mallets
4 Wooden Donuts
5 Rotating Leather Punches
3 Single Leather Punches
8 Awls-asst. sizes
13 Craftool Modelers - 1 end pointed - other end scoop
1 Craftool Molder - round each end
Stamping Tools:
4 Flowers
2 Geometrics
4 Leaves
7 Seeders

1	Special Stamp
1	Border Stamp
6	Backgrounds
25	Bevelers
6	Camouflage
4	Mulefoot
8	Backgrounds
11	Pears
3	Basket Weave
8	Veiner
4	Utility Knives (1,2,3,4, Knife)
2	#1 X-acto Knives
2	#2 X-acto Knives
1	Snap Awl Kit
1	Rivet Set
	Razor Blades #12 (Skiver)
23	Stamping Boards
11	Rubber Boards
19	Paint Brushes - 1"
1	Pair Tile Cutters
9	Stencil Brushes - asst. sizes
8	Oil Paint Brushes - asst. sizes
1	Paint Brush - Red Sable
2	Rulers 1, 6" and 1, 12"
2	Copper Enameling Spatulas
7	Paint Brushes 1" (used)
1	Paint Brush 1 1/2"(used)
3	Rolling Pins
Ceramic Brushes:	
11	1"
1	1/2"
2	1/4"
1	2"

Miscellaneous:

1 Set Allen Wrenches
1 Keyhole Saw
2 Hack Saws
3 C Clamps (small)
12 C Clamps (large)
3 Half-round wood files
2 Tapered - flat wood files
1 Round wood file
1 Triangle wood file
1 Paint Brush - 4"
2 Carding Tools
1 Rip Saw-Atkins Silver Steel 30"
3 Right Angle Steel Squares
3 Pair Pliers
1 Set Wrenches
1 Compass
7 Screw Drivers Set Assorted
1 Table Knife
2 Glass Cutters
1 Set - 7 pc. High Speed Drill Bit
1 Set - 9 pc. High Speed Drill Bit
2 Drills - hand
4 Brayers
8 Droppers
2 Extension Rulers - 5' (60")
1 Pair Utility Shears

Sewing: Needlework
3 Package Tapestry Needles
2 Package Hand Sewing Needles
2 Package Straight Pins
6 Pair All purpose Scissors
5 Tape Measures

Knitting Needles:
1 Pair Size 9
1 1/2 Pair Size 8
1 Pair Size 2
1/2 Pair Size 10

5 Hair Pin Lace Frames
4 Embroidery Hoops
4 Crochet Hooks
3 Rug Hooks

6 Weaving Looms (Looper style)
1 "Hazel's Loom"

1 Thread Rack
1 Pair Wire Cutters

- - - - - - - - - - - - - - - - - -

1 Skeleton

6 Anatomical Charts
    1- The Muscular System
    2- The Sekeletal System
    3- Thoracic and Abdominal Viscera
    4- Heart and Lungs
    5- The Ear
    6- Respiratory System

EXHIBIT 1

GALVESTON COLLEGE
and
UNIVERSITY OF TEXAS MEDICAL BRANCH at Galveston
SCHOOL OF ALLIED HEALTH SCIENCES
Department of Associated Health Occupations

Interview Schedule for: ______________________

Interviewed by: ______________________

Date: ______________________

Note to Interviewer The primary points which we would like covered in the interview are below. The Admissions Committee will be seriously considering your remarks and impressions, so please be quite candid and objective. Please return the enclosed information materials with this appraisal.

Points to be Covered:

(a) general appearance, manner, poise
(b) ability to converse and communicate ideas and concepts
(c) estimate of maturity, judgment, stability
(d) stated reasons for desiring to become an occupational therapist
(e) clarity and appropriateness of stated reasons
(f) overall impression of sincerity
(g) in your opinion, based upon this interview, does this student have potential for becoming an occupational therapist
(h) any additional information which you feel would be helpful to the Admissions Committee

EXHIBIT 2

To: J. Cantwell, Chairman, Department of Associated Health Occupations

From: Clinical Admissions Committee for ______________________________

______________________________ has had an admissions interview for entry into the Summer 1971 class.

The Candidate:

____ is recommended for admission without conditions.

____ is not recommended for admission.

____ is recommended for the summer program with the following conditions:

____ a. On Probation

____ b. On Completion of ____________, ____________

____ c. Other ________________________________

COMMENTS:

Signatures: ______________________________
Program Director

Committee: ______________________________

____

____

____

This form is CONFIDENTIAL and becomes a part of the student's file.

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EXHIBIT 3

Instructional Plan

SUBJECT: ______________________________

OBJECTIVE: ______________________________

____

____

MATERIALS, TOOLS AND EQUIPMENT: ______________________________

____

TRAINING AIDS: ______________________________

____

STEP I. PREPARATION: (Prepare the learner's mind. Create interest, get attention.)

____

____

____

____

STEP II. PRESENTATION: (Present the new information.)
(List points of information or things to remember to do or say.)

____

____

____

____

____

____

____

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STEP II. (Continued)
(List points of information or things to remember to do or say.)

STEP III. APPLICATION: (Under your close supervision, have the learner apply the information or skill to situations or jobs.)

STEP IV. FOLLOW UP OR TEST. (Check up on learner's individual efforts, under working conditions, if possible.)

EXHIBIT 4

EVALUATION OF GROUP TRAINING

CHECK SHEET FOR PRACTICE SESSIONS

85=A
68=B
51=C
34=D
17=F

TRAINER ______________________

	5	4	3	2	1pts.
POINTS TO CHECK	Excellent	Good	Average	Fair	Poor
1. Subject or topic: (To what extent was it appropriately selected?)					
2. Objective or aim: (How well was it used to orient us?)					
3. Instructional plan: (To what extent did the instruction give evidence of planning?)					
4. Material and equipment: (To what extent was it ready and used?)					
5. Chart work or chalkboard work: (To what degree was it adequate?) . . . . (To what degree was its arrangement pleasing?)					
6. Main points: (To what extent were main teaching points stressed?)					
7. Steps and key points: (In a manipulative lesson, how clearly were these items stressed?)					
8. Methods: (To what extent was demonstration used?). . . . . (To what extent was illustration used?) . . . . (To what extent were questions used?). . . . . (To what was practice or drill used?)					
9. Instructions: (To what extent were instructions clear?)					
10. Application: (How well did the trainer handle having the learners "do" something with the content?)					

	5	4	3	2	1pts.
	Excellent	Good	Average	Fair	Poor
11. Passout sheets: (To what degree did he use passout material?)					
12. The four steps: (To what extent were all four steps used?)					
13. Backtracking: (To what extent was backtracking avoided?)					
14. Safety: (How well were safety and precaution emphasized?)					
15. Knowing and doing: (How well was the relationship between knowing & doing stressed?)					
16. Standards: (How clearly were the standards of workmanship specified?)					
17. Summary: (What was your appraisal of the summary?)					

EXHIBIT 5

EVALUATION OF A DEMONSTRATION

Instructions: Rate by checking appropriate column

TEACHER SUBJECT FIELD DATE

GRADE LEVEL NO. IN CLASS:

Low High

	1	2	3	4	5	6	7	8	9
1. The demonstrator provided the class with a real stimulus.									
2. The demonstration showed signs of planning and preparation.									
3. The problem was made meaningful to the students.									
4. The demonstrator motivated the class by: (a) Making the problem attractive (b) Creating a desire to learn, to investigate or to study.									
5. The demonstrator arranged the class so that the best physical and mental environment was provided for the students.									
6. The demonstrator pointed out relationships as they developed in the demonstrations after which he illustrated those relationships.									
7. The demonstrator stimulated the students by questions, comments, anecdotes, or indications of applicability of the methods, apparatus, or materials used.									
8. The demonstrator employed: (a) a pleasing voice, (b) a confident informal manner, (c) a touch of humor.									
9. The demonstrator guided and stimulated critical analysis -- helping the students to compare, contrast, and evaluate.									
10. The demonstration was timed so that at its conclusion, there was ample time for a discussion. the drawing of inferences and summarization.									

	Low								High
	1	2	3	4	5	6	7	8	9
11. There was a follow-up as an evaluation.									
12. General merit -- How well did the demonstrator follow the instructional plan?									

COMMENT:

EXHIBIT 6

Dates and Hours in Clinical Affiliation - AHO Sophomores - O.T.A. Study Track 1971 - 1972

		Mon	Wed	Fri	Hours in Week	Week in Clinic	Week of Semester	Mid-Way in Affiliation Area Evaluation	Cee report final for Area		
SEMESTER I							1				AFFILIATION I
	Sept		8	10	16 hrs	1st	2				
		13	15	17	24 hrs	2nd	3				
		20	22	24	24 hrs	3rd	4				
		27	29	Oc1	24 hrs	4th	5				
	Oct	4	6	8	24 hrs	5th	6	Oct 8			
		11	13	15	24 hrs	6th	7				
		18	20	22	24 hrs	7th	8				
		25	27	29	24 hrs	8th	9				
	Nov	1	3	5	24 hrs	9th	10		Nov. 12	10 wks. -1day Total Times = 232 hrs.	
		8	10	12	24 hrs	10th	11				
		15	17	19	24 hrs	1st	12				AFFILIATION II
		22	24	H26	16 hrs	2nd	13				
		29	1	3	24 hrs	3rd	14				
	Dec	6	8	10	24		15				
		13	Finals		8 hrs	4th	16	Dec 13			
	End of Fall Semester Dec 22, 1971										
SEMESTER II	1972										
	Jan	17	19	21	24 hrs	5th	1				
		24	26	28	24 hrs	6th	2				
		31	2	4	24 hrs	7th	3				
	Feb	7	9	11	24 hrs	8th	4				
		14	16	18	24 hrs	9th	5		Feb. 18	9 wks Total Times: 216 hrs.	
		21	23	25	24 hrs	1st	6				AFFILIATION III
		28	1	3	24 hrs	2nd	7				
	Mar	6	8	10	24 hrs	3rd	8				
		13	15	17	24 hrs	4th	9				
	-	20	22	24	24 hrs	5th	10	Mar. 24			
	Spring Holidays March 25 - April 2										
	Apr	3	5	7	24 hrs	6th	11				
		10	12	14	24 hrs	7th	12				
		17	19	21	24 hrs	8th	13				
		24	26	28	24 hrs	9th	14				
	May	1	3		16 hrs	10th	15		May 3	10 wks -1 day Total Times = 232 hrs	

Finals 4 - 10th End of Spring Semester - May 12 Graduation May 12, 1972

Each semester is divided into thirds for grading purposes. The first affiliation = 2/3 of final grade. The first half of second affiliation = 1/3 of final grade for the 1st semester.

For the second semester. The 2nd half of the 2nd affiliation = 1/3 of final grade. The last or 3rd affiliation = 2/3 of final grade for second semester.

EXHIBIT 7

Objectives - O.T. Affiliation

1. To apply knowledge of objectives and functions of O.T. in Pediatrics.
2. Become familiar with varied program in Pediatrics (therapeutic activities, treatment, evaluation).
3. Develop skill and experience in observing and reporting the behavior of children.
4. Learn age appropriate activities and how to provide a creative outlet
5. Transfer academic education to clinical practice.
6. Build knowledge through observation and practice of clinical procedures.
7. Develop professional maturity and judgment through clinical experience.
8. Cultivate communication with other staff members.
9. Develop ability to accept and put to use constructive directions and/or suggestions given by the staff members on whose service the student affiliates.
10. Develop ability to act and think objectively and creatively.
11. Develop skill in the utilization of self with the pediatric patient.

EXHIBIT 8

Responsibilities during Pediatrics affiliation

1. Be familiar with Occupational Therapy policy and procedure manual.
2. Attend theory and application lectures as assigned.
3. Work on each of pediatrics unit 9C, 9B, 8C as assigned. 1st week_____. 2nd week _____, 3rd week _____, 4th week _____.
4. Treat 2 - 3 specifically assigned patients daily.
5. Keep daily progress notes on each assigned patient on checklist form.
6. Present 3 case studies (1 a week) on assigned patients.
7. Present study on one assigned diagnosis (4th week) including description and symptoms, treatment, O.T. role in treating this type of patient and any other pertinent information.
8. Present one inservice to the staff on a craft or play activity appropriate for the Pediatric unit.
9. Observe treatment and evaluation given by ____________________OTS on ____________________________.
10. Observe treatments and evaluations by OTR and COTA as assigned.
11. Attend student conference after two weeks of affiliation with supervisor.
12. Attend conference on last day of affiliation with supervisor to discuss clinical experience evaluation report.
13. Safety precautions specific to area.
14. Inform staff member in your area when leaving unit or working with specific patients.
15. Specific time for reading and study related to Pediatrics will be allowed.
16. Reading assignments will be made and should be listed on form provided. A synopsis of the reading should be written on an index card and turned in to your supervisor.

EXHIBIT 9

THE AMERICAN OCCUPATIONAL THERAPY ASSOCIATION, INC.
251 Park Avenue South, New York, N.Y. 10010

APPLICATION FOR CERTIFICATION AS AN OCCUPATIONAL THERAPY ASSISTANT

Mr.
Mrs.
Miss ________________________________ Birth Date ______________
(Please print) Last First M.I. Maiden (Month,year)

Current Mailing Address ________________________________
Street City State Zip code

Place of Employment ________________________________

Address Where Employed ________________________________
Street City State Zip Code

I hereby apply for certification as an Occupational Therapy Assistant.

Date ____________ Signature of applicant ________________________

- -

REMAINDER OF FORM TO BE FILLED OUT BY DIRECTOR OF PROGRAM

I hereby certify that this applicant has successfully completed the program for Occupational Therapy Assistants at ________________________ (name of program) and recommend certification.

Kind of program completed: Certificate ________________ (date of completion)

Associate Degree ________________ (date of completion)

Rating of student: ____________, ____________, ________________
academic skills supervised practical experience

REMARKS: Briefly evaluate the student's performance and attitudes; including effectiveness with patients, relationship to staff, strengths, weaknesses, and potential for work in occupational therapy. (Use reverse side.)

Date: ________________ Signature of Director of Program ________________

ORTHOTICS ASSISTANT

The Orthotics Assistant study track was offered in the summer of 1970. To date, two students have entered the field. This study track is unique in that all didactic and clinical studies are under the direction of an Orthotist who is in private practice. The program has been limited to two male students.

This program has been submitted for accreditation by the American Board for Certification in Orthotics and Prosthetics, Inc.

The program was designed from the Essentials of Acceptable Schools For The Education of Orthotists and Prosthetics At The Associate of Arts Degree Level. These standards were obtained from the American Orthotic and Prosthetic Association.

As defined, the orthotist and the prosthetist work directly with the physician and representatives of other allied health professions in the rehabilitation of the disabled. The orthotist, designs, fabricates and fits devices, know as orthoses, to provide care to patients with disabling conditions of the limbs and spine. The prosthetist designs, fabricates and fits devices know as prostheses for patients with a partial or total absence of a limb.

The suggested curriculum guide lists the courses for specialization instruction; however, it does not list the number of clock hours or credit hours required. The Advisory Committee with the local Orthotist designed the course which is for two years and a second summer session.

The national association also requires clinical training which involves experience in treatment of patients of all age groups. In the discussion of this training the guidelines include:

> Clinical Training is a supervised learning experience through which the student acquires understanding and skill in orthotic-prosthetic procedures; learns to deal with the patient's physical, emotional and mental problems; accepts responsibilities as a participating staff member aware of the need for adherence to medical ethics in all relations ips; and recognizes the contribution of and learns to work with other professional and non professional personnel, all in attaining the objectives of the treatment plan prescribed by the physician.

These goals are covered in the first year AHO courses. They are found in the clinical rotations to see how all departments function together, in the medical ethics lectures, the psychology of being ill and the dying patient, and the group dynamics which helps the person to relate to those around him.

Following is shown the courses suggested by the national association and the corresponding courses and clock hours which are offered as part of the Orthotics Assistant program at Galveston College.

STANDARDS	GALVESTON COLLEGE AHO CURRICULUM COURSE DISTRIBUTION	SEMESTER
ANATOMY AND PHYSIOLOGY	BIO 143, 144 ANATOMY AND PHYSIOLOGY	SEMESTER I SEMESTER II
PATHOLOGY	AHO 143 INTERDISCIPLINARY HEALTH CONCEPTS	SEMESTER II
KINESIOLOGY	AHO 243 - I. H. C. PROSTHETICS & ORTHOTICS III (UNIT OF P.T. INSTRUCTION)	SEMESTER IV
MATHEMATICS	BUS 133 - BUSINESS MATH	SEMESTER IV
PHYSICS	OIT 141 - APPLIED PHYSICS I	SEMESTER III
PSYCHOLOGY	PSY 131 - INTRODUCTION TO PSYCHOLOGY	SEMESTER II
MECHANICS	AHO 242 - ADVANCED APPLICATION PROSTHETICS & ORTHOTICS II	SEMESTER III
DYNAMICS	AHO 242 - ADVANCED APPLICATION PROSTHETICS & ORTHOTICS II	SEMESTER III
PROPERTIES OF MATERIALS	AHO 155 - APPLIED HEALTH CONCEPTS IN PRACTICE	SUMMER I
	AHO 243 - I. H. C. PROSTHETICS & ORTHOTICS III	SEMESTER IV
BIOMECHANICS	AHO 243 - PROSTHETICS & ORTHOTICS III	SEMESTER IV
	AHO 244 - ADVANCED HEALTH CONCEPTS & PRACTICES PROSTHETICS & ORTHOTICS IV	SEMESTER IV

GALVESTON COLLEGE
AHO CURRICULUM

STANDARDS	COURSE DISTRIBUTION	SEMESTER
MECHANICAL DRAWING	AHO 242 - ADVANCED APPLICATION PROSTHETICS & ORTHOTICS II	SEMESTER III
BUSINESS ORGANIZATION AND MANAGEMENT	AHO 141 - INTERDISCIPLINARY HEALTH CONCEPTS AHO 232 - CLINICAL PRACTICUM	SEMESTER I SEMESTER IV
ORTHOTIC-PROSTHETIC TECH TECHNIQUES	AHO 241 - PROSTHETICS & ORTHOTICS I	SEMESTER III
LOWER EXTREMITY PROSTHETICS	AHO 244 - P. & O. IV	SEMESTER IV
UPPER EXTREMITY PROSTHETICS	AHO 243 - P. & O. III	SEMESTER IV
LOWER EXTREMITY ORTHOTICS	AHO 242, P. & O. II AHO 256 - PRECEPTORSHIP	SEMESTER III SUMMER II
UPPER EXTREMITY ORTHOTICS	AHO 242 - P. & O. II AHO 256 - PRECEPTORSHIP	SEMESTER III SUMMER II
SPINAL ORTHOTICS	AHO 242 - P. & O. II AHO 256 - PRECEPTORSHIP	SEMESTER III SUMMER II
SPECIAL PROBLEMS	AHO 232 - CLINICAL PRACTICUM	SEMESTER IV

GALVESTON COLLEGE
DIVISION OF OCCUPATIONAL EDUCATION

ASSOCIATED HEALTH OCCUPATIONS

ORTHOTICS ASSISTANT

(Meets Associate in Applied Science Degree Requirement)

FIRST YEAR

First Semester

		Hours			
		Class	Lab	Credit	Contact
AHO 141	Interdisciplinary Health Concepts - Introduction to Health Occupations	3	3	4	96
AHO 132	Interdisciplinary Health Practices - Specialized Clerkship	3	0	3	48
BIOL 133	Anatomy & Physiology	3	0	3	
BIOL 113	Anatomy & Physiology Lab	0	2	1	
ENGL 131	Basic Composition	3	0	3	
SOC 131	Introduction to Sociology	3	0	3	
	Total Hours	15	5	17	144

Second Semester

		Class	Lab	Credit	Contact
AHO 143	Interdisciplinary Health Concepts	3	3	4	96
AHO 134	Interdisciplinary Health Practices	3	0	3	48
BIOL 134	Anatomy & Physiology	3	0	3	
BIOL 114	Anatomy & Physiology Lab	0	2	1	
ENGL 132	Compostion and Rhetoric	3	0	3	
PSYC 131	Introduction to Psychology	3	0	3	
	Total Hours	15	5	17	144

Second Summer Session

		Class	Lab	Credit	Contact
AHO 155	Applied Health Concepts in Practice	2	16	5	288
		2	16	5	288

SECOND YEAR

First Semester

		Class	Lab	Credit	Contact
AHO 241	Interdisciplinary Health Concepts -	2	8	4	160
AHO 242	Advanced Application - Health Concepts and Practices	2	8	4	160
PSYC 231	Child Growth and Development	3	0	3	
PSYC 233	Psychology of Personality	3	0	3	
	Total Hours	10	16	14	320

ORTHOTICS ASSISTANT
(continued)

Second Semester			Hours			
			Class	Lab	Credit	Contact
AHO	232	Special Problems and Techniques	3	0	3	48
AHO	243	Advanced Application - Health Concepts and Practices	2	8	4	160
AHO	244	Advanced Interdisciplinary Health Concepts	2	8	4	160
BM	133	Business Mathematics I	3	0	3	
GOVT	233	Survey of American and Texas Government and Constitutions	3	0	3	
		Total Hours	13	16	17	368

First Summer Session			Class	Lab	Credit	Contact
AHO	256	Applied Health Concepts in Practice I	2	16	5	288
		Total Hours	2	16	5	288

ASSOCIATED HEALTH OCCUPATIONS

ORTHOTICS ASSISTANT

Course Descriptions

AHO 155 Credit: 5
ALLIED HEALTH CONCEPTS IN PRACTICES

This course is designed to allow the student to become proficient in hand skills and the use of various materials and small tools. In addition, the student begins his first series of clinical medicine lectures pertaining to orthopedics, pediatrics, and general medicine; lectures pertaining to psycho-social disability; individual student development of basic technical skils.

AHO 241 Credit: 4
INTERDISCIPLINARY HEALTH CONCEPTS

This course is designed as an introduction to the field of prosthetics and orthotics. It serves to orient the student to the terminology, media and techniques used in the profession. In addition, field trips to hospitals and other facilities are included so that the student may observe actual work in progress. Laboratory sessions will include instruction and practice in plaster pattern and mold-making, construction of low pressure laminates, leather work and other basic procedures.

AHO 242 Credit: 4
ADVANCED APPLICATION - HEALTH CONCEPTS AND PRACTICES

This course is designed to provide the student with opportunities for applications of anatomy and physics to the construction of prosthetic-orthotic devices. Laboratory sessions will develop the student's skills in processes and techniques required for proficiency in this area.

AHO 243 Credit: 4
ADVANCED APPLICATION - HEALTH CONCEPTS AND PRACTICES

This course is designed to provide knowledge and skills in the selection, fabrication, and fitting of postheses for the upper extremities. It includes study of upper extremity biomechanics and factors to be considered in the prescription of prosthetic devices. Laboratory sessions will develop the student's skill in techniques of fabrication and fitting.

AHO 244 A Credit: 4
ADVANCED INTERDISCIPLINARY HEALTH CONCEPTS

This course is designed to provide the student with opportunities to apply previously developed skills and knowledge to the selection, fabrication, and fitting of prostheses for below the knee amputations. Current practices for prescription, fitting, static and dynamic alignment are among the subjects covered. Laboratory sessions provide patient contact and practical applications.

AHO 232 Credit: 4
SPECIAL PROBLEMS AND TECHNIQUES

Provides the student with opportunities to practice and refine skills previously learned in the study areas of prosthetics-orthotics. This is also a period for the refinement of work habits, attitudes, and adminstrative activities which will aid the student in making the transition from student to professional.

AHO 256 Credit: 5
APPLIED HEALTH CONCEPTS IN PRACTICE I

This course is designed to provide the student assignment in his area of clinical interest for a supervised preceptorship including clinical application of skills and proficiencies; review of techniques and procedures pertaining to upper extremity orthotics, lower extremity orthotics and spinal orthotics.

PSYC 233 Credit: 3
PSYCHOLOGY OF PERSONALITY

A study of major factors and conditions related to personality development, including parent-child relations, personality defense mechanisms, methods of personality measurement, and behavioral pathologies and their treatments.

PSYC 231 Credit: 3
CHILD GROWTH AND DEVELOPMENT

Human psychological development from birth to adulthood. The birth of the baby; from organism to person; the infant; the toddler; the preschool child, the middle years of childhood; adolescence; disturbances in development; the study of children.

MATH 133 Credit: 3
BUSINESS MATHEMATICS I

A study is made of fundamental mathematical processes, fractions, decimals, percentage in business, business equations, and simple interest.

GOVT 233 Credit: 3

SURVEY OF AMERICAN AND TEXAS GOVERNMENT AND CONSTITUTIONS

Study of the institutions of government and [illegible] functions from the local level to the national with particular emphasis on the city, county, and state governments. Examines in detail and on a comparative basis the United States and Texas Constitutions.

Students

Two students have entered the program. One completed the AHO course work and the clinical affiliation required for the degree; however, he did not complete his academic courses at Galveston College. He has since dropped out of college and is driving a messenger service truck.

The other student opted for the study track, changed his mind at the last moment and asked to join another study track. He was not admitted into the other study track and subsequently dropped out of the program two days later. He has since contacted the AHO Director to determine if he could again re-enter the program.

The limitation on the number of students in the program is that the orthotist is equipped for two students. Orthotics are not included in the clinical rotation during the first semester of the Freshman year; however, the students are apprised of the program and anyone interested is taken to the orthotist for an interview and a period of time in the business.

During the study track clinical courses, the student is in the orthotist's place of business which is not in a medical facility. He does; however, accompany the orthotist on calls and works with the orthotist and the physician (or recommending allied health personnel) and the patients. Therefore, he is not confined to one health facility but draws from the needs of the community and the area for his training.

PHYSICAL THERAPIST ASSISTANT

History

The Physical Therapist Assistant program was instituted at Galveston College at the time of the first Texas Education Agency program approvals. The American Physical Therapy Association had only one year earlier adopted the assistant position in a policy statement by the House of Delegates.

Training and Utilization of the Physical Therapy Assistant*

Policy Statement

TITLE: Physical Therapist Assistant

DEFINITION:

The physical therapist assistant is a skilled technical health worker who has completed an educational program approved by the American Physical Therapy Association.

EDUCATION:

The Association supports the concept of upward educational mobility.

a. The educational program for the physical therapist assistant shall be at a two year college level leading to an associate degree and shall include some course work which may be credited towards requirements leading toward a higher degree.

b. The educational program shall be administratively located within, and offered by, an educational institution which is accredited by the regional accrediting agency in its geographical area.

c. The physical therapist assistant program shall meet the standards of approval established by the APTA.

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* Prepared by the Ad Hoc Committee to Study the Utilization and Training of NonProfessional Assistants, March, 1967. Amended and adopted as amended by APTA House of Delegates, July, 1967. Since that time, title has been changed to Physical Therapist Assistant, and this new title will be used throughout this statement.

d. The clinical portion of the educational program shall be:

   1. Located within physical therapy services of health care facilities which meet requirements for:

      a. Accreditation by the Joint Commission on Accreditation of Hospitals and/or

      b. Conditions of Participation standards established by the U.S. Social Security Administration Documents HIM-1,2 and 3, 1966, and regulatory changes pertaining to physical therapy and physical therapists up to and including July 7, 1967;

      c. Such other facilities with comparable standards and which are acceptable to the American Physical Therapy Association;

   2. Supervised by physical therapists who meet standards established by the APTA

e. The physical therapist who shall have the responsibility and authority for the administration and direction of the physical therapist assistant program shall meet the standards established by the APTA.

SUPERVISORY RELATIONSHIP:

The physical therapist assistant works within a physical therapy service administered by a professional physical therapist who meet the standards established by the American Physical Therapy Association. The assistant performs his duties with the direction and supervision of the professional physical therapist to whom he is directly responsible.

FUNCTIONS:

The assistant's function is to assist the professional physical therapost in patient related activities; to perform such procedures delegated to him that are commensurate with his education and training. He carries out designated tasks which are required for the operation of the service. The extent to which the physical therapist assistant will participate in the following activities will be dependent upon the organization structure and size of the physical therapy service and upon the health needs of the individual patient.

a. Functions as a participating team member who contributes to total patient care.

b. Assists the professional physical therapist in carrying out complex procedures and programs.

c. Performs routine treatment procedures in accordance with the planned programs.

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d. Observes, records and reports to his supervisor conditions, reactions and responses related to his assigned duties.

REGULATION:

The APTA supports mandatory licensure or registration for the physical therapist assistant and recommends that such regulations be incorporated into the existing physical therapy laws for the purpose of controlling quality of care and practice.

AFFILIATION:

Upon completion of requirements as prescribed by the Board of Directors, the physical therapist assistant shall be eligible for an appropriate membership category in the American Physical Therapy Association.

At the time of development of the assistant's program, the Medical Branch had already a baccalaureate physical therapy program in existence. Because of the maximum number of students constantly enrolled in the four-year program, there were limited clinical facilities for applicants in the AHO program. Therefore, only two physical therapist assistant students may be in a study track at one time.

Curriculum

The curriculum has been designed from the standards established by the national association. Other study tracks with national accreditation standards require a certain number of contact hours for academic and clinical studies. The physical therapist assistant requirements are established on a percentage of total time as shown. The following pages show the requirements changed to contact hours to conform to Texas Education Agency specifications.

"STANDARDS" OF AMERICAN PHYSICAL THERAPY ASSOCIATION

	Percentage of Total Time	Percentage of Technical Course Work
GENERAL EDUCATION[a]	39-53	
General degree requirements	25-30	
Anatomy and physiology[b]	5-10	
Behavioral sciences	5-10	
Electives	4- 8	
TECHNICAL EDUCATION[c]	47-61	100
Orientation to physical therapy and the role of the assistant	1	3
Applied anatomy	1	2
Survey of pathophysiological conditions	2- 5	5- 8
Physical therapy assistant procedures	18-27	27-45
Basic patient skills (4%)[d]	1	1
Modalities of heat and cold (23-25%)[d]	5	5-10
Massage (7-9%)[d]	2	4
Functional activities (25-28%)[d]	4- 8	10-12
Exercise (32-25%)[d]	6-10	12-16
Other selected procedures (3%)[d]	1	1
Directed clinical experience	25-30	40-45

[a] Anatomy and physiology and behavioral sciences are an essential part of the total program

[b] Instruction is required. If considered part of the technical education course work, total percentages are to be adjusted accordingly

[c] Demonstration, laboratory instruction, and practice are to be utilized

[d] Percentage of procedures course work

DISTRIBUTION OF SPECIFIC PHYSICAL THERAPIST ASSISTANT STUBJECT MATTER AS STIPULATED BY THE "STANDARDS" OF THE AMERICAN PHYSICAL THERAPY ASSOCIATION, ACCORDING TO REQUIRED COURSES

	A.P.T.A. STANDARDS	GALVESTON COLLEGE AHO CURRICULUM DISTRIBUTION	SEMESTER	CLOCK HOURS
1.	ORIENTATION			
	A. To Physical Therapy	AHO 131	Semester 1	
	1. History and Philosophy	Lectures		9
	2. Role and Function	Clerkship		9
				18
2.	SURVEY OF PATHOPHYSIOLOGICAL CONDITIONS	AHO 133 Nursing	Semester II	18
		AHO 134 Psychology		8
		AHO 135 Applied Health Concepts in Practice	Summer 1	30
		AHO 231 Advanced Application Health Concepts and Practices	Semester III	10
				66
3	PHYSICAL THERAPY PROCEDURES			
	A. Basic Patient Skills	AHO 135	Summer 1	23
	B. Modalities of Heat and Cold	AHO 231	Semester III	86

DISTRIBUTION OF SPECIFIC PHYSICAL THERAPIST ASSISTANT SUBJECT MATTER AS STIPULATED BY THE "STANDARDS" OF THE AMERICAN PHYSICAL THERAPY ASSOCIATION, ACCORDING TO REQUIRED COURSES

A.P.T.A. STANDARDS	GALVESTON COLLEGE	SEMESTER	CLOCK HOURS
C. Massage	AHO 231	Semester III	34
D. Functional activities	AHO 234 Advanced Application Health Concepts and Practices	Semester IV	108
E. Exercise	AHO 234	Semester IV	54
F. Other Selected Procedures	AHO 234	Semester IV	10
			315
4. APPLIED ANATOMY	AHO 231	Semester III	32
			32
5. DIRECTED CLINICAL EXPERIENCE	AHO 135 AHO 231 AHO 234	Summer 1 Semester III Semester IV	174 143 260
			577

DISTRIBUTION OF SPECIFIC PHYSICAL THERAPIST ASSISTANT SUBJECT MATTER AS STIPULATED BY THE "STANDARDS" OF THE AMERICAN PHYSICAL THERAPY ASSOCIATION ACCORDING TO REQUIRED COURSES

A.P.T.A. STANDARDS	GALVESTON COLLEGE AHO CURRICULUM DISTRIBUTION	SEMESTER	CLOCK HOURS
TOTAL HOURS OF CLINICAL EDUCATION AND CLINICAL EXPERIENCE			1008
	AHO Seminar and Conference		9
	Health Related Subjects in AHO Core Curriculum		
	Medical Terminology AHO 133	Semester II	54
	Group Dynamics AHO 134	Semester II	54
	Orientation AHO 131	Semester I	15
	A. Introduction to Course		
	B. Ethics		
	C. Medicine and the Law		
	D. To other disciplines		
	1. Hospital Administration		18
	2. Inhalation Therapy		18
	3. Social Services (including community)		18
	4. Radiologic Technology		18
	5. Orthotics		3
	6. E.E.G. Service		12
	7. Occupational Therapy		18

DISTRIBUTION OF SPECIFIC PHYSICAL THERAPIST ASSISTANT SUBJECT MATTER AS STIPULATED BY THE "STANDARDS" OF THE AMERICAN PHYSICAL THERAPY ASSOCIATION ACCORDING TO REQUIRED COURSES

A.P.T.A. STANDARDS	GALVESTON COLLEGE AHO CURRICULUM DISTRIBUTION	SEMESTER	CLOCK HOURS
TOTAL HOURS OF HEALTH RELATED EDUCATION			228
	GENERAL EDUCATION COURSES in AHO program		
	English 131 - Composition and Rhetoric	Semester I	54
	English 132 - Composition and Rhetoric	Semester II	54
	Psychology 131 - Introduction	Semester I	54
	Sociology 131 - Introduction	Semester II	54
	Psychology 132 - Social	Semester IV	54
	Psychology 232 - Human Growth and Development	Semester III	54
	Survey of Government - 232	Semester IV	54
	Anatomy	Semester I	108
	Physiology	Semester II	108
			594

DISTRIBUTION OF SPECIFIC PHYSICAL THERAPIST ASSISTANT SUBJECT MATTER AS STIPULATED BY THE "STANDARDS" OF THE AMERICAN PHYSICAL THERAPY ASSOCIATION ACCORDING TO THE REQUIRED COURSES

A.P.T.A. STANDARDS	GALVESTON COLLEGE AND CURRICULUM DISTRIBUTION	SEMESTER	CLOCK HOURS
TOTAL HOURS OF GENERAL EDUCATION			822
TOTAL EDUCATIONAL HOURS INVOLVED IN THE PHYSICAL THERAPIST ASSISTANT PROGRAM			1839

GALVESTON COLLEGE
DIVISION OF OCCUPATIONAL EDUCATION

ASSOCIATED HEALTH OCCUPATIONS

PHYSICAL THERAPIST ASSISTANT
(Meets Associate in Applied Science Degree Requirements)

FIRST YEAR

First Semester			Hours		
		Class	Lab	Credit	Contact
AHO 141	Interdisciplinary Health Concepts Introduction to Health Occupations	3	3	4	96
AHO 132	Interdisciplinary Health Practices - Specialized Clerkship	3	0	3	48
BIOL 133	Anatomy & Physiology	3	0	3	
BIOL 113	Anatomy & Physiology Lab	0	2	1	
ENGL 131	Basic Composition	3	0	3	
SOC 131	Introduction to Sociology	3	0	3	
	Total Hours	15	5	17	144

Second Semester					
AHO 143	Interdisciplinary Health Concepts	3	3	4	96
AHO 134	Interdisciplinary Health Practices	3	0	3	48
BIOL 134	Anatomy & Physiology	3	0	3	
BIOL 114	Anatomy & Physiology Lab	0	2	1	
ENGL 132	Composition and Rhetoric	3	0	3	
PSYC 131	Introduction to Psychology	3	0	3	
	Total Hours	15	5	17	144

Second Summer Session					
AHO 155	Applied Health Concepts in Practice	2	16	5	288
	Total Hours	2	16	5	288

SECOND YEAR

First Semester					
AHO 241	Interdisciplinary Health Concepts	2	8	4	160
AHO 242	Advanced Application - Health Concepts and Practices	2	8	4	160
GOVT 233	Survey of American and Texas Government and Constitutions	3	0	3	
PSYC 232	Social Psychology	3	0	3	
	Total Hours	10	16	14	230

PHYSICAL THERAPIST ASSISTANT
(continued)

Second Semester			Hours Class	Lab	Credit	Contact
AHO	232	Special Problems and Techniques	3	0	3	48
AHO	243	Advanced Application - Health Concepts and Practices	2	8	4	160
AHO	244	Advanced Interdisciplinary Health Concepts	2	8	4	160
BM	133	Business Mathematics I	3	0	3	
PSYC	231	Child Growth and Development	3	0	3	
		Total Hours	13	16	17	368

Total Semester Credit Hours in Program: 70

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PHYSICAL THERAPIST ASSISTANT

Course Descriptions

AHO 155
APPLIED HEALTH CONCEPTS IN PRACTICE CREDIT: 5

This course is designed to provide the student with the initial concepts of procedures and techniques, and an overview of physical therapy in action. In addition to an introduction to the physical therapists' role and function in major medical areas, the student will experience, under the supervision of a physical therapist, the applications of those procedures being learned. The student will gain basic skills and procedures as applied to physical therapy. Emphasis is focused upon developing a practical body of knowledge related to a high standard of patient care.

AHO 241
INTERDISCIPLINARY HEALTH CONCEPTS CREDIT: 4

This course is designed to provide the student with assignment to the student's area of interest, physical therapy, for supervised application of techniques and individual student development of intermediate technical skills as applied to physical therapy treatment. Emphasis is placed on actual clinical application of proficiencies and compentencies learned in previous didactic courses.

Objectives:

1. To provide the student with supervised clinical experience in treatment of patients, within all age groups, with pathophysiological problems.
2. To provide the student with direct contact experience, under supervision, with patients of all age groups who have pathophysiological problems.
3. To develop aims and attitudes which are directive in aiding the student in achieving an understanding of clinical procedures as they relate to a high standard of patient care.

AHO 242
ADVANCED APPLICATION -- HEALTH CONCEPTS AND PRACTICES CREDIT: 4

This course is designed to provide assignments to the student's area of clinical interest, physical therapy, including application of techniques, procedures, and individual student development of intermediate technical skills. Emphasis is placed upon providing the student with comprehensive information concerning all aspects of physical therapy, including types of patients, methods of treatment and treatment philosophies.

Objectives:

1. To provide the student with knowledge and understanding of the dynamic concepts of physical therapy.

2. To provide the student with the knowledge and understanding of treatment procedures: heat and cold, massage, and other selected procedures.

3. To provide the student experience of perceiving and manipulating human functional anatomy.

4. To provide the student with learning experiences necessary to understand the concepts of muscle action biometrics.

AHO 232
SPECIAL PROBLEMS AND TECHNIQUES CREDIT: 3

This course has been designed to provide the student with the opportunity to explore in greater depth the procedures and techniques used in physical therapy. Emphasis is placed on exploration of new areas of procedures and techniques, the reinforcement of previously learned skills, and the analysis of procedures and techniques for application to physical therapy.

Objectives:

1. To allow the student to explore new areas of procedures and techniques that can be innovative, as well as practical.

2. To allow the student to gain additional experience in the maintenance of materials and equipment.

3. To allow the student to gain greater knowledge of the adjustment of procedures and techniques to physical therapy treatment.

4. To allow the student to reinforce previously learned skills in the area of procedures and techniques.

5. To assist the student in developing sound methods of analysis of procedures and techniques for application to physical therapy treatment.

AHO 243
ADVANCED APPLICATION -- HEALTH CONCEPTS AND PRACTICES CREDIT: 4

This course is designed to provide the student with assignment to the student's area of interest, physical therapy, for supervised application of techniques and individual student development of intermediate technical skills as applied to physical therapy treatment. Emphasis is placed on actual clinical application of proficiencies and competencies learned in previous didactic courses.

Objectives:

1. To provide the student with supervised clinical experience in treatment of patients, within all age groups, with pathophysiological problems.

2. To provide the student with direct contact experience, under supervision, with patients of all age groups who have pathophysiological problems.

3. To develop aims and attitudes which are directive in aiding the student in achieving an understanding of clinical procedures as they relate to a high standard of patient care.

AHO 244
ADVANCED INTERDISCIPLINARY HEALTH CONCEPTS AND PRACTICES CREDIT: 4

This course is designed to provide assignment to the student's area of clinical interest, physical therapy, including instruction in specialized concepts and theory, supervised application of techniques and individual student development of intermediate technical skills. Emphasis will be placed on providing the student with comprehensive information concerning all aspects of functional training. In addition, a segment of study concerning other selected procedures will be incorporated in this unit of study.

Objectives:

1. To provide the student with knowledge and understanding of the dynamic concepts of physical therapy treatment in physical dysfunction.

2. To provide the student with the knowledge and understanding of treatment, the physical therapy process, and other techniques with patients in the area of physical dysfunction.

3. To allow the student to gain specific knowledge concerning the adjustment of procedures and techniques to individual patient care.

4. To aid the student in developing a basic understanding of various forms of treatment in physical therapy as they relate to a high standard of care for the patient with problems of physical dysfunction.

GOVT 233
SURVEY OF AMERICAN AND TEXAS GOVERNMENTS CREDIT: 3

Study of the institutions of government and their functions from the local level to the national with particular emphasis on the city, county, and state governments. Examines in detail and on a comparative basis the United States and Texas Constitutions.

PSY 232
SOCIAL PSYCHOLOGY CREDIT: 3

A study of individual behavior as affected by cultural and social stimuli. Emphasis is placed upon the differences in human conduct as determined by various social and cultural environments. The objective of the course is to better prepare the student to understand and evaluate the effect of the social environment on the development of individual behavior and personality. Likewise, the overall effect of the individual's activities on society will be reviewed.

PSYC 231
CHILD GROWTH AND DEVELOPMENT CREDIT: 3

This course is designed to provide students with basic understandings concerning the nature of children and youth, how they grow and develop, and the major influences which contribute to their behavior and learning. Emphasis will be placed on building a functional knowledge of scientific principles about human beings which will assist the student in understanding and explaining one's own, as well as others behavior.

Objectives:

1. To develop aims and attitudes which are directive in making the individual's growth and development the central focus of education.

2. To acquire skill in using the scientific method as the most effective and valid way of interpreting behavior.

3. To employ these skills and this information to improve our ways of working with children and youth.

4. To demonstrate democratic attitudes in the teaching-learning process which facilitates growth and development.

5. To provide experiences in the meanings of "acceptance", "student-teacher-planning" and "learning by doing and feeling".

MATH 133
BUSINESS MATHEMATICS I CREDIT: 3

A study is made of fundamental methematical processes, fractions, decimals, percentage in business, business equations, and simple interest.

The physical therapist assistant student begins the study track in the summer session with days divided into four hours of lecture and four hours of clinical experience. The time in class is almost doubled during the summer to leave more time for patient treatment during the spring semester when skills have been acquired.

Throughout the sophomore year the physical therapist assistant student spends time with the baccalaureate physical therapy student both in the classroom and in clinical situations. The Technical Director of the Physical Therapist Assistant program determines if the assistant students belong in the baccalaureate classes. Usually, when basic skills are taught, the students are together since some procedures and techniques would apply at both levels

The therapist-assistant relationship is good for both sets of students. The therapy students learn what they can expect from the assistants in a job situation, the assistant students learn their roles as support to the therapists. The assistants, being relatively new to the field, have to win the confidence of therapist in job situations. Having therapists now graduating with the knowledge of the work of the assistant helps to promote good relationships later on. One example is the assistant who is required to write progress notes on a patient, but the therapist must countersign the notes for validity.

To achieve an understanding of the role of the physical therapist assistant, the UTMB School of Allied Health Sciences Clinical Education Supervisor for Physical Therapists prepared a "Procedure for Utilization of Physical Therapist Assistant in Patient Treatment". This information is shown in Exhibit 1 which is used as a basis for the structure of the clinical education program at The University of Texas Medical Branch.

Classroom lectures and clinical experience are correlated, the student learning didactically and then entering into application. Clinical Evaluation Sheets (Exhibits 2, 3, and 4) have been developed for each of the courses. The purpose of the Sheets is to determine if a student has a grasp of the knowledge gained in the classroom and can then apply it in the clinic. Clinical evaluations by the faculty are made at the end of the fifth and tenth weeks of a semester, ending with the final examination. During the summer months, there is an evaluation at mid-term and at the final.

The student also has a curriculum evaluation sheet (Exhibit 5) which is turned in at the end of the year. Assistant students keep no diaries but are required to write reports on all patients to whom they are assigned. The faculty can determine from these reports what the student has been taught in classroom and experienced in the clinics. They can then assign the students to patients with problems the students need to encounter.

The concept of the clinical training for the physical therapist assistant is best summed up in a staff memorandum from the Clinical Education Supervisor for the program . . .

"No patient is to be assigned to a student without having first been evaluated by a physical therapist. The physical therapist will explain the treatment program for that patient to the student, and will recheck the patient's progress and the student's performance at least twice weekly. Students should write their own progress notes and obtain a countersignature by the physical therapist. Re-evaluation notes must be written by the physical therapist."

"The students need to work with patients having varied diagnoses and requiring a side variety of treatment modalities and exercise programs. In order to provide a source of information about diagnoses and types of treatment, the students are to turn in a list to the clinical education supervisor at the end of each week. Material to be included: Patient's name and diagnosis; supervising physical therapist; treatment given. Students will meet with the Clinical Education Supervisor at 11:30 a.m. on Fridays for discussion of progress, problems, etc."

Admissions

The Admissions Committee for Physical Therapist Assistants formulated a guide for accepting the best qualified students into the program. The standards are not only used for screening students, but currently are utilized as a research tool for determining future criteria for acceptance into the program.

The following criteria were established by the Admissions Committee as standards for acceptance into the Physical Therapists Assistant Program.

I. Mental Capabilities

   A. The Otis Test will be given

      1. An I. Q. of 100 or better is preferred
      2. Less than 100 would be questionable

   B. The Nelson-Denny will be given

      1. Students ranking below the 10th percentile would be questionable
      2. The purpose of giving the Nelson-Denny is threefold
         a. A possible indicator of "achiever level"
         b. May show a pattern in relation to other material collected. This pattern might show up as everything being at about the same level or it may show an "out of the ordinary" situation of high in one area and low in others
         c. May also be used as a research tool. May show trends that will be helpful in predicting successful Physical Therapist Assistant students

   C. Necessary information from Galveston College

      1. Overall Grade Point Average

      2. Specific Grades in
         a. Anatomy

        b. Physiology
        c. Math, if math course has been taken

D. A student will be considered ineligible if:

1. His final grade in Anatomy is below a C
2. He is an alternate student and has not completed anatomy by the beginning of the second half of the summer semester

II. Physical Capabilities

A. Information required prior to interview date:

1. Health form to include
    a. Height
    b. Weight
    c. Blood pressure
    d. Any weakness of loss of
        1) Hearing
        2) Vision
        3) Body parts
    e. Past history of:
        1) Seizures
        2) Scoliosis
        3) Orthopedic problems

B. A student may be considered ineligible if:

1. It is felt the candidate is not capable of heavy labor
2. He is less than five feet tall
3. He is overweight
    a. Bad risk from an orthopedic standpoint
    b. May have increased blood pressure
    c. May have decreased endurance
    d. May not be able to get close enough to the patient for safe or effective handling
4. It is felt that the candidate lacks the general coordination ability to be a skilled technician

III. Interview Forms - Standardized Interview Forms will be used. These forms will serve as a guideline for the subjective assessment of the students:

A. Communication ability

1. How well he speaks
    a. Shy
    b. Aggressive
2. How well he listens
3. His ability to respond appropriately

B. Knowledge of Physical Therapy

   1. What he will be doing as a P.T. Assistant
   2. What Physical Therapy is

C. Interest in Physical Therapy

   1. How he became interested in Physical Therapy
   2. How he feels about people

D. Interests in general

   1. Hobbies
   2. Desire to continue his education
   3. Where he would like to work after graduation
   4. Previous jobs

E. Physical Characteristics

   1. Overall physical appearance
   2. Noticeable disabilities or handicaps
      a. Neuromuscular problem
      b. Missing part
      c. Assistive devices

With this guide, the Admissions Committee interviews the students utilizing the specially-designed interview form (Exhibit 6). The forms are then analyzed and condensed into a report on each student by the Technical Director and presented to the Admissions Committee for final review and selection.

Students

Four students have entered the physical therapist assistants program since its inception. The first student did not complete the clinical work, transferring to another college.

Another student has graduated and has a position in Galveston working under a registered physical therapist in an orthopedic clinic.

Two students are in their clinical year. Student #1 scored 118 on her Otis examination and Student #2 scored 94. The Nelson-Denny Reading

Test showed the following:

	Student #1	Student #2
Vocabulary	67%	9%
Comprehension	78%	14%
Reading Rate	80%	56%

Both girls are making comparable grades in their AHO work because Student #1 is considered an underachiever and #2, an overachiever.

Physical Therapy is one of the most popular first choices of students when they write their initial autobiographies early in their freshman years. Many change their minds and opt for other study tracks. It is considered there are three possible reasons:

First, some students find they lack the emotional stability needed to work with people thusly handicapped. Secondly, they want to experience patient contact in their occupation, but they find that there is too much actual physical involvement with very sick patients, and thirdly, the influence of this position being new and accepted only in a limited way. The worry over future jobs causes them to change their minds.

Those students who finally opt for the program do so with the full knowledge of what is expected of them. They learn this beginning with clinical rotations the first semester of their freshman year.

Equipment

To equip a laboratory for fifteen physical therapy assistant students, the following is recommended:

1. The Laboratory

The general appearance should be similar to that of the physical therapy service department. A functioning clinical area should not be considered for the dual purpose of patient service and student education.

Dressing Room: As physical therapist assistants students are generally required to wear shorts and shirts or bathing suits during laboratory periods, dressing rooms, lockers, lavatories and toilets for men and women should adjoin the laboratory area. Minimum space required: 300 square feet.

Storage: Storage space adequate for such equipment as crutches, electro therapy machines, hydro therapy equipment, etc. Minimum space required: 100 square feet.

Preparation Room: Space adequate for setting up audio visual aids, demonstrations, etc. prior to class period. Minimum space required: 280 square feet.

Office space and equipment for the director and faculty must also be considered. Suggested are 210 square feet for the director's office and 140 square feet for each of the faculty offices.

Estimated cost of office equipment for One Director and One Faculty Member:

2 desks	$190.00		$380.00
1 steel file 4 drawer	62.00		62.00
2 storagers	29.00		58.00
		TOTAL	$500.00

A list of items and approximate cost to equip a classroom with the necessary equipment for a class of 15 Physical Therapist Assistant students follows.

A. Treatment cubicle furniture and accessories

Quantity	Item	Price	Total
8	Treatment tables	$ 181.00	$ 1,448.00
3	Foot stools	17.80	53.40
4	Timers	15.50	62.00
			$ 1,563.00

B. Electrotherapy Equipment

1	Sieman's diathermy with accessories	2 short wave	$ 1,150.00
1	Burdick diathermy with accessories		957.00
1	Microwave diathermy with 2 directors		970.00
1	Ultra sound electrical stimulation combination		935.00
1	Ultra Sound		500.00
1	Ultra Violet Lamp		900.00
1	Electrical diagnostic testing instrument		795.00
			$ 6,207.50

C. Heat and Cold Therapy

2	Infra Red lamps		$ 310.00
1	Hot Packs and Cabinet	$ 155.00	390.00
1	Arm, Hand, and Foot Paraffin bath		580.00
			$ 1,280.00

D. Hydro Therapy

1	"Long and Low" whirlpool		$ 1,182.00
1	Stationary Arm whirlpool		792.00
1	Low chair for long and low		140.00
			$ 2,114.00

E. Ambulation Equipment

1	Walking Parallel bars		$ 550.00
4 pair	Adjustable wooden crutches	$ 10.60	42.40
2 pair	Adjustable forearm crutches	21.50	43.00
3	Hospital canes	3.00	9.00
1	Quad cane		18.00
1	Standard walker adjustable		17.90

Quantity	Item	Price	Total
4	Safety belts	$ 14.75	$ 59.00
			$ 739.30
F. Exercise Equipment			
2	Exercise platforms	$ 175.00	$ 350.00
2	Exercise mats	136.80	273.60
1	Wall weights		218.00
1	N-K table		275.00
	Weights and weight cart		341.50
2	Tilt tables	380.00	760.00
4	Sphygmomanometers	50.00	200.00
2	Powder boards	52.00	104.00
1	Set of sandbags		58.30
1 set	Cuff weights		45.00
			$ 2,625.40
G. Wheelchair and Stretchers			
4	Wheelchairs	$ 256.00	$ 1,024.00
2	Stretchers	310.00	620.00
			$ 1,644.00
H. Traction Equipment			
1	Traction table and accessories		$ 824.00
		GRAND TOTAL	$16,997.70

EXHIBIT I

UNIVERSITY OF TEXAS MEDICAL BRANCH HOSPITALS

PHYSICAL THERAPY DEPARTMENT

Procedure for Utilization of Physical Therapist Assistant in Patient Treatment

Initiation of treatment is done by the PT who evaluates the patient and outlines a treatment program in accord with the results of the evaluation. In the initital entry in the patient's chart, the PT includes the results of his evaluation, plus a detailed outline of the treatment plan. Any questions regarding type of treatment to be given should be cleared with the physician by the PT before turning the patient over to the PTA.

The PTA will be responsible for obtaining countersignatures for her status notes from the PT, and for notifying the PT when a recheck of the patient is due (this shall be at least once a week, for patients receiving treatment once daily, and more often if so specified by the PT).

These periodic re-evaluations by the PT will reveal changes in the patient's condition which may result in modifications in the goals of treatment and treatment program. Such modifications may only be made by the PT. He is responsible for discontinuing treatment if indicated. He will determine if a need is present for special appliances or equipment and will specify exact type to be ordered. The PT will determine whether or not a ward program or home program is indicated for the patient and will inform the PTA what is to be included. Communication with the physician regarding goals and methods of treatment, status and progress of patient will be effected by the PT.

Status notes written by the PTA should include which procedures outlined by the PT were done during that treatment session, how they were tolerated by the patient, whether expansion or progression of program as outlined by PT had been possible.

The PTA should notify the PT if:

1) New MD's orders are received
2) A procedure used was poorly tolerated
3) Patient's condition changes, requiring and change in treatment
4) Accident or emergency occurs

Information Which the PT Must Give to the PTA

General Instructions to be used with all treatment procedures, if applicable

1. Position of patient
2. Duration of treatment
3. Special precautions for treatment

Whirlpool

1. What part is to be immersed
2. Whether agitation is desired
3. Temperature
4. Additives
5. Whether debridement is to be done
6. Specific exercises, if desired

Tank

1. Additives
2. Agitation desired
3. Special instructions re: cathethers, colostomies, IV's
4. Areas to be debrided and how extensively
5. Specific exercises, if desired
6. Temperature

Traction (pelvic and cervical)

1. Poundage, rate of progression, maximum level
2. Intermittent or static
3. Angle of pull
4. Time settings

Hot Packs

1. Area of application

Cold Packs

1. Area

Ultrasound

1. Intensity
2. Area
3. Rate of increase of intensity, if desired, and highest level
4. Standard or underwater application
5. Pulsed or continuous application

Shortwave Diathermy

1. Which machine
2. Area to be heated
3. Acceptable range of intensity

Microwave Diathermy
1. Which director
2. Area of application

Infrared Application
1. Areas to be protected, if any
2. Areas to be heated

Ultraviolet
1. Number of M.E.D.'s to be given
2. Area to be irradiated
3. Rate of progression, if indicated

Electrical Stimulation
1. Muscles or nerve distribution to be stimulated
2. Type of current, including particulars on duration, interval, intensity (may be specified by strength of contraction elicited)
3. Approximate number of contractions or length of treatment

Paraffin Bath
1. Area to be treated
2. Whether elevation of part is desired after application

Massage
1. Purpose of massage - (to relax, to mobilize, to provide sensory stimulation, etc.)
2. Area to be covered
3. Note trigger points or areas requiring special attention
4. Specify type of stroke if indicated

Therapeutic Exercises
1. Purpose of exercise (mobilization, strengthening, maintenance of ROM, conditioning, coordination, etc.)
2. Type of exercise to be done (using the following terminology to define and/or limit exercise)
    a. Isotonic or isometric
    b. Isolated muscle action or in groups
    c. Specify where in the continuum of passive--active--resistive exercise
    d. Straight planes or diagonal patterns
    e. Antigravity, gravity eliminated, gravity assisted
    f. With or without equipment
    g. Define limitations imposed by pain, fatigue, etc.

Bronchial Drainage
1. Segments to be drained
2. If percussion or vibration is desired
3. Positions to be avoided, if any

Tilt Table

1. Weight bearing restrictions
2. If lower extremities are to be wrapped with elastic bandages
3. If vital signs are to be monitored
4. Rate of progression desired
5. If progression to ambulation is desired without rechecking with PT, and if so, instruct as shown below under ambulation

Ambulation

1. If lower extremities are to be wrapped with elastic bandages
2. Type of lateral support desired, if any
3. Gain pattern to be taught
4. Weight bearing precautions
5. Assistive devices to be used

Prepared by Madeleine Baker with
Assistance of the Staff

October 7, 1971

EXHIBIT 2

Department of Physical Therapy
School of Allied Health Sciences
Associated Health Occupations

AHO 155 Clinical Education Evaluation Sheet

Name:______________________________ Date:________________

Supervisor:_________________________ Affiliation:____________

Statements relating to the student's performance in clinical education should be scored in the following manner:

YES: Indicates acceptable performance
NO: Indicates unacceptable performance
DA: Does not apply or student had no opportunity to perform

COMMENTS: Use to explain why performance was unacceptable or to comment on an exceptional performance

	YES	NO	DA	COMMENTS
A. The student displays skill in performing the following tasks:				
1. Clerical duties				
a. Answer the phone				
b. Page Physicians, others				
c. Prepare daily transportation schedule				
d. Record and deliver messages				
e. Perform billing procedures				
f. Register consults				
2. Departmental Maintenance				
a. Clean and fill Whirlpool				
b. Clean treatment area				
c. Clean mats and tilt tables				

	YES	NO	DA	COMMENTS
3. Patient Transportation a. Transfer patients from bed to wheelchair or stretcher				
b. Operate wheelchair on level ground, into and out of elevator, up and down ramps				
c. Operate stretcher on level ground, into and out of elevator, up and down ramps				
d. Transfer patient from wheelchair or stretcher to bed				
e. Transport patients records and other material to and from physical therapy department				
4. Tank Room Duties a. Prepare patient for tank				
b. Perform isolation techniques used in physical therapy department				
c. Transfer patient to and from hubbard tank using hydraulic lift				
d. Transfer patient to and from continuous tub without a lift				
e. Sterilize tank, equipment, instruments				
f. Remove dressings				
g. Cleaning, powdering and storing gloves				
h. Preparing antibacterial solution				
i. Cover patient properly after treatment				
j. Observe safety precautions				
k. Debride wounds in acceptable manner				
l. Demonstrate mature behavior				
5. Patient Treatment a. Transfer patient from wheelchair or stretcher to mat or plinth				
b. Prepare booth or treatment area for patient treatment				

	YES	NO	DA	COMMENTS
c. Apply and remove assistive devices				
d. Position patient for treatment				
e. Drape patient for treatment				
f. Apply elastic bandages				
g. Perform passive range of motion exercises, straight planes				
h. Perform passive range of motion exercises, diagnal patterns				
i. Guard and train patient during basic gait activities				
j. Stabilize and supervise patients' safety during exercise				
k. Use splints, sandbags, pillows, towels, hiprolls in patient positioning				
l. Assist patient in use of bed pan and urinal				
m. Assist patient with dressing				
6. Tilt Table a. Transfer patient to tilt table				
b. Strap patient to table				
c. Elevate tilt table				
d. Observe and record patient's reactions				
e. Take and record vital signs				
B. The student displays skill in relating to job requirements in the following way: 1. Communication a. Using correct terminology				
b. Giving clear, concise instructions				
c. Speaking with people at their level of understanding				
d. Reporting pertinent information about the patient				
e. Answering questions directly without hedging				

	YES	NO	DA	COMMENTS
2. Responsibility a. Being punctual on the job				
b. Adhering to your administration policies				
c. Using free time constructively				
d. Proceeding with assigned tasks with minimal assistance				
e. Completing assigned tasks within a reasonable time				
f. Proceeding with tasks not specifically assigned				
3. Self-Confidence a. Proceeding with known techniques when given the opportunity				
b. Accepting constructive criticism without excuses or undue distress				
c. Seeking solutions to problems rather than becoming excited				
d. Seeking explanation of variations in techniques or procedure seen in your clinic				
4. Judgment a. Asking questions or commenting on confidential matters at an appropriate time				
b. Consistently displaying professional behavior				
c. Seeking assistance when not sure of appropriate action				
d. Seeking assistance when unable to perform tasks safely				
5. Departmental Procedures a. Adhering to departmental procedures during an emergency				
b. Adhering to safety precautions during all activities				
c. Utilizing good body mechanics				

Additional Comments:

I have discussed this evaluation with the student YES_______ NO_______

Supervisor______________________________

EXHIBIT 3

Department of Physical Therapy
School of Allied Health Sciences
Associated Health Occupations
AHO 231 Clinical Education Evaluation Sheet

Name:______________________________ Date:__________________

Supervisor:__________________________ Affiliation:______________

Statement relating to the student's performance in clinical education should be scored in the following manner:

YES: Indicates acceptable performance
NO: Indicates unacceptable performance
DA: Does not apply or student had no opportunity to perform

COMMENTS: Use to explain why performance was unacceptable or to comment on an exceptional performance

	YES	NO	DA	COMMENTS
A. The student displays skill in relating to job requirements in the following way:				
1. Communication				
a. Using correct terminology				
b. Giving clear. concise instructions				
c. Speaking with people at their level of understanding				
d. Reporting pertinent information about the patient				
e. Answering questions directly without hedging				
f. Using correct grammar and spelling when reporting pertinent information about a patient				
2. Responsbility				
a. Being punctual on the job				
b. Adhering to your administrative policies				
c. Using free time constructively				
d. proceeding with assigned tasks with minimal assistance				

	YES	NO	DA	COMMENTS
e. Completing assigned tasks within a reasonable time				
f. Proceeding with tasks not specifically assigned				
3. Self-Confidence				
a. Proceeding with known techniques when given the opportunity				
b. Accepting constructive criticism without excuses or undue distress				
c. Seeking solutions to problems rather than becoming excited				
d. Seeking explanation of variations in techniques or procedure seen in your clinic				
4. Judgment				
a. Asking questions or commenting on confidential matters at an appropriate time				
b. Consistently displaying professional behavior				
c. Seeking assistance when not sure of appropriate action				
d. Seeking assistance when unable to perform tasks safely				
e. Using variations in techniques or procedures when appropriate				
5. Departmental Procedures				
a. Adhering to departmental procedures during an emergency				
b. Adhering to safety precautions during all activities				
c. Utilizing bood body mechanics				
d. Replacing equipment to its assigned place				
e. Wearing clean uniform and shoes				
6. Interest				
a. Being attentive during observation periods				
b. Following instructions given				
c. Asking appropriate questions				
d. Being attentive to the patient during treatment				

	YES	NO	DA	COMMENTS
B. The student displays skill in performing the following tasks: 1. Clerical Duties a. Answering the phone				
b. Performing billing procedures				
2. Departmental maintenance a. Cleaning and filling the hubbard tank				
b. Cleaning the filling the whirlpool				
c. Cleaning treatment area				
d. Taking inventory of departmental supplies				
e. Folding And storing linen				
3. Tank Room Duties a. Preparing patient for tank				
b. Performing isolation techniques used in physical therapy dept.				
c. Transferring patient to and from hubbard tank using hydraulic lift				
d. Transferring patient to and from continuous tub without a lift				
e. Sterlizing tank and equipment				
f. Removing dressings				
g. Supervising active exercise as specified by physical therapist or a PT student				
h. Taking patients' vital signs before and during treatment when appropriate				
4. Patient Treatment a. Transferring patient from wheelchair or stretcher to mat or plinth				
b. Preparing booth or treatment area for patient treatment				
c. Applying and removing assistive devices				
d. Positioning patient for treatment				
e. Draping patient for treatment				
f. Applying Elastic bandages				
g. Performing passive range of motion exercises				
h. Taking and recording vital signs				
i. Guarding and training patient during basic gait activities				
j. Stabilizing and supervising patients' safety during exercise				

	YES	NO	DA	COMMENTS
k. Using splints, sandbags, pillows, towels, hiprolls in patient positioning				
l. Using special beds and frames				
m. Assisting patient in use of bed pan and urinal				
n. Assisting patient with dressing				
o. Inspecting patients' skin before and after the treatment when appropriate				
5. Tilt Table				
a. Transferring patient to tilt table				
b. Strapping patient to table				
c. Elevating tilt table				
d. Observing and recording patient's reactions				
e. Taking and recording vital signs				
6. Modalities of Heat and Cold				
a. Applying diathermy with glass air-spaced electrodes				
b. Applying diathermy with hinged drum				
c. Applying microways diathermy				
d. Applying ultrasound, direct application				
e. Applying ultrasound, under water				
f. Applying infra red heat				
g. Applying ultra violet				
h. Treating a patient using the whirlpool bath				
i. Treating a patient using the paraffin bath				
j. Treating a patient using ethyl chloride and friction massage				
k. Applying ice packs				
m. Applying hot packs				
n. Applying cervical traction				
o. Applying pelvic traction				
p. Applying muscle stimulation as directed by the PT				
7. Massage				
a. Performing massage to neck and back				
b. Performing massage to entire back				

	YES	NO	DA	COMMENTS
8. Therapeutic Exercise a. Exercise in a straight plane motion				
1. Passive				
2. Active Assistive				
3. Active				
4. Manual resistive				
b. Berger-Allen Exercises				
c. Williams Flexion Exercises				
d. Exercise for hip arthroplasty				
e. Exercise for a neck problem				
f. Codman's pendulum exercises				
g. Coordination exercises				
h. Exercises for a patient in a Milwaukee Brace				
i. Exercises for chest disorders 1. Breathing exercise				
2. Trunk mobilization				
3. Bronchial drainage				
4. Precussion				
5. Clapping				
j. Diagonal patterns 1. Upper extremity				
2. Lower extremity				
k. Stretching techniques				
l. Pre and Post op amputee exercises and positioning				
m. Stump wrapping				
n. Use of exercise equipment 1. N-K table				
2. Overhead pulley				
3. Stationary bicycle				
4. Wall weights				
5. Cuff weights, bar bells, dumb bells				
6. Restorator				
7. Other				

Additional Comments:

I have discussed this evaluation with the student YES______ NO__________

Supervisor________________________________

EXHIBIT 4

Department of Physical Therapy
School of Allied Health Sciences
Associated Health Occupations

(Clinical Education Evaluation Sheet AHO 243)

Name ______________________________ Date ______________________

Supervisor _________________________ Affiliation ________________

Statement relating to the student's performance in clinical education should be scored in the following manner:

YES: Indicates acceptable performance
NO: Indicates unacceptable performance
DA: Does not apply or student had no opportunity to perform

COMMENTS: Use to explain why performance was unacceptable or to comment on an exceptional performance

	YES	NO	DA	COMMENTS
A. The student displays skill in relating to job requirements in the following way:				
1. Communication				
a. Establishing rapport with patients				
b. Using correct terminology				
c. Giving clear, concise instructions				
d. Speaking with people at their level of understanding				
e. Reporting pertinent information about the patient				
f. Answering questions directly without hedging				
2. Responsbility				
a. Being punctual on the job				
b. Adhering to your administrative policies				
c. Using free time constructively				
d. Proceeding with assigned tasks with minimal assistance				
e. Completing assigned tasks within a reasonable time				

	YES	NO	DA	COMMENTS
f. Proceeding with tasks not specifically assigned				
3. Self-Confidence				
a. Proceeding with known techniques when given the opportunity				
b. Accepting constructive criticism without excuses or undue distress				
c. Seeking solutions to problems rather than becoming excited				
d. Seeking explanation of variations in techniques or procedure seen in your clinic				
4. Judgment				
a. Asking questions or commenting on confidential matters at an appropriate time				
b. Consistently displaying professional behavior				
c. Seeking assistance when not sure of appropriate action				
d. Seeking assistance when unable to perform tasks safely				
e. Using variations in techniques or procedures when appropriate				
5. Departmental Procedures				
a. Adhering to departmental procedures during an emergency				
b. Adhering to safety precautions during all activities				
c. Utilizing good body mechanics				
d. Replacing equipment to its assigned place				
e. Wearing clean uniform and shoes				
6. Interest				
a. Being attentive during observations period				
b. Following instructions given				

	YES	NO	DA	COMMENTS
c. Asking appropriate questions				
d. Being attentive to the patient during treatment				
B. The student displays skill in performing the following physical therapy procedures				
1. Clerical duties				
2. Departmental maintenance				
3. Tank room responsibilities				
4. Patient treatment				
a. Transfer patient				
b. Prepare booth or treatment area				
c. Apply and remove assistive devices				
d. Position patient for treatment				
e. Drape patient to expose area to be treated and preserve patients modesty				
f. Apply elastic bandages				
g. Take and record vital signs				
h. Guard and train patient during basic gait activities				
i. Stabilize and supervise patient during exercise				
j. Inspect patients skins before and after the treatment, when appropriate				
5. Tilt table				
6. Modalities of Heat and Cold				
a. Short wave diathermy				
b. Micro wave diathermy				
c. Ultra sound, direct application				
d. Ultra sound, under water				
e. Infra red heat				
f. Ultra violet				
g. Whirlpool				
h. Paraffin				
i. Ethel chloride and friction massage				

	YES	NO	DA	COMMENTS
j. Ice Packs				
k. Hot packs				
l. Cervical traction				
m. Pelvic traction				
n. Muscle stimulation				
7. Massage				
8. Therapeutic Exercise				
a. Exercise in a straight plane motion 1. Passive				
2. Active assistive				
3. Active				
4. Manual resistive				
b. Berger-Allen Exercises				
c. Williams Flexion Exercises				
d. Exercise for hip arthroplsty				
e. Exercise for a neck problem				
f. Codman's pendulum exercises				
g. Coordination exercises				
h. Exercises for a patient in a Milwaukee Brace				
i. Exercises for chest disorders 1. Breathing exercise				
2. Trunk mobilization				
3. Bronchial drainage				
4. Precussion				
5. Clapping				
j. Diagonal patterns 1. Upper extremity				
2. Lower extremity				
k. Stretching techniques				
l. Pre and post op amputee exercises and positioning				
m. Stump wrapping				
n. Use of exercise equipment 1. N-K table				
2. Overhead pulley				
3. Stationary bicycle				
4. Wall weights				
5. Cuff weights, bar bells, dumb bells				

	YES	NO	DA	COMMENTS
6. Restorator				
7. Other				
9. Functional training				
a. Bed activities				
b. Balance activities				
c. Self assistive range of motion exercises				
d. Dressing activities				
e. Mat activities				
f. Wheel chair activities				
1. Cleaning and care				
2. Manipulation of parts				
3. Propulsion and balance activities				
4. Transfer to and from wheelchair				
g. Ambulation activities				
1. Patient with one sided weakness				
2. Patient with bilateral lower limb weakness				
10. Assists the physical therapist in the following procedures				
a. Hemiplegic evaluation				
b. Cerebral palsy evaluation				
c. Posture evaluation				
d. Range of motion evaluation				
e. Muscle strength test				
f. Activities of daily living evaluation				
g. Orthotic and prosthetic check out				
h. Strength duration curve				
i. Nerve excitability test				
j. Splint making				

EXHIBIT 5

UNIVERSITY OF TEXAS MEDICAL BRANCH
School of Allied Health Sciences
Physical Therapist Assistant Program

Curriculum Critique on Technical Education
(Material covered from July through May in P.T.A. Curriculum)

1. Do you feel the course material could have been better sequenced to make your clinical education more meaningful? Identify and explain.

2. How could the classroom teaching be altered to better prepare you for clinical education?

3. Was the programmed text entitled: Muscles, Bones and Joints, helpful to you? Do you think it should be a supplement to kinesology in ther future?

4. What other material do you feel should have been included in the technical education curriculum?

5. Was any part of the curriculum particularly stressful? Identify and explain.

6. Was any part of the curriculum not worthwhile? Identify and explain.

7. Was there unnecessary overlap or repetition in materials presented? If yes, identify and explain.

8. What specific techniques, that were presented in the classroom, were used or presented in a different manner in clinical education:

   THERAPEUTIC EXERCISE

   FUNCTIONAL TRAINING

   MASSAGE

   MODALITIES OF HEAT AND COLD

9. In what areas did you feel particularly weak during clinical experience?

10. During your clinical education did you feel you were being asked to to things you were not qualified or trained to do? If yes, identify and explain.

11. Additional Comments

EXHIBIT 6

INTERVIEW FORM
DEPARTMENT OF PHYSICAL THERAPY
PHYSICAL THERAPIST ASSISTANT PROGRAM
SCHOOL OF ALLIED HEALTH SCIENCES
UNIVERSITY OF TEXAS MEDICAL BRANCH

NAME______________________________ DATE____________________

ADDRESS______________________________________

OVERALL GPA ____________________

ADMISSIONS BATTERY SCORES OTIS______________

NELSON-DENNY: VOC_____________ COMP_____________

R. RATE____________

SCIENCE GRADES AT GALVESTON COLLEGE

ANATOMY______________

PHYSIOLOGY ____________

MATH GRADE, IF TAKEN______________

INTERVIEWERS IMPRESSION OF:

1. PHYSICAL APPEARANCE
    a) Overall
    b) Any noticeable disabilities or handicaps
    c) General coordination
    d) Does this person look physically able to do heavy labor?

2. COMMUNICATION ABILITIES

   a) How well does he speak? i.e., shy-aggressive

   b) How well does he listen?

   c) Does he make the appropriate responses?

3. INTERESTS

   a) Introduction to Physical Therapy

   b) Does he know what a P.T. Assistant does?

   c) How he feels about people

   d) Hobbies

   e) Previous jobs

   f) Continuing toward a higher degree

   g) Where he would like to work as a P.T. Assistant

4. ADDITIONAL COMMENTS:

Signed ______________________
Interviewer

FORM ADOPTED APRIL 22, 1971

RADIOLOGIC TECHNOLOGY

The Radiologic Technology study track can enroll the largest number of students with clinical facilities capable of training forty. The number of students is set at 20 a year. There is an overlapping of first and second year clinical students because of the requirements of another summer and a full semester of education after the second year.

When this program was incorporated into the Galveston College AHO curriculum in the summer of 1970, The Medical Branch began phasing out a certificate program which had been in existence for a number of years. It was the aim of the College and The Medical Branch to have a radiologic technology course which offered the student a well-rounded educational experience.

The certificate studies, which were 24 months in length, were accredited by the American Medical Assocation. The AHO program had to undergo a new accreditation in order to join the one in existence. Adjustments were necessarily made for the AHO study track. The course was extended to 30 months to comply with AMA standards of hours students must train in clinical studies and the academic hours required for the college degree. The program was so structured that AHO students and remaining certificate students received their clinical and theory training at the same time. It was gratifying to note the AHO students were able to maintain their studies at The Medical Branch as well as their college work during the same time the certificate students had only the studies at The Medical Branch.

Curriculum

Students entering this program graduate with 88 hours of credits. The clinical experience stipulated by the AMA causes them to schedule their time until the end of December in their third year of the program. Should a student miss clinical time, he must make it up before he may graduate.

The following pages outline the structure of the program in relation to the standards established by the AMA.

DISTRIBUTION OF SPECIFIC RADIOLOGICAL TECHNOLOGY SUBJECT MATTER AS STIPULATED BY THE ESSENTIALS OF THE AMERICAN MEDICAL ASSOCIATION/AMERICAN REGISTRY OF RADIOLOGIC TECHNOLOGISTS, ACCORDING TO REQUIRED COURSES.

ASSOCIATED HEALTH OCCUPATIONS PROGRAM, GALVESTON COLLEGE/SCHOOL OF ALLIED HEALTH SCIENCES, GALVESTON

A.M.A. ESSENTIALS	GALVESTON COLLEGE A.H.O. CURRICULUM DISTRIBUTION	SEMESTER	CLOCK HOURS
A. DIDACTIC			
1. ORIENTATION			
a. History and Philosophy of Radiologic Technology	AHO 132 - 141	Semester I	9
b. Role and Function of Radiologic Technology	AHO 132 - 141	Semester I	9
2. PROFESSIONAL ETHICS			
a. Ethics and Legality	AHO 132 - 141	Semester I	9
3. ANATOMY AND PHYSIOLOGY			
a. Anatomy	Biology 143	Semester I	108
b. Physiology	Biology 144	Semester II	108
c. Topographic Anatomy	AHO 155	Summer I	12
4. NURSING PROCEDURES			
a. Nursing Procedures Common to Radiologic Technology	AHO 134 - 141	Semester II	18

	A.M.A. ESSENTIALS	GALVESTON COLLEGE A.H.O. CURRICULUM DISTRIBUTION	SEMESTER	CLOCK HOURS
5.	PHYSICS			
	a. Biomedical Physics (Introduction) I	Physics 231	Semester III	54
	b. Biomedical Physics (Including Radiation and Nuclear) II	Physics 232	Semester IV	54
6.	DARKROOM CHEMISTRY AND TECHNIQUES			
	a. Darkroom Chemistry / Techniques	AHO 155	Summer I	10
7.	PRINCIPLES OF RADIOGRAPHIC EXPOSURE			
	a. Introduction	AHO 155	Summer I	10
	b. Continuation	AHO 241 - 242	Semester III	10
	c. Continuation	AHO 232 - 243 - 244	Semester IV	10
8.	TERMINOLOGY			
	a. Medical and Radiographic	AHO 134 - 143	Semester II	54
9.	COMMON RADIOGRAPHIC PROCEDURES			
	a. Use of Contrast Media	AHO 241 - 242	Semester III	8
10.	FILM CRITIQUE			
	a. Introduction	AHO 155	Summer I	10
	b. Continuation	AHO 241 - 242	Semester III	20
	c. Continuation	AHO 232 - 243 - 244	Semester IV	20
	d. Continuation	AHO 256	Summer II	20
	e. Continuation	AHO 287	Summer II	20

A.M.A. ESSENTIALS	GALVESTON COLLEGE A.H.O. CURRICULUM DISTRIBUTION	SEMESTER	CLOCK HOURS
11. RADIOGRAPHIC POSITIONING			
a. Positioning A	AHO 241- 242	Semester III	30
b. Positioning B	AHO 232 - 243 - 244	Semester IV	30
12. PEDIATRIC RADIOGRAPHY			
a. Principles and Techniques	AHO 232 - 243 - 244	Semester IV	8
13. PROTECTION OF PATIENTS AND PERSONNEL			
a. Principles and Techniqes	AHO 155	Summer I	5
	AHO 241 - 242	Semester III	10
14. CLINICAL CONDITIONS			
a. Medical	AHO 232 - 243 - 244	Semester III	10
b. Surgical	AHO 232 - 243 - 244	Semester III	10
c. Disease	AHO 232 - 243 - 244	Semester III	10
15. SPECIAL RADIOGRAPHIC PROCEDURES			
a. Procedures and Techniques	AHO 256	Summer II	20
16. EQUIPMENT MAINTENANCE			
a. Practicum and Lecture	AHO 232 - 243 - 244	Semester IV	10
17. GENERAL REVIEW			
a. General Review	AHO 267 - 268	Summer II Semester V	20

A.M.A. ESSENTIALS	GALVESTON COLLEGE A.H.O. CURRICULUM DISTRIBUTION	SEMESTER	CLOCK HOURS
B. CLINICAL EXPERIENCE			
1. Clinical Experience I	AHO 155 - 8 weeks at 33 hours per week	Summer I	264
2. Clinical Experience II	AHO 241 - 242 - 18 weeks at 16 hours per week	Semester III	288
3. Clinical Experience III	AHO 232 - 243 - 244 - 18 weeks at 33 hours per week	Semester IV	532
4. Clinical Experience IV	AHO 256 - nine weeks at 45 hours per week	Summer II	315
5. Clinical Experience V	AHO 267 - 268 - 20 weeks at 38 hours per week	Summer II Semester V	760
TOTAL DIDACTIC HOURS IN RADIOLOGIC STUDY CURRICULUM		744	
TOTAL CLINICAL EXPERIENCE HOURS IN RADIOLOGIC STUDY CURRICULUM		2153	
TOTAL HOURS IN RADIOLOGIC TECHNOLOGY STUDY CURRICULUM			2897
	GENERAL STUDIES DISTRIBUTION		
	English 131	Semester I	54
	English 132	Semester II	54

A.M.A. ESSENTIALS	GALVESTON COLLEGE A.H.O. CURRICULUM DISTRIBUTION	SEMESTER	CLOCK HOURS
	Psychology 131 (Introduction)	Semester I	54
	Sociology 131 (Introduction)	Semester II	54
	Government 233	Semester III	54
	Algebra 131	Semester III	54
	A.H.O. 131 (Introduction)	Semester I	54
	A.H.O. 143 (Rotation Clerkships)	Semester I	108
	A.H.O. 132 (Nursing Procedures, The Dying Patient, Anxiety of Illness)	Semester II	54
	A.H.O. 143 (Terminology, Group Dynamics, Leadership)	Semester II	108
TOTAL CREDIT HOURS FOR RADIOLOGIC TECHNOLOGY STUDY CURRICULUM		87	

GALVESTON COLLEGE
DIVISION OF OCCUPATIONAL EDUCATION

ASSOCIATED HEALTH OCCUPATIONS

RADIOLOGIC TECHNOLOGIST
(Meets Associate in Applied Science Degree Requirements)

FIRST YEAR

First Semester

			Hours		
		Class	Lab	Credit	Contact
AHO 141	Interdisciplinary Health Concepts - Introduction to Health Occupations	3	3	4	96
AHO 132	Interdisciplinary Health Practices - Specialized Clerkship	3	0	3	48
BIOL 133	Anatomy & Physiology	3	0	3	
BIOL 113	Anatomy & Physiology Lab	0	2	1	
ENGL 131	Basic Composition	3	0	3	
SOC 131	Introduction to Sociology	3	0	3	
	Total Hours	15	5	17	144

Second Semester

		Class	Lab	Credit	Contact
AHO 143	Interdisciplinary Health Concepts	3	3	4	96
AHO 134	Interdisciplinary Health Practices	3	0	3	48
BIOL 134	Anatomy & Physiology	3	0	3	
BIOL 114	Anatomy & Physiology Lab	0	2	1	
ENGL 132	Composition and Rhetoric	3	0	3	
PSYC 131	Introduction to Psychology	3	0	3	
	Total Hours	15	5	17	144

First Summer Session

		Class	Lab	Credit	Contact
GOVT 233	Survey of American and Texas Government and Constitutions	3	0	3	
MATH 141	College Algebra	3	2	4	
	Total Hours	6	2	7	

Second Summer Session

		Class	Lab	Credit	Contact
AHO 155	Applied Health Concepts in Practice	2	16	5	288
	Total Hours	2	16	5	288

RADIOLOGIC TECHNOLOGIST
(continued)

SECOND YEAR

First Semester

	Class	Lab	Credit	Contact
AHO 241 Interdisciplinary Health Concepts	2	8	4	160
AHO 242 Advanced Application - Health Concepts and Practices	2	8	4	160
PHYS 231 Survey of Biomedical Physics	3	0	3	
Total Hours	7	16	11	320

Second Semester

	Class	Lab	Credit	Contact
AHO 232 Special Problems and Techniques	3	0	3	48
AHO 243 Advanced Application - Health Concepts and Practices	2	8	4	160
AHO 244 Advanced Interdisciplinary Health Concepts	2	8	4	160
PHYS 232 Survey of Biomedical Physics	3	0	3	
Total Hours	10	16	14	368

First Summer Session

	Class	Lab	Credit	Contact
AHO 256 Applied Health Concepts in Practice I	2	16	5	288
Total Hours	2	16	5	288

Second Summer Session

	Class	Lab	Credit	Contact
AHO 267 Applied Health Concepts in Practice II	2	16	6	288
Total Hours	2	16	6	288

THIRD YEAR

First Semester

	Class	Lab	Credit	Contact
AHO 268 Applied Health Concepts in PracticeIII	0	35	6	560
Total Hours	0	35	6	560

Total Semester Credit Hours in Program: 88

RADIOLOGIC TECHNOLOGIST

Course Descriptions

AHO 155
APPLIED HEALTH CONCEPTS IN PRACTICE

Lectures and practical experience in entry level skills and proficiences for radiologic technology; topographic anatomy; darkroom chemistry and techniques; principles or radiographic exposure; film critique; protection of patients and personnel; clinical experience.

AHO 241
INTERDISCIPLINARY HEALTH CONCEPTS

Lecture and practical experience in intermediate level skills and proficiencies in radiologic technology; principles of radiographic exposure; use of contrast media; film critique; practical experience.

AHO 242
ADVANCED APPLICATIONS - HEALTH CONCEPTS AND PRACTICES

Lecture and practical experience in intermediate level skills and proficiencies in radiologic technology; positioning; protection of patients and personnel; practical experience.

AHO 232
SPECIAL PROBLEMS AND TECHNIQUES

Lecture and practical experience in advanced level skills and proficiencies for radiologic technology; film critique; clinical conditions.

AHO 243
INTERDISCIPLINARY HEALTH CONCEPTS

Lecture and practical experience in advanced level skills and proficiencies for radiologic technology; positioning pediatric radiograpy; equipment maintenance.

AHO 244
ADVANCED HEALTH CONCEPTS AND PRACTICES

Clinical experience in radiographic procedures and techniques.

AHO 256
APPLIED HEALTH CONCEPTS IN PRACTICE I

Special radiographic procedures and practical experience

AHO 267
APPLIED HEALTH CONCEPTS IN PRACTICE II

General review and practical experience

AHO 268
APPLIED HEALTH CONCEPTS IN PRACTICE III

General review and practical experience

GOVT 233
SURVEY OF AMERICAN AND TEXAS GOVERNMENT AND CONSTITUTIONS

Study of the institutions of government and their functions from the local level to the national with particular emphasis on the city, county and state governments. Examines in detail and on a comparative basis the United States and Texas Constitutions.

MATH 141
COLLEGE ALGEBRA

An introduction to the basic concepts of modern algebra. Topics are taken from logic and set theory, the development of the number systems, relations, functions, equations, inequalities, determinants and matrices, probability and mathematical induction.

PHYS 231 and 232
SURVEY OF BIOMEDICAL PHYSICS

Fundamental and derived units, force, energy, work, power, structure of matter ionization, magnetism, electro statics, AC and DC currents -EMF-electric circuits, electric induction, motors, generators, transformers and coils, rectification, X-ray machine design and operation. X-rays and other radiation.

The AHO Technical Director for Education for Radiologic Technology is directly responsible to the AHO Department Chairman and works with the Technical Director in the Department of Radiology to formulate the schedules of clinical hours for the students. The AHO Director handles much of the lecturing; however, registered technicians from The Medical Branch are invited to lecture, if they so desire.

Perhaps this situation best typifies the needed cooperation between the educational and medical facilities. At the present time, budgets cannot permit the payment of more teaching faculty for the Radiologic Technology study track. Those registered technicians who teach do so because of a genuine desire to communicate their knowledge to others, and without pay. It is interesting to note one of the instructors (non-paid) is taking courses at Galveston College to receive his A.A.S. degree in A.H.O. He will take the proficiency examination for his clinical hours upon completion of his academic courses.

Because of the large number of students who may enroll in radiologic technology every year, there is a clinical supervisor, paid by Galveston College, who is with the students during their clinical hours. The supervisor assists the students in working out scheduling problems, reschedules students when they are absent, conducts some lectures and is responsible for the individual student film critiques. The film critiques enable the student to understand what is essential to have an acceptable film and how errors can be alleviated.

Clinically, the Department of Radiology at The Medical Branch is ideally suited for teaching. Each room is designed for certain procedures. The student is assigned to a particular room under the Registered

Technologist in charge. The RT submits an evaluation of the student's performance at the end of his rotation period. Also evaluating is the supervisor in charge of the area. In this way, if a student does not perform adequately, he will be rotated back into that area at a future date to repeat until he has mastered that particular procedure. The student must pass each clinical area with a C or better.

At first, the technologists who were given charge over students were prone to haphazardly complete the evaluations. Now, they take time to complete the forms, making comments which are constructive and helpful to the instructors. In turn, the students are made more aware of their deficiencies in certain areas and are given individual training and counseling whenever needed. (See evaluation, Exhibit 2, page 120).

Students are admitted to the study track upon recommendation of the Advisory Committee. Each student is individually intereviewed. He must have made 2.0 or better in all science-related courses and must have completed Anatomy, Physiology and required AHO courses to date. The student must have shown a desire to help other people and have displayed good study habits during the first year of AHO work.

The first summer session students spend 50% of their time in lectures and the other in clinical observation. They learn basic positioning and fundamentals of x-ray. They may only serve as observers and can only offer assistance to the registered technologist when the actual taking of x-rays is not involved.

During the fall semester, the student will begin to see the correlation between the lectures and the clinical experience. He is under the direct supervision of a staff radiologic technologist throughout his clinical experience except for the final six months. During this time, however, there must be supervisors always in the area.

An example of classwork is given in Exhibit 1 which is an outline of one of the lecture-labs they attend throughout their studies. There are multiple study units during the course of one semester. Length of time of these units varies with the content and AMA standards for hours taught on individual subjects.

Because of the number of clinical hours a student is required to complete before he is eligible for national registry, the student is not only present for the hours allotted for the AHO courses, but also trains during the evening and night shifts with registered technologists. A typical schedule for a student may be as follows:

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
3-11 p.m.	8 a.m.- 5 p.m.	8 a.m.- 5 p.m.	8 a.m.- 5 p.m.	8 a.m.- 5 p.m.	8 a.m.- 5 p.m.	

(Academic courses taken during the semester in the evenings)

	8 a.m.- 5 p.m.	8 a.m.- 5 p.m.	8 a.m.- 5 p.m.	8 a.m.- 5 p.m.	8 a.m.- 5 p.m.	
	8 a.m.- 5 p.m.	8 a.m.- 5 p.m.	8 a.m.- 5 p.m.	8 a.m.- 5 p.m.	8 a.m.- 5 p.m.	3-11 p.m.

Upon completion of 15 months of clinical work in the study track, the student may apply for registry examination. He may take the examination and pass it, but will not receive certification until he has completed the requirement of clinical hours, the AAS degree from Galveston College and The Medical Branch's Certificate of Proficiency.

Additional Clinical Facilities: Plans were finalized in late spring, 1972, for the addition of clinical experience for radiologic technology students in the facilities at St. Mary's Hospital which is adjacent to The University of Texas Medical Branch. Students are rotated between the two institions, giving them the added experience of working within two radiology departments and with different technologists.

Alternates: Most of the students entering the second semester of the first year do so with the intent of entering the radiologic technology program. This is because, to date, the positions have not been completely filled at the time of student opting, and additional students may enter. Because there is additional time at the end of the second year, some students are able to take all required courses at Galveston College and graduate on schedule. The radiologic technology program is time-consuming and can be difficult to master. Students with previous college studies and those entering from high schools should be able to show by previous grades that they can maintain studies both at Galveston College and The Medical Branch.

Students

One class has graduated in the AHO program. Five students chose this field. One student was counseled out of the study track before it began because of low grades. This student has since returned to Galveston College to retake the college courses and has shown the intent to apply again. Another student has passed all academic and clinical work in AHO and passed the registry examination; however, she failed English and is retaking the course. She will be in the x-ray department at The Medical Branch but will still maintain the status of a student until she graduates. At that time, she will also be registered and receive her certificate of proficiency from The Medical Branch.

Of the three graduates, one is teaching radiologic technology (he previously had a B.S. degree), one is going to The University of Texas to study pre-med (she was a 4.0 student), and the third student has requested additional clinical time. The student is foreign and has a language problem; however,performance and grades made him eligible for graduation.

Facilities

Galveston College is striving to gather equipment suitable for teaching students, which would free the rooms used for studies at The University of Texas Medical Branch. Machines and other equipment is in the process of being purchased to establish a teaching classroom at the College. Some of the equipment has been donated by physicians who are replacing old equipment with newer models.

The classroom at Galveston College will utilize x-ray equipment which is functioning; however, there will be lead shielding so the beam is absorbed. The room is being constructed according to radiation standards established by the Texas Department of Health and federal regulations.

The following listing of equipment is recommended for establishing a classroom facility:

DARK ROOM

	Kool-X Air-cooled with stainless steel exterior
2	Insert 20 gauge type 316 S.S. 5 gallon capacity
2	Stainless Steel cover
	Identification Printer
	CM Scale
	.5 Lead Apron
	.25 Lead Apron
	Combination Work Bench (film dryer, film bin and storage)
1	Lead impregnated gloves (pr.)
4	14x17 Cassette with par speed blockers
4	10x12 Cassette with par speed blockers
4	8x10 Cassette with par speed blockers
12	14x17 Hangers
12	10x12 Hangers
12	8x10 Hangers
3	Hanger storage racks
	Glove and Apron rack
2	Dark Room Lamps
	Adjustable Lamp
	Wet Film Illuminator with dry tray
	Lead Rubber Half-Film Blockers 17x17
	Lead Rubber Half-Film Blocker 6x12
	Lead Rubber Half-Film Blocker 5x10

Total.....$2,449.60

AUTOMATIC PROCESSOR

Automatic Processor with 14 gallon Replenisher Tanks

Total.....$7,400.00

TABLE:

1	Diagnost-1500 with Motor-Driven Table-top; Includes Scopo 71 Spot Film Device, Amplimat Bucky, 60L Grid (13:1,40"), Automatic Collimator, Footswitch, and Footrest, Retractable Radiation Shield
1	Shield, (XF3001/10), Insert (XF2051) 150/20/50 Re., 0.6/1.2, and Stator Cable
1	Trunnion
1	Amplimat Chamber for Scopo 71
1	Amplimat Chamber for Bucky
1	Compression Device

Total.....$21,915.00

GENERATOR:

1	Medio 3500 - 300 mA/150 kV Control and Generator for two tubes. Includes Automatic Exposure Control and two I/C Cables. Further includes; High Speed Rotor Control Rack Cabinet, without Door Two 3E Blank Panels Two 12E Blank Panels

Total.....$12,920.00

CEILING CRANE:

1	DS-62 Ceiling Crane
1	Rails
1	Trunnion
1	Shield (XF3001/100) Insert Rotalix 150/30/50 (XF2013/000) 1.2/2.0 and Stator Cable
1	Manual Collimator
2	H. V. Cables

Total.....$ 9,080.00

IMAGE INTENSIFIER SYSTEM

1	6" Image Intensifier Tube
1	6" I.I. Shield
1	Power Supply
1	Lens 0.75/50 mm
1	Test Phantom
1	Single Channel Attachment
1	Adaptation for Scopo 71

Total.....$ 8,660.00

TELEVISION SYSTEM:

1	Camera
1	Plumbicon Tube
1	Lens
1	Camera Control Unit
1	19" TV Monitor
1	Ceiling Suspension
1	Ceiling Rails

Total.....$17,025.00

WALL CASSETTE STAND:

1	Wall Cassette Stand
1	Amplimat M. Chamber
1	Grid 60L/13:1 60"
1	Chamber Cable/Amplimat

Total.....$ 1,870.00

EXHIBIT I

AHO 232 243 Spring Semester 1972

Radiographic Position with Lab

Volumne I -- Unit III -- Merrill

Class Room AHO 101

Class Hour Requirement: 51 Hours - Time: 10:30 - 12:00 Noon

Instructor - Mr. C. Davis ARRT

				Section I	PP
1.	Jan.	25	Tuesday	Knee - Femur Long Bone Measurement	94-117
2.	Jan.	27	Thursday	Lab	94-117
3.	Feb.	1	Tuesday	Shoulder girdle	120-129
4.	Feb.	3	Thursday	Shoulder girdle	130-137
5.	Feb.	8	Tuesday	Lab	120-137
6.	Feb.	10	Thursday	Clavicle	138-143
7.	Feb.	15	Tuesday	Scapula	144-149
8.	Feb.	17	Thursday	Lab	138-149
9.	Feb.	22	Tuesday	TEST I	94-149
				Section II	
10.	Feb.	24	Thursday	Sternum	152-159
11.	Feb.	29	Tuesday	Sterno Clavicular Joint	160-163
12.	March	2	Thursday	Lab	152-163

13.	March	7	Tuesday	Ribs & Costal Cartlege	164-173
14.	March	9	Thursday	Lab and Review	152-173
15.	March	14	Tuesday	TEST II	152-173

Section III

16.	March	16	Thursday	Cervical Vertebrae	208-225
17.	March	21	Tuesday	Cervical Vertegrae	226-237
18.	March	23	Thursday	Lab and Review	
19.	March	28	Tuesday	TEST III	

Spring Holidays March 27 - April 2, 1972

20.	April	4	Tuesday	Cervical-Thoracic region and vertebrae	238-245
21.	April	6	Thursday	Lab and Review	238-245

Section 3, TEST 3 will be combined with Section 4, TEST 4

Section IV

22.	April	11	Tuesday	Lumbo-Secral	246-257
23.	April	13	Thursday	Lab and Review	246-257
24.	April	18	Tuesday	Sacro Iliac joints	258-261
25.	April	20	Thursday	Sacrum & Coccyx	258-263
26.	April	25	Tuesday	Lab and Review	258-263
27.	April	27	Thursday	Scoliosis Series & Lab	266-269
28.	May	2	Tuesday	Review for Test	
29.	May	4	Thursday	TEST 3-4	208-269

CHAPTER 5

STUDENTS

The success of a new curriculum concept can be measured by evaluating The students and what they have gained or failed to achieve from the program. This chapter will take a statistical overview of four years of students, discuss entrance counseling, ongiing student evaluations and student input into the program.

Data was gathered on every student. Sources of information were college permanent records, autobiographies written shortly after students entered the program, and an Interest Inventory (personal data questionnaires). Instructors were also interviewed for their attitudes toward the students' enthusiasm, educational backgrounds and abilities.

The first part of this chapter will deal with the student from the time he applies for the program until he graduates -- the mechanics of getting a student through AHO. The next section will deal with statistics concerning the students as a whole, by classes and by successes. These statistics will prove the validity of the program and that it does belong in the junior college community. The last section will discuss the changes which are to be made which hopefully will give the student a better understanding of himself, the AHO program and his future in the health care fields.

Fulfilling Requirements

The student who wants to enter into the AHO program has to fulfill requirements over and above those for entering Galveston College. These procedures have been developed to give the AHO faculty a better idea of the type of student applying for admission. Not all people are able to function in a health care facility, so pre-admission procedures are necessary and important.

Many students attempt to first come to the AHO department to begin their admissions procedure. They are advised to first see the counselor at Galveston College. The AHO faculty will not interview a student who has not completed his admission requirements at Galveston College. The following note is given to a student coming to the AHO department:

> "Students interested in Associated Health Occupations, please make appointment with Mr. Bob Bennett, Counselor at Galveston College, 4015 Avenue Q, Galveston, Texas. Mr. Bennett will provide information regarding application for entry into A.H.O. Program which includes careers in:
>
> 1. Occupational Therapy Assistant
> 2. Physical Therapy Assistant
> 3. Inhalation Therapy
> 4. Radiologic Technologist
> 5. Community Health Worker
> 6. Orthotics Assistant
> 7. Electroencephalography
> 8. Hospital Management Assistant

When a student contacts the counselor at Galveston College, he is given a check list (Exhibit 1) which he is responsible for completing. When the student has completed the checklist through #9, he is then able to make an appointment for an AHO interview through the Department Chairman.

At the time of the interview with the AHO faculty, the student is given the AHO admission form which is confidential (Exhibit 2). The faculty feels that, since the AHO student is in the program to achieve a specific employment category, it is necessary to determine if that person is actually suited for this employment. The references the student gives are sent the Applicant s Personal Reference form, (Exhibit 3). Until these references are completed, the student is not notified of acceptance.

The student is then required to have a physical examination which is to be completed before registration. The University Health Form (Exhibit 4) is sent to the student who is responsible for getting this examination back to the College.

During this time, the admissions memorandum, (Exhibit 5) is sent to the registrar. The student is notified of his acceptance or nonacceptance into the program.

At the time the confidential admissions form for AHO is completed by the student, a file is made which contains the Admission Summary (Exhibit 6).

Having completed the above and having been accepted into the AHO program, the student then registers at the college. The counselor gives the student a Credit Record form (Exhibit 7) which they complete together, should the student have attended college previous to this semester. The student then keeps this credit record to help him with future planning of courses. Should a student wish to enter a specific study track at the time of entering the program and have required courses already completed, he then may take the option courses peculiar to the specified study track. Another credit record is kept in each student's file in the AHO program.

The first class session of the AHO courses, the student is given more information and forms. Exhibit 8 is the information of the health coverage which is porvided through Galveston College and The University of Texas Medical Branch. The student is also asked to sign the Honor Pledge (Exhibit 9), which is a requirement of all students at The University of

Texas Medical Branch.

The student also is given a Career Choice Inventory (Exhibit 10) which he completes. This form is used as supplemental information for those faculty members wishing to learn more about a student and also used during the time the individual study track faculty members are reviewing records of students who have opted for the particular courses.

Individual student files are maintained in the office of the Department Chairman until the time the student enters a particular study track. The files are then transferred to the Technical Director of that program. Included in the files are the reaction papers which the students wrote during the first semester of clerkships, all of their AHO test papers, and their paper giving the reason for their choice for a study track. By the close of prescribed study, the student's file contains all the tests, the clinical evaluations by AHO faculty, and the student's own evaluations and reaction papers. This file would then be helpful to the faculty who may be interviewing the student for baccalaureate study.

During the second semester the student's credit record is reviewed so he is able to determine what courses he needs to take to complete the study track in which he is entering. The individual records of students will be discussed more fully in the study track chapter.

At the time of graduation, the student will receive an Associate in Applied Science degree from Galveston College and a certificate of proficiency from the University of Texas Medical Branch. The student will also have been given the opportunity to apply for certification and qualifying examinations given by the national accrediting organizations.

AHO Club

AHO students are encouraged to participate in the activities of Galveston College as well as to belong to the Associated Health Occupations Club. This group was established in February of 1970 and is composed of members interested in and studying for a career in the health professions which are offered in AHO.

Their creed as adopted is:

> We the students of the Associated Health Organization pledge our services to help the crippled in mind and body
> We will strive together to obtain a sense of cooperation and participation
> We pledge to obey all rules set up by the organization
> In order to have more unity among us; we pledge to be honest, reliable and dependable at all times
> As a group will always have the right of freedom of expression
> We will gry to exercise God's given power to choose our direction and have Him teach us to believe; that with His help we are able to master any problem. And with assurance of growth in all our undertakings.

The club functions to bring students together informally. They initiate projects for the community. Christmas-time of 1970, the students chose a family they had learned of in their rotation through the Community Health Worker clerkship. They began gathering food for Christmas and delivered so much to the family that the family invited another family over to share it with them. The students also discuss the curriculum and work for changes. They strive to create an identity for AHO both at the College as well as at University of Texas Medical Branch.

The "buddy system" has proven successful. Every incoming freshman student is assigned a sophomore "buddy" who will help him with questions, problems, and will assist in referring the student to someone else if help is needed.

Uniforms

After the first six weeks of the fall term, the freshman student is required to wear a uniform when at The University of Texas Medican Branch. The uniform has two purposes. (1) To identify the student to the patients and employees at the Medical Branch. (2) To create a group pride in their positions.

The freshman uniforms are white blouses or shirts with blue skirts or trousers. An AHO emblem is on the pocket. They also wear name tags which are blue and yellow and say, "AHO Program."

The sophomores are distinguished by wearing white coats (short) with the AHO emblem on the pocket. Their name tags are yellow and blue with "AHO Program" letters smaller than those designating the study track they are following as "PHYSICAL THERAPY ASSISTANT."

Name tags and uniforms are required for work in the hospital. The students may wear their uniforms to classes at Galveston College; however, many prefer to look like everyone else.

The students must follow basic rules of good grooming. Hair must be styled in such a way that it must not touch the collar. Primarily, this request is a safety precaution rather than a grooming one.

The dress and grooming is all covered in the Honor Code which the student signs upon entering the program.

Student Affairs Committee

The Student Affairs Committee is composed of representatives of the AHO students and the chairman of the department of AHO, who serves as the advisor. This committee functions whenever there is a need. They have been know to counsel with students who are not properly dressed or need constructive advice on grooming. The committee is conscious of the need to have AHO students accepted as part of the professional health care team while they are in the process of learning their skills.

EXHIBIT 1

CHECK LIST FOR AHO APPLICANTS

This is a list of procedures and steps to be taken by an applicant for the Galveston College Associate Health Occupation Program. It is suggested that you keep this list. Check and date each step as you successfully complete each item on the list. This will enable you to know exactly what your status is at all times. Please note that it is the students responsibility to see that all steps are completed.

1. ______________ Counselor notified

2. ______________ Registrar notified

3. ______________ Application Filed

4. ______________ High School Transcript or G.E.D. filed

5. ______________ College Transcripts filed

6. ______________ ACT Scores on file

7. ______________ Otis scores on file

8. ______________ Notified to bring 2"x2" photo to S.A.H.S. for interview

9. ______________ Interview completed at Galveston College (Mr. Bennett, Counselor, initials here)

10. ______________ Appointment made with AHO Chairman, S.A.H.S. Phone 765-2901

11. ______________ Interview completed at School of Allied Health Sciences University of Texas Medical Branch (AHO Faculty initials here)

12. ______________ Physical Exam form completed

13. ______________ Notify Registrar at Galveston College of acceptance or non-acceptance in AHO

1 & 2 Notify Counselor, Mr. Bob Bennett, (Room 142 - Moody Hall) and Registrar's Office that you wish to be placed on the Active Applicants List for the fall class.

3. Complete admission procedure as outlined on pages 19-21 in the Galveston College catalogue (1970)

Note #1-Be sure all transscripts of all previous school work are in Registrar's office.

Note #2-Have ACT scores on record in Registrar's Office.

Note #3-Make arrangements for Finanacial Aid Assistance (if needed) immediately through Finanacial Aid Advisor, Mrs. Jacobs.

Note #4-Apply for pre-registration at Counselors Office (Room 142-Moody Hall) at announced times.

EXHIBIT 2

CONFIDENTIAL

ASSOCIATED HEALTH OCCUPATIONS PROGRAM
GALVESTON COLLEGE
40 and Avenue Q
Galvetson, Texas 77550

NAME ____________________

ADDRESS ____________________
____

Date ____________________

AGE __________

1. LIST THE LAST THREE POSITIONS OF EMPLOYMENT YOU HAVE HELD. Give employer's name and address (include military service), supervisor's name and title; your duties, salary and reason for leaving; list dates for employment in each position.

____
____
____
____
____

2. DISMISSALS AND FORCED RESIGNATIONS: List and describe.

____
____

3. COURT RECORD: List and explain all arrests, claims, fines and convictions.

____

4. REFERENCES: List three persons not related to you, that have know- of your skills and character.

Name	Address	Occupation	Phone

5. HEALTH: Have you any physical impairment or history of emotional problems whatsoever? Explain. (You will be required to have a complete physical examination before entering the program)

____

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(This information is stricktly confidential and will be reviewed without prejudice)

6. Why are you interested in a career in health care services?

____

____

____

7. MARRIED__________ WIDOW __________ DIVORCED__________

8. NUMBER OF CHILDREN __________

9. WHERE DID YOU GET INFORMATION CONCERNING THIS PROGRAM?

____

____

____

10. HIGH SCHOOL GRADUATION FROM______________________________

11. AVERAGE GRADES IN HIGH SCHOOL

12. G.E.D. TEST LOCATION____________________ DATE__________

13. FINANCIAL STATUS: (x)

_____Needs aid and part time work

_____Needs scholarship

_____Needs part time work

_____Is self supporting

_____Is supported by family

_____Is supported by agency

14. Have you worked in a hospital before __________

Location____________________Department__________

15. Do you belong to national professional registry in any area?______

16. Future employment plans:

Full time work _____ Part time work _____ Undecided__________

Transfer to professional school ______ When?__________

17. Remarks you wish to make

INTERVIEWER'S GENERAL IMPRESSION OF APPLICANT: (appearance, maturity, poise, alertness, etc.)

RECOMMENDED NOT RECOMMENDED

RECOMMENDED WITH RESERVATIONS: (explain)

Signature of interviewer

EXHIBIT 3

APPLICANT'S PERSONAL REFERENCE

_______________ Date_______________

_______________ City_______________

_______________ School_______________

_______________ has applied for admission to our Associate Health Occupations Program and has given us your name as reference. Will you kindly give us your candid opinion of this applicant's suitability for the duties of a Health Care Worker? All information will be kept confidential. It is not a kindness to recommend one who is not suited to this type of work.

How long have you known the applicant?_______________

In what relationship have you known him/her?_______________

What qualities does the applicant have that you believe would contribute to their success as a Health Care Worker?_______________

Has the applicant any personal peculiarity that might interfere with his success as a Health Care Worker _______ If so, kindly explain _______

____

What do you consider the applicant's strongest characteristics?_______________

____

What do you consider the applicant's weakest characteristics?_______________

____

If you or a member of your immediate family were advised by a physician to employ a Health Care Worker during an illness, would you have enough confidence in this applicant to employ him after graduation from this school?

_________If not, why?_______________

Kindly give us any further information that you have about this individual that will help us to decide upon his suitability for A.H.O.

____

Date_______________ Signature_______________

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EXHIBIT 4

In advance of registration, mail to:
UNIVERSITY HEALTH SERVICE
UNIVERSITY OF TEXAS MEDICAL BRANCH
Galveston, Texas 77550

"This is to certify that we, the undersigned, authorize the University Health Service and the Medical staff of the University of Texas Medical Branch to perform such preventive, therapeutic, operative, isolation and confinement procedures upon

_______________________________ (name in full)

(date of birth) _______________________________

as its medical staff may deem necessary. However, it is understood that, except in emergency, no major surgery will be carried out upon _______________ _______________ without prior discussion with parent or guardian, and if requested, the family physician."

____

STUDENT'S SIGNATURE _______________________________

BOTH PARENTS OR GUARDIANS, IF MINOR _______________________________

DATE _______________________________

RELATIONSHIP TO STUDENT _______________________________

EXHIBIT 4 (CONT)

UNIVERSITY HEALTH SERVICE
(Revised 10/68)

Your health coverage will not be in effect until entrance **immunization** requirements have been met:

* SMALL-POX VACCINATION: successful vaccination within two years, giving at least an "immune" reaction (required)

* TETANUS: full course, or booster dose toxoid within five years if previously given full course (required)

* DIPHTHERIA: full course of diphtheria toxoid, or booster within five years if previously given full course (required)

TYPHOID: not recommended or required

POLIO: not required if oral polio vaccine administered previously

INFLUENZA: not recommended except in instances of chronic diseases

TUBERCULIN TEST AND CHEST X-RAY: will be carried out by the Health Service after matriculation

* THESE IMMUNIZATIONS MUST BE COMPLETED

Please have your physician use the attached form in recording the above immunizations and return to:

UNIVERSITY HEALTH SERVICE
UNIVERSITY OF TEXAS MEDICAL BRANCH
GALVESTON, TEXAS, 77550,

prior to matriculation. It will be used as part of your health record here.

GALVESTON COLLEGE

HEALTH OCCUPATIONS PHYSICAL EXAMINATION

1. NAME ____________________ DATE ________
2. Address ____________________ Telephone No. ________
3. Birth Date ________ Height ______ Weight ______ Temperature ______
4. Past History: (must be complete with dates) illnesses, operations, injuries: ____________________
5. Menses: Regular ____ Prolonged ____ Excessive ____ Painful ______
   Menopausal syndrome ________ Amenorrhea ________
   Pelvic exam ____________________
6. Eyes: Vision-R ______ L ______ With glasses-R ______ L ______
7. Ears: Condition-R ______ L ______ Hearing- R ______ L ______
8. Teeth ____________________ Tonsils ________
9. Nose ____________________ Sinuses ________
10. Skin ____________________ Thyroid ________
11. Posture ________________ Orthopedic conditions ________
12. Varicose Veins ____________ Feet: R ________ L ________
13. Heart ________________ Blood Pressure: S ____ D ______
14. Abdomen ________________ Hernia ________________
15. Lungs ____________________
16. Urinalysis: Sp. Gr. ______ Albumin ______ Sugar ______ Reaction ______
17. Blood Count: RBC ________ WBC ________ Hgb. ________
18. Blood (One test): Kahn ______ Kline ________ Wassermann ________
19. Do you have any limitations? If answer is yes, please describe: ____________________
20. Are you now under a doctor's care? If answer is yes, please describe: ____________________

IMMUNIZATIONS REQUIRED

21. Small pox Vac.: Date ________ Satisfactory Scar: YES ____ NO ______
    (every two years)
22. Polio-Oral Polyvalent: Date ____________________
23. Diptheria (every five years): Date ____________________
24. Tetanus (every 5 years): Date ____________________

REMARKS AND RECOMMENDATIONS

Defects found: ____________________

Corrections made or recommended: ____________________

In your opinion, is this individual in suitable physical and emotional condition for training in health occupations? ______ If not, why? ________

____
(Signature of examining physician)

____
(Address)

3/72

EXHIBIT 5

TO: ______________________ Registrar

______________________ Admissions Committee

FROM: ____________________________ Department Chairman or Program Director

__________________________ has had an admissions interview
Student

for entry to the _____Fall; _____Spring; ______Summer

19__ Class.

_____ The Applicant (NOT completed application with College as of this date)

OR

_____ The Candidate (ACCEPTED to College but not to this program as of this date)

_____ is recommended for admission

_____ is not recommended for admission

COMMENTS:

Signatures: ____________________
Dept. Chm.

also if by Committee: ____________________
Student Personnel

This form is CONFIDENTIAL and becomes part of the student file.

EXHIBIT 6

School of Allied Health Sciences/Galveston College
Associated Health Occupations Department
Admission Summary

Applicant's Name ______________________________

Home Address ______________________________

Phone Number ______________________________

School Address ______________________________

Application Form Complete, year __________

Health Forms Complete - (5) __________

Letters of Recommendation __________

Admissions Testing Complete

Otis __________

ACT __________

Official Transcripts in __________

Interview __________

Admissions Committee Action __________

Letter of Committee Action
sent Applicant __________

Registered at Galveston College
AHO Program __________

Prerequisite Courses Incomplete __________

____

Clinical Experience Complete __________

Galveston Col. Requirements Comp. __________

Degree Obtained __________

Application for Certification/
Registry __________

Committee Action Taken __________

Certification Approval __________

EXHIBIT 7

CREDIT RECORD OF A.H.O. STUDENTS

Name ____________________
Study Track ____________________
Date ____________________

Course		Cr. Hrs	Grade	GPs
Semester I - Freshman Year				
Biol.143	Anatomy and Physiology	4		
Soc. 131	Introduction to Sociology	3		
Engl.131	Composition and Grammar	3		
AHO 141	Interdisciplinary Health Concepts - Intro to Health Occupations	4		
AHO 132	Interdisciplinary Health Practices-Intro to Patient Care	3		
Summer Session I				
*Math 133	Algebra or Bus Math	3		
*Psych231	Child Growth and Development	3		
Semester I - Sophomore Year				
Govt.233	Survey Amer. & Texas Govt.	3		
*Chem141	Chemistry	4		
*Physics131	Biomedical Physics	3		
AHO 241	Interdisciplinary Health Concepts	4		
AHO 242	Adv.App.Health Concepts & Practices	4		

Course		Cr. Hrs	Grade	GPs
Semester II - Freshman Year				
Biol.144	Anatomy and Physiology	4		
Psvch.131	Introduction to Psychology	3		
Engl. 132	Composition and Grammar	3		
AHO 143	Interdisciplinary Health Concepts	4		
AHO 134	Interdisciplinary Health Practices	3		
Summer Session II				
AHO 155	Applied Health Concepts in Practice	5		
Semester II - Sophomore Year				
Psych 233	Psychology of Personality	3		
*Physics131	Biomedical Physics	3		
AHO 232	Sp. Problems and Techniques	3		
AHO 243	Interdisciplinary Health Concepts	4		
AHO 244	Adv.Health Concepts and Practices	4		
Biol.135	Microbiology	3		

*Options are specified according to study track

Course	Cr. Hrs	Grade	GPs
Summer Session I			
AHO 256 Applied Health Concepts in Practice I Radiology, Orthotics, E.E.G. and Inhalation Therapy only	5		
Semester I - Sophomore Year add			
AHO 268 Applied Health Concepts in Practice III Radiology and Inhalation Therapy only	6		
Minimum Requirements for Graduation			
Occupational Therapy Asst.			
Physical Therapist Asst.			
Inhalation Therapy			
Radiologic Technologist			
Community Health Worker			
Orthotics Assistant			
Electroencephalography			
Management Assistant			
Grading System			
A = 4 Grade Points Per Sem. Hr.			
B = 3 Grade Points Per Sem. Hr.			
C = 2 Grade Points Per Sem. Hr.			
D = 1 Grade Point Per Sem. Hr.			
F = 0 Grade Points Per Sem. Hr.			

Course Course	Cr. Hrs	Grade	GPs
Summer Session II			
AHO 267 Applied Health Concepts in Practice II Radiology, and Inhalation Therapy only	6		
Totals Col. 1			
Col. 2			
Grand Total			
Courses completed before enrollment in AHO program			
Courses completed to meet AHO requirements (after)			

EXHIBIT 8

TO: ALL GALVESTON COLLEGE HEALTH STUDENTS

SUBJECT: YOUR HEALTH FEE - COVERAGE AND RESPONSIBILITIES

You have just signed up for the health coverage required of all students in the health occupations. Health coverage is a joint project of Galveston College and The University of Texas Health Service and is designed to protect you.

It includes the following:

1. Immunizations kept up to date.
2. Periodic testing for tuberculosis
3. Periodic Chest X-Ray
4. Surveillance for exposure to communicable diseases while a student in the hospital.

You will receive periodic requests to come to the University Health Service located in Rebecca Sealy Building on the University of Texas Campus. Bring your health card with you to your appointments.

It is your responsibility to meet appointments. If it is necessary to change your appointment, call the Health Service - 765-2031 and make your own arrangements. Any students with delinquent appointments at the end of the Semester will have his or her grades withheld until the delinquency is removed.

Remember--Maintenance of health is essential to all people and doubly essential to those people in the health occupations.

EXHIBIT 9

I. PREAMBLE

Since we are studying guests of the University of Texas Medical Branch campus and students of the Galveston College campus, we are under the jurisdiction of the HONOR PLEDGE adopted by the A.H.O. program at Galveston College and the University of Texas Medical Branch.

A student is committee to ACADEMIC HONESTY upon signing the pledge which is mandatory. Obligation is not only for self-honesty, but also the honesty of student colleagues.

Failure to carry out the HONOR PLEDGE may result in dismissal.

I - A

The Associated Health Occupation Program is committed to providing its members with an opportunity to pursue their academic and social education with maximum freedom combined with maximum responsibility. The Honor Principle provides an educational basis for the creation of an academic community in which the total honesty and integraity of that community are regarded as being the responsibility of each student, faculty, and staff member. All members of the community must be committee to the Honor Code and to maintaining the high standards of integrity at the University of Texas Medical Branch and Galveston College Campuses. Each individual admitted to the Associated Health Occupation Program must agree to the following statments defining and specify the substances of the Honor Code.

II. HONOR CODE

Student Conduct and Discipline

1. Drinking

"The use of intoxicating beverages is prohibited in classroom buildings, laboratories, auditoriums, library buildings....and all other public campus areas"[1] with the only exception that of waival by the institutional head for specific affairs. The student is subject to disciplinary action when participating in functions of the School of Allied Health Sciences after obvious indulgence in intoxicating beverages as well as when using intoxicating beverages on campus.

---

[1] "Rules and Regulations" from the Board of Regents of University of Texas System

2. Illegal Drugs

"....the illegal use, possession or sale of a drug or narcotic.... renders the student subject to discipline. Any student placed on probation or finally convicted of illegal use, possession, or sale of a drug or narcotic shall be automatically expelled from school, regardless of whether or not the illegal act that gave rise to the conviction was committed on the campus of one of the component institutions of the University of Texas System." [1]

3. Weapons

The carrying or use of any instrument commonly recognized as a firearm or potentially lethal weapon on the campus is prohibited and renders the student subject to disciplinary action.

4. Gambling

"Gambling.....renders the student subject to discipline."[1]

5. Hazing

"Hazing in state educational institutions is prohibited by state law. Initiations by organizations may include no feature which is dangerous, harmful, or degrading to the student, and a violation of this prohibition renders the organization subject to discipline."[1]

6. Legal Violations

"Any student who advocates or recommends, either orally or in writing, the conscious and deliberate violation of any federal, state, or local law is subject to discipline."[1] Students guilty of legal violations are subject to discipline by due process in accordance with the policies of the "Rules and Regulations."

7. Academic Honesty

The student is committed to academic honesty upon signing the Honor System pledge which is mandatory for all students. Obligation is not only for self-honesty but also the honesty of student colleagues. Violations of the Honor Code will be reported and acted upon as outlined in this document. Those actions considered in offense are cheating, plagiarism, and falsification of College.

8. General Conduct

Students are recognized as mature individuals with the integrity and judgement for self-discipline in their actions both on and off campus. The policies below are to assist the student in realizing

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[1] "Rules and Regulations" from the Board of Regents of University of Texas System

the scope of professional bearing. Violations are subject to disciplinary action.

a) Moral Conduct

Moral conduct is interpreted as that conduct considered acceptable and appropriate by society

b) Dress

Dress on campus should always be the student's uniform. On the other hand, uniforms should not be worn unnecessarily off campus because of association of activities with institutions and professions rather than with the individual wearing the uniform.

Departmental regulations should be referred to for the appropriate style of uniforms; however, the length should be at least to the top of the patella (knee-cap). Name tags are considered a part of the uniform while on campus.

Accessory dress items such as hair ribbons and costume jewelry are both inappropriate and, in situations of close patient contact, potentially dangerous to the wearer.

Hair length and styles should be "off the collar." Any form of beard is prohibited.

9. Building Regulations of the School of Allied Health Sciences

a) Smoking

Smoking is permitted in the halls, student lounge, office areas, and rest rooms. Fire regulations stipulate that smoking is prohibited in classrooms and laboratories at all times.

b) Use of Building

Use of institutional buildings for other than academic purpose outlined in the"Rules and Regulations". This information is available from the Student Affairs Committee of the S.A.H.S.

c) Hours

d) Telephones

The telephones in the Dean's office may be used for local calls. Requests should be directed to the receptionist. All long distance calls should be made on the telephone in the John Sealylobby rather than at the school.

10. Absences

Anticipated class absences should be reported prior to class, if not it will be counted as one unexcused absence.

Sickness must be validated by a doctor's certificate, if two or more days are missing in sequence.

All work missed during absences must be accounted for equal to the number of A.H.O. class days missed. Ex: Absent [illegible]day make up work on Wednesday, Friday turn in work at the beginning of the class period.

. . . . . If honor Code is broken

1st Offense:

1. Person in question is approached by whoever sees this person and tells them what he has seen. After this Mr. Cantwell is to be told immediately.

2. A zero is given for that particular test and an additional assignment will be given.

3. If in doubt, another exam will be given.

2nd Offense:

If found guilty by the Student Affairs Committee and Advisor, there will be an immediate dismissal.

III. HONOR PLEDGE

A. I have neither given nor received aid on this exam, nor have I seen anyone else do so. By my signature I am hereby honor bound to the above statement. I am also aware that should I violate this Honor Pledge I will forfeit my grade in this course.

B. I will uphold all rules and regulations pertaining to: grooming, absences, behavior, and mode of conduct at Galveston College and the University of Texas Medical Branch campuses.

C. All individuals in the Associated Health Occupations Program are obligated to sign.

Date ______________________________ ______________________________

Respectfully submitted
by the Student Affairs Committee

EXHIBIT 10

UNIVERSITY OF TEXAS MEDICAL BRANCH AT GALVESTON

SCHOOL OF ALLIED HEALTH SCIENCES

CAREER CHOICE INVENTORY - ALLIED HEALTH SCIENCES

________ ________ Date of Entrance
month year

A. Personal Information

________ ________ ________ Name
last first middle

________ Home City

________ Home State

________ Year of Birth

________ City of Birth

________ State of Birth

Marital Status (circle appropriate word)
single married divorced separated widowed

B. Curriculum Information

Check which course of study enrolled in

- ______Associated Health Occupations
- ______Health Care Sciences (Clinical Associate)
- ______Medical Record Administration
- ______Medical Technology
- ______Occupational Therapy
- ______Physical Therapy
- ______Other ________

C. Family Information

Father: (circle appropriate one) living deceased

His occupation________

Extent of education (circle highest year he completed)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 more

________Highest degree he attained in college, if any

________Other vocational-technical diplomas or certificates

Mother (circle appropriate one) living deceased

Her occupation ______________________________

Extend of education (circle highest year she completed

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 more

______________ Highest degree she attained in college, if any

______________ other vocational-technical diplomas or certificates

Self - Brothers - Sisters

Self - Brothers - Sisters

	AGE	SEX	OCCUPATION	HIGHEST GRADE
1st child				
2nd child				
3rd child				
other children				

Indicate which child you are with * on left side of page

D. Education - Pre College

______ Did you attend nursery school or kindergarten?
______ Calendar year you began in the first grade
______ Calendar year you completed high school

______ approximate size of your graduating class

Academic Interests While in High School (rate numerically 1 - 2 - 3 etc. in order of preference those subjects you took which interested you the most)

____English
____history
____social sciences
____foreign languages
____home economics
____other (Please specify)______________________________
____

____mathematics
____music
____physical sciences
____fine arts
____biological sciences

Extra-curricular Interests while in high school (rate numerically 1-2-3, etc. in order of preference all extra-curricular activities you participated in while in high school)

_____intramural sports
_____music (band, chorus)
_____science club
_____religious club
_____scouting or campfire
_____student council
_____language club
_____future teacher club
_____future health career club
_____journalism (yearbook, newspaper)
_____4 - H
_____volunteer club (candy striper)
_____scholastic honor society
_____other ____________________

During your JUNIOR HIGH school years what career (s) did you seriously consider

1____________________ 2____________________

3____________________ 4____________________

During your HIGH school years what career (s) did you seriously consider

1)____________________ 2____________________

3____________________ 4____________________

Other than high school extra-curricular activities what were your major hobbies or interests during that time

1____________________ 2____________________

3____________________ 4____________________

At what age did you FIRST hear about the allied health science career you have chosen ________

E. College Education

_______Upon entering college had you reached a decision about what career you were going to pursue

____________________if YES, what career had you decided upon

____________________if NO, what career choices did you consider <u>after</u> entering college

____

____

____________________Of the careers indicated above, which ONE(s)
did you consider sufficiently to effect
____________________what course you took

If you completed a degree prior to entering the School of Allied Health Sciences, please indicate

title of degree	major	minor	year

College Extra-Curricular Activities (rate numerically 1-2-3-etc in order of preference all activities you participated in from the time you entered college

_____intercollegiate sports
_____political clubs
_____fraternity-sorority
_____music (band,orchestra)
_____intramural sports

_____service fraternity
_____college publications
_____religious organization
_____other
____

Since enrolling in college, other than extra-curricular activities indicated above, what hoppies or special interests have you pursued

1______________________________ 2______________________________

3______________________________ 4______________________________

F. Professional Career Choice

From what source do you attribute the MOST helpful information in making your ultimate vocational choice

_____personal contact with a professional person
_____newspaper accounts
_____junior or senior high school counselor
_____junior or senior high school teacher
_____college counselor or counseling service
_____major or minor adviser
_____career day activities
_____Texas Hospital Association's Health Careers Program
_____television or radio "spot" career announcements
_____School of Allied Health Sciences catalog or brochures
_____Other____

Once you made your ultimate decision did you do one or more of the following (indicate by checking)

_____write to Texas Hospital Association Health Career Program
_____personally contact a hospital having a department
_____contact a junior or senior high school counselor
_____write to one or more colleges having educational programs in your chosen career
_____contact college counseling service
_____contact health careers adviser in college
_____write directly to the School of Allied Health Sciences
_____call or visit at one of the School's open houses
_____other ____
_____ ____

______________________________Where did you first find out that The University of Texas Medical Branch had an educational program in your chosen profession

__________________________________ What factors helped you make the decision to enter the School of Allied Health Sciences

____

____

Do you have any relatives who have or are in a health specialty, such as medicine, nursing, dentistry, allied health sciences

RELATIVE	PROFESSION

THANK YOU VERY MUCH FOR YOUR ASSISTANCE. Your responses will aid us in reaching others who might wish to follow you into the allied health sciences.

Statistical Review

There were questions which were considered upon undertaking the project of compilation of statistics. These were:

1. Is there any significance in the ACT scores in relation to success or failure?
2. Has pre-entrance counseling had an effect on studentdrop-out?
3. Why did students not complete the program?
4. Is the drop-out rate excessive?
5. Does prior post-secondary education contribute to a student's success or failure in the program?
6. Is the course work designed for junior college level students?
7. Is it significant when students leave the program?
8. Is there any significance to a student's ethnic or financial status?

The statistics were gathered from the permanent records on each student at Galveston College, the Interest Inventory sheets, and the autobiographical sketches submitted by the students.

In four years of the school's operation, the statistics are:

TOTAL PROGRAM

Currently enrolled	68
Left program	37
Graduated	10
Total Student Enrollment	115

By years, the breakdown is as follows:

	Enrolled	Left Program	Graduated
Class 1968 - 69	9	8*	1
Class 1969 - 70	24	14*	9
Class 1970 - 71	49	16	
Class 1971 - 72	33	1	

* 1 re-entered program in Summer 1971.

The drop-out rate has steadily decreased since the school opened four years ago. In 1969-70 it was 58%, and the 1970-71 class has only seen 32.7%. The more intricate admissions requirements were initiated during the fall of 1970 and seem to indicate that prior counseling and admissions procedures are admitting those students who are capable of this type of study.

Interestingly, two students who dropped out of the program during the first two years have re-entered the field, and several other student drop-outt are indicating they wish to try again. There are two students who completed the courses in the AHO program but did not complete academic requirements at Galveston College. These are listed in the "left program" category since success is measured by the diploma and national registry certification.

Just why the students left the program came under study. Although reasons for leaving the program cannot be accurately gauged, a look at the grade points of these students possible tells a lack of interest, unable to do the work, or pressures from without the school.

STUDENTS LEAVING AHO PROGRAM - REASONS

	Left Program Above 2.0	Left Program before Completion Below 2.0
Low Grades (Sco Pro)*		18
Suspended**		7
Other	8*	4***
Left Program		37

* Scholastic Probation
** Low Grades
*** Financial, illness, marriage/family, changed major, unknown

Considered also was when the students left the program. Breaking down the time when they left but keeping the students divided as to those on sco pro or suspended and those who were making adequate grades, the chart shows:

WHEN STUDENTS LEFT PROGRAM

	Before Completion of Semester 1	After 1 Semester	After 2 Semesters	After 1st summer
Sco/Pro Suspension	1*	10	10	1
Other		5		4
	1	15	10	5

	After 3 Semesters	After 4 Semesters	After 2 Summers
Sco/Pro Suspension	0	2	
Other		2	1
	0	4	2

1* Military but entered AHO on Sco Pro

Obviously, the students who have difficulty with the studies are mainly eleminated after the second semester. Still, the student has gained some knowledge and skills if he attended the classes. The five who dropped out after the first semester probably did so after realizing that this type of career was not for them. The first summer session is when the studnets actually get into the clinical environment, and the next largest number of drop-outs occur at that time. After the four semesters of work, four dropped out. With two it was obvious that their clinical performance was not adequate to conform to standards of the college and of the registry associations. The two who dropped out after the second summer also had problems in clinical adaptability and functions.

Another question was whether maturity had anything to do with the success or failure of a student. The follwoing chart indicated the age groups of the students and the last grade point average they have recorded is figured. If they left the program, the last grade showing was counted.

ENTERING
AHO PROGRAM

AHO PROGRAM
(Excluding 1971 entering students)

AGE	LAST GRADE ABOVE 2.0	LAST GRADE BELOW 2.0
17-20	33	24
21-23	4	5
24 and over	9	7

These statistics show that there is no significant difference in a person's age or maturity in relation to achievement in the AHO program.

The American College Testing (ACT) scores which are an admission requirement for Galveston College were also reviewed. There is a stipulation that a person should make a 9 or above before he can be considered for the program without reservations. The scores for ACT do not seem to indicate the future success or failure of a student in AHO. One factor is that ACT tests are not uniformly administered for students entering college during a particular year. In other words, some students had taken the ACT testing some fifteen years previous to Galveston College entrance.

Scores have ranged from a 5 as high as 25. The graduates have had scores of 6 (1), 7 (2), 9 (1), 11 (1), 15 (1), 16 (1), 17 (1), with two previously attending college and their ACT scores were not transferred.

Five students entered at age 17 and their ACT scores ranged from 7 to 19. Thirty-six students entered at age 18, and their scores ranged from six to 25; 15 students entered at age 19 with their scores from six to 25; 15 students entered at age 20 with scores from 16 to 23; six students entered at age 21 with scores from nine to 17; two 22-year olds entered with ACT scores from 10 to 22; two students at age 23 3ntered with ACT scores of 10 and 21; and 21 students 24 years of age and older entered the program with scores from five to 20. It was not recorded when these tests were administered to these students.

Therefore, the ACT tests do not indicate how a person will achieve or fair in the AHO program. the Otis test is now being incorporated into the requirements for AHO admission.

In order to ascertain if the Otis Test has any relation to academic success in the AHO program, these tests were administered at the close of the semester (1971 Fall) to all students. In checking the scores against their grade point average for the end of this semester, the following was determined:

Sixty tests werewadministered with the following general results (the Otis I.Q. will be given instead of the Otis score since other I.Q. tests can be compared to this one.)

I.Q. #SCORING

130 - 1
127 - 1
124 - 1
122 - 1
121 - 4
118 - 3
117 - 1
116 - 1
115 - 1
113 - 1
112 - 4
111 - 2
109 - 2
107 - 2
106 - 2
105 - 4
104 - 1
103 - 1
102 - 4
101 - 1
100 - 3
99 - 2
96 - 1
95 - 2
94 - 2
92 - 1
91 - 2
90 - 1
89 - 1
88 - 1
85 - 1
81 - 2
78 - 1
77 - 1
75 - 1

In checking the I.Q. ranges, the students scoring 90 and above generally were considered doing well within the porgram. With a few exceptions, those students scoring below 90 had not made grades which were considered acceptable. The following tables indicate the I.Q. scores of students on scholastic probation or those having a cumulative grade average below 2.0 (a C).

Students on Sco Pro - 5

Cumulative Average	I.Q.
1.6	88
1.7	105
1.4	105 (suspended)
1.6	89
1.7	85

Students with less 2.0 Cumulative Average	I.Q.
1.7	102
1.9	121
1.8	92
1.7	95
1.7	94

Students with a 89 I.Q. and below were checked for their cumulative averages. The findings are listed below.

Students with less than 90 I.Q.

I.Q.	I.Q.	GRADE AVERAGE
	89	1.6 Sco Pro
	88	1.6 Sco Pro
	85	1.7 Sco Pro
	81	2.2
	81	2.4
	78	2.3
	77	2.2
	75	2.0

In summary, the Otis I.Q. test does not contain the indications hoped for; however, the test can help to indicate to the interviewer a need for counseling if the student scores an I.Q. of below 90.

Since the Junior College programs are to assist in the education of the entire community, those persons who entered the AHO program as part of Vocational Rehabilitation were reviewed.

The findings were:

STUDENTS ON VOCATIONAL REHABILITATION

	In Program	Left Program	Graduated
1968	-	-	-
1969		5	
1970	6	2	
1971			
	TOTAL 6	7 TOTAL	

In Program		Out of Program	
2.0+	-2.0	-2.0	-2.0
6		2	5

Those six students who are still in the program are maintaining a 2.0 grade average (C) or above. Those who left the program were split with five having less than a C average and 2 showing more than a 2.0 grade point average.

There are 36 students who have applied for financial aid through Galveston College. Of these 36, 25 are still in the program, eight left the program, and three obtained degrees.

Studies also revealed that many AHO students had previously attended college. Therefore, it was considered that perhaps the success or failure of a student might be related to other post secondary education. It does not.

The following statistics will prove this AHO program can be mastered by those just out of high school, and the program also seems to enjoy the facility of holding "seasoned" college students' interests.

For clarification, "restrictions" refers to scholastic probation. It was noted that students may have a grade average below a C (2.) and not be on scholastic probation. Since some of the study tracks require a student carry an overall 2.0 average, this norm was used for study. This study lists the students according to the psst secondary education at Galveston College, that at other colleges/universities, and those who took courses from other colleges and from Galveston College.

PREVIOUS COLLEGE STUDY BEFORE AHO PROGRAM

# entering W/O restrictions	49	
# entering on Sco Pro	8	
# 1971 Fall entries	19	
# entering on Sco Pro remaining in program	4	
# entering on Sco Pro leaving on Sco Pro	4	
Total Students		57

STUDENTS ENTERING AHO WITH PREVIOUS STUDY AT GALVESTON COLLEGE - (30)

Students Entering AHO on Sco Pro (6)	
Left Sco Pro Suspended	4*
In on Sco Pro	1
In off Sco Pro	1**

* 1971 Fall entry - 1
** Removed after 1st semester

Students Entering AHO Below 2.0 (10)	
Left Sco Pro	4
Left Off Sco Pro	1*
In on Sco Pro	1
In Below 2.0	3**
In off Sco Pro	1

* Graduated
** Fall 1971 Entries - 2

Students Entering 2.0 and above (14)	
Left 2.0+	2*
In 2.0+	5
In below 2.0	1
Fall 1971 Students	6

* Graduated

STUDENTS ENTERING AHO WITH PREVIOUS STUDY AT OTHER COLLEGES & GALVESTON COLLEGE (5)

	In on Sco Pro	In off Sco Pro
Entered Sco Pro	1	1
Entered no Sco Pro		3*

* 1971 Entries

STUDENTS ENTERING AHO WIT'' PREVIOUS STUDY AT OTHER COLLEGES (22)

In 1971 Fall	7
In above 2.0	6
Left above 2.0	8 (2*)
Left Sco Pro/Suspension	1

* Graduated

SCO PRO ENTRANCE TO PROGRAM

	Left Sco-Pro/Susp.	Left Off Sco Pro	In Sco Pro	In Off Scc Pro
From Galveston College	5		1**	2***
From other colleges	1	1*		Total 10

*Left off ScoPro but with 1.9 cumulative average
**Second Sco Pro
*** Sco Pro removed after first semester

Summing up the above findings, the program is depicted thusly:

	No Previous College	Previous College
Number entering	58	57
Number entering w/o restrictions	58	49
Number entering w/restrictions		8
Number leaving program w/o restrictions	6	6
Number leaving program w/restrictions	16	9
Total leaving program	22	15
Number graduated	5	5
Enrolled students on Sco Pro	2	2

	No Previous College	Previous College
Number enrolled students w/grade points below 2.0	*5	*4
Number students (Fall 1971) no grades given	14	18

* Includes students on Sco Pro

Taking the program by years, it is shown that each year the percentages are almost the same:

	1971			1970			1969			1968		
	SUB		TOTAL	SUB		TOTAL	SUB		TOTAL	SUB		TOTAL
	N* C	C**		N C	C		N C	C		N C	C	
# Students	14	19	33	26	22	48	14	11	23	5	4	9
# Graduated							5	4			1	
# In Program												
above 2.0				12	14			1				
below 2.0				3	1		1				1	
Sco Pro/Susp.				2	1							
#Left Program												
above 2.0				1	2		1	2		1	1	
below 2.0				3	1						1	
Sco Pro/Susp.		1		5	3		7	4		4		

* No Previous College
** Previous College

Study was also made into the ethnic backgrounds of the students to determint if there was any factors which might be involved in the pursuit of studies in the AHO program.

Program totals for the years 1968-1970 entrances are:

Out of 44 whites enrolled 18 dropped	(41%)
Out of 22 blacks enrolled 15 dropped.	(66%)
Out of 14 chicano enrolled 4 dropped.	(35%)

Out of 2 other enrolled ____ dropped (0%)

Breaking it down by years, the statistics are:

CLASS OF 1968-69

	ADD	ENROLLED	DROP	GRADUATED
1st Semester		4 White 3 Black 1 Chicano 8 TOTAL	2 White 2 TOTAL	
2nd Semester	1 Chicano	2 White 3 Black 2 Chicano 7 TOTAL	*1 White 2 Black 1 Chicano 4 TOTAL	*re-entered program Summer 1971
1st Summer		1 White 1 Black 1 Chicano 3 TOTAL	1 Black 1 TOTAL	
3rd Semester		1 White 1 Chicano 2 TOTAL		
4th Semester		1 White 1 Chicano 2 TOTAL	**1 Chicano 1 TOTAL	1 White 1 TOTAL

** Incomplete Academic/Clinical Work

CLASS OF 1969 - 70

	ADD	ENROLLED	DROP	GRADUATED
1st Semester		13 White 5 Black 3 Chicano 1 Other 22 TOTAL	4 White 2 Black 6 TOTAL	
2nd Semester	2 White 2 TOTAL	11 White 3 Black 3 Chicano 1 Other 18 TOTAL	1 White 2 Black 3 TOTAL	

	ADD	ENROLLED	DROP	GRADUATED
1st Summer		10 White	1 White**	
		1 Black	1 Black	
		3 Chicano		
		1 Other		
		15 TOTAL	2 TOTAL	
3rd Semester		9 White		
		0 Black		
		3 Chicano		
		1 Other		
		13 TOTAL		
4th Semester		9 White	2 White*	4 White
		0 Black		
		3 Chicano	1 Chicano*	1 Chicano
		1 Other		
		13 TOTAL	3 TOTAL	5 TOTAL

* 1 White completed AHO courses but not academic courses.

	ADD	ENROLLED	DROP	GRADUATED
2nd Summer		3 White	1 White	
		0 Black		
		1 Chicano		
		1 Other		
		5 TOTAL	1 TOTAL	
5th Semester		2 White		2 White
		1 Chicano		1 Chicano
		1 Other		1 Other
		4 TOTAL		4 TOTAL

** Dropped but re-entered program Summer 1971.

CLASS OF 1970 - 71

	ADD	ENROLLED	DROP	GRADUATED
1st Semester		16 White	1 White	
		12 Black	1 Black	
		7 Chicano		
		1 Other		
		36 TOTAL	2 TOTAL	

	ADD	ENROLLED	DROP	GRADUATED
2nd Semester	9 White	24 White	5 White	
	2 Black	13 Black	4 Black	
	2 Chicano	9 Chicano	1 Chicano	
		1 Other		
	13 TOTAL	47 TOTAL	10 TOTAL	
1st Summer	1 White	20 White	2 White	
		9 Black	2 Black	
	1 Chicano	9 Chicano		
		1 Other		
	2 TOTAL	39 TOTAL	4 TOTAL	

CLASS OF 1971 - 72

	ADD	ENROLLED	DROP	GRADUATED
1st Semester		19 White		
		5 Black		
		9 Chicano	1 Chicano	
		33 TOTAL	1 TOTAL	

In looking for reasons of dropout or failure the other side of the program certainly should not be overlooked. Since the AHO program has been in existence 20 have made the Dean's List (semester grade point average above 3.0) and 12 made the President's List (semester grade point average above 3.5). There have been 3 sophomore class presidents and 6 members of the student senate.

Summary

The quality of students who are successful in the AHO program has shown a definite rise. The students are entering the program, not just to see what's in it for them, but to contribute to their own future in the health care fields. Galveston College has liberal entrance requirements, and the AHO program only adds additional stipulations to aid in student selection to obtain those students who will hopefully remain in the program. Students with low ACT scores can achieve a degree. There is more to dedicated motivation than to brilliance in academics. Neither type student should be denied the opportunity of the program. This is why individual interviews both at Galveston College and by the AHO faculty are so important. Personal contact seems to be the key. The other requirements tend to supplement the information about a student; however, it is these requirements coupled with personal contact which helps in the successful determination of the eligibility of a student to master the AHO program of studies.

CHAPTER 6

FINANCING

The Associated Health Occupations program received its funding through the Texas Education Agency (contact hour allocations), through Galveston College (facilities and faculty) and The University of Texas Medical Branch (facilities and faculty).

Student Contact Hours

Financing from the Texas Education Agency for the AHO program has come through the student contact hours. They are defined by the TEA as "one hour in which a student has contact with an instructor. Lecture and laboratory hours are counted in the same manner."

Because this funding comes from the number of students in the program, a problem arises if there is a high drop-out rate. Since students cannot enter the program after the spring semester of the freshman year (only on special instances), the funding for the program for the sophomore year is established and any change would be to lessen the funding when drop-outs occur. For this reason alone it is imperative that students who enter this program do so out of dedication and a desire to stay with it. This is why the individual counseling both by college counselors and by the Department Chairman for AHO is so important. Students are not "kept in" the program to make the contact hours, however. But it can be a source of concern for a new AHO program in another college and should be anticipated as possible decreased revenue from the beginning of the year.

History

It would be difficult to compute the monetary contributions made by both educational institutions from the beginning. Both do not care to do so, simply because this program is a cooperative effort by both institutions to graduate trained workers in health occupations.

As stated earlier, the students receive education both at Galveston College and The Medical Branch. This will continue to be; however, the amount of time spent at Galveston College is increasing. This is because of a building program which will permit the students to find classroom space at the college for courses previously conducted at The Medical Branch.

In much the same way the faculty has been developed. The first semester of the program there was no paid instructor-coordinator for AHO. Galveston College had agreed to contribute monies toward the employment of UTMB personnel in this position whose responsibility would be to establish the AHO programs.

In the spring of 1969 The Medical Branch hired J. Laurence Cantwell, with the concurrence of Galveston College, who was appointed to the staff of the Vice President of Health Services. He was also provided a faculty appointment within The University of Texas Medical Branch School of Allied Health Sciences. At that point, the AHS school was furnishing physical facilities and equipment unique to the AHO educational programs; support personnel, such as administrative, budgetary, and clerical; lecturers for AHO courses; and needed supplies. This was deemed appropriate and necessary since there was no sizeable budget available from the new college to equip and staff the complex program from the onset.

In July of 1969, a memorandum of agreement between Galveston College and The Medical Branch was signed in which Galveston College paid for twenty-five (25) percent of the instructor-coordinator's salary.

The memorandum of agreement was again signed in September, 1970, with Galveston College reimbursing The Medical Branch for ninety (90) per cent of the annual salary of the instructor-coordinator. This was paid on a monthly basis into a special account.

Since no precedent had yet been set, this funding was mutually submitted to the TEA for a formal statement.

In October of 1970, the Texas Education Agency sent Galveston College the following letter concerning contracting for instruction with The Medical Branch...

> It is permissible for you to contract with the University to provide instruction in your Associated Health courses. This contractual arrangement will be in lieu of having the instructors on your payroll. A copy of your contract with the University should be kept on file in your Business Office.
>
> All instructors teaching on this contracted basis must meet the requirements for occupational teachers as outlined in the Post Secondary Guide. They must be subject to supervision by appropriate Galveston College officials.

A new letter of memorandum of agreement was signed for the AHO program for the period of one year, renewable every four months. This first agreement was for January 1, 1970, through April 30, 1970.

Galveston College would reimbuse the Medical Branch for services of instructional personnel, as follows:

> Four months salary computed on the basis of 75% of the annual salary for the Technical Director for Occupational Therapy Assistants
>
> Four months salary computed on the basis of 50% of the annual salary for the Technical Director for Education of Radiologic Technology

students.

Four months salary computed on the basis of 20% of the annual salary of the Technical Director for Community Health Worker.

Four months salary computed on the basis of 20% of the annual salary of the Technical Director of Education for Physical Therapy Assistants.

These technical directors were employees of The Medical Branch who had been utilizing part of their time in training the AHO students. Some were involved in teaching the students in the School of Allied Health Sciences while others were technical directors for education within The Medical Branch clinical departments.

In August of 1971, a new memorandum of agreement was signed with additions to the faculty:

	% of effort paid by Galveston College
Department Chairman	80
Technical Director for	
Radiologic Technology	75
Occupational Therapy Assistant	75
Physical Therapy Assistant	20
Inhalation Therapy	50
Instructor of Radiologic Technology	75

Salaries of AHO employees paid 100% by Galveston College are paid directly from the college and not through reimbursement to The Medical Branch.

In January of 1972, another addition was made to the Galveston College faculty. This was the position of Core Subjects Instructor, who is paid solely by the College.

A part-time typist in AHO is also funded through Galveston College. Her time is divided between this program and the Vocational Nursing Program.

Facilities at The Medical Branch have been utilized [illegible]ching of all AHO courses. This was because of available [illegible] at The Medical Branch. Also, many of the volunteer faculty or guest lecturers were from The Medical Branch which facilitiated their being able to speak to the students.

Because of increasing classroom space at Galveston College, the plan is to conduct the first semester AHO courses mainly at The Medical Branch because of the specialized clerkships, and eventually to conduct all AHO courses the second semester of the freshman year at Galveston College when space is made available.

The sophomore year students would attend classes wherever their study track would designate. For example, students in radiologic technology would meet for lectures and refinement of techniques in the new facility at Galveston College which is currently being designed. This will be a fully-equipped X-ray room which the students could use for practice. The diagnostic rooms at The Medical Branch would then be kept clear for patients and not tied up for instruction.

It is gratifying to note that The Medical Branch will continue to furnish the needed equipment and faculty, with Galveston College able to plan and equip classrooms and laboratory facilities when funds become available. The main concern of Galveston College is that the College can eventually provide the faculty and laboratory areas for training so that the professionals at The Medical Branch would have more time to devote to patient care and have less time to involve equipment for training purposes.

Dual Faculty Salaries

Perhaps the funding of salaries for one individual from two sources seems cumbersome. From the beginning of the program, this cooperative situation has had its merits.

Having a percentage of the salaries of the Department Chairman and the Technical Director paid by the medical facility, these individuals are accepted as part of the facility and not as "outsiders". They are able to participate in the administration of the departments, can attend meetings, and have a better knowledge of the problems and assets of the departments they are assigned.

Scheduling of students into the clinical setting seems to be the largest headache since it means juggling between the hours the students can be there and the hours the qualified professionals are able to devote to the students both in clinical time and in lectures. Also, technique training in some study tracks will require using equipment without patients and therefore keeping an area from being utilized by the medical staff. Therefore, the Technical Director and Galveston College Department Chairman who are employed by the medical facility are better able to understand these situations and to adjust programs. Note: This situation can only be realized if there is complete cooperation between the College and the medical facility.

Volunteer Faculty

Much must be said about these individuals at The Medical Branch who without salary supplement have consented to utilize part of their time in the education of AHO students. Of course, again, this is the cooperation which is necessary between the institutions. Wherever possible, Galveston College is paying percentages of the salaries of the Technical Directors. But the others, the professionals who lecture and help the students in the clinics, they are not now reimbursed for their efforts. It is desirable that they could be compensated, but until that time, these people serve as volunteer faculty. All of them, however, are carefully screened by the AHO Technical Directors and are qualified to teach the students according to Texas Education Agency Standards.

Sample Memorandum of Agreement

The following is a suggested memorandum of agreement which a college and medical facility could utilize as a guide for entering into a similar contract:

MEMORANDUM OF AGREEMENT

This agreement is made by and between ________________ College, ____(city and state)____ and ____(medical facility____, ____(city and state)____, hereinafter referred to as the Affiliating Agency, for the purpose of conducting the ____(name of program)________________. This agreement is subject to review annually, and is automatically renewable unless either party requests a change:

It is mutually agreed between the Affiliating Agency and ____________ College that faculty and students of the Department of Associated Health Occupations of ________________ College may utilize the various departments and units of the Affiliating Agency for instructions and clinical experiences to meet the objectives of the curriculum for the Associated Health Occupations program, as set forth in the ________________ College catalogue, subject to the following provisions:

1. The Affiliating Agency will provide qualified instructional personnel who meet the requirements of [illegible] Personnel Policies as defined in , __________ of the __________________ College Staff and Faculty Handbook, and the standards outlined in the Guide for Occupational and Technical Education in Post Secondary Institutions in Texas, Texas Education Agency, Austin, Texas, Series 3230, "Qualifications of Teachers of Health Occupations." For these instructors, the Chairman, Department of Associated Health Occupations, as approved by the Board of Regents, ______ _______ College, shall be responsible to the Dean, Division of Occupational Education, ______________ College, for those areas affecting the Associate in Applied Science Degree program. The Chairman shall consult and coordinate with the directors, department heads, and supervisors of the Affiliating Agency, as to specific areas, dates, and hours for instructional purposes, and will assure compliance with rules and regulations governing student and faculty affiliate relationships with the Affiliating Agency's procedures manual.

2. The Affiliating Agency, will, for the consideration of one dollar ($1.00) per annum provide classroom, laboratory, and office space, and furniture required for the operation of the Associated Health Occupations Program at the site of the Affiliating Agency.

3. _________________ College will provide funds for instructional services as outlined in separate memorandums of agreement, negotiated annually, between ____________ College and the Affiliating Agency.

4. ________________ College will provide necessary equipment for conducting of the didactic portion of the program for Associated Health Occupations.

5. ________________ College will provide clerical personnel for the program.

____________________ COLLEGE

By:________________________
President

(NAME OF AFFILIATING AGENCY)

By:________________________

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MANPOWER PLANNING FOR WASTEWATER TREATMENT PLANTS.

OLYMPUS RESEARCH CORP., WASHINGTON, D.C.
ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C.

MF AVAILABLE IN VT-ERIC SET.
PUB DATE - ND 211P.

DESCRIPTORS - ADULT VOCATIONAL EDUCATION; *MANPOWER DEVELOPMENT; *PROGRAM PLANNING; *FEDERAL PROGRAMS; GLOSSARIES; OCCUPATIONAL INFORMATION; NATURAL RESOURCES; BIBLIOGRAPHIES; HUMAN RESOURCES; *MANUALS; *WATER POLLUTION CONTROL; WASTE DISPOSAL; CAREER LADDERS; GOAL ORIENTATION
IDENTIFIERS - *WASTEWATER TREATMENT PLANTS; ECONOMIC AWARENESS; CAREER AWARENESS

ABSTRACT - DESIGNED FOR THOSE PERSONS ENGAGED IN FEDERAL AND STATE MANPOWER PLANNING FOR MUNICIPAL WASTEWATER TREATMENT PLANTS, WHICH IS THE FIRST PRIORITY IN GOVERNMENT WATER POLLUTION CONTROL, THE INSTRUCTIONAL MATERIALS IN THIS MANUAL CONTAIN FIVE CHAPTERS, EACH PREPARED TO MEET ONE OF FIVE GENERAL OBJECTIVES. THESE GOALS ARE: (1) TO REVIEW THE GENERAL PRINCIPLES AND PRACTICES OF MANPOWER PLANNING, (2) TO REVIEW THE DEVELOPMENT OF THE NATION'S PROGRAMS IN THIS AREA AND THE NEED FOR A SYSTEMATIC EFFORT IN WATER POLLUTION CONTROL, ESPECIALLY AT THE MUNICIPAL LEVEL, (3) TO EXAMINE THE EDUCATIONAL AND MANPOWER DEVELOPMENT RESOURCES AVAILABLE, (4) TO PROVIDE INSTRUCTION IN MANPOWER PLANNING, AND (5) TO ORGANIZE IN A WORKBOOK FORMAT A SERIES OF STEPS TO APPLY DIRECTLY TO MANPOWER PLANNING. MOVING FROM THE GENERAL TO THE SPECIFIC, EACH CHAPTER CONTAINS A CONTENT OUTLINE, A BIBLIOGRAPHY, AND EXTENSIVE READING MATERIALS. RESOURCE MATERIALS SUCH AS JOB DESCRIPTIONS AND A GLOSSARY ARE INCLUDED. (AG)

Manpower Planning
for
Wastewater Treatment Plants

Prepared for
Office of Water Programs,
Environmental Protection Agency

by
Olympus Research Corporation

DISCRIMINATION PROHIBITED — Title VI of the Civil Rights Act of 1964 states: "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Therefore, the Vocational and Technical Education program, like all other programs or activities receiving financial assistance from the Department of Health, Education, and Welfare, must be operated in compliance with this law.

Contents

FOREWORD

The instructional material provided in this manual has been designed to offer guidance to those individuals engaged in manpower planning for certain segments of the water pollution control field. A preliminary version of this material was used in a series of three workshops sponsored by the Office of Water Programs (OWP). Representatives of federal, state, and local water pollution control agencies attended these workshops, as did representatives of federal and state offices of labor and of education. The reactions of the participants in these workshops to the preliminary material were solicited, as were their suggestions for improvement. Many of these suggestions have been included in the current version of this manpower planning manual.

This manual has been written because of the importance attached to manpower planning by OWP. The manpower development staff within OWP recognizes that manpower is a vital factor in the accomplishment of national water pollution control objectives. The effectiveness and economy with which wastewater treatment plants and collection systems are designed, constructed, and operated are dependent upon the availability of qualified personnel to the public and private organizations responsible for these functions. Because of the recognition of the importance of manpower, OWP has established a manpower planning program whose objective is to satisfy the basic objective of manpower planning and to ensure that the necessary trained manpower is available at the time and place required. The basic components of OWP's manpower planning program are the development of a forecasting process by which manpower needs can be determined and the development of action programs by which the projected needs may be satisfied. The forecasting process consists of the following elements: the development of planning tools, the determination of manpower and training requirements, the determination of manpower training supply, and the identification of imbalances between supply and demand. The basic function of the action programs of manpower planning is to develop programs aimed at recruiting, retaining, and utilizing manpower and to develop programs to provide adequate training for new and current employees in the water pollution control field. This manual represents an initial and important step in satisfying the objectives of the manpower planning program.

One of the objectives of the manpower planning program within OWP is the establishing of a manpower planning capability at the state level for all manpower issues related to water pollution control. This is not an immediate objective, however, and a less comprehensive manpower planning capability is being sought during the initial phases of OWP's program. For this reason the scope of this manual has been limited to a consideration of manpower planning for that segment of the water pollution control field whose manpower needs have been given first priority by OWP: municipal wastewater treatment plants.

To satisfy the various manpower objectives in water pollution control in general and for wastewater treatment plants in particular, local, state, and federal cooperation will be required. Recognizing the value of such cooperation, OWP has proceeded in its strategy of developing a manpower planning capability on the premise that the ultimate responsibility for obtaining the necessary manpower resides with that organization needing the manpower, whether it be a state or local entity. The federal government, however, can perform certain common and developmental-type functions more effectively and economically than can individual states and cities. Futhermore, it is felt that water pollution control manpower planning cannot be done independent of the many manpower programs sponsored by the federal government, which, of course, require the participation of other federal agencies. The development of this manual falls within one of those areas where it is felt that the resources of the federal government are most effectively and efficiently allocated.

Responsibility for overseeing the construction, operation, and maintenance of municipal wastewater treatment plants is usually a state function. The training and certification of the manpower employed in these municipal plants are also a state function most usually performed by the state water pollution control agencies. The primary focus in designing this manual has been directed therefore to that person in a state agency who has the responsibility for planning the manpower and training requirements of municipal wastewater treatment plants. This person may or may not be employed by the state water pollution control agency. For example, such a person may in fact work in a state or local manpower planning council, the state employment security office, or a state environmental protection agency.

Because of the possible diversity in the backgrounds of those engaged in manpower planning for municipal wastewater treatment plants, the instructional material in this manual has been prepared and organized to meet five general objectives:

(1) To review the general principles and practices of manpower planning

(2) To review the development of the nation's water pollution control program and the need for a systematic effort in water pollution control, particularly at the municipal level

(3) To examine the educational and manpower development resources that are available for use by the water pollution control field

(4) To provide instruction in manpower planning for use in planning manpower needs of municipal wastewater treatment plants

(5) To organize in a workbook format a series of steps that draws upon the above information and applies it directly to manpower planning for municipal wastewater treatment plants

The information presented in meeting the five objectives has been organized into five separate chapters. It should be noted that the instructional material will move from the general to the specific. This style was followed to permit use of this manual by persons employed both in and out of the water pollution field.

ACKNOWLEDGMENTS

This manual has been prepared as a result of effective cooperation between two federal agencies, the U. S. Office of Education and the Environmental Protection Agency. A contract between Olympus Research Corporation and USOE, supplemented by additional funds from EPA, made it possible to glean the necessary talent from the environmental and educational spheres to review initial drafts of the document and to produce the final publication. Special thanks go to Dr. Howard Matthews, Director, Division of Manpower Development and Training, USOE, for providing the contractual support of the project.

Without the guidance and direction of Morton S. Ettelstein of the Manpower Development Staff, Office of Water Programs, EPA, this manual would not have its present thrust. The comments and constructive criticism of Thomas R. Hill of the Division of Manpower Development and Training, Bureau of Adult, Vocational and Technical Education, USOE, have aided greatly.

The manual was developed in what was essentially a three-step process. First, the draft of the manual was prepared by Olympus Research Corporation under the guidance and direction of the Environmental Protection Agency. Second, the draft was presented at a series of seminars held across the nation to more than 200 knowledgeable individuals who reviewed the material and offered suggestions for improvement. Those who reviewed the material included representatives from both national and regional staffs of EPA, from the Department of Health, Education and Welfare, from the Department of Labor, from various state environmental agencies, and from agencies of metropolitan government dealing with environmental and manpower problems. Finally, the manual was rewritten in its present form to reflect the suggestions obtained through the series of conferences.

The manual was written by J. Kenneth Davies, Lloyd L. Gallardo, Edward F. Mackin, Garth L. Mangum, Kenneth C. Olson, and Colin Wright, who had final editorial responsibility.

CHAPTER ONE

PRINCIPLES AND PRACTICES IN MANPOWER PLANNING

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CHAPTER ONE

PRINCIPLES AND PRACTICES IN MANPOWER PLANNING

Though the primary user of this manual might be a specialist in planning to meet state and local needs for personnel in water quality activities, he will undoubtedly perform his functions more effectively as he becomes a part of a new and growing profession involved in a wide variety of activities but using a common set of tools toward accomplishing a similar set of objectives—the profession of manpower planner. In this chapter we identify the various levels and types of manpower planning and review those steps generally followed in what we refer to as specialized or micro-manpower planning—that form of manpower planning closest to the assignment of the state water pollution control manpower planner.

A. Typology and Experience in Manpower Planning

No single concern has more generally permeated the full range of economic and social activites throughout the world over the past two decades than the concern for manpower as a human resource. There are many reasons for this concern. Government policies aimed at maintaining or achieving full employment have become a political imperative in every industrial democracy. In an industrial society the majority are dependent upon wage and salary income, while in a democratic society the majority will demand that the government meet those needs they cannot meet themselves. Job creation is high on the list of such needs. In addition, because inflation is a major obstacle to full employment, nations pursuing the goal of inflation control must train and upgrade their workers and improve their labor markets to reduce the inflationary impact of government employment policy. As advanced societies meet more and more of their basic needs for goods, the emphasis of consumer demand shifts toward the more labor-intensive services. In the capital-goods sector, the technology becomes more developed and requires more advanced human inputs from trained minds and hands. Warfare tends to demand and absorb the best technical manpower. With more and more people living closer and closer together, served by more and more technology, the complexities of life demand more human effort in planning, control, and remediation. Meantime, those countries in search of modernity must pursue the same excellence in human resources, leaping over those years when concern with the development of capital and natural resources was dominant.

To show the universality of national manpower planning, a discussion of a few international examples will be enlightening. The nature and objectives of the economic and political environments in which manpower planning occurs differ widely among countries, depending on national goals and priorities. The manpower policies that are developed in such countries will reflect those differences.

Manpower planning in Western and Northern Europe is similar to that in the United States in having as its major objective the social welfare of wage-earning families. Subsidiary, but important to this objective, is the reduction in inflationary pressure induced by a policy of maintaining full employment. The immediate goal of such planning is to provide a job for all who desire it—a goal made possible by the rise of the working class to political power. The need for adopting such a goal comes about in part because of maladjustments existing in the marketplace for which corrections must be made. The achieving of this goal is made easier by the small size, population homogeneity, ideological commitment, and low birthrate of the countries involved.

The objective of Soviet manpower planning is the efficient use of a scarce economic resource—manpower—and is an integral part of the national economic plan. The U.S.S.R. faces labor shortages because of the great population losses during World War II, yet its economic development plans require dispersal of population and manpower over a vast expanse of territory. Soviet policies provide incentives for workers to move to undesirable locations and to work at "productive" (goods-producing) rather than "unproductive" (service) jobs. Despite its reputation for arbitrariness, the Soviet Union seems to have given up most of the various forms of compulsion it once used and now relies primarily on monetary incentives, though compulsion remains as the ultimate tool of manpower policy and is used when needed.

Japanese manpower planning is dedicated to the maximum utilization of the labor force and is made necessary by the existence of rapid economic growth, a reduced birthrate (induced by a vigorous program of birth control), and a paternalistic employment system. Numerous policies and programs have been instituted to increase the labor force through increased participation of women, older workers, and rural residents.

In contrast to these activities in developed countries, the developing agrarian nations find themselves in the quandary of too few educated and trained workers and too many uneducated and untrained citizens. Their manpower plans usually contain programs for the development of rudimentary school systems designed to increase literacy and programs to either send their nationals abroad for certain education or training or to attract citizens from other countries to provide the needed initial cadre of entrepreneurs, managers, engineers, technicians, and teachers.

Three types and levels of manpower planning have emerged within the United States: (1) national macro-manpower planning to determine the levels of economic growth necessary to achieve employment targets or to fill the human resource needs for meeting national goals, (2) national manpower program planning for administration of programs designed to remedy the problems of special groups of persons, and (3) micro-manpower planning for the specialized needs of private business firms, employer associations, employee associations, and public agencies. Examples of each will better illustrate the role and techniques of the manpower planner in modern society.

B. National Macro-manpower Planning

An oversimplified version of national macro-manpower planning would include: (1) forecasting the size of the labor force in the following year, (2) estimating the level of economic production (gross national product (GNP)) likely to occur without policy measure changes, (3) estimating the level of employment likely to be generated by that GNP, (4) deciding upon an employment target, and (5) devising policies, consistent with other economic and social goals, to reach that target.

To illustrate these five steps we introduce a simple example. Let us assume that the size of the labor force (those employed plus those seeking employment) next year is to be 90.5 million persons. Let us now suppose that the estimate of the GNP next year is $1,100 billion and that this level of GNP will generate employment of 85.1 million persons which is 94 percent of the projected labor force. If it were now assumed that 96 percent employment of the labor force is the optimal employment level, meaning employment for 86.9 million, an unemployment gap of 1.4 million people would exist, and steps would then have to be taken to eliminate this gap. These steps might include government fiscal and/or monetary policies that involve the national government's power to tax, spend, and regulate the supply of money and credit. In instituting such policies, other national goals must be taken into consideration, such as price stability and personal freedom.

While the primary tools used in reaching the target of full employment are such items as expenditures, tax, and monetary variables, there is growing interest (though not as yet much skill) in using education, manpower training, and the various labor market measures as anti-inflation devices to assist in reaching macro-manpower planning goals. It is now generally conceded that the U.S. economy could attain any level of employment it wanted if it could just learn to do so without inflation.

While macro-manpower planning may seem removed from the operations of other manpower planners, the ease or difficulty with which other manpower planners are able to accomplish their work will be affected by macro-manpower successes or failures. It would seem, therefore, that other manpower planners must become familiar and conversant with what is taking place with manpower issues at the macro level. A start in providing material pursuant to this end is found in some of the remaining sections of this chapter and also in Chapter Three.

C. National Manpower Program Planning

During the 1950s manpower policies and programs in the United States concentrated on producing a supply of highly educated scientists and engineers devoted to keeping ahead of the Soviet Union in the arms and space races. Persistently rising levels of unemployment during the late 1950s and the explosive race issues of then and the early 1960s turned attention to new issues. Alleviating the competitive handicaps of those persons in or entering into the labor market, who were unable to obtain adequate employment and earnings, became the dominant objective of manpower policies in the 1960s. In the 1970s, with the general level of unemployment rising, concern began to be expressed for other groups, such as unemployed aerospace workers and returning veterans.

1. Emergence of National Manpower Programs

A long series of programs has emerged in an attempt to meet these needs. The Manpower Development and Training Act; the Economic Opportunity Act, with its Neighborhood Youth Corps, Job Corps, Operation Mainstream, and New Careers Program; JOBS; and the Work Incentive (WIN) program to rehabilitate welfare recipients and the Concentrated Employment Program (CEP) to bring together all manpower programs in a concentrated area comprise the more important ones. The most recent is the Emergency Employment Act (EEA) of 1971, also known as PEP (for public employment programs), which seeks to employ the unemployed in public sector service jobs during the current recession (1971-72).

This variety of categorical programs—all (except for the last mentioned) aimed at essentially the same disadvantaged target groups but having different administering agencies; funding procedures; eligibility requirements; levels of federal, state, and local authority; and mixes of services—was confusing and hard to administer. National policy making tended toward uniform program directives regardless of local situations. Categorical programs required enrollees to fit program requirements in order to receive available services, rather than having a package of services tailored to individual needs.

Policy makers were never able to make up their minds whether the basic obstacles to adequate employment and income for so many were the individual's lack of qualifications and motivation or institutionalized discrimination in the hiring process. For policy, the answer made all the difference. Some programs leaned one way and some the other. Most assumed that the individual, rather than the institutions had to change. But increasingly we are becoming aware that there are institutional barriers requiring institutional reform.

2. *Cooperative Area Manpower Planning System*

The Cooperative Area Manpower Planning System (CAMPS) was created in an attempt to coordinate all of the agencies and programs. Representatives of each agency involved in funding and administering manpower programs in a state or major metropolitan area met, explored state or local employment problems, identified target groups, and informed each other of their plans. This cooperation was, however, a case of equals working with equals with no one having authority to reallocate funds across program lines if one program should seem better adapted to the current or local situation than another.

In each state, the Employment Service (ES) was to provide the leadership but include all agencies involved in manpower programs. Each state was to draft a state plan for the delivery of manpower services. As the system expanded, OEO, the Departments of Commerce, Housing and Urban Development, Agriculture, and Defense along with the Civil Service Commission became signatories to the interagency guidelines setting up CAMPS in the spring of 1967. In 1971, EPA was added as a signatory.

The system was to include regional, state, and local CAMPS committees. The local committees were to draw up their plans, under federally issued guidelines, to be forwarded to the states and there consolidated in state plans to be forwarded for regional approval. Individual agencies maintained the power of final approval of their individual programs.

While CAMPS has been far from perfectly effective, it established a mechanism for communication among agencies providing manpower and manpower-related services, and it pointed to the need for more power through control of funding if it was to be an effective planning agency. The U.S. Department of Labor (DOL) has continued to be the primary advocate and user of CAMPS, with most of the other agencies providing varying degrees of resistance or acceptance.

Probably the most effective use of CAMPS as a planning device has been with Manpower Development and Training (MDT). Of the money allotted to MDT by Congress, Washington retains 20 percent to be used for national projects to meet critical national needs. The remaining 80 percent is made available to the states. Of that 80 percent, 20 percent has been available to be spent by the states in accordance with their approved CAMPS plans but without specific regional approval. The remaining 80 percent of state-allocated money can be spent only on project-by-project approval of the regional officials.

3. *The Emergence of State and Area Manpower Planning Councils*

Frustrated by the details of administering programs under the restrictions of federal guidelines, a few governors and mayors began to play a stronger role. Some were irritated by the fact that federal manpower funds tended to bypass them in going directly to either autonomous state education and employment service agencies or to quasi-private community action agencies operating at the local level. Through legislation or executive order, a few governors and mayors began to intervene with their own staffs and organizations. Examples of such organizations are New York's Human Resources Administration, Utah's State Manpower Planning Council, and California's Department of Human Resource Development. Within whatever discretion was available under federal law, they wanted to shape manpower programs to fit local, political, and economic needs.

DOL has become increasingly aware of the objective need and political pressure to decentralize more manpower policy decision making to the regional, state, and local levels, and has declared its intent to go as far as present law allows toward decentralization and decategorization. A concomitant of this has been the decategorization of the manpower programs to give more flexibility in determining the mix of services. A variety of legislative proposals has been made to effect this flexibility; and there seems to be a strong likelihood of their eventual success. In general, the ultimate model will probably involve federal funding and guidelines; state, local, and regional annual or multiyear plans; federal (national and regional) plan approval; state and local administration; and federal (regional) monitoring and evaluation. The major issue is the exact degree of federal (regional), state, and local authority. Each level tends to be jealous of its prerogatives and decision-making authority. Each thinks of the others as being hungry for power.

In the meantime, states (and a limited number of local governments) have been given federal funds through CAMPS for manpower planning staffs. This contribution from CAMPS has placed personnel on the staffs of large city mayors and governors who have a personal interest in enlarging the roles of their principals—and therefore themselves—in manpower decisions, and constitutes a cadre of perhaps 1,000 nonfederal planners (financed by federal funds) engaged in manpower programs for the disadvantaged. EEA funds have probably increased the number of local and state manpower planners, though the total effect is yet unknown. This is in addition to the manpower administrators on state and local governments' payrolls. Most of these personnel have limited backgrounds and training in their new assignments. In addition, involvement of private industry through the National Alliance of Businessmen's Job Opportunities in the Business Sector (NAB-JOBS) has produced an uncertain number of manpower staff on private payrolls added to those already employed by private agencies administering Job Corps and Job Corps-type programs. At this point, federal manpower staffs are more numerous and more experienced, though most of them are better described as administrators rather than as planners.

President Nixon in 1971 and again in 1972 asked Congress for manpower revenue sharing in which blocs of manpower money would be made available to state and larger local units or consortia of governments with few strings attached. Such monies, coupled with the limited manpower monies appropriated by state and local governments, would enhance the ability of these units to do manpower planning. There is, however, much concern over the ability of such units to do effective planning and to do the type of planning that would meet the national goals of emphasizing assistance to the disadvantaged. This concern could probably be met, at least in part, by the development of professionally competent manpower planners at all levels of government. The future of revenue sharing, at least under the present administration and Congress, is at best uncertain.

4. *Interagency Cooperative Issuances No. 72-1 and No. 72-2*

Meanwhile in 1971, the National Manpower Coordinating Council (NMCC), faced with eventual decentralization and in a move toward revenue sharing, issued Interagency Cooperative Issuance No. 72-2 in recognition of the "lack of impact of CAMPS on funding decisions." The issuance called for both structural and functional revision of CAMPS, allowing for increased initiative by state and local officials in the planning and initiating of manpower programs. Former state CAMPS committees are known as State Planning Councils and local CAMPS committees as Manpower Area Planning Councils (MAPC). The primary tasks of these councils are:

(1) To advise elected officials, governors, and RMCCs of locally conceived area and state needs

(2) To assist local elected officials and governors in the development of plans to meet these needs, including priorities and recommendations for funding

These plans are to include all manpower and manpower-related programs, irrespective of funding source. In the case of programs funded by the Manpower Administration and agreed upon by the RMCCs, these plans will constitute action plans for funding to the maximum extent possible under existing law. With respect to other agencies, they only constitute recommendations.

State and area councils will be supported by independent secretarial staffs. Area plans are submitted through the state manpower planning council with its comments to RMCC, and MAPC has the opportunity to comment to RMCC on the state plan.

Membership on the planning councils has been expanded to include:

(1) Representation from the broadest spectrum of interests

(2) Decision-making agency representation

(3) Client group representatives chosen by the clients

(4) Representation of the public, business, and organized labor

ICA No. 72-1 constitutes the policy guidelines for fiscal year 1972, with a separate section for each of the agencies signatory to the document, including OWP.

Five planning levels have been designated:

(1) The National Manpower Coordinating Committee (NMCC)

(2) Regional Manpower Coordinating Committees (RMCC)

(3) State Manpower Planning Councils (SMPC)

(4) Manpower Area Planning Councils (MAPC)

(5) Ancillary Manpower Planning Boards (AMPB)

The NMCC establishes the overall goals and guidelines, delegating to the RMCCs the responsibility and authority to administer these. These committees include representatives from the nine federal departments and agencies signatory to CAMPS. The SMPCs are the creation of the governors and constitute their overall manpower planning arm. MAPCs are the creations of mayors or other local officials of large cities, metropolitan areas, and other special areas such as Indian reservations. The AMPBs are planning arms of the SMPCs, in areas not designated as MAPCs.

The sequence of planning as stated in ICA No. 72-2 is as follows:

(1) SMPCs, MAPCs, and AMPBs are involved in preliminary planning and discussions and develop draft plans.

(2) Draft plans are exchanged, and an attempt is made to reach agreement.

(3) MAPCs and AMPBs submit plans to the governor. MAPC plans are also submitted to the RMCCs.

(4) SMPCs develop comprehensive state plans, forwarding to the RMCCs and to mayors.

(5) Mayors comment to RMCCs on state plans.

(6) RMCCs review plans and comments, resolve differences, and approve plans.

(7) RMCC agencies use plans to the extent possible in final actions.

These plans will:

(1) Identify the people needing services

(2) Identify employers needing workers

(3) Designate the provision of services needed to make people employable in the shortest and best way

(4) Include all manpower and manpower-related program plans regardless of funding source

If this CAMPS planning process is fully implemented, it will constitute a major change in the planning process, with the local areas and states playing the major roles in the development of plans. Implementation is contingent, however, on developing the manpower planning capabilities of the local and state planning councils and boards that will require trained planners—either full-time manpower planners or general planners with manpower planning capabilities. The experience gained should lead the way to considerable decentralization.

5. *National Manpower Program Planning Steps and Principles*

In a profession so new that only two universities—the University of Utah and the University of Redlands, insofar as we know—explicitly give a master's degree in manpower planning and administration, there is as yet no common methodology for manpower planning. There is, however, a near consensus on the appropriate planning steps in national manpower program planning. Such planning steps are:

(1) Identifying critical manpower problems

(2) Establishing manpower program objectives

(3) Exploring alternative approaches to the accomplishment of objectives

  (a) Inventory of resources
  (b) Identification of alternate target groups
  (c) Establishment of priorities
  (d) Marshaling of available facts
  (e) Estimate of costs and benefits

(4) Choosing and implementing most cost-effective approach

(5) Involving inputs from other institutions related to manpower planning process: unions, schools, employment service, etc.

(6) Monitoring programs

(7) Evaluating program achievement

(8) Feeding back and modifying from lessons of experience

There is also emerging a set of principles for national manpower program planning which may have application to other manpower planning activities:

(1) There should be a regular and formal process of manpower planning at the state and local levels as well as at the regional and national levels.

(2) Planning, to be meaningful, must be a continuous effort unencumbered by the problems of day-to-day administration.

(3) Manpower planning, like planning in general, involves systematic steps, procedures, and actions to:

  (a) Identify the people to be served
  (b) Establish priorities

(c) Formulate a mix of services
(d) Organize a delivery system
(e) Feed back into the program the improvements and the results of monitoring and evaluation

(4) Planning of manpower services in the present environment requires that the planning body control the allocation of funds. If funding takes place independently of the formal planning process, the planning program will not have the support or the impact desired.

(5) Manpower planning requires that the people needing service be brought together with the institutional capacity to provide service. This means, in practical terms, that cities and states must jointly plan and program a common effort. Neither has the capacity to proceed independently of the other.

(6) Persons with nearly equal employment handicaps should have equal access to services. This concept requires a model for the formal allocation of resources on a geographical basis and on a program-content and -level basis.

(7) A manpower planning program should be structured so that it has the support and possibly the participation of client groups, appropriate elected officials, manpower agency professionals, and persons with the professional planning skills from economics, statistics, psychology, and related disciplines.

While the manpower planner, for whom this manual is primarily designed, will have little to do directly with most national manpower program planning, these programs do constitute potential sources for the manpower needed in his manpower programs. In addition, the increasing social and political pressures require that the micro-manpower planner take these programs and their clienteles into consideration in their manpower planning activities. Therefore, close acquaintance with programs and personnel in this area is essential.

D. Micro-manpower Planning within the Private Sector

The major purpose of this manual is to meet the needs of the state water pollution control manpower planner. In subsequent chapters material will be presented to give that individual perspective in the ramifications of his job. Such a perspective will be obtained by a discussion of the nature of environmental problems, the scope and structure of the water pollution control field, the organization of the education, training, and employment systems which develop this nation's manpower resources, and the principles, practices, and functions of the manpower planning profession. The remainder of this chapter, however, will be devoted to discussing the basic principles and steps of what has been referred to as micro-manpower planning—that type of manpower planning conducted to meet the manpower needs of a particular industry, company, or agency. It is from this general area of manpower planning that the specific steps in manpower planning for wastewater treatment plants will be derived.

Manpower planning in the business firm is a relatively new activity. In the past, most employees have needed only the most rudimentary training for their jobs, and such skills could be replaced with ease if new skills were needed. However, with unionization, seniority rules, benefit packages, and changes in business practices, there has developed a tendency toward the development of careers, reducing turnover and making for a greater interdependence between employers and employees. A higher proportion of employees are now skilled workers, technicians, engineers, scientists, and others with long training times in whom firms may have made major investments and which firms want to retain. Professional business management puts a premium on looking ahead to see that each supervisor, manager, and corporate officer is understudied and the right replacement is in the right place at the right time. Whereas once the primary personnel concern was human relations (to keep employees happy despite the necessity of discipline) or labor relations (keeping the peace), manpower planning with its career implications is now rising in importance relative to both.

The primary motivation for firms and employer associations to be involved in manpower planning is its ability to contribute to profits. Thus, if the costs of manpower planning and developments are less than the potential benefits, planning will be done once the relationship of costs to benefits is known. Increasingly, larger firms and employer associations include, as potential benefits, the public esteem that may come from demonstrating a social conscience in their manpower policies as well as the direct benefits that may be derived from cooperating with government in its attempt to achieve certain social goals, especially in the hiring of disadvantaged people. These inclusions enhance the prospects for manpower planning.

In its manpower planning, a firm or employer association must take four unique and important manpower characteristics into consideration:

(1) To reach maximum productivity in higher skills, an individual must prepare by way of education and training for a long period of time.

(2) The value of workers generally appreciates, rather than depreciates, from use for a substantial period of time.

(3) An investment in manpower becomes the possession of the individual who is free to leave the employment of a firm or agency almost at will, though he or she may well remain in the industry.

(4) Personal satisfaction plays a key role in a worker's productivity and stability.

The employer's manpower needs depend upon the product or service he sells, the technology used, and the profitability of the firm. The available manpower depends upon the population, the labor force participation rate (the percentage of the population in the labor force), the human resource development system, and the demands of other employers.

To project manpower needs, therefore, entails projecting economic conditions, product or service demand, market share, wage rates, costs, and prices. The sophistication required for such projections lies beyond the resources of all but the larger individual firms, though business or industrial associations or consultants may be of some value to small companies. The most effective manpower planning is found in rapidly growing companies in expanding industries, but is concentrated primarily with planning for the higher level or skill shortage positions.

This part of the manpower planning profession, though also new, has begun to develop its assorted professional practices. For instance, the usual steps to manpower planning in the firm or association consist of:

(1) A projection of manpower requirements in different firms, departments, divisions, occupations, and levels at various points in the future

(2) An inventory of the numbers, ages, skills, and performance of current personnel

(3) Implementation of a plan to develop current personnel appropriate to meet future needs and to supplement that personnel as required from outside sources

At a more detailed level, these steps require the manpower planner to:

(1) Examine the historical data to determine the relationships between the size and composition of the work force and sales, production, and inventories

(2) Examine the historical data to determine retirements, deaths, quitting and dismissal rates, promotions and transfers, and retraining periods and retrainability rates

(3) Determine the relationship of staff functions to line employees, sales volume, and production

(4) Examine the rate of product or service development and its impact on the work force

(5) Determine the rate of productivity increase in terms of the ratios of man-hours to output, capital equipment to output, and of man-hours productivity index to capital productivity index

Then, given forecasts regarding sales, capital outlays, and product development, the following steps are taken in defining the work to be done:

(1) Make forecasts of turnover, promotion and transfer, retrainability and productivity increases (both from ongoing methods of improvement, work simplification, etc., and from major installations of automation, electronic data-processing equipment, plant layout revisions, etc.).

(2) Construct a model to forecast future manpower needs based on forecasted variables.

(3) Use the model to make two-, five-, and ten-year projections.

(4) With these projections, the company can compare its projected manpower supply to its projected needs and make plans to do something about its potential quantitative deficit or surplus.

Once the quantitative requirements for the future have been forecast, the firm or employer association must answer such pertinent qualitative questions relating to its employment needs as the following:

(1) Can the voluntary separation rate be reduced, particularly among the most promising younger employees?

(2) Can the replacement problem be met by opening up positions in middle management for younger men? What changes would this mean in retirement policy?

(3) Do all management positions require the equivalent of a college education?

(4) Are there men among the hourly and weekly work force with managerial potential?

(5) What are the sources of manpower—untrained and trained?

(6) Can women be used for some of the supervisory jobs?

(7) Can jobs be identified which develop younger men at faster rates than other jobs?

(8) Can capable men be obtained by transfer from other units of the firm or industry?

(9) Should the firm begin to hire outsiders who will provide the talent and age requirements needed?

(10) What are the qualitative requirements of the various jobs?

(11) How might the qualitative requirements best be met?

(12) What training programs are needed to fill needs?

(13) What is the best situs for these training programs?

(14) Are there any departments with problems of greater or lesser severity than the overall firm?

(15) Does the firm really need, say, 15 percent of its labor force as engineers when a third of them are doing nonengineering work?

(16) Can men not considered to have promotion potential be developed into promotable candidates?

(17) Can incentive factors (salaries, fringe benefits, promotions, job status, etc.) be revised to achieve greater effort from available manpower?

(18) Is a high school diploma really necessary?

(19) Are there identifiable career ladders?

(20) What training programs are needed to make career ladders effective?

A firm with some foresight will have established criteria for either internal development and promotion or outside recruiting. Though internal development is usually preferred, there are times and jobs for which the firm has no current available talent or lacks the time to develop the skills, knowledge, and judgments of existing personnel. When this occurs, the manpower planner must take steps to assure that there are responsive external human resource development institutions available within the community. This requires a knowledge of and working relationship with such human resource institutions.

A primary conflict often exists between national manpower program planning and micro-manpower planning in the efforts of national manpower program planners to get the disadvantaged hired. Ever-increasing hiring standards stand in the way of employing the more poorly equipped workers. Employer reluctance to train, unless absolutely necessary, can be understood when it is realized that the trained worker is free to leave almost at will and may hire himself out to a competitor. However, effective manpower planning should result in a higher retention rate, minimizing the losses from this source; and internal training programs may reduce the length and cost of the orientation period. The federal NAB-JOBS and MDT-OJT programs help to bridge this gap, with the federal government financing the training of disadvantaged workers by private firms.

The location and authority of the manpower planner in the business firm is still unclear; but there seems to be a tendency to place the function, along with budgeting, under those having ultimate responsibility for generating and measuring performance of an operating plan. With techniques so new, the pitfalls are many. Errors in projections are common and widespread. The primary determinants of future employment are not generally clear. There are no generally accepted measures of competence, and personal judgments are less than objective. Department heads and other supervisors often attempt to "hoard" good people by "hiding them" from the planner. Internal and external labor markets touch only at certain ports of entry and exit, making it difficult to foresee future interactions between supply and demand for manpower.

E. Micro-manpower Planning within the Water Pollution Control Field

Leadership for manpower planning within the water pollution control field is exercised by the Manpower Development

Staff (MDS) within OWP. The fact that this manual has been prepared indicates the value that OWP is placing upon the development of a capability to engage in manpower planning. Such planning is considered a vital factor in accomplishing the national water pollution control objectives. It has been recognized, however, that the formulation and evaluation of programs to provide adequate manpower to the water quality industry have been hampered by two problems: (1) a lack of information concerning what are the real requirements for and supply of water pollution control manpower, and (2) the lack of a systematic framework for doing manpower planning within the 50 states and territorial possessions.

The first problem is being rectified by the execution of a survey questionnaire completed on a sample of 3,500 municipal wastewater treatment plants and administered jointly by the Department of Labor and the Environmental Protection Agency in 1971 (hereafter called DOL/EPA survey). The preparation of this manual is an attempt to rectify some of the implications of the second problem.

Some of the major functions performed by MDS are:

(1) To establish manpower planning criteria

(2) To develop manpower factor guidelines

(3) To measure current employment in the water quality industry

(4) To project future manpower requirements in the water quality industry

(5) To develop programs to improve the recruitment, retention, and utilization of manpower

(6) To assist regional and state agencies in manpower planning

(7) To collect and disseminate manpower information

OWP believes that it can best serve the water quality industry by actively seeking to effect close coordination with other federal programs. In this way it will utilize the skills and resources of other agencies, particularly manpower agencies within DOL and the U.S. Office of Education (USOE). The 1970-71 survey of employment in municipal wastewater treatment plants is an example of interagency cooperation initiated by the Environmental Protection Agency (EPA) and OWP.

MDS, in cooperation with DOL's Manpower Administration, designed and conducted in 1971 an extensive survey of employment in municipal wastewater treatment plants. (A copy of the survey questionnaire appears as Appendix I.) State employment service personnel, water pollution control organizations, and many similar regional, state, and local groups participated in the administration of this survey. The results should provide the industry with very useful base-line data for measuring employment in one major segment of the industry. Similar cooperation is anticipated with the Department of Housing and Urban Development (HUD). In addition, some cooperative efforts are under way to improve the level of manpower planning in large metropolitan areas and in regional labor market areas. For example, the necessity of identification of manpower needs is now recognized by EPA and HUD in water quality programs that are planned jointly.

In addition to measuring current employment, MDS has been concerned about projections of future manpower requirements. Tasks associated with this function include: design of the methodologies and procedure for generating, processing, storing, and communicating the data and information, and establishment of the appropriate capabilities of manpower planning at all levels of government. To make periodic manpower projections, plans will be prepared and reported by each of the states and each of the regions, and this will be used as a basis for development of national projections and plans by OWP staff. Until state and city capabilities are developed, regional and national projections will be made on the basis of existing available data.

The objectives of establishing manpower planning criteria will be to produce, maintain, and disseminate criteria to facilitate the identification of the various types of personnel engaged in water pollution control activities and to make manpower requirement determinations. The criteria will need to be continuously updated to provide for changes in technology and in manpower utilization practices. It is intended that the criteria be made available to consulting engineers and government staffs for planning the staffing of new plants and evaluating the staffing of existing plants. The regional staffs will be called upon to make arrangements for criteria development studies, to handle the regional review of new criteria, and to assist others in the application of the criteria.

To ensure that appropriate manpower information is generated and manpower factors are considered in the design and demonstration of new equipment, MDS will develop, maintain, and disseminate a manual of guidelines. The manual will be made available to all EPA staff, contractors, equipment manufacturers, and others connected with the design and analysis of water pollution control systems at the state and local levels.

Various forms of assistance will be provided for designing work plans, preparing requests for proposals, selecting and negotiating with contractors, reviewing project progress, and determining acceptability of end products. Assistance will be provided to engineering and research firms and to equipment manufacturers in their activities related to the manpower factors associated with equipment and system design and demonstration. OWP is concerned with the solution of problems and improvement of practices related to manpower development and utilization. To this end, guidance materials will be generated and special analyses made on topics such as recruiting practices, certification of wastewater treatment plant operators, salary structures, career development opportunities, and organization and management practices.

It is anticipated that a manpower planning capability will be established in each region. The primary outputs of this effort will be projections of regional manpower needs and supply and action plans for training and overcoming manpower problems. In addition, regional offices will stand ready to assist state offices in their planning activities.

The extent to which the function of manpower planning is recognized as an essential activity by the senior administrator of a state agency will be an important measure of how well municipal wastewater treatment plants will be staffed, operated, and maintained. It is no accident that in those states with systematic manpower planning, program development, and training of plant operators, significant gains have been recorded in achieving water quality objectives. Progress in proper staffing at the municipal wastewater treatment level is often a reflection of how well a state agency's senior management perceives the manpower planning function. If it ranks in importance and is coordinated with facilities construction, surveillance, enforcement, and standard setting, it will directly influence the quality of those parts of these agency functions that depend upon an adequate supply of qualified manpower. If, on the other hand, it is relegated to a staff member as "one more hat to wear" in an understaffed state agency, state water pollution control authorities would do well to consider alternative methods for having this function performed.

For a state water pollution control agency to develop a satisfactory manpower plan, a number of factors must be available: (1) a person or persons who are knowledgeable and can articulate the mission, goals, and objectives of the industry; (2) the resources and technology available and required to achieve the desired objectives; (3) an accurate data base that can be collected and utilized and which can define the direction and boundaries or limits of the industry; and (4) at least one person who can identify, analyze, and describe the most significant issues or problems that relate to the industry's manpower needs. In short, the minimum manpower planning capability that must be available to a state water pollution control agency is the ability to at least identify, define, and assign priority to those manpower requirements absolutely essential to achieving the agency's objectives.

If manpower planning for water pollution control is not done within the state water quality agency or by a more comprehensive environmental management agency, two alternatives should be considered: planning by state agencies other than the water pollution control agency and planning by the local communities. At least three "outside" manpower planning resources are available to assist state authorites responsible for water pollution control: (1) the state department of employment security, (2) the state department of education, and (3) CAMPS, with its system of state and local manpower planning councils. The first two of these resources will be examined in Chapter Three, while the third has been treated in this chapter. All represent valuable expertise to assist water quality agencies in establishing manpower development and training programs.

There are many advantages in having the staff of a state water pollution control agency develop its own manpower planning capability. Other state agencies operate under different authority and pursue objectives that may sometimes be in conflict with the goals of water pollution control. An example of such conflicts is the possibility of a conflict between the maintaining of full employment and the achieving of some desired level of water quality. Manpower planners in general will have as one of their goals that of full employment. Such a goal, however, may have to go unsatisfied, temporarily at least, if a firm has to be closed down or have its production activities curtailed because its activities are causing water pollution which places in jeopardy the health and general welfare of the community. Nevertheless, a state water pollution control agency should be prepared to investigate and seriously consider close cooperation in manpower planning with officials from education, the employment service, and state manpower planning councils. After all, if the aim of the manpower planner is to develop programs that make the most effective use of personnel, minimizing duplication of effort at any level of government will reflect well on the state agency executive who successfully makes full use of the expertise and resources of other state agencies that he believes are equipped to assist in manpower planning.

For the most part, few local communities have the resources to carry out comprehensive manpower planning to meet their needs in the water pollution control field. However, large cities and a growing number of other urban population centers have initiated modest efforts to carry out metropolitan regional planning, and this recent development in the national strategy for improved water quality management offers the state water pollution control agency an excellent opportunity to participate with other local organizations as a member of a metropolitan manpower planning council. Such membership will put the state water agency into direct communication not only with training and manpower development agencies, but also with those who offer funding and technical assistance that can be used in planning programs to upgrade workers now on the job or to train new workers for future job openings. Local communities will probably continue to look to state agencies for programs for the training and upgrading of workers now employed in local plants.

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CHAPTER TWO

WATER POLLUTION AND THE DEVELOPMENT OF THE WATER POLLUTION CONTROL PROGRAM

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CHAPTER TWO

WATER POLLUTION AND THE DEVELOPMENT OF THE WATER POLLUTION CONTROL PROGRAM

A. Introduction

Pollution is a pervasive and persistent problem. We have all seen chimneys belching smoke, refuse strewn along our highways, automobile graveyards, and once-clean waters turned foul by human and industrial waste. Pollution does not discriminate among individuals and communities by affecting some and not others, though some may experience pollution more than others. Pollution has no public advocates, though individuals may differ in their recommendations for its proper reduction. Pollution, we all agree, is bad and must be significantly reduced.

In his message transmitting to Congress the first annual report of the Council on Environmental Quality, President Nixon said:

> Our environmental problems are very serious, indeed urgent, but they do not justify either panic or hysteria. The problems are highly complex, and their resolution will require rational systematic approaches, hard work, and patience. There must be a *national* commitment and a *rational* commitment.[1]

That such commitments are being made in the area of water pollution control we hope to illustrate in this chapter.

The contents of this chapter have also been designed to provide a common understanding of water pollution problems and pollution control programs for the manpower planner in the water pollution control field, regardless of in which state office such planning may occur. We shall discuss water as a

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[1] Council on Environmental Quality, *Environmental Quality* (Washington, D.C.: U.S. Government Printing Office, 1970), p. xiv. (Emphasis in the original.)

national resource, threats to the quality of this resource, and the development of legislation and governmental programs to preserve it.

B. Water as a Resource

Two observations which, though simple, provide a key to understanding the problem of water quality are: (1) The supply of water from nature remains basically constant from year to year, and (2) conflicting demands are made upon the use of water.

While the supply of water has remained constant, the demand for water has increased. This is not to imply, as some prophets of doom have suggested, that we are or will shortly be out of water, though water shortages are of great concern in certain regions. Rather, it implies that the public's attitude toward the use of water must be changed if the supply of water of a desired quality is to be maintained and distributed equitably.

There are two essentially conflicting demands imposed upon our water supply. One type of demand arises from the fact that water is necessary to maintain and to preserve all forms of life. For such demands certain standards of cleanliness are required. The second type of demand arises from the usefulness of water in certain human and industrial activities. For such uses high standards of cleanliness are not required.

Quite clearly these two opposing demands for water cause almost certain conflict—a conflict arising out of the commonality of the water resource. They also create a conflict because individuals and firms, though generally falling into both classifications of demand, are not always aware of the effects their actions have upon themselves and upon others. These circumstances also arise because some of the economic and political institutions in the United States have not been designed to reflect the fact that water is generally a scarce and valuable resource that is used to satisfy a variety of functions. In former times a smaller and more dispersed population, along with a lower level economic activity, did not place a great deal of strain upon the ability of water to dilute and assimilate waste. As a consequence of this lower scale of activity, the inherent conflicts in the different demands placed upon water remained dormant. As the level of population and economic activity changed and as water uses changed, the condition of water quality changed also.

C. Threats to Water Quality

Documentation, in the sense of providing precise figures, of the amount and type of pollutants emitted into receiving waters is difficult if not impossible. Government agencies have not inventoried all sources of pollution; nor do the resources exist for them to accomplish this task in the foreseeable future. However, samples of water quality at different points in time and space, recurrent testing of water quality at stationary testing stations, and extrapolations to the universe from these samples (based upon reasonable analytical techniques and professional judgments of those skilled in water quality management) are available.

1. Types of Pollutants

There are eight major categories of water pollutants[2]: (1) oxygen-demanding wastes, (2) disease-causing agents, (3) plant nutrients, (4) synthetic organic chemicals, (5) inorganic chemicals and mineral substances, (6) sediments, (7) radioactive substances, and (8) heat.

2. Amounts of Pollution

Though we have noted that a precise documentation of the magnitude of water pollution is not possible at this time, nevertheless some idea of the magnitude of certain aspects of the problem, particularly as it may change over time, is possible. In this section we consider, by way of illustration and example only, the projected changes in three factors related to water pollution. The three factors that we have chosen are BOD, phosphorus, and thermal pollution. Although thermal pollution is not directly related to the pollution activities of wastewater treatment plants, nevertheless the available data depicting the possible growth of thermal pollution will give us some indication of the possible growth of pollution in general.

a. Growth of BOD. The primary measurement of the strength of organic waste is the amount of oxygen used in a

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[2] For further details, see U.S. Department of Interior, *A Primer on Wastewater Treatment* (Washington, D.C.: U.S. Government Printing Office, 1969), pp. 10-13.

fixed period of time and at a fixed temperature by the biological processes involved in the stabilization of organic matter. This action is called the biochemical oxygen demand (BOD). The presence of organisms in water allows bacteria to decompose waste material. If, however, the concentration of organic waste is high, the available oxygen is insufficient to allow the bacteria to decompose the waste, and water pollution results.

Table 2-1 shows the estimated increase in the gross production of BOD for 1957, 1964, and 1968. The average annual growth rate in BOD production is approximately 6 percent. The important insights to be obtained from this table are that: (a) the production of BOD is related to many industrial activities

TABLE 2-1

Estimated Increase in Gross Production of BOD
(1957, 1964, 1968)

	Millions of Pounds of BOD per Year		
Waste Source	1957	1964	1968
Food processing	3,400	4,300	4,600
Textile mill products	660	890	1,100
Paper and allied products	4,300	5,900	7,800
Chemical and allied products	5,500	9,700	14,200
Petroleum and coal	410	500	550
Rubber and plastics	20	40	60
Primary metals	350	480	550
Machinery	100	130	180
Transportation equipment	50	120	160
All other	300	390	470
Manufacturing TOTAL	15,090	22,460	29,670
Sewered population	5,700	7,600	8,500
TOTAL	20,790	30,060	38,170
Annual rate of increase		5.4%	6.2%

Source: Environmental Protection Agency, Water Quality Office, *Cost of Clean Water*, vol. II of *Cost Effectiveness and Clean Water* (Washington, D.C.: U.S. Government Printing Office, March 1971).

and since these activities increase over time, so will the production of BOD; and (b) approximately one-third of the produced BOD comes from sewage, and as the population increases, BOD will increase also. Clearly, the implication of these observations is that increasing economic activity and population will require increasing amounts of treatment to maintain given water quality standards.

b. Growth of phosphorus. Natural bodies of water contain mineral and organic elements that are essential for biological growth. Sometimes, as the result of pollution, however, an overabundance of one or more of these elements occurs. Table 2-2 shows the magnitude of increase of one such element—phosphorus. Increases of such a magnitude have had a dele-

TABLE 2-2

Estimated Increase in Phosphorus Discharged as Municipal Sewage (1957, 1964, 1968)

	1957	*1964*	*1968*
Sewered population (millions of persons)	98.4	119.6	139.7
Per capita phosphorus production, pounds			
(a) From metabolic process	1.0	1.0	1.0
(b) From consumption of detergents	2.0	3.0	3.3
TOTAL sewered phosphorus (million lbs per year)	295.2	478.4	600.7
Less phosphorus incorporated in sewage sludge:			
(a) Primary treatment—0.5 lb per capita (million lbs per year)	(12.9)	(20.4)	(21.8)
(b) Secondary treatment—1.31 lbs per capita (million lbs per year)	(63.6)	(81.3)	(111.8)
TOTAL discharged phosphorus (million lbs per year)	218.7	376.7	467.1

Source: Environmental Protection Agency, Water Quality Office, *Cost of Clean Water*, vol. II of *Cost Effectiveness and Clean Water* (Washington, D.C.: U.S. Government Printing Office, March 1971).

terious effect upon water ecology and have caused abnormal growth in certain aquatic organisms. The amount of available phosphorus has increased in recent years because of the substitution of phosphorus detergents for soap, not only by households but also by industry. In addition, because of the increased demand for phosphorus, the production of phosphorus detergents has increased, thus resulting in an increase in the amount of phosphorus entering receiving waters, not only as a residual from cleansing processes but also as a waste in the production of the detergent itself.

The estimated increases in phosphorus discharges from municipal sewage for 1957, 1964, and 1968 are shown in Table 2-2. The average annual growth rate in estimated phosphorus production was approximately 7 percent between 1957 and 1968. Clearly, the same conclusions may be obtained concerning the growth of phosphorus as were obtained for BOD.

c. Growth of thermal pollution. The primary source of thermal pollution is the electric power industry which requires tremendous quantities of water for cooling. Insofar as the use of electricity will increase in the future, the possible magnitude of thermal pollution will also increase. Table 2-3 shows the past and estimated future use of electricity from 1912 to 1985.

TABLE 2-3

U.S. Electric Power—Past Use and Future Estimates

Year	Billion Kilowatt-hours
1912	12
1960	753
1965	1,060
1970	1,503
1975	2,022
1980	2,754
1985	3,639

Source: Federal Water Control Administration, "Industrial Waste Guide on Thermal Pollution" (Washington, D.C.: U.S. Government Printing Office, September 1968).

From 1970 to 1985 the average annual increase in the use of electricity is approximately 6 percent.

D. *Factors Affecting Water Quality*

The factors that affect water quality may be divided into four categories: (1) increases in population, (2) changes in technology, (3) the lack of economic incentives or penalties, and (4) the existence of a "frontier psychology."

We shall not be concerned as to whether this is an exhaustive listing or whether a shorter list could be as encompassing, nor shall we attempt to list these factors in order of the seriousness of their effect; but rather, we present this classification because it provides a convenient framework for summarizing the principal causes of water pollution.

1. *Increases in Population*

The sheer increase in the number of people places considerable pressure upon facilities designed to treat waste water. More people simply implies more waste. If waste water is not adequately treated and is allowed to find its way into the water system, as has occurred in recent years, more water pollution results. The effects of increases in the population are further intensified by the tendency of the population to congregate in large urban areas. The resulting increases in population density place great strain upon existing treatment facilities and do so, it appears, in greater proportion than the simple increase in population density.

The increases in waste resulting from increases in population are not limited to human waste. As more people are absorbed into the economy, more products are demanded and produced, whether they be industrial or agricultural. Thus economic activity has increased with a resulting increase not only of final products but also of waste material.

2. *Changes in Technology*

With the advance of science, new products and new methods have evolved. Our life-styles have been changed. We drive more and bigger automobiles, buy drinks in "disposable" containers, and use new chemicals in our homes and factories. Though such changes may have had significant beneficial effects upon our lives, they have not been without some detrimental side effects. In moving to new ways of producing electricity (for example, by harnessing atomic power), we have experienced, as a detrimental side effect, the consequences of emitting heated water (thermal pollution) into our estuaries. Advances in biological and chemical branches of science have increased the efficiency by which we produce food, but they have done so with the consequence that our water resources are becoming saturated with harmful pesticides and phosphates.

3. Lack of Economic Incentives or Penalties

Although many of our activities are affected by economic forces, we have usually considered the bounties of nature to be unlimited. Because of the conflicting demands placed upon our water resource and the relative scarcity of such resources, this provision of nature cannot be considered a free good, especially if we desire certain standards of water quality while still demanding certain material things.

If we allow the indiscriminate emission of pollutants into our waterways, we pay all of the costs inherent in low water quality—fewer places to swim, higher costs of supplying drinking water, and increased possibility of disease. Yet if we eliminate pollutants completely, we face the prospect of high control costs for individuals and for firms, with the resulting decreases in individuals' incomes to spend on other goods and services. We must reduce pollution in an effective and equitable manner.

We have seen significant changes in technology and leisure time without the required changes in economic incentives to control their adverse effects. For example, individuals buy disposable containers but are not confronted directly with the cost of disposing of them. Consequently, more products are produced in disposable containers than would be the case if the price of the product reflected its true cost. Furthermore, firms emit such things as chemicals and refuse into receiving waters without paying the added purification costs of providing potable water or without indemnifying those directly affected by the resulting dirty water. As a consequence of these conditions, such firms are able to charge a price for their products that is lower than if they were confronted with the true costs of their operations. This situation would be alleviated if firms were confronted with the true cost of their activities. This could be accomplished by imposing taxes upon certain goods, the proceeds of which would pay for their disposal, and by imposing effluent fees, the presence of which would give industry the incentive to decrease the emission of pollutants. In the absence of such economic incentives, water quality will continue to be less than what is desirable or attainable. The recognition of these facts has found expression in the most recent report of the President's Council of Economic Advisors; and recently Russell Train, Chairman of the Council of Environmental Quality, said:

> We think that significant reductions in waste discharges might be more quickly and inexpensively effected if, in addition to regulatory restrictions, changes were made in the costs of facing individual polluters. For example, a system of effluent or emission charges requiring payment for the amount of specific pollutants added to the environment would, it seems to me, help harness the normal competitive forces of our economy to work with us rather than against us in achieving our pollution abatement goals.[3]

4. Frontier Psychology

In summarizing the relationship between the American society and its natural resources, Alexis de Tocqueville said, "Their ancestry gave them love of equality and of freedom; but God Himself gave them the means of remaining equal and free by placing them upon a boundless continent." This abundance has, however, caused us to be careless. This carelessness has been referred to as "a reflection of our frontier psychology."

Man has traditionally been a developer, for he alone among all living things is capable of changing his environment. It has been asserted that man, particularly Western man, has pursued development with a frontier mentality—a mentality that causes him to believe that his resources are unlimited. As a consequence of this error in thinking and this selfishness of attitude, developmental decisions have been made without an awareness of their consequences for water quality. Cities have

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[3] Address delivered at the Atlantic Council, Battelle Memorial Institute Conference, Department of State, Washington, D.C., June 15, 1971 (processed) as quoted in Charles L. Schultze *et al.* (eds.), *Setting National Priorities in the 1972 Budget* (Washington, D.C.: The Brookings Institution), p. 239.

grown with no more thought to sewage treatment than the requisite pipes to direct the effluent to some receiving waters, and firms have expanded their facilities with equally reckless abandon.

E. Governmental and Private Responses for Water Quality

Pollution control has become a major issue of public policy. In this section we shall review some of the major landmarks in the development of government response to problems of water pollution control. Though our review is brief, it is sufficient to indicate that in recent years the rate at which government control has been extended and monetary appropriations made has risen quite rapidly.

1. Role of State and Local Governments

Prior to 1948 most of the responsibility for controlling water pollution resided with state and local governments. Even in colonial times cities had regulations governing the disposal of sewage. Baltimore, for example, banned the use of cesspools in 1889, in 1857 Philadelphia began the construction of a sewer system, and also in 1857 Brooklyn installed sewers for the transportation of sewage. As cities grew, regulations governing the emission of foreign material into waterways were adopted by both state and local authorities. However, such regulations were adopted primarily to minimize the disruption of water navigation. Late in the 19th century as scientists began to establish the relationship between contagious diseases and water pollution, state and local governments created public health boards that were charged with pollution control as a way of maintaining health standards.

State and local governments have traditionally played an innovative role in environmental protections and continue to do so even with the increased involvement of the federal government, an involvement we shall document in the next section. The state and local governments perform creative and essential functions in planning, managing, and enforcing the various means that have been adopted to restore and maintain water quality. Though the variety in and the number of state and local governmental efforts prohibit a detailed examination of their activities, a few general observations can be made by referring to two tables recently released by EPA.

Table 2-4 shows the amount of funding and the amount of manpower for state and federal water quality agencies as funded in 1970 and budgeted for 1971. As indicated in the table, there has occurred an increase of approximately 21 percent in the amount of money devoted to water quality programs and an increase of approximately 8 percent in the number of man-years devoted to work in such programs.

Though state and local governments have enjoyed considerable success in their efforts in water pollution control, their work has become increasingly difficult as pollution has increased and as the size and number of municipalities have increased. Since pollution is no respecter of political boundaries, it was difficult for one locality, or even a state, to clean up its water when other communities were not so inclined. Furthermore, even those communities dedicated to improving water quality have experienced increasing difficulty in financing their projects as financial squeezes began to affect state and local governments. In addition, there arose competition among municipalities for new business, some of which polluted; and in many areas pollution control was afforded low priority by those cities competing for new industry and fearful that stringent controls would put them at a competitive disadvantage. Such problems, along with the experiences of the New Deal (e.g., increased federal control and aid to state and local governments), eventually began to encourage federal authorities to take increasingly more initiative.

2. *Role of the Federal Government*

Prior to 1948 the only federal legislation in the area of water pollution control was an 1899 law prohibiting the dumping of debris into navigable waters—to prevent impediments to navigation rather than to fight pollution—and a 1924 act prohibiting oil pollution from ocean-going vessels. Since 1948 a series of federal acts has been passed, beginning with the Water Pollution Control Act of 1948. The contents of this Act were based upon the opinion that the control of water pollution was a state and local responsibility but that the federal government should aid the financing of such facilities by providing capital in the form of loans to state and local governments. In 1956 the Water Pollution Control Act was amended to change what was a temporary authority into a permanent authority and to change

TABLE 2-4

Funding and Manpower for State Water Quality Agencies

(1970-71)

State	Fiscal Year 1970 Funding			Fiscal Year 1971 Budgeted			Fiscal Year 1970 Man-Years	Fiscal Year 1971 Man-Years
	Federal	State	Total	Federal	State	Total		
Alabama	185,012	58,068	243,080	190,500	158,750	349,250	21.90	22.20
Alaska	20,100	56,280	76,380	20,000	114,700	134,700	8.20	15.00
Arizona	69,377	59,003	128,380	75,500	88,117	163,617	12.75	11.00
Arkansas	118,169	182,401	300,570	115,700	275,000	390,700	27.30	35.00
California	662,460	2,314,066	2,976,526	661,100	2,801,270	3,462,370	239.00	192.30
Colorado	84,970	141,463	226,433	88,000	220,485	308,485	20.00	21.00
Connecticut	169,811	324,787	494,598	167,400	503,905	671,305	50.80	64.00
Delaware	86,267	217,312	303,579	85,900	202,200	288,100	36.33	33.20
District of Columbia	89,055	271,515	360,570	87,800	579,744	667,544	51.70	63.80
Florida	267,440	462,300	729,740	266,300	658,519	924,819	68.50	72.00
Georgia	223,337	412,894	636,231	218,700	535,544	754,244	38.00	50.00
Hawaii	65,100	114,781	179,881	71,100	184,900	256,000	24.20	31.00
Idaho	42,957	173,467	216,424	44,100	214,000	258,100	9.75	20.30
Illinois	379,097	645,359	1,024,456	428,000	2,327,340	2,755,340	95.00	188.00
Indiana	229,696	346,732	576,428	230,000	484,358	714,358	66.03	56.80
Iowa	123,699	121,309	245,008	121,200	124,580	245,780	15.25	22.75
Kansas	98,724	321,285	420,009	97,600	426,400	524,000	37.75	49.61
Kentucky	171,210	218,059	389,269	165,000	327,546	492,546	33.00	45.80
Louisiana	187,743	266,887	454,630	184,100	331,502	515,602	40.00	49.00
Maine	64,122	371,023	435,145	63,000	397,093	460,093	24.00	29.00
Maryland	183,480	1,135,869	1,319,349	181,300	1,369,830	1,551,130	69.20	82.60
Massachusetts	224,604	413,490	638,094	264,600	457,598	722,198	58.00	58.00
Michigan	358,803	659,392	1,018,195	357,800	992,200	1,350,000	91.00	95.50
Minnesota	156,651	561,030	717,681	155,400	661,955	817,355	60.40	60.00
Mississippi	149,000	123,235	272,235	145,100	72,550	217,650	25.75	25.00
Missouri	199,368	224,456	423,324	196,700	230,534	427,234	31.50	31.50

Montana	39,896	69,117	109,013	39,000	68,664	107,664	7.00	7.00
Nebraska	66,404	77,909	144,313	66,400	117,021	183,421	12.20	11.90
Nevada	21,485	32,682	54,167	23,787	34,213	58,000	5.50	5.71
New Hampshire	63,488	300,544	364,032	63,500	517,326	580,826	55.00	66.00
New Jersey	313,742	856,408	1,170,150	311,900	726,204	1,038,104	77.90	88.90
New Mexico	52,875	34,943	87,818	52,300	113,000	165,300	11.30	14.60
New York	671,175	4,349,545	5,020,720	650,400	4,564,632	5,215,032	328.00	300.00
North Carolina	269,764	438,219	707,983	264,600	509,930	774,530	58.50	57.00
North Dakota	34,398	30,454	64,852	37,200	27,700	64,900	6.00	5.85
Ohio	445,000	495,549	940,549	447,300	819,875	1,267,175	51.10	60.00
Oklahoma	119,156	138,437	257,593	117,600	181,098	298,698	19.00	31.90
Oregon	97,121	497,780	594,901	96,900	468,835	565,735	38.50	41.80
Pennsylvania	496,504	1,779,523	2,276,027	488,300	2,085,978	2,574,278	206.00	170.81
Rhode Island	110,443	163,827	274,270	111,000	187,200	298,200	29.65	32.60
South Carolina	159,749	200,631	360,380	157,400	365,474	522,874	36.50	43.00
South Dakota	41,165	58,683	99,848	38,500	66,500	105,000	11.70	8.70
Tennessee	212,537	188,780	401,317	208,200	329,320	537,520	31.50	37.50
Texas	436,951	1,796,201	2,233,152	427,000	1,771,339	2,198,339	133.00	145.00
Utah	54,592	62,455	117,047	55,400	92,052	147,452	11.15	12.67
Vermont	43,999	216,078	260,077	43,700	239,820	283,520	21.60	23.00
Virginia	212,858	625,220	838,078	210,500	1,065,740	1,276,240	78.50	100.00
Washington	131,037	997,205	1,128,242	131,037	1,025,803	1,156,840	73.50	73.50
West Virginia	111,682	173,790	285,472	111,682	233,870	345,552	28.50	28.50
Wisconsin	196,393	959,602	1,155,995	193,000	1,402,000	1,595,000	75.00	83.00
Wyoming	23,786	31,302	55,088	23,600	39,400	63,000	2.50	3.00
Guam	46,719	43,105	89,824	75,000	39,469	114,469	7.80	10.60
Puerto Rico	198,900	106,234	305,134	195,000	182,813	377,813	26.50	36.95
Virgin Islands	52,725	35,325	88,050	70,300	35,150	105,450	10.40	10.90
TOTAL	9,334,796	24,956,011	34,290,807	9,392,406	32,051,045	41,443,451[a]	2,709.11	2,934.75[b]

Note. Data represents activities of water quality agencies, not expenditures for pollution control facilities. Fiscal year refers to the federal July-June fiscal year.

[a] 20.86 percent increase over 1970 expenditures

[b] 8.3 percent increase over 1970 level

Source: Environmental Protection Agency, Office of Water Programs.

what had been a system of loans to a system of grants. The annual authorization under the amended Act was $50 million.

In the early 1960s Congress appeared to be dissatisfied with the progress of pollution control and eventually adopted the Water Quality Act in 1965. This Act increased the authorized level of funding, increased support to research and development activities, created the Federal Water Pollution Control Administration (FWPCA), and strengthened the role to be played by the federal government in the enforcement of water pollution control and the establishment of water quality criteria. In 1966 the Clean Water Restoration Act was passed, which further increased authorized funding—reaching a high of $1.25 billion by 1971– and increased research and development activities into advanced water treatment methods. Also at this time (1966) the FWPCA was transferred from Health, Education and Welfare (HEW) to the Department of the Interior.

Between 1967 and 1970 water pollution control legislation concentrated upon specific pollution problems. Bills were passed which dealt with problems of oil pollution, acid mine drainage, eutrophication, and thermal pollution. Such acts were primarily designed to strengthen the weaknesses of former acts or to cover aspects of pollution control that had been overlooked in previous acts. In addition, the FWPCA was changed to the Federal Water Quality Administration (FWQA).

In 1970, realizing the fragmentation of responsibility, not only in water pollution control but the entire area of environmental control, President Nixon by a Presidential Act established EPA. This agency represented an addition to the President's cabinet and thereby emphasized the importance the federal government was now assigning to problems of environmental deterioration. In addition to EPA the President established the Council on Environmental Quality—a committee created to report directly to the President in an advisory and recommendatory capacity on environmental issues.

Three terms frequently used to describe the government funding process include authorization, appropriation, and expenditures. Each term has a specific meaning. When a legislature enacts a new law that requires funding for implementation, the legislature will authorize a ceiling or upper limit in dollar amounts. The actual monies Congress or a state legislature appropriates for any piece of legislation are the result of a subsequent and an entirely different appropriation process. Appropriations are often below authorization amounts. Expenditures of a government depend upon an agency of the executive branch of government. While a government agency can usually find ways to encumber all funds it has received through an appropriation, it is possible for a variety of reasons for expenditures to fall below the level of appropriations. It is not unusual for a legislature to increase both appropriation and authorization levels from time to time on any piece of legislation, thus permitting an agency to expand its staff and services. In Table 2-5 a summary of federal appropriations for water pollution control is shown. As can be seen, both appropriations and expenditures have increased, though expenditures have been substantially below those amounts appropriated.

TABLE 2-5

Federal Appropriations and Expenditures for
Water Pollution Control
(Millions of dollars)

	Actual			*Estimated*	*Proposed*
	1965	1969	1970	1971	1972
Grant program for construction of waste treatment facilities:					
Appropriations	$ 93	$214	$800	$1,000	$2,000
Expenditures	70	135	176	422	1,000
Administration, research, development, miscellaneous grants, enforcement:					
Appropriations	35	87	87	120	143
Expenditures	31	79	86	113	131
TOTAL:					
Appropriations	128	301	887	1,120	2,143
Expenditures	$101	$214	$262	$ 535	$1,131

Sources: *The Budget of the United States Government . . . Appendix*, for fiscal years 1967, 1971, 1972, pp. 494 and 496, 625 and 803, 805, respectively; *The Budget of the United States Government, Fiscal Year 1972* (Washington, D.C.: U.S. Government Printing Office), p. 113.

3. *Role of the Private Sector*

The private sector has also become involved in the control of water pollution. Most obviously, the private sector has been affected by governmental regulations and, in many cases, has had to reorganize its production processes to meet the requirements of the new legislation. If some aspects of the currently proposed legislation are enacted, the private sector will have to reorganize its production processes even more.

Some indication of what has been occurring in the private sector in the area of water pollution control can be obtained by examining the appropriations for research and development in this area as well as the amount of money actually invested in pollution control equipment. Table 2-6 shows the amount appropriated to research and development in 1970 by broad industrial classifications and the planned expenditure for 1971. Table 2-7 gives actual and planned investments in both air and water pollution control. Though these figures are not as accurate as we should like, they do perhaps give some indication of the monies involved and the increased commitment of the private sector to pollution control. These monies fall short of those that it has been estimated will be required by industry to satisfy federal guidelines such that further increases can reasonably be expected.

President Nixon has called for the establishing of a national industrial pollution control council. Such a council would work closely with the Council on Environmental Quality, the Secretary of Commerce, and other federal agencies involved in pollution control. The purpose of such a council would be to help develop effective policies for curbing pollution, to enlist increased support from business and industry to reduce pollution, and to provide a mechanism through which government officials could work with industrial leaders to establish voluntary programs for accomplishing desired pollution control goals.

F. *National Water Pollution Control Program*

In response to expressions of public concern over existing levels of water pollution (as reflected in part in the passing of certain legislation), a national water pollution control program was developed. In this section we review the significant aspects of this program. In our review we shall, as in previous sections, concentrate upon the role of municipal wastewater treatment facilities and upon those aspects of the national program that would seem to be of importance to the manpower planner.

TABLE 2-6

Industry Research and Development Expenditures
for Pollution Control, 1970-71
(Millions of dollars)

Industry	Actual 1970	Planned 1971	Percent change 1970-71
Iron and Steel	$ 1.7	$ 0.8	-53
Nonferrous metals	10.1	13.5	34
Machinery	177.6	186.5	5
Electrical machinery and communications	48.1	63.7	32
Aerospace	181.3	222.0	22
Autos, trucks, and parts	60.1	74.6	24
Other transportation equipment	2.2	2.1	-5
Fabricated metals and ordnance	7.0	11.0	57
Professional and scientific instruments	31.6	32.9	4
Lumber	0.4	1.2	200
Furniture	0.4	1.1	175
Chemicals	53.1	36.1	-32
Paper	8.2	8.3	1
Rubber	3.2	3.1	-3
Stone, clay, and glass	15.4	19.1	24
Petroleum products	34.4	43.2	26
Food and kindred products	5.6	7.3	30
Textile mill products	5.0	4.3	-14
Apparel	< .5	< .5	NA
Other manufacturing	15.7	12.4	-21
All manufacturing	661.1	743.2	12
Nonmanufacturing	80.4	182.6	127
All industry	$741.5	$925.8	25

Source: McGraw-Hill Book Company.

TABLE 2-7

Industry Investment for Air and Water Pollution Control, 1969-71 (Millions of dollars)

Industry	Actual		Planned	Percent change	Planned percent change
	1969	1970	1971	1969-70	1970-71
Iron and steel	$ 179	$ 206	$ 212	15	3
Nonferrous metals	41	100	152	144	52
Electrical machinery	32	52	58	63	12
Machinery	51	121	169	137	40
Autos, trucks, and parts	55	67	118	22	76
Aerospace	22	15	18	−32	20
Other transportation equipment	15	15	6	0	−60
Fabricated metals	44	53	70	20	32
Instruments	25	25	28	0	12
Stone, clay, and glass	63	64	104	2	62
Other durables	103	135	175	31	30
TOTAL durables	630	853	1,110	35	30
Chemicals	140	169	263	21	56
Paper	143	153	321	7	110
Rubber	9	50	42	456	−16
Petroleum	260	337	507	30	50
Food and kindred products	58	84	151	45	80
Textiles	10	13	25	30	92
Other nondurables	31	60	37	94	−38
TOTAL nondurables	651	866	1,346	33	55
All manufacturing	1,281	1,719	2,456	34	43
Mining	105	115	135	10	17
Railroads	NA	28	28	NA	0
Airlines	NA	21	27	NA	29
Other transportation	0	4	10		150
Communications	0	a	a	NA	NA
Electric utilities	155	405	679	161	68
Gas utilities	130	110	148	−15	35
Commercial[b]	0	100	158		58
All business	$1,671	$2,502	$3,641	50	46

NA = not available

[a] Less than 0.5

[b] Based on large chain, mail order, and department stores; insurance companies; banks; and other commercial business

Source: McGraw-Hill Book Company.

1. Mission, Objectives, and Goals of the Office of Water Programs

Within the framework of the federal-state-municipal partnership, a national strategy has been suggested that, if followed, will contribute significantly to achieving adequate standards of water quality throughout the country. This plan includes a statement of the mission, objectives, and goals of the national program for water pollution control and an established order of priorities among a variety of possible activities.

The central mission of the national program is:

(1) To prevent further pollution of the nation's water resources by preserving existing high-quality waters for future generations and maintaining achieved level of water quality for presently defined uses

(2) To reverse the present degradations of the nation's waters and to enhance the value of water and related resources by abating pollution and by managing waste-bearing waters for beneficial reuse

(3) To contribute to a coordinated and long-range national program for the preservation of a balanced environment

A principal objective of the national program for the five-year period ending in 1976 is to establish water quality standards and obtain compliance with such standards. The objective to be attained by 1980 is to manage and control all sources of water pollution and to develop the technology and institutions for the complete recycling of waste and the reuse of renovated waste waters.

To achieve the objective of reaching established water quality standards, several intermediate goals have been established. The following is a sample of such goals:

(1) To have an information system and the management capability to direct resources toward high-priority goals (by 1971)

(2) To establish effluent requirements as an element in establishing water quality criteria (by 1972)

(3) To complete programs of heat and radiation control from power plants (by 1972)

(4) To complete required implementable water basin plans to be certified by the states and river basin commissions and to be accepted by OWP (by 1973)

(5) To achieve compliance with effluent requirements for municipal wastes and maintain this level of compliance on an ongoing basis through surveillance, enforcement, and public utility long-term financing arrangements (by 1974)

2. *Program Strategy*

The goals of the national water pollution control program have been structured into an order of priorities which in turn determines a water program strategy. Within this program strategy the most important item is the establishing of water quality standards. Such standards, when properly used, identify water uses and water quality criteria along with a timetable for corrective measures and a mechanism for implementation and enforcement of the standards. The second item in the program strategy is the development of river basin pollution abatement and prevention plans. Water quality standards provide the basis for control and abatement activities to be implemented in each basin plan, while the basin plan provides the means for focusing upon the appropriate combination of technology, facility construction, enforcement, and the management of resources in the most cost-effective manner for obtaining the desired water quality.

Some significant elements of the program strategy are:

(1) To take those actions that will assure the adoption of federally approved water quality standards by all of the states

(2) To take those actions that will encourage the state to develop implementable plans to achieve the federally approved water standards. This will be done by:

(a) Increasing federal and state emphasis upon good planning for river basins and regional-metropolitan areas

(b) Requiring that federally subsidized construction projects conform with approved water quality plans

(c) Assuring that the priorities established in state program plans (i.e., the one- and five-year lists to be explained subsequently) are consistent with the schedules contained in approved basin or regional-metropolitan water quality plans

(3) Annual, qualified, objective analysis of each state program to identify strengths and weaknesses, activeness of legislative base, inactivity of funding, and successes as measured by programs in attaining water pollution control goals

3. *Priorities in National Problem Areas*

In assessing the impediments to achieving the stated objectives of water quality, we have identified several national problem areas. These problem areas are: (1) municipal-sewered wastes, (2) industrial and power plant wastes, (3) agricultural wastes, (4) other urban wastes, (5) oil and hazardous materials spills, (6) mining and wells, and (7) other wastes.

To order this list of problem areas in terms of priorities, two indices were compiled by EPA/OWP. One, the "impact index " attempted to relate the proportion of waste discharged by a given problem area to total wastes discharged in the basin and to the population adversely affected by this discharge. A large relative discharge affecting a large proportion of the basin's population results in a high index. The other was the "action effectiveness index" which combines the relative costs of control, effectiveness toward meeting standards, availability of technology to meet the need, and willingness and ability to proceed with the desired activity. This factor modifies the impact index to indicate the most effective area in which to make initial investments.

Municipal-sewered discharges ranked first among the problem areas regardless of which index was used. This factor indicates that attention to this particular problem area has been assigned first priority.

4. *Municipal Wastewater Treatment Plants*

Municipal wastewater treatment plants, ranging from very minor holding tanks to highly complex operations that permit water to be eventually recycled into the community's potable water supply, are designed to perform specific functions. The EPA data collection and reporting system, known as STORET, uses "type of treatment" as the key term in the identification of a municipal wastewater treatment plant. Approximately 16 separate types of treatment can be identified. This number is increased, however, when it is realized that a particular plant may engage in several types of treatment. Terms such as "primary" and "secondary" are used to describe the general type of treatment a plant engages in and, as such, will contain specific types of treatment.

To establish more precisely the place of employment for detailed manpower planning, identifying the plant by two additional means of subclassification is necessary: plant size and specific processes available for treating waste. Plant size is measured by the volume of waste water treated or the average daily flow expressed in million gallons per day (mgd). Determining the specific process in the use is a little more complex; but it is the combination of processes that most accurately represents the technology used in the plant. As an example, a secondary treatment plant is formed by a configuration of a number of specific processes extended beyond the primary process.

Advanced or tertiary-type treatment plants, while few in number,[4] are significant because they represent the most modern technology available in the municipal water quality field and, as such, signal to the manpower planner many of the job tasks that must be performed in the future.

For the present (and the immediate future), the manpower planner in a state agency is required to devote much of

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[4] Only 10 tertiary plants were reported in Federal Water Quality Administration, "Inventory of Municipal Waste Facilities," *Statistical Summary, 1968* (Washington, D.C.: U.S. Government Printing Office, June 1970).

his time to calculating the need and developing training programs for persons increasingly employed in plants having the secondary treatment process. Table 2-8 gives data that are suggestive of the direction technological change has taken during the past few years. As can be seen, in 1940 the number of secondary and primary plants was about the same, while by 1968 the number of secondary plants was approximately four times that of primary plants. Furthermore, the total number of plants more than doubled within the 28-year period. Similar growth in the future is not unlikely.

In future years the concern for higher water quality standards, increasing population, and changes in technology will bring about the following changes in wastewater facilities: (1) replacement of obsolete plants, (2) expansion of existing plants by increasing flow capacity, (3) improvement of or upgrading the treatment process in existing plants, (4) combination of (2) and (3), and (5) new plant design and construction.

5. *Construction* of *Plants*

Clearly the construction of municipal wastewater treatment plants will play an important role in the national plan and strategy for water quality. For this reason, as well as for reasons

TABLE 2-8

Number of Primary and Secondary Municipal
Wastewater Treatment Plants in
the United States
(Selected years, 1940-68)

Type of Treatment	1940	1945	1948	1949	1957	1962	1968
Primary	2,938	2,889	3,035	3,073	2,771	2,709	2,431
Secondary	2,630	2,897	3,023	3,157	4,747	6,669	10,126
TOTAL	5,580	5,786	6,058	6,230	7,518	9,378	12,565

Source: Federal Water Quality Administration, "Inventory of Municipal Waste Facilities," *Statistical Summary, 1968* (Washington, D.C.: U.S. Government Printing Office, June 1970).

that will become more apparent in subsequent chapters of this manual, it will be profitable for us to trace those steps that are most commonly followed in bringing a wastewater treatment plant into being.

Following a period of determining desired water uses (current and future) and establishing water quality criteria at the various sources that are necessary to effect those uses, state agencies identify and record the specific sources of pollution to determine which sources need to be reduced. When a municipality is found to be discharging waste that causes the receiving water to be below water quality standards, the state water pollution control agency notifies by letter the appropriate local authority. Since this letter is recognized in many states as a legal citation fully enforceable by the state courts, its receipt by the local governmental authorities signifies the commencement of the community's attempt to do its part in meeting water quality standards either by building new or by expanding and upgrading existing wastewater treatment plants.

Through authorization given by the various water pollution control acts discussed in the previous section, the federal government stands ready to offer financial assistance to local governments wishing to build, expand, or upgrade wastewater treatment plants. To qualify for such assistance, certain procedures must be followed: When the type and size of facility has been determined, designed, and approved by the state water pollution control agency, the local community, through the state, formally applies for a federal sewage treatment works grant. If the application is approved, the grant is awarded, and shortly thereafter the final plans and specifications of the plant are submitted and approved. With this approval, bids for the construction of the plant may be taken and, upon acceptance, construction initiated. Immediately prior to the construction of the facility, the engineer responsible for designing the wastewater treatment plant must submit for approval an "operating manual" which includes staffing requirements. Upon the completion of construction, the plant is inspected and commences operation thereafter.

One year after the facility has been in operation, regional operations and maintenance personnel inspect the facility. Current rules and regulations for federal grants also require that the state assure that it will conduct annual inspections for three years after construction to determine whether such facilities are operated and maintained in an efficient, economic, and effective manner and to ensure that approved operative and maintenance practices are followed. Although all states do not have annual or seasonal inspection programs, it is intended that such a capability be established in the near future.

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CHAPTER THREE

HUMAN RESOURCE DEVELOPMENT AND WATER POLLUTION CONTROL

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CHAPTER THREE

HUMAN RESOURCE DEVELOPMENT AND WATER POLLUTION CONTROL

Solving the problems of water pollution control will require a major manpower effort. This is a commonplace fact of the age in which we live—the age of manpower, of education, of human resources. Whatever the current issue, be it law and order, community health, national defense, reduction of poverty, or the protection of our environment, the critical resource is trained manpower: physical and social scientists, engineers and technicians, and those workers with social as well as manipulative skills.

The results of a recent study conducted by the National Planning Association (NPA) illustrates the challenge of acquiring the necessary manpower to achieve certain goals. Considering a series of national goals identified in 1960 by a national commission established by President Eisenhower, NPA asked, "If we seriously set out to achieve these goals, would we have enough manpower to do them all?" The answer was an unqualified "No!" If we want rising living standards—including both private and public goods and services; national defense; better health care; improved education; adequate recreational facilities; cultural amenities; resource conservation and development; housing; a clean, attractive, and healthy environment; and all the rest—we cannot have them all at once. We must, therefore, establish priorities among these goals and organize our resources efficiently to achieve as many of them as possible. To this end we must plan the development of human resources to enable them to make the greatest possible contribution to the achievement of these national goals.

A. *Role of the Manpower Planner in Human Resource Development*

The manpower planner is charged with the primary responsibility of satisfying the manpower needs of the organization within which he operates. In meeting this responsibility, the manpower planner must first identify the number and kind of workers that are needed and at which particular time and place they will be needed. The methodology used in identifying such needs will be developed subsequently. The manpower planner must then plan to meet these identified needs through the development of human resources. Developing the needed human resources will require that the manpower planner: (1) be familiar with the existing human resource development institutions, (2) determine the extent to which these institutions can provide the needed manpower, and (3) work with these institutions to maximize their contributions to human resource development. Any deficiency in the ability of existing institutions to meet human resource needs will require that the manpower planner become involved either in the adjustment of existing institutions or in the creation of new institutions. It is with the human resource development institutional framework of the United States that we shall be concerned in this chapter.

While the manpower planner's primary function is to engage in those activities that will ensure that his organization's manpower needs be satisfied, the psychology of today's labor force and the human-oriented training of the professional manpower planner require that his activities go beyond merely meeting the identifiable institutional needs. Today's worker demands the opportunity to develop to the maximum of his potential as a human being. This means the opportunity: (1) to become educated to the extent capable, desired, and needed to compete in a modern world; (2) to become trained with an occupational skill needed by the society within which he lives; and (3) to have the opportunity to [illegible] that knowledge and skill to effective use and in so doing, p[illegible] for his personal needs. The manpower planner must understand and accept these personal, people-oriented needs and seek a mutual accommodation with the needs of his industry. The exciting concept about manpower planning is that personal human needs can usually be met at the same time that the institutional needs are satisfied. The extent to which the manpower planner is successful in accommodating these needs will determine his ultimate success as a professional.

If these needs are to be met, it is required that, in addition to a vigorous and growing economy which will be providing job opportunities:

(1) An education system providing sufficient education and vocational training exist to enable all citizens to develop their human potentials to the maximum, thus enabling them to compete in the labor market

(2) An employment system provide the educated and trained labor force with the opportunity to take advantage of employment opportunities which will best utilize their talents

B. The Education System

1. Its Evolution

The American education system began early in the history of the United States. The Founding Fathers saw the need for the encouragement of the educational process. Under the Land Ordinance of 1785, 1/36 of the land in new territories was set aside for support of educational activities, with most states adding a like amount for a total of 1/18 of the land to benefit the common schools. This Act was followed by the Morrill Act of 1862, which granted land as an endowment for state colleges dedicated to education in the agricultural and mechanical arts. Most of these schools later added education in business and industry and played a key role through their extension services in the development of the most productive agricultural system in the world.

By the turn of the century, a major schism had developed in the ranks of education. One group, the generalists, maintained that the major purpose of high school was to prepare students for college and that college was to emphasize a liberal education in culture and theory. Little or no attention was given to preparing people for a "job." On the other hand, the "vocationalists" looked upon people as human economic resources and maintained the need to prepare them throughout the educational process with skills needed in the labor market. John Dewey, who saw the benefits to be derived from the preparation of worker-citizens and the danger of a bifurcated education system, tried but could not heal the breach. The generalists prevailed to the neglect of vocational education.

To aid in meeting the demands for skilled manpower in World War I, Congress passed the Smith-Hughes Act of 1917 which provided federal grants on a matching basis to states for vocational education. Throughout the following years, the federal government remained the prime sponsor of vocational education. The original list of vocational programs allowed under Smith-Hughes—agricultural, trade, industry, and home economics—was later expanded to include distributive education and secretarial training. On the state level, however, the generalists prevailed, with the resulting neglect by the state and local school districts of vocational education. While traditional high schools and state colleges secured new buildings and the best students, vocational education inherited the castoffs, both in terms of buildings, students, and all too frequently, teachers. It became too often the neglected stepchild.

In 1963, following many years of intensive deba' in response to the Manpower Revolution of that decade, the Vocational Education Act was passed (amended in 1968), constituting one of the most significant developments in the evolution of a system for human resource development. The restrictions of the old vocational education legislation were removed. For the first time, vocational education was to be people (human) rather than program oriented. The Act emphasized assistance to the individual in preparing for employment and keeping up-to-date with the knowledge and skills needed by the job market. Programs could cut across all occupations except those requiring at least a bachelor's degree. They could involve people of all ages and preparation levels. Research and experimentation were provided. Area vocational schools were also encouraged. And most importantly, the federal funds available were increased from $55 million in 1964 to $225 million in 1968, with state and local funds increasing in the same period from $278 million to $715 million. The result has been more attractive physical plants, younger and more competent staffs, and, consequently, a range of student quality from the least able to the most able. The physically, socially, and economically handicapped or disadvantaged are singled out for special attention. Vocational education has become a full-fledged and fully accepted part of the academic community, cutting across the wide range of community interests.

Perhaps a return to John Dewey's philosophy of education calling for worker-citizens is becoming possible. An educational system which concentrates on developing the manipulative as well as the intellectual skills, which gives to all students the real option to select and prepare for a career which may emphasize one or the other, might better meet our needs. To give our students that real choice, training for manipulative skills should be as honored and supported as training in intellectual skills. Manipulative training should contain sufficient content to provide the opportunity for change to the other approach. By the same token, the student who selects the more intellectual approach should have as a real option the transfer to a manipulative-oriented program. To make such transfers possible requires the removal of psychological and other barriers now existing.

One of the most promising developments within the education establishment in making effective Dewey's concept of worker-citizens is what is called "career education." Promoted by USOE, the concept is relatively simple. The education establishment is being nudged in the direction of educating students for careers rather than educating them for college or for a job. To accomplish such an education requires that students obtain a wide acquaintance with the "world of work." Such an acquaintance should be developed throughout a student's school life and should permeate the whole curriculum. At the secondary level, a student will make a tentative selection of a career area, each career area encompassing all levels of skill and conceptualization. This selection is followed by the development of the skill needed in that career field, enabling the student to secure a job upon exit from school, whether by dropout or graduation. Whichever the form of exit, the system would encourage reentry for the development of additional skills and concepts as needed for continued career development. This concept envisions education as a means to an end—a career—rather than solely as an end in itself.

2. *General School System*

Historically, the American education system has begun with the five- or six-year-olds, either in kindergarten or the first grade. Increasingly, however, educational opportunities are being given to three- and four-year-old preschoolers in private or quasi-private nursery schools. The federal Headstart program provides funds for preschool programs, primarily for children from disadvantaged homes. Grades 1 through 8 concentrate their attention on developing reading, writing, speaking and computational skills as well as an understanding of the world in which we live. However, manipulative skills are generally neglected after kindergarten. While the emphasis in grades 9 through 12 is usually on the same order as the earlier grades, some schools include vocational courses which begin to develop manipulative vocational skills as well as some appreciation of vocational opportunities after high school. These programs still suffer somewhat from the traditional view that only the troublemakers and less capable students find their way into such programs, though there is some evidence that this attitude may be breaking down. One of the major problems facing the manpower planner is that individuals just finishing high school, or those who have dropped out, are seldom prepared for much more than laborer kinds of entry-level jobs. The dropout, because of his frequent lack of abilities obtained from a general education (e.g., reading, writing, speaking, computation, and general understanding), is frequently limited in his ability to be promoted without additional education. The high school graduate, who has taken full advantage of the educational program, usually has the general skills needed to make advancements on the job. However, he frequently lacks practical knowledge and manipulative skills, which many entry-level jobs require. The high school diploma and the graduation equivalency diploma (G.E.D.), generally speaking, can be assumed to give a student sufficient basic education to handle lower level entry jobs.

The continued development of the "career education" concept should eventually merge the academic or traditional education with vocational education, both being important in developing and maintaining a career.

3. Vocational Schools

An important arm of the education system is vocational schools, public and private, that accept individuals regardless of educational credentials and train them in a particular vocation. These schools pay little attention to so-called general education—humanities, the arts, the sciences, the social sciences. The training, though generally narrow, provides students with the skills to obtain employment in narrow occupational fields such as barbering, secretarial, plumbing, heating, electrical, computer technology, etc. Theoretical underpinnings are often neglected in favor of the practical. From the viewpoint of the individual, the chief disadvantage of such schools is that a particular skill may become obsolete, of little or no economic value; and unless the individual has continued with his "education," he may be at a disadvantage in a changing labor market. This disadvantage is overcome by looking at the training in the vocational school not as something that is final, but only as a step in "career education." From the viewpoint of manpower planning, such graduates can be used in operator- or craftsman-type jobs; but without additional, more generalized education, they are usually limited, or at least thought to be limited, in their abilities to advance.

4. Two-Year Colleges

Sometimes identified as the most rapidly growing sector of the American education system, the two-year college helps to bridge the gap created by the nature of the development of most four-year colleges. There are generally three kinds of two-year colleges: technical, community, and junior. The technical colleges concentrate primarily on programs to train people in vocational and manipulative skills, but with an increasing amount of general and theoretical background. They grant certificates for completion of certain short-term courses and frequently grant associate degrees for the completion of two-year programs. Operators, technicians, and skilled workers are often products of these schools.

Community colleges emphasize educational service to the whole community and are frequently much like technical colleges in what they emphasize and in the programs they offer. Increasingly, these colleges are "open schools" admitting all applicants and then helping them move from their present educational levels to wherever they wish to move. Much impetus has been given to this trend by the inclusion of MDTA skill centers at community colleges.

Junior colleges may have much the same characteristics as the technical and community colleges. The more traditional junior colleges do, however, constitute a stepping stone to the four-year college and university, either for those who wish to improve upon their high school preparation or for those who wish a less expensive first two years in their post-high school educational program. Associate degrees are usually granted by junior colleges, and sometimes there are limited vocational programs available.

5. *Four-Year Colleges*

The more traditional post-high school college has been the four-year college or university offering bachelors' degrees. Such institutions are usually characterized as providing what is called a "liberal education," though some schools also offer vocational programs. A person may major in the humanities, fine arts, sciences, or social sciences. These students are seldom prepared for a job as such, though their more general and theoretical training may prepare them for learning one of a wide variety of primarily white-collar occupations. Many employers look to these graduates as potential managers requiring a more generalized background than is provided in technical and vocational schools. The graduates of the science programs can often assume, with a minimum amount of additional training, a technology-type job. A substantial number of college students continue on to graduate school.

6. *Post-graduate Universities*

Long considered the ultimate in education are the postgraduate universities which include the programs and philosophies of the four-year colleges but in addition offer graduate programs with masters' and doctorate degrees. They frequently include such professional programs as law, engineering, dentistry, business, medicine, etc. The graduates of these schools are usually classified as professionals and scientists—at the top of the educational spectrum.

7. *Continuing Education*

High schools, two-year colleges, four-year colleges, and universities frequently have continuing or adult education programs and short courses designed for adults who are not enrolled as full-time students and frequently do not intend to get a degree but merely want to continue their educations as circumstances permit. Such programs offer real opportunities for upgrading the abilities of full-time employees. They are usually quite flexible in the courses they offer, and there are seldom any entrance requirements. They are generally held at night, though vocational and technical schools and community colleges also cater to this type of student in daytime offerings. Adult basic education is often available, financed by federal funds, enabling adults with deficiencies in English, mathematics, and other basic education to learn or relearn these subjects. It is frequently possible to obtain a G.E.D. which is generally acceptable as the equivalent of a high school diploma. Such education frequently establishes a base permitting people previously condemned to dead-end, low-paying jobs to develop the skills needed for occupational and economic upgrading.

8. Cooperative Education

While most daytime education programs have little or no on-the-job training components, some schools have developed cooperative education programs which build into the education process the opportunity to work for remuneration under educational direction and often for credit. These programs enable students to earn while they learn, and for some, provide a superior form of motivation for the learning process.

9. Employer Education and Training Programs

Many of the larger employers offer education and training programs for their employees. These are of two primary types: external and internal. Some employers pay for the tuition and books and grant free time or any combination of these for employees to enroll in courses and programs, usually directly related to their present jobs or in preparation for advancement. Large firms frequently have internal training programs in which they either bring in instructors under employer auspices or develop their own cadre of instructors for the purpose of upgrading and updating their staffs. Internal programs have the advantage of giving the employer greater control over what the employees learn, and the training can be tied directly to their unique operations. There is less transferability of knowledge and greater direct benefits. One of the problems may be employee receptivity.

Correspondence courses are often available to employees, with employers sometimes financing these courses if they are closely enough related to the employees' work. Somewhat related to the traditional correspondence course is the self-instruction or programmed learning course. Such a course may be tailor-made to a particular employer's operation, with a minimum amount of instructor activity and a maximum amount of self-teaching. Such programs are especially helpful for orientation and at lower levels of competence, though of less value at the more sophisticated levels. The same kinds of programs are also available in more general types of learning such as accounting, simple mathematics, grammar, etc.

From the social point of view employer education and training programs have the deficiency of being generally limited to those of demonstrated superiority. The NAB-JOBS program helps to bridge this gap through federal financing of training for disadvantaged people.

10. Apprenticeship Programs

In some of the more highly skilled trades, formal apprenticeship programs are available. Usually under the joint sponsorship of management and the labor union with relevant jurisdiction (a carefully structured and controlled program of mostly on-the-job training), an apprentice, working with an experienced journeyman, is trained carefully in each phase of the trade or skill. These programs last usually from two to five years, at the end of which time the apprentice becomes a journeyman. There is sometimes conflict between labor unions which promote these programs and vocational schools which attempt to shorten the period of training required for a skilled craftsman through formal classroom and on-the-job training. From the social point of view, these programs have in the past worked to the disadvantage of racial minority groups that have been systematically excluded from such programs. Equal employment laws and regulations enforced on management and unions alike should in time eliminate this form of discrimination, especially where federal funds are used.

11. State and Local Roles in Education

At the state level, the highest authority in education is usually vested in a single board which provides policy direction to specialized segments of the education system. The state board, for elementary and secondary education, will usually provide for the establishment of local administrative units called school districts. One of the unique characteristics of American education is the extent to which schools are administered by local authorities operating independently under local boards.

The theory supporting this practice argues that local control will permit education to reflect and be responsive to the will of the local electorate and taxpayer. In very few cases will local school districts be concerned with manpower planning as an ongoing activity. Most school districts will look to the state department of education for guidance in this area. The few exceptions to this general procedure are the large metropolitan school districts or specialized regional vocational education districts.

Within most state education systems there is (either as a separate board or under the general board) an authority to administer the state's higher education, post-secondary system. There is also a vocational education office charged with the responsibility for promoting vocational education through the school system of the state. There is sometimes conflict over the location of responsibility for the administration of post-secondary vocational education. Many vocational educators and their promoters do not feel comfortable (in fact, feel discriminated against) when controlled by university- and college-oriented boards and have moved in the direction of separate boards.

12. Federal Role in Education

While historically education has been considered as primarily the function of local and state government, with the private sector fundamentally concerned with colleges and universities, the federal government has come to play a significant role. USOE has been given prime responsibility for aiding in the development of an education system which will promote national goals as formulated by Congress, the Supreme Court, the President, and the federal educational bureaucracy. USOE has established and staffed regional offices which work closely with state and local agencies as well as monitor the progress of federal contracts and grants to various education and research agencies. In addition, USOE, assisted by its regional offices, collects, analyzes, and disseminates data needed within the education establishment.

Within USOE is the Bureau of Adult, Vocational, and Library Programs directing its primary efforts toward two groups: (1) the high school dropout and the high school graduates, both of whom are in need of specialized training for immediate employment, and (2) people in the labor force who need retraining to keep up with technological change. Funds are provided to states on a fifty-fifty matching basis. Within the Bureau, the Division of Manpower Development and Training was created in response to the Manpower Development and Training Act of 1962. This Division has been given the responsibility for the management and operation of HEW's responsibilities under MDTA, with the primary purpose of providing "education and training to help unemployed and underemployed persons fully participate in productive employment." The Division also has the responsibility to help establish programs to alleviate skill shortages. Both the Bureau and the Division have representatives in the regional offices of USOE which are a part of the regional offices of HEW.

13. Purpose of Education and Training

The purpose of education differs, depending upon the frame of reference. From the point of view of the individual, it is a means of providing for his needs—physical, mental, psychological, social, political, and spiritual. From the point of view of society, it is to develop an enlightened citizen capable of self-government and self-support. From the point of view of the employer, it is to prepare productive workers. Examining this latter function in greater detail, we find that general education should prepare a person to make adjustment to entry-level jobs in the minimum amount of time and with the minimum amount of expense to the employer. The employer does not want to have to teach new employees how to read, write, and speak English, or how to do simple arithmetic. Career education recognizes that, in addition, manipulative skills and positive work attitudes are also an important part of the education process. The employer usually expects to provide orientation training. Training for upgrading of existing employees is designed to give them the opportunity for higher level jobs, providing them with upward mobility for those who desire it, and for morale building. Training for updating enables the employer to take advantage of the latest technology in the field, either to remain competitive or to become more efficient if in a noncompetitive position. It is generally felt that both upgrading and updating, to be most effective from the employer's point of view, must be under his considerable control and directed toward meeting his needs.

Under the career education concept, there is no longer the traditional dichotomy between education and training, both concepts being merged into the single term "career education." However, there may still be conflict between the traditional advocates. Increasingly, educators are accepting the idea that the proof of a "good" educational experience is employment. Schools are more and more concerning themselves with what happens to their graduates, some even accepting the responsibility to help graduates find jobs. The resulting close contact with the world of work should play a key role in developing worker-citizens.

C. The Employment Service System and the U.S. Department of Labor

It would be a mistake to assume that the preparation of an individual through the education system automatically assures that he will be a part of the labor force. The next step in entering the labor force after obtaining an education, while usually not as time-consuming, nevertheless is not automatic, nor even easy. An individual must convince an employer that there is a need for his service. With the development of the public employment service (ES) system, we have the second major element of a human resource development establishment.

1. Its Evolution

Until the 1930s, job hunting and placement were haphazard. Most people were hired off the streets or through friends, though some firms had developed fairly sophisticated personnel departments to screen job applicants. Private employment offices existed for certain kinds of jobs but were frequently characterized by exploitation of the job seekers. During World War I, a n[illegible]de public employment service was organized to meet [illegible]or demands of that period. However, during the 1920s it was allowed to atrophy almost to a point of extinction. Under the authority of the Wagner-Peyser Act of 1933, the beginnings of a new national employment system were laid, with state employment services to be financed on a matching basis from general funds. In 1935, the Social Security Act was passed, establishing the basic system of today. States had the opportunity of establishing employment services to be financed 100 percent out of federal funds coming from a federal unemployment compensation tax on employers. All states eventually took advantage of the opportunity and established state employment service agencies.

During the remainder of the prewar years, these state services were mainly concerned with screening welfare and work-relief participants through the application of "ready, willing, and able-to-work" tests. The system was federalized shortly after the outbreak of World War II, being placed under the War Manpower Commission and given the responsibility to allocate scarce manpower. Following the war, the Employment Act of 1946 was passed, declaring that:

> It is the continuing policy and responsibility of the federal government to use all practicable means consistent with its need and obligations and other essential considerations of national policy with the assistance and cooperation of industry, agriculture, labor, and state and local governments, to coordinate and utilize all its plans, functions and resources for the purpose of creating and maintaining, in a manner calculated to foster and promote free competitive enterprise and the general welfare, conditions under which there will be afforded useful employment opportunities, including self-employment, for those able, willing, and seeking to work, and to promote maximim employment, production, and purchasing power.

Despite this legislative injunction, the service was allowed to atrophy again, its primary function being an "unemployment agency" responsible for handling unemployment compensation claims and matching a few job orders with the available workers.

In 1958, Secretary of Labor James P. Mitchell gave a speech in which he criticized the service for failing to act adequately as a placement agency. This criticism released several forces which began to develop the service into what is designated by some authorities as a "community manpower service center," with its major function "human resource development." In some states, it has virtually become such, while in others, it remains as the "unemployment office."

2. *Organization and Functional Operations of the Employment Service*

Beginning in 1962, in response to the "manpower revolution" of that decade, ES began to take on expanded responsibility as a manpower agency concerned with all aspects of manpower. Each employment center was to become a community manpower center, operating within a state- and nationwide network. To achieve its goal of a more efficient labor market involved not only in the employer's interest but also in that of the clients, ES was required to become associated with employers, unions, schools, and community development efforts. With the plethora of manpower programs of the 1960s, its involvement would have to expand to include the myriad of federal manpower programs as well as programs providing ancillary services. No longer was ES to merely wait for jobs to be listed with it. It was to seek new job orders and to place clients.

To accomplish its goals, ES has had the traditional tools of testing, counseling, referrals, and payment of unemployment compensation. Beginning with the "war on poverty," it has been expected to assist clients not meeting employer standards by working with vocational educators to establish training courses in fields where there is "reasonable expectation of employment." In addition, ES is to recruit and screen unemployed and underemployed persons for those training programs. Training is then to be followed by placement efforts.

Another tool is "relocation." ES has had limited funds to use in assisting clients to relocate, moving from areas of high unemployment to areas of manpower shortages or low unemployment. When coupled with education and training it has the potential power to improve the functioning of the labor market. Unfortunately, ES funds have been too limited to contribute significantly to the solution of unemployment.

For a time, ES was so concerned with its antipoverty client orientation that it ran the danger of losing the confidence of the employers who became wary of ES referrals. Recently, however, the service has moved to a more balanced position, that of providing the best possible service to all elements of the community, and employers are increasingly using ES services.

Federal agencies and contractors are required by law to list job openings with ES.

Some of the activities of the Office of Economic Opportunity (OEO), especially the Community Action Agencies (CAA), in setting up competitive service centers which reached out to the youth and the poor, induced ES to add to its services Youth Opportunity Centers (near central city ghettos) as well as other "outreach" activities, seeking out potential clients hesitant to come into ES centers. Minority consultants were added to whom racial minorities could better relate.

In 1968, ES was given responsibility to provide manpower services to Concentrated Employment Programs (CEP), to train and place welfare recipients in the Work Incentive (WIN) program, to recruit disadvantaged people for JOB Opportunities in the Business Sector (JOBS), and to lead in the establishment of CAMPS.

Considerable internal turmoil was involved in these changes and additions, resulting in the elimination of the Bureau of Employment Service and the creation of the U.S. Training and Employment Service of the Manpower Administration. State employment services were to relate to the federal government through the regional manpower administrators and thence to the Manpower Administration.

For the unemployment offices to become community manpower service centers, considerable changing of funding and philosophy was required. The transition has been made more difficult, though not impossible, by the fact that state offices operated under both state and federal laws. Although federal financing tends to give federal authorities some power over state activities, the fact that the system must operate under state civil service and state legislatures often makes it more difficult for federal officials to implement their ideas. The conflict is not only between state and federal officials, however, for in the past several years sharp disagreements have occurred at the federal level between "old line" ES personnel and those who are pressing the community manpower service concept. The involvement of ES activities within the line authority of the Manpower Administration of DOL may be onerous to some, but it enhances the role of state ES agencies as manpower service agencies.

DOL has decentralized its activities to a great extent, and the regional manpower administrator is being given the major responsibility for promoting and monitoring manpower programs within his region. A large proportion of DOL and OEO manpower money is apportioned to the regional offices. The regional manpower administrator will, in turn, apportion it to state and local manpower planning councils.

The national Manpower Administration is advised, in part, by the National Manpower Advisory Committee (NMAC). While the NMAC has no administrative power, it can and does make its influence felt on policy questions. This advisory body also advises, though less effectively, the secretary of HEW on his manpower responsibilities. The regional manpower administrator also has an advisory committee which advises him on the application of policy to the region. This regional committee also serves in an advisory capacity to the regional director of HEW. Its chairman also serves as an associate member of NMAC, giving a regional input to NMAC.

While on the state level, ES has served as the primary agent for planning DOL's manpower programs, this function is in the process of being changed with the development of the state and local manpower planning councils that serve as the manpower planning arm of the governor and local elected public officials. However, whatever the outcome, ES will still play a very powerful role. In local areas it will probably continue as a prime deliverer of programs for human resource development because of its presence throughout community-based employment offices.

D. National Manpower Programs

In addition to the manpower revolution of the 1960s and its demands for changes in the human resource development system, a third dimension was added which was to make its mark upon the other elements—education and the employment service. Until the 1960s those two elements constituted the whole. But in the minds of some, they were not responsive enough to the needs of this new era of rapid change which had left behind about a fifth of the population, the poor of the nation. The result was the creation of national manpower programs with the purpose of optimizing the manpower contributions of the nation's population. Because of past neglect, special attention was focused on those sectors of the population experiencing the greatest difficulty in becoming an effective part of the labor force.

1. *Manpower Development and Training*

The first really significant element of this new dimension of the human resource development system was MDT, created by the Manpower Development and Training Act of 1962 (MDTA).

Human Resource Development (HRD) requires a linking of ES with the education establishment. A key mechanism for accomplishing this has been the enactment and administration of MDTA. Conceived as a temporary program to train persons unemployed as a result of technological change and later adapted as a part of the "war on poverty," MDT has shown its staying power and flexibility by assuming a leadership role in HRD. While it has responsibility for vocational-type training for the adult population in general, its major emphasis is on the disadvantaged portions of the population.

Under MDTA, administrative responsibility is shared by the secretary of HEW and the Secretary of Labor. DOL, acting through the state employment service, establishes the need for training by identifying people eligible for and requiring training and the occupations in which there is reasonable expectation of employment. Within HEW, the division of MDT of USOE is responsible for administering manpower institutional training programs to meet the objectives under Title II of the Act. Specifically, each state employment service has designated an MDTA coordinator and each state school office an MDTA supervisor, usually within a division of vocational and technical education. These two coordinate MDT for the state. MDTA has made possible a variety of major innovations in the HRD system which are of interest to the manpower planner. These innovations are:

(1) Innovative techniques and material for those lacking adequate communicative and computative skills

(2) Use of adult basic education to upgrade the general educational level of trainees

(3) Bilingual basic education and skills training for those who must learn English as a second language

(4) On-site testing to determine education areas which need strengthening as well as to determine occupational abilities and interests

(5) On-site counseling to assist students to meet successfully their new challenges, and especially to help in making occupational choices

(6) Open admissions, admitting all persons referred by agencies, regardless of educational background

(7) Open-entry/open-exit institutional training using modular units, admitting students at any point in the course and allowing them to exit at any time

(8) Development of occupational clusters, permitting greater flexibility on the part of the trainees in the selection of an occupation

(9) Association of skill centers with colleges encouraging MDTA students to enroll in allowable courses with regular college students. The acquisition of a G.E.D. has become possible, and some MDTA students are encouraged to continue for a college degree.

Perhaps one of the most important contributions to the range of institutions available to the HRD system has been the MDTA skill center and its emphasis of institutional training for disadvantaged persons. MDTA has provided a basis for funding a variety of environmental manpower training programs and will continue to be a resource of considerable value to the manpower planner.

In addition to the institutional programs and courses located at various education institutions and at independent skill centers, MDT has established on-the-job training (MDT-OJT) programs with employers in which employers are reimbursed for training costs through the state ES. During slack labor market periods, employer response has been less than enthusiastic. However, during tight labor markets, employer enthusiasm increases considerably. Overall, OJT constitutes roughly one-half of the MDTA enrollment. In addition to MDT (institutional) and MDT-OJT, there is an individual referral program. Where institutional training is needed but there is insufficient demand to warrant the establishment of special classes at an institution, individuals can be referred for training to existing programs. MDT is expensive primarily because it involves living stipends in addition to covering direct educational costs, but such arrangements do assist those who could not afford additional training without such help.

2. *Vocational Rehabilitation*

An additional resource which is of some importance to the manpower planner is the Vocational Rehabilitation Program, not only in its preparation of people for employment but also in the example of success it provides in human rehabilitation. This program is an employment-oriented activity whose goal is employability. Although it offers both skill development and job creation, its special significance is the process by which access to employability services and employment is achieved.

The vocational rehabilitation program each year places in competitive employment a large number of disadvantaged persons, making it one of a small number of effective programs. The high success rate is built in because the process begins with careful evaluation of the potential employability of the client. When employability is determined, the Rehabilitation Services Administration has, within a single program, the authority to fund nearly any activity related to employment for any eligible client. Essentially any service that contributes to achieving the individual's employment objective is acceptable, including: (1) comprehensive evaluation, both psychological and medical; (2) medical, surgical, and hospital care and related therapy to remove or reduce disabilities; (3) prosthetic devices; (4) counseling and guidance for vocation adjustment; (5) training; (6) service in comprehensive or specialized rehabilitation facilities; (7) maintenance and transportation; (8) tools, equipment, and licenses needed for work or in establishing a small business; and (9) placement and follow-up. Eligibility, too, is broad, having expanded from the physically handicapped to the mentally handicapped, and more recently to behavioral disorders characterized by deviant social behavior or impaired ability to carry out normal relationships with family and community which may result from vocational, educational, cultural, social, environmental, or other factors.

The key element of the program is a personal relationship between a client and a trained counselor, equipped, as it were, with a blank check to purchase whatever medical, educational, or other services are needed to successfully place the client in satisfactory employment. After evaluation to ascertain potential employability and to determine handicaps and strengths, the counselor and client jointly work out an employment plan merging the client's interests and realistic possibilities for employment. The program is usually locally administered by a state social services department, education department, or as a separate entity. A few states have created departments of human resources which encompass the rehabilitation function.

It is of considerable importance for the manpower planner to establish close ties with the Vocational Rehabilitation Agency.

3. Public Employment Programs

Long advocated by manpower experts, an important and growing part of national manpower programming are programs offering the unemployed and disadvantaged jobs with local and state governments, either temporary or permanent, to be financed by federal funds.

Public Service Careers (PSC) is aimed at opening entry-level public jobs to the disadvantaged by revising the nature of tasks performed to eliminate unnecessary barriers to employment. Additionally, efforts are made to eliminate arbitrary merit or civil service system requirements which effectively bar the disadvantaged from public service. Funds are provided for training of program enrollees and some supportive services. Stipends or subsidy to the employing unit are not included.

The Emergency Employment Act of 1971 (PEP) provides a new and probably permanent addition to the arsenal of manpower resources. Public service employment funds are allocated to cities, counties, and states to pay up to 90 percent of the wages and benefits for new public service jobs in areas of critical public concern. Persons hired with these funds must be unemployed for at least 30 days (in the case of rehires) and seven days (in the case of new hires). Special requirements exist for underemployed persons. Special preference is given to unemployed Viet Nam veterans, graduates of manpower programs, and high-technology and professional manpower. Unfortunately, minimal funds are provided for training purposes under this Act. The program requires that individuals be moved eventually to permanent-type jobs. Since pollution control is one of the most critical public service needs, the PEP program, by making federally financed public employment slots possible in the area of environmental management (including water quality), may have a major impact in adding to the flexibility of environmental manpower planning. Such inclusion, however, is not automatic but must be sought.

4. Other National Manpower Programs

There are a number of other categorical manpower programs which constitute less important resources to the environmental manpower planner within the HRD system. Nevertheless, they should be understood. Those programs authorized under the Economic Opportunity Act, such as Neighborhood Youth Corps, Job Corps, Operation Mainstream, and Special Impact, may be of some use to the manpower planner concerned with environmental careers.

The Work Incentive Program authorized by 1968 amendments to the Social Security Act, which is aimed at moving welfare recipients into productive employment, may be difficult to adapt to environmental careers under existing conditions; however, the resourceful planner may find it of some value.

5. Need for Coordination in Manpower Programs

This seemingly endless expansion of manpower and manpower-related programs produced considerable confusion and conflict. A myriad of agencies and programs with varying requirements and benefits were competing for the same clientele. Local agencies were faced with an increasing variety of programs and funding sources. In the closing month of fiscal year 1966, the announcement of cooperative state manpower planning was made, the result of leadership by the Manpower Administration of DOL but in cooperation with HEW. This planning effort was to become CAMPS which was described in Chapter One.

E. Manpower Development and Training in the Water Pollution Control Field

The education system usually provides the general education required for persons entering the water pollution control field at the lower level entry positions. A number of post high school institutions might possibly provide the training in water pollution control needed by the professional and technical workers, either entry or upgrading, without any federal encouragement. However, in an industry as uncertain as water pollution control, because of its dependence upon relatively unpredictable legislative and executive decisions, training for specific occupations in the industry would be highly speculative and risky. It has therefore been necessary for an agency of government to help assume the financial risks inherent in such training programs. This function OWP has assumed, helping to direct national resources into their areas through its training programs, both in house and out of house. The training activities of MDS fall into three basic categories: training grants, direct training, and interagency training programs.

1. OWP Training Grants

It will be helpful to summarize the internal education and training programs now being offered by OWP in order to indicate the directions in which MDS is moving to support water pollution control activities. This staff is developing a fully integrated training approach which incorporates remedial education programs as well as beginning, intermediate, and advanced programs in training water pollution control personnel. For applications or information write to: Chief, Academic Training Branch, Manpower Development Staff, Office of Water Programs, Environmental Protection Agency, Washington, D.C. 20460.

a. Graduate programs. Within the general category of training grants, there are several subprograms. The first is graduate training programs in water pollution control and water quality management. These training activities, authorized by the Federal Water Pollution Control Act of 1956, as amended, provide that EPA/OWP will maintain a grant-in-aid program aimed at assisting public and private institutions in establishing, expanding, or improving training opportunities for persons interested in careers or research, teaching, administration, and general service in water pollution control. Individual support is provided through such training programs in the form of stipends and allowances for individuals obtaining professional degrees leading to careers in the field of water pollution control or the management of water quality. The basic program requires the possession of a bachelor's degree, normal eligibility for admission to graduate school, and appointment on a full-time basis.

The graduate training program is basically aimed at producing professional personnel in four general careers in water pollution control: (1) environmental engineers; (2) aquatic biologists, water chemists, and chemical engineers; (3) administrators and planners; and (4) economists and other social scientists. In addition to stipend support of trainees, grants may also be made to institutions which offer the training program for the purpose of improving the staff and facilities. Under the grant-in-aid program, a variety of special areas is covered, including: sanitary or agricultural engineering, limnology, aquatic-ecology, wildlife biology, zoology, and oceanography.

In addition to the full-time graduate training, short-term programs are offered which provide upgrading and skill improvement capacity to working professionals. Furthermore, attempts are being made to service those engineers from such fields as aerospace and electronics who, for a variety of reasons, have found difficulty obtaining employment in recent months and hope to find employment in the water pollution control field.

b. Research training fellowships. In addition to graduate training programs, the Federal Water Pollution Control Act of 1956 provides that OWP may maintain a grant-in-aid program to increase the number and competence of trained specialists engaged in research and other activities related to the control of water pollution and the maintenance of water quality. As a result, OWP has made available a limited number of research training fellowships for study in the fields of engineering, physical science, biological science, and some socioeconomic disciplines. The applicant must have a bachelor's degree, must have completed 30 hours of graduate study at a recognized institution of higher education, and be accepted for admission in an appropriate institution. These fellowships are generally awarded for a 12-month period, and the research fellow is expected to pursue a program on a full-time basis. Support for longer periods is available. Post-doctoral fellowships are also available for those with doctoral degrees.

c. Undergraduate training grants. Enactment of the Water Quality Improvement Act of 1970 specifically provided for undergraduate training grants to institutions of higher education which agreed to provide training to individuals planning to enter an occupation which involves the design, operation, or maintenance of wasterwater treatment works. Training grants may be awarded to two-year, post-high school institutions for demonstration programs in the operation, maintenance, and management of treatment plants. Demonstration programs at the baccalaureate level to train individuals in the design of treatment works are also fundable. Individual scholarships for undergraduate study are authorized under the law and will be provided by the granting institutions.

d. Operator/technician training grants. Improvement Section 5(g)(1) of the Water Quality Act of 1970 makes possible the support of:

(1) State training grants to upgrade plant personnel

(2) Advanced waste treatment training

(3) Instructor training

The basic objective of Section 5(g)(1) is to plan, devise, implement, and fund training programs that will assure an adequate supply of skilled subprofessional manpower to operate and monitor wastewater treatment collection and distribution systems. Specific programs that are included in this program are:

(1) Coupled OJT training programs utilizing both classroom instruction and on-the-job training

(2) Variations of classroom training with in-service, hands-on training

(3) Correspondence or extension courses followed by "over-the-shoulder"-type instruction

(4) Highly specialized technical training for high levels of plant personnel, such as phosphorous removal techniques and instrumentation training

(5) Decision-maker seminars to acquaint civic officials with training efforts

(6) Combinations of the above, including short-term refresher courses

Pilot grants will be developed in approximately 30 states for training 1,500 persons.

Additional funds will be allocated for programs that are national in scope. These programs are initiated by members of the state and local training branch headquarters staff to fill the voids left in the overall training effort needed to attain MDS requirements. These efforts are coordinated with the regions in order to develop sites to carry on the training. Programs to be researched and funded under this portion of the commitment are:

(1) Advanced waste treatment programs for professional and other interested persons

(2) Training courses for instructors at all levels of our training programs

(3) National decision-maker conference

(4) Field-study course to provide training for operators unable to attend regular training sessions

(5) Training courses for operators employed by federal agencies as a joint effort

(6) Extended aeration courses for operators of small package plants throughout the country

e. Other technical training grants. MDS has also undertaken a few innovative technical grants aimed at furthering the capacity of the Division to perform its function. These activities include the development of curriculum guides and teacher training systems, the development of programmed instructional materials, and the promotion of a correspondence course for treatment plant operators developed by Sacramento State College.

2. Direct Training

MDS conducts certain programs on a direct basis at selected institutions in support of water pollution control at five locations in Ohio, Oklahoma, Georgia, Oregon, and New Jersey. Additional training courses can be held in other areas. The objective of the direct training branch is to provide specialized training in specific causes, prevention, and control methodologies related to water pollution. Training offered under the Direct Training Branch is usually not offered or readily available elsewhere in these specialized subjects.

Specific training is provided in the planning, development, and management of wastewater treatment facilities. Training programs are aimed at improving the operation and maintenance of wastewater treatment facilities and support and supplementary state and local programs of operator training. Direct training programs typically focus upon those individuals in supervisory, managerial, or training levels who are in a position to transmit their knowledge to others whom they supervise or with whom they work.

It is expected that this training will lead to rapid application of new research findings, increase skills of technical and professional personnel, and train new employees recruited from other professional or technical areas in the special skills required in water pollution control. Scientists, engineers, and recognized authorities from other EPA programs, other government agencies, universities, and industry supplement the training staff by serving as guest lecturers and special consultants.

Most training is conducted in the form of highly technical, short-term courses of one or two week's duration. The scope and level of these courses is designed to meet specific practical features of wastewater treatment plant design and operation, water quality evaluation in field and laboratory, and technical and administrative aspects of water quality management and water pollution control.

3. Training Programs under Interagency Agreements

MDS, through its state and local manpower development branch, has undertaken a variety of initiatives aimed at meeting the critical shortage of trained operators in wastewater treatment plants at the state and local levels. It has participated actively in the CAMPS program, developing four programs funded cooperatively with DOL, HEW, and OEO.

a. Coupled classroom and on-the-job training programs. MDS along with MDTA has developed a combination of classroom and on-the-job training programs under subcontracts with states, municipalities, councils of governments, colleges, universities, and special wastewater districts. This program currently trains approximately 1,000 operators annually—70 percent of whom are undergoing upgrading training while 30 percent are new entries. These training programs vary from 22 to 44 weeks in length, depending upon local assessment of conditions and needs. All provide essentially the same basic instruction and training in subjects such as mathematics, science, communications, plant operations, laboratory techniques, and maintenance practices. Through cooperative arrangements between the training institutions and publicly owned local wastewater treatment facilities, trainees receive part of their training at these latter facilities. Certificates of proficiency are issued in the program, and in most cases those operators who take upgrading training have received salary increases. The program is administered on the basis of subcontracts with states, major municipalities, or councils of the government and with direct grants to universities and special wastewater districts. Coupled classroom and on-the-job programs are now being carried out in about half of the states in the nation.

b. Regional institutional training programs. In addition to the state and local levels' coupled programs, OWP has initiated a series of regional full-time training programs based at community colleges or vocational schools in critically situated areas of the country. Regional centers in New Jersey, Maryland, Florida, Ohio, Colorado, Missouri, Iowa, and Louisiana offer short-term courses approximately 22 weeks in duration. Enrollment in the regional centers is generally limited to approximately 40 trainees per session. Each trainee receives approximately 440 hours of formal classroom instruction and 440 hours of related hands-on training in a cooperating wastewater treatment plant. Subsistence allowances are paid to the trainees by DOL through MDTA.

c. *Transition training programs.* An additional experimental program has been developed which is aimed at servicemen returning to civilian life. This program, operated in cooperation with the Department of Defense, has linked nine regional military installations to nine local educational institutions offering courses in wastewater treatment plant operation in Maryland, North Carolina, South Carolina, Hawaii, Washington, Ohio, and California. Two additional programs are being developed overseas in Korea and Germany. Sewage plants located near the training institutions and military bases are utilized during the course. The course is open to servicemen during their last six months of duty.

d. *Public service careers programs.* Using the Public Service Careers Program in 1971-72, MDS has been engaged in the training of approximately 400 new wastewater treatment plant operators for existing job vacancies and upgrading the skills of 500 employed persons in Alaska, South Carolina, Texas, Virginia, Wisconsin, and the Virgin Islands.

4. *Related Environmental Training Programs*

Related environmental training programs are offered by the Environmental Control Administration, Radiological Health Training Branch, Solid Wastes Management Office, Air Pollution Control Office, and all of EPA. In addition, related programs are offered by the National Institute of Occupational Safety and Health, the Food and Drug Administration, and the Center for Disease Control of the Department of Health, Education and Welfare.

5. *Involvement with CAMPS*

OWP, the first office within EPA to become involved in the CAMPS planning, participated in the issuance of ICA No. 72-1; and EPA personnel, largely out of OWP, have been appointed to serve with regional CAMPS committees.

In its CAMPS planning document, OWP states that the Manpower Development Staff program is:

(1) To encourage and assist agencies, institutions, and individuals in conducting courses dealing with environmental pollution

(2) To increase the number and proficiency of persons employed as treatment operators

(3) To schedule courses of EPA facilities for professionals and subprofessionals

(4) To provide grants to schools or individuals for subprofessional training

To assure inclusion in CAMPS planning on the state level, the state environmental authorities must seek representation on the state CAMPS committee or manpower planning councils. Because of the emphasis of MDTA and a member of other manpower programs on serving the "disadvantaged," environmental authorities should give serious consideration to developing recruitment and training plans, enabling people in this category to become environmental control personnel. This may require some restructuring of job content and added flexibility in training programs.

F. A Model for Cooperative Human Resource Development Planning

An important function of the manpower planner is that of providing a bridge between the area he represents and other professional fields. When employed by a state agency or in a particular industry, be it health care, transportation, or improving environment quality, the manpower planner has a dual responsibility. On the one hand he must understand the technical operations and needs of his own industry in order to adequately interpret his industry to other agencies and professions. He must also become familiar with the human resource agencies his organization might use in meeting its manpower requirements. The more expert the manpower planner can be in assessing his industry's manpower needs, the greater will be the opportunity for precision and confidence in his translation of these needs into terms and concepts useful to educational administrators, curriculum developers, and training institutions. As a bridge builder, the manpower planner can provide an administrative paradigm for human resource development through cooperative planning.

Cooperative planning has already begun in the water pollution control field in both the national and the regional offices of EPA. It is suggested that further cooperation between regional manpower representatives, from the appropriate federal agencies, be encouraged by fostering a "team approach" to planning at the regional and state levels. The three federal agencies most concerned with developing trained manpower for water quality and environmental management include the Manpower Administration officers in DOL, the USOE, and, of course, the OWP.

This team approach can also be fostered by regional representatives at the state and local levels by setting up situations which bring appropriate state and local representatives together to jointly plan development of the needed human resources. The state agency representatives would include the state supervisor for manpower programs in the state employment office, the manpower specialist for vocational education in the state office of education, and the state water pollution control agency person most concerned with the proper staffing of wastewater treatment facilities and similar areas of manpower need. It will also be to the advantage of the water quality manpower planner to be involved in the manpower planning and coordinating activities of the state and area manpower planning councils or CAMPS committees. The simple model illustrated in Figure 3.1 shows the relationship of those agencies that should be involved in manpower planning for the water pollution control field.

The chief advantage to be derived from this "team approach" to planning can be seen in the potential for each agency to profit from the experience and information pool of the other two agencies. DOL and the state employment services possess considerable expertise in measuring demand in the labor market and making job and salary evaluation, while the vocational education staff is familiar with the resources and capability of regional, state, and local training institutions. The manpower planner representing an environmental agency is in an ideal position to facilitate communication and program planning between his own agency and the two federal and state units most concerned with employment and training, and the manpower planning councils can help relate water quality manpower planning to the overall manpower planning and activities of the state and local areas.

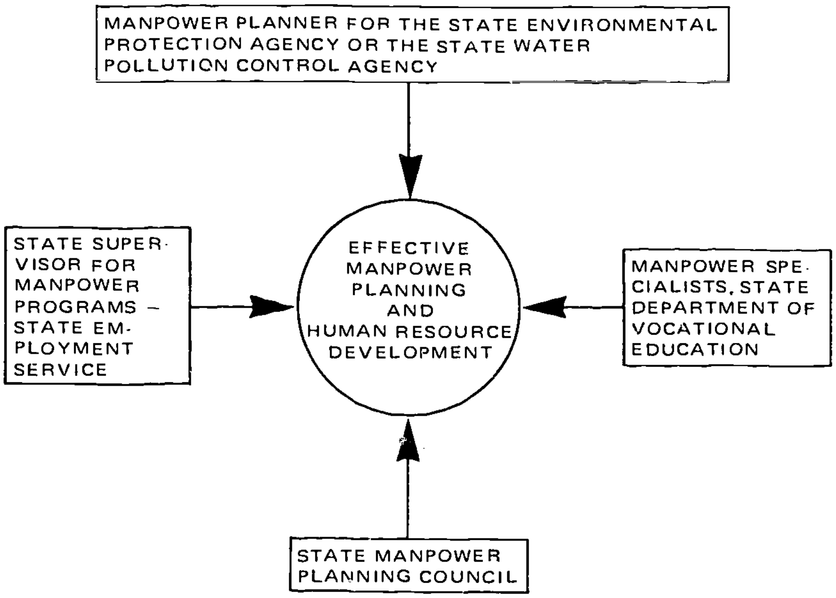

Figure 3-1. A Model for Cooperative Human Resource Development Planning

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CHAPTER FOUR

MANPOWER PLANNING FOR MUNICIPAL WASTEWATER TREATMENT PLANTS

A. Introduction

B. Manpower Planning Process—An Overview

C. Seven Steps for Manpower Planning in Municipal Wastewater Treatment Plants

1. Describe that segment of the water pollution control field for which manpower training is being performed.
2. Determine the relationship between the objectives of the state water pollution control agency and the objectives of manpower planning.
3. Determine selected characteristics of current and expected employment.
4. Analyze manpower problems.
5. Develop training plans and action steps in response to current and expected manpower training needs and manpower problems.
6. Develop and maintain a data system.
7. Monitor and evaluate all of the manpower planning process.

CHAPTER FOUR

MANPOWER PLANNING FOR MUNICIPAL WASTEWATER TREATMENT PLANTS

A. Introduction

In this chapter the focus is narrowed to manpower planning for a specific source of employment in water pollution control. Because of the limited resources available to the manpower planner in a state water pollution control agency and the initiatory aspects of this planning effort, our approach will not be as detailed as we might like. Furthermore, the development of the manpower planning techniques will be made within the institutional framework already established, or in the process of being established, by OWP and the conceptual framework implied by the methodology employed in the recent DOL/EPA survey of employment in wastewater treatment plants.

Though the exposition in this chapter is primarily in terms of a single occupation, that of wastewater treatment plant operator, the analysis can be applied to most, if not all, occupations found in a wastewater treatment plant.

B. The Manpower Planning Process—An Overview

The objective of manpower planning for wastewater treatment plants is to ensure that the right number and the right kind of people are in the right place at the right time. The primary function of the manpower planner is to develop manpower information and training plans to ensure that this objective is continuously satisfied.

To assess whether the planning objective is being satisfied, the planner must first define, or have defined for him, what the "right number" and the "right kind" of people are. The definition of what constitutes the right number of people is related to what has been called the level of "recommended employment," while the definition of the right type of people is related to the qualifications workers should have when occupying positions within wastewater treatment plants. Determining the right place and time for employment requires the optimal placement of workers both spatially and temporally. This aspect of the manpower objective recognizes that elements of change impinge upon those processes that affect manpower conditions and should be taken into account by the manpower planner.

The major aspects of change that affect manpower conditions in wastewater treatment plants are the growth in the number and size of the plants, the change in technology of wastewater treatment, and the various elements of transformation that occur within a given level of employment. Over time both the number and size of wastewater treatment plants have increased. As such changes continue, they will generate an ongoing need for additional manpower. In addition to this source of growth in the level of employment, more manpower will be required to fill positions vacated by individuals who, for a variety of reasons, terminate their employment. As changes in the technology of wastewater treatment occur and as changes in water quality standards call for more reliability in the performance of wastewater treatment plants, not only will additional manpower be needed, but the qualifications of many of those currently employed will have to be updated. All of these changes will require imaginative additions to existing training programs.

When the manpower planner has assured himself that he is familiar with the definitional and descriptive aspects of employment in wastewater treatment plants, he must then determine in a quantitative sense whether the objective is currently being achieved and whether or not it will be achieved in the future. This will require that the manpower planner not only measure and assess characteristics of current employment, but also project future employment characteristics.

If the manpower objective is currently being satisfied, the planner must determine whether existing and expected future manpower programs, as tempered by his expectations of future manpower conditions, are sufficient to guarantee that the objective will be continuously satisfied. If the objective is not being satisfied, or if existing programs are judged inadequate to ameliorate projected future problems, the manpower planner must determine the nature and possible cause for such failure. Having made such a determination, he must develop, or assist in the development of, those programs that will eliminate, or at least reduce, current and anticipated future manpower problems.

To measure and project selected characteristics of employment in wastewater treatment plants, the manpower planner must collect and draw conclusions from certain data. These tasks require that the planner establish a system for collecting, storing, retrieving, and analyzing data. The collection of data for inclusion in such a data system implies that there is a body of data deemed important to collect and that an analytical framework exists, whether stated explicitly or residing implicitly in the actions of the planner, that serves as a guide in determining which data are relevant.

The analytical framework used in this manual is dual but interrelated. We are concerned with recommended employment while also being concerned with budgeted and actual employment. In the DOL/EPA survey of employment in wastewater treatment plants, the three types of employment are identified and measured. Recommended employment is that which, if currently used, would maximize the establishment's efficient operation. Budgeted employment is that level budgeted by the government, a unit responsible for the operation of the wastewater facility. Actual employment is simply the number of individuals employed by the facility at the time the survey questionnaire was completed.

Historically there have been differences in the numbers associated with these alternative measures of employment. Recommended employment is based upon engineering and other technological considerations, while budgeted and actual employment is determined by the various economic forces that impinge upon the demand and supply for positions in wastewater treatment plants. The number of people actually employed in a given occupation will be determined by the juxtaposition of demand and supply forces, where those various forces subserve under the demand for workers are affected, in varying degrees, by the technological considerations that determine the level of recommended employment. The level of actual employment for a given occupation within wastewater treatment plants will be related to such variables as: (1) the budget for the plants, (2) wages paid within the occupation, (3) wages paid in occupations requiring similar skills and education, (4) the effluent (in mgds) of the plant, (5) water quality standards, (6) certification requirements for operators, (7) nature of labor market for that area in which the plant is located and from which it is expected to draw its labor supply, and (8) general nature of working conditions.

Wastewater treatment plants are operated by personnel employed by local municipalities, the officials of which also determine the operating budget for the facility. It is from this budget that money is made available to employ individuals to operate the plant. For given values of other variables that affect the employment of a particular type of labor, it is reasonable to expect that the larger the budget allocated to the plant, the more employment there will be. Because of this, the size of the budget is among the more significant variables that determine the amount of employment within a plant. It is, for example, one of the important variables which determine how close actual employment is to recommended employment. Within a given budget, however, other variables will have an important effect on the level of actual employment.

Wages paid to operators, especially in relation to wages paid to individuals of similar skill and educational attainment working in other occupations, will be a significant determining factor in both the number of people who are sought by the managers of the wastewater facility and the number of people wishing to work there. Working conditions, which contain a variety of possible configurations, will be an important factor in determining the desirability of work within a wastewater treatment plant and will, therefore, affect the level of employment that can be achieved with a given wage rate.

The effluent of a wastewater treatment plant, both in its quantity and quality, is an index of the number of gallons of water treated and the type of treatment used. In Chapter Two, we documented the growth in the quantity of pollutants being produced and the growth of the wastewater treatment plants to treat these pollutants. Each of these factors implies that the number of gallons treated will increase over time. Furthermore, the type of treatment has changed over time; one of the most recent examples of which are new methods for phosphorus removal. It is reasonable to assume a positive relationship between the amount of water treated in both of its dimensions and the quantity of operators demanded; thus as treatment increases, and no changes in technology occur, we should expect an increase in the level of recommended employment.

Enforcing certain laws and regulations to increase water quality will have two separate effects upon employment. As water quality standards are enforced, the amount of water treated and the degree of treatment will increase with the resulting increase in actual employment. In addition, there are existing regulations which when enforced, give many states the power to require that budgeted employment be equal to recommended employment. When such laws are enforced and there occurs an increase in budgeted employment, actual employment may also increase.

The quantity of labor available for employment within a wastewater treatment plant will, in the aggregate, be determined by the number of people between certain ages since only such people are considered to be potential members of the labor force. The specific educational and skill requirements for certain jobs delimit the available number for such jobs as does the spatial distribution of places of residence and places of work. There are limitations upon how far people can and will travel to and from work; thus the labor market for a particular plant will have a spatial limitation. In time, however, all of these constraints might be relaxed as individuals respond to certain stimuli. Thus the size of the available labor force might increase as people migrate into a given area or as transportation facilities improve, or the number of people having a given educational background might increase as the size and number of various training programs are increased.

Within the general type of restriction just outlined, the quantity of labor available to a wastewater treatment plant will also be a function of the wages paid. In general, the higher the wage in one occupation (relative to another requiring similar skills and education and having similar working conditions), the greater will be the quantity of labor made available for employment. This increase in the quantity may come about because of the added inducement for certain people to travel farther to and from work or even to change their places of residence to be closer to the source of higher wages. Higher wages may induce people to obtain the requisite training for a particular job, though this will not affect the available quantity immediately because of the necessary time lags in completing the training. Higher wages may also affect the size of the labor force by inducing students to leave school earlier than normal and inducing those not in the labor force, such as housewives and discouraged workers, to enter it either on a full- or part-time basis.

Within the preceding analytical framework, the manpower planner must determine the number of additional workers who must be recruited to a particular occupation and the type of training they should be given. He should also determine what additional training might be provided for current and future employees. Training, whether for new or existing employees, may be of short or long duration and may be for the purpose of skill improvement or for entry-level jobs. Upon obtaining estimates of the number of people receiving the various types of training, the manpower planner should work in cooperation with training specialists in devising an efficient program for meeting training needs.

C. Seven Steps for Manpower Planning in Municipal Wastewater Treatment Plants

To accomplish the basic objectives of manpower planning requires that certain activities be performed. The performance of these activities may be viewed as occurring in a sequential fashion, the order of which, though differing in minor ways among different planners, would be dictated by a logic shared by many individuals engaged in manpower planning. Though the sequence may be divided into few or many steps, we have chosen to delineate the following seven discrete steps as descriptive of the planning process:

(1) Describe that segment of the water pollution control field for which manpower planning is being performed.

(2) Determine the relationship between the objectives of the state water pollution control agency and the objectives of manpower planning.

(3) Determine selected characteristics of current and expected employment.

(4) Analyze manpower problems.

(5) Develop training plans and action steps in response to current and expected manpower training needs and problems.

(6) Develop and maintain a data system.

(7) Monitor and evaluate all of the manpower planning process.

The details of how one applies each step may differ slightly among the various types of manpower, and some planners may prefer to increase or decrease this number of steps to allow for more or less detail. Nevertheless, the seven steps provide a useful framework for initiating a manpower planning process in the water pollution control field.

1. *First Step: Describe that segment of the water pollution control field for which manpower planning is being performed.*

The purpose of executing this step is to have the manpower planner become familiar with that segment of the water pollution control field for which he is conducting manpower planning. The technological aspects of wastewater treatment will have important effects upon manpower issues. The manpower planner must, consequently, become familiar with some of the general technological aspects of water pollution control. He should also become familiar with existing job classifications and requirements.

One of the first things that the manpower planner should note is that wastewater treatment plants differ by the type of treatment they perform and the amount of waste water they treat per day. We shall refer to these two characteristics as the "type and size" of the wastewater treatment plant. The type of treatment may be identified by its code number obtained from a coding system used, but now in the process of being redeveloped, by OWP. A list of the codes in recent use follows.

Code	*Name*
20	Primary—settling tanks with no detail
21	septic tanks
22	Imhoff tanks
23	mechanically cleaned tanks
24	plain, hopper bottom tanks
29	Primary—others and unknown
30	Chemical
41	Secondary—activated sludge
42	extended aeration
43	biological filters, fixed nozzle
44	biological filters, rotary
45	intermittent sand filter
46	land disposal
47	lagoons
48	biological
49	Secondary—others and unknown

The size of a wastewater treatment plant is usually identified on the basis of the plant's "average day capacity," measured in mgds. In the DOL/EPA survey, six classifications of size were recognized: unknown, 0.001–0.999, 1.000–4.999, 5.000–24.999, 25.000–99.999, and 100.000 plus.

Within a wastewater treatment plant several occupations are found. In the DOL/EPA survey 21 specific occupational categories were identified and a summary of the job descriptions provided. (In Appendix II, we provide a list and summary job description of these 21 occupations.) In many states the number of occupations found within a typical wastewater treatment plant, and the relevant job description, will differ from those used in the DOL/EPA survey. For example, the DOL/EPA survey listed two classifications of operators—Operator I and Operator II—while in some states four or five grades or classifications of operators exist, all with differing job descriptions. That such differences exist is not surprising, given the local autonomy that has existed and still exists in the operation of wastewater treatment facilities.

OWP is aware of the diversity in both the number and description of occupations and is now supporting research aimed at improving our understanding concerning the appropriate number of occupations to designate for wastewater treatment plants, the number of workers that should be assigned to each occupation, the appropriate job descriptions for each occupation, and the general education and skill requirements for each occupation. Such research is not being undertaken merely to try to standardize job numbers and descriptions, but rather to provide assistance to local communities in the efficient staffing of their wastewater treatment facilities. One of the first results of this research are the "staffing guides" that now exist in preliminary form.

The engineer who designs a wastewater treatment plant provides a schedule detailing the number and type of workers to be employed in each job classification within the plant, if the plant is to be operated at its design efficiency. (The level of employment that would occur if these recommendations were followed is the recommended employment mentioned previously.) The engineer will have at his disposal the staffing guides which OWP will shortly make available throughout the nation. These staffing guides are not intended to represent static organizational tables, but rather are intended to be flexible guidelines for staffing complements to be adapted to specific local situations. These guides also contain an occupational list for wastewater treatment plants along with a description of the type of work performed and the skills required to perform such work for each occupation. The occupational descriptions should also be considered flexible guidelines to be adjusted according to what local conditions dictate. A preliminary sample of a staffing guide appears as Table 5-1:D in Chapter Five.

Knowing that wastewater treatment plants differ by type and size, that there has been some attempt to standardize the job descriptions and occupational structure in such plants, and that the staffing complement varies according to plant type and size, the manpower planner should inventory his own state with respect to the type of facilities currently in operation and determine whether the occupational titles and descriptions displayed in Appendix II compare with those currently in use within his state.

Not only should the manpower planner become familiar with the different employment requirements and the suggested qualifications of the various personnel within a wastewater treatment plant, he should also determine what training programs are currently available and what additional training programs it would be desirable to institute. Aside from the "qualitative" aspect of training, the manpower planner should also determine some of the "quantitative" aspects of training programs. He should obtain knowledge about the financial resources available for training programs, the capability of existing training institutions to increase their training loads, the availability of additional or alternative institutions to conduct training, and the methods by which recruits for the various training programs are obtained.

Some of the specific problems a manpower planner may identify in recruiting candidates for a training program may actually have their roots within the occupation, or in the interrelated network of various occupations for which the training is being offered. For example, if the occupation is one lacking in opportunity for personal advancement, it will be exceedingly difficult to recruit and retain employees. If, however, the occupation or series of occupations can be structured to provide a "career ladder," then the recruiting, training, and job stability may be greatly enhanced.

2. *Second Step: Determine the relationship between the objectives of the state water pollution control agency and the objectives of manpower planning.*

The purpose in executing this step is to have the manpower planner become familiar with the specific objectives of the state water pollution control agency that might affect the fulfillment of the manpower planning objective. The presence of this step acknowledges that the manpower planner must view himself as an important member of the state water pollution control team. Certain policies and priorities established by the state agency affect the specific direction that manpower planning will take, as may the limitations of those individuals or agencies that support the manpower planner in the performance of his duties.

The objectives and goals of manpower planning should be understood within the broader objectives and goals of a state's water pollution control program. As discussed in Chapter Three the federal water pollution control program identifies the state water pollution control agencies as playing a central role in improving water quality. Because of the central role of the state agency and the effort of the federal and state agencies to work together, it will often be the case, aside from minor differences in emphasis, that the objectives of the state program will, wherever applicable, be the same as those of the federal program. The manpower planner should become familiar with his state's programs, particularly as they apply to the improvement, expansion, and operation of existing wastewater treatment plants and the construction of new plants.

The manpower planner may wish to begin this aspect of the planning process by collecting and becoming familiar with the contents of such items as the state's various water pollution control planning documents, the water quality standards implementation plans, the legislation authorizing the construction of wastewater treatment plants in the state, the policy statements and directives being issued on the state's water pollution by the state agency, and whatever information is available concerning past and projected future values of the financial support for water pollution control programs. This information will provide the manpower planner with a broad outline of the state's water pollution control objectives.

In addition to this kind of information, it will also be useful for the manpower planner to obtain copies of what are referred to in many states as the "one-year" and "five-year needs." These documents list a state water pollution control agency's priorities for building new wastewater treatment plants throughout the state. Such information is based upon the priorities established by the various basin plans that may exist within the state and the water quality standards implementation plans.

One further piece of information that the manpower planner should obtain relates to the water pollution control agency's position regarding the staffing of wastewater treatment plants. Since the number of people to be recruited and trained should be based upon actual employment rather than recommended employment, it will be necessary for the planner to determine whether, in his state, an attempt will be made to induce the municipalities that budget for wastewater treatment plants to bring employment, or at least the number of budgeted positions, in line with the level of recommended employment.

He should also be familiar with his state's program for the certification of operators. He should determine the current effects such a program has upon desirable training programs and the possible future effects that changes in the program might have.

3. *Third Step: Determine selected characteristics of current and expected employment.*

The purpose of completing this step is for the manpower planner to gain knowledge of the various dimensions of current and expected future employment within wastewater treatment plants. This knowledge is needed to determine current and expected future manpower and training needs. An important aspect of this step is the development and use of an instrument to collect the data by which to measure the various dimensions of current and expected future employment. The DOL/EPA survey is an example of such an instrument and represents the initial attempt to collect manpower data for wastewater treatment plants.

We shall divide this step into three subsections. In the first we shall deal primarily with current employment characteristics, in the second with projecting future employment characteristics, and in the third with calculating additional manpower requirements.

a. Current employment characteristics. When the survey instrument is completed, the first task is to determine the value of the three alternative measures of employment—recommended, budgeted, and actual. Since both full- and part-time work exists as a part of actual employment and may exist as a part of recommended employment, an attempt should be made to distinguish between total employment (whether it be recommended, budgeted, or actual) and total full-time employment. If resources permit, data should also be obtained on "full-time equivalent" employment. For example, if the total number of workers is 120 and the total full-time workers is 100 with the 20 people working half-time, then there would be 110 full-time equivalent workers.

The differences among the three alternative measures of employment should be computed. The difference between recommended and budgeted employment will be referred to as the "budget shortfall," the difference between budgeted employment and actual employment as "vacancies," and the total of these two, or what is the difference between recommended and actual employment, as the "employment shortfall." These shortfalls and vacancies should also be expressed in ratio form, with actual employment being the denominator, in order to eliminate scale effects and to facilitate certain types of projections to be discussed below.

In addition to measuring employment totals, the manpower planner should obtain other characteristics of employment. In particular, "terminations" and "accessions" should be measured. Terminations are the number of employees that leave a particular occupation within the year, while accessions are the number of people that enter a particular occupation within the year. (On some occasions such changes are referred to as "turnovers.") Terminations determine the number of workers that have to be attracted to the occupation if employment is to remain unchanged within the relevant time period, while accessions measure the number of workers attracted to the position.

Terminations consist of several components. Individuals leave a particular occupation for several reasons—they die, retire, quit, are discharged, are promoted within the plant or to some other plant, or are transferred or request a transfer to some other plant. Accession, which measures the sources from which new employees were recruited, also has several components. An individual may come to a particular job from what we shall refer to as "external labor sources." Workers coming from this source will usually have no direct experience in wastewater treatment plants and may exhibit considerable variance in their education and skills. Another component of accession is that related to those workers who are already employed in a wastewater treatment plant but who transfer into the occupation in question. Such transfers may be in the form of a promotion, or an upgrade, insofar as the transfer is to an occupation requiring greater expertise than the position vacated. Such transfers may occur from within the same plant or from some other plant within the state. Transfers may also be "horizontal transfers," those individuals who transferred from one wastewater treatment plant to another while keeping the same occupational title. Although the same occupational title is used, different skills may be required. The determining factor in this matter would seem to be the difference in the type and size of plant between which the employee transferred.

In Figure 4.1, we illustrate schematically the preceding process. We also introduce in this diagram some alternative nomenclature. We shall divide terminations into two major components—separations and transfers out—where "separations" include such items as "quits" and "discharges" while "transfers out" refers to those workers that left their employment in the occupation in question but did not leave the state's wastewater treatment system. We shall also divide accessions into two major components—new hires and transfers into—where "new hires" are those workers that come from external labor supply sources and "transfers into" includes accessions due to upgrade within or between plants and horizontal transfers between plants. We also illustrate in Figure 4.1 the fact that workers may enter a particular occupation with or without training though, of course, the former is to be preferred.

One additional piece of information that should be obtained when this step is executed is a detailed education and work profile of each employee in the wastewater treatment plants. This information may be difficult for many manpower planners to obtain because of budgetary restrictions, and less ambitious undertakings should be followed. At a minimum, information should be collected that attempts to assure whether current employees are qualified for their positions. If certification requirements exist, such information will be important not only for determining the number of current employees that should have some type of training but also the needed capacity of any program designed to bring all those employees so required into certification.

b. Future employment characteristics. The manpower planner should project the value of all the employment characteristics measured in the preceding substep. A reasonable period of time over which to make projections of future employment characteristics is five years because other segments of the water pollution control field engage in five-year projections. Because of the time necessary to project the value of future employment and the lead time necessary to respond to whatever problems may exist, a period of one or two years is too short a time. This

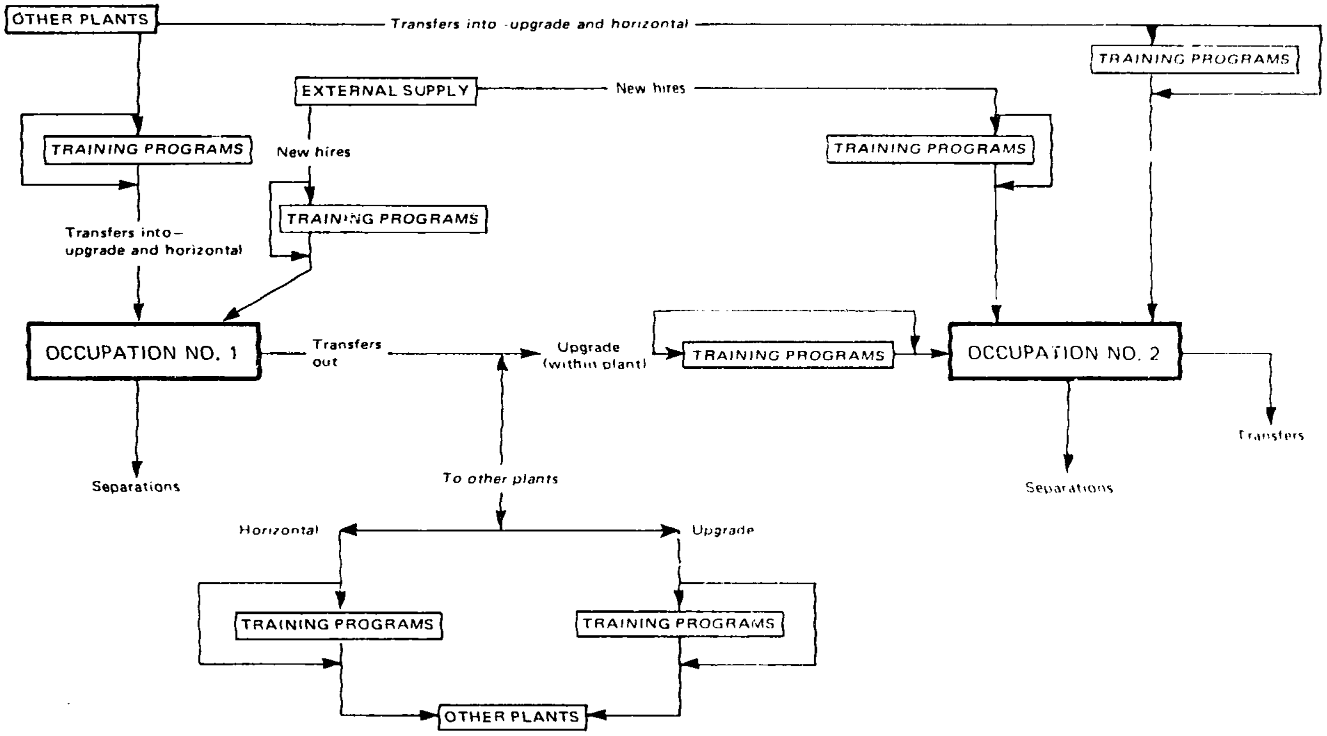

Figure 4.1. Termination and Accession Processes

is especially true when it is recognized that most of the available data are annual. Furthermore, the tradition of post-secondary school programs and the postponement of career choice until early adulthood appear to dictate a planning horizon of from three to five years.

The projection of future manpower requirements and employment can be accomplished by relying upon data obtained from the survey instrument used to measure current employment and from certain documents that are related to what we have referred to in Chapter Two as the construction grants process.

From among the many activities that occur in the construction grants process, five can be singled out as having particular significance to the manpower planner. They are significant either because certain important information is available at that time or because it would be desirable to have certain information at that time These five activity points are: the basin plan, the construction grant application, the approval of plans and specifications, the final inspection, and the operation and maintenance annual inspection. Though certain manpower information is already available from existing forms, it is the intent of EPA/OWP to expand the available data base by adding to these forms questions that are designed to obtain additional manpower information.

To illustrate the type of information that is normally available at these five data points, we shall trace the process by which a typical wastewater treatment plant comes into existence. Initially the need for a wastewater treatment plant, either a new one or an expansion of an old one, is identified in the basin plan—the first data point. The plant is often identified by the type and size needed and, as such, will appear on the state's list of priorities where a date is sometimes given for completion of such a facility. The use of this information, and the information contained in the staffing guides, will enable the manpower planner to make some preliminary projections for the additional manpower that will be required to operate this plant. Such a projection would be of recommended employment.

The second source of information is the engineering report accompanying the construction grants application form.

New federal guidelines require that manpower data be made available in the engineering report. Such information, when available, can be obtained from those offices in the state dealing either with operations and maintenance or construction grants. Should such manpower data not be made available, the manpower planner can once again use the available information on the type and size, the staffing guide, and the estimated date of completion to make preliminary projections of recommended employment.

The third data point in the construction grants process is when the plans for the construction of the wastewater treatment plant and the specifications of the plant are approved. At this point an operations and maintenance manual is usually available, as is a detailed staffing plan. Upon completion of the plant, a final inspection is conducted at which time we have the occurrence of the fourth data point. Up to this point in the process, only the level of recommended employment has been available because actual budgetary data have not been available, and there has been an absence of an employment history from which to obtain data such as terminations and accessions. When the final inspection occurs, however, data on budgeted employment will be available since by the time this inspection is held, the plant is complete and ready for operation.

After the final inspection, another inspection is performed approximately one year after the plant has been in operation and represents the fifth data point. This inspection is normally executed jointly by federal and state personnel from the operations and maintenance division. It is the intention of OWP to establish at least an annual inspection of wastewater treatment plants by state personnel from operations and maintenance. Though this inspection was originally designed and planned on the basis of gathering data on the technological aspects of the plant's operation, it is the intent of both the federal operations and maintenance and the manpower development staff in OWP to expand this annual inspection form to collect the data which are pertinent to manpower planning.

Because the new federal guidelines pertaining to the operation and maintenance, of wastewater treatment plants require that manpower data be made available at the data points listed above, the manpower planner's task of obtaining data of projected increases in recommended employment resulting from new and expanded plants is made more simple. In principle, he should be able to visit those people in his state agency concerned with construction grants, as well as operations and maintenance, to obtain data on recommended employment for each year for approximately the next five years. Because of these new guidelines, the manpower planner should therefore make every effort to become acquainted with those individuals working in the offices responsible for collecting these data, and should continuously urge them to supply him with, and possibly cooperate in the format for displaying such data.

We illustrate in Figure 4.2 the time phasing of the manpower data collection system. The amount of information on manpower aspects of wastewater treatment plants increases as the plant draws closer to completion, as does the certainty attached to the data.

Much of the projected employment data obtained from the construction grants process will be for recommended employment. One of the tasks that the manpower planner must do, which we shall discuss shortly, is to determine additional manpower and training needs. But such determinations should be based upon actual rather than recommended employment. Insofar as actual employment is expected to differ from recommended employment, the manpower planner must make separate estimates of the future values of actual employment.

Given the limited resources available to most manpower planners, detailed projections will not be feasible and, given the probable magnitude of the manpower problems of the state, unnecessary. Until additional resources are made available or experience suggests that more complex methods are required, the manpower planner should make his projections of future actual employment in the following manner: from the annual survey of wastewater treatment plants, the manpower planner can calculate the factor proportionality between recommended and actual employment which we shall note as "P." Actually, several *P*s might be estimated, not only for different occupations but also for different types and sizes of plants so that, in principle, a matrix of *P*s would be computed.

When future actual employment is projected, these *P*s may be used by simply multiplying the projected recommended

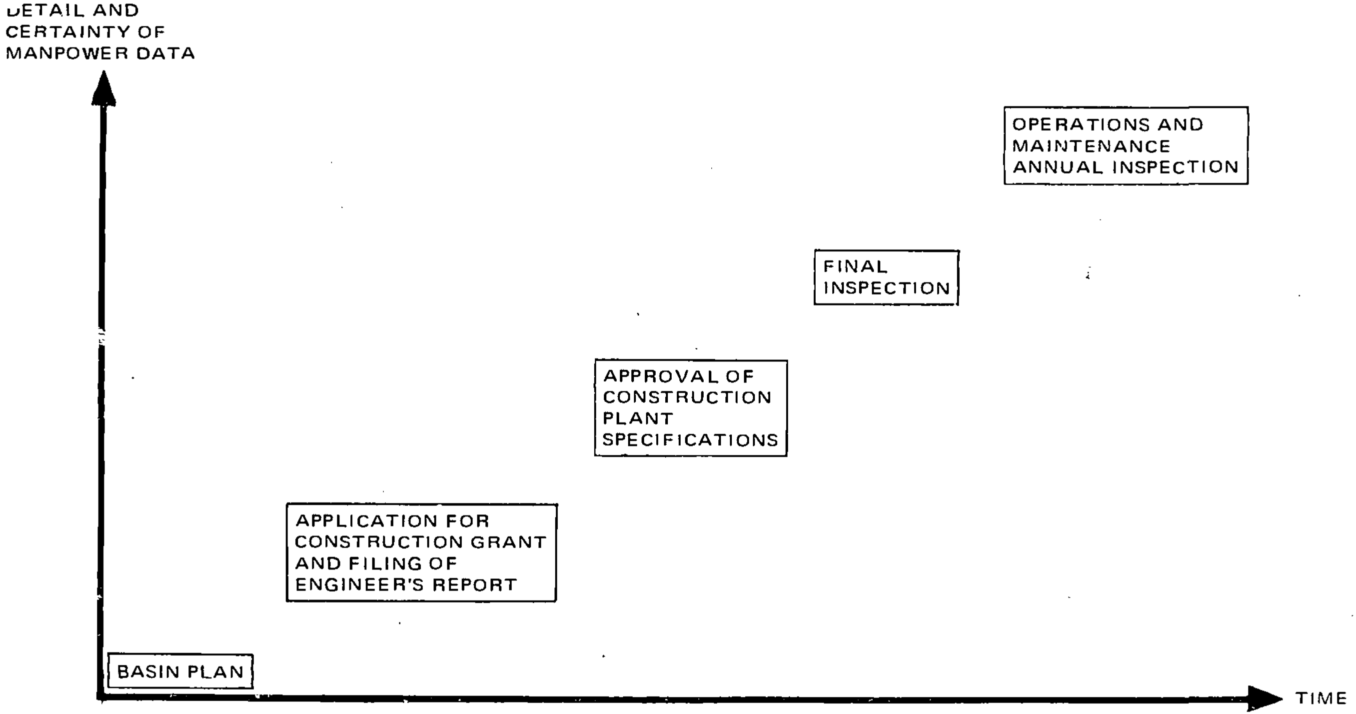

Figure 4.2. The Time Phasing of Manpower Data

employment by them. This would imply that the ratio of actual to recommended employment which exists today is assumed to exist each year in the future. Should there be reason to believe that future conditions will change so as to affect the size of *P*, then the value of *P* used in this process should be adjusted accordingly. For example, if the relevant *P* for a given projection has been estimated to be 0.80 in the current period, but it is expected that in the near future actual employment will be closer to recommended employment, because of a concerted effort to enforce existing regulations, then over the next five years the value of *P* used might increase as in the following sequence 0.82, 0.84, 0.86, 0.88, and 0.90. This would imply that over the length of the five-year planning horizon, it is being assumed that actual employment in wastewater treatment plants will increase from 80 to 90 percent of recommended employment.

c. Additional manpower requirements. A further task in this step, which applies to both current and future time periods, is the determination of additional manpower requirements. Such a determination has both a quantitative and qualitative aspect. It will require that the manpower planner calculate the number of additional workers that will be required in each occupation for each year in the planning horizon, the type of training they may require, and the type of training that may be required of current employees.

To determine the number of additional workers that will be needed, the manpower planner must determine what growth in actual employment will occur within the year and how many workers will terminate employment within the year. There are several aspects to consider under the rubric of growth, all of which, however, will be captured in the value assigned to *P*, the factor of proportionality between actual and recommended employment. Growth in actual employment may occur because of the addition of new or the expansion of existing plants, or because of a decrease in the employment shortfall in new and existing plants.

By examining the accession rate and its various components, the manpower planner will be able to obtain estimates of the most likely sources for the additional manpower. On the basis of the various accession rates, the manpower planner may then provide estimates to those individuals working in the training division of labor supply when they, in consultation with the manpower planner, may devise the appropriate training programs.

The final task in the execution of this step is the revision of various aspects of the estimating procedure. Over time, changes in termination and accession rates may occur and should be used in the projection process. Adjustments over time may also be required in the value assigned to P. If, for example, current federal guidelines are followed, the value of P will very shortly be equal to unity, indicating an equivalence between actual and recommended employment.

4. *Fourth Step: Analyze Manpower Problems.*

The purpose of analyzing manpower problems is to have the manpower planner become familiar with a variety of possible manpower issues—their causes and possible solutions. Although there are many problems with which a manpower planner may be confronted in successfully fulfilling his objectives, we shall consider only a portion of them and shall consider only those that relate directly to the recruitment, retention, and utilization of the wastewater treatment plant personnel.

There can, quite legitimately, be some disagreement about what constitutes a manpower problem, the evidence that a given problem exists, and the cause of that problem. This occurs, in part, because of the infinite regress which may occur in determining the "basic" cause of a problem. Hence, differences among individuals concerning differences between cause and effect relationships will, to some extent, depend upon how far in the infinite regress pattern a particular problem is traced. One possible way of viewing a sequence of manpower problems is illustrated in Figure 4.3. The sequence has been extended to just beyond that point where it seems reasonable to expect the actions of the manpower planner to have some noticeable effect. In the first block, the specific problem confronting the water quality industry with which manpower will be intimately related is the improper operation and maintenance of a wastewater treatment plant. The "cause" of this problem, to some, might be identified as "inadequate staffing," in both its quanti-

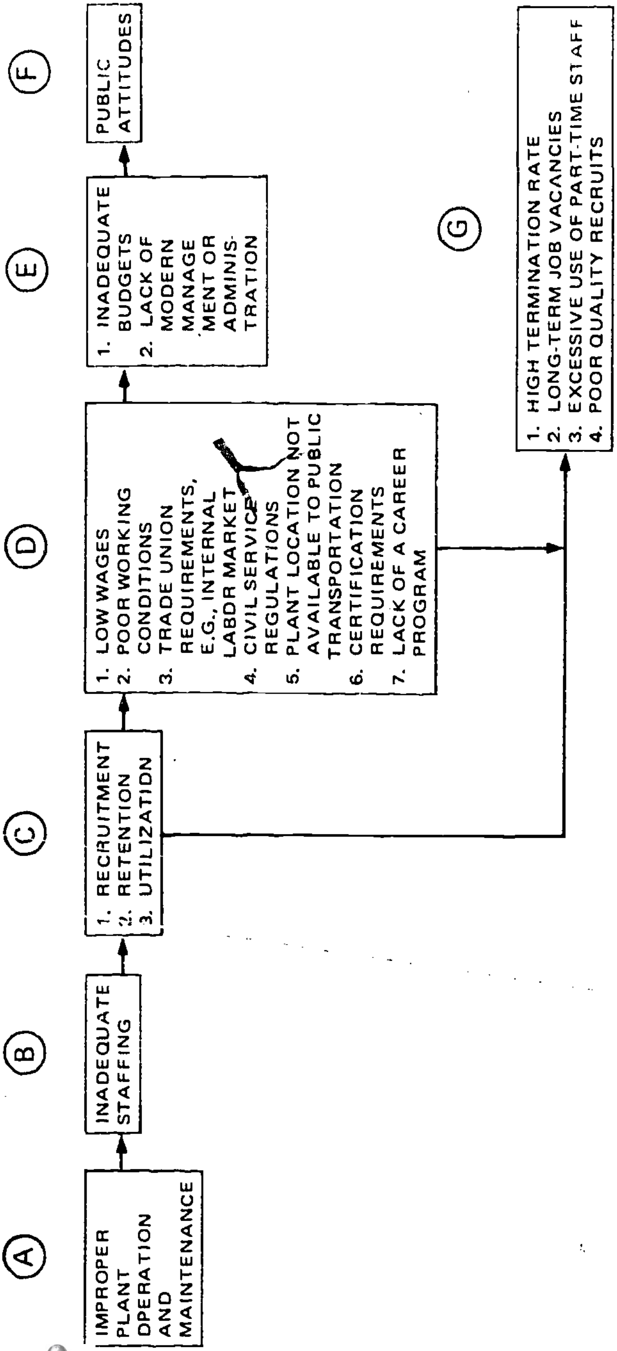

Figure 4.3. The Sequence of Manpower Problems

tative and qualitative aspects, while to others inadequate staffing will simply be identified as another problem. The "cause" of inadequate staffing may be identified as being related to recruitment, retention, and use of manpower, which may be caused by low wages or poor working conditions, which in turn are identified by others to be "problems." Two other steps illustrating the problem of inadequate budgeting, poor plant management, and public attitudes are included in the figure. Block G, which is not in the chain of possible problems but is connected to blocks C and D, may be taken as factors which may be problems in themselves but also evidence of other problems. Thus the existence of a high termination rate is indicative of a problem in manpower retention or evidence of poor working conditions, etc.

A question the manpower planner must answer is, "At which level should I attempt to enter the chain of problems depicted in the preceding figure?" The principle of division of labor would seem to suggest that those individuals working in operations and maintenance be concerned with blocks A and B, while the manpower planner would direct most of his energies to solving those problems listed in blocks C and D.

The inability to recruit new and retain current employees may be related to similar variables. Difficulties in recruiting new individuals into a particular occupation may be related to the existence of physically poor working conditions, lack of assumed prestige in the occupation, or low wages. The presence of any one of these variables; with the absence of compensating offsets in other variables, would be sufficient to cause recruitment and retention problems. Alternatively, however, the presence of one or two of these variables may be completely offset by significantly high values for the remaining values. For example, high wages may offset the effects of poor working conditions and occupational prestige.

To determine whether recruitment and retention are existing problems within wastewater treatment plants, we find that some of the variables already computed may be of assistance. If retention is a problem, for example, it would be expected that separation rates, particularly quit rates, would be higher than for other occupations within the state that require similar skills and education. If recruitment is a problem, it would be expected that the vacancy rate would be higher than the state average for similar occupations. Problems of recruitment and retention may also be reflected in more qualitative as compared to quantitative aspects of employment. The presence of workers with qualifications less than those that are reasonably desirable would be evidence of recruitment and retention problems. The willingness of those supervising the operation of wastewater treatment plants to accept poor work habits would also be evidence of recruitment and retention problems.

The appropriate use of workers, though most appropriately related to the technological operations of the plant, may result in certain types of problems with which the manpower planner must concern himself. Hiring or promoting workers to positions for which they are not qualified would be one form of poor utilization that might place undue pressures upon some workers, thus causing them to quit and thereby contributing to manpower problems. Considerable disparity between recommended and actual employment might be taken as prima facie evidence of poor worker utilization. Such conditions may result in increased work loads on existing workers and thereby eventually lead to the other problems of recruitment and retention.

Determining whether recruitment and retention of workers are indeed a problem for a state's wastewater treatment plants would require that quit and vacancy rates be compared with such rates for other occupations. Comparisons among occupations within wastewater treatment plants should also be made to determine whether internal differences exist. To determine which of several possible factors are contributing to the existence of any manpower problem will be a difficult task, given the resources available to most state manpower planners; nevertheless, some attempt should be made to determine the cause of specific problems.

5. *Fifth Step: Develop training plans and action steps in response to current and expected manpower training needs and manpower problems.*

The purpose of executing this step is to have the manpower planner develop plans for recruiting, to a particular occupation, that number of workers his calculations imply will be needed, to ensure that such recruits receive the training necessary to properly qualify for the occupation, and to take certain steps designed to eliminate those manpower problems already identified. Much of the program development and activities called for in executing this step will require that the manpower planner develop a close working relationship with individuals in a variety of departments both within and outside the state water pollution control agency. Furthermore, the manpower planner must develop a sense of priorities in his work of implementing certain programs. Problems that affect the present operation and maintenance of wastewater treatment plants will require an immediate response, even though initially pretested solutions are not available, while the planning for and implementation of programs that have bearing more upon the solution to future problems should be afforded somewhat lower priority. This is not to imply that the planning and development of manpower programs to solve expected future problems should not be initiated in the current period, but only that their urgency should be recognized as being less than the solution to current problems.

The development of additional training programs will require time not only to develop the content of the programs but also to recruit students, organize and offer the planned training, and evaluate the results. In setting up training programs, the planner should ask and have answered the following kinds of questions:

(1) Who will be trained? What is their level of education? Their age? Are they inside or outside the industry?

(2) Are they being trained for entry-level positions with career opportunities and mobility, or for positions that offer little opportunity for advancement?

(3) What prerequisite skills should be expected of trainees recruited to the program under consideration?

(4) What task will the graduates be expected to perform once they are on the job?

(5) Do existing training programs have the ability to satisfy current and projected training needs?

The answers to some of these questions will be obtained from the data generated in executing previous steps. For example, data collected on accessions to a given occupation will give the manpower planner information on the sources of additional manpower. If data are also collected on the educational background of such individuals, then, in consultation with individuals working in federal training programs, the appropriate kind of training can be identified and planned.

The manpower planner will find assistance in meeting his training needs from the following sources:

(1) A training officer in his own agency

(2) The state director of vocational education in the state department of education

(3) The manpower development officer in the state employment service

(4) A community college dean of occupational studies or a person in a similar position in another postsecondary institution offering technical programs

(5) The manpower development and training committee of the state or regional federation or association concerned with water pollution control

(6) Federal OWP

(7) Consulting engineers

(8) Equipment manufacturers

(9) The various unions concerned with the various occupations within wastewater treatment facilities

The person contacted in any of these organizations should be familiar with funding sources to expand or initiate new training programs. He will also be anxious to learn of any opportunity that promises to offer a "reasonable expectation of employment" to the graduates of his training programs.

In the development of a training program, the manpower planner and the training specialists may jointly develop programs based on the following steps:

(1) Establish performance objectives expected of the program graduates once employed on the job.

(2) Design an evaluation procedure to measure the level of performance of the graduates on the job.

(3) Design the instructional and training format of the presentation form (e.g., "hands-on" experience, lecture/note taking, experimentation/discovery, programmed self-instruction, and combinations of these).

(4) Select instructional media (e.g., case materials, specialized equipment, films, tapes, etc.).

(5) Develop instructional components (e.g., modular forms, concepts, units).

(6) Test and revise instructional components on pilot groups.

(7) Produce instructional components.

(8) Test and revise instructional components.

(9) Implement training program.

(10) Test and revise instructional system as a result, measuring graduate performance on the job.

Once a given program has been developed, it should, insofar as it is successfully fulfilling its objectives, be maintained. The goal of program maintenance is creation of an interactive network of parties who have a direct interest in the water quality and manpower fields. The purpose of this network is the maintenance of programs and activities that minimize manpower problems. A manpower planner, working in cooperation with training specialists (both inside and outside the industry) and representative of employer groups, trade unions, professional organizations, state and local employment services, and educational institutions, should promote the flow of information concerning manpower problems. In addition, he should work toward the development of an organization for monitoring the progress of recently developed manpower programs, identifying new manpower problems as they occur and projecting potential manpower problem areas at some time in the future.

The manpower planner's active membership on state, regional, or area manpower planning councils is a good place to begin to build an interactive network of interested groups. There is no formula that outlines in step-by-step fashion how to create a program to maintain the success of earlier efforts. But a manpower planner who gets himself situated to participate in the feedback of ongoing operations and at the front end of new developments in the industry will soon learn how to meet the manpower needs of his industry.

There may be some reservations as to how much a state manpower planner in the state water pollution control agency may act toward solving certain types of manpower problems that could confront a municipal wastewater treatment plant. The most likely candidates for such manpower problems are poor working conditions and low relative wages. Insofar as the manpower planner can document such problems and the magnitude of the actions necessary to solve them, he can then, either singly or as part of a team effort, try to convince those people who have more direct control over such matters that these problems are of serious proportion and should be eliminated.

At this point in the manpower planning process the manpower planner should report the results from completing the first five steps to those individuals that will provide the assistance necessary to satisfy the manpower planning objectives. Thus, he should report his estimates of training needs to the staff concerned with training in this agency, his analysis of manpower problems to the various agencies that may assist him in eliminating whatever problems exist (the agency so chosen will, of course, depend upon the manpower problems that have been discovered), and his estimate of future manpower needs to individuals not only within his own agency but also to CAMPS. Such reports should describe the situation under discussion, and tables should accompany such a report whenever necessary.

The manpower planner should contact the executive director and/or the chairman of the state manpower planning council to request an opportunity to present his report at a regularly scheduled meeting. Sufficient copies of written reports should be furnished to the secretariat of the state CAMPS organization to provide each member with a copy. Verbal presentations to the council should focus upon identifiable action steps to be taken by the council collectively as well as by individual members who represent service-delivery agencies. Training needs requiring allocation of resources should be a matter of principal importance.

Where appropriate, similar presentations should be made to area manpower planning councils with appropriate attention paid to area-specific problems and action steps.

6. Sixth Step: Develop and maintain a data system.

In executing the preceding steps, certain employment data were collected and analyzed. These data were used as the basis for such activities as projecting the future values of certain employment characteristics, documenting the possible existence of manpower problems, and determining the number of additional workers needed each year within the planning horizon. Clearly, the existence of manpower data is important for the manpower planning process, and every effort should be made to increase the amount and availability of useful data.

To accomplish such a task not only requires that annual surveys of wastewater treatment plants be conducted and the progress of new plants monitored, but also that the resulting data be stored in such a manner as to be easily retrievable for future use and analysis. In time, the manpower planner may have direct access to computer facilities and programming expertise; but until such time comes, he will do well to devise simple tables that summarize for each year the data collected in the annual survey and the various calculations and projections made on the basis of those data. By faithfully recording the annual data and calculations made with such data, the manpower planner will be contributing to the important task of developing time series data for manpower in the wastewater treatment plant segment of water pollution control.

Because of the importance of alternative measures of employment, these should be recorded each year, as should terminations and accessions. Since the various rates—vacancy, terminations, etc.—are used in analyzing manpower problems and projecting the future value of certain employment characteristics, they should be recorded in such a way as to facilitate the manpower planner in detecting any significant changes in their respective values.

Because of the uncertainty attached to the projections made by the manpower planner, he should be aware of the possibility of projection errors and be ready to measure and adjust for such errors in his future work. It is through the maintenance of a data system on a continuing basis that the manpower planner will have the data necessary to compare his projections and analysis with the data measured in the annual survey and adjust his projections and analytical techniques accordingly.

The manpower planner should become knowledgeable of other information and data systems within state and federal water pollution control offices and, wherever meaningful, integrate his system with other systems. In obtaining such knowledge, he will undoubtedly discover alternative sources of data. Though it will always be necessary for him to initiate some data collection, nevertheless the amount he has to personally collect could be minimized by successfully integrating his data system with others.

7. *Seventh Step: Monitor and evaluate the manpower planning process.*

Throughout this manual, particularly in the first part of this chapter, the general principles of manpower planning have been outlined in a manner that seems most reasonable for their application to manpower planning in the water pollution control field. Because of the peculiarities of the various states, other slight adjustments to these principles may have to be made on a state level by the state manpower planner. To accomplish this, the manpower planner must continually seek to improve his performance by making the necessary adjustments in his various activities. It should be apparent, therefore, that the job of manpower planning will not be complete until the manpower planner has determined how effective his manpower plan, in both its design and execution, has been. For this reason it is important that the evaluation of the manpower planning process be considered as a separate step in this process. Although listed as a separate step, the evaluation of the planning process, more than any other of the preceding steps, is best understood as a continuous process and one fully integrated with all of the preceding steps. Information obtained from monitoring and evaluating the planning process should be fed back into each step of the planning process in an attempt to improve the precision and reliability of the process. Such practices of using information in this way are often referred to as "feedback" systems.

In order that the various components of the manpower planning process be correctly evaluated, the manpower planner must establish performance criteria. Some difficulty may be experienced in doing this during the initial phases of establishing a manpower planning capability within a state. Thus, for example, it may be difficult, initially, to determine whether or not an error of 15 percent in projecting actual employment next year is tolerable. In time, when the state manpower planner has accumulated experience within his state and with information provided to him by OWP from experiences in other states, some basis for establishing quantifiable performance criteria will have been developed. With such criteria the state manpower planner may then be able to measure his own performance and take the appropriate steps to improve it. The areas in which he will most easily be able to grade his performance will be those such as the accuracy of his projections of future actual employment, his calculation of future manpower needs, the ratio of the number of people trained to the number of people that should be trained, and the adequacy of alternative techniques in projecting the value of selected employment characteristics and in reducing the problem areas of manpower within his state.

An important aspect of the evaluation process is the useful inputs that it provides within the framework of a feedback system. By the evaluation of past performance, insight will be obtained on how to improve upon currently practiced procedures. These weaknesses can be corrected with a resulting increase in the efficiency of the manpower planning process. Such a process of continually evaluating performance and making the necessary corrections by feeding the relevant information back into the planning systems is made more effective, in general, when all of the feedback information is used with little delay and with the greater specificity of the feedback information.

CHAPTER FIVE

APPLIED MANPOWER PLANNING FOR MUNICIPAL WASTEWATER TREATMENT PLANTS

Applied Step 1: Describe that segment of the water pollution control field for which manpower planning is being performed.

A. Inventory of Existing Plants

B. Types of Occupations

C. Existing Training Opportunities

D. Career Ladders

Applied Step 2: Determine the relationship between objectives of the state water pollution control agency and the objectives of manpower planning.

A. Legislative Authority

B. Water Quality Uses and Criteria

C. Budgetary History

Applied Step 3: Determine selected characteristics of current and expected employment.

A. Measuring Current Employment Characteristics

B. Projecting Future Employment Characteristics

C. Additional Manpower Needs

Applied Step 4: Analyze manpower problems.

A. Recruitment

B. Retention

C. Utilization

Applied Step 5: Develop training plans and action steps in response to current and expected manpower training needs.

Applied Step 6: Develop and maintain a data system.

Applied Step 7: Monitor and Evaluate the Manpower Planning Process.

CHAPTER FIVE

APPLIED MANPOWER PLANNING FOR MUNICIPAL WASTEWATER TREATMENT PLANTS

The purpose of this chapter, which we shall refer to as the workbook section of the manual, is to provide for the application of those planning procedures outlined in the previous chapter. It is the intent of this workbook to provide the manpower planner with an outline of the forms (and a description of the detailed steps for completing such forms) that can be used in carrying out the various manpower planning activities. In the process of completing this workbook, the manpower planner would have executed all the planning steps developed in the previous chapter and would thereby have completed the first cycle in conducting manpower planning for a segment of the water pollution control field.

As mentioned in the previous chapter, our exposition will be primarily in terms of the single occupation of wastewater treatment plant operator. Our planning methods are, however, applicable, with only minor changes, to the remaining occupations within a wastewater treatment plant. Our practice of considering only the occupation of operator will imply that when an entire table is to be devoted to the characteristics of a single occupation, the operator classification will be used; and when a table is relevant for all occupations, we shall highlight only the operator classification—it being understood that the remaining occupations are treated in an identical manner.

This workbook has been developed in such a manner that each element in the manpower planning process is spelled out in considerable detail. Some persons will no doubt find the work program outlined here difficult, and others will likely question the necessity to be as thorough and careful as this workbook requires. The workbook should be a helpful guide, however, and is not intended that it be a straightjacket requiring unnecessary precision and detail. Each planner can adapt the material provided here to meet the needs of his organization. It is essential, however, that the manpower planning process outlined in this document be thoroughly understood. Once a broad and general understanding is achieved, and after some experience, changes or modifications may be readily incorporated into a state's manpower planning process.

Applied Step 1: Describe that segment of the water pollution control field for which manpower planning is being performed.

A. *Inventory of Existing Plants*

The manpower planner may obtain information from the staff concerned with monitoring the operation and maintenance of wastewater treatment plants that would enable him to prepare an inventory of the wastewater treatment plants within his state. Initially, this information can be accumulated in a master table having the format as illustrated in Table 5-1:A. In such a table the manpower planner would have displayed all the relevant information concerned with the physical aspects of his state's wastewater treatment plant system. This information may, for certain purposes, be rearranged and displayed in a format such as that illustrated in Table 5-1:B. This table uses the treatment codes currently used by STORET (but currently under revision) and a division of plants by size as used in the DOL/EPA survey of employment in wastewater treatment plants. Note that a table such as Table 5-1:B provides a summary of plants by type and size. Some of this same information could be displayed in an alternative and simpler format. We illustrate such a format in Table 5-1:C.

TABLE 5-1:A

Inventory of the State's Wastewater Treatment Plants

PLANT NUMBER	LOCATION	CODES			SIZE IN MGD	TREATMENT	
		COUNTY	SMSA	BASIN		CODE	NAME

TABLE 5-1:B

Inventory of the State's Existing Plants by Type and Size

TYPE OF TREATMENT	*SIZE OF PLANT BY AVERAGE DAY CAPACITY MGD*						
	UNKNOWN	0 001 0 999	1 000 4 999	[illegible]	25 000 99 999	100 000+	TOTAL FOR GIVEN TYPE
20 PRIMARY SETTLING TANKS							
21 PRIMARY SEPTIC TANKS							
22 PRIMARY IMHOFF TANKS							
23 PRIMARY MECHANICALLY CLEANED							
24 PRIMARY PLAIN, HOPPER BOTTOM							
29 PRIMARY OTHERS AND UNKNOWN							
30 CHEMICAL							
41 SECONDARY ACTIVATED SLUDGE							
42 SECONDARY EXTENDED AERATION							
43 SECONDARY BIOLOGICAL							
44 SECONDARY BIOLOGICAL							
45 SECONDARY SAND FILTER							
46 SECONDARY LAND DISPOSAL							
47 SECONDARY LAGOONS							
48 SECONDARY BIOLOGICAL							
49 SECONDARY OTHERS AND UNKNOWN							
TOTAL PLANTS FOR GIVEN SIZE							

TABLE 5-1:C

Inventory of the State's Existing Plants by General Type of Treatment and by Size

TYPE OF TREATMENT	*SIZE OF PLANT BY AVERAGE DAY CAPACITY IN MGD*						
	UNKNOWN	0.001– 0.999	1.000– 4.999	5.000– 24.999	25.000– 99.999	100.000+	TOTAL PLANTS FOR GIVEN TYPE
PRIMARY							
SECONDARY							
TERTIARY							
TOTAL PLANTS FOR GIVEN SIZE							

B. Types of Occupations

In the DOL/EPA survey, a total of 21 specified occupations were used. A list of these occupations appears as the first column in the example of a staffing guide displayed as Table 5-1:D, and a list of the job descriptions appears as Appendix II.

TABLE 5-1:D

Staff Complements to Wastewater Treatment Plants

Example No. 1[a]

Occupation Title	*Plant Average Day Capacity in mgd*									
	1	*3*	*5*	*10*	*20*	*35*	*50*	*65*	*80*	*100*
	Estimated Number of Personnel									
Superintendent			0.5	1	1	1	1	1	1	1
Assistant superintendent						1	1	1	1	1
Clerk typist				1	1	1	1.5	2	2	2
Operations supervisor										1
Shift foreman								1	1	1
Operator II	1	1	1	1	2	3	6	6	7	8
Operator I	3	4	5	4	4	5	6	6	8	8
Auto. equipment operator						1	1	1	2	2
Maintenance supervisor										1
Mech. maintenance foreman								1	1	1
Maintenance mechanic II				0.5	1	1	1	2	2	2
Maintenance mechanic I					1	1	1	1	2	2
Electrician II					0.5	1	1	1	1	1
Electrician I							0.5	0.5	1	1
Maintenance helper				1	1	1	2	2	3	4
Laborer		0.5	1	1	2	4	4	5	5	7
Painter										0.5
Storekeeper								1	1	1
Custodian							1	1	1	1
Chemist									0.5	0.5
Laboratory technician				1	1	2	2	2	2	2
TOTAL staff complement	4	5.5	7.5	9.5	14.5	22	29	34.5	41.5	48

[a] Plant components included in this example are:

Liquid Treatment

Raw wastewater pumping
Preliminary treatment
Primary sedimentation
Chlorination

Sludge Treatment

Primary sludge pumping
Sludge digestion
Sludge drying beds (b)
(1, 3 and 5 mgd plants)
Sludge lagoons (c)
(10 mgd and larger plants)

Other Plant Components

Yardwork
Laboratory
Administration and general

[b] Sludge removed from plant site by plant personnel.
[c] Sludge removed from plant site under contract.

In some states the occupations will differ from those exhibited in the staffing guide. When such differences arise, the manpower planner should note them and decide whether to recommend that job restructuring be attempted in order to align the list of occupations in his state with those suggested by OWP. Valuable information used in making such decisions would be obtained by comparing the OWP job descriptions with those in his state. It is probably the case, for example, that the job descriptions for Operators I and II cover whatever number of operators appear in most states, but the division of responsibilities (i.e., the job structure) among operators is different.

In addition to being familiar with the job descriptions for the various occupations within his state's wastewater treatment plant system, the manpower planner should become familiar with other aspects of the occupation. Such aspects would include the qualification profile, the entry sources for the occupation, and those occupations into which a worker may transfer from the occupation in question. These additional characteristics of the occupation, along with the job description, constitute what is called the occupation description. An example of an occupation description for Operator I is:

OCCUPATION DESCRIPTION

Title: OPERATOR I, WASTEWATER TREATMENT PLANT

JOB DESCRIPTION

Assists Operator II in performance of any combination of following tasks pertinent to controlling operation of plant or performs various tasks as directed: Operates treatment facilities to control flow and processing of wastewater, sludge, and effluent. Monitors gages, meters, and control panels. Observes variations in operating conditions and interprets meter and gage readings and test results to determine processing requirements. Operates valves and gates either manually or by remote control; starts and stops pumps, engines, and generators to control and adjust flow and treatment processes. Maintains shift log and records meter and gage readings. Extracts samples and performs routine laboratory tests and analyses. Performs routine maintenance functions and custodial duties. Operates and maintains power generating equipment and incinerators. Classified by title such as Pumping Station Operator I or Digester Operator I when performing specialized activities only.

QUALIFICATIONS PROFILE

1. Formal Education
   High school graduate or equivalent training and experience.

2. General Requirements

   a. Ability to learn operation of plant processes and equipment.

   b. Ability to maintain and evaluate simple records.

   c. Ability to maintain working relationship with other shift workers.

3. General Educational Development

   a. Reasoning
   Apply common sense understanding to carry out written, oral, or diagrammatic instructions. Deal with problems involving concrete variables in or from standardized situations.

   b. Mathematical
   Perform ordinary arithmetical calculations.

   c. Language
   Ability to comprehend oral and written instructions, record information, and request supplies and work materials orally or in writing.

4. Specific Vocational Preparation
   On-the-job training from date of employment. Completion of an operator training course highly desirable. Previous experience as laborer or equipment operator in wastewater treatment plant also desirable.

5. Aptitudes—Relative to General Working Population

a. Intelligence	Lowest third excluding bottom 10 percent
b. Verbal	
c. Numerical	
d. Spatial	
e. Form Perception	
f. Clerical Perception	
g. Motor Coordination	
h. Finger Dexterity	
i. Manual Dexterity	Middle third
j. Eye-Hand-Foot Coordination	Lowest third excluding bottom 10 percent
k. Color Discrimination	Middle third

6. Interests
   Preference for activities of a routine, concrete, organized nature; dealing with things and objects.

7. Temperament
Worker must adjust to situations involving a variety of duties and evaluation of information against measurable criteria.

8. Physical Demands
Medium work; involving climbing, balancing, stooping, kneeling, crouching, reaching, handling, fingering, talking, hearing, visual acuity, depth perception, and color vision.

9. Working Conditions
Both inside and outside. Exposed to weather, fumes, odors, and dust. May be exposed to toxic conditions. Definite risk of bodily injury.

ENTRY SOURCES: Graduates of operator training courses, treatment plant laborers or equipment operators, general public.

PROGRESSION TO: Operator II.[5]

C. *Existing Training Opportunities*

Though many aspects of a state's training programs will be considered in Applied Step 5, an appropriate description of that segment of the water pollution control field for which manpower planning is being performed should contain data that describe some of the quantitative aspects of existing training opportunities. It will be important, for example, for the manpower planner to know something about the dimensions of the state's capacity to train individuals for positions within wastewater treatment plants. By completing a table such as Table 5-1:E, the manpower planner will gain information on what the

TABLE 5-1:E

Summary of Training Programs for 1971

OCCUPATION	NAME AND LOCATION OF TRAINING PROGRAM	LENGTH OF COURSE	COURSE CAPACITY	NUMBER TRAINED	NUMBER FINDING EMPLOYMENT IN AREA OF TRAINING	TRAINING EXPENDITURE	
						TOTAL	PER TRAINEE

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[5] Manpower Development Staff, "Manpower Requirements," mimeographed (Washington, D.C.: Office of Water Programs, Environmental Protection Agency, 1972), pp. 197, 198.

state's current capacity to train is and the relevant training costs per trainee. This information will be helpful in projecting the costs of increasing this capacity if, for example, projections of future training needs should differ significantly from current training capacity.

D. Career Ladders

A career ladder within a wastewater treatment plant provides an opportunity for advancement and defines the path that such advancement is most likely to follow. Whether or not career ladders exist will play an important part in satisfying the objectives of manpower planning, for their presence will tend to attract and keep workers while their absence will tend to repel and discourage workers. The manpower planner should document the existence of career ladders in his state and help in the development and introduction of them should they be weak or absent. Figure 5.1 (a modification of an internal document of

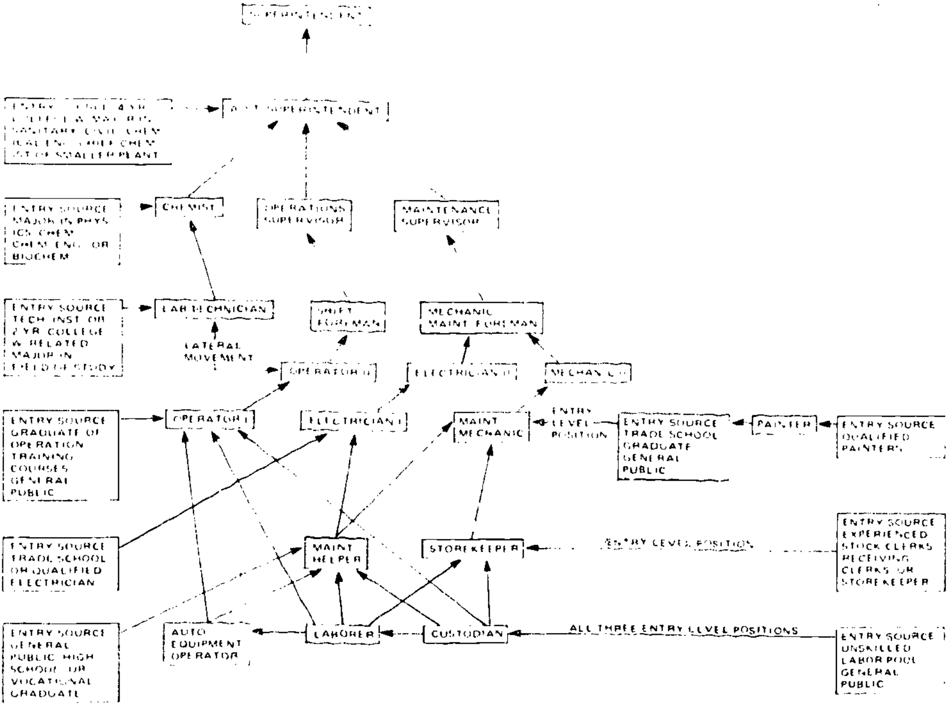


Figure 5.1. Career Ladder for a 50 to 100 mgd Wastewater Treatment Plant

MDS) shows a schematic of a career ladder. The manpower planner should construct the relevant figure for his state. More quantitative aspects [illegible] career ladders will be considered in Applied Step 5.

Applied Step 2: Determine the relationship between objectives of the state water pollution control agency and the objectives of manpower planning.

The purpose of this operation is to provide the manpower planner with a simple set of guidelines to assess the progress his agency has made in achieving its objectives of water pollution control. As a unit of government, the state water pollution control agency will be responsive to and its success dependent upon: (1) legislative authority, (2) program activities, and (3) available resources. A familiarity with these important elements will permit the manpower planner to make judgments concerning the direction of his agency and the progress it is making in pursuit of specified objectives.

A. *Legislative Authority*

The manpower planner should do the following tasks:

(1) Cite and describe the state and federal legislative authority that defines the missions of water pollution control in his state. Cite the title of the law or laws, or report on the progress of any legislation currently under consideration by the state legislature that will modify in any substantial way the goals or objectives of the state water pollution control agency.

(2) Comment upon any relevant policy directives that have significant manpower implications.

B. *Water Quality Uses and Criteria*

(1) Because water quality standards represent specific benchmarks for evaluating a state's progress in bringing water pollution under control, briefly describe the progress made by the state in establishing water quality standards on both interstate and intrastate waterways.

(2) What is the status of the water uses inventory?

(3) What is the status of the establishing of water quality criteria?

(4) What is the status of the state's implementation plans for municipalities only?

C. Budgetary History

The manpower planner should describe the agency's budgetary history for the past few years and estimate the fiscal resources the agency can anticipate to meet future needs. This task may be accomplished by completing a table such as Table 5-2:A.

TABLE 5-2:A

State Budgetary History and a Tentative Forecast for Construction and Grants to Municipalities for Wastewater Treatment Plants
1969-1976
(Millions of dollars)

	1969	1970	1971	1972	1976
FEDERAL SHARE					
STATE SHARE					
LOCAL SHARE					
TOTAL					

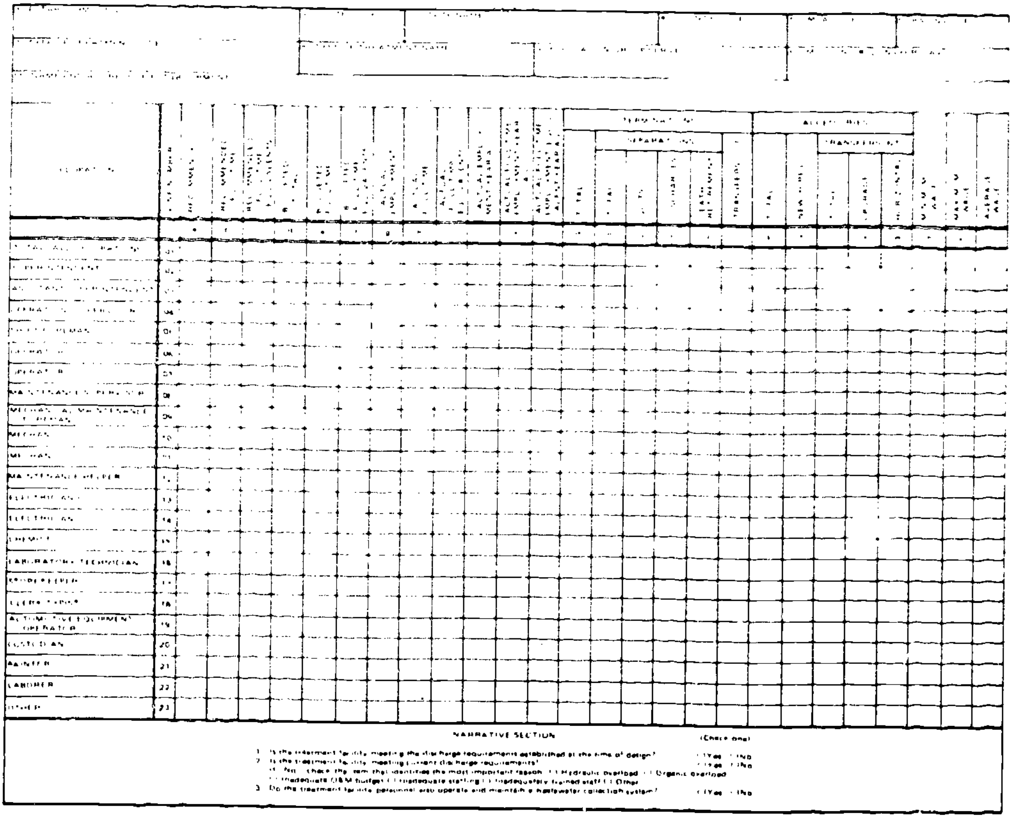
Applied Step 3: Determine selected characteristics of current and expected employment.

The DOL/EPA survey of wastewater treatment plants was done on a sample basis, and the resulting data inflated so as to apply to the universe of plants. In the future, information on the universe of plants should be obtained. The most probable source of acquiring the needed information is through the inspections currently managed (and currently being expanded) by the staff concerned with the operation and maintenance of wastewater treatment plants. Should this opportunity not be available in the manpower planner's state, he should consider circulating a form such as the instrument shown as Table 5-3:A.

We shall refer to this instrument simply as the "data form" throughout this chapter.

TABLE 5-3:A

Wastewater Treatment Plant Data Form



Once the data form has been completed, the manpower planner should make certain calculations. We shall illustrate the relevant tables in which to record these calculations but shall do so only for the occupation noted as Operator I—it being already understood that similar calculations should be made for the remaining occupations. Occasionally in following discussions, we shall use a table that contains all of the occupations, and we do this at those times when it seems appropriate to remind the manpower planner that master tables should occasionally be made which summarize the results of several calculations.

It is quite possible that a data collection system for each wastewater treatment plant in the state will be unnecessary if measures can be adopted by which existing manpower data can be simply updated on a continuing basis. Perhaps the simplest way to accomplish this would be to have the manpower planner return a previously completed copy of the data form to the person in charge of the wastewater treatment plant to make the necessary changes. Because the manpower planner must depend upon the plant manager for the correctness of his data, the more demands the planner places upon the manager's own data system, the less accurate are the data received most likely to be. This observation implies that the manpower planner should ask only for "raw data" and not request that the plant manager make certain calculations.

A. Measuring Current Employment Characteristics

From the preceding data form (Table 5-3:A) and from the DOL/EPA survey in Appendix I, information to complete Table 5-3:B may be obtained. Columns 2 through 4 in this table are obtained by summing, for each occupation, columns *e*, *c*, and *a* in questionnaire A of the DOL/EPA survey. (This information is also available directly from Table 1 compiled from the DOL/EPA survey that should have been compiled in completing the DOL/EPA survey.) From the data form for wastewater treatment plants, when completed, the relevant totals are obtained from columns *a*, *d*, and *g*, respectively.

TABLE 5-3:B

Alternative Measures of Employment by Occupation

(1) OCCUPATION	(2) RECOMMENDED EMPLOYMENT	(3) BUDGETED EMPLOYMENT	(4) ACTUAL EMPLOYMENT
OPERATOR I			

Table 5-3:C may be completed from information in Table 5-3:B in the following manner: column 2 is obtained by sub-

tracting column 3 from column 2 in Table 5-3:B: column 3 by subtracting column 4 from column 3; and column 4 by either adding columns 2 and 3 in Table 5-3:C or subtracting column 4 from column 2 in Table 5-3:B.

TABLE 5-3:C

Shortfalls and Vacancies by Occupation

(1) OCCUPATION	(2) BUDGET SHORTFALL	(3) VACANCY	(4) EMPLOYMENT SHORTFALL
OPERATOR I			

Table 5-3:D is completed by dividing columns 2, 3, and 4 in Table 5-3:C by column 4 of Table 5-3:B. The data in Table 5-3:D are free of scale effects, so that meaningful intraoccupational comparisons can be made. (Such comparisons will be made in Applied Step 4.)

TABLE 5-3:D

Shortfall and Vacancy Rates by Occupation

(1) OCCUPATION	(2) BUDGET SHORTFALL RATE	(3) VACANCY RATE	(4) EMPLOYMENT SHORTFALL RATE
OPERATOR I			

In Table 5-3:E data on terminations and accessions are displayed. From the data form the total number of terminations is the sum of column *m*, while separations are the sum of column *n*. The components of separations are, in order, the sums of columns *o* through *q*. The total number of transfers out is the sum of column *r*. From the DOL/EPA survey the total number of terminations is the sums of columns *m* and *n* as appropriately inflated. Separations are the sum of column *n*, with quits being the sum of column *o*, and transfers out are the sum of column *m*. Additional detail on the components of separation is not available from the DOL/EPA survey.

TABLE 5-3:E

Terminations and Accessions by Occupation

OCCUPATION	TERMINATIONS							ACCESSIONS			
	TOTAL	SEPARATIONS				TRANSFERS OUT	TOTAL	NEW HIRES	TRANSFERS INTO		
		TOTAL	QUITS	DISCHARGES	DEATH RETIREMENT				TOTAL	UPGRADE	HORIZONTAL
OPERATOR I											

For accessions we have from the data form the total number as the sum of column *s*. For the components we have new hires from column *t*; and for transfers into and its components, we have columns *u*, *v*, and *w*. Total accessions from the DOL/EPA survey are obtained from column *i*, with new hires from column *j*, and transfers into from column *l*. Further detail is not easily or accurately available from the DOL/EPA survey.

Total termination and accession rates are most appropriately computed by using current actual employment as the denominator or base. Their major components—separations and transfers out; new hires and transfers into—could be expressed in two alternative forms: The first form would use current actual employment as a base, while the second would use the number of terminations and accessions, respectively, as the bases. The remaining components such as quits, discharges, upgrades, etc., could be expressed by using the previously mentioned bases but may also be used for a base, as applicable: separations, transfers out, new hires, or transfers into. Which of these alternative bases is eventually chosen will depend upon the uses to which the resulting rates are to be put. Since the most frequently used rate would be that using actual employment as a base, it is such a rate that is entered into Table 5-3:F. Other tables could be displayed using the alternative bases and could, for convenience, be listed as Tables 5-3:Fi, Fii, etc.

TABLE 5-3:F

Termination and Accession Rates by Occupation

OCCUPATION	TERMINATION RATE						ACCESSION RATE				
	TOTAL	SEPARATIONS				TRANSFERS OUT	TOTAL	NEW HIRES	TRANSFERS IN		
		TOTAL	QUITS	DISCHARGES	DEATH OR RETIREMENT				TOTAL	UPGRADE	HORIZONTAL

All of the preceding tables were concerned with data that were relevant to the state as a whole. The manpower planner should now complete similar tables but for data according to size of plant, type of treatment, and plant location. To do this, he must decide upon the division of his state's plants according to type, size, and location. In the tables that follow in the sequel, we shall assume a division by type and size similar to that used in the DOL/EPA survey of four types of treatment (i.e., two primary and two secondary) and five size classifications. Since a manpower planner in a particular state—as dictated by the specific characteristics of his state's wastewater plant system—may wish to use a different classifying of plants, we shall refer to type of treatment by the codes *A*, *B*, *C*, and *D*, and size of plant by the codes 1, 2, 3, 4, and 5.

We shall not display the tables that would be the counterparts to Tables 5-3:B through F, for they would be repetitive and used more in the nature of worksheets for those tables which we shall illustrate immediately below. In Tables 5-3:G through J, certain information is listed according to type and size of plant. This information will be useful in noting differences among plants according to type and size and will be the basis for some of the analyses introduced in Applied Step 4.

To complete Table 5-3:G, the manpower planner should enter the level of recommended, budgeted, and actual employment, in that order, in subcells *a*, *b*, and *c*.

TABLE 5-3:G

Comparison of Alternative Employment Concepts by Type and Size of Wastewater Treatment Plant for Operator I

Type of Treatment	Size of Plant					Av. for Given Type
	1	2	3	4	5	
A	a. b. c.					
B	a. b. c.					
C	a. b. c.					
D	a. b. c.					
Av. for Given Size						

In Table 5-3:H, the shortfall and vacancy rates should be displayed. Listed in order, these will be: budget shortfall rate, vacancy rate, and employment shortfall rate. These will be entered in subcells *a*, *b*, and *c*.

In Table 5-3:I, termination rates by type and size of plant are displayed. The three numbers are, in order: termination rate, separation rate, and transfer out rate. These will be entered in subcells *a*, *b*, and *c*.

In Table 5-3:J, the components of the separation rate are displayed. They are, in order: quit rate, discharge rate, and death and retirement rate. These will be entered in subcells *a*, *b*, and *c*.

TABLE 5-3:H

Comparison of Shortfall Vacancy Rates by Type and Size of Wastewater Treatment Plant for Operator I

Type of Treatment	Size of Plant					Av. for Given Type
	1	2	3	4	5	
A	a. b. c.					
B	a. b. c.					
C	a. b. c.					
D	a. b c.					
Av. for Given Size						

TABLE 5-3:I

Comparison of Termination Rates by Type and Size of Wastewater Treatment Plant for Operator I

Type of Treatment	Size of Plant					Av. for Given Type
	1	2	3	4	5	
A	a. b. c.					
B	a. b. c.					
C	a. b. c.					
D	a. b. c.					
Av. for Given Size						

TABLE 5-3:J

Comparison of Separation Rates by Type and Size of Wastewater Treatment Plant for Operator I

Type of Treatment	Size of Plant					Av. for Given Type
	1	2	3	4	5	
A	a. b. c.					
B	a. b. c.					
C	a. b. c.					
D	a. b. c.					
Av. for Given Size						

B. Projecting Future Employment Characteristics

It was stated in Chapter Four that projections of actual employment would be based upon the projections of recommended employment. The projections of recommended employment could, in principle, be obtained in two alternative ways:

(1) From the manpower information system to be implemented for manpower planning for wastewater treatment plants

(2) From estimates based upon the construction grants process

  (a) Either directly from the staff concerned with municipal wastewater facilities or

  (b) Indirectly on the basis of information concerning new and expanded plants within the state and upon information contained in the staffing guides

None of these methods is completely satisfactory and the merits of each should probably be combined.

The projections obtained from the manpower information system for wastewater treatment plants could be obtained in the same way as such estimates were obtained in the DOL/EPA survey. In that survey plant managers were asked to use whatever means were at their disposal to project future recommended employment in their particular plants, while various municipal officials were surveyed to determine the completion dates of new plants, and estimates of expected future employment were then made with regard to such plants.

The second alternative would be to obtain from the staff concerned with the operation and maintenance of wastewater treatment plants the manpower data required in the various forms used in the construction grants process, and then add to this the estimates of any changes in recommended employment in existing plants. If manpower data are not available directly from the operations and maintenance staff, the manpower planner must generate his own estimates.

With the manpower information system currently being developed by OWP, coupled with the incentive that most states would have in maintaining a good data base on which to make projections of construction and financial needs in the area of water pollution control, it would seem reasonable to expect that the manpower planner could obtain estimates of additions to recommended employment directly from the staff concerned with the operation and maintenance of wastewater treatment plants. Many states have for several years collected the data that are necessary to complete the first three columns of Table 5-3:K, and with the advent of new federal reporting procedures, the data necessary to complete the remaining columns will be available.

Should projections of additions to recommended employment from new plants not be available directly from the municipal facilities office, it will then be necessary for the manpower planner to rely upon the information he obtains from conducting his employment survey or by making his own projections. He can make such projections by obtaining information such as that contained in the first three columns of Table 5-3:K and

TABLE 5-3:K

New Plants and Their Recommended Employment Listed in Order of Projected Construction Completion Dates

TYPE	SIZE	COMPLETION DATE	RECOMMENDED EMPLOYMENT
			OPERATOR I

combining it with information readily available from the staffing guides. Hence if the manpower planner knows that a plant of a given type and given size is to come on line in six months, he can then obtain from the staffing guide relevant to such a plant a tolerable approximation to the additions to recommended employment by occupation sufficient to complete Table 5-3:K.

The recommended employment listed in Table 5-3:K should be added for each year in the planning horizon and entered into a table such as Table 5-3:L.

TABLE 5-3:L

Additions to Recommended Employment from New Plants by Year

OCCUPATION	YEAR				
	1972	1973	1974	1975	1976
OPERATOR I					

From the staff concerned with municipal facilities or from the annual updating of the data form, the manpower planner will obtain estimates of changes in recommended employment for existing plants that are being modified in some way. Such information may be entered in a table such as Table 5-3:M.

TABLE 5-3:M

Additions to Recommended Employment from Existing Plants by Year

OCCUPATION	YEAR				
	1972	1973	1974	1975	1976
OPERATOR I					

To determine the projected level of employment for next year, the manpower planner adds to recommended employment for this year the total of additions to recommended employment from new plants and the changes in recommended employment from the modification of existing plants. The manpower planner may accumulate this total for each year in the planning horizon and may complete a table such as Table 5-3:N.

TABLE 5-3:N

Recommended Employment by Year and by Occupation

OCCUPATION	RECOMMENDED EMPLOYMENT					
	1971	1972	1973	1974	1975	1976
OPERATOR I						

Before estimates of actual employment can be obtained, it is necessary to determine the value of *P*, the factor of proportionality between actual and recommended employment, for the state as a whole and the various occupations separately. This can be done quite simply by dividing actual by recommended employment. We show the format for displaying such calculations as Table 5-3:O.

TABLE 5-3:O

Factors of Proportionality between Actual and Recommended Employment by Occupation

OCCUPATION	RECOMMENDED EMPLOYMENT	ACTUAL EMPLOYMENT	$\frac{\text{ACTUAL}}{\text{RECOMMENDED}} = B$
OPERATOR I			

The factors of proportionality displayed in the previous table are most applicable for the first year in the planning horizon. If it is anticipated, for whatever reason, that actual employment will change relative to recommended employment throughout the planning horizon, such changes should then be incorporated into the value of the *P*s that are used in future time periods. To record the changes, if any, in the expected value of the factors of proportionality, the manpower planner should construct a table such as Table 5-3:P. This table will also provide the manpower planner with a record by which at some future date he may check the accuracy of his projections concerning the relationships between actual and recommended employment.

TABLE 5-3:P

Factors of Proportionality by Occupation and Year

OCCUPATION	YEAR					
	1971	1972	1973	1974	1975	1976
OPERATOR I						

To obtain estimates of actual employment, the manpower planner should multiply the estimates of recommended employment in Table 5-3:N by the factors of proportionality in Table 5-3:P with the results entered into a table such as Table 5-3:Q.

TABLE 5-3:Q

Estimates of Actual Employment by Year and Occupation

OCCUPATION	ACTUAL EMPLOYMENT					
	1971	1972	1973	1974	1975	1976
OPERATOR I						

C. *Additional Manpower Needs*

By additional manpower needs, we mean the additional workers required in order that the effective demand for workers be satisfied. Such needs arise because people terminate employment and also because growth occurs in employment. Estimates of the additional workers that will be needed because of termination may be obtained by multiplying the estimate of actual employment by the termination rate. If E_i denotes actual employment in the ith year and t_i the termination rate, then the additional manpower needed in 1972 due to terminations would equal $t_{71}E_{71}$. Actually, since employment changes throughout the year, a better estimate would be to compute the average employment for 1971 and 1972 and multiply it by the termination rate for 1971. Since employment and termination rates are available by occupation, this calculation can be done for each occupation.

Additional needs due to growth may be computed simply by subtracting actual employment of one year from actual employment of a succeeding year. Hence, for 1972 the additional needs due to growth would simply be $E_{72} - E_{71}$.

Needs arising from the growth of employment may be further separated according to whether the growth comes from new and expanded plants or from certain changes in the employment practices within wastewater treatment plants. Those changes that we specifically have in mind are the possible decreases in the employment shortfall. Insofar as changes in the factor of proportionality were assumed in estimating future actual employment, then implicit in such estimates was the assumption that changes in the employment shortfall would occur. Insofar as the manpower planner feels it beneficial to separate the effects of growth into these two components, he may do so by estimating future actual employment on the assumtpion that the factor of proportionality does not change—which, upon subtracting succeeding estimates, gives additional manpower needs due to new and expanded plants only—and then multiplying actual employment by additions to the factor of proportionality to obtain increased manpower needs from changes in employment practices.

The above calculations should be made for each occupation and entered into a table such as Table 5-3:R. The totals from such tables can then be shown in a format such as Table 5-3:S. These two tables are shown in their entirety.

TABLE 5-3:R

Additional Manpower Needed by Source for Operator I from 1972 to 1976

REASONS FOR ADDITIONAL MANPOWER	YEAR				
	1972	1973	1974	1975	1976
1. TERMINATIONS IN CURRENT EMPLOYMENT					
2. GROWTH IN CURRENT EMPLOYMENT					
a. NEW AND EXPANDED PLANTS					
b. DECREASE IN EMPLOYMENT SHORTFALL					
TOTAL					

TABLE 5-3:S

Additional Manpower Needed by Occupation from 1972 to 1976

OCCUPATION	YEAR				
	1972	1973	1974	1975	1976
TOTAL (ALL OCCUPATIONS)					
SUPERINTENDENT					
ASSISTANT SUPERINTENDENT					
OPERATIONS SUPERVISOR					
SHIFT FOREMAN					
OPERATOR II					
OPERATOR I					
MAINTENANCE SUPERVISOR					
MECHANICAL MAINTENANCE FOREMAN					
MECHANIC II					
MECHANIC I					
MAINTENANCE HELPER					
ELECTRICIAN II					
ELECTRICIAN I					
CHEMIST					
LABORATORY TECHNICIAN					
STOREKEEPER					
CLERK TYPIST					
AUTOMOTIVE EQUIPMENT OPERATOR					
CUSTODIAN					
PAINTER					
LABORER					
OTHER					

The final task in executing Applied Step 3 is to estimate the sources from which the additional manpower needs are most likely to be obtained. To accomplish this, we turn to the various components of the accession rate. For purposes of exposition, note that the major components of accessions are "new hires" and "transfers into." If these rates were, for example, 1/3 and 2/3, expressed as a percentage of total accession, and an additional 12 workers were needed within the coming year, then on the basis of past experience, and in the absence of additional information, it would be reasonable to estimate that three would come from new hires and nine from transfers into the occupation.

Care should be exercised in this matter, however, to assure that this estimating procedure be adjusted if additional evidence exists. If, for example, it had been discovered that, on the average, 50 percent of new Operator IIs came from the ranks of Operator Is and that, due to some change in the plant operation, additional Operator IIs were needed to such an extent that 50 percent of the increase would be greater than all employees in the Operator I category, then the preceding technique would have to be adjusted.

In a table such as Table 5-3:T the estimates of additional manpower needed in a specific year should be entered, and then, on the basis of existing data concerning the various components of accessions, estimates should be made on the most likely source of such manpower. Such information will be invaluable in designing training programs since the presumed background of the new workers may have significant effects upon the contents of the training program.

TABLE 5-3:T

Sources of Additional Manpower by Occupation

OCCUPATIONS	ADDITIONAL MANPOWER NEEDED	SOURCE OF ADDITIONAL MANPOWER		
		NEW HIRES	TRANSFERS INTO	
			UPGRADE	HORIZONTAL
OPERATOR I				

Applied Step 4: Analyze manpower problems.

The basic problems that the manpower planner will wish to investigate in this section are related to the recruitment, retention, and utilization of personnel. It is first required that he determine whether such problems exist. When such a determination is made, it should be noted that certain types of evidence may be related to more than one problem area. Thus, for example, high vacancy rates may be indicative of both recruitment and retention problems. This observation is simply a way of noting that the three manpower problems under investigation are themselves interrelated. Having called such interrelationships to the attention of the manpower planner, we shall, nevertheless, consider each of the three problems separately for each has certain unique characteristics.

A. Recruitment

Evidence that recruitment is a problem would be indicated by:

(1) High vacancy rates

(2) Excessive use of part-time personnel

(3) Poor quality of recruits

Judgmental decisions will be required in determining what is "high," "excessive," and "poor." Such decisions may be aided, however, by collecting and comparing certain data. To determine whether vacancy rates are "high," the manpower planner should:

(1) Compare vacancy rates for occupations within wastewater treatment plants to determine whether there is significant variation among occupations

(2) Compare the vacancy rate for each occupation with the vacancy rate, wherever possible, for occupations requiring similar skill and educational background

A comparison of vacancy rates for occupations within wastewater treatment plants will be facilitated by listing occupations, in decreasing order, according to their vacancy rates. This would be accomplished by completing Table 5-4:A.

TABLE 5-4:A

Rank Order of Occupations by Vacancy Rate

OCCUPATIONS RANKED ACCORDING TO DECREASING VACANCY RATE (1)	VACANCY RATE (2)

With the help of individuals located in the state employment service, the manpower planner could complete a table such as Table 5-4:B. Column 1 lists occupations for wastewater treatment plants and column 2, the vacancy rate for each occupation. Columns 3 and 4 display the high, low, and average vacancy rates for occupations having similar skill or educational requirements.

TABLE 5-4:B

Comparison of Vacancy Rates in WWTPs with Occupations Requiring Similar Skills and/or Education

		VACANCY RATES FOR OTHER OCCUPATIONS		
OCCUPATION (1)	VACANCY RATE (2)	HIGH (3)	LOW (4)	(UNWEIGHTED) AVERAGE (5)

Evidence that there was an excessive use of part-time personnel would be obtained from a comparison of actual part-time to recommended part-time employment. To facilitate the comparison, Table 5-4:C should be completed.

TABLE 5-4:C

Comparison of Actual Part-time with Recommended Part-time Workers

OCCUPATIONS (1)	NUMBER OF PART-TIME WORKERS		PART-TIME RATES		ACTUAL PART-TIME RATE / RECOMMENDED PART-TIME RATE
	RECOMMENDED (2)	ACTUAL (3)	RECOMMENDED (4)	ACTUAL (5)	(6)

In Table 5-4:C both the numbers and rates of part-time workers are shown. The rates are displayed to eliminate possible scale effects. It may be possible, however, to have a difference between recommended and actual part-time workers yet have equality in the part-time rates. This would reflect a problem not so much of incorrect use of part-time workers but rather one of having differences between recommended and actual employment. Column 6 lists the ratio of the part-time ratios. A value of unity indicates that recommended and actual part-time rates are equal, a value less than unity indicates that the actual part-time rate is less than the recommended part-time rate, and a value greater than unity indicates a higher part-time rate for actual employment than for recommended employment.

Evidence to discriminate among the quality of possible recruits will be quite difficult to obtain for most manpower planners, given the resources at their disposal. A table could be constructed from data that the manpower planner may obtain from those individuals working in the training office and from Tables F-5 through F-11 in the *Manpower Report of the President* (MRP) by which a comparison of the quality of recruits could be made. In Table 5-4:D we display a format that would facilitate such a comparison.

If it is possible to complete all or part of Table 5-4:B, those occupations in wastewater treatment plants having higher vacancy rates than the average of other occupations would be candidates for further study. If Table 5-4:B cannot be completed, those occupations ranked at the top of Table 5-4:A should be considered further. How far down the rank ordering

TABLE 5-4:D

Comparison of New Recruits for the Positions of Operators I and II with Enrollees in Various Training Programs

CLASSIFICATION	PERCENTAGE HAVING YEARS OF SCHOOL COMPLETED				
	UNDER 8 YEARS	8 YEARS	9-11 YEARS	12 YEARS	OVER 12 YEARS
OPERATOR I					
INSTITUTIONAL TRAINING PROGRAMS UNDER MDTA (MRP, Table F-4)					
OJT TRAINING PROGRAMS UNDER MDTA (MRP, Table F-7)					
OPERATION MAINSTREAM PROJECT (MRP, Table F-10)					
NEW CAREERS PROJECT (MRP, Table F-10)					
CIVILIAN LABOR FORCE 25 YEARS AND OLDER (MRP, Table E-10)					
OTHER OCCUPATIONS OF SIMILAR SKILL REQUIREMENTS					

of occupations the manpower planner will go will depend upon the resources at his disposal and his judgmental decision as to what constitutes high or "ir[illegible]rable" vacancy rates.

Similar procedures should be followed in determining whether "excessive" use of part-time personnel is occurring. Those occupations for which the ratio

$$\frac{\text{actual part-time rate}}{\text{recommended part-time rate}}$$

is other than unity should be investigated further. Greatest concern would appear to be warranted when the ratio is greater than unity. Should those occupations so characterized also be those ranked high according to vacancy rates, additional cause exists to investigate such occupations further.

The manner in which additional investigations should be made will be discussed after we consider the problems of retention and utilization.

B. Retention

Evidence that retention is a problem could be obtained by analyzing the various components of the termination rate. Those components that would be the most relevant to investigate would be quits and discharges. High quit rates would be evidence of voluntary separation from the plant, for a variety of possible reasons, while discharges would be indicative of involuntary separations. Again, however, benchmarks to determine normality are not easily available, and judgmental decisions will have to be made. To facilitate these decisions, an ordering of occupations according to quit and discharge rates ought to be made. This would require the completion of a table such as Table 5-4:E.

TABLE 5-4:E

Rank Order of Occupations According to Quit and Discharge Rates

QUIT RATE	RANK ORDER OF OCCUPATION	RANK ORDER OF OCCUPATION	DISCHARGE RATE

C. Utilization

The utilization of personnel is an issue most appropriately investigated by the staff concerned with the operation and management of wastewater treatment plants. Nevertheless, there is one way of displaying certain data already computed that would, from the manpower planner's perspective, indicate those occupations where some problems with utilization might exist. Insofar as shortfalls may indicate the presence of utilization problems, a rank ordering of occupations according to shortfall rates would at least indicate, in a simple manner, those occupations where utilization may be a problem. This procedure would require the completion of Table 5-4:F. In this table we have allowed for a ranking as the basis of budget shortfall and employment shortfalls.

TABLE 5-4:F

Rank Order of Occupations By Shortfall Rates

BUDGET SHORTFALL RATE	OCCUPATION	OCCUPATION	EMPLOYMENT SHORTFALL RATE

In summarizing all of the preceding work in this step and in preparing for the analysis of the possible determination of manpower problems, the manpower planner should complete a table such as Table 5-4:G. Using the value of 1 to denote the occupation having the highest rate for a particular variable, we could rank all occupations according to the various problem areas. From such a table those occupations appearing to rank high in all or many areas should be the first ones considered for further study.

To help determine which occupations are primary candidates for further study, the manpower planner should compute the average rank. This would require the summing of all the points for each occupation in Table 5-4:G, dividing by 5, and then ranking the occupations from low value to high value as in Table 5-4:H. The occupations having the lowest average value are those that would seem to be experiencing the more serious problems.

Upon determining whether certain problems exist or, alternatively, after determining whether the value of some

TABLE 5-4:G

Rank Ordering of Occupations According to Several Possible Problem Areas

OCCUPATION TITLE (1)	OCCUPATION RANK [illegible]				
	VACANCY RATE (2)	PART-TIME RATE (3)	QUIT RATE (4)	DISCHARGE RATE (5)	EMPLOYMENT SHORTFALL RATE (6)
SUPERINTENDENT					
ASSISTANT SUPERINTENDENT					
OPERATIONS SUPERVISOR					
SHIFT FOREMAN					
OPERATOR II					
OPERATOR I					
MAINTENANCE SUPERVISOR					
MECHANICAL MAINTENANCE FOREMAN					
MECHANIC II					
MECHANIC I					
MAINTENANCE HELPER					
ELECTRICIAN II					
ELECTRICIAN I					
CHEMIST					
LABORATORY TECHNICIAN					
STOREKEEPER					
CLERK TYPIST					
AUTOMOTIVE EQUIPMENT OPERATOR					
CUSTODIAN					
PAINTER					
LABORER					

variable constitutes a problem, the manpower planner should attempt to determine the cause of the problem. This is an area of analysis that many state agencies may find difficult to complete because of inadequate resources. Nevertheless, the manpower planner should attempt to ascertain the principal causes of the problem. Primary candidates for the causes of many

TABLE 5-4:H

Rank Order of Occupations According to the Average Value of Several Possible Problem Areas

OCCUPATION	AVERAGE VALUE OF RANK ORDER

problems are low wages, poor working conditions, lack of career ladders, etc. Though it will be difficult to quantify many of these variables, some attempt should be made to do so.

The types of analyses with respect to determining the possible cause of certain problems that we shall consider in this section are simple and straightforward. We shall suggest that certain scatter diagrams be computed and, on the basis of certain simple tests, will determine whether certain cause and effect relationships exist. When the type of analysis that we are about to suggest is conducted, it is necessary that certain computations be made which involve the obtaining of average values for certain variables and the difference between the average and individual values. For example, if we denote that the wage rate for a particular computation in the ith plant within the state was W_i, then the average wage rate will be noted as $\overline{W}$. The difference between the average wage and the individual wage will be noted as $(\overline{W} - W_i)$. The proportional difference as $(\overline{W} - W_i)/\overline{W}$. Hereinafter, the proportional difference in wages will be noted as w^*.

We may do similar computations for other variables such that we would have the following set of definitions:

v^* = proportional difference in vacancy rates
p^* = proportional difference in part-time rates
s^* = proportional difference in employment shortfall rates
q^* = proportional difference in quit rates
d^* = proportional difference in discharge rates

When these computations are completed, they can be entered onto a scatter diagram such as the one shown in Figure 5.2.

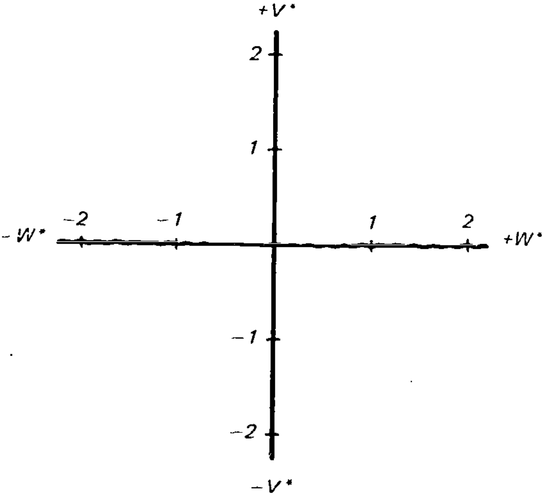


Figure 5.2. Relationship between Vacancy Rate and Wage Rate

In a diagram such as Figure 5.2 we would expect that as wages in a particular plant went above the average wage, the vacancy rate would tend to go below the average vacancy rate. Hence if there were a cause and effect relationship between wages and vacancy rates, we would expect to see a negative trend in the scatter diagram, as indicated by Figure 5.3.

A positive relationship would not be expected, and the scatter diagram depicting no definite trend, as in Figure 5.4, would be taken as partial evidence that, in the particular case at hand, there is no strong relationship between wages and vacancies.

Similar analyses could be followed for the other variables listed above. Should the scatter diagrams indicate the trends that are expected if cause and effect relationships exist, this would be a signal to the manpower planner to eliminate the problem by working on eliminating the cause of the problem. Thus, if vacancies are judged to be an important manpower

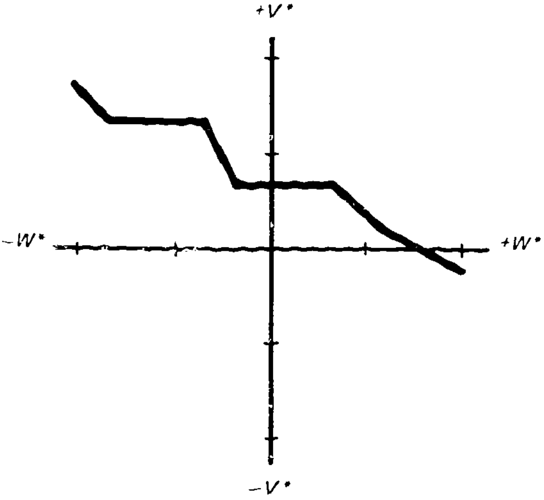


Figure 5.3. One Possible Negative Relationship between Vacancies and Wage Rates

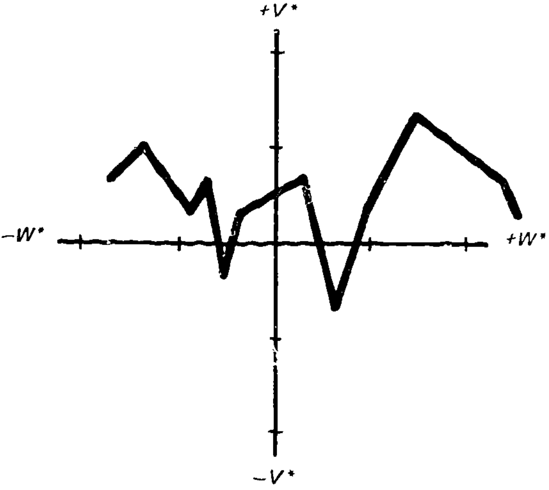


Figure 5.4. One Possible Neutral Relationship between Vacancies and Wage Rates

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problem and it is indicated that wages and vacancies are related as expected, the manpower planner should then pursue those measures aimed at increasing the wages in those plants that are below average and in raising the wages for all workers in that occupation throughout the state.

It is intended by OWP that in the near future certain types of manpower analyses will be computerized. Thus the type of analyses that we have just reviewed will be done more rigorously by using sophisticated statistical techniques and the facilities of the STORET system. Until such time as these analyses are available, however, it will be helpful to the manpower planner to perform the types of analyses we have suggested.

Applied Step 5: Develop training plans and action steps in response to current and expected manpower training needs.

In the execution of this step, the manpower planner seeks to compile data and develop plans concerning the kind of training that is to be provided in the state, the location within the state for this training, and the number of people who should participate. Training programs may in general be classified as training for: (1) entry-level positions or (2) skill improvement. Training programs for skill improvement may be further differentiated according to whether the training is: (1) to upgrade the skills of workers who are currently employed but who are, for example, transferring from one occupation to another, or (2) to update certain skills that may have become obsolete because of technological change within an occupation. Training programs for occupations within wastewater treatment plants should also be differentiated according to the type and size of plant in which the trainee is to be employed. In consultation with the staff concerned with training and with the staff concerned with the operation and maintenance of wastewater treatment plants, the manpower planner may group the plants within his state by type and size according to the similarity of their training needs.

The quantitative dimensions of the required training capacity for these general types of training may be determined by data obtained in the execution of the state's training needs for a given occupation, plant classification, and year and may be displayed in a table such as Table 5-5:A. Within each general classi-

TABLE 5-5:A

Total Training Needs for Operator I[a] for 1972

TYPE OF TRAINING 1	NUMBER TO BE TRAINED 2	NUMBER TRAINED LAST YEAR 3	TRAINING COST LAST YEAR 4	CHANGE IN NUMBER TO BE TRAINED (2-3) 5	ESTIMATED TRAINING COST THIS YEAR 6	CHANGE IN TRAINING COST 7
ENTRY LEVEL						
UPGRADE						
UPDATE						
TOTAL						

[a] Although this table is generalized, the manpower planner may wish to construct a similar table for each plant classification that has common training requirements.

fication of training, the manpower planner should determine the number that should be trained, the number trained last year, and the difference between these numbers. The numbers entered in column 2 are those that have been measured in the various substeps of Applied Step 3, the data displayed in column 4 will be a measure of the required increase in the state's training capacity. The remaining columns give some insight into the dimensions of the budgetary aspect of satisfying the estimated training needs of the state.

Each of the aggregate training statistics can be broken down into finer detail for each of the general classifications of training. In Table 5-5:B we illustrate the format for such data

TABLE 5-5:B

Training Needs for Entry-Level Training for Operator I[a] for 1972

TRAINING PROGRAM CODE 1	TYPE OF TRAINING (OJT, INSTITUTIONAL, COURSES, ETC.) 2	SUGGESTED LOCATION FOR TRAINING 3	NUMBER TO BE TRAINED 4	NUMBER TRAINED LAST YEAR 5	CHANGE IN TRAINING NEED 6	ESTIMATED TRAINING COST 7	[illegible] CHANGE 8

[a] Although this table is generalized, the manpower planner may wish to construct a similar table for each plant classification that has common training requirements.

for entry-level training. (Similar data should be obtained and displayed for upgrade and update training.) It will, of course, be important for the manpower planner to determine and then record the manner in which training will be given—Will it be

OJT, institutional, or coupled training? This information, along with information concerning the geographical distribution of the required training, will help in determining the location for such training. The remaining columns follow the pattern of Table 5-5:A by seeking to illustrate the magnitude of the changes in training needs and the relevant budgetary requirements of satisfying such changes.

On occasion there may be some difficulties [illegible] determining where the manpower planning process ends and the role of manpower training begins. This is not a distinction to belabor, though the fact that it may exist indicates the nature of other types of information that must be provided in order that adequate training programs can be developed. Before individuals have been recruited into a training program the content of such a program should be determined by the [illegible] work that the trainee will be expected to perform. For [illegible]ason the manpower planner should provide the staff of the training office of his state agency (should such an office be separate from the manpower planner's office) with the relevant occupation descriptions for his state. Such descriptions will list the general educational, specific vocation educational, and skill requirements for various occupations. These descriptions will, in turn, help to determine the contents of the training programs. Furthermore, the occupation description should refer to the specific categories of training within the state. This should be done in that section of the occupation description which delineates specific vocational training.

To help those concerned with training to adjust their curriculum to the characteristics of the labor force that is recruited to the positions, the manpower planner should prepare a table such as that displayed in Table 5-5:C. Such information gives those working in the training office an estimate of the raw material with which they will work.

In a number of states certification programs for positions within wastewater treatment plants have been or may shortly be introduced. Such programs often call for a training response. To display the important data relevant to training needs for certification, the manpower planner should complete a table such as Table 5-5·D. In addition to such data the manpower planner should provide a verbal description of the nature of the certifi

TABLE 5-5:C

Characteristics of Individuals Participating in Training Programs for Operator I for 1971

[illegible]

TABLE 5-5:D

Characteristics of Certification Program by Occupation for 1972

OCCUPATION	NUMBER EMPLOYED	NUMBER THAT REQUIRE CERTIFICATION	PERCENT OF THOSE WHO NEED CERTIFICATION	NUMBER CERTIFIED LAST YEAR	CERTIFICATION CLASSIFICATION
OPERATOR I					

cation program which would include a description of the skills that a worker will be required to have. Such a description will be similar to the occupation description, as adjusted for the peculiarities of his state, displayed in Applied Step 3.

A final task that the manpower planner should perform relates to the nature of career ladders within his state's wastewater treatment plant system. Career ladders provide an opportunity for advancement within the occupational structure of a wastewater treatment plant. The typical routes for such advancement within the manpower planner's state system should be documented. This can be done verbally, diagramatically, or by the use of a table. We have illustrated in Figure 5.1 in this chapter one possible system of career ladders. From the figure the outlines of a table such as Table 5-5:E can be constructed such that when the relevant data have been entered into the tables, some quantification of the extent of career ladders within the state is available, though such quantification may vary according to plant size. From Table 5-5:E we may conclude, for

TABLE 5-5:E

Quantitative Description of Career Ladder for Operator I for 1971

OCCUPATIONS FROM WHICH WORKERS HAVE TRANSFERED INTO OPERATOR I CLASSIFICATION (1)	NUMBER OF ACCESSIONS INTO OPERATOR I (2)	PERCENT OF ACCESSIONS FROM THIS SOURCE (3)
LABORER		
AUTO EQUIPMENT OPERATOR		
CUSTODIAN		
TOTAL		

example, that the higher the percentage in each row of column 3, the more the occupation in question is a source of advancement to Operator I classification, and the more important is such an occupation in the career ladder structure of the wastewater treatment plant. In Table 5-5:Ei we have a table illustrat-

TABLE 5-5:Ei

OCCUPATIONS TO WHICH WORKERS HAVE TRANSFERED FROM OPERATOR I CLASSIFICATION	NUMBER OF TRANSFERS FROM OPERATOR I	PERCENT OF TRANSFERRED FROM OPERATOR I
OPERATOR II		
FOREMAN		
OPERATIONS SUPERVISOR		
TOTAL		

ing transfers out of Operator I with similar conclusions to be drawn from this table as from Table 5-5:E.

Much of the information that is necessary in the execution of this planning step will have to be obtained from sources not previously mentioned. It should be possible, for example, for some of the training data to be obtained from the staff concerned with training wastewater treatment personnel within the state. Other information, such as the educational profile, is most appropriately obtained by distributing a questionnaire to each employee in the state's wastewater treatment plant system. In Appendix III we display a questionnaire recently circulated by Michigan's Department of Public Health. The Michigan Information Form collects such data on the employee as his educational and training background, his employment record, and his certification status. From such data it will be possible to generate estimates of the educational profile of the work force for a particular occupation within the state's wastewater treatment plants. It should also be possible to determine certain aspects of training needs.

Applied Step 6: Develop and maintain a data system.

At this point in the development of a manpower planning capability in state water pollution control agencies, it would be an improvement on existing practices if the manpower planner executed the previous five steps and did so with care and conviction. In the sixth step it is suggested that the manpower planner record the output of all the previous steps, which can be conveniently accomplished by completing a table such as Table 5-6:A. Over time this table can be extended to cover more years than illustrated in this table.

It should be recalled that as a part of Applied Step 3, a data form was introduced for each wastewater treatment plant. One task that should be an important aspect of Applied Step 6 is the maintenance and expansion of this data form. Because it was unreasonable to ask those people in charge of managing a wastewater treatment plant to make certain calculations pertaining to employment within their particular plant, the data included in the data form are not as complete as the manpower planner's data system should be. It is suggested that a "summary data matrix," such as the one displayed as Table 5-6:A,

TABLE 5-6:A
Summary Data Matrix of Employment Characteristics for Operator I

CHARACTERISTICS	YEAR					
	1971	1972	1973	1974	1975	1976
RECOMMENDED TOTAL						
RECOMMENDED FULL TIME						
RECOMMENDED FULL TIME EQUIVALENTS						
BUDGETED TOTAL						
BUDGETED FULL TIME						
BUDGETED FULL TIME EQUIVALENTS						
ACTUAL EMPLOYMENT						
ACTUAL FULL TIME						
ACTUAL FULL TIME EQUIVALENTS						
ACTUAL FULL TIME EMPLOYMENT EQUIVALENTS						
ACTUAL/RECOMMENDED EMPLOYMENT						
BUDGET SHORTFALL						
BUDGET SHORTFALL RATE						
VACANCY						
VACANCY RATE						
EMPLOYMENT SHORTFALL						
EMPLOYMENT SHORTFALL RATE						
TOTAL TERMINATIONS						
SEPARATIONS						
QUITS						
DISCHARGES						
DEATH AND RETIREMENT						
TRANSFERS OUT						
ACCESSIONS						
NEW HIRES						
TRANSFERS INTO						
UPGRADE						
HORIZONTAL						
TERMINATION RATE						
SEPARATION RATE						
QUIT RATE						
DISCHARGE RATE						
DEATH/RETIREMENT RATE						
TRANSFER OUT RATE						
ACCESSION RATE						
NEW HIRE RATE						
TRANSFERS INTO RATE						
UPGRADE RATE						
HORIZONTAL RATE						
NUMBER TRAINED						
NUMBER THAT REQUIRE TRAINING						
TOTAL NUMBER CERTIFIED						
NUMBER CERTIFIED THIS YEAR						

for this reason be maintained for each plant within the state's wastewater treatment system. Such a form is not as formidable to maintain as it may first appear to be because for many plants, the entries will not change significantly from year to year. Furthermore, the information needed to update and maintain such a form, especially for the smaller plants within the state's system, could be obtained by a simple telephone call. A plant manager could have been provided with a copy of the data form for the preceding year and asked merely to report the changes in employment that may have occurred.

Applied Step 7: Monitor and Evaluate the Manpower Planning Process

This action step provides the planner with the means for measuring his effectiveness and, of equal importance, a procedure for improving the planning process. By definition, the process of planning requires both preview and review of the task to be performed. This suggests that the planner view his function as a continuous process of iteration and reiteration. The results should be a refinement of both data inputs and judgments. Evaluation, therefore, is not the final step in the planning process; it represents a milestone the planner can use to signal a return and critical review of each of the previous steps.

The initial part of the execution of this step is intended to provide the planner with a set of basic questions he will want to consider and a means for measuring the progress achieved relative to each applied step. The more frequent his review and the more specific his response, the higher the quality of the feedback into the planning process.

The manpower planner should complete Table 5-7:A, checking that statement which best describes the status of his various activities.

An important aspect of the monitoring and evaluation of the manpower planning process is the investigation of the accuracy with which the values of future manpower variables are projected. To facilitate such an investigation, the manpower planner should complete a table such as Table 5-7:B. If the numbers in column 4 are negative, the projected values are

TABLE 5-7:A

Evaluation Check-Off

Applied Step 1		Applied Step 2		Applied Step 3		Applied Step 4		Applied Step 5		Applied Step 6		Applied Step 7
Determination has not begun or has been delayed.		Study of objectives has not begun.		Design of survey has not begun.		Analysis of problems has not begun.		Action on training needs has not begun.		Data requirements are not known.		Evaluation procedure has not begun.
Study of field has begun.		Agency objectives have not begun.		Survey instrument has been developed, field tested, and data collected.		The identification of problem areas has been completed.		Contact has been established with training authorities.		Data requirements have been specified.		Evaluation procedure is being developed.
Determination of field is in progress.		Agency objectives have been analyzed.		Analysis of data under way and employment levels have been determined.		Isolation of problems is well under way.		Training requirements specified, needs established, and program elements identified.		Data requirements are being collected.		Evaluation procedures have been identified and being set up.
Determination of field is well under way.		Tentative manpower objectives have been formulated.		Identification of employment characteristics has been completed.		Analysis of specific problems has been completed.		Funding commitments made, facilities made available, and staff assigned.		Data requirements have been collected and organized.		Evaluation procedures have been established and under way.
Comprehensive and in-depth study has been completed.		Manpower objectives have been derived from agency objectives *in detail.*		Future estimates of employment requirements have been determined.		Rank order of importance has been assigned to problems.		Arrangements completed to provide training as required on a regular basis.		Information system has been installed and is operating.		Evaluation procedure has been accomplished.

TABLE 5-7:B

Comparison of Projected and Actual Values of Manpower Variables for Operator I for 1972

MANPOWER VARIABLE	PROJECTED VALUE	ACTUAL VALUE	PERCENTAGE DIFFERENCE $\left[\frac{(3)-(2)}{(3)}\right]$
(1)	(2)	(3)	(4)
RECOMMENDED EMPLOYMENT			
BUDGETED EMPLOYMENT			
ACTUAL EMPLOYMENT			
ADDITIONAL MANPOWER NEEDS			

greater than the actual values, and if positive, the projected values are smaller than the actual values. From such information the manpower planner must try to determine the cause of the projection error and make the judgmental decision of what constitutes a significant error. In executing the planning process during the next time period, he should adjust his projection techniques in accordance with the errors displayed in Table 5-7:B. Errors displayed in this table should provide input into the next cycle of manpower planning activities by indicating to the manpower planner those areas of his plan that are in need of the greatest adjustment.

APPENDIX I

DOL/EPA Survey

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DOL/EPA Survey

U.S. DEPARTMENT OF LABOR
Manpower Administration

DATA ON EMPLOYMENT IN MUNICIPAL WASTE TREATMENT PLANTS

QUESTIONNAIRE A

TYPE OR PRINT IN BLACK INK

1. ESTABLISHMENT NO
2. STATE CODE
3. STATE NAME
4. COUNTY CODE
5. SMSA CODE
6. BASIN CODE
7. TYPE OF TREATMENT CODE
8. TYPE OF TREATMENT NAME
9. POPULATION GROUP SERVED
10. MILLION GALLONS PER DAY
11. NAME AND ADDRESS OF ESTABLISHMENT
12. STATE INFLATION FACTOR
13. SMSA INFLATION FACTOR

SELECTED WASTEWATER TREATMENT PLANT OCCUPATIONS	LINE NUMBER	EMPLOYMENT								LABOR TURNOVER PRECEDING YEAR							JOB VACANCIES			WAGES
										Accessions			Internal Transfers		Separations					
		Current Total	Current Full Time	Authorized Total	Authorized Full Time	Recommended Total	Recommended Full Time	Year Ago Total	Year Ago Full Time	Total	New Hires Total	New Hires From Other Plants Only	To Occupation	Out Of Occupation	Total	Quits	Current Total	Reason For Vacancies 1/	Open One Month Or More	Average Annual Salary
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s
Total (All Occupations)	01																			
Superintendent	02																			
Ass't Superintendent	03																			
Operations Supervisor	04																			
Shift Foreman	05																			
Operator II	06																			
Operator I	07																			
Maintenance Supervisor	08																			
Mech Maint Foreman	09																			
Mechanic II	10																			
Mechanic I	11																			
Maintenance Helper	12																			
Electrician II	13																			
Electrician I	14																			
Chemist	15																			
Laboratory Technician	16																			
Storekeeper	17																			
Clerk Typist	18																			
Auto Equipment Operator	19																			
Custodian	20																			
Painter	21																			
Laborer	22																			
Other	23																			

NARRATIVE SECTION

(Check one)

1. Is the treatment facility meeting the discharge requirements established at the time of design? . . . . ☐ Yes ☐ No

2. Is the treatment facility meeting current discharge requirements? . . . . ☐ Yes ☐ No

If "No," check the item that identifies the most important reason ☐ Hydraulic overload ☐ Organic overload
☐ Inadequate O&M budget ☐ Inadequate staffing ☐ Inadequately trained staff ☐ Other

3. Do the treatment facility personnel also operate and maintain a wastewater collection system? . . . . ☐ Yes ☐ No

1/ *Enter letter that identifies the most significant reason for vacancies A qualified personnel not available. B pay not adequate to attract qualified workers C inadequate transportation to or from plant D other*

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EMPLOYMENT PROJECTIONS FOR EXISTING MUNICIPAL WASTE TREATMENT PLANTS

QUESTIONNAIRE B

NAME AND ADDRESS OF ESTABLISHMENT

SELECTED WASTEWATER TREATMENT PLANT OCCUPATIONS	LINE NO	AVERAGE EMPLOYMENT FOR OCTOBER					
		ACTUAL	PROJECTED				
		1970	1971	1972	1973	1974	1975
		a	b	c	d	e	f
Total (All Occupations)	01						
Superintendent	02						
Ass't. Superintendent	03						
Operations Supervisor	04						
Shift Foreman	05						
Operator II	06						
Operator I	07						
Maintenance Supervisor	08						
Mech. Maint. Foreman	09						
Mechanic II	10						
Mechanic I	11						
Maintenance Helper	12						
Electrician II	13						
Electrician I	14						
Chemist	15						
Laboratory Technician	16						
Storekeeper	17						
Clerk Typist	18						
Auto. Equip. Operator	19						
Custodian	20						
Painter	21						
Laborer	22						
Other	23						

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EMPLOYMENT PROJECTIONS FOR NEW MUNICIPAL WASTE TREATMENT PLANTS

[illegible]

[illegible]

SELECTED WASTEWATER TREATMENT PLANT OCCUPATIONS	[illegible]	AVERAGE EMPLOYMENT FOR OCTOBER					
		[illegible]			[illegible]		
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		a	b	c	d	e	f
[illegible]	01						
Superintendent	02						
Ass't Superintendent	03						
Operations Sup.	04						
Shift Foreman	05						
Operator II	06						
Operator I	07						
Maintenance Supervisor	08						
Mech. Maint. Foreman	09						
Mechanic II	10						
Mechanic I	11						
Maintenance Helper	12						
Electrician II	13						
Electrician I	14						
Chemist	15						
Laboratory Technician	16						
Storekeeper	17						
Clerk Typist	18						
Auto. Equip. Operator	19						
Custodian	20						
Painter	21						
Laborer	22						
Other	23						

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Apr. 1971

APPENDIX II

Appendix II

MANPOWER ADMINISTRATION – ENVIRONMENTAL PROTECTION AGENCY: JOINT SURVEY OF MUNICIPAL WASTE TREATMENT PLANTS

JOB DESCRIPTIONS OF OCCUPATION CATEGORIES

SUPERINTENDENT:

Responsible for administration, operation, and maintenance of entire plant. Exercises direct authority over all plant functions and personnel, in accordance with approved policies and procedures. Inspects plant regularly. Analyzes and evaluates operation and maintenance functions; initiates or recommends new or improved practices. Develops plans and procedures to ensure efficient operation of present plant and provide for projected future requirements. Recommends plant improvements and additions. Co-ordinates data and prepares or reviews and approves operation reports and budget requests. Controls expenditure of budgeted funds and requests approval for major expenditures, if required. Recommends specifications for major equipment and material purchases. Organizes and directs activities of plant personnel. Maintains effective communications and working relationships with employees, government officials, and general public. Designated as Superintendent I or II, depending upon size and complexity of plant.

ASSISTANT SUPERINTENDENT:

Assists in administrative engineering and supervisory duties, under general direction of superintendent. Serves as superintendent in his absence. Aids in analyzing and evaluating operating and maintenance procedures, and in developing new or improved practices. Participates in maintenance of operating records, compilation of data, and report preparation. Assists in employee training. Inspects plant. Assists in planning special maintenance work and minor plant alterations. Designated Assistant Superintendent I or II, depending upon size and complexity of plant.

CLERK TYPIST:

Performs any combination of following tasks and/or other clerical duties. Operates typewriter and other standard office machines and equipment; including adding machine, calculator, and duplicating machine. Serves as secretary to superintendent. Acts as receptionist. Responsible for personal work determination in accordance with established precedent or policy. Sets up simple office routines and filing systems. Minor supervisory responsibilities. Composes routine correspondence. Answers telephone and handles routine inquiries from public. Typing includes tables, reports, requisitions, forms, and other material from copy, draft, or dictating machines; frequently involving judgment regarding format or information to be included. Clerical duties include maintaining financial records not requiring technical bookkeeping skills. Duties ordinarily include posting, filing/sorting, and other routine clerical functions.

OPERATIONS SUPERVISOR:

Supervises and co-ordinates activities of plant operators, laborers, custodians, and/or laboratory personnel. Prepares work schedules, subject to approval of superintendent or assistant. Analyzes recording instrument readings and laboratory test results, adjusts various plant processes accordingly. Prepares reports and maintains records. Inspects plant to determine efficiency of operation, cleanliness, and maintenance requirements. Instructs and directs operators. Determines remedial action in emergencies. Conducts training program. Requisitions chemicals and supplies. Performs duties of assistant superintendent in his absence.

SHIFT FOREMAN:

Supervises operation of plant, under general direction of superiors. Performs duties of maintenance supervisor or foreman in their absence. Supervises, instructs, and assigns specific duties to shift workers. Reviews and evaluates work performance. Participates in training programs. Inspects plant equipment and processes regularly. Analyzes instrument readings and laboratory test results. Determines site and causes of any malfunctions.

Orders, supervises, or participates in required adjustments or repairs. Maintains and evaluates operating records. Replaces operator or maintenance worker during emergency situations. Communicates with other shift foremen regarding plant conditions.

OPERATOR II:

Performs any combination of following tasks pertinent to controlling operation of plant. Operates wastewater treatment, sludge processing, and disposal equipment to control flow and processing of wastewater, sludge, and effluent. Monitors gauges, meters and control panels. Observes variations in operating conditions and interprets meter and gauge readings and test results to determine processing requirements. Operates valves and gates either manually or by remote control; starts and stops pumps, engines and generators to control and adjust flow and treatment processes. Maintains shift log and records meter and gauge readings. Extracts samples and performs routine laboratory tests and analyses. Performs routine maintenance functions and custodial duties. Operates and maintains power generating equipment and incinerators. Classified by titles such as Pump Station Operator or Digestor Operator when performing specialized activities only.

OPERATOR I:

Assists Operator II in performance of any combination of following tasks pertinent to controlling operation of plant or performs various tasks as directed. Operates wastewater treatment, sludge processing, and disposal equipment to control flow and processing of wastewater, sludge, and effluent. Monitors gauges, meters, and control panels. Observes variations in operating conditions and interprets meter and gauge readings and test results to determine processing requirements. Operates valves and gates either manually or by remote control; starts and stops pumps, engines, and generators to control and adjust flow and treatment processes as required. Maintains shift log and records meter and gauge readings. Extracts samples and performs routine laboratory tests and analyses. Performs routine maintenance functions and custodial duties. Operates and maintains power generating equipment and incinerators. Classified by title such as Pump Station Operator I, or Digester Operator I when performing specialized activities only.

MAINTENANCE SUPERVISOR:

Supervises all preventive and corrective maintenance on plant and equipment. Plans, schedules, and directs maintenance of wide variety of specialized mechanical and electrical equipment plus buildings, structures, and grounds. Inspects plant frequently to ensure proper maintenance procedures. Determines necessity for and establishes long-range maintenance programs. Decides remedial action in emergency situations. Assigns work to Mechanical Maintenance Foreman and Electricians. Supervises installation and testing of new or rebuilt equipment. Supervises and instructs maintenance personnel. Supervises inspection of subcontracted maintenance work. Submits maintenance budget requests. Supervises maintenance records. Performs related work as required.

MECHANICAL MAINTENANCE FOREMAN:

Supervises mechanical maintenance crew in performance of wide variety of maintenance and repair tasks on machinery, equipment, buildings, structures, and grounds. Duties include any combination of tasks such as the following: Assigns tasks to maintenance crew. Directs and/or participates in maintenance and repair tasks as required. Supervises and instructs maintenance personnel on routine and emergency tasks. Consults superiors regarding preventive maintenance program. Establishes and operates preventive program. Inspects plant and mechanical equipment for malfunctions and needed repairs. Determines repair methods. Consults with superior and/or manufacturer's representatives on difficult or complicated repairs. Keeps maintenance records. Works with subcontractors.

MAINTENANCE MECHANIC II:

Performs preventive maintenance and repairs on mechanical and electro-mechanical machinery and equipment, under general direction of superior. Maintains buildings, structures, and grounds. Duties include any combination of tasks such as following: Lubricates equipment and checks for malfunctions. Replaces packing in pumps or valves. Replaces bearings in motors, pumps, and other equipment. Adjusts and cleans bar screens, comminutors, and weir plates. Cleans out pipes and performs other plumbing and pipefitting tasks as required. Uses gas and/or arc welding equipment to heat, cut, braze, or weld. Performs duties of electrician and/or painter in their absence. Relines incinerator with firebrick. Installs and sets up new equipment. Assists in keeping maintenance records. Supervises, instructs, and inspects work of Mechanic I, Operator-Mechanic, Maintenance Worker, or Laborer to ensure proper performance of maintenance work or repairs. Performs general maintenance and repair tasks on buildings, structures, and grounds.

MAINTENANCE MECHANIC I:

Performs or assists in performance of preventive maintenance and repairs on mechnical and electro-mechanical machinery and equipment, under direction of Mechanic II, Foreman, or Supervisor. Maintains buildings, structures, and grounds. Duties include any combination of tasks such as following: Lubricates motors and equipment and checks for malfunction. Replaces packing in pumps and valves. Replaces bearings in motors, pumps, and other equipment. Adjusts and cleans bar screens, comminutors, and weir plates. Installs and sets up new equipment. Cleans out pipes and performs other plumbing and pipefitting tasks as required. Uses gas and/or arc welding equipment to heat, cut, braze, or weld. Performs duties of electrician and/or painter in their absence. Assists Mechanic II and/or Foreman on difficult or highly complicated maintenance or repair tasks. Performs general maintenance and repair tasks on buildings, structures and grounds; including limited laboring and custodial tasks. Assists in keeping maintenance records.

MAINTENANCE HELPER:

Assists maintenance mechanics in maintaining and repairing equipment, machinery, buildings, and grounds. Duties include any combination of tasks such as following: Cleans and lubricates pumps, motors, and related equipment. Assists in removing, repairing, and replacing equipment as directed. Performs routine building maintenance work. Performs simple repairs and adjustments to equipment. Keeps simple records. Carries or holds materials, supplies, or tools to assist mechanics, electricians, or painters. Performs laborer tasks as required.

ELECTRICIAN II:

Inspects, repairs, and maintains electrical and/or electronic operating and control systems, equipment, and fixtures; including instrumentation and heating and cooling systems. Exercises independent judgment in solving normal work problems under general supervision of maintenance supervisor or assistant superintendent, uses standard and special electrical tools and equipment, such as voltmeters, ammeters, and synchroscopes. Duties include any combination of tasks such as following: Inspects, maintains and repairs wiring and lighting systems, electrical control equipment, meters, outlets, and panels. Installs new equipment. Interprets oral and written instructions, specifications, wiring diagrams and codes. Supervises Electrician I, Maintenance Helper, and /or Laborer. Establishes and operates scheduled maintenance program for plant equipment. Repairs electrical and electronic instruments. Keeps maintenance records. Prepares labor and material estimates.

ELECTRICIAN I:

Participates in installation, maintenance, and repair of electrical systems, equipment, and fixtures. Assists Electrician II in particularly difficult or complicated tasks. Work frequently performed independently, subject to inspection by superiors. Follows oral and written instructions including specifications, wiring diagrams, and codes. Duties include any combination of tasks such as following: Inspects, maintains, and repairs wiring and lighting systems, electrical control equipment, meters, outlets, and panels. Installs new equipment. Supervises maintenance helper and/or laborer. Repairs electrical instruments. Keeps maintenance records.

CHEMIST:

Supervises and performs specialized and complex chemical, bacteriological and physical tests and analyses of raw, partially treated, and treated wastewater and by-products to determine efficiency of plant processes and ensure that plant effluent meets local, state, and federal requirements. Conducts or supervises less complex routine tests. Supervises collection of laboratory samples. When laboratory technician is present, supervises technician and provides routine procedures to be followed. Evaluates and interprets test results, establishes test priorities, prepares reports, and supervises laboratory technicians. Assembles data, maintains records, and prepares periodic reports. Sets up pilot processes when conducting research on improved procedures. Provides direct or indirect instructions to operating personnel regarding chemical requirements and adjustments, changes, or additions to various treatment processes. Classified as Chief Chemist, Chemist I or Chemist II, or Research Chemist according to function performed.

LABORATORY TECHNICIAN:

Performs any combination of the following routine laboratory tasks as instructed by chemist. Collects samples of plant influent, partially treated wastewater, sludge, effluent, and other by-products. Assembles instruments and equipment for analytical or research work. Prepares chemical and bacteriological media, stains, reagents, and test solutions routinely used in laboratory. Operates equipment and conducts tests as directed. Maintains test result records, prepares data sheets. Prepares or assists in preparation of reports. Cleans, maintains and stores instruments and equipment. Maintains inventory and order supplies. Performs custodial duties in laboratory. Operates laboratory in small primary treatment or trickling filter plant in absence of chemist.

STOREKEEPER:

Requisitions, receives, stores, and issues supplies, tools, and equipment. Maintains inventory records and controls. Duties include any combination of tasks such as following: Inspects incoming stock to verify quantity, quality, and adherence to specifications. Identifies and stores material. Fills orders and issues supplies from stock. Prepares periodic or perpetual inventory. Requisitions replacement quantities of stock items as necessary. Compiles records and reports of material used, spoilage or other loss, inventory adjustments, and refusal of shipments. Recommends changes in established procedures. Determines methods of storage, identification, and location of stock. Divides stock quantities into portions to fill orders.

AUTOMOTIVE EQUIPMENT OPERATOR:

Operates automotive equipment such as dump truck, tank truck, fork lift, or tractor to perform any combination of tasks such as following: Loads or assists in loading grit, sludge, or other disposable material. Hauls material from plant to disposal area. Unloads material at destination. Operates tractor to cut grass or weeds, bulldoze soil, or remove snow. Performs maintenance on vehicles.

CUSTODIAN:

Cleans all or designated portions of wastewater treatment plant and grounds. Performs any combination of tasks such as following in accordance with established procedures, subject to inspection for adherence to required standards of cleanliness and compliance with instructions. Sweeps, mops, waxes, and polishes floors; washes walls and woodwork; dusts furniture, piping, valves, etc. Washes and polishes windows and metal surfaces. Cleans restrooms and maintains supplies. Empties wastecans and ashtrays. Polices and performs general custodial duties on grounds, including picking up litter and sweeping walks. May shovel snow and cut grass. Adjusts heat and air conditioning controls. Reports any repairs or adjustments required. Acts as watchman. Washes and polishes cars and trucks.

PAINTER:

Performs all types of painting work, including any combination of tasks such as following: Under general supervision of Maintenance Foreman or Shift Foreman. Prepares various surfaces for painting by washing, scraping, burning, sanding, sand-blasting or other means as necessary. Mixes, matches, and blends various paints, enamels, lacquers, varnishes, stains and special protective coatings to achieve desired color, consistency, and drying properties. Caulks, putties, cements, or plasters holes and cracks. Cuts and replaces glass in windows and doors. Erects and uses ladders, scaffolding, and swinging stage equipment as required. Paints buildings, structures, equipment, and furniture using brush, roller, spray gun or other applicator. Prepares wall and hangs paper or other wall-covering material. Performs simple sign-painting, using stencils. Requisitions material and equipment. Cleans and stores tools and equipment. Cleans up work site or arranges for laborer to clean up.

LABORER:

Performs any combination of following: Tasks in Wastewater Treatment Plant. Cleans equipment such as bar screens, comminutors, and weirs. Lubricates machinery, loads and unloads trucks; spreads sand, gravel, and dirt. Drives truck. Paints (rough) and performs other minor maintenance. Digs and refills ditches. Cleans drains, ditches, and culverts. Cuts grass, weeds, and brush; trims trees and bushes; rakes grass, leaves, and trash; seeds and cares for lawn and ornamental plantings. Removes snow and ice from walkways, driveways, and equipment. Collects and disposes of trash and garbage. Washes and cleans vehicles, tools, and equipment. Carries or holds material, supplies, or tools to assist maintenance personnel.

APPENDIX III

WTP -

WASTEWATER TREATMENT PLANT OPERATORS
INFORMATION FORM

SOCIAL SECURITY NUMBER | NAME (Last, First, Middle Init.)

HOME MAILING ADDRESS | POST OFFICE: | STATE

ZIP CODE: | HOME PHONE NO. Include Area Code | BIRTHDATE

SEX:
1. ☐ MALE
2. ☐ FEMALE

EMPLOYMENT STATUS
1. ☐ ACTIVE 2. ☐ INACTIVE
3. ☐ RETIRED

PRESENT EMPLOYMENT (Fill in below):

NAME OF PLANT:

PLANT MAILING ADDRESS:

POSITION TITLE:

STATUS:
1. ☐ FULL TIME 2. ☐ PART TIME 3. ☐ SEASONAL

WASTEWATER TREATMENT PLANT CERTIFICATE (Fill in below):

1. ☐ CLASS A Year: ______ Number: ______	2. ☐ CLASS B Year: ______ Number: ______	3. ☐ CLASS C Year: ______ Number: ______	4. ☐ CLASS D Year: ______ Number: ______	5. ☐ NOT CERTIFIED

WATER TREATMENT CERTIFICATES (Fill in below):

1. ☐ F 1	2. ☐ F 2	3. ☐ F 3	4. ☐ D 1	5. ☐ D 2	6. ☐ M	7. ☐ T

PROFESSIONAL STATUS (Fill in below):

1. ☐ ENGINEER REGISTERED: 1. ☐ YES 2. ☐ NO REGISTRATION NO: ______	2. ☐ SANITARIAN REGISTERED: 1. ☐ YES 2. ☐ NO REGISTRATION NO: ______	3. ☐ OTHER: ______ REGISTERED: 1. ☐ YES 2. ☐ NO REGISTRATION NO: ______

MILITARY STATUS:

VETERAN: 1. ☐ YES 2. ☐ NO DRAFT CLASS: ______

I hereby certify that the information contained herein is accurate and complete.

____
Signature

____
Date

EDUCATION AND TRAINING – DIVISION I

WWTP – 11

GRAMMAR SCHOOL (Circle highest grade you completed in Grammar School): 1 2 3 4 5 6 7 8

HIGHER EDUCATION

HIGH SCHOOL	COURSE OF STUDY	CIRCLE HIGHEST GRADE COMPLETED	Date From Mo. – Yr.	Date To Mo. – Yr.	DID YOU GRADUATE?
NAME LOCATION		9 10 11 12			1. ☐ YES 2. ☐ NO
NAME LOCATION		9 10 11 12			1. ☐ YES 2 ☐ NO

IF YOU DID NOT GRADUATE FROM HIGH SCHOOL HAVE YOU OBTAINED A STANDARD HIGH SCHOOL EQUIVALENCY G E D CERTIFICATE? 1 ☐ YES 2 ☐ NO IF YES DATE EARNED (Mo.-Yr.) ______

JUNIOR COLLEGES, COLLEGES YOU HAVE ATTENDED (List below)

NAME:	MAJOR:	DATES ATTENDED		NAME OF DEGREE:
		From (Mo.-Yr.):	To (Mo.-Yr.):	
LOCATION	MINOR:			YEAR OF DEGREE:
NAME:	MAJOR:	DATES ATTENDED		NAME OF DEGREE:
		From (Mo.-Yr.):	To (Mo.-Yr.):	
LOCATION:	MINOR			YEAR OF DEGREE:
NAME:	MAJOR	DATES ATTENDED		NAME OF DEGREE:
		From (Mo.-Yr.):	To (Mo.-Yr.):	
LOCATION:	MINOR:			YEAR OF DEGREE:

HOW MANY HOURS CREDIT HAVE YOU OBTAINED FROM AN ACCREDITED COLLEGE *(Fill in below)*:

NOTE: Term credits are obtained in a school offering 3 twelve-week periods from September to June. Semester credits are obtained in a school offering 2 or 3 sixteen-week periods annually. If you attended more than three colleges, use additional sheets of paper and attach.

UNDERGRADUATE	GRADUATE	UNDERGRADUATE	GRADUATE
SEMESTER CREDITS: ______	SEMESTER CREDITS: ______	TERM CREDITS: ______	TERM CREDITS: ______

WHAT BUSINESS, TRADE, OR OTHER SCHOOLS HAVE YOU ATTENDED *(Including courses while in military service)*:

NOTE: Include any extention or correspondence courses you have completed. List in sequence from earliest date to present. Give name of school, or sponsoring agency, location, course title or subject material, beginning and ending dates of attendance, and hours in class per week. For correspondence courses, check proper box. Include such courses as 'Gull Lake Laboratory Course', but do not include short duration activities such as, 'Wastewater Plant Operator Fall Training Session.'

NAME:	COURSE TITLE OR SUBJECT:	DATES ATTENDED		HOURS IN CLASS PER WK.
		From (Mo.-Yr.)	To (Mo.-Yr.)	
LOCATION:	CORRESPONDENCE COURSE: ☐ YES			
NAME:	COURSE TITLE OR SUBJECT:	DATES ATTENDED		HOURS IN CLASS PER WK.
		From (Mo.-Yr.)	To (Mo.-Yr.)	
LOCATION:	CORRESPONDENCE COURSE: ☐ YES			
NAME	COURSE TITLE OR SUBJECT:	DATES ATTENDED		HOURS IN CLASS PER WK.
		From (Mo.-Yr.)	To (Mo.-Yr.)	
LOCATION:	CORRESPONDENCE COURSE ☐ YES			
NAME	COURSE TITLE OR SUBJECT	DATES ATTENDED		HOURS IN CLASS PER WK.
		From (Mo.-Yr.)	To (Mo.-Yr.)	
LOCATION:	CORRESPONDENCE COURSE: ☐ YES			
NAME	COURSE TITLE OR SUBJECT:	DATES ATTENDED		HOURS IN CLASS PER WK.
		From (Mo.-Yr.)	To (Mo.-Yr.)	
LOCATION:	CORRESPONDENCE COURSE ☐ YES			
NAME	COURSE TITLE OR SUBJECT:	DATES ATTENDED		HOURS IN CLASS PER WK.
		From (Mo.-Yr.)	To (Mo.-Yr.)	
LOCATION:	CORRESPONDENCE COURSE: ☐ YES			

IF YOU HAVE ATTENDED MORE THAN SIX SPECIAL STUDIES COURSES, USE ADDITIONAL SHEETS OF PAPER AND ATTACH.

EXPERIENCE - DIVISION II

YEAR ENTERED WORK IN WASTEWATER TREATMENT PLANT: ______	AREAS IN WHICH YOU ARE MOST KNOWLEDGEABLE:
NUMBER OF YEARS OF EXPERIENCE IN:	1. ☐ PRIMARY TREATMENT W DIGESTERS
1 PRIMARY TREATMENT ______	2. ☐ ACTIVATED SLUDGE
2 ACTIVATED SLUDGE ______	3. ☐ TRICKLING FILTER
3 TRICKLING FILTER ______	4. ☐ LABORATORY
4 LABORATORY ______	5. ☐ MECHANICAL WORK
5 DIGESTERS ______	6. ☐ ELECTRICAL WORK
6 VACUUM FILTERS ______	7 ☐ VACUUM FILTERS
7 INCINERATOR ______	8 ☐ INCINERATOR
8 RAPID SAND FILTER ______	9 ☐ OTHER. ______

EMPLOYMENT RECORD (Fill in below):

NOTE: Beginning with your present or last employment and continuing in reverse time order, list and describe in detail in the spaces provided, and, on additional sheets if necessary, every position which you have filled since the beginning of your wastewater treatment plant work experience including that while in the military service. If you have held two or more positions for the same plant or different levels of responsibility or with different duties, list and describe them separately the same as though this had been for separate employers

PLANT LOCATION:			POSITION TITLE:	5 ☐ CHIEF CHEMIST
			1 ☐ SUPERINTENDENT	6. ☐ LAB TECHNICIAN
DATE From (Mo.-Yr.)	DATE To (Mo.-Yr.)	No. Employees Supervised by you: ______	2. ☐ ASST SUPERINTENDENT	7. ☐ MECHANIC
			3 ☐ SHIFT SUPERVISOR	8 ☐ ELECTRICIAN
			4. ☐ OPERATOR	9. OTHER: ______

DESCRIPTION OF DUTIES *(Be Specific)*:

PLANT LOCATION:			POSITION TITLE:	5. ☐ CHIEF CHEMIST
			1. ☐ SUPERINTENDENT	6. ☐ LAB TECHNICIAN
DATE From (Mo.-Yr.)	DATE To (Mo.-Yr.)	No. Employees Supervised by you: ______	2. ☐ ASST. SUPERINTENDENT	7. ☐ MECHANIC
			3. ☐ SHIFT SUPERVISOR	8. ☐ ELECTRICIAN
			4. ☐ OPERATOR	9. OTHER: ______

DESCRIPTION OF DUTIES *(Be Specific)*:

PLANT LOCATION:			POSITION TITLE:	5. ☐ CHIEF CHEMIST
			1. ☐ SUPERINTENDENT	6. ☐ LAB TECHNICIAN
DATE From (Mo.-Yr.)	DATE To (Mo.-Yr.)	No. Employees Supervised by you: ______	2. ☐ ASST. SUPERINTENDENT	7 ☐ MECHANIC
			3. ☐ SHIFT SUPERVISOR	8. ☐ ELECTRICIAN
			4. ☐ OPERATOR	9. OTHER: ______

DESCRIPTION OF DUTIES *(Be Specific)*

PLANT LOCATION:			POSITION TITLE:	5. ☐ CHIEF CHEMIST
			1. ☐ SUPERINTENDENT	6. ☐ LAB. TECHNICIAN
DATE From (Mo.-Yr.)	DATE To (Mo.-Yr.)	No. Employees Supervised by you: ______	2. ☐ ASST. SUPERINTENDENT	7. ☐ MECHANIC
			3. ☐ SHIFT SUPERVISOR	8. ☐ ELECTRICIAN
			4. ☐ OPERATOR	9. ☐ OTHER: ______

DESCRIPTION OF DUTIES *(Be Specific)*

EXPERIENCE – DIVISION II

WWTP [illegible]

PLANT LOCATION:			POSITION TITLE 1 SUPERINTENDENT 2 ASST. SUPERINTENDENT 3 SHIFT SUPERVISOR 4 OPERATOR 5 CHIEF CHEMIST 6 LAB TECHNICIAN 7 MECHANIC 8 ELECTRICIAN 9 OTHER
DATE From (Mo.-Yr.)	DATE To (Mo.-Yr.)	No. Employees Supervised by you:	
DESCRIPTION OF DUTIES *(Be Specific)*			

PLANT LOCATION:			POSITION TITLE 1 SUPERINTENDENT 2 ASST. SUPERINTENDENT 3 SHIFT SUPERVISOR 4 OPERATOR 5 CHIEF CHEMIST 6 LAB TECHNICIAN 7 MECHANIC 8 ELECTRICIAN 9 OTHER
DATE From (Mo.-Yr.)	DATE To (Mo.-Yr.)	No. Employees Supervised by you:	
DESCRIPTION OF DUTIES *(Be Specific)*			

GENERAL EXPERIENCE (Fill in below):

List and describe in detail in the spaces provided, and on additional sheets if necessary, your work experience other than in a wastewater treatment plant, but which provides a background of experience which has contributed significantly to your work in the wastewater treatment field. List in reverse time order.

EMPLOYER:			ADDRESS
DATE From (Mo.-Yr.)	DATE To (Mo.-Yr.)	No. Employees Supervised by you:	POSITION TITLE:
RESPONSIBILITY AND DESCRIPTION OF DUTIES *(Be Specific):*			

EMPLOYER:			ADDRESS:
DATE From (Mo.-Yr.)	DATE To (Mo.-Yr.)	No. Employees Supervised by you:	POSITION:
RESPONSIBILITY AND DESCRIPTION OF DUTIES *(Be Specific):*			

EMPLOYER:			ADDRESS:
DATE From (Mo.-Yr.)	DATE To (Mo.-Yr.)	No. Employees Supervised by you:	POSITION:
RESPONSIBILITY AND DESCRIPTION OF DUTIES *(Be Specific):*			

MACHINES OR MECHANICAL EQUIPMENT WHICH YOU CAN OPERATE SKILLFULLY *(Fill in below):*

1.	2.
3.	4.

GLOSSARY

Accessions

Additions to establishment's employment roll within the preceding year

Accession rate

Total accessions divided by current full-time employment

Horizontal—number of people who transferred into the occupation from a similar occupation in a wastewater treatment plant

Horizontal rate – total number of horizontal transfers divided by total number of transfers

New hires – number of people hired within the past year who were obtained from external labor supply sources

New hire rate—number of new hires divided by number of accessions

Transfers into – number of people entering a particular occupation who were transferred from some other occupation either within the same wastewater treatment plant or from some other plant in the state

Transfer into rate – number of people transferring into the occupation divided by accession rate

Upgrade—that number of people who transferred into the occupation from some other occupation requiring fewer skills and less educational background

Upgrade rate—total number of upgrade transfers divided by the total number of transfers

Associate degree

An educational degree usually signifying completion of two years of prescribed college or university level coursework

Bachelor's degree

An educational degree usually signifying completion of four years of prescribed college or university work

Basic education

The education essential to take care of one's self, usually including basic language, mathematics, and other communication skills

Basic plan

A plan for achieving water quality standards within an area drained by a river and its tributaries

Bilingual

Communication in two languages

Biochemical oxygen demand

The quantity of oxygen used in the biochemical oxidation of organic matter in a specified time, at a specified temperature, and under specified conditions. This term also refers to a standard test used in assessing wastewater strength.

Career education

A concept of education which brings together both general and vocational education in mutual support to assist the individual in the development and maintenance of a career throughout a working life

Career ladder

The various skill or developmental steps, arranged from the lowest level to the highest, in a career area

Categorical programs

Government programs to meet a specific need

Certification

The granting of a certificate which states that an individual has successfully completed a given course or a series of related courses and indicating that the individual is qualified to perform a given function

Client

An individual making use of the services of an agency

Community Action Agency (CAA)
A local agency formed and funded by the Office of Economic Opportunity for the purpose of representing the poor and providing certain programs of assistance with a high degree of client control. Sometimes referred to as the Community Action Programs (CAP).

Community college
A two-year educational institution with minimal entrance requirements, established to serve the post-secondary and remedial educational needs of a community

Concentrated Employment Program (CEP)
A federally funded program to bring together all needed manpower services within a limited target area to provide concentrated services to the disadvantaged

Cooperative Area Manpower Planning System (CAMPS)
A system established by federal agencies engaged in manpower development activities for the coordination of such activities at the local, state, regional and national levels

Cooperative education
A work-study program at the college level enabling a student to work about half time while pursuing a college program, under the supervision and control of the educational institution

Cost-effective approach
The use of an approach to the attaining of certain objectives which has the least cost for the greatest effectiveness

Coupled classroom
A program bringing work and classroom experience together, each reinforcing the other through a coordinated curriculum of activities

Decategorization
The elimination of categories

Decentralization
The delegation of authority and responsibility to subsidiary units

Direct training

The training developed and offered by an agency

Disadvantages

Those meeting federal standards

(1) Poverty level incomes and

(2) Unemployed or underemployed and

- (a) Under 23 or
- (b) Over 45 or
- (c) Minority or
- (d) Handicapped or
- (e) High school dropout

Doctorate degree

A professional degree offered by universities and colleges following successful completion of several years of work beyond the bachelor's degree signifying that the recipient is a scholar in a given field of learning

Dropout

One who leaves school before completion of a given program

Economic Opportunity Act

The federal act of 1964 setting up the Office of Economic Opportunity with the avowed purpose of eliminating poverty by opening to everyone the opportunity for "education, training, work, decency, and dignity "

Education

The process of developing knowledge, skill, mind, and character

Effluent

Wastewater or other liquid, partially or completely treated, or in its natural state, flowing out of a treatment plant

Elementary education

The education from kindergarten through 6th grade

Employment

Actual employment—number of people employed at the time the survey was taken

Actual full-time employment—number of people employed at the time the survey was taken who worked at least 36 hours a week

Actual full-time equivalents—total number of hours worked by all people employed divided by 40

Actual part-time employment—number of people employed at the time the survey was taken who worked less than 36 hours a week

Authorized employment – number of people allowed in the budget for the wastewater treatment plant

Authorized full-time employment—the number of people allowed in the budget for the wastewater treatment plant who worked at least 36 hours a week

Authorized full-time equivalents—number of hours worked by all people authorized for employment divided by 40

Authorized part-time employment—the number of people allowed in the budget for the wastewater treatment plant who worked less than 36 hours a week

Recommended employment—the number of people who if currently employed would maximize the plant's effective operations

Recommended full-time employment—the number of people who if currently employed would maximize the plant's effective operation who would work at least 36 hours a week

Recommended full-time equivalents—total number of recommended hours of work divided by 40

Recommended part-time employment—the number of people who if currently employed would maximize the plant's effective operation who would work less than 36 hours a week

Evaluate

To determine the degree to which the objectives of a program are met

External labor market

That labor market lying outside the industry

Feedback

Making available to a program the results of monitoring and evaluation so that the program can be continuously improved

Fringe benefits
Those nonmonetary rewards or benefits provided by an employer

Full employment
The employment of all persons willing and able to work. Statistically this is about 95–96 percent of the labor force

General education development diploma (G.E.D.)
A program designed for school dropouts to give them the development equivalent to that received from securing a high school diploma, and generally accepted in lieu of that diploma

Graduate training
Education and training beyond the bachelor's degree

Gross national product (GNP)
The market value of all goods and services produced by a nation for the marketplace

Hands-on
Experience using actual equipment

Higher education
Education beyond high school

Human resource development
The development of human beings into producers through education, training, and employment services

Inflation
The general or overall upward movement of prices or the price level

Interagency agreement
An agreement between two or more government agencies

Internal labor market
That labor market within an industry

Institutional program
A training program in an educational institution as differentiated from an apprenticeship or on-the-job training

Job Corps
A program of education and training for disadvantaged

high school dropouts to build them into self-respecting, productive citizens

Job evaluation

The process of dividing a job into its major components to enable analysis for the purpose of establishing rates of pay and training

Journeyman

A craftsman qualified to function in a trade without supervision

Junior college

Two-year, post-secondary colleges with the main purpose of preparing people to go on to a four-year college program

Labor market

The geographical area within which most workers are secured. For some occupations, this may be a given community, while for others, it may be nationwide.

Labor unions

Organizations of workers for the purpose of representing them in bargaining with private employers or government

Liberal education

Education in the arts—literature, philosophy, languages, history—as compared with professional or technical subjects

Macro-manpower planning

That manpower planning associated with macro-economic planning, which generally involves full employment of human resources of manpower

Manpower

Productive human beings

Manpower Administration

The agency within the Department of Labor with the primary responsibility for administering manpower programs

Manpower advisory committees

Federal committees at the regional and national levels created to advise Department of Labor and Department of Health, Education and Welfare officials on manpower problems and programs

Manpower coordinating councils

Federal councils of federal officials from various agencies at the national and regional levels to coordinate federal manpower programs

Manpower Development and Training Act (MDTA)

The federal legislation of 1962, first designed to retrain persons with obsolete skills, redirected to include youth and then to emphasize training for the disadvantaged

Manpower planning

Planning for the optimal development and use of manpower

Manpower planning councils

Councils at local and state levels, representing a cross section of the community, including elected and appointed officials, clients, business and labor representatives, to plan manpower activities for optimum effectiveness

Manpower revolution

The period of the 1960s in which technological changes and problems became apparent, producing a series of corrective manpower programs

Master's degree

A collegiate degree usually requiring one to two years of work beyond the bachelor's degree

Micro-manpower planning

That manpower planning involved in meeting the manpower needs of a particular company, agency or industry

Minorities

Refers to those ethnic groups in a minority who experience special problems of assimilation into the dominant culture

Monitor

The day-to-day evaluation of a program's movement toward achieving certain goals

National Alliance of Businessmen—Job Opportunities in the Business Sector (NAB-JOBS)

An organization of businessmen with the purpose of giving jobs to disadvantaged people, the extra training costs involved being reimbursable from the federal government

National manpower program planning

That manpower planning involved in meeting specific national needs, i.e., pollution, disadvantaged, shortage of science skills, etc.

Neighborhood Youth Corps (NYC)

A federally funded program to give jobs to youth 16 to 22, enabling them to stay in school or return after dropping out

Occupational cluster

A grouping of closely related skills or occupations having a common core of skills and/or learning

On-the-job training (OJT)

The usually informal training that is a part of learning a job as compared with classroom and apprenticeship programs

Open entry

The admission of students regardless of educational background taking them as far as they are capable and desire

Operation Mainstream

A federal OEO work-relief program for older, near unemployable workers

Operator

One who operates equipment in the workplace

Outreach

Reaching out into the community, offering services to clients rather than waiting for clients to come into an office

Placement
The placing of a person on a job by an educational or employment agency

Pollution
A condition created by the presence of harmful or objectionable material in water

Port of entry
The place where a person enters

Productivity
The output per unit of input, usually per person or per man-hour

Professional
One who works in any profession such as law, medicine, engineering, teaching, etc., implying training at the four year college level

Programmed learning
A planned system program for learning a subject usually of the self-instruction variety

Projections
Using current statistics, determining future statistics from the trends they establish

Promotion
The movement up an occupational ladder

Public employment
Employment with a government agency

Public Employment Program (PEP)
The temporary program established by the Emergency Employment Act of 1971 to subsidize jobs in the public sector of the local and state levels of unemployed and underemployed persons

Public service careers
A permanent federal program to finance the preparation of disadvantaged persons for careers in the public service

Referrals
Those persons referred to an agency or employer for service or employment

Regional
Generally refers to the geographical area covered by several states

Relocation
The process of moving, usually from an area of labor surplus to an area of labor shortage

Revenue sharing
The granting of a block of money for generalized purposes and with few guidelines

Salary
Payment by the week, month, or year

Secondary education
Education in the 7th through 12th grades

Skilled worker-craftsman
A worker who has learned a craft or trade

Skills Center
Centers set up under MDTA to give disadvantaged people the opportunity to develop a skill and basic education

Special impact
Areas especially hard hit by military bases from which large numbers of students enter the school system, but the residents pay no property tax to support the schools

Subprofessionals—paraprofessionals
Persons trained to perform work to assist professionals but requiring less than baccalaureate education and training

Technical college
A post-high school educational institution which prepares technicians in relatively narrow occupational areas

Technician
A person trained to perform complex or technical jobs requiring less than bachelor's degree work or its equivalent

Technology

The method of performing a series of operations

Terminations—number of people who discontinue their employment within the preceding year for a particular occupation

- Death and retirement rate—total number who died or retired divided by total number of separations
- Death and retirements—total number of people within a wastewater treatment plant terminated because of death or retirement
- Discharge—number of people released from employment because of unsatisfactory performance
- Discharge rate—the number of discharges divided by number of terminations
- Quit rate—total number of quits divided by total number of separations
- Quits—number of people who voluntarily terminated their employment within the wastewater treatment plant
- Separation rate—total number of separations divided by the total number of terminations
- Separations—number of people who discontinued their employment within a state's system of wastewater treatment plant
- Termination rate—total terminations divided by full-time employment
- Transfers out—number of people who terminated their employment within a given occupation in a wastewater treatment plant in order to obtain employment either in some other occupation within the same or alternative waste facility
- Transfer out rate—total number of transfers out divided by total number of terminations

Tight labor market

A condition in the labor market in which there is a shortage of workers to meet existing demand, creating good job opportunities and rising wage levels

Training

The development of vocational skills

Training grant

The awarding of money by a government agency to establish a training program

Transfer

The lateral movement of a person from department to department or plant to plant

Turnover

The change of personnel

Typology

The differentiation of various types of activity

Undergraduate training or education

The training or education in college up to and including a bachelor's degree

Unemployment

Being without a job but in the process of looking for one

Unemployment compensation

Compensation paid to workers by the government during periods of unemployment

Updating

Bringing skills up to date with the latest technology

Upgrading

The improvement of job skills

Vocational education

The preparation of an individual for a vocation, usually requiring manual skills

Vocational rehabilitation

Making people employable through the reduction or elimination of physical, mental or social problems

Wages

Payment by the hour

Water quality

The chemical, physical, and biological characteristics of water with respect to its suitability for a particular use.

The same water may be of good quality for one use and bad for another, depending upon its characteristics and the requirements for the particular use.

Water standards

Definitions of water quality established as a basis for control for various water-use classifications

Water use

A system of classifying utilization of waters in natural watercourses for such purposes as potable water supply, recreation and bathing, fish culture, industrial water, waste assimilation, transportation, and power production

White-collar occupations

Those occupations requiring a substantial amount of communicative skill and involving substantial mental activity

Work Incentive (WIN)

A federally financed program for welfare recipients who are able to work in which extra compensation is provided them as an incentive to register for employment and educational/training programs.

Youth opportunity centers

Centers established specifically to aid youth in the development of job skills and the acquisition of job opportunities

VT 016 605

VT 016 605
TEACHER GUIDE FOR INCREASING THE CAREER
AWARENESS OF PRIMARY SCHOOL CHILDREN, GRADES
1-3.

PLEASANT HILL SCHOOL DISTRICT 1, ORE.
OREGON STATE BOARD OF EDUCATION, SALEM
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 10AUG72 100P.

DESCRIPTORS - HUMAN RESOURCES; SERVICES; *PRIMARY GRADES; *TEACHING GUIDES; *CAREER EDUCATION; VOCATIONAL DEVELOPMENT; HUMANITIES; *INTEGRATED CURRICULUM; BEHAVIORAL OBJECTIVES; EVALUATION TECHNIQUES; *LEARNING ACTIVITIES; RESOURCE MATERIALS; COMMUNITY RESOURCES; CONCEPTUAL SCHEMES; STUDENT TESTING; BIBLIOGRAPHIES
IDENTIFIERS - CAREER AWARENESS

ABSTRACT - THIS COLOR KEYED TEACHING GUIDE FOR AN INTEGRATED CAREER EDUCATION PROGRAM IN GRADES 1, 2, AND 3 PRESENTS CONCEPTUAL STATEMENTS, BEHAVIORAL OBJECTIVES, AND LEARNING ACTIVITIES IN A 2-COLUMN FORMAT, ACCORDING TO GRADE LEVEL, SUBJECT MATTER, AND UNIT OF INSTRUCTION. FOCUSING ON INSTRUCTION IN THE HUMANITIES AND HEALTH, THE GUIDE INCLUDES IDEAS FOR STUDENT EVALUATION, A PRE- AND POST-TEST, AND RESOURCE MATERIALS. A WIDE RANGE OF PROGRAM FORMS AS WELL AS STUDENT AND TEACHER BIBLIOGRAPHIES ARE PROVIDED. A RATIONALE FOR CAREER EDUCATION IS GIVEN. THIS DOCUMENT IS RELATED TO A TEACHING GUIDE FOR THE ELEMENTARY GRADES, AVAILABLE IN AIM VOL. 6, NO. 1 AS VT 015 371. (AG))

TEACHER GUIDE

For

INCREASING THE CAREER AWARENESS OF PRIMARY SCHOOL CHILDREN

Grades 1 - 3

By

Pleasant Hill School District #1
Route 8, Box 750
Pleasant Hill, Oregon 97401

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August 10, 1972

PROJECT FUNDED BY

OREGON BOARD OF EDUCATION
Salem, Oregon

and

PLEASANT HILL SCHOOL DISTRICT #1
Pleasant Hill, Oregon

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INCREASING THE VOCATIONAL AWARENESS OF PRIMARY SCHOOL CHILDREN

Background

Preparing youngsters for the World of Work is to be a major goal of the Pleasant Hill School District. A satisfactory and rewarding vocational adjustment holds high priority in our technologically oriented society. The concept of career awareness must be developed at an early age and hence must be included within the primary school curriculum. The role and responsibility of the primary teacher in fostering the development of vocational awareness shall be of great importance.

A 1968 study reports approximately two and a half million students are graduated annually from American high schools. Of these, 53% continue their education at institutions of higher learning. However, only about one half of this group completes their training. About 1,175,000 young men and women terminate their formal education with high school graduation. In addition, another 100,000 drop out each year before completing high school. Therefore, over two million students terminate their education at the 12th grade level, or earlier. Only some 400,000 of these students have had some vocational training in high school. The remaining 1.5 million leave school with little or no skills and the labor market offers few opportunities for these unskilled workers.

In spite of the importance of work to the nation and to the individual, today we find a large percentage of our young people preparing unrealistically due to their preference for the more glamorous professional or "status" jobs. This is shown by investigations that have statistically demonstrated discrepancies between the occupational distribution of our existing employed population. Only twelve in every one hundred individuals in the average community will find their occupational futures in medicine, law, teaching, nursing, dietetics, engineering, or the other professions. Parents must come to realize that over eighty percent of the young people entering the labor market will be needed in occupations other than the professions. While particular prestige has been attached to education for the professions, other equally important vocations have been given lower priority and less attention. Such insights as these should induce us, as educators, to provide educational programs which will foster a broadened understanding of work related to individual interest and the potential skills of all the students.

Making career decisions is not an objective at an early stage of a child's life. The primary school child may make what are commonly termed as "tentative choices" which will help to motivate him in attaining desired learning. The exploration of such "tentative" career choices provides a climate in which the school may help him to expand his appreciation of his total personality and the world in which he lives. This exploration of "tentative" career choices is related to the development of self-concept and identity.

Teachers have long been alert to the need to introduce the "world of work" as an integral part of all areas of learning in the early school years. Their concern for relevancy of school to life gives this practice high priority and is usually expressed during the early school years through the exploration of "community helpers". It is generally in this setting that career awareness emerges as a part of the child's knowledge.

A review of early-school approaches aimed at enhancing "vocational awareness" as presented in occupational literature, texts, references, audio-visual aids, community helpers studies, reveals that the emphasis is too frequently placed on the "informational" aspect only. This technique represents too narrow a base from which students may become knowledgeable about the function of work in our society and specifically their prospects in becoming productive members.

A program attuned to the career awareness of students extending from kindergarten to adult, should address itself to broader, more comprehensive objectives- not just informational services. These may be expressed in the following manner: To provide students:

- With a foundation for wholesome attitudes regarding the worth and the function of man's work in our society.

- With an understanding of the world of work that would contribute in a constructive way to the development of each one's self-image as a productive member of society.
- With an opportunity to develop a self-understanding as an awareness of their personal responsibility for making their own decisions,
- With an opportunity to develop attitudes of respect and appreciation toward workers in all fields and in all levels of work.
- With an understanding of their developing personal interests, attitudes, aptitudes, abilities, and skills, as they relate to future career decisions.
- With an understanding of the broad range of occupations open to them through education.

To carry out these expressed objectives, changes are required in teaching style, instructional methodology, and utilization of classroom materials.

If we are to help teachers make significant "judgements" pertaining to a student's career awareness, we must find answers to the following questions.

- What type of experiences should the teacher provide in an effort to enhance career awareness?
- What might be used that may help him assess the student's potential progress and needs in the growth of career awareness?
- How does a teacher determine the level of a student's vocational awareness and how much progress has taken place?
- How can he determine whether his response is appropriate for his age and ability.
- How can he evaluate the effectiveness of his efforts over the years?

A necessary first step is to develop a workable "model" of career awareness that might be readily applicable to the classroom. Such a guide placed in the teacher's hands should open the door to exploration and experimentation that could lead to meaningful research. Only through classroom research can such significant questions be answered. The following guide has been prepared by teachers for teachers to accomplish this meaningful purpose.

Setting

The Pleasant Hill School District is located in the southern tip of the Willamette Valley, just a ten minute drive from Eugene, Oregon. The district covers an area of 113 square miles, with an estimated population of 5000 persons. The majority of the populace either drives into Eugene for employment or works in the forest product industry in Oakridge or the Cascade Range of mountains east of the school district. The school district does not have monetary income for budget purposes through industry but depends almost entirely upon local property taxes for support.

The educational system of the district follows a 3-3-2-4 plan with a total of 1400 students and 81 certified staff members involved. It is the belief of the district that the development of a person's perceptions of himself in a career role is a continuing process which requires constant focus on relevant experiences throughout his entire life. The intent of this project is to develop or enhance teaching techniques and obtain related media for expanding the career awareness of the Pleasant Hill Primary School children. Emphasis of the project will be placed on teacher inservice, occupational awareness and the relationship between skills learned at school and skill requirement in occupations.

The project will be directed toward the primary school children of the Pleasant Hill School District, grades 1 - 3.

Trent Primary School

Don Brumfield, Principal
13 teachers
1 librarian
½ remedial reading
½ time counselor
1 full time music

Grade 1	105 students
Grade 2	105 students
Grade 3	105 students

This project will be directly and indirectly connected to the present 4-12 career education program of the Pleasant Hill Elementary School, the Pleasant Hill Junior High School, and the Pleasant Hill High School to provide a sequential career education program with a definite scope and sequence.

Parameters of Guide

The guide is confined to the Primary school, grades one, two, and three. The central theme of increasing the career awareness of primary school children places the spotlight on occupations associated with all of the various areas of the curriculum for the entire year.

The study of careers/occupations is not confined to the service or professional occupations but attempts to explore many of the occupations associated with any given area traditionally taught in the primary school. The skilled and semi-skilled occupations are treated with equal emphasis as the service or professional careers. An attempt has been made to remove the stereotype picture of occupations typically found in social studies units, i.e., the father going off to the office in a business suit with a briefcase in his hand while mother remains home with the children in a middle class home.

Procedure for Guide Use

The teacher guide, Increasing the Career Awareness of Primary School Children, is divided into seven categories: (1) grade level (2) subject matter (3) unit of instruction (4) concepts (5) behavioral objectives (6) suggested activities, and (7) suggested materials and resources.

The grade level, subject matter, and units of instruction refer to: the grade level the material is to be taught i.e., grade 1, the subject area under consideration, i.e., Social Studies, the unit of instruction within the particular subject area, i.e., map skills.

The concepts to be developed came from an investigation of material presently being taught at each grade level by subject matter. Inasmuch as no known list of concepts is available for use, a sequented, developmental list of concepts was obtained through a study of curriculum subject matter. This was done to assist students in comprehending the relationship between skills learned at school and skill requirements in occupations regardless of the occupations they might enter in later life.

The bahavioral objectives are the immediate expectations a teacher will expect upon the completion of the unit of study. Short range evaluations will be based upon these results.

The activities section is a culmination of suggestions found in the local school district curriculum guide, curriculum guides from other school districts, occupational guidance literature, and discussions with primary teachers.

The materials and resources suggested to accompany each activity are a compilation of available materials and/or resources found in (1) primary classroom, (2) primary library (3) Intermediate Education District Instructional Resource Center (4) review of publisher's list of commercial materials (5) Lane Community College and University of Oregon resource personnel and (6) citizens in the local community.

Grade: 1 Subject: Language Arts Unit: Speech and Drama

I. CONCEPT: Jobs use speech and drama.

Objective: The children can name or draw two occupations using speech and/or drama.

Learning Activities:	Materials and Resources:
1. Speech therapist will visit and explain her work and correct speaking habits.	1. School Speech Therapist
2. The drama department from Pleasant Hill High School will visit and show use and working of puppets.	2. Drama Department
3. Each child will make a puppet which is resembling an occupational worker who uses speech; they will give a play to the other rooms.	
4. Have a pantominist visit; hold assembly for all grades.	4. Charge $35.00 - $40.00 Carol Thibeau
5. Have librarian visit and demonstrate the art of story telling.	5. Librarian

Evaluation Activities:

1. The child will draw a picture of two occupations using Speech and/or Drama.

Grade: 1 Subject: Social Studies Unit: School Orientation

I. CONCEPT: Many people work in our school.

Objective: Students can verbalize the role of five school employees.

Learning Activities:

1. Take students on a tour of school buildings to look for places where people work and also to look for as many workers as possible.
    a. office
    b. health room
    c. kitchen (volunteer mothers)
    d. library
    e. speech room
    f. janitor's work room
    g. playground
    h. other classroom
    i. bus driver
2. Draw pictures of three school workers, as teacher writes down child's description.
3. Charades.
4. Discuss which jobs take a lot of training and ones involving special training.
5. Child have the responsibility of custodial job for one week.
6. Tour bus garage.

Evaluation Activities:

1. The child can draw a picture of five people working at school, and/or
2. The child can verbalize orally the jobs of five school employees.

Materials and Resources:

Resource Person:

1. School personnel

Bus driver - Mrs. Dilley

Study Prints:
#17 School Safety
School Friends and Helpers
PS 5600 44

Grade: 1 Subject: Social Studies Unit: 2. Family

I. CONCEPT: An "occupation" or "career" is that work which one selects as a means of earning money, or maintaining a family.

Objective: The child can tell the role of the mother in or out of the home.

Learning Activities:

1. Roles mothers play:

Occupations	Repairing
Cooking	Sewing
Shopping	Hair dresser
	Nurse

2. Paste picture onto board and cut into puzzle.
3. Write recipe of a lunch; make the lunch; trace how the ingredients are purchased. (related to math)
4. Child close eyes - make picture of one job that is done in the home. Make bulletin board display.
5. Point to various displayed pictures; child decides what person in the home does the work; label the picture with the name of the worker.
6. Riddles about the jobs around the house.
7. Seamstress visit.

Evaluation Activities:

1. The child can draw and/or verbalize as many jobs as he can that the mother does in or out of the home.

Materials and Resources:

Peabody Kits
Lesson 5 - Activity 1
Lesson 9 - Activity 1-3
Lesson 10 - Activity 2,3

Resource

1. Seamstress - mothers
Home Ec. teacher.

3. Cook

Films:
"Our Family Works Together"
MA 6208 02
"The Busy Bee" Sound-filmstrip
FR 7002 90
"Family Teamwork and You"
MB 6901 28
"My Mother is the Most Beautiful Woman in the World"
MA 7001 77
"Family at Work and Play"
SP - PS 6600 45
"Families and Jobs" Resa Earns Her Dime
MA 7004 02

Grade: 1 Subject: Social Studies Unit: 2a. Family

I. CONCEPT: An "occupation" or "career" is that work which one selects as a means of earning money.

Objective: Every child can identify his father's "occupation" or "career".

Learning Activities:

1. Riddles about occupations that the fathers of the students are presently in.
2. Pantomine Workers from Peabody.
3. Find or draw pictures exemplifying fathers occupation; display on bulletin board. Match titles to pictures.
4. Bring in actual tools a father uses.
5. Make worksheet which matches uniform to worker; hat to worker; tool to worker.
6. Visits from interesting fathers and what they do.
7. Use alphabet letters to think of a worker beginning with each letter.

Evaluation Activities:

1. The child will be able to describe orally the work his father does for a living.
2. Name his father's occupation.

Materials and Resources:

Peabody Kit

2. Lesson 5 - Activity 2
   Lesson 6 - Activity 2
   Lesson 6 - Activity 3
   Lesson 35 - Activity 2
   Lesson 779- Activity 3

Films:
"Hands Grow Up"
MA 7200 40
"The Thinking Book"
MA 7101 95

Resource person:
Fathers
School personnel

Grade: 1 Subject: Social Studies Unit: 2b. Family

I. CONCEPT: To know the ways foods are produced, prepared, marketed, and consumed.

Objective: The child can list, or draw, one occupation involved in the handling of milk.

Learning Activities:

1. Visit a dairy; creamery.
2. Trace production of milk and paint a mural of steps from cow to table.
3. Make experience chart.
4. Make butter.

Evaluative Activities:

1. The child will list orally, or by drawing a picture, one occupation involved in the handling of milk.

Materials and Resources:

1. Medo-Land Dairy 345-2371

4. Lochmead Dairy
Junction City 998-8544
(complete processing)

Study Prints

Dairy Helpers
PS 5505 81
Dairy Helpers #7

Films:

The Cow
MA 5812 72
How Milk is Processed
ML 5901 09
Dairy Cow
ML 5901 11
How a Cow is Milked
ML 5901 10
How Milk Comes To Us
ML 5901 08
Milk
MA 6204 18
Butter Making Kit
DA 5704 80

Grade: 1 Subject: Social Studies Unit: 2c. Family

I. CONCEPT: Many people work on building a home.

Objective: Learners can name three important people in a construction unit. (1) carpenter (2) cement truck driver (3) plumber (digger)

Learning Activities:

1. Pictures and discussion of various types of shelter.
2. Construct model of own home by paper folding, milk cartons, blocks.
3. Visit local unit being built and observe all workers involved.
4. Ask student to bring from home some of the common tools used in the home.
    - a. hammer and nails
    - b. screw drivers and screws
    - c. pliers and wrenches
    - d. hand drill and wooden bits
    - e. can opener
    - f. electric or play iron
    - g. broom
    - h. mop
    - i. portable vacuum cleaner

Hold up and ask this question:

1. What is this?
2. Who uses this?

Evaluative Activities:

1. The child will list orally, in writing, or by drawing, three occupations involved in the construction of a home.

Materials and Resources:

Peabody:

1. Breeden Brothers
   Jim McKee - speak on trailer houses.
2. Carpenter visit

Films:

Pipes In The House
MA 6220 65
We Live in a Trailer
MA 6704 09
Let's Build a Home
MA 6220 66
House Ahead
MA 7102 06
Building A House
MB 6503 14
New House-Where it Comes From
MA 6300 52

Grade: 1 Subject: Social Studies Unit: 2d. Family

I. CONCEPT: Many people are involved in clothing construction.

Objective: The child can list one job involved in the construction of clothing.

Learning Activities:

1. Trace clothing production from cow hide to selling of a coat.
2. Visit tannery.
3. Visit weaver and/or Jean's Knitting Center.
4. Riddles - children can write and say verbally as test in who prepared the piece of clothing.
   Example:
   "It keeps you warm. You wear it over clothes.
   It is a _________ (coat)
5. Demonstration of spinning wheel.
6. Demonstration on loom.
7. Models of kinds of clothing.
8. Visit fabric store and make a book featuring clothes for work, hot and cold weather, and people involved.

Evaluative Activities:

1. The child can list orally, in writing, or by illustrating, one job involved in clothing construction.

Materials and Resources:

1. Tandy Leathercraft
   Ralph's Leather Tailors
   Shoe Repairman
2. Leather Goods - McPhearson
3. Serenity Weavers 345-0643
   Eugene, Oregon

Films:

How Clothing Is Made
MB 7003 46
George's New Suit
MA 6300 50
Cloth - Fiber to Fabric
MB 7003 20
Clothes We Wear
MA 6501 05
Clothing
MA 6204 09

Peabody Kit
Lesson 20 - Activity 3 - 4

Grade: 1 Subject: Social Studies Unit: 2e. Family

I. CONCEPT: There are many kinds of work people do in the home.

Objective: The child can name his present career as that of a student and son/daughter.

Learning Activities:

1. Ask student to try new task in the home they don't generally perform for one week. Ask child one question:
    a. Do you like the new task?
    b. Were you able to do it successfully?
    c. What did you use or learn?
    d. Are you willing to try new jobs at home?

Teacher sends a letter home:

Dear Parents:
Your child is learning about the world of work. Will you help him select a task in the home which he normally does not do but which would be helpful to the family?

Teacher________________

2. Show filmstrip which relates to jobs in the home. Discuss skills needed and list on the board.

Cooking ----read recipes
Shopping ---count money
Washing ----grouping clothes by color
Repairing---using tools

Evaluative Activities:

1. The child can draw or describe his own job as a student and son/or daughter.

Materials and Resources:

Peabody Kit

Lesson 10 - Activity 1 - 3
Lesson 136 - Activity 1

Films:

Allen Is My Brother
MA 6700 80
Our Family Works Together
MA 6208 02
What Do Fathers Do
MA 6220 47

Study Prints:

Our Family at Work and Play

Filmstrips:

Helping Mother and the Father
Encyclopedia Britannica #7700
What Mothers Do SRA filmstrip from World of Work Series

Grade: 1 Subject: Social Studies Unit: 3. Holidays

I. CONCEPT: Many workers come to the home.

Objective: Shown a list of workers, pupils can name service performed for his family. (postman, garbage man, soldier)

Learning Activities:

1. Role play workers and their duty after they visit.
   - a. postman - have him visit
   - b. garbage man - have him visit
   - c. soldier
   - d. doctor
   - e. neighbor
   - f. paper boy
2. Write story about what the worker does.

   Title: The Postman
   Illustrate:_______
   Story:_________

3. At Thanksgiving, visit a turkey farm.
4. At Christmas, visit toy making industry.
   Goodwill Industries
   Roche - dolls
5. Mrs. Brown visit on repair of dolls.
   Patty Keipet.

Evaluative Activities:

1. The child can role play the service that the following people offer to the family.

   postman
   soldier
   neighbor
   garbage man
   paper boy
   doctor

Materials and Resources:

1. Garbage man
   Soldier
2. Postman
3. Lorang Turkey Farms
   Junction City, Oregon
4. Goodwill Industries
   Roche - Dolls
5. Mrs. Hobert Brown. Patty Keipet

Films:
The Mailman
MA 6503 15
A Community Keeps House
MA 6701 42
Dolls of Many Lands
MA 6204 37

Study Prints:

Holidays and Special Occasions
Columbus Day
PS 6718 78
Christmas PS 6718 77
Lincoln's Birthday PS 6718 79
Thanksgiving PS 6718 80
United Nation's Day PS 6728 66
Washington's Birthday PS 6718 81
Spring and Summer Holidays PS 6718 7
Keep the City Clean and Beautiful
PS 6600 40

Grade: 1 Subject: Social Studies Unit: 4. Patriotism

I. CONCEPT: Develop attitudes, knowledge, and skills needed for effective employment.

Objectives: Child can state the four important characteristics of a good citizen. (1) be on time (2) observe rules (3) doing one's part (4) accept responsibility.

Learning Activities:

1. Have a puppet show on "undesirable qualities", then "desirable qualities" of a good citizen who becomes a good worker.
2. Films about responsibility of each person in a world of work and play.
3. Guest speaker from either Army or Navy to speak on patriotism.

Evaluative Activities:

1. The child will verbalize the four important characteristics of a good citizen.

Materials and Resources:

1. Films:
   Going to School is Your Job
   MB 6905 59
   Ant and the Grasshopper
   MA 5908 53
   The Apple
   MA 7102 05

Resource:

U.S. Army Recruiting Services
U.S. Navy Recruiting Services

Grade: 1 Subject: Social Studies Unit: 5. Maps

I. CONCEPT: People make maps for safety.

Objective: Child can follow the fire drill map from the room to point of safety.

Learning Activities:

1. Principal makes original map. Explain to class how and why he did it.
2. Draw map of fire drill pattern on large scale, from room to safe spot.

Evaluative Activities:

1. The child will follow a simple map on a practice fire drill - getting the child from the room to a point of safety.

Materials and Resources:

1. Resource person: Principal

Film:
Maps of Our School
MA 6508 78

Grade: 1 Subject: Social Studies Unit: Animals

I. CONCEPT: Animals need the care of people.

Objective: The learner can match the workers to the care animals need.

Learning Activities:	Materials and Resources:
1. Have a veterinarian visit the classroom.	Speakers: 1. Dr. Blinkhorn, Veterinarian
2. Visit Mr. Powers Pet Store.	2. Donald Powers
3. Field trip to Portland Zoo.	Films: Zoo Babies - Observing Things About Us MA 5704 45
4. Visit the Humane Society.	Dogs Don't Eat Grapes or Bananas MA 7102 93 Rhythm in the Zoo MB 6201 50 Care of Pets MB 6205 30
5. Have a Dog Groomer visit.	5. 4-H Department

Evaluative Activities:

1. The learner will cut and paste the picture of a worker to match the picture describing his job.

Grade: 1 Subject: Science Unit: Observing

I. CONCEPT: Many jobs use observation.

Objective: The child can list two jobs using observation.

Learning Activities:	Materials and Resources:
1. Visit paint and wallpaper store.	1. Wallpaper and Paint Store
2. List ways a teacher observes a child in school (reading, health, behavior).	
3. Tour once around the school and write up their observation of people using observing.	
4. Visit Pleasant Hill Gardens and have them explain how fruits and vegetables are selected by color, texture, shape observation.	4. Pleasant Hill Gardens
5. Visit from White Dove on using handicrafts and the importance of color, shape, texture.	5. White Dove Anna Dinnel 516 Ivy Street Junction City, Oregon
6. Visit from mother showing cake decorating.	6. Volunteer mother Cake Decorating

Films:

Pigs
MB 6803 43
What Shall We Paint?
MA 6704 18
How Little, How Big
MA 6702 20

Evaluative Activities:

1. The child can list orally, in writing, or by drawing, two jobs using observation.

Grade: 1 Subject: Science Unit: Perception 2

I. CONCEPT: Many occupations use perception.

Objective: The learner can list two occupations using perception.

Learning Activities:

1. Have a cook visit and explain how one uses perception of odor, taste, sound.
2. Have band or orchestra leader explain how they use perception of sound.
3. Have one write experience chart on how the shoe repairman has to perceive what the old shoe needs - shoe strings, etc.
4. Play game: Pretend you're a scientist; blindfolded you will taste the two mystery powders.

Evaluative Activities:

1. The child will list orally, in writing, or by drawing, two occupations using perception.

Materials and Resources:

1. Cook from Trader Lee
   Leslie Mandarin Foods
2. Band Leader: Mr. Welch
3. Ralph's Shoe Store

Films:

How We Feel About Sound
MA 7100 25

Listening, Looking, and Feeling
FR 5606 18

Grade: 1 Subject: Science Unit: Classifying

I. CONCEPT: Many occupations are involved in classifying.

Objective: The learner can name two occupations involved in classification.

Learning Activities:	Materials and Resources:
1. Visit library and see how the books are classified.	1. Librarian
2. Have mothers share how the various rooms have equipment and supplies pertaining to that room. Cut out pictures of household items and classify according to use in the household. Let child pretend he is mother or father, and classify.	2. Mother
3. On the visit to the supermarket, have child draw pictures of his three favorite foods and observe how foods are classified in the store. Have child classify all pictures.	3. Magazines. Shop Rite Market
4. While at the Pet Store, observe how animals are classified.	4. Little Ark Pet Store Eugene, Oregon
	Films: Spring Brings Changes MA 6703 75

Evaluative Activities:

1. The child will be able to describe two jobs involved with classification, either orally, in writing, or by illustrating.

Grade: 1 Subject: Science Unit: Movement

I. CONCEPT: Many occupations involve movement.

Objective: The student can name two occupations involved in movement.

Learning Activities:

1. Visit the airport and make a book covering all people who work with airplanes.
2. Make a book which describes the workers on a train.
3. Have a ballerina visit and explain body movement, and how she dances as her work.
4. Have Dave Wilcox visit and tell how he makes money by playing football.

Evaluative Activities:

1. The child will be able to check the jobs using movement as the teacher gives the list orally to the child.

Examples:

artist	(no)
principal	(no)
football player	(yes)
ballerina	(yes)

Materials and Resources:

1. Eugene Municipal Airport
2. Railroad Depot
   Eugene, Oregon
3. University of Oregon School of Dance
4. Dave Wilcox

Films:

Dance Your Own Way
MA 5701 50

Grade: 1 Subject: Science Unit: Measurement

I. CONCEPT: Many people use measurement in home and in occupations.

Objective: The student can name two occupations involving measurement.

Learning Activities:

1. Bring in a measuring device used by shoe salesman, and decide how they use measurement.
2. Lady making drapes; how she uses measure.
3. List all the people who use measurement in building a house.
4. Role play how a child uses measurement.

Evaluative Activities:

1. The student will list two occupations using measurement, either orally, by writing, or by illustrating.

Materials and Resources:

1. Ralph's Shoe Store
2. P.T.A. worker
3. Carpenter

Films:

Let's Build A House
Ma 6220 66

New House - Where It Comes From
MA 5300 52

Grade: 1 Subject: Math Unit: 1. Counting

I. CONCEPT: Many occupations use counting.

Objective: The student can name as many ways as possible that people use counting in their work.

Learning Activities:

1. Student counting: the milk; student attendance; ice cream bars.
2. Visit the library and count the number of books they turned in and the number they have out. Librarian could explain this.
3. Secretary of school could talk to the children about how she uses counting in her job.
4. List jobs at home that involve counting. Ask parent for one new duty through the week that depends on the child for counting.
5. Visit a local grocery store. Have store keeper explain counting - how much was stored on shelf.

Evaluative Activities:

1. The child can draw or list orally the ways people use counting in their occupations.

Materials and Resources:

2. Librarian

3. Secretary

Films:

Behind the Scenes at the Supermarket
MA 5701 03

Arithmetic in the Food Store
MA 5604 10

Grade: 1 Subject: Math Unit: 2. Addition and Subtraction

I. CONCEPT: People use the idea of addition and subtraction in their work and at home.

Objective: The child can identify two ways addition and subtraction are used.

Learning Activities:

1. Game: "Have You Seen My Geese?"

Prep: Pin a large number on each child in a circle.

Intro: I will be farmer and you are geese. I will go to one and say, "Have you seen my geese?" Robert (#8) would say, "No. How many have you?" I have two more than you. He must find answer (2+2) and look for the guy with #4. Chase him and catch him before he (#4) gets back to his place. Can also use subtraction.

2. Game: "Postman"

Prep: Cut ten squares of paper and number 1 - 10. Cut many rectangles resembling envelopes. On each write an addition or subtraction problem whose answer is between 1-10.

Intro: Ten people are houses holding an answer card. Mailman delivers envelopes to right house. (4+1) goes to (#5).

3. Visit service station. Have attendant explain how he has to use addition and subtraction.

Evaluative Activities:

1. The child can draw or list orally, or in writing, at least two ways subtraction and addition are used in occupations and at home.

Materials and Resources:

1. Game: "Have You Seen My Geese"

2. Game: "Postman"

Films:

The Service Station
MA 6506 09

More and less
MA 6809 83

Grade: 1 Subject: Math Unit: 3. Measurement

I. CONCEPT: Measurement is used in many jobs.

Objective: The child can list two jobs which use the measurement of liquids and dry goods.

Learning Activities:	Materials and Resources:
1. Have a mother visit and tell how she uses cups, pints, quarts in cooking. Make cookies or cake using measures.	1. Volunteer mother
2. On visit to dairy have them explain pints, quarts, gallons.	2. Field Trips: Dairy (listed under Social Studies)
3. Visit Farrell's Ice Cream Parlor to learn use of pints, quarts, and gallons.	3. Farrell's Ice Cream Parlor or Modo-Land Creamery
4. Make Salt Flour Dough using pints, quarts, etc. Model animals out of dough. Mix 1 pint salt, 3 quarts flour, 4 T cooking oil, and enough water to make a soft dough (about 1½ cups water). Add vegetable coloring or powdered paint. Store in plastic bag in refrigerator.	

Evaluative Activities:

1. The child can list orally, in writing, or by drawing a picture, occupations using the measurement of liquid and dry goods.

Grade: 1 Subject: Math Unit: 4. Money

I. CONCEPT: Many people use money in occupations.

Objective: The student can list two people who use money in their occupations and at home.

Learning Activities:

1. Visit Woolworths

See how people purchase items using money. Let each child (?) purchase something.

2. Third grade tell how they make change when selling ice cream.

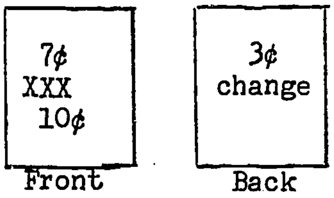
3. First graders purchase milk, hot dog, hamburgers, spaghetti, pencils, erasers.

4. Observe P.T.A. ladies computing monies from the above purchases. Room 13.

5. Game:

Prep: 20 2x3 cards. Paste on pictures from magazines, and price. Under this draw and label several coins whose total is more than price of toy. On back write amount of change received.

Intro: Work in pairs
Show to whole class
Two teams.



Evaluative Activities:

1. The child can draw pictures of two occupations that involve the use of money handling.

Materials and Resources:

1. Woolworth's, Eugene, Oreg

4. Trent P.T.A.

Grade: 1 Subject: Health Unit: 1. Community Health

I. CONCEPT: Some occupations are related to community health.

Objective: The student can list two occupations related to community health.

Learning Activities:	Materials and Resources:
1. Discuss the pollution of swimming water and those who test it. Sanitation people.	
2. School nurse visits and describes her work.	2. School nurse
3. Visit from American Cancer Society, Red Cross, and what they do for the community.	3. American Cancer Society
4. Make a scrap book of people who are involved in community health.	
5. Visit Twilight Acres Rest Home. Take a toy they have made by the assembly line method.	5. Twilight Acres Rest Home

Evaluative Activities:

1. Draw a picture of two people who work to make the community healthy.

Grade: 1 Subject: Health Unit: 2. Safe Living

I. CONCEPT: Many people are helping to keep you safe.

Objective: The student can list or name two occupations that help keep us safe.

Learning Activities:

1. Visit from policeman - for safety.
2. Visit from Lane County Sheriff's Water Search and Rescue Team.
3. Slides on Burns from doctor at University of Oregon.
4. See film on bus safety. Have bus driver talk to us.
5. Interview teacher's aides on school safety.

Evaluative Activities:

1. The student will draw as many occupations as possible who help keep us safe.

Materials and Resources:

1. Lane County Sheriff's Dept.
2. Lane County Sheriff's Dept.
3. University of Oregon Health Department.
4. Bus driver
5. Teacher's aides

Films:

School Bus Safety
PS 6700 14

School Safety
P.S. 6700 15

Safety on School Bus
MA 6203 53

Safety on Playground
MB 6204 07

Grade: 1 Subject: Health Unit: 3. Personal Health

I. CONCEPT: Many occupations are related to personal health.

Objective: The student can identify one job related to personal health.

Learning Activities:

1. Have dental hygienist visit.
2. Visit dentist; draw picture of all people who work with him.
3. List the basic food groups and the people who supply them.

   Farmer
   Store clerk
   Baker

4. Visit from Doctor; Pharmacist.
5. Gymnast from University of Oregon.
6. Visit from Dave Wilcox on body exercise.
7. Visit from baton twirlers in Trent on body movement.

Evaluative Activities :

1. The student will role play one job involved with personal health.

Materials and Resources:

1. Lane Community College

4. University of Oregon

6. Dave Wilcox - football player

7. Lynn Porter

Films:

Bread
Eat Well, Grow Well

Grade: 1 Subject: Health Unit: 4. Mental Health

I. CONCEPT: Occupations are involved in mental health.

Objectives: The child can name one person who is involved in mental health.

Learning Activities:	Materials and Resources:
1. Visit from School Nurse	1. Marian Wolfe
2. Visit from School Counselor	2. Richard D'Emidio

Evaluative Activities:

1. Draw a picture of one person who works to keep us happy and healthy in mind.

Grade: 2 Subject: Language Arts Unit: Speaking Skills

I. CONCEPT: Some occupations require good speaking ability.

Objective: The student can list three occupations that use speaking skills.

Learning Activities:

1. Make puppets and put on a play for other rooms showing occupations that use speaking skills in their occupations. (telephone operator, radio announcer, T.V. announcer, minister, teacher, etc.)

2. Set up mock radio station - use microphones and have children give weather reports, news reports, speeches.

3. Use Teletrainer telephones and be an operator.

4. Field trip KPNW Radio Station, or KERG Radio Station.

   Visit KEZI Television Station.

5. Listen to a disc jockey and observe his speech.

Evaluative Activities:

1. The child will list orally, in writing, or by drawing, three occupations that use speaking skills.

Materials and Resources:

2. Tape recorder
   Microphones
   Television

3. Teletrainer

4 & 5 Radio Station

Grade: 2 Subject: Social Studies/Health Unit: 1. Community Helpers Who Help us Stay Healthy.
A. Hospital Workers

I. CONCEPT: There are many jobs connected with the hospital.

Objective: Shown pictures of hospital helpers, the student can identify and tell at least one service performed by each. (identify four)

Learning Activities:

1. Observe and discuss study prints, films, and filmstrips.
2. Role play, Doctor, nurse, lab technician, X-Ray technician, druggist, and other workers.
3. Write stories about and draw pictures of hospital workers.
4. Read library books.
5. Play charades. Some members act out and rest of class guess.
6. Have children tell of their experiences in a hospital.
7. Visit a hospital. Sacred Heart General Hospital (K-12)

Evaluative Activities:

1. Show the child pictures of hospital workers and let him choose four to identify and tell one service performed by each.

Materials and Resources:

Films:

The Hospital
MB 5910 93
Community Hospital
MA 6701 40
The Doctor
MB 7003 29
Alexander Learns Good Health
MA 6207.27
Soapy, The Germ Fighter
MA 6725 75

Study Prints:

Hospital Helpers
PS 5505 83
We Visit The Doctor
FS H #21 (Trent)

Grade: 2 Subject: Social Studies/Health Unit: 1. Community Helpers Who Help Us Stay Healthy
B. Care of Teeth

I. CONCEPT: Many people work to help care for our teeth.

Objective: The student can identify the dentist and tell what he does.

Learning Activities:	Materials and Resources:
1. Invite a dentist to visit the classroom and discuss his occupation.	1. Dr. H.T. Gable
2. Plan a field trip to a dentist's office.	
3. Invite a dental hygienist to visit and discuss the work she does.	
4. Have the school nurse demonstrate the proper way to clean teeth.	4. School Nurse, Marian Wolfe
	Tooth Model
	We Visit The Dentist Trent F.S. #H 20 Let's Talk About Teeth Trent F.S. #H 36
	Film:
	Dottie and the Dentist MA 5230 24
	Teeth Are to Keep MB 5208 89
Evaluative Activities:	
Shown several pictures, the child can identify the dentist and tell what he does.	

Grade: 2 Subject: Social Studies/Health Unit: 1. Community Helpers Who Keep Us Safe.
A. Policemen

I. CONCEPT: Policemen help to keep us safe in many ways.

Objective: Students can identify policemen and tell three ways they help us. (1) enforce laws (2) direct traffic (3) help in emergencies

Learning Activities:

1. Invite a policeman to come in and tell how he trained for his job and explain his various duties.
2. Make bulletin board. Policeman at work.
3. Discuss how policemen help in emergencies.
4. Draw a series of safety signs a motorist should obey and tell how policemen direct traffic.
5. Make fingerprints. Discuss how they help a policeman in his work.
6. Field trip to police station.

Evaluative Activities:

1. Shown a set of pictures, the child can identify the policeman and tell three ways he helps people.

Materials and Resources:

1. Policeman

Films:

The Policeman
MB 5801 99

Policeman Walt Learns His Job
MA 5603 34

Study Prints:

Police Department Helpers
PS 5505 84

Grade: 2 Subject: Social Studies/Health Unit: 2. Community Helpers Who Keep Us Safe
B. Firemen

I. CONCEPT: The fireman is an important helper in keeping the community safe.

Objective: Students can identify a fireman, his clothing, and his equipment.

Learning Activities:

1. Invite representatives from the local Fire Department to visit school and demonstrate their equipment and clothing and tell about their work.
2. Plan a field trip to Springfield or Eugene Fire Departments.
3. Role play being a fireman.
4. Discuss occupations seen in films.
5. Draw pictures of fireman and his equipment.

Evaluative Activities:

1. Shown a set of pictures, the child can identify the fireman, describe his clothing, and tell three things about his equipment.

Materials and Resources:

1. Dexter Fire Department

Filmstrip:
Trent SS 47 Fire Prevention

Films:

The Fireman
MB 6204 12
The Firehouse Dog
MA 6701 85
Fire Safety is Your Problem
MA 6203 03
In Case of Fire
MB 6205 85
I'm No Fool With Fire
MA 6505 82

Study Prints:

Fire Prevention Set
PS 6508 73
Fire Department Helpers
PS 6505 82

Grade: 2 Subject: Social Studies/Health Unit: 3. School Citizenship and Safety

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I. CONCEPT: Many people are responsible for the operation of a safe school.

Objective: Students can identify four school workers and tell one responsibility of each.

Learning Activities:

1. Invite the superintendent, principal, secretary, custodian, school nurse, librarian, bus driver, music teacher, counselor, aides, etc., for an interview. Let children ask questions.
2. Discuss how the school nurse helps us.
3. Have school nurse demonstrate eye chart and audiometer.
4. Discuss playground and bus safety.

Evaluative Activities:

1. The child will draw pictures of four school workers and verbalize one responsibility of each.

Materials and Resources:

1. 2. 3. and 4.
All school personnel

Films:

Let's Play Safe
MA 5505 11
The Dangerous Playground
MB 7102 55
Courtesy at School
BA 6208 11

Study Prints:

School Bus Safety
PS 6700 14
School Friends and Helpers
PS 6600 44
School Safety
PS 6700 15

Grade: 2 Subject: Social Studies/Health Unit: 4. Community Helpers in Foods

I. CONCEPT: Many jobs are related to food production. Stress bakery, supermarket, butcher shop, truck farmer.

Objective: Given pictures of food, the student can tell who prepares the food.

Learning Activities:

1. Visit a supermarket bakery, butcher shop, truck farm.
2. Dramatize shopping experiences of children.
3. Observe and discuss film.
4. Bake bread and/or cookies.
5. Prepare a lunch.
6. Have a farmer come in and talk with the children.

Evaluative Activities:

1. Give the child two sets of pictures; foods and workers. Have the child match the food with the producer.

For example: Milkman - cream, milk
Baker - bread, cookies
Butcher - steak weiners
Farmer - vegetables, fruits.

Materials and Resources:

Films:

Behind the Scenes at the Supermarket
MA 6701 03
The Food Store
MB 6204 13
Foods From Grains
MA 6300 09
Bakery Beat
MB 6906 80
Bread
MB 6704 17
Grandmother Makes Bread
MA 6702 04
Where Does Our Meal Come From
MA 6300 55
We Get Food From Plants and Animals
MA 6203 50
Truck Farmers
MA 6204 21
The Story of the Wholesale Market
MB 6703 77

Study Prints:

Supermarket Helpers
PS 6505 86

Grade: 2 Subject: Social Studies Unit: 5. Community Helpers in Communications

I. CONCEPT: Many workers help in communication: post office, newspaper, telephone, library, T.V., and others.

Objective: The student can identify three workers in communications and describe their work.

Learning Activities:

1. Take a field trip to the post office.
2. Write letters to mail on the field trip.
3. List all of the jobs observed while on the field trip.
4. Make a stamp collection.
5. Have a news reporter visit the classroom and discuss his work.
6. Use the teletrainer from the Bell Telephone Company to teach the correct way to use a telephone.
7. Prepare a class newspaper.
8. Visit the Springfield or Eugene Library.
9. Bulletin Board
10. Scrap book, class or individual.

Evaluative Activities:

1. Given a set of pictures, the child will identify three workers in communications and tell about their work.

Materials and Resources:

Resource: Mrs. Davies,
Librarian

5. Mike Thoile

6. Teletrainer

Films:
Communication: A First Film
MA 7101 17
Communications For Beginners
MA 6300 49
Our Post Office
MA 7001 49
Telephone For Help
MA 7001 75
A Newspaper Serves It's Community
MB 5702 94
Where Do Our Letters Go - The Postal System
MA 6208 04
Discovering the Library
MA 6300 12

Study Prints:

Postal Helpers
PS 6505 85

Grade: 2 Subject: Social Studies: Unit: 6 Map Skills

I. CONCEPT: Map makers help people find their directions.

Objective: Children can draw a map from home to school.

Learning Activities:

1. Examine maps and globes learning about directions, symbols, and legends.
2. Make table or floor map of Pleasant Hill community, putting in schools, businesses, and homes.

Evaluative Activities:

1. The child will draw a map showing the route from his home to school.

Materials and Resources:

Maps - An Introduction
(constructing a map from a model of the community)
MA 6702 75 12 min. color

Let's Make a Map
MA 5910 75 11 min color

Grade: 2 Subject: Science Unit: Five Senses

I. CONCEPT: The senses are used in many jobs.

Objective: The student can list three jobs and tell how the senses are employed.

Learning Activities:

1. You are a scientist, blindfolded. Use five senses to figure out five objects.
2. You are a scientist. Figure out three clear liquids. What senses did you use?
3. Children tell the class what senses are used in the following jobs:

    logger
    baker
    dentist
    saleslady
    pilot
    doctor
    typist
    cook
    seamstress
    fireman
    policeman
    band conductor

4. Name the people involved in caring for the five senses.

    optometrist
    ear and throat specialist

    otologist (ear)

Evaluative Activities:

1. The child can name and then describe how the senses are used in three jobs.

Materials and Resources:

Films:

The Senses
MA 7001 54
Curiosity Did Not Kill The Cat
MA 7102 53
You and Your Sense of Touch
MA 7003 90
You and Your Five Senses
MA 5728 85
Learning To Use Your Senses
MA 7002 97
Your Senses and Their Care
MA 6900 57
How Our Eyes See
Trent FS S #63

Grade: 2 Subject: Science Unit: 2. Seasons - Shadows

I. CONCEPT: Some jobs are related to seasons.

Objective: The student can identify three jobs related to seasons.

Learning Activities:

1. List instruments and people that help us understand the seasons.

    Astronomers - telescopes
    Cameramen - cameras
    Scientists - spectroscope
    Weathermen -
    Farmer - (plants, spring, harvest, fall)

2. Read about and discuss bird banding and migration of birds and animals.
3. Watch film and list all the jobs you observe.

Materials and Resources:

Films:

The Seasons of the Year
MA 5200 [illegible]
Seasonal [illegible]ges in Plants
MA 5202 9[illegible]
Shadows of Our Turning Earth
MA 5703 53
Space Flight Around the Earth
MB 5703 72
Big Sun and Our Earth
MA 5200 27
Spring Brings Changes
MA 5703 75

Trent's Model Planetarium

Film Strips:

Signs of Spring
Trent FS S #25
Signs of Summer
Trent FS S #27
Finding Out About Day and Night
Trent FS S #15

Grade: 2 Subject: Science Unit: 3. Plants and Animals

I. CONCEPT: Many jobs and hobbies are related to plants and animals.

Objective: The student can list two jobs and two hobbies which are related to plants and animals.

Learning Activities:

1. Invite a farmer to talk to the class about farming.
2. Visit a pet shop or a pet hospital and see the people at work. (clerk, veterinarian, groomer)
3. List as many jobs as you can related to plants and animals. (logger, farmer, mill workers, bird bander, veterinarian, meat cutter, cannery workers, meat packers, fish hatchery, cattle raising, cowboy, etc.)
4. Make a scrapbook of jobs listed above in #3.
5. Have a 4-H leader talk to the class and try to interest them in participating.

Evaluative Activities:

1. The child will list orally, in writing, or by drawing, two jobs and two hobbies related to plants and animals.

Materials and Resources:

Films:

Mr. Blue Lake
MB 5700 55
How Animals Help Us
MA 6300 31
We Get Food From Plants and Animals
MA 6703 50
Seeds Grow into Plants
MA 6302 34

Grade: 2 Subject: Science Unit: A. Weather

I. CONCEPT: Many people are employed by weather bureaus.

Objective: The student can identify three jobs related to weather bureaus.

Learning Activities:

1. Call the weather station and find out how many people are employed. How?
2. Listen to weather forecast on T.V. and radio.
3. Make simple weather instruments and relate to people who use them.

   thermometer - weatherman
   candy makers, doctors,

   weather vane-wind socks - pilots and
   weathermen.

   rain gauge

   animometer
4. Make weather chart to record weather for one month.
5. Bring weather maps from the newspaper to be discussed.

Evaluative Activities:

1. The child will identify orally, in writing, or by illustrating, three jobs related to the weather bureau.

Materials and Resources:

Films:

Thermometers
MA 5703 86

Thermometers and How They Work
MA 6304 75

Thermometers: How They Help Us
MA 5723 14

Grade: 2 Subject: Science Unit: B. Weather

I. CONCEPT: Many jobs depend upon the weather.

Objective: The student can identify five jobs that are affected by the weather.

Learning Activities:

1. Bulletin Board - Who Weather Affects. (astronauts, stewardess, pilots, farmers, fruit growers, recreational workers)
2. Make reports on jobs that are affected by the weather, explaining why.
3. Read books about weather.

Evaluative Activities:

1. Give the child a list of ten jobs and have him check the five that are affected by the weather.

Materials and Resources:

Films:

Whatever The Weather
MA 7003 15
Water in the Weather
MB 6704 05
Water, Water, Everywhere
MA 6300 39
Water For All Living Things
MA 6704 04

Film Strips:
Why Do We Have Warm and Cold Days?
Trent FS S #53

Grade: 2 Subject: Math Unit: 1. Addition and Subtraction

I. CONCEPT: People use the idea of addition and subtraction in their work and at home.

Objective: The student can identify two jobs which use addition and subtraction in their work.

Learning Activities:

1. Visit a supermarket and add up grocery items.
2. Observe how a cashier uses a cash register.
3. Role play jobs using addition and subtraction.

    secretary
    store clerk
    carpenter
    highway construction man

Evaluative Activities:

1. The child will list orally, in writing, or by drawing, two jobs which use addition and subtraction.

Materials and Resources:

Films:

Arithmetic in the Food Store
MA 5604 10

The Food Store
MB 5204 13

Grade: 2 Subject: Math Unit: 2. Measurement

I. CONCEPT: People use measurement in many occupations and at home.

Objective: A. The child can list two jobs each that use liquid, linear, and time measurement.

Learning Activities:

1. Have children figure how many cups of cool-aid needed for class. Prepare cool-aid.
2. Have children bake bread and cookies using measurement.
3. List all the jobs you can think of that use measurement of time. (time clocks, scheduling, school, transportation, etc.)
4. When visiting the fire department, find out how long the hoses are, how many gallons of water pumped per minute.
5. Measure room.
6. When visiting the supermarket, look for as many units of measurement as you can find.
7. In the fall, make jelly to use on bread when we bake.

Evaluative Activities:

1. The child will illustrate six occupations using measurement, (2 time; 2 linear; 2 liquid) for a bulletin board.

Materials and Resources:

Films:

Time For Clocks
MB 5501 07

Measurement in the Food Store
MA 5702 80

What Time Is It?
MA 5200 04

Filmstrips:
Trent:

The second	M10
The Minutes	M11
The Hour	M12
The Half-Hour and Quarter Hour	M13
Hours and Minutes	M14
Comparisons	M15

Grade: 2 Subject: Math Unit: 3. Money

I. CONCEPT: People use money in many occupations and at home.

Objective: The student can identify three jobs which use money.

Learning Activities:

1. Make a play store, and use play money to make change.
2. When at supermarket note the price of articles. Have each child list the cost of their three favorite foods.
3. Use "play" money for behavioral modification and let the children buy their awards.
4. Buy milk tickets, ice cream, hot dog, and hamburgers at school. Learn to make correct change.
5. Buy stamps when we go to the Post Office.

Evaluative Activities:

1. The child will list orally, in writing, or by drawing, three jobs that use money.

Materials and Resources:

Films:

Money and It's Uses
MA 5305 07

Making Change for a Dollar
MA 5300 01

Grade: 2 Subject: Math Unit. [illegible] Geometry - Fractions

I. CONCEPT: People use geometry in their work and at home.

Objective: The student can name two jobs which use geometry.

Learning Activities:

1. Have Pleasant Hill High School construction student visit class and tell how he uses geometry in building.
2. Observe geometric shapes the construction people used in playground equipment and the school building.
3. Observe geometric shapes in the room - clothing, etc.
4. Cut apples, pies, cakes, fruit into halves, thirds, fourths, then use in fruit dish for lunch.

Evaluative Activities:

1. The child will list orally, in writing, or by drawing, two jobs which use geometry.

Materials and Resources:

Films:

Geometry - Curves and Line
MA 5718 45

Geometry - Lines and Shapes
MA 5809 88

Geometry: Points, Angles, Lines, and Tigers
MA 5704 59

Building A House
MB 6503 14

Grade: [illegible] Subject: Language Arts Unit: Creative Writing

I. CONCEPT: Some people do creative writing for occupations and/or hobbies.

Objective: The child can describe an occupation which uses creative writing.

Learning Activities:

1. Guest speaker: Ken Kesey. Have the children write down questions to ask him before he arrives.
2. Discuss the steps involved in writing a story.
3. Students will write their own short stories. These should be put together in a booklet for the library and/or parents.
4. Have students read poetry written by authors. (see list)
5. Students will write their own poetry. These could be put into booklets for parents and/or library.
6. Guest speaker: Carolyn Feller, University of Oregon.

Evaluative Activities:

1. The child will describe, orally or in writing, an occupation which uses creative writing:

   author
   poet
   newspaper reporter

Materials and Resources:

Books:

The Golden Treasury of Poetry
  Untermeyer
Wings From The Wind
  Tudor
Cricket Songs
  Behn
The Moment of Wonder
  Lewis
Oxford Book of Poetry For Children
  Blishen
Piper, Pipe That Song Again
  Larrick

Films:

Let's Write A Story
MA 5501 74
Story of a Book
MA 5501 73

Teacher References:

The Junior Book of Authors
More Junior Authors
Illustrators of Children's Books
Index to Children's Poetry
Subject Index to Poetry for Children and Young People

Grade: 3 Subject: Social Studies Unit: Living in Lane County: Transportation

I. CONCEPT: The Lane County transportation system provides many occupations for its residents.

Objective: The student can identify (orally or in writing) three transportation-related occupations in Lane County.

Learning Activities:

1. Build paper models of trains, cars, planes, trucks, buses, monorails, etc.
2. Complete questionaire:

   --How does your father go to work?
   --How does your mother go to work?
   --How many cars does your family have?
   --Have you ever ridden in a plane? A train?
3. Go on a field trip to the airport.
4. Visit the "round house" in Eugene.
5. Ride the "Goose Train" from the Village Green in Cottage Grove. (in September)
6. Visit the Model Train at OMSI.
7. Have students from Lane Community College in aviation explain about aviation.
8. Field trip to Greyhound Bus Depot.

Evaluative Activities:

1. The child will list orally, by illustration, or in writing, three occupations which are related to transportation.

Materials and Resources:

Guest Speakers:

--traffic controllers
--policemen
--city engineer
Darrel Dorman, Pilot

Films:

Busy Harbor
MA 5300 44
How People Travel In The City
PS 5600 41
Airport in the Jet Age
[illegible] 5218 44
[illegible]boats and Harbors
[illegible] 5220 70
The Helicopter Carries Mail
MA 5702 10
An Autumn Story: Mrs. Pennymaker
MB 5908 73
The Freight Train
MA 5204 28
Service Stations
MA 5505 09

Books:

Find a Career in Auto Mechanics

Grade: 3 Subject: Social Studies Unit: Living in Lane County: Resources

I. CONCEPT: Lane County natural resources provide many occupations for it's residents.

Objective: The student can identify verbally or by illustration, five resource-related occupations.

Learning Activities:

1. Field Trip to Kimball's Mill.
2. Visit Lookout Point Dam.
3. Visit the salmon holding ponds at Dexter Dam.
4. Have Demonstration Agent from courthouse come and show samples of soil and discuss specialized farms.
5. Field trip to Newman's Fish Market. How fish are caught, prepared, and handled.
6. Give a short oral report on a natural resource and the jobs it involves.
    a. worm farm
    b. fishing lures
7. Visit Agri-Pak or Hudson House for food products.

Evaluative Activities:

1. The child will illustrate five occupations that are involved with natural resources.

Materials and Resources:

Films:

Copper Mining
MB 5701 45
The Truck Farmer
MA 5204 21
Visit to the Waterworks
MA 520[illegible]3
Mountain Men
MB 5702 89
Forest Ranger
MB 5205 34
Food Cannery
MA [illegible]02 83
[illegible] Our Forests
[illegible]102 83
The Cedar Tree
MA 7102 92

Transparencies:

Loggers At Work
TR 5800 55

Books:

Smoke Jumper
Forest Patrol

Resource People:

Strawberries - Clyde Ward
Beans - Ruth Ellison
Nuts - Powers
Fruits - Tinkers
Hunting and Fishing - Cliff Soderstrom

Grade: 3 Subject: Social Studies Unit: Living in Lane County Government

I. CONCEPT: Lane County government provides many different occupations.

Objective: The students can list three occupations required to operate Lane County government.

Learning Activities:

1. Field trip to Lane County Court House.

   --Court system
   --Sheriff's Department
   --Clerk or Record Office
   --County Commissioner
   --Assessor
   --Health and Sanitation

2. Have a "mock trial" with judges, jury, defendents, lawyers, etc.

3. Make a bulletin board with Lane County Court House as the center with services and departments out from it.

Evaluative Activities:

1. The student will list orally, or in writing, three occupations required to operate the Lane County Government.

Materials and Resources:

Films:

Our City Government
MA 5910 79

Big People - Little People
MA 7003 10

Grade: 3 Subject: Social Studies Unit: Living in Lane County
Recreational Maps

I. CONCEPT: Map makers help people enjoy our land.

Objective: The students can use a map to identify three types of occupations related to recreation.

Learning Activities:

1. Make a hiearchy of maps:

   community
   county
   state
   United States
   North America
   World

2. Invite a person from the Forest Service to discuss the use of maps in his job. (from fourth grade)

3. Make a relief map of Lane County showing from "sea level to ski level" - mountains, lakes, rivers, valley, ocean.

4. Identify occupations related to recreation through collages.

5. Invite Lane County Road Engineer to discuss how roads are maintained so we can visit recreational areas.

Evaluative Activities:

1. The child will take a map of Lane County and list (or draw) on it, three occupations related to recreation.

Materials and Resources:

1. City of Eugene Department of Parks and Recreation

2. Lane County Committee on Parks and Recreation, Lane County Courthouse.

Films:

What Is A Map
MA 6203 25

Map Skills - Recognizing Physical Features
MA 7100 28

Maps - Coastal Symbols & Terms
MA 7001 20

Maps - Land Symbols and Terms
MB 6910 81

Grade: 3 Subject: Social Studies Unit: Living in Lane County: History

I. CONCEPT: There are occupations which help create early Lane County communities.

Objective: The student can list four occupations of the early settlers of Lane County.

Learning Activities:

1. Visit Bristow Monument and Cemetery.
2. Role play events of Pioneer Life in Lane County.
3. Make mural showing river and sea coast Indian life.
4. Collect pictures of pioneer times - trapping, trading, fishing, mining, and farming.
5. Do people still work at jobs that existed 100 years ago?
6. Guest speaker: Wilbur Ternyik, on artifacts, early trade, Indians, guns, and sea fishing.

Evaluative Activities:

1. The child will list orally, in writing, or by illustration, four occupations of early settlers in Lane County.

Materials and Resources:

3. Maps:
   Indians of Oregon
   PM 7103 03
4. Cal Schmidt
6. Wilbur Ternyik
   Florence, Oregon

Films:

Indian Family of Long Ago
MB 6204 45
Fur Trade - Beaver Valley
MB 6506 97
Children of the Covered Wagon Train
MB 6501 93
Westward Growth of Our Nation
MA 6207 95
Kentucky Rifle
MA 7006 08

Grade: 3 Subject: Science Unit: Insects

I. CONCEPT: Jobs and hobbies can be related to insects.

Objective: The child can list two jobs and how insects are helpful or harmful to that job.

Learning Activities:

1. Guest speaker: Mrs. Ray Ralston, on insect collection.
2. Interview County Agent about insects.... harmless and harmful...in our area.
3. Assign children to call the following people and ask them how insects help them and how insects harm their job:
    - a. Tinker's Orchards
    - b. Chase Flowers
    - c. Pleasant Hill Gardens
    - d. A dairy farm
    - e. Forest Service
    - f. Truck farmer (beans, nuts)

Evaluative Activities:

1. The child will illustrate how insects are helpful, or harmful, to two occupations.

Materials and Resources:

1. Mrs. Ray Ralston
2. County Agent
3. Forest Service

Films:

Spiders
MB 7003 44

Butterfly and Moth Life Cycles
MB 7100 77

Filmstrips:

Flies and Mosquitoes
FA 241 C

Life Story of a Grasshopper
FB 237 C

Grade: 3 Subject: Science Unit: 2. Plants

I. CONCEPT: Many jobs and hobbies are related to plant life.

Objective: The child can list three jobs related to plant life or growth of Plants

Learning Activities:

1. Have children make a bulletin board showing a plant and tree in the center, with related jobs around it. (County Agent, seed salesman, farmer, irrigation (dam worker), research scientists, forest service, etc.)
2. Go on the Clark Creek Nature Trail and determine occupations related to this area.... loggers, firemen, forest service, horticulturist, road builders, etc.
3. Visit Chase Flowers for discussion of occupations involved in growth of a plant from seed to the flower shop.
4. Play the role of a scientist and graph the growth of two plants, one being watered, one not being watered.

Evaluative Activities:

1. The child will list orally, in writing, or by illustration, three occupations related to plant life or growth of a plant.

Materials and Resources:

Films:

Leaves
MB 7101 51

Seed Dispersal
MB 6200 72

Seasonal Changes in Plants
MA 6202 98

Seasonal Changes in Trees
MA 6300 91

A Plant Through the Seasons
MB 6910 65

Plant Motions
MB 6208 74

Plants Make Food
MA 6501 75

Plants That Grow From Leaves, Stems, and Roots
MA 6207 85

Plants That Have No Flowers Or Seeds
MA 6902 15

Grade: 3 Subject: Science Unit: 3. Earth, Rocks, and Soil

I. CONCEPT: Many occupations and hobbies are related to earth, rocks, and soil.

Objective: The child can identify two jobs or hobbies related to earth, rocks, and soil.

Learning Activities:

1. Guest speakers to discuss rock collecting, jewelry making, and classifying.
2. Play the role of an astronaut on the moon. You find rocks that you have never seen. You must classify them some way.
3. Field trip to the coast:
   a. Fossil Point
   b. Shell Island
   c. Strata layers
   d. Different kinds of soil: sandy, clay, red, etc.
4. Trace the story of a pencil. (manufacturing)
5. Have students give reports and demonstrations on prospecting and panning of minerals. (miner)

Evaluative Activities:

1. Out of a checklist of six or eight occupations and hobbies, the student will pick out at least two which involve earth, rocks, or soil.

Materials and Resources:

1. Glenn Humiston

Films:

Rocks: Where They Come From
MA 5703 55

Rocks For Beginners
MB 5501 19

Copper Mining
MB 5701 46

Filmstrips:

Shale, Sandstone, and Conglomerates
FR 7002 14

Coal
FR 7002 13

Chart:

Rocks and Minerals
PC 5707 40

Grade: 3 Subject: Science Unit: Simple Machines

I. CONCEPT: Simple machines help in many occupations.

Objective: The student can identify three simple machines used in family occupations.

Learning Activities:

1. Fill out Observation Rating Sheet for father's occupation. See Appendix.
2. Walk around the Trent playground. Find as many simple machines as you can and see how they are being used.
3. Interview the custodian to find out what simple machines he uses.
4. Have a contest to see who can get the longest list of simple machines used in the home by father and mother.
5. Role play the job of a truck driver. What simple machines could you use to make your job easier?
6. Role play the job of a logger. What simple machines would make the job easier?

Evaluation Activities:

1. The child will list orally, in writing, or by illustration, three simple machines used in the home by the family.

Materials and Resources:

Films:

How Machines and Tools Help Us
MA 6200 37

Simple Machines:
The Inclined Plane
MA 6208 55

The Lever
MA 6300 80

Pulleys
MA 6300 81

Wheels and Axles
MA 6300 82

Machines That Help Farmers
MA 6702 62

What's So Important About A Wheel
MA 6506 08

Chart:

Machines Work and Friction
PC 6706 53

Grade: 3 Subject: Science Unit: Solids, Liquids, and Gas

I. CONCEPT: Several jobs are related to the study of solids, liquids, and gas.

Objective: The child can describe one of each (solid, liquid, and gas) and tell one occupation in which each is used.

Learning Activities:

1. Make a class poster listing the kinds of things a chemist would have developed... dyes, materials, spacecraft, plastics, etc.
2. Play the part of a scientist. There are three mystery powders in front of you (sugar, starch, and baking soda). Determine what they are.
3. As a research project, learn what you can about Robert Boyle and Antoine Lavoisier, chemists.
4. Have the firemen explain to the class how fire extinguishers work.
5. Prepare jello for the class. Observe the stages: powder, liquid, solid.

Evaluative Activities:

1. Match the following occupations with the thing that the worker would use the most.

1.	ice skater	a.	gas
2.	milk bottler	b.	liquid
3.	propane gas man	c.	solid

Materials and Resources:

2. Raymond Seals

Films:

Air: A First Film
MA 7002 77

Simple Changes in Matter
MA 53-0 75

Simple Demonstrations With Air
MA 6300 77

Grade: 3 Subject: Math Unit: 1. Addition and Subtraction

I. CONCEPT: People use addition and subtraction in their work and at home.

Objective: The students can list three jobs that require use of addition and subtraction.

Learning Activities:

1. Visit a bank, or Selco, to observe how the teller and cashier use addition and subtraction.
2. Visit the Pleasant Hill District Office to observe the secretary using the calculator.

Evaluative Activities:

1. The child will list orally, or in writing, three occupations that require the use of addition and/or subtraction.

Materials and Resources:

1. U.S. National Bank
   Selco - Richard Boettcher

Films:

Doing and Undoing in Math
MA 5718 44

Money In The Bank
MB 5805 99

Trent filmstrips:

Addition and Subtraction Are Related

Renaming Numbers for Subtraction

Grade: 3 Subject: Math Unit: 2. Measurement

I. CONCEPT: Many jobs use forms of measurement.

Objective: The child can list verbally, or in writing, three jobs that use measurement.

Learning Activities:

1. Field trip to fabric store to observe linear measuring of material.
2. Field trip to service station to observe liquid measurement of gasoline.
3. Have a drafting student from the Pleasant Hill High School visit the class to tell the students how measurement is used for building things.
4. Have the Bus Superintendent visit the class to discuss mileage.
5. On field trip to Kimball's Mill, have them point out methods used for measuring lumber.
6. Construct clock faces with assembly line techniques.
7. Measure running lanes for yearly relays in front of rooms 6, 7, and 8.

Evaluative Activities:

1. The child will list orally, or in writing, or by illustration, three jobs that use measurement.

Materials and Resources:

3. Pleasant Hill High School Construction Class. Ray Kodera

4. Bus Superintendent.

Trent filmstrips:

Introduction to Measurement

Grade: 3 Subject: Math Unit: 2. Multiplication and Division

I. CONCEPT: People use multiplication and division in their work.

Objective: The child can list two jobs which require use of multiplication and division.

Learning Activities:

1. Field trip to Meier and Frank to see how they use multiplication and division in their stock room, or mailing room.
2. Have a guest speaker from Oregon Environmental Council to tell how multiplication and division are used in their work.
3. Guest speaker:

   Eugene City Hall-Planning Commission for discussion on dividing property.

Evaluative Activities:

1. The child will list orally, in writing, or by illustration, two jobs which use multiplication and/or division.

Materials and Resources:

2. Oregon Environmental Council, Eugene, Oregon
3. Eugene City Hall Planning Commission.

Trent filmstrips:

Multiplication and Division Are Related

Renaming Numbers For Multiplication

Grade: 3 Subject: Math Unit: 4. Geometry and Fractions

I. CONCEPT: Geometry and fractions are used in several jobs.

Objective: The child can identify three jobs that use geometry or fractions.

Learning Activities:

1. Go on a walk around the Trent area and observe geometric shapes that carpenters used in building houses.

2. Have the children make a design using Spirographs.

   Have them explain in what occupations these designs might be used. (artist, lamp manufacturer, cloth designer, etc.)

3. Make a "Crystal Garden" using fractional measurements.

   Recipe: ¼ salt
   ¼ bluing
   food color
   ½ water
   1 T ammonia
   Mix and pour over crumpled tin foil.

4. Invite a member of the Drafting Class to explain use of graphs and fractions.

5. Draw a circle representing an entire day. Divide it into fractional parts showing time spent eating, sleeping, working (school), and playing.

Evaluative Activities:

1. The child will list orally, in writing, or by illustration, three jobs which use geometric shapes or fractions.

Materials and Resources:

2. High School Drafting Teacher

Films:

Shape
MA 7003 08

Trent filmstrips:

Fractional Parts of a Whole and of Sets
How We Think in Geometry: Points, paths

4. Ray Kodera

Grade: 3 Subject: Health Unit: 1. Community Health: Microbes - Drugs

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I. CONCEPT: Lane County employees help maintain good community health.

Objective: The student can identify the role of the Lane County Health Department.

Learning Activities:	Materials and Resources:
1. Visit the Health Service at the Lane County Courthouse.	1. Mary Stanford (?)
2. Field trip: McKesson and Robbins Drug Wholesaler, Eugene, Oregon.	
3. Diseases: Field trip to Lammer's Fairfield Pharmacy.	
4. Narcotic speaker: Fred Jenkins, Springfield, Oregon.	4. Lt. Howard Kershner

Evaluative Activities:

1. Student check the jobs related to Lane County Health Department.

Example:

___1. Teacher
___2. Janitor
___3. Garbageman
___4. Nurse
___5. Welder
___6. Doctor
___7. Pilot
___6. Water comptroller
___9. Forester
___10.. Air pollution engineer

Grade: 3 Subject: Health Unit: 2. Growth as a Family Member

I. CONCEPT: Some occupations help us grow emotionally.

Objective: The student can describe orally, or in writing, how a psychologist or a counselor can help us become good citizens.

Learning Activities:

1. Have a psychologist visit the classroom to discuss Mental Health. (from I.E.D. or the University of Oregon.)
2. Have our Guidance Counselor talk to the children on citizenship.

Evaluation Activities:

1. Role play the job of a psychologist or a counselor.

Materials and Resources:

1. Lane County Juvenile Home
   Dr. Ellsworth
2. Lt. Howard Kershner

Films:

Am I Dependable
MA 7102 60

Forgive and Forget
FA 397 D

Choosing Up
MA 7200 30

How Friends Are Made
FA 398 D

Just Like Me
MA 5702 39

Grade: 3 Subject: Health Unit: 3. Physical Safety:
Preventing Accidents

I. CONCEPT: Many occupations are related to physical safety.

Objective: The student can identify three jobs related to our physical safety.

Learning Activities:

1. Discuss children's swimming experiences and the role of a lifeguard. (Red Cross)
2. Out of cardboard, make the basic traffic signs.
3. Set up a miniature street. Students must use hand signals and obey traffic signs. Have a traffic controller.
4. Have Lt. Felix Baker, Springfield Police Department, talk about bicycles and bicycling.
5. List possible jobs that help make our homes safer:
    1. electrician - wiring
    2. plumber
    3. electrical appliances
    4. fire alarm systems

Evaluative Activities:

1. Use check list to check jobs related to our physical safety.

Materials and Resources:

Films:

The Day the Bicycles Disappeared	MB 7003 19
The Talking Car	MB 7101 37
One Got Fat	MB 6703 15
Bicycle Safety Skills	MA 6208 15
I'm No Fool With Fire	MA 6506 82
Seven Rules of Bicycle Safety	MA 6900 55
Let's Play Safe	MA 6606 11
Midsummer's Nightmare	MB 6800 44
Make Your Own Home Safe	MA 6203 39
I'm No Fool In Water	MA 6505 83

Books:

The Sad Tale of Careless Klunk
Kesler, L.

Safety Can Be Fun
Leaf. M.

Grade: 3 Subject: Health Unit: 4. Physical Growth

I. CONCEPT: Some occupations help physical growth.

Objective: The student can list jobs where good physical health is helpful or necessary.

Learning Activities:

1. Using the "torso", role play the professor pointing out parts of the body to his class.

2. Emphaaize need for good physical condition by these speakers from High School or Lane Community College.

   a. football player
   b. basketball player
   c. tennis player
   d. volleyball
   e. golf
   f. track and field
   g. baseball

3. Have tasting party to explain where their food came from and jobs needed to grow, cook, and serve it.

Evaluative Activities:

1. The child will list orally, in writing, or by illustration, three jobs where good physical health is helpful or necessary.

Materials and Resources:

1. Film:
   Creative Body Movements
   MA 6912 18

2. Guest speakers: from
   High School or
   Lane Community College

   Mr. Edward Armstrong -
   Olympic Games

Grade: 1 - 3 Subject: Art Unit: 1. Drawing

I. CONCEPT: Drawing is used in several occupations and for hobbies.

Objective: The child can list two jobs or hobbies which use drawings.

Learning Activities:	Materials and Resources:
1. Ken Kesey's illustrator: speak on illustrating books.	1. Ken Kesey
2. Louise Brown: display portraits.	2. Louise Brown
3. Have Metal's Department explain how their drawings help their project.	3. Norman Miller, High School
4. Make a notebook (grade level wise) of any famous paintings found in magazines.	
5. Have sign painter visit and demonstrate steps in sign painting.	5. Visits: Obie Outdoor Advertising
6. Visit from Jack Bergener from University of Oregon, on sculpture.	6. Jack Bergener
7. Someone visit that draws as a hobby.	7. & 8. Robert Neims Route 1 Box 36 Springfield, Oregon Mrs. Roach
8. Someone visit that paints as a hobby.	

Films:

What is Art?
MA 6205 68
Discovering Drawing and Painting
MA 6701 52
Creating With Color
MA 7003 83

Evaluative Activities:

1. Check the jobs that use drawing:

____secretary
____custodian
____artist
____milk man
____sign painter
____book illustrator
____truck driver

Grade: 1 - 3 Subject: Art Unit: 2. Design and Shape

I. CONCEPT: Many jobs and hobbies are involved in artistic design and shapes.

Objective: The child can list two occupations that involve artistic skill in design and sh .

	Learning Activities:		Materials and Resources:
1.	Have a lady visit and display her needlework.	1.	Bon Marche
2.	Have a man visit and show a display on photography.	2.	Mark Jenkins Pleasant Hill, Oregon
3.	Visit University of Oregon Museum of Art.	3.	University of Oregon
4.	Visit set construction of a play and costume design at the high school.	4.	Visit Pleasant Hill High School.
5.	On any field trip, observe window displays. Then design and build your own display.		
6.	Visit a florist to observe and demonstrate the use of design and shape.	6.	Chase Gardens Eugene, Oregon
7.	Have a landscape architect visit and explain his work.	7.	Vern Cornelius
8.	Have a jeweler visit and explain creativity and design.	8.	Harold Dunn

Films:

Form
MA 6205 69
Eyes Are For Seeing
MA 5900 68
Look At That
MA 7002 75
The Purple Turtle
MB 5700 12

Evaluative Activities:

1. Give the child the four basic shapes and have him list orally, or verbally, two jobs which involve use of these shapes.

Grade: 1 - 3 Subject: Art Unit: 3. Handicrafts

I. CONCEPT: Some jobs and hobbies are related to handicrafts.

Objective: The child can list two jobs or hobbies which are related to handicrafts.

Learning Activities:

1. Guest speaker on handicrafts from The White Dove.
2. Have a person who teaches glass-blowing at OMSI, demonstrate his art to the class.
3. Have a puppet show, with students making puppets and scenery.
4. Manufacture your own stationery using pressed flowers, waxed paper, onion skin paper, and kleenex.
5. Guest speakers on pottery.
6. Have Sue Davis, Pleasant Hill High School, demonstrate how to make candles.

Materials and Resources:

1. White Dove
2. OMSI
4. Sunset Magazine, May 1972
5. Clark Ceramics
   Junction City
6. Sue Davis
   White Dove

Films:

How to Make a Simple Loom and Weave
MB 5206 73

Evaluative Activities:

1. The child will complete two handicraft projects and tell what job is related to each.

Directions for Administering Pre-Test and Post-Test

A pre-test and post-test will be given to the students of grades 1, 2, and 3. The purpose of these tests is to measure the awareness the learner gains in his knowledge of the "world of work".

To administer this test, as to give one an accurate account of measurement, please do the following:

1. If the child is unable to read and write out the questions and answers, give this test orally. (Teachers, or teacher's aides)

2. Administer individually or to very small groups, recording answers on Test Check List.

3. Record the number of correct responses per child on the class roster; testing once in the fall and once in the spring.

* In questions 1 and 2, the correct answer must be the exact job. (not trucker, but log truck driver)

4. Data to be given to the Career Awareness Committee to be used for evaluations and quarterly and yearly reports.

PRE-TEST AND POST-TEST

Grades: 1, 2, 3

1. What kind of job does your father (or any male guardian) do when he goes to work?

2. What kind of job does your mother (or any female guardian) do when she goes to work?

3. List ten jobs that people do when they go to work.

4. List five jobs that people do around our school.

5. What jobs are <u>you</u> (meaning the student) able to do. Name at least three.

____

____

____

6. See questions pertaining to your grade level.

A. <u>Grade 1</u> Circle the occupations which involve the production [illegible]ilk [illegible] handling of it:

___dairy farmer (yes)
___doctor
___teacher
___store clerk (yes)
___cook (yes)
___fireman
___truck driver (yes)
___assembly line worker (yes)
___secretary
___carpenter

B. <u>Grade 2</u> Circle the occupations which involve communications.

___radio announcer (yes)
___lawyer
___mailman (yes)
___policeman
___fireman
___telephone operator (yes)
___receptionist
___news reporter (yes)
___T.V. repairman (yes)
___secretary

C. <u>Grade 3</u> Circle the occupations that involve working with natural resources.

___receptionist
___author
___fisherman (yes)
___log truck driver (yes)
___road construction worker (yes)
___stewardess
___chemist (yes)
___miner (yes)
___veterinarian
___teacher aide

TEST CHECK LIST

Scoring: For every correct response, score 1 point.
For every incorrect response, score 0. (zero)

Question	#1	#2	#3	[illegible]		#6	Total
Possible Score	1	1	10	5	3	10	30
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
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PRE-TEST AND POST TEST CLASS ROSTER

Total Possible Score -30

Name	Pre-Test	Post-Test
1.		
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30.		

TEACHER SURVEY

This survey will be given at the beginning and the end of the school year. The survey is only to be used as a tool to evaluate the effectiveness of the career awareness program.

	Yes	Sometimes/Maybe	No
1. I use guest speakers. (If the answer is yes, please do question number 2.			
2. When I use guest speakers, a part of the class discussion is concerned with their occupation.			
3. When taking field trips, some emphasis is placed on occupations observed.			
4. I can see where I can add vocational interest to subjects that are already taught.			
5. I have used bulletin boards which emphasize occupations.			
6. Vocational awareness is a legitimate goal for grades 1, 2, and 3.			
7. I feel adequately prepared to emphasize vocations in my teaching.			
8. I am aware of the resources available to teach vocational awareness.			

GUIDE EVALUATION

1. Were you able to use the career awareness guide in your teaching this year?

   If no, why not, and if yes, which areas did you use most?

2. What suggestions do you have for improving the career awareness guide?

3. Were you able to use the student tests as a teaching tool?

   Please list any suggestions you have for improving the student tests.

4. Please share any human interest stories which have arisen from the use of the career awareness guide.

5. What problems did you find in using the career awareness guide?

COMMUNITY SURVEY

Please check the appropriate answers.

1. Have you heard of the career awareness program at Trent Primary School that is aimed only at making your child aware of the many jobs involved in our "world of work"? There has been no attempt to channel a child toward any job.

   Yes______

   No ______

   If yes, where did you hear about it?

   Your child______

   A neighbor______

   What other means______

2. Has your child mentioned any school activity which has been connected with the career awareness program?

   Yes______

   No ______

3. Does your child show any increase in understanding of the relationship between school and the world of work?

   Yes______

   No ______

4. How do you feel about career awareness in the primary school?

   Favorable______

   Unfavorable______

   No opinion ______

5. Do you think that the career awareness program should be continued?

   Yes______

   No ______

Additional Comments:

FORM LETTER FOR FIELD TRIPS

Dear______________________:

The _(1st, 2nd, 3rd)_ grade would like to visit ___(Wednesday)___________ the _(4th)___ day of _(June)___ 197_ at ___(9:20)______ A.M. P.M. to learn about careers.

There will be ___(25)____ students.

Enclosed find a list of the questions the children have asked.

Sincerely,

(Teacher's or Student's Name)

FORM LETTER FOR GUEST SPEAKERS

My name is ____________________________________. I am __________years old and we are learning about acareers in ____. One important way to learn is to have a guest speaker help explain about his occupation.

There will be _______________students in the ___________ grade. Some of the questions we would like answered are attached. We hope it will take ___________________________________; in room____________at Trent School.

Very Sincerely,

(Student's Name

OBSERVATION RATING SHEET

Sample of a Rating Sheet a child could use for his father's occupation.

1. Name of occupation____.
2. Worker uses hands Yes ________No__________.
3. Worker uses eyes Yes__________No__________.
4. Worker works with people Yes__________No__________.
5. Worker works with ideas Yes__________No__________.
6. Worker works with things Yes__________No__________.
7. Worker works outside Yes__________No__________.
8. Worker works inside Yes__________No__________.
9. Is this work dangerous? Yes__________No__________.
10. What kinds of tools or equipment does he use?

____

____

____

11. Check the things that are true about this worker in his job:
    - a. _____lifts heavy things
    - b. _____lifts light things
    - c. _____lifts very little
    - d. _____walks a great deal
    - e. _____walks a little
    - f. _____sits most of the time.
12. Does this worker like his job?

Yes_________ No__________ Doesn't care__________.

THANK YOU FORMS FOR GUEST SPEAKER AND FIELD TRIPS

Dear________________:

The Trent ______________grade thanks you for being our guest speaker. We enjoyed learning about your career.

Thank you.

____
Student's Name

Dear ___________________:

The ___________________grade thanks you for the field trip. We really enjoyed visiting you. We learned many different things.

Thank you.

____

JOB LIST

The following ond hundred jobs have been included in the Career Awareness Guide for the primary school.

Grade 1

Family workers
Speech Therapist
Drama Player
Pantominist
Dairyman
Plumber
Paper Boy
Postman
Garbageman
Soldiers
Toy Makers
Turkey Farmer
Fireman
School Employees
Veterinarian
Pet Store Owner
Dog Groomers
Carpenter
Construction Workers
Paint Store Workers
Cake Decorators
Cook
Musician
Shoe Repairman
Shoe Clerk
Clothes Salesman
Pilot
Train Engineer
Ballerina
Athletes
Creamery Workers
Clerks
Cashiers
Truck Drivers
Bus Drivers
Service Station Attendant
Custodian
Gardener
Weaver
Pottery Maker
Candle Maker

Grade 2

Radio Disc Jockey
Radio Announcer
Telephone Operator
T.V. Announcer
News Reporter
Policeman
Dentist
Doctors
Nurse
Lab Technician
Aides
Druggist
X-Ray Technician
Market Manager
Baker
Butcher
Truck Farmer
Store Clerks
Secretary
Scientist
Astronomers
Photographer
Weatherman
Rancher
Loggers
4-H Leaders

Grade 3

Author
Trader
Trapper
Boat Captain
Foresters
Miners
Commissioners
Lane County Sheriff
Judge
Lane County Agents
Orchardist
Feed Store Workers
Horticulturist
Road Builders
Collectors
Bank Teller
Cashier
District Clerk
Sawmill Workers
Environmentalist
Architecture
Counselor
Psychologist
Electrician
Life Guards
Traffic Controller
Illustrators
Metal Workers
Artist
Sculpture
Designers
Landscape Artist
Florist
Glass Blower
Jeweler

STUDENT BIBLIOGRAPHY

TITLE	AUTHOR
ABC's of Space	Asimov, Isaac
Adventures of a Letter	Schloat, G.
Animal Doctors: What do They Do	Green, Carla
Annapolis, Cadets, Training and Equipment	Colby, C.B.
At The Harbor	Colonius, Lillian
Bill's Story of the Wholesale Produce	Burt, Olive
Big City Workers	Urell, Catherine
Bob's Story of the Retail Market	Smith, Marie Elizabeth
Cotton Growing	Harvey, Lois F.
Dairyman Don	Chapman, Cynthia
Doctors and Nurses: What Do They Do	Greene, Carla
Danger Fighting: Men and Ships of Coast Guard	Colby, C.B.
Farms	Howard, Robert West
Fibers	Adler, Irving, and Ruth
First Book of Cotton	Rogers, Matilda
First Book of Fruits	Beck, Barbara
Have You Seen Boats	Oppenheim, Joanne
How We Get Our Cloth	McCall, Edith S.
How We Get Our Clothing	McCall, Edith S.
How We Get Our Mail	McCall, Edith S.
Let's Find Out About Bread	Burt, Olive
Let's Find Out About Cloth	Pitt, Valerie
Let's Find Out About Farms	Campbell, Ann
Let's Find Out About Firemen	Shapp, Martha
Let's Find Out About Milk	Whitney, David
Let's Find Out About Policemen	Shapp, Martha

Continued:

Let's Find Out About Safety	Shapp, Martha
Let's Find Out About School	Shapp, Martha
Let's Find Out About Telephone	Knight, David
Let's Go To An Airport	Sootin, Laura
Let's Go To A Clothing Factory	Lazarus, Harry
Let's Go To A Fire House	Buchheimer, Naomi
Let's Go To A Garage	Goodspeed, J.
Let's Go To A Post Office	Buchheimer, Naomi
Let's Go To A Rocket Base	Chester, Michael
Let's Go To A Telephone Company	Buchheimer, Naomi
Let's Ride In The Caboose	Burlugh, David
Milk For You	Schloat, G.
Mr. Zip And The U.S. Mail	Barr, Jene
Mother's Story of Dairying	Smith, Marie
My Garden Grows	Watson, Aldren
News Travels	Dhapin, Cynthia
On The Beat	Robinson, Barry
Our Friend The Forest	Lauber, Patricia
Our Post Office and It's Helpers	Miner, Irene Servey
One Horse Farm	Ipcar, Dahlov
Park Ranger	Colby, C.B.
Pogo's Fishing Trip	Norling, Josephine
Pogo's House: Story of Lumber	Norling, Josephine
Pogo's Lamb: A Story of Wool	Norling, Josephine
Pogo's Letter: A Story Of Paper	Norling, Josephine
Pogo's Sea Trip	Norling, Josephine
Policeman Small	Lenski, Lois
Riding The Rails	Olds, Elizabeth

Continued:

Railroad Engineers and Airplane Pilots	Greene, Carla
Safety Can Be Fun: Words and Pictures	Leaf, Munro
Ships Come And Go	Smith, Mary Elizabeth
Smoke Eaters	Colby, C.B.
Soldiers And Sailors	Colby, C.B.
Squad Car 55	Chapin, Cynthia
Submarine Warfare	Colby, C.B.
Survival Training	Colby, C.B.
Story Book of Houses	Petersham, Maud
Tall Timber: The Work, Machines, and Men of The Forest Service	Colby, C.B.
The Big Book of Fire Engines	Zaffo, George, Jr.
The Bread Book	Meyer, Carolyn
The First Book of Lumbering	Rich, Louise
The Indoor and Outdoor Grow It Book	Baker, Samm
The First Book of Wool	Cavanna, Betty
The Sad Tale of the Carless Klunks	Kessler, Leonard
The Toolbox	Rockwell, Anne
The True Book of Tools For Building	Leavett, Jerome
The True Book of Cloth	Nighbert, Ester
The True Book of the Moonwalk	Frisky, Margaret
The True Book of Policemen and Firemen	Miner, Opal
The True Book of Ships and Seaports	Carter, Katherine
This Is A Department Store	Romano, Louis
Tools For Andy	Tippett, James S.
Visit To The Dentist	Garn, Bernard, Jr.
Visit To The Hospital	Chase, Francine
What Happens In A Car Factory	Shay, Arthur

Continued:

What Happens When You Travel By Plane	Shay, Arthur
What To Be	Powell, Meridith
Whose Tools Are These	Radlauer, Edward
Work Around The World	Jackson, Kathryn
Workers Long Ago	Baker, Eugene

ABOUT BOOKS

That Amazing Portland Cement	D. Telfer
Bananas	S.P. Russell
A Bicycle For Linda	E. Baker
Cargo Ships	M. Uhl
Clouds	T. Shannon
Engineer Of A Train	S. Johnson
Family Helpers	E. Hoffman and J. Hefflefinger
Farm Helpers	E. Payton
Fireman	E. Hoffman and J. Hefflefinger
Food and Where it Comes From	T. Shannon
Helpful Helicopters	D. Allison
Jerry And Jimmy And The Pharmacist	F. Thompson
Jack's Dental Checkup	R. Jubelier
Men At Work	R. Radiauer
Miss Sue, The Nurse	F. Thompson
Policemen	I. Dillon
Postmen	E. Hastings
Ready To Wear Clothes	T. Shannon
School Helpers	E. Hoffman and J. Hefflefinger
Truck Farming	I.B. Johnson

Continued:

COME TO WORK WITH US IN

Aerospace	Jean and Ned Wilkson
An Airplane	Jean and Ned Wilkson
A Bank	Jean and Ned Wilkson
A Dairy	Jean and Ned Wilkson
A Department Store	Jean and Ned Wilkson
A Hospital	Jean and Ned Wilkson
A Hotel	Jean and Ned Wilkson
House Construction	Jean and Ned Wilkson
A Newspaper	Jean and Ned Wilkson
A Telephone Company	Jean and Ned Wilkson
A Toy Factory	Jean and Ned Wilkson
A T.V. Station	Jean and Ned Wilkson

Continued:

I WANT TO BE A (AN)

Airplane Hostess	Greene
Animal Doctor	Greene
Architect	Baker
Baker	Greene
Ballet Dancer	Greene
Bank Teller	Baker
Baseball Player	Greene
Basketball Player	Baker
Beauty Operator	Baker
Bus Driver	Greene
Carpenter	Greene
Coal Miner	Greene
Cowboy	Greene
Dairy Farmer	Greene
Dentist	Greene
Doctor	Greene
Farmer	Greene
Fireman	Greene
Fisherman	Greene
Football Player	Baker
Forester	Baker
Homemaker	Greene
Librarian	Greene
Mechanic	Greene
Musician	Greene
News Reporter	Greene

Continued:

I WANT TO BE A (AN)

Orange Grower	Greene
Pilot	Greene
Policeman	Greene
Postman	Greene
Restaurant Owner	Greene
Road Builder	Greene
Sales Clerk	Baker
Scientist	Greene
Secretary	Baker
Service Station Attendant	Baker
Ship Captain	Greene
Space Pilot	Greene
Storekeeper	Greene
Taxi Driver	Baker
Teacher	Greene
Telephone Operator	Greene
Train Engineer	Greene
Truck Driver	Greene
Waitress	Baker
Weatherman	Baker
Zoo Keeper	Greene

PAMPHLETS AVAILABLE TO TEACHERS ONLY

Requests on school stationery preferred

1. The Creative Scientist	1. U.S. Atomic Energy Commission P.O. Box 62 Oakridge, Tennessee 37830
2. Health Careers Leaflets Leaflets in the set are: Hospital Purchasing Agent #1 Supportive Nursing Personnel #2 Hospital Admitting Officer #3 Hospital Engineer #4 Technicians: Electrocardiograph and Electroencephalograph #5	2. American Hospital Association Division of Health Careers 840 North Lake Shore Drive Chicago, Illinois 60611
3. Jobs With the Forest Service, A Up-843	3. U.S. Department of Agriculture Forest Service Washington, D.C. 20250
4. Occupational Guide Index Once this is received, individual Occupational Guides may be ordered.	4. California Dept. of Employment 800 Capitol Mall Sacramento, California 95814
5. Tommy Looks at Farming (cartoon book on many skills needed in farming today) Available in classroom lots. Request must be on official stationery.	5. The B.F. Goodrich Company Public Relations Department 500 South Main Street Akron, Ohio 44318
6. What Is a Pharmacist	6. The Upjohn Company 7171 Portage Road Kalamazoo, Michigan
7. Your World of Work (intended for those who do not plan to attend college) Available to librarians only.	7. National Farmer's Union Educational Material Service 1575 Sherman Street Denver, Colorado 80201

PAMPHLETS AVAILABLE TO STUDENTS AND TEACHERS

Hobbies or Avocational Interests

Pamphlet Name	Address
1. Let's Collect Rocks (single copies)	1. Shell Oil Company Public Relations Department Room 4154 50 West 50th Street New York, New York 10020
2. Let's Collect Shells (single copies)	2. Shell Oil Company (as above)
3. Model Rocketry: The Answer To The Youth Rocketry Problem	3. National Assoc. of Rocketry 1239 Vermont Avenue, N.W. Washington, D.C. 20005
4. New Horizons for Leisure Time	4. Sun Life Assurance Co. of Canada One North LaSalle Street Chicago, Illinois 60602
5. Standards for U.S. Commemorative Postage Stamps	5. Post Office Department Office of Public Information Washington, D.C. 20260
6. Our Introduction to Scale Model Railroads	6. Kalmback Publishing Company Sales Promotion Manager 1027 North 7th Street Milwaukee, Wisconsin 53233
7. Write business letters asking for information on the background of the model-making industry to: (If none of these acknowledge the student's letters, Eugene Toy and Hobby will be glad to furnish additional names and addresses)	7. Revell Inc. 4223 Glencoe Avenue Venice, California 90291 Western Model Distributors 6480 Flotilla Street Los Angeles, California 90022 Aurora Plastics Corporation 44 Cherry Valley Road West Hempstead, New York 11552 Monogram Models Inc. 8601 Waukegan Road Morton Grove, Illinois 60053
8. Fascination of Stamp Collecting	8. American Stamp Dealers, Assoc. Inc. Department H 147 West 42nd Street New York, New York 10036

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CONTENTS

PROGRAM DEVELOPMENT

APPENDICES

PROGRAM PHILOSOPHY AND OBJECTIVES

Updating the training of nurses is an established worthwhile endeavor by any institution able to demonstrate a need for registered, professional nurses. Nurse refresher programs have been offered for several decades under numerous auspices, predominantly hospitals. Rising costs, changing priorities for hospital programs, and difficulties in standardizing courses have prompted concerned professional organizations to request that community colleges be charged with this educational responsibility.

The following state guidelines are set forth so that some degree of standardization and economy can be achieved, while allowing flexibility in local implementation, scheduling, and instructional strategies.

Philosophy

The philosophy for nurse refresher programs to be implemented in Oregon community colleges is expected to reflect the philosophical concepts which these educational institutions collectively embrace. These concepts or operational principles include the following:*

1. Citizens in a democracy should have continuous opportunity to increase their knowledge of the world and their ability to perceive and assess information given them.
2. Post-high school education should be available to everyone in a community.
3. Such education beyond high school should be structured to fulfill the needs of both the student and community.
4. A community college should maintain an "open door" policy.

The right of every person to continue learning in an educational setting is also the nurse's right. This individual has already shown the capacity and desire to learn by completing a basic nursing program and is now studying in order to transfer to another area within the nursing field, to upgrade skills, or to return to active practice.

The refresher nurse is an adult with special needs—seeking meaningful experiences which will assure readiness to fulfill a professional role. Lacking recent experience and reinforcement of previous learning, self-confidence is greatly diminished. (Apprehension and lack of confidence are common among refresher nurse applicants.) A supportive and accepting environment will further restore self-confidence. Support can best be promoted by the teacher through a personalized approach which contributes to purposeful interactions between instructor and nurse and between nurse and patient. Peer group interaction also provides vital support to the refresher nurse.

Education for the occupations and professions is a continuing process. A three-month refresher curriculum cannot totally educate the returning nurse to the magnitude of changes, new approaches, and techniques of current technical and professional practice. It can provide the processes and content needed to meet requirements for safe practice and

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**Articulation and Coordination of Occupational Preparatory Curriculums from the High School Through the Community College: Report of Task Force II.* Oregon Board of Education, Salem, Oregon 97310, 1969, p. 18.

equip the returnee for continued learning. The refresher curriculum is only the initial step to re-entry into the profession. It must be followed by self-directed participation in continuing education and in-service programs.

A philosophy needs to be adopted which is compatible with the philosophical concepts of the sponsoring educational agency and which makes provision for individual student and local community needs. This philosophy should be written so that all who participate in program development, implementation, and evaluation may proceed with clarity of purpose within the limits of this structural framework.

Objectives

A nurse refresher program will enable the nurse to—

(1) Assess own readiness for return to active practice.

(2) Reaffirm previously acquired knowledge and skills of basic nursing care.

(3) Acquire additional knowledge and skills in nursing care.

(4) Apply concepts of patient-centered care in using the team approach, have awareness of changes in medical and nursing practice, and adjust to altered roles of health care personnel.

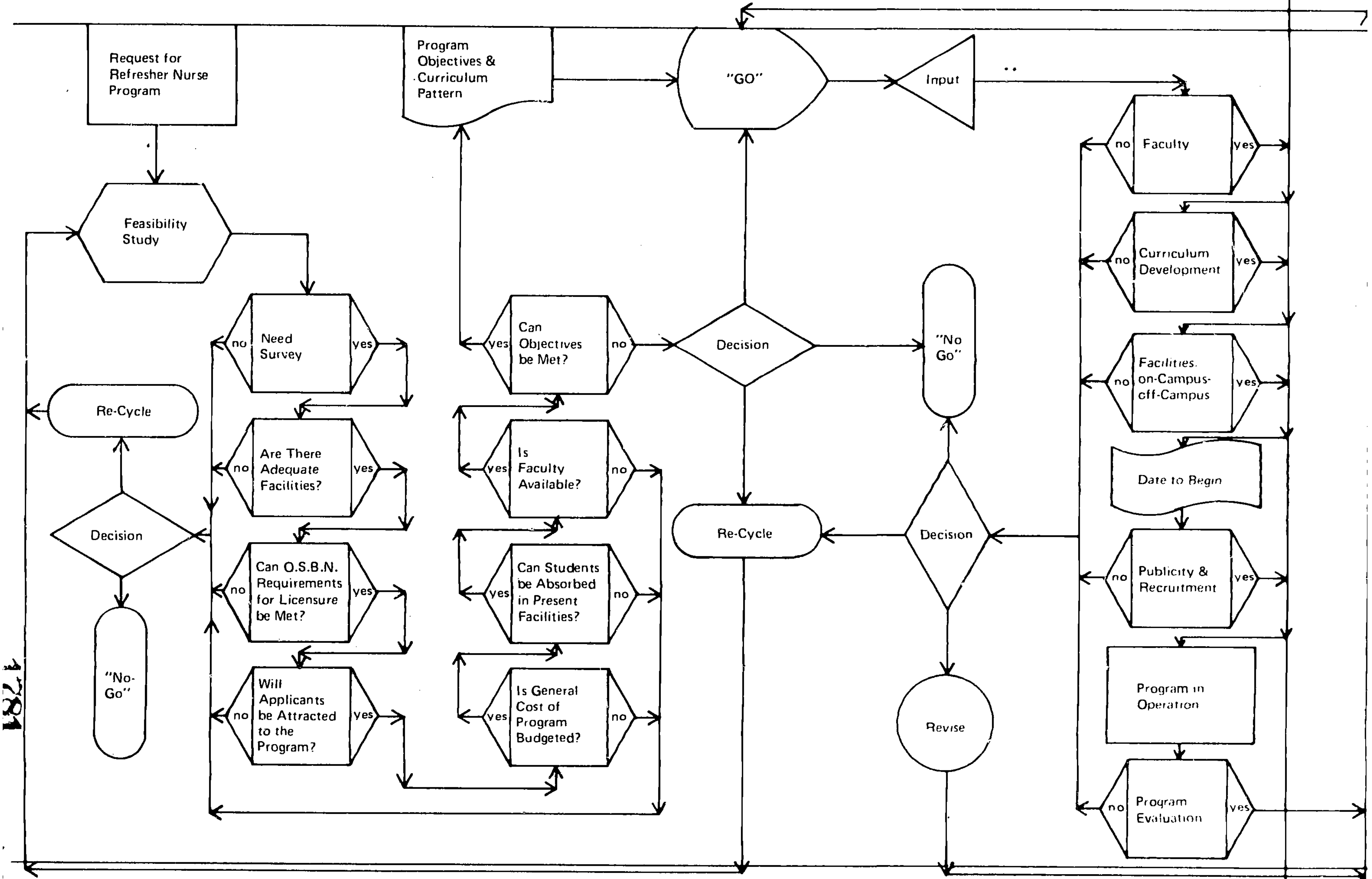
(5) Change own behavior, including attitudes, to reflect current philosophy and trends in nursing practice.

(6) Participate as a team member in assessing, planning, giving, and evaluating individualized nursing care.

(7) Move into a staff orientation program as a responsible nurse practitioner in a hospital, nursing home, or other health care facility at the completion of the program.

(8) Contribute to improving the quality of nursing care through continued and self-directed professional development after returning to nursing practice.

SYSTEMS APPROACH TO PROGRAM DEVELOPMENT AND OPERATION***



*Appointment of Representative Advisory Committee

**Adjustment of Representation on Advisory Committee

***Adapted from *A Guide for Health Technology Program Planning*, American Association of Junior Colleges, Washington, D.C., 1967; *A Strategy for Evaluation Design*, Teaching Research, Oregon State System of Higher Education, April 1970; *"Nurse!" A Guide for Establishment of Refresher Courses for Registered Nurses*, American Nurses Association, New York, N.Y. 1968

PROGRAM DEVELOPMENT

Development of a nurse refresher program is a dynamic process in which numerous checkpoints occur as to whether it should be offered, revised after being in operation, and/or continue to be offered. A flow chart, adapted from several sources,* has been plotted to relate the progression of program development from instigation through evaluation and follow-up. (See opposite page.) In the following paragraphs, several key issues are expanded and resources suggested.

Clinical and Community Resources

Ample classrooms, clinical facilities, and demonstration equipment must be available for student use. Clinical facilities should be selected on the basis of which can offer the learning experience needed to fulfill objectives of the curriculum.

A memorandum of agreement for utilization of clinical facilities should be arranged well in advance of the beginning date. The memorandum should include responsibilities of the participating agency and the college or sponsoring agency. The agreement will need to be more formal if considerable instruction and supervision is to be provided by the clinical staff. A liaison person should be named in the agreement to facilitate communication and coordinate learning activities.

Clinical agencies to be considered for nurse refresher experiences are hospitals, convalescent centers, nursing homes, and public health agencies. Other community agencies may be used on a limited basis for tours, observation visits, or to achieve other specified objectives.

Advisory Committee

The appointment of an advisory committee is recommended for all occupational education programs. A committee of manageable size composed of resource persons and specialists can provide expert assistance during the development of the program. An ad hoc committee may be appointed initially to assist with need and feasibility studies. When this preliminary function is completed and program development is to begin, a permanent committee, or existing committee for other nursing education programs, can assume the stabilizing and supportive role needed for effective implementation, continued evaluation, and revision.

The committee's role should be clearly defined as primarily *advisory* at the time its members are appointed. Ultimate decision-making is the responsibility of the educational institution. The committee should be accountable to the president or director of the sponsoring agency. It can assist in gathering data, offer suggestions regarding course content based on job requirements, aid in promotion efforts, and promote community support for the program, equipment, and staff. As the program progresses, this group can continue to feed information which will keep the program relevant to learner and community needs.

**A Guide for Health Technology Program Planning*, American Association of Junior Colleges, Washington, D.C., 1967; *A Strategy for Evaluation Design*, Teaching Research, Oregon State System of Higher Education, April 1970; *"Nurse!", A Guide for Establishment of Refresher Courses for Registered Nurses*, American Nurses Association, New York, 1968.

The committee should include representative persons from the health disciplines. Nursing representatives from hospitals, long-term care facilities, public health agencies, and the local nursing association as well as representatives from labor, education, and consumer groups provide a reasonably accurate sounding board for a nurse refresher program. The program coordinator should also meet with the committee as the program is being implemented and teaching and evaluation strategies are being planned.

Limitations of an advisory committee are usually found to include operating within the scope of defined functions; working within the framework of school district or sponsoring agency policies, rules, regulations and procedures; and refraining from committing the school or sponsoring agency financially or to a course of action.

Instructional Staff

Careful selection of instructional staff and provision for time and resources are essential to program success. Time should be provided for the instructor to preplan, assemble needed instructional materials, arrange for guest speakers, and prepare course materials. Additional time in the daily schedule should be provided for preparation of specific patient assignments and related instructional materials for the next day's class.

Instructors should meet the following qualifications:

1. Current licensure as a registered nurse in Oregon
2. Expertise in nursing practice
3. Enthusiasm for teaching adults
4. Acceptance of the goals and philosophy of the program
5. Orientation to the broad scope of nursing practice
6. Fulfillment of certification requirements of the Oregon Board of Education—minimum of three years of related occupational experience

Clinical Supervision

Arrangements for clinical personnel to supervise refresher nurses during clinical assignments may be necessary. These assistants will supervise these nurses with guidance from the coordinating instructor of the sponsoring educational agency.

Guest Speakers

Selective inclusion of speakers will bring the necessary detail in specialty areas. A schedule for participation should be completed before the class begins.

Instructional Materials

The refresher nurse is expected to purchase one or more textbooks. She should be informed prior to registration as to the title(s) and cost. All other materials should be provided by the educational agency and/or cooperating agencies.

The subject content can be supplemented by numerous useful, visual, and learning aids. These may include the following:

Handouts

- Teacher expectations
- Course objectives
- Assignments
- Bibliography or reference lists
- Study guides
- Nursing care plan guides
- Skill inventory form
- Test or evaluation forms
- Supplementary information sheets
- Pamphlets and brochures available from various health organizations
- Samples and/or pocket guides from pharmaceutical companies–Contact salesmen or write directly to companies requesting materials.

Programmed Materials

Contact companies publishing nursing references for listing of programmed materials.

References

Access to a library stocked with current reference material is essential.

Excellent references are available free of charge from pharmaceutical companies and from agencies such as the American Heart Association, Oregon State Board of Health, and others.

References on each nursing unit should be readily accessible on each nursing unit where refresher nurses are assigned. Policy and procedure manuals, basic nursing, and current drug references are among the most essential for this purpose.

Audio-visual Aids–(For use in emphasizing key points, illustrating a lesson, and relating attitudes.)

- Chalk and blackboards
- Flip charts and/or wall charts
- Transparencies and overhead projectors
- Slides and scripts
- Filmstrips, records, and/or scripts
- Single-concept film loops
- Bulletin boards
- Tapes and tape recorders
- Closed-circuit television
- Demonstration supplies and equipment
- Films (purchased or rented)

In ordering any visual aid, reserve it well in advance of use date. It is wise to plan alternative experiences so that if a shift in plans is necessary, continuity of presentation will be maintained. Mechanical and electrical equipment should be inspected and adjusted prior to use in the classroom.

Publicity and Recruitment

Publicity and recruitment measures are essential when starting a refresher program. Publicity should be carefully planned and organized to start six to eight weeks before the program is scheduled to begin. Time must be allowed for applicants to complete processing a temporary nursing permit from the Oregon State Board of Nursing.* Helpful suggestions and sample releases are provided in the New Jersey Guide.**

Student Selection

The applicant must meet requirements for admission to the community college or the requirements established by the facility offering the program. An interview is recommended as part of the selection process. This interview serves as a gross screening for admission and for placement in the program.

In addition, the applicant must be–

1. Physically and mentally healthy
2. Concurrently licensed in the State of Oregon as a registered nurse, or have a temporary permit from the State Board of Nursing. See Appendix III for the Board policy regarding temporary permits and the application form.

Evaluation and Follow-up

Evaluation serves a two-fold purpose: program development and recommendation for licensure.

Refresher nurses should be given opportunities to evaluate course content, clinical experiences, and teaching methods. The teacher also has a responsibility for concurrent and terminal evaluation of each applicant. The instructor needs to indicate the readiness of the refresher nurse for employment and licensure.

For total program evaluation, follow-up planning should provide for feedback at critical points. A 3-6-12-month pattern has been suggested by the Community Nurse Refresher State Education Advisory Committee. Where established patterns for follow-up of all programs exist within an educational agency, some adjustment may be indicated. The follow-up form used by the Oregon League for Nursing is included in Appendix V. It should be used as a sample in preparing or supplementing, if necessary, the form to be used by the sponsoring agency. Graduates of the program and their employers should be asked to indicate the effectiveness of program content in preparing nurses for re-entry employment and the needs of graduates for in-service and continuing education programs.

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*See Appendix III, page 50

***Nurse Refresher Program Guide from Start to Finish*, Hospital Research and Educational Trust of New Jersey, Princeton, N.J. 1967

PROGRAM MANAGEMENT

Minimum Time Requirement: 240 hours*

Total Weeks: 10 to 11 weeks

Hours Per Week: 24 to 30 hours per week including clinical practice

Clinical Practice: One-half to two-thirds of total time

Optimal Class Size: 12 students

Suggested Textbooks: Cooper, Signe S. *Contemporary Nursing Practice*. McGraw-Hill Book Company, San Francisco, 1970

or

Stryker, Ruth Perin. *Back to Nursing*. W.B. Saunders, Philadelphia, 1966.

and

Sutton, Audrey Latshow. *Bedside Nursing Techniques in Medicine and Surgery*. W.B. Saunders Company, Philadelphia, 1969.

CURRICULUM OVERVIEW

	Unit Titles	Minimum Hours
Unit I:	Return to Nursing	36 hours
Unit II:	Nursing Care, Principles and Practices	180 hours
Unit III:	The Professional Nurse	24 hours
	TOTAL MINIMUM HOURS	240 hours

In *Unit I*, changes in health and nursing practices are studied. *Unit II* presents nursing care principles and practices. Application of principles is demonstrated in the care of geriatric patients and patients with cancer, cardiovascular disease, genito-urinary disease, infections, orthopedic conditions, and diabetes. New and current techniques and equipment are introduced. Community and mental health concepts are introduced in *Units I and II* as needed to give the refresher nurse sufficient knowledge and confidence to provide supportive and comprehensive nursing care. *Unit III* concerns the role and responsibilities of the professional nurse practitioner and opportunities for positions in nursing service.

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*Oregon State Board of Nursing requirement. See Appendix III.

UNIT I: RETURN TO NURSING*

Upon completion of this unit, the participant will be able to—

1. Identify the changes affecting the nursing profession.
2. Identify the role and functions of the professional nurse.
3. Define the roles of current health and nursing personnel.
4. Describe current patterns of health care.
5. Identify, compare, and contrast current and past patterns for nursing care.

*This unit may be offered as a course in contemporary nursing preceding the formalized community nurse refresher program or as an integral part.

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
Determine expectations of the teacher and each participant.	A. Introduction 1. Course objectives 2. Course descriptions 3. Description of facilities	Share objectives with participants. Tour of school.	Give pretest. *The nurse can:* 1. *Understand what is expected of her during this unit.* 2. *Use results of a pretest to assess own learning needs.*
Identify trends, personnel, and current concepts of health care.	B. Health Care Practices 1. Emerging trends affecting health care	Read: French, "Our Concern: Health," *Dynamics of Health Care,* pp. 1-24. View film: "The Patient as a Person." C, S, 16mm.	The participant is able to identify the following emerging trends: 1. Scientific progress 2. Population change and growth 3. Increasing expectation for health 4. *Increasing demand for health care* 5. Specialization in medical practice

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
			6. *Increasing use of equipment* resulting from research 7. Increasing use of team concepts *applied to health care* 8. Need for increasing numbers of health professionals 9. Increased use of supportive health personnel 10. Expanding role of government *in health care* 11. Rising costs of health care 12. Increased sophistication of patient regarding health care
Identify the role and function of key health professionals and health occupations personnel.	2. Health Care Personnel a. Professionals b. Supportive health occupations personnel	Have participants observe in several settings how professionals utilize other health professionals and health occupations personnel. Follow with large group discussion.	
		View film: "A Case for Understanding." C, S, 27 min., 16 mm. Follow up with discussion on necessity for lines of authority, procedures, etc.	Does the participant initiate cooperative interaction with peer group and other health personnel?
		Read: French, *Dynamics of Health Care*, pp. 66-78.	
		Discuss issues involved in utilizing supportive health personnel.	
		Independent study: "Ward Management for Quality Patient Care:	

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
		Programmed Instruction," *American Journal of Nursing*, March 1966, p. 36.	
Describe the three major current concepts of health care.	3. Concepts of Health Care a. Supportive care 1) Basic needs 2) Emotional support 3) Spiritual concern	Read: Cooper, *Contemporary Nursing Practice: A Guide for the Returning Nurse*, pp. 23-27, 129. View film: "Quiet Victory," black and white, sound, 15 minutes, 16 mm.	
	b. Comprehensive care 1) Specialty Services: a) Private medical and dental b) Mental health c) Community health d) Industrial health e) Emergency	Seek information on local service resources, e.g. 1. Poison Control Center 2. Suicide Prevention Station 3. *Emergency Care Centers* 4. Maternal & Child Clinics	
	2) Coordination of Services	Discuss the importance of referrals in continuity of patient care. *Observe coordination of services on* all three shifts.	
	c. Progressive Care 1) Intensive	Read: Abdellah, "Progressive *Patient Care," Hospital Management*, June 1960, p. 102. View *film*: "The Cost of Hope." Black and white, 27 minutes,	

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	2) Intermediate	16mm. Discuss activities occurring in an acute, intensive care hospital.	
	3) Self-care	Discuss meaning of "convalescing."	
	4) Long-term	Discuss needs of patients versus those of staff in items no. 1-5.	
	5) Home-care and community health *services*	Confer with home health agency, public health nurse during hospital *rounds.*	Is the participant able to identify components of health care *patterns?*
	C. Nursing Care Patterns 1. The Professional Role a. Service		
	1) Diagnosis: Assessment of needs	Explore all sources of data for assessment. View film: "Eye of Beholder," black and white, sound, 25 *minutes, 16 mm.*	
	2) Planning: nursing care plan	Work with group to develop a plan based on sources of data obtained above (use clinical settings or role play in classroom). Read: Cooper, "Planning Nursing Care," *Contemporary Nursing Practice,* pp. 97-107.	*In planning nursing care,* does the participant use most of the following sources? 1. Patient 2. Medical chart 3. Nurse's notes 4. Nursing care plan prepared by others 5. Previously learned knowledge 6. References 7. Personnel resources

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	3) Intervention: Nursing action	View film: "More than Words," color, sound, 14 minutes, 16 mm. Discuss principles involved in getting changed behavior, understanding, acceptance, and action.	Has the participant made provision for revision of plan?
	4) Evaluations of care or action taken	Discuss development of standards of care.	
	b. Patient and Family Education 1) Informal 2) Planned a) Teaching plans b) Teaching materials 3) Principles of teaching	Read: Cooper: "Teaching Patients," *Contemporary Nursing Practice*, pp. 109-122.	Does the participant recognize health teaching situations? Does the participant know how to assess patient's level of knowledge? Can the participant adapt readily to meeting the learner's need?
	c. Research	View films: "What is EDP?" color, sound, 13 minutes, 16mm, and "A Different Drum," color, sound, 16 minutes, 16mm. Discuss contribution which the nurse makes to research.	
Participate on nursing team in the current role of the professional nurse.	2. Team Nursing a. Definition b. Staff utilization	Visit a health facility to observe a nursing team function; include one or two observations at a public health agency and follow with	Does the participant recognize team nursing as "management by objectives?"

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	c. Relationship to nursing *service:* 1) Supervisor 2) *Head nurse* 3) Team leader 4) Other team members	group discussion for comparison. Read: Cooper, "The Nursing Team," *Contemporary Nursing Practice*, pp. 65-74.	Does the participant know accepted patterns for communication and lines of [illegible] within health facilities?
	3. Team conferences	Observe and participate in patient care conference if *available.*	Does the participant share information for mutual benefit of patients and *other staff? The source of* information is documented (reliable)?
	4. Nursing rounds	Arrange with head nurses on *various wards to permit each* refresher an opportunity to accompany her on nursing rounds *during the term.*	Is the participant able to identify cues to [illegible] problems?
	5. Nursing history	Develop an interview guide and practice *taking nursing histories on* peers. If possible, use videotape and follow critique by self and/or group.	Is the participant able to recognize *special needs and initiate* appropriate referrals?
		Read: McGuire, R., "Bedside Nursing Audit," *AJN*, October 1968, pp. 2146-48.	Is *the participant able to relate* content of interview accurately? Is the participant able to summarize *without omitting* key points?
		Read: Dunn, H.W., et. al., "The Nursing Audit," *NLN Exchange* 84:1-38, 1968.	Does the *participant offer and sup*port con[illegible] suggestions for improvem[illegible]?
		Observe a nursing audit being performed in a public health agency and in a general hospital.	Carry out [illegible] evaluation.

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
		Use, individually or in groups, the NLN audio tape cassettes, with accompanying workbook.	

UNIT II: NURSING CARE PRINCIPLES AND PRACTICES

Upon completion of this unit, the participant will be able to–

1. Describe briefly the anatomy and physiology in each functional area of the body.
2. Describe the general adaptive reactions of the body and mind to injury, illness, and stress.
3. Apply nursing care principles to nursing action and procedures.
4. Participate as a team member in assessing, planning, giving and evaluating individualized nursing care.
5. Provide nursing care by meeting patient needs for–
    - Hygiene and comfort
    - Safety
    - Nutrition
    - Elimination
    - Fluid balance
    - Oxygen
    - Rest and sleep
    - Activity
    - Therapeutic agents

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
Provide for patient hygiene and comfort, assisting the patient when needed.	A. Hygiene and comfort 1. Related anatomy and physiology a. Cells b. Tissues c. Skin	Share unit objectives. Plan activities based on results of testing and expressed need and interest of each participant. Have participants begin to compile own annotated bibliography for this unit. Read: Dean, W.B., et. al, *Basic Concepts of Anatomy and Physiology: A Programmed Study*, pp. 27-110.	Pretest should cover only that content required of the beginning nurse practitioner. Pretest and skill inventory results should be utilized to individualize instruction throughout the course. The instructor should keep records of progress on each participant throughout the course. (Refer to Fivars and Gosnell, "Evaluation in Terms of Performance," *Nursing Evaluations*, pp. 147-199.)

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	2. Principles: a. Homeostasis b. Protective mechanisms c. Frustration–psychological equilibrium d. Effective communication–key to good mental health e. Nursing action is based on patient need.	Read: Cooper, pp. 78-82. Discuss in a large group the implications of principles a-d for hygiene and comfort.	Have participant begin to evaluate care (self-evaluation) See: Gillies and Alyn, *Saunder's Tests for Self Evaluation of Nursing Competence*, pp. 227-234.
	3. Skills a. Observation	Observe and talk with patients in nursing homes. Make an assessment of the possible emotional impact of physical illness or disability.	Complete skill inventories. (Adapt form presented in guide, *Refresher Programs*, HEW, 1967.)
	b. Listening	Discuss in small groups what communication between patient and nurse should include. Share recommendations in large group discussion.	Pretest on performance skills in laboratory setting. The participant can: Demonstrate a bed bath applying principles of cleanliness, safety, and comfort in relation to the following criteria:
	c. Communication	Read: Kron, *Communication in Nursing.*	1. Patient is well groomed a. Hair is combed and/or brushed b. Male patient is shaved c. Body is clean and dry d. Teeth are clean e. Nails are manicured and pedicured
	d. Bathing	Assist and encourage elderly patients in nursing homes to achieve best grooming possible.	

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	e. Personal hygiene and grooming	Assist patients prior to meals, visiting hours, rest periods, with personal hygiene.	2. Patient is comfortable a. Bed and body are properly positioned b. Call signal is left within easy reach c. Diversional materials and personal care items are within easy reach
	f. Bed operation 1) Electric 2) Circo-Electric 3) Stryker frame	Read: Sutton, pp. 197-200; Dison, *An Atlas of Nursing Techniques*, pp. 30-34. Arrange for demonstration of equipment operation in the clinical setting.	
	g. Bed making 1) Open 2) Closed 3) Post-anesthesia	Review in classroom laboratory as needed. Provide overhead transparencies, single concept film loops and/or Trainex filmstrips for student review.	Instructor does an evaluation of skill performance.
	4. Suggested problems/ conditions for study: Geriatric problems a. Scope of problem b. Rehabilitation	Observe medications being given and begin to give selected medication under supervision.	Is the participant's charting pertinent and accurate? Does the participant include observations about behavior and changes in response in the Nurses' Notes?
	5. Nursing care	Clinical assignment: Select a relatively stable patient situation—a	Does communication with patients include the following components?

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
		patient requiring assistance with hygiene and who may need emotional support. (Suggest inclusion of several bed baths for restoring confidence to returning nurse.)	1. Explanation of patient's condition 2. Explanation of procedures 3. Evidence of observation and listening 4. Encouragement of independence
		Use pre- and post-conferences as integral part of clinical instruction whenever possible.	Evaluation of care is to be based on response of patient and on whether objectives of care were achieved.
		Preconferences are for patient assignment and completion of nursing care planning. Post-conferences are for sharing nursing care experiences with peers.	
Protect patient, self, and others from transmission of harmful organisms through practice of aseptic and isolation techniques.	B. Safety and Asepsis 1. Related anatomy and physiology: a. Review inflammatory process and infections	Discuss relationships of inflammation and infection; sepsis and asepsis. Read: Stryker, pp. 187-194; Sutton, pp. 101-111.	
	2. Principles a. Medical asepsis b. Surgical asepsis	View Trainex filmstrip on asepsis. Have participants investigate infection controls in clinical facilities and report on research studies done in this field. Read: Sutton, pp. 112-127.	

OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	3. Skills a. Handwashing b. Complete isolation c. Reverse isolation d. Surgical dressings e. Eye irritations f. Lumbar puncture g. Incision and drainage	Arrange for one day observation in Central Supply Department. Review recent procedure book on skills a-g. Have a demonstration by instructor followed by practice with peers critiquing performance.	Nursing instructor evaluates skill performance.
	4. Suggest problems/ conditions for study: Infections and diseases requiring special attention to aseptic techniques. a. Scope of problems b. Diagnosis c. Treatment d. Rehabilitation	View film: "The World of Walter Krolick." Follow by discussion including emotional aspects and implications of aseptic techniques. Review common antiseptics used in health care facilities.	
	5. Nursing Care	Clinical Assignment: Care of patient requiring special attention to asepsis–prevention or treatment of infections; post-surgery; tuberculosis; leukemia.	

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
Assist patient in meeting nutritional needs by using therapeutic diets and special techniques such as gastric intubation and tube feeding as ordered.	C. Nutrition 1. Related anatomy and physiology a. Nutritional status	Assign Dean, et. al., *Basic Concepts of Anatomy and Physiology, A Programmed Study*, pp. 316-346. Review normal nutrition as needed.	Pretest on basic principles of nutrition used in planning a normal diet.
	b. Gastro-intestinal tract	Have participants divide in groups to investigate diet patterns relative to purpose for foods being included or excluded.	Can the participant identify factors influencing acceptance of the diet? 1. Cultural 2. Economic 3. Religious 4. Psychologic 5. Medical
	2. Principles a. Requirement of all cells for oxygen b. Homeostasis restored through medical-surgical intervention		
	c. Psychological adjustments needed when permanent disability occurs or when arrest of disease is only temporary		Is the participant aware that emotional state affects nutritional status in a number of ways?
	d. Pain threshold		Is the participant aware of relationship between pain and anorexia. nausea, vomiting?
	3. Skills a. Therapeutic diets	Talk with patients on special diets. Read charts. Arrange question and answer session with dietician.	Can the participant identify special diets and make acceptable substitutions?
	b. Gastric intubation	Demonstrate this procedure. Reinforce using Trainex Filmstrip or film loop. Assign student practice and return demonstration.	Can the participant pass the gastric tube and safely aspirate fluids or funnel feed the patient?

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	c. Tube feeding	Observe a tube feeding in a clinical area if available. Read and discuss article: Davenport, "Tube Feeding for Long-term Patients." *AJN*, 64: 121-123, 1964.	
	d. Preoperative care	Review drugs used as preoperative medications.	
	e. Postoperative care		
	4. Suggested problems/conditions for study: Cancer	(Instructor: Refer to *Guidelines for Cancer Content in Refresher Courses for Registered Nurses*, American Cancer Society, 1967.)	
	a. Scope of problem		
	b. Diagnosis	Refer to ACS pamphlets for coverage of early signs and symptoms; detection; facts and figures, etc.	
	c. Treatment	Show film: "What is Cancer?" Follow by discussion.	
	d. Rehabilitation	Explore community resources for patient with cancer. Role play reactions of patient, family, and community. Discuss nurse's role in giving emotional support.	

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	5. Nursing care	Clinical assignment: Patient with cancer with emphasis on– 1. Feeding problems 2. Irrigations 3. Preoperative care 4. Postoperative care Assignments are made in "pre-conference" and peers share experiences in "post-conference" after care is given and patient response is evaluated.	Is the plan of care for patient 1. Complete? 2. Continuous? 3. Individualized?
Assist patient to maintain fluid balance by attention to intake and output and by safely administering intravenous fluids.	D. Fluid balance 1. Related anatomy and physiology: genito-urinary system 2. Principles a. Body water, a necessary solvent b. Fluid balance c. Electrolyte balance d. Drainage and suction 3. Skills a. Intake and output measurement b. Catheterization c. Intravenous fluid therapy d. Transfusions– – "Cut-down" tray	Read: Cooper, pp. 82-88. Supplement discussion of renal function and status with programmed instruction: Dean, et. al., *Basic Concepts of Anatomy and Physiology: A Programmed Study*, pp. 289-315. Read: Sutton, pp. 80-82; Stryker, pp. 212-213; Metheny & Snively, *Nurses' Handbook of Fluid Balance;* Sutton, pp. 82-100; Dison, *An Atlas of Nursing Techniques*, pp. 140-157. *Class demonstrations by instructor;* Trainex filmstrips; and/or single concept film loops. Follow by practice and return demonstration.	

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	e. Peritoneal dialysis f. Hemodialysis	Observe and assist intravenous therapy nurse in the hospital.	Nursing instructor evaluates skill performance.
		Refer to Appendix IV, ONA statement on "Role of the Professional Nurse in Parenteral Therapy."	
	4. Suggested problems/conditions for study: Genitourinary problems a. Scope b. Diagnosis c. Treatment d. Rehabilitation	Refer refresher to Appendix II, "Bibliography for Participants." Encourage use of *International Nursing Index* for further study.	
	5. Nursing care	Clinical Assignment: Care of patient with nephritis, uremia, or incontinence with emphasis on— 1. Methods of intake and output measurement 2. Catheterization 3. Intravenous fluid therapy 4. Pre- and Postoperative care See: "Bowel and Bladder Retaining," Geigy Pharmaceutical Company.	Does the nursing care plan reflect that the participant has given consideration to intake and output needs of the patient? Does the nursing care plan provide for the following: 1. Dependency when needed? 2. Privacy? 3. Safety? 4. Comfort?

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
Assist patient with elimination needs through such techniques as giving enemas, inserting rectal tubes, and giving colostomy care.	E. Elimination 1. Related anatomy and physiology: lower intestinal tract 2. Principles a. Elimination of wastes is essential to maintaining life b. Review electrolyte balance 3. Skills a. Enemas b. X-ray enema preparation c. Fleets and Baxter d. Disposal e. Colostomy care 4. Suggested problems/conditions for study: Cancer or obstruction of lower gastro-intestinal tract. a. Scope b. Diagnosis c. Treatment d. Rehabilitation	Read: Dison, *An Atlas of Nursing Techniques*, pp. 158-174; Sutton, pp. 224-225. Arrange for patient with permanent colostomy to share hints on management of a colostomy from perspective of patient. Demonstrate and practice colostomy care. Observe and demonstrate topical medications. Explore and identify sources of assistance and information for the patient with a stoma. Refer to *Cancer Source Book for Nurses*, American Cancer Society.	Nursing instructor evaluates skill performance. Have a return demonstration.

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	5. Nursing care	Clinical Assignment: Care of patient with cancer with emphasis on– 1. Postoperative care 2. Emotional support 3. Colostomy care 4. Teaching patient to change dressing	Were the following problems handled effectively? 1. Control of soiling? 2. Control of odor? 3. Care of skin around the opening? 4. Coping with emotional aspects of this change in body function?
		Visit from an Ostomy Club member to discuss needs of patient with colostomy.	Have a self-evaluation of care. See: Gillies and Alyn, *Saunder's Tests for Self-Evaluation of Nursing Competence*, pp. 227-234.
Promote patient ventilation for maintaining blood's access to oxygen through such techniques as breathing exercises, oxygen administration, nebulization of drugs, and use of positive pressure breathing units.	F. Ventilation and oxygen 1. Related anatomy and physiology a. Respiratory status b. Cardiovascular status	Read: Cooper, pp. 88-94 Programmed instruction: Dean, et. al., *Basic Concepts of Anatomy and Physiology: A Programmed Study*, pp. 138-197. "Potassium Imbalance," *AJN*, 67:343-366, 1967. "Respiratory Tract Aspiration," *AJN*, 66:2483-2510, 1966.	The participant knows conditions which interfere with an adequate supply of oxygen.
	2. Principles a. Oxygen–requirement of all cells b. Acid base balance		

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
		Read: Jenson, *Introduction to Medical Physics*, pp. 54-75.	
		Read: *Linde Oxygen Therapy Handbook*, Union Carbide Corporation.	
	3. Skills	Review.	
	a. Vital signs T.P.R., *B.P.*	Programmed instruction: Seedor, *Aid to Diagnosis.*	Have a return demonstration.
	b. Breathing exercises		
	c. Emergency O2 in mask, cannula, tent	Practice: Use single concept film loops, Trainex filmstrips and/or overhead transparencies.	
	d. Tracheostomy care in throat suction		
	e. Thoracentesis		
	f. Abdominal paracentesis	Assist in preoperative care, preparing patient in breathing exercises (teaching).	
	g. Hypothermia		
	h. Chest drainage		
	i. Postural drainage	Read: Sutton, pp. 30-53.	
		Observe intensive care demonstration of oxygen administration by inhalation therapist followed by practice and review of audiovisual aids.	
		View film, "Safe and Effec Oxygen Therapy," followed by summary of key points.	Have a return demonstration.
		Observe heart lung machine.	

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
		Demonstrate tracheostomy care in clinical setting if possible.	Have a return demonstration.
		View film: "Mrs. Reynolds Needs a Nurse." Spend considerable time discussing and possibly reviewing selected portions of film.	Instructor evaluates skill performance.
		Review emergency care procedures.	
	4. Suggested problems/conditions for study: Cardiovascular problems a. Scope b. Diagnosis c. Treatment d. Rehabilitation	Emphasize tracheostomy care, team nursing in action, and the emotional components of air and oxygen hunger. View film, "Strike Back at Stroke," followed by discussion.	
		Demonstrate and discuss drugs being used. Include anticoagulants.	
	5. Nursing care	Clinical Assignments: Care of patient with congestive heart failure, stroke, peripheral vascular disease and/or one with cardiac surgery with emphasis on– 1. Vital signs 2. Taking and recording blood pressures 3. Oxygen therapy 4. Use of positive pressure oxygenators	

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
		5. Observation of administration of special drugs 6. Measurement of central venous pressure 7. Use of hypothermia equipment 8. Care of unconscious patient	Conduct a self-evaluation of nursing care. See Gillies and Alyn, *Saunder's Tests for Self-Evaluation of Nursing Competence*, pp. 185-191.
Assist patient with measures which will promote rest and sleep, relieve pain, and conserve energy.	G. *Rest and sleep* 1. Related anatomy and physiology: physiology of sleep 2. Principles a. Restoration of energy b. Conservation of energy c. Pain	Observe a coronary care unit. Demonstrate drugs being used.	
	3. Skills a. Mileu therapy b. Emotional support c. Positioning for rest d. Back rub e. EKG f. Electronic monitoring	Programmed instruction: 1. "Pain, Part I, Basic Concepts and Assessment," *AJN*, *66:1085-1108, 1966.* 2. "Pain, Part II, Rationale for Intervention," *AJN*, 66:1345-1368, 1966.	Arrange an evaluation of skill performance.
	g. Apical pulse h. Cardiopulmonary resuscitation i. Defibrillator j. Cardioscope	View films, "External Cardiac Massage," "Pulse of Life," "Disorders of the Heartbeat," and "Myocardial Infarction," with discussion following each. Tie in with experiences in coronary care unit.	Can the participant recognize and report major arrhythmias?

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	4. Conditions for study of myocardial infarction a. Scope b. Diagnosis c. Treatment d. Rehabilitation 5. Nursing care	Clinical Assignment: Assist with care of patient with myocardial infarction emphasizing taking EKG's and apical pulses; observation of cardiac defibrillation or pacing, replenishing cardiac resuscitation cart, and observation of drugs being given.	Does the nursing care plan give evidence of consideration for the following: 1. Observation? 2. Safety? 3. Patient's self-esteem? 4. Providing conditions conducive to optimal rest? 5. Relief of pain? 6. Revision of nursing care plan as patient improves? Assign self-evaluation of care. See Gillies and Alyn, *Saunder's Tests for Self-Evaluation of Nursing Competence*, pp. 143-148.
Assist patient with alignment, movement, and activity through techniques such as positioning, range of motion, transfer, and ambulation.	H. Activity 1. Related anatomy and physiology: muscular–skeletal system 2. Principles a. Alignment b. Mechanics of body motion c. Interrelation of systems	Programmed Instruction: Dean, et. al., *Basic Concepts of Anatomy and Physiology: A Programmed Study*, pp. 111-137. View film, "Balance in Action" with summary of key points. (Instructor refer to book, Prior, *Applied Body Mechanics: Instruction Manual*, OSBH.)	

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
		View slides with script accompanying above. The slides are most effectively used if studied before and after demonstration and practice.	
	3. Skills a. Positioning, costs, and traction b. Range of motion, body mechanics, exercises c. Transfer, wheelchair d. Mechanical devices, braces, lifts, Hoyer lift e. Ambulation – walkers and crutch walking f. Protective restraints	Demonstrate range of motion by physical therapist. Provide for return demonstration. All class members should experience range of motion and transfer activities as a "patient" and as a "worker." Arrange demonstration with supply houses, hospital, rental agencies, (possibly share event with other in-service groups.)	Instructor makes an evaluation of performance skill.
	4. Suggested problems/conditions for study: a. Injuries resulting in limited motion 1) Fractures 2) Dislocations b. Disease conditions resulting in limited motion 1) Arthritis 2) "Low-back pain"	Introduce application to children when possible. Observe for signs and symptoms of shock. Identify ways to prevent shock.	

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	5. Nursing care	Clinical Assignment: Care of patient with limited motion with emphasis on– 1. Positioning 2. Prevention of decubitus ulcers 3. Minimizing deformity 4. Optimal activity 5. Rehabilitation	Is the participant able to position and transport patients while at the same time maintaining safety, asepsis, privacy, and comfort? In teaching ambulation, is consideration given to progression (to sit, to stand, to take a step)?
Administer medications safely including preparing, giving, observing response, reporting, recording, and instructing patient.	I. Therapuetic agents 1. Review of sources of drug information 2. Principles a. Intervention to restore homeostasis	Develop guide or method for small groups for obtaining needed current drug knowledge. Combine suggestions for guide in large group discussion.	Does the participant consistently refer to current sources for drug information?
	b. "Seven Rights"	Read: Conway, et. al., "The Seventh Right," *AJN*, May 1970.	
	3. Skills a. Oral medications b. Injections–subcutaneous, intramuscular, and intradermal c. Topical medications d. Inhalation e. Insulin	View film, "An Ounce of Prevention," with discussion. Read: Sutton, pp. 76-80. View film, "Techniques of Parenteral Medication," with summary and key points. (Schedule basic arithmetic review in basic skills lab or request programmed materials as needed from library.)	Pretest on arithmetic ability required for safe administration of drugs. (See Stryker, pp. 209-211, for sample test.) Is the participant able to safely administer medications? Use criteria developed by Stryker, pp. 206-8, for evaluating ability.

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	4. Suggested problems/conditions for study: Drug overdose, poisoning, metabolic disorders. a. Scope b. Diagnosis c. Treatment d. Rehabilitation	Study alternative plans for handling emergency situations due to drugs. Investigate poison control, information, and services in the community. View films: "Quiet Victory," "Understanding Diabetes." Programmed instruction: Dean, et. al., *Basic Concepts of Anatomy in Physiology: A Programmed Study.* pp. 264-288. Explore resources for patient education. View film, "Home Care," with discussion.	
	5. Nursing care	Clinical Assignment: care of the diabetic patient with emphasis on— 1. Administration of insulin 2. Special diet 3. Patient-family education 4. Emergency care a. Coma b. Shock 5. Team participation	Does the nursing care plan provide for the following: 1. Encouragement of independence–interdependence 2. Recognition that physical needs will continue 3. Allowance for teaching to begin. Does the nurse participate and contribute to team conferences?

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
		Refer to Pohl, *Teaching Function of the Nursing Practitioner.*	Is the participant able to initiate a teaching plan? Have agency personnel participated in providing feedback of participant effectiveness in giving quality nursing care? Conduct a self-evaluation of nursing care. See, Gillies and Alyn, *Saunder's Tests for Self-Evaluation of Nursing Competence*, pp. 30-36, 104-107, 203-208. Arrange individual conferences to compare evaluation reports or course and/or unit tests.

UNIT III: THE PROFESSIONAL NURSE

Upon completion of this unit, the participant will be able to—

1. State in own words a guiding philosophy as a professional nurse.
2. Plan for own continued professional growth.
3. Practice with awareness of legal implications of behavior to self and others.
4. Seek employment in the nursing field.

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
State in own words a guiding philosophy as a professional nurse practitioner.	A. Toward a professional philosophy	Read: French, *Dynamics of Health Care*, pp. 79-85. Read statements of beliefs about nursing made by Henderson, Geitgey, and others. Have participants attempt to put thier own beliefs about nursing and nursing care in writing. Discuss how the above may have implications for type of employment desired.	Does the participant maintain standards of behavior that reflect personal belief of what constitutes safe, effective and therapeutic nursing care?
Plan for own continued professional growth.	B. Continuing competency in technical knowledge and skills	Engage in participant self-evaluation and teacher evaluation followed by a conference to compare ratings.	Is the participant aware of her own strengths and limitations?

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	1. Orientation	Read and discuss in small groups: Stryker, "Advice from a Successful Refresher," *Back to Nursing*, pp. 295-7.	
	2. Continuing in-service education	Have participants consider and develop own plans for professional growth.	Has the participant expressed interest in increasing her scope and depth of nursing knowledge and skills through employment, in-service, clinical experience, perusal of periodicals and references, workshops, and continuing education?
	3. Continuing education a. Workshops b. Collegiate courses	Read: Cooper, "Keeping Up With Nursing," *Contemporary Nursing Practice*, pp. 315-326.	
	4. Resources a. Reading materials b. Nursing organizations	Have participants identify the resources available for keeping them professionally informed.	Does the participant seek out appropriate source information on her own that is pertinent to professional growth?
Practice nursing with awareness of legal implications of behavior to self and others.	C. Legal Aspects 1. Responsibility a. Personal b. Delegation of authority c. Liability d. Malpractice	Review Oregon Nursing and Medical Practice Acts.	Does the participant demonstrate responsibility for own behavior?
	2. Accountability a. Health facility policies b. Nurse Practice Act c. Medical Practice Act d. Pharmacy Act	Explore other related legislation: Good Samaritan Act, Medicare, Medicaid. Review ONA and OSBN policy statements on: I.V. Administration, Coronary Care (see Appendix IV.)	Is the participant aware of accountability factors involved in the following problem areas? 1. Verbal orders 2. Pronouncement of death

OBJECTIVE	CONTENT	SUGGESTED ACTIVITIES	EVALUATION
	3. Prevention of Lawsuits	View film: "No Margin for Error." Black and white, sound, 24 minutes, 16mm.	3. Administration of intravenous fluids 4. Medication errors 5. Questioning the physician's orders 6. External cardiac resuscitation 7. Consent forms
Make appropriate job application.	D. Employment *considerations* 1. Job opportunities 2. Personnel policies 3. Application and interview	Have *participant* committee *arrange* to visit or have prospective employers visit class and present information on programs offered in their facilities. Compare findings in large group. Role play job interview situations.	Is the participant aware of the variety of job opportunities in 1. The local community? 2. Outside the community? Is the participant aware of differences in personnel policies of various agencies and how to make *appropriate* comparisons? Arrange a unit or course evaluation.

APPENDIX I: INSTRUCTIONAL RESOURCES

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"Balance in Action (Body Mechancis)," ANA-NLN Film Library

"Children in the Hospital," Oregon State Board of Health

"The Cost of Hope," American Hospital Association Film Library

"Disorders of the Heartbeat," Wyeth Film Library

"External Cardiac Massage," Smith, Kline and French Laboratories

"Home Care," ANA-NLN Film Library; Oregon State Board of Health

"Hospital Sepsis," American Medical Association Film Library; ANA-NLN Film Library; Oregon State Board of Health

"Innovations in Transfusion Therapy," Fenwal Laboratories

"Intensive Care," National Medical Audiovisual Center

"Intravenous Fluid Infusion: Basic Theory and Practice," ANA-NLN Film Library

"Introduction to Nursing in a Coronary Care Unit," National Medical Audiovisual Center

"More Than Words," ANA-NLN Film Library

"Mrs. Reynolds Needs a Nurse," ANA-NLN Film Library, Oregon State Board of Health

"Myocardial Infarction," American Heart Association Film Library; ANA-NLN Film Library

"Nurse-Patient Relationship," Smith, Kline and French Laboratories, ANA-NLN Film Library

"Nursing Management of the Patient with Cancer," American Cancer Society

"Parenteral Fluid Therapy," Baxter Laboratories

"Prescription for Life," Oregon State Board of Health

"Psychiatric Services in General Hospitals," Squibb Laboratories

"Pulse of Life," Oregon State Board of Health

"Quiet Victory," ANA-NLN Film Library, Oregon State Board of Health

"Safe and Effective Oxygen Therapy," Union Carbide Corporation (Linde Oxygen Therapy Handbook, 1962, to accompany film if requested)

"Strike Back at Stroke," U.S. Department of Health, Education and Welfare

"Techniques of Parenteral Medications," ANA-NLN Film Library

"This is Nursing," ANA-NLN Film Library

"Understanding Diabetes," ANA-NLN Film Library, Oregon State Board of Health

"What is Cancer?" American Cancer Society

"The World of Walter Krolick," ANA-NLN Film Library

Video Tapes

"Return to Nursing," TV Series (Instructor: Order accompanying Instructor and Student Manuals.) Twenty-five, 30-minute sessions produced for the State University of New York by Russell Sage College, Department of Nursing, Troy, New York.

*No.

1. The Changing Role of the Nurse
2. Comprehensive Nursing Care, Part I
3. Comprehensive Nursing Care, Part II
4. Comprehensive Nursing Care, Part III
5. Nursing Care Plan
6. Medications
7. Injections
8. The Patient with Peptic Ulcer: Diagnosis
9. The Patient with Peptic Ulcer: Nursing Care
10. Fluid and Electrolytes
11. Intravenous Therapy

*Individual video tapes can be ordered by number and title.

No.
12. Pre-Operative Care
13. Post-Operative Care
14. Inhalation Therapy
15. The Patient with Diabetes
16. The Patient with CVA, Part I
17. The Patient with CVA, Part II
18. The Patient with Cancer
19. The Problem of Infection
20. The Nursing Team
21. The Nurse-Patient Relationship
22. Care of the Aging
23. Legal Aspects of Nursing
24. The Nurse and New Equipment
25. What's Ahead for Nursing

Slides

Slides and script to accompany *Applied Body Mechanics*, Oregon State Board of Health.

Filmstrips

Wide assortment available from—

Trainex Corporation, P.O. Box 1[illegible], Garden Grove, California 92642.

The Blakiston Division. McGraw-Hill Book Company. 330 West 42nd Street, New York, N.Y. 10036.

Single concept film loops (Super 8mm) available from Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Audio Tape Cassettes

"The Nursing Audit Series" (Order accompanying workbook), National League for Nursing, 10 Columbus Circle, New York. N.Y. 10019

Medical Illustrations

Netler, Frank. "Ciba Collection of Medical Illustrations," Ciba Pharmaceutical Products, Summit, New Jersey

Overhead Transparencies

"Respiratory System"

"Circulatory System"

"Genito-Urinary System"

"Nervous System"

Suitable for review of gross anatomical structures and functions.

Available from Wyeth Laboratories, 43 West 61st Street, New York, N.Y. 10023

Film Sources

American Cancer Society
219 East 42nd Street
New York, N.Y. 10017

American Cynamil Company
2300 South Eastern Avenue
Los Angeles, California

American Heart Association
44 East 23rd Street
New York, N.Y. 10010

American Hospital Association
Film Library
840 North Lake Shore Drive
Chicago, Illinois 60611

American Medical Association
Film Library
535 North Dearborn Street
Chicago, Illinois 60610

Ames Company, Inc.
Medical Film Department No. 620
819 McNaughton Street
Elkhart, Indiana 46514

ANA-NLN Film Library
267 West 25th Street
New York, N.Y. 10001

Association Film, Inc.
25358 Cypress Avenue
Hayward, California 94544

Audio-Visual Instruction
Division of Continuing Education
Coliseum 131
Corvallis, Oregon 97331

Fenwal Laboratories
Morton Grove, Illinois

Ideal Pictures
417 North State Street
Chicago, Illinois 60610

McGraw-Hill Book Company
Text-Film Department
330 West 42nd Street
New York, N.Y. 10036

National Medical Audiovisual Center
(Annex)
Chamblee, Georgia 30005
Attn: Film Distribution

Oregon Heart Association
Film Library
234 SE 12th Avenue
Portland, Oregon 97214

Oregon State Board of Health
Health Education Section
1400 SW Fifth Avenue
Portland, Oregon 97201

Pfizer Medical Film Company
267 West 25th Street
New York, N.Y.

Rarig's Inc.
Audio-Visual Specialist
2100 North 45th
Seattle, Washington 98103

Smith, Kline, and French Laboratories
1500 Spring Garden Street
Philadelphia, Pennsylvania

Squibb Laboratories
New Brunswick, New Jersey

U.S. Dept. of Health, Education and
Welfare
Public Health Service
Division of Chronic Diseases
Washington, D.C.

Wyeth Film Library
Box 8299
Philadelphia, Pennsylvania 19101

Oregon Health Organizations

American Cancer Society
1530 SW Taylor
Portland, Oregon
228-8331

Epilepsy League of Oregon, Inc.
718 W Burnside
Portland, Oregon
228-7651

Mental Health Association of Oregon
718 W Burnside
Portland, Oregon
228-6571

Oregon Association of Hospitals
220 SW Morrison
Portland, Oregon
228-5608

Oregon Heart Association
1133 SW Morrison
Portland, Oregon
226-2575

Oregon League for Nursing
718 W Burnside
Portland, Oregon
227-2129

Oregon Nurses Association
1212 Failing Building
Portland, Oregon
228-2114

Oregon State Board of Health
1400 SW Fifth
Portland, Oregon
226-2161

APPENDIX II: BIBLIOGRAPHY FOR PARTICIPANTS

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"Commonly Used Hospital Abbreviations" and "Facts About Fever," Becton, Dickinson and Company, Rutherford, New Jersey

"Facts at Your Finger Tips," Roche Laboratories, Nutley, New Jersey

"Keflin Slide Ruler," Eli Lilly and Company, Indianapolis, Indiana

"Bowel and Bladder Retaining," Geigy Pharmaceutical Company

APPENDIX III: POLICIES AND PROCEDURES
OREGON STATE BOARD OF NURSING

STATE BOARD
OF NURSING

1400 S.W. FIFTH AVE. • PORTLAND, OREGON • 97201 • Phone 229-5653

cCALL
NOR

e Secretary

OREGON STATE BOARD OF NURSING
SUPERVISED NURSING EXPERIENCE POLICY

All applicants for a registered professional nurse license by endorsement, reinstatement, or reactivation must have been actively engaged in nursing practice within five years of the date of application. In obtaining work experience confirmation, only that experience obtained while legally licensed in the state of practice will be considered. Those who have not had such practice must demonstrate their ability to give safe nursing care by having a supervised nursing experience as designated below:

All applicants will be required to–

1. Have a temporary permit *before* beginning this experience.
2. Be at all times under the direct supervision of a registered nurse.
3. Be assigned to duty at such times as there is adequate staff on duty to allow for the person responsible for their supervision to give adequate time for instruction and follow up.
4. Be supervised in direct patient care for no less than 240 working hours and up to 480 hours (12 weeks)–depending on their ability to adjust and take the responsibility of a professional nurse. If additional time appears to be needed, individual arrangements will be made.
   a) If working on a part-time basis, must average at least 24 hours a week.
5. Have this experience in an institution or agency that is satisfactory to the Board. The applicant must make her own arrangements for this practice and, before a permit can be issued, notification of these arrangements must be on file. A form for this notification will be supplied by the Board office. A work reference form will be sent by the Board to the Director of Nurses at the end of a six-week period for an evaluation of the person's performance. If at that time it is indicated that further supervision is needed, the temporary permit will be extended for another six-week period.
6. Present this policy to the Director of Nurses who agrees to provide supervised experience so it may be read before the agreement is signed.

RN No. 26
9-69

OREGON STATE BOARD OF NURSING
1400 S.W. Fifth Avenue
Portland, Oregon 97201

NOTIFICATION OF ENROLLMENT
IN
RN REFRESHER COURSE

This is to advise the OREGON STATE BOARD OF NURSING that I have arranged to take the REGISTERED NURSE REFRESHER COURSE at ________________________________
(Name of Institution)

starting on ________________________
(Date)

____
(Name of Applicant)

____
(Address)

____

This is to advise the OREGON STATE BOARD OF NURSING that we have accepted ________________________

for enrollment in a RN REFRESHER COURSE starting ______________ and ending ______________
(Date) (Date)

This course covers ______ hours of theory and ______ hours of supervised clinical practice.

We agree to submit verification of completion of the course and an evaluation of the enrollee's ability. (On forms to be provided by the Board.)

____
(Signature of Director or Instructor)

____
(Name of Agency)

____
(Date)

____
(Address)

____

This form must be submitted by all applicants who have not practiced in the past five years who are seeking original licensure, reactivation, or reinstatement of their license to practice in Oregon. Upon receipt of the application, fee and this form, a TEMPORARY PERMIT may be issued.

RN 27-A

OREGON STATE BOARD OF NURSING
1400 S.W. Fifth Avenue
Portland, Oregon 97201

TO:

FROM: Virginia H. Hildebrand, RN Executive Secretary

REGARDING: ______________________________ who is completing

SUPERVISED PATIENT CARE EXPERIENCE: From __________ To __________ Total Hours __________

Patient Care Experience was supervised by ______________________________ (Name

______________________________ (Position

Please comment in short, pertinent statements on the professional competence of this nurse:

1. Ability to assess patient needs.

2. Ability to modify care to the changing condition of the patient.

3. Ability to cooperate and work with staff.

4. Technical competence.

5. Understands the responsibilities and limitations of the various categories of nursing service personnel.

6. Exhibits initiative in seeking out resource material related to nursing activities.

7. Professional conduct.

Is continued employment planned? __________ If not, reason: ______________________________

Would you recommend for licensure? __________ If not, reason: ______________________________

Signature ______________________________ Title ______________________________

Institution ______________________________ City ______________________________

Date ______________________________

Form 9-B2

STATE OF OREGON
OREGON STATE BOARD OF NURSING
778 State Office Building
1400 S.W. Fifth Avenue
Portland, Oregon 97201

TO: Schools of Nursing

REGARDING: Guidelines for the Evaluation of Clinical Facilities for Nursing Education Programs

The Board, in its concern with the development and maintenance of quality nursing education programs, presents the enclosed guidelines.

PURPOSE:

The guidelines were prepared to:

(1) Assist education personnel in selecting for nursing students, educational facilities appropriate in terms of the objectives stated for the program.
(2) Assist agency personnel to understand the type and quality of clinical facilities that provide an environment supportive of learning needs.

RATIONALE:

During a survey, one of the most difficult problems, in addition to assessing an agency as an educational resource, is to identify and help the agency look at itself as an educational setting in which students practice and observe to learn nursing. The guidelines, as one resource, lists areas that bear consideration in selecting clinical facilities for educational programs.

There is no expectation that all the attributes mentioned in the guide, although desirable, will be present in an agency being surveyed. Rather it is anticipated that the objectives of the program, which determine the type of nursing role students are to acquire, will also determine the attributes considered essential for student learning in the clinical facility.

Movement toward meeting areas in the guidelines may be considered as evidence of a sincere concern and desire to provide the type of clinical facilities that best serve student needs.

The Board will appreciate your comments and suggestions regarding the Guidelines.

EFS/9/
2/1/67
Enc.

PROPOSED GUIDELINES FOR THE EVALUATION OF CLINICAL FACILITIES FOR NURSING EDUCATION PROGRAMS

A. ATTITUDE TOWARD PROGRAM

There is evidence of sincerely wanting the program:

1. The agency is accredited by the appropriate accrediting agencies.
2. The objectives for the nursing education program, including what the graduate of this program is prepared to do, have been shared with administrators and nursing staff of this agency by the director of the nursing education program.
3. There is evidence of provisions for periodic meetings between the personnel of the service agency and the school faculty for:
   - a) developing understanding of their respective roles and responsibilities
   - b) planning for the best utilization of clinical facilities
   - c) communication so that issues and problems may be properly understood.
4. Hospital administration and nursing staff accept or appear interested in making an effort to understand how student and instructor function in the clinical situation in these programs.
5. Hospital staff express a sense of responsibility for providing a clinical climate accepting of students as learners.
6. The Head Nurses are receptive to planning with the instructors, student assignments which require partial patient care based on educational needs, with the staff nurse retaining responsibility for total care.
7. The nursing staff personnel are receptive to and will permit faculty to select and plan patient assignments in terms of learning needs of students.

B. THE AGENCY PROVIDES AN ENVIRONMENT CONDUCIVE TO LEARNING QUALITY NURSING CARE

1. There are written nursing service philosophy and objectives and the nursing service personnel are aware of them.
2. There is evidence of concern and/or realistic planning for preparing patients to return to the community.
3. The attitude of the personnel appears to be one of concern for:
   - a) patients as people: Nursing care plans are written and used in assignments.
   - b) patient request, when these conflict with established routines
   - c) patients as individuals: Patients are assigned by name, rather than room number.
4. Nursing care hours demonstrate staffing patterns that consider needs of patients rather than number of patients.
5. There is apparent effort to utilize personnel in terms of their preparation, and in relation to the judgment needed to provide adequate patient care.
6. Assignments reflect concern for the health needs of patients and knowledge of the nursing activities required to meet these health needs.
7. Aides are assigned to assist the RN and/or LPN with patient care rather than being assigned directly to patients.

8. Patient charts and kardex contain nursing care plans which indicate individual needs of patients as ascertained by the nursing staff.
9. There is staff sufficient in preparation, experience, and stability to provide continuous and safe nursing care to patients.

C. NURSING PERSONNEL AND ADMINISTRATION POLICIES

1. Administrative policies and procedures are written and available to staff and students.
2. Nursing procedure manuals are up to date and available in each nursing unit.
3. Personnel policies including job descriptions are written and used in nursing care assignments of staff.
4. The job descriptions define responsibilities and privileges of the RN, LPN, and assisting personnel.
5. The current "Guide for Assigning Responsibilities to Nursing Service Personnel" of the ONA, OLPNA, and OSBN provides the basis of nursing care assignments.
6. The school accepts responsibility to plan for an orientation of its faculty to the agency: and the agency accepts responsibility to orient all personnel (current and incoming) to the nursing education program.
7. An active ongoing orientation program for all levels of new personnel to nursing service is accepted as a responsibility of the agency.
8. There is an active, planned in-service program. The topics are primarily concerned with nursing and administrative concepts and activities that contribute to the improvement of patient care and staff development.

D. CLINICAL FACILITIES

1. There is sufficient variety of patients as to age, health and illness, disability and socioeconomic levels to meet the objectives of the program.
2. In the units to be used for nursing education—
   a) The patient areas are large enough to absorb the number of refreshers and instructors to be assigned.
   b) The staff is receptive to permitting refresher nurse observation.
   c) The medication unit is adequate in size to absorb students and instructor. There is evidence of control and safe practices in the storage, administration, and recording of medication.
   d) Facilities provide sufficient space to allow students to chart or read charts and kardex.
   e) There is in each unit a basic library with up-to-date reference books. If not, administration is receptive to providing space and setting up a control system for a unit library to be provided by the school.
   f) Equipment and supplies are adequate and available for use of students in their educational programs.
   g) Kardex and charts are available for student use.

E. INSTRUCTIONAL AND STUDENT FACILITIES IN EXTENDED CAMPUS AREA

Space and equipment provided and/or planned for, include:

a) Locker facilities
b) Instructor office with locked file cabinet
c) Reference library
d) Conference room for pre- and post-conference (available with specified priority to instructor)
e) Use of parking facilities
f) Use of dining facilities

APPENDIX IV: POSITION STATEMENTS
OREGON NURSES ASSOCIATION

Oregon Nurses Association
Position Statement on the Registered Nurse
(Adopted by ONA Board of Directors September 20, 1968)

The registered nurse functions as an integral component of the medical care team. Although all registered nurses have demonstrated through licensure that they have minimal abilities and are safe practitioners, the capabilities and skills of individual nurses vary and are dependent upon a number of factors, including but not limined to educational preparation, experience, opportunity, and motivation.

Registered nurses practice in a variety of settings and within each setting may be required to perform dependent and independent functions. Many of the functions will require specialized training and knowledge beyond that included in basic nursing education programs.

The Oregon Nurses Association believes that, in the best interest of the patient, the registered nurse, and other members of the health care team:

1. The individual nurse has a responsibility to keep her skills and competencies current with the increasing body of knowledge in her field of practice.
2. The nurse should assume responsibility only for functions within the scope of her skills and competencies.
3. Nurses should participate actively in the development and planning of programs that provide training in the various areas of nursing practice and especially in those areas which require highly specialized skill and an unusual degree of nursing judgment.
4. The nurse should assess the availability of guidelines, the adequacy of equipment, and the capabilities of personnel assigned to provide care, including lifesaving and other emergency measures and provisions for rehabilitation, before accepting any assignment that requires highly specialized skills and an unusual degree of judgment.
5. The nursing service department, acting jointly with administration of the employing facility and the medical staff, shares responsibility for the development of appropriate written policies and guidelines and for providing the training that will enable the nurse to provide effective, safe, and therapeutic care to patients for whom highly specialized skill and an unusual degree of nursing judgment is required.
6. Employers of nurses share responsibility for the quality of care received by patients and are expected to provide opportunities for the nurse to participate in orientation and in-service education programs and in other programs of a continuing education nature that will assist the nurse to maintain and develop skill and competency.

The Oregon Nurses Association believes further that the registered nurse has an obligation to the patient to perform only those functions or procedures for which she has been trained and is competent, and to refuse to place herself in a situation in which she is responsible for the incompetencies of those working under her direction and/or supervision.

Since the nursing service department provides continuing direct care, the registered nurse in her developing role as a professional practitioner assumes responsibility for coordinating the care provided to the patient by other members of the health care team.

Oregon Nurses Association
Statement on Registered Nurses in Acute Cardiac Care
(Adopted by ONA Board of Directors September 20, 1968)

The Oregon Nurses Association concurs with the statement of the Oregon Heart Association that the nursing staff is the key to the coronary care unit team. However, the Oregon Nurses Association believes that registered nurses should accept assignment in such units only if:

1. Hospital administration, medi[illegible] and the nursing department in each hospital have agreed on, and made a[illegible] to each nurse involved, policies and procedures including at least the foll[illegible]g:
    a. The nurse's responsibility with regard to specialized equipment, such as monitors, pacemakers, and defibrillators.
    b. The nurse's responsibility for initiating and/or performing defibrillation, cardiopulmonary resuscitation and other emergency procedures.
    c. Specific instructions providing for the administration of emergency medications, including those medications which can be administered only upon the specific order of a physician and those which might be required on an emergency basis by the patient.
    d. Adequate standing orders, including those for emergency situations, with provision for periodic review.
2. The nurse has had special training including:
    a. Anatomy, physiology, and pathology of coronary disease.
    b. Clinical features and complications of acute myocardial infarctions.
    c. Electrocardiography emphasizing pattern recognition of cardiac arrhythmias.
    d. The principles and practice of cardiac resuscitation, including the use of pacemakers and defibrillators.
    e. The principles of inhalation therapy, including tracheo-bronchial suction.
    f. Principles and operation of electronic equipment.
    g. Specialized problems of patients in coronary care units.
3. There is provision for continuing training of the nursing staff.

Since registered nurses are employed in facilities other than those with coronary care units, the Oregon Nurses Association believes that all facilities should have developed and approved by the administration, medical staff, and nursing service department guidelines for the nurse involved in an emergency cardiac situation and provision for continuing training in the emergency procedures.

THE ROLE OF THE PROFESSIONAL NURSE IN PARENTERAL THERAPY

(Approved in 1963)

The statements regarding the role of the professional nurse in parenteral therapy were developed by a committee composed of representatives of the Oregon Nurses Association, the Oregon Association of Hospitals and the Oregon State Medical Society, and have been approved by the boards of he three organizations.

There appears to be nothing in the Oregon Law regulating the Practice of Professional Nursing (ORS 678.010-678.990) which prohibits nurses from performing intravenous therapy nor the physician from delegating this responsibility to nurses. Individual employing agencies are urged, therefore, to use these statements as guidelines in developing policies for their spe[illegible]uations.

I. [illegible] of the Professional Nurse in Parenteral Therapy

A. For the purposes of these statements:
   1. The words "doctor" and "medical" refers to a person or persons, duly licensed by the State of Oregon to practice medicine or surgery, osteopathy, or dentistry.
   2. The phrase "individual employing agency" shall refer to any hospital, clinic, doctor's office, or other facility whose primary functions are to maintain health and to treat the ill, injured, and physically infirm.
   3. The word "nurse" refers to a person licensed by the State of Oregon to practice professional nursing.

B. Nurses must be informed that any statement of policy made by professional organizations or by the employing health care facility does not relieve the individual nurse of responsibility for her own acts. Such statement will not provide the nurse with immunity from legal action if she is negligent. However, such statements will give the nurse support by setting forth specific information which those responsible groups recognize to be proper practice and sound procedure.

C. The nurse who administers intravenous fluid or medication, or subcutaneous fluid, should have been properly taught and supervised in the procedure until she is sufficiently competent to proceed by herself. It is recommended that each employing agency assume responsibility for providing this instruction and supervision to licensed professional nurses. It is further recommended that the schools of professional nursing include this instruction and supervision in the curriculum.

D. The individual employing agency, with the assistance of the medical and nursing staffs, is responsible for establishing in writing and disseminating the following information:
   1. All orders for intravenous fluids and medications, and all orders for subcutaneous fluids and medications administered in those fluids, must be written by a doctor. The duration of the order should be specified.
   2. A list of solutions and medications that can be given intravenously and/or subcutaneously by the nurse. (This does not preclude the administration of medications ordinarily administered subcutaneously.)
   3. A list of the solutions and medications that can be given only by a doctor, or under the direction and supervision of a doctor.
   4. A statement concerning the insertion and removal of intravenous flexible plastic needles by the nurse.
   5. The types of patients and the areas to be used by nurses when giving intravenous therapy. It is recommended that nurses not administer intravenous solutions or medications to infants nor in the scalp veins, and that each individual institution determine the age group of children to which the nurse can administer intravenous therapy.
   6. Intravenous therapy shall be limited to administration via vena-puncture only. Nurses shall not perform acts of minor surgery such as cut-downs.
   7. Rate of flow of solutions and medications.
   8. Administration of blood and blood products by the nurse.

APPENDIX V: NURSE REFRESHER PROGRAM FOLLOW-UP FORM

NURSE REFRESHER PROGRAM FOLLOW-UP FORM*

NAME ____________________

ADDRESS ____________________

MARITAL STATUS ____________________
single married widowed divorced or separated

YEAR OF BIRTH __________ Number of Children __________ Age of youngest __________

PLACE OF REFRESHER COURSE __________ DATE __________

NURSING SCHOOL PROGRAM FROM WHICH GRADUATED? __________
Diploma Baccalaureate ADN

1. How many years had you been inactive prior to taking course? __________

2. Are you now employed in nursing? (check one)
   (a) Not working ______
   (b) Yes, full time ______
   (c) Yes, part time ______
   (d) If part time, number of hours per week ______

3. If employed, what type of work?
   (a) Hospital ______
   (b) Nursing Home ______
   (c) Other (state) ______

4. If you are not now employed in nursing, were you employed at any time following completion of refresher course?

   Yes ______ No ______

   If "yes," for how long? __________

5. Please check *Main* reasons you are not now working:
   ______ Employment opportunity not available locally
   ______ Working hours not suitable
   ______ Child care arrangements not available
   ______ Cost of child care excessive
   ______ My health does not permit me to work
   ______ Transportation a problem
   ______ Poor working conditions
   ______ Husband objects to my working
   ______ Home and family obligations do not permit me to work
   ______ Going to school
   ______ Not interested in working
   ______ Other (specify) __________
   ____

6. Are you employed for pay in something other than nursing? __________

7. If you returned to employment anytime since taking the course, please answer these questions:
   (a) Did you receive adequate orientation to the hospital or agency when beginning employment? Yes ____ No ____
   If "no" please explain __________
   (b) Would you have returned to nursing without the refresher course? Yes ____ No ____
   (c) Did you encounter any special difficulties in returning to practice? __________

Suggestions for Improvement of Course: __________

____

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*Adapted from Oregon League for Nursing Form 1969

VT 016 607
GROUP INSTRUCTION FOR WORK EXPERIENCE
EDUCATION.

LOS ANGELES COUNTY SUPERINTENDENT OF SCHOOLS,
CALIF.
CALIFORNIA STATE DEPT. OF EDUCATION,
SACRAMENTO. VOCATIONAL EDUCATION SECTION
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 72 178P.

DESCRIPTORS - *CAREER EDUCATION; VOCATIONAL DEVELOPMENT; *GROUP INSTRUCTION; *WORK EXPERIENCE PROGRAMS; SECONDARY GRADES; SELF EVALUATION; PROGRAM EVALUATION; RELEVANCE (EDUCATION); INTERPERSONAL RELATIONSHIP; INSTRUCTIONAL INNOVATION; *RESOURCE UNITS; TEACHING PROCEDURES; HUMANITIES; WORKSHEETS; *GOAL ORIENTATION
IDENTIFIERS - SELF AWARENESS; CAREER AWARENESS

ABSTRACT - DESIGNED TO ASSIST SCHOOL DISTRICTS IN PROVIDING INSTRUCTION FOR GROUPS OF 25 TO 30 WORK EXPERIENCE EDUCATION STUDENTS, THIS FEDERALLY FUNDED RESOURCE UNIT CONTAINS FIVE COLOR-KEYED CHAPTERS, EACH WRITTEN BY A DIFFERENT SUPERVISOR IN CAREER EDUCATION, WHICH INCLUDE TEACHING PROCEDURES AND STUDENT WORKSHEETS. EACH CHAPTER COVERS ONE OF FIVE PROGRAM GOALS: (1) RELEVANCY, (2) SELF-ACTUALIZATION, (3) SELF-EVALUATION, (4) INTERPERSONAL RELATIONS, AND (5) APPLICATION. THIS GUIDE IS THREE-HOLE PUNCHED FOR EASY INSERTION INTO A RING BINDER. INNOVATIVE INSTRUCTIONAL TECHNIQUES INCLUDE ROLE PLAYING, GAMES, AND CROSSWORD PUZZLES WITH ANSWER KEYS. VARIOUS STUDENT AND PROGRAM EVALUATION FORMS ARE PROVIDED. (AG)

GROUP INSTRUCTION FOR WORK EXPERIENCE EDUCATION

PREPARED BY OFFICE OF THE LOS ANGELES COUNTY SUPERINTENDENT OF SCHOOLS FOR
CALIFORNIA STATE DEPARTMENT OF EDUCATION, 1972

GROUP INSTRUCTION
FOR WORK EXPERIENCE EDUCATION

Funded under Part B of the
Vocational Education Amendments of 1968
Public Law 90-756: VEA Number AB-49
"Curriculum Materials for Related
Instruction in Work Experience Education"

California State Department of Education
Vocational Education Section
and
Office of the Los Angeles County Superintendent of Schools

1972

1845

FOREWORD

That the future of work experience education is exceptionally bright and that its impact on the total program of vocational education in California is profound cannot be challenged. Consider the facts: In 1965 only 60 programs existed. Now there are more than 750 programs in operation, involving more than 80,000 students.

The inclusion of related instruction as a significant part of each work experience education student's plan became a requirement in 1971, after evaluation of the program strongly indicated the need.

As an initial step to assist schools in providing meaningful and useful related instruction, California State Polytechnic College, San Luis Obispo, was selected to develop individualized learning activity packages, based on the goals, objectives, and standards of work experience education. Subsequent field tests of the learning activity packages indicated that similar special attention should be given to the area of group instruction.

Subsequently, the Office of the Los Angeles County Superintendent of Schools in cooperation with the California State Department of Education, Vocational Education Section, submitted a proposal to develop group instructional units based upon the goals and objectives of work experience education. This task is now completed.

The purpose of this publication is to assist school districts in providing group instruction for work experience education students.

Wesley P. Smith
State Director of Vocational Education
California State Department of Education

Sacramento, California

PREFACE

This guide, Group Instruction for Work Experience Education, represents a next step in what has become a long journey with two major purposes: (1) to develop a hierarchy of goals and objectives for students enrolled in California's program of exploratory, general, and vocational work experience education; and (2) to prepare related instructional materials.

In February, 1970, the task was undertaken as an adjunct to a new state handbook for the program. During meetings held that year, agreement was reached on five major goals for students, and a beginning was made on a system of measurable objectives to enable instructors to monitor student progress toward the goals. The material was distributed throughout the state in a preliminary workbook dated March 25, 1971, titled, Goals, Selected Program Objectives, Performance Objectives, Terminal Objectives and Evaluative Criteria for Students Enrolled in California State Programs of Work Experience Education.

With the assistance of a research grant funded under VEA Title I, Part C, Public Law 90-576, a team was commissioned in 1971 to continue work on the project. The following was accomplished:

1. The major goal statements were revised.
2. Additional program goals were written and others improved to provide from three to five program goals for each of the five major goals.
3. Each program goal was further refined through a sequential series of measurable performance objectives.
4. To facilitate attainment of the performance objectives, a Learning Activity Package, LAP, was developed for each objective.
5. A series of comprehensive tasks which measure progress toward the attainment of each program goal, as well as the five major goals, were prepared to serve as terminal objectives. They are, in a sense, a final examination to be taken near the end of the school year.
6. Arrangements were made to field test the material in six high schools during the 1971-1972 school year.

7. All materials were duplicated and distributed to the pilot schools under the title, Work Experience Education Research for Accountability, in the Fall of 1971.

Recognizing the need for instructional materials to use with groups of students enrolled in work experience education, an application was prepared and funded late in 1971 under Part B of the Vocational Education Amendments of 1968. This publication is the result. It is divided into five chapters, each one prepared by a different project writer. The chapters provide a series of units applicable to one of the five major goals for work experience education, resources for the instructor, and worksheets which may be duplicated for student use. Pages for the instructor's use are yellow: those for students are white. The publication has been pre-punched so that it may be placed in a binder to make the worksheets readily accessible for duplication and return to the binder.

The project team agreed that the activities should be prepared for groups of about twenty-five to thirty students. They include ample opportunity for both small and large group discussion as students are assisted to explore the relevance of the school's curriculum to their present and future roles and responsibilities, grow in their understanding of self, enhance their appreciation of the importance of productive work, improve their interpersonal relationships, and finally, apply their knowledge and skills to the world of work. It is particularly appropriate that this intensive effort to improve the state's program of work experience education coincides with the emergence of nationwide interest in career education. Appropriate, since work experience education is the capstone of career education.

In addition to those cited in the ACKNOWLEDGEMENTS which follow, sincere thanks are extended to all of those who have contributed to the various projects conducted during the past three years. Two persons merit special consideration: Wes Smith, State Director of Vocational Education, who has provided his special brand of leadership to California's program of work experience education; and, Herb Ellenburg, consultant-on-leave, who gave impetus to the project from its inception.

Agnes S. Robinson
Associate Professor of Education
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EVALUATION FORM

Group Instruction for Work Experience Education

Will you please assist us in evaluating the usefulness of this guide to you and your students by completing the questionnaire below. Return it to: Allan Holmes, Consultant, Work Experience Education, California State Department of Education, 721 Capitol Mall, Sacramento 95814.

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1. How often and how long is group instruction provided for students enrolled in the following work experience education programs:

EXPLORATORY ____________ (meetings per month) ____________ (minutes per session)

GENERAL ____________ (meetings per month) ____________ (minutes per session)

VOCATIONAL ____________ (meetings per month) ____________ (minutes per session)

(Note: Circle one response for Items 2 - 6.)

2. Overall, did you find this guide of assistance to you?

SOMEWHAT USEFUL   USEFUL   VERY USEFUL

3. Would you have used the guide more extensively if students spent more time in group instruction?

NO   MAYBE   YES

4. Generally, how did your students react to the activities included in the guide for each unit?

NEGATIVELY   REACTIONS VARIED   POSITIVELY

5. Were the suggested resources of assistance to you?

NO USE   USEFUL   VERY USEFUL

6. Did you duplicate and use the forms provided for students?

NEVER   OCCASIONALLY   FREQUENTLY

7. What improvements need to be made in the guide in order to make it more useful to you and your students? What did you particularly like about the guide? Please use the reverse side for your comments.

- THANK YOU -

TABLE OF CONTENTS

CHAPTER I

THE GOAL OF RELEVANCY

GOAL 1.0 RECOGNIZE THAT THE PROCESS AND CONTENT OF THE SCHOOL'S CURRICULUM ARE RELEVANT TO CAREER REQUIREMENTS AND RESPONSIBILITIES

PROGRAM GOAL

1.1 (E, G, and V) Identify the educational goals (purposes) of the courses in which you are currently enrolled

UNIT A - OPERATION A.I.M. (Accreditation in Miniature)

Estimated Completion Time of Four 55-Minute Periods

Activities

1. Using the class discussion and lecture approach, the instructor explains the process and purpose of accreditation. In the discussion, he introduces the concept of educational goals and gives examples of typical educational goals for one or two courses in the school. At the conclusion of this activity, the students will conduct their own accreditation in miniature and determine the educational goals of a variety of courses.

2. The instructor assists the class in completing Form #1, page 3, the Operation A.I.M. Data Sheet. Additional suggestions are provided under Item 1, page 7, in the section on Resources. Each student is to complete Form #1.

3. The instructor secures four volunteers to serve as the Operation A.I.M. steering group. He assists the steering group in tabulating the courses listed by the students on their copies of Form #1 on Form #2, page 4.

4. The instructor helps the steering group to extract the major purposes of each course listed by the students and transferring them to Form #2, page 4, Operation A.I.M. Interview Sheet.

5. The instructor assigns students as nearly as possible to the A.I.M. visiting committee they have chosen. This is done after tallying their choices from Form #1 and placing them on Form #3, page 5, Operation A.I.M. Listing Sheet.

6. The instructor explains to the students the role of the A.I.M. visiting committees. He asks them to meet as a group with the respective department chairmen and to secure the major purposes of each course within each department in which one or more of the work experience education students is involved.

7. The students in each visiting committee choose their chairman by popular vote. Following this, the instructor, using the discussion method, explains to all students how the visiting committees are to secure the data they need. Emphasis is given to the manner in which the visiting committee chairman is to arrange an appointment for his committee to interview the faculty department head or his designate.

8. One or two mock interviews are conducted by a visiting committee before the entire class so that all students will become knowledgeable in how these interviews are to be conducted. Interviews should include:

    a. Introduction of committee members

    b. Explanation of purpose for the assignment

    c. Request for the three or four major purposes for each course in the department

    Courses may be limited to those listed by members of the class on their Operation A.I.M. Data Sheets.

9. Working in groups, each visiting committee tallies "What Ought To Be," a composite of students' reactions to a given course as listed on each Operation A.I.M. Data Sheet, from Form #1. This tally is done on Form #4, page 6, Operation A.I.M. Tally Sheet. Duplicate 40-50 of these.

10. Each visiting committee gives an oral report containing the following information:

    a. The major purposes of each course as reported by the department chairman or other authority (Activity 4)

    b. What ought to be the major purposes of each course as tallied on Form #4

    c. A conclusion and accreditation rating, "Outstanding," "Average," or "Below Average" for each course based upon the degree to which Form #1 and Form #2 are similar

Program Goal 1.1 - Unit A
Form #1

Operation A.I.M. Data Sheet

Student's Name ______________________ Date ______________________

Committee Desired ______________________

	A Course Title	B Why You Enrolled	C In Your Opinion, What Should Be the Major Purposes of the Course?
Period 1			
Period 2			
Period 3			
Period 4			
Period 5			
Period 6			
Period 7			
Period 8			

Program Goal 1.1 - Unit A
Form #2

Operation A.I.M. Interview Sheet

Visiting Committee

DEPARTMENT ____________________ DATE ____________________

Course ____________________

Major Purposes ____________________

Course ____________________

Major Purposes ____________________

Program Goal 1.1 - Unit A
Form #3

Operation A.I.M. Listing Sheet

Visiting Committee Assignment

DEPARTMENT ______________________ DATE __________________________

Students Volunteering for this Committee:

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________

Program Goal 1.1 - Unit A
Form #4

Operation A.I.M. Tally Sheet

"What Ought To Be"

DEPARTMENT ____________________ DATE ____________________

Course ____________________

What Ought To Be ____________________

Course ____________________

What Ought To Be ____________________

Resources

1. An excellent resource to illustrate how students should complete their Operation A.I.M. Data Sheet is included on page 4 of LAP 1.1.1 (F) by Dr. Stanger.

"Here is a sample of the way one student viewed his school program and some reasons for taking those courses. It is very simply done.

COURSE TITLE	REASONS WHY ENROLLED
History	Required by school
Phys. Ed.	Required
English	Required
Woodshop	I wanted to make some things
Math	Required
Work Experience	Counselor talked me into it

"Here is another sample. It is the way another student looked at his school program and the reason for having selected his courses. Note that he lists at least two reasons and that he slants the wording towards the employment scene. But, again, note how very simply stated.

COURSE TITLE	REASONS WHY ENROLLED
Music	I like to sing; singing interests me as a vocation
Phys. Ed.	Required, strengthen body muscles, learn cooperative team work
Typing	Learn skills needed in offices; sharpen typing speed
Social Studies	Required; emphasize history of social development
English	Required; improve 3R's skills
Work Experience	Further explore job requirements and opportunities

"Now you make a chart (similar to those above) of your own school program and list several good reasons why you are enrolled."

Resources (Continued)

2. Western Association of Schools and Colleges. Visiting Committee Handbook, Accreditation Program, Secondary Schools. Burlingame, California, 1971.

UNIT B - EDUCATIONAL GOALS REPORT

Estimated Completion Time of One-Four 55-Minute Periods

Activities

1. Using the lecture-discussion approach, the instructor defines and gives examples of an educational goal for his course(s) and for other courses in the curriculum.

2. Each student is given the assignment to interview his "first period"* teacher before school hours in order to determine the educational goals for that course, based upon information provided by the teacher. Students are to use the format given in Form #1, page 10, Interview and Oral Report Format.

3. Each student (or some, if time is of the essence) reports orally for a maximum of five minutes and shares the information which he has received from his interview.

4. Following the oral reports, ask the class to develop conclusions as to the validity and relevance of the educational goals which the teachers identified during the interviews.

---

*If more than one student has the same teacher and course for Period One, there is need for only one oral report to cover the course. All such students may collaborate on this.

Program Goal 1.1 - Unit B
Form #1

Interview and Oral Report Format

Student's Name ______________________________ Date ________________________

Title of Course ____

Name of Instructor ____

Characteristics of Students Enrolled:

high ability ☐ average ability ☐ low ability ☐ mixed ☐

Type of Course:

elective ☐ required ☐

Educational Goals: ____

____

____

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____

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UNIT C - DEBATE--RESOLVED: THE CURRICULUM IS RELEVANT

Estimated Completion Time of One 55-Minute Period

Activities

1. By means of small group discussion (5-6 students in each group), the students share their meaning of the term "relevance." The instructor may assist discussion by posing the following question: "In order for a course to be relevant, must it relate solely to past or present experiences or must it merely relate to real life situations or conditions in society?"
2. Each small group will then select a spokesman to present its point of view in a debate. The students will debate the question, "Resolved: The Curriculum Is Relevant."
3. Each side is given 10 minutes to cite reasons and examples in support of its position and 5 minutes for any rebuttal. The instructor moderates.
4. Questions from the class are directed to panel members.
5. The students in the large group vote on the winning team based upon the presentation of the most cogent reasons and examples. The instructor directs the students in a discussion as to the strengths and weaknesses of the various points of view presented.

UNIT D - COURSE GOALS: "MAN IN THE STREET"

Estimated Completion Time of One 55-Minute Period

Activities

1. The instructor sets the stage. He is an interviewer for TV station K.I.X. The students are to be the "man in the street" as they are interviewed.

2. Using a tape recorder or video recorder, the instructor interviews 10 students at random and asks the following questions:

   a. "To what extent have your teachers discussed the major goals of their courses with you?"

   b. "Are they similar to the goals you have for that course?"

   c. "If your goals and your teacher's goals for a course are not similar, justify this discrepancy."

3. The tape recordings may be shared with other members of the staff at a meeting of teachers and department chairmen.

PROGRAM GOALS

1.2 (E) Observe the activities of persons in a variety of careers and relate them to the educational goals (purposes) of elective and required courses in your school's curriculum

1.2 (G and V) Assume assigned duties and responsibilities and relate them to the educational goals (purposes) of elective and required courses in your school's curriculum

UNIT A - "NAME THE COURSE" CONTEST

Estimated Completion Time of Two-Three 55-Minute Periods

Activities

1. This activity is provided in 1.1, Unit C, Activity 1, on page 11. If the instructor did not choose that alternative, it may be appropriate here; or, he may wish to review the conclusions reached by the class if the activity was conducted.

2. The instructor introduces the contest "Name the Course." Prior to the next meeting of the class, each student is to make note of an experience which is directly related to an instructional goal of one of his classes. This experience may be one he had on the job or an occurrence he observed in a career situation.

   A typical example for the class is:

   > "As a salesclerk at J. C. Nickel Department Store, you reported for work last Monday. The manager called you into his office and congratulated you as the winner of the Accuracy Award for the month. You were the only clerk who had not made an error in totaling a sales check for the entire month.
   >
   > "You recall that your Senior Math teacher had stated in September that an instructional goal in her class is that all students will develop accuracy in the four basic arithmetic processes by the end of the year.
   >
   > "You conclude that this goal has certainly been relevant to your job experience."

3. The instructor divides the class into two teams and explains the rules for the contest "Name the Course" as follows:

   > "Each team takes turns as a member relates either an experience or observation on the job which was directly related to an

instructional goal in one of his classes. Members of the other team will guess the title of the course being related or described. Five points are awarded to the guessing team if the first guess is correct, three points if it takes two guesses, and one point if three guesses are needed. No points are given if more than three guesses are necessary.

"Five points are subtracted for each student on a team who cannot relate an experience or observation. At the end of the period, the team with the highest point total wins. The "Name the Course" Score Sheet on page 15 may be used to tally the responses of each team. The instructor will keep score; therefore, one copy per class is sufficient."

"Name the Course" Score Sheet

TEAM A		TEAM B	
Student # - Presentation	Correct Guess (5, 3, 1)	Student # - Presentation	Correct Guess (5, 3, 1)
1.		1.	
2.		2.	
3.		3.	
4.		4.	
5.		5.	
6.		6.	
7.		7.	
8.		8.	
9.		9.	
10.		10.	
11.		11.	
12.		12.	
13.		13.	
14.		14.	
15.		15.	
16.		16.	
17.		17.	
18.		18.	
19.		19.	
20.		20.	
Total:		Total:	
Subtract five points for each student who did not relate an experience:		Deductions:	
GRAND TOTAL		GRAND TOTAL	

UNIT B - THE CLASS PLANS A WORK EXPERIENCE EDUCATION COURSE

Estimated Completion Time of One-Three 55-Minute Periods

Activities

1. The instructor explains that the class is going to plan a work experience education course that is relevant to their needs. He indicates that in planning the course the format will be provided in Form #1, page 17, Course Plan for Work Experience Education. Each student will be provided with a copy of the form.

2. Discussion is led by the instructor. Students contribute those factors which they feel should be considered in planning a course, including the relevance of a topic to the students' needs.

3. The instructor then asks each student to determine from his career sponsor those skills, duties, and responsibilities which are important for success in the trainee assignment and approximately how long each would take to learn.

4. Students secure the data requested in Activity 3 and enter it on Form #2, page 18, Sponsor Interview Sheet. Duplicate one copy for each student.

5. Each student completes a Sponsor Interview Sheet, including "Suggested Topics For Work Experience Education Course."

6. The instructor, using the Course Plan For Work Experience Education, Form #1, page 17, requests each student to suggest a topic (one that has not already been given by another pupil), the reason for the suggestion, and a suggested time allotment. The students' oral responses may be taken from their findings which have been recorded on Form #2.

7. Students are then asked to complete and expand upon the following sentence. "I feel that this course would be relevant to me because it would enable me, as well as others in the course, to . . . "

Program Goal 1.2 - Unit B
Form #1

Course Plan For Work Experience Education

Student's Name ______________________ Date ______________

Topic	Time Allotment

Program Goal 1.2 - Unit B
Form #2

Sponsor Interview Sheet

Student's Name ____________________ Date ____________________

Name of Sponsor ____________________

Title of Trainee Assignment ____________________

Major Skills ____________________

____

____

____

____

Major Duties ____________________

____

____

____

____

Major Responsibilities ____________________

____

____

____

____

Suggested Topics for Work Experience Education Course Which Are Relevant to the Skills, Duties, and Responsibilities Listed Above:

____

____

____

____

____

____

UNIT C - PANEL DISCUSSION: WHAT IS RELEVANCE?

Estimated Completion Time of One-Two 55-Minute Periods

Activities

1. With the instructor as moderator, the following question is discussed: "What is relevance?" The instructor writes this topic on the chalkboard and explains it briefly, answering any general questions which may arise.

2. The instructor chooses six groups, three groups of students to prepare for each side of the discussion. Each group meets within the time allowed for preparation of arguments.

3. A student from each group is selected as its representative to the panel. In effect, then, there is to be three members discussing each side of the topic.

4. Following a ten-minute preparation period for the six selected representatives, the panel discussion is held, with each side presenting its views.

5. Upon completion of the panel discussion and using the ideas presented, the instructor guides the class in the formulation of its own definition of "relevance." The instructor may also expand this discussion to illustrate how this definition applies to the student's social world as well as to his scholastic world.

UNIT D - FIND THE COMMON TRAITS

Estimated Completion Time of One 55-Minute Period

Activities

1. Each student in class makes a three-minute maximum, oral presentation and lists on the chalkboard the two major responsibilities and two major duties of his job.

2. The instructor tries to avoid duplication as much as possible as the list grows.

3. Once the lists are completed, the instructor asks for several definitions by students of the word "trait." These definitions are then compared to that of a standard dictionary. Using the dictionary definition, the class volunteers traits which are important in assuming the duties and responsibilities listed.

4. Under the leadership of the instructor, the class compiles a master list of traits which are common to at least three duties or three responsibilities on the list. Examples might be honesty, dependability, punctuality, maturity, etc.

5. The instructor leads a class discussion on the degree to which courses in school enable the student to develop the traits named. If students feel courses do not adequately contribute to the development of desirable traits, the discussion should also include what could be done to the school curriculum and by the student himself to counterbalance this shortcoming.

PROGRAM GOALS

1.3 (E) Identify required and elective courses in the school's curriculum which are relevant to career requirements and responsibilities of careers which are of interest to you

1.3 (G) Analyze and compare duties and responsibilities which are important to various careers and to required and elective courses in the school's curriculum which are of interest to you

1.3 (V) Assume assigned duties and responsibilities and improve on-the-job performance through related in-school instruction

UNIT A - RELEVANT COURSE CONTEST

Estimated Completion Time of One 55-Minute Period

Activities

1. Using the lecture and discussion method, the instructor cites examples of two or three typical careers to which the students might aspire, e.g., airline stewardess, teacher, model and gives examples of a major duty and a major responsibility associated with each.

2. The instructor then prepares students for a contest to determine the most relevant course they have taken, or are taking in school.

3. To provide data for the contest, students complete Form #1, page 22, Relevant Course Form. Duplicate one for each work experience education student. On this form students indicate the career of greatest interest to them, the major duties and responsibilities of that career, and the courses which have given them the most relevant training.

4. The instructor selects three students who tabulate the results of the last item on Form #1, giving five points for a first choice and three points for a second choice. On the basis of five points for a first place choice and three points for a second place choice, scores are tallied.

5. Results and contest winners are announced at the next class meeting.

6. After the winners are announced, the instructor makes provision for students to discuss the reasons for their selections.

Program Goal 1.3 - Unit A
Form #1

Relevant Course Form

Student's Name ______________________________ Date __________________________

Name the career that is of greatest interest to you:

____

Identify two major duties and two major responsibilities of a person in that career:

Duties

1. ____
____
2. ____
____

Responsibilities

1. ____
____
2. ____
____

Of the high school courses you have taken or are presently taking, name two which have contributed most in preparing you for the duties and responsibilities of the career you have named.

(5 points) 1st choice ____

(3 points) 2nd choice ____

UNIT B - INSTRUCTIONAL APPROACHES TO TEACHING SKILLS AND RESPONSIBILITIES

Estimated Completion Time of One-Two 55-Minute Periods

Activities

1. The instructor explains to the class that the purpose of this unit is for each student to share with the class those instructional approaches used by his teachers which he found helpful in learning a skill or responsibility that he needed for his job.

2. The instructor explains what is meant by an instructional approach; such as lecture, demonstration, debate, film, etc. He gives examples and discusses these with the class. He includes reasons why one approach might be more effective in certain learning situations and other approaches more appropriate in different situations. This can be done through inquiry based on the student's observations.

3. Each student takes his turn: (1) naming the skill or responsibility, and (2) within three minutes describing or role playing the instructional technique used in one of his classes which helped him learn that skill or responsibility.

UNIT C - PANEL DISCUSSION: SCHOOL HELPS TO PREPARE FOR THE WORLD OF WORK

Estimated Completion Time of One-Two 55-Minute Periods

Activities

1. During a class meeting prior to this one, the following discussion topic was given: "School is helpful in providing students with the skills and responsibilities needed in the work-a-day world."
2. Half of the class is assigned the pro and half the con side of the topic. After the assignments are made the two groups meet and discuss arguments, pro and con, and attempt to reach some conclusions.
3. Each team selects its own chairman for discussion, a recorder, and one additional spokesman.
4. With the instructor as moderator, each side takes 15 minutes to present its case (five minutes for each spokesman).
5. At the conclusion, the audience (rest of the class) is given the opportunity to make statements citing personal examples of how school is or is not helpful in providing students with the skills and responsibilities necessary for work.
6. Finally, the audience votes on the superior position and arguments.

UNIT D - CONTEST: "NAME THE JOB"

Estimated Completion Time of One-Two 55-Minute Periods

Activities

1. The instructor sets the stage for this assignment and contest. He asks each student to interview his work experience education sponsor in order to determine the most important duty and also the most important responsibility in a job title with which the sponsor is familiar; e.g., if the sponsor is head of the Housewares Department in a large store, the student might ask for the most important duty and responsibility of a clerk in the Housewares Department.

2. The instructor asks each student to record the information on Form #1, page 26, making two copies and submitting one copy to the instructor prior to the contest. Duplicate two copies of Form #1 for each student.

3. The class is divided into two sides. Each side selects a member who provides an M.I.D. (most important duty) and an M.I.R. (most important responsibility). Members of the opposing side are given 30 seconds to guess the job title referred to which requires the duty and responsibility named. A correct guess gives the guessing side one point and the side with the most points at the end of the period wins.

4. The instructor keeps score on the chalkboard.

Program Goal 1.3 - Unit D
Form #1

Sponsor Interview Sheet

Student's Name ______________________________ Date ________________________

Name of Person Interviewed ____

Job Title ____

Most Important Duty ____

____

____

____

____

____

____

____

Most Important Responsibility _____________________________________

____

____

____

____

____

____

____

UNIT E - CROSSWORD PUZZLE GAME

Estimated Completion Time of One 55-Minute Period

Activities

1. The instructor prepares an overhead projection (transparency) of the crossword puzzle provided on page 28.

2. He explains the game procedure as follows:

   > "On the screen is the crossword puzzle which we will try to complete. Raise your hand if you have an answer to fill in. If you are correct, you receive one point. The student with the most points by the time the puzzle is completed wins."

3. The instructor hands out the page of game "clues" given in Form #1, page 29. Duplicate one for each student. One student is selected to stand in front of the class and keep score.

4. As the correct answers are given the instructor fills them in with a felt pen, directly on the transparency.

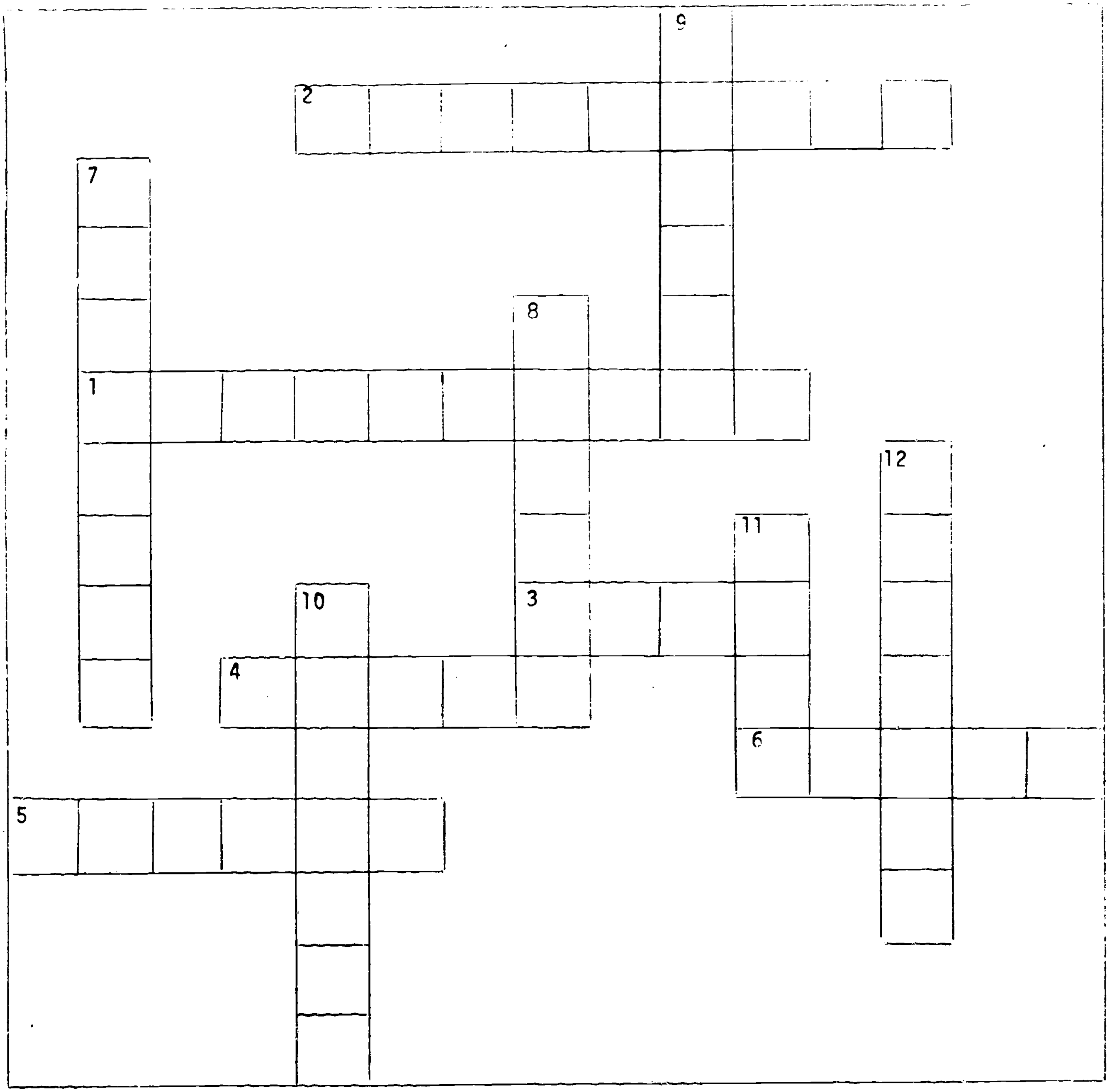
5. After the puzzle is completed, a winner is declared.

6. Using the discussion method, the instructor elicits the five basic qualities treated in the puzzle which aid all employees in successfully assuming their duties and responsibilities. The five major qualities include:

   a. Punctuality
   b. Confidence
   c. Poise
   d. Loyalty
   e. Honesty

   The keys to the Crossword Puzzle Diagram are provided on pages 30 and 31.

Crossword Puzzle Diagram



Crossword Puzzle Game

ACROSS:

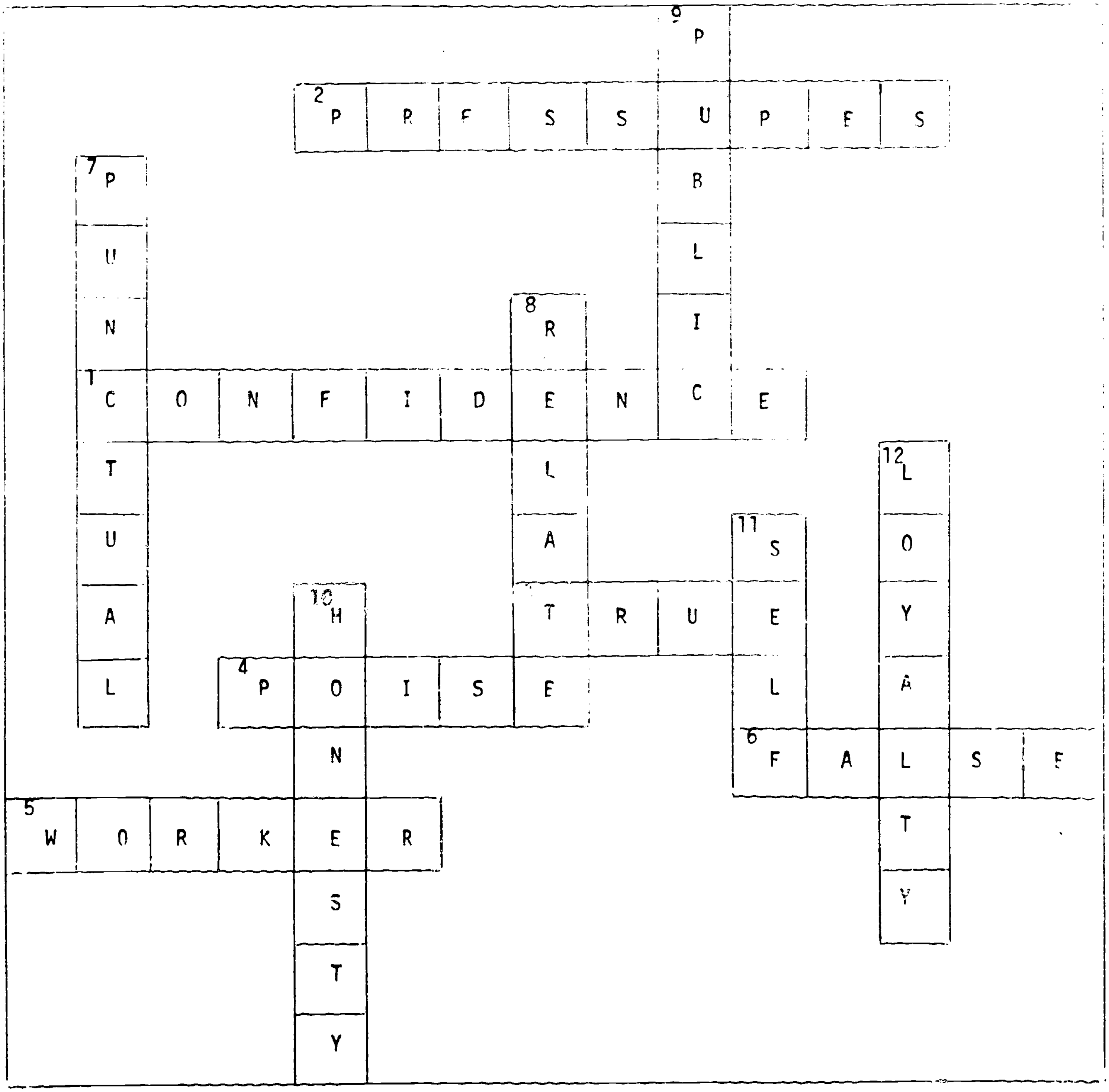
1. Having ________________ in yourself is the first big step toward assuming your duties and responsibilities successfully.
2. Try to lessen your employer's __________________, not create them.
3. True or False: Since your employer is more experienced than you, if he tells you to do something a certain way - DO IT!
4. Try to retain a degree of __________________ no matter what the situation.
5. An employer wants a ________________, not just an employee.
6. True or False: If you make good money, your work will be enjoyable.

DOWN:

7. A person's attitude toward his employer and his job is reflected in his arrival time at work. Be ___________________.
8. ___________________ to those around you.
9. You must have rapport with the ___________________ you serve.
10. An employer wants a person whose __________________ is unquestioned; someone he can trust.
11. __________________-improvement in the basic skills will often make your work more enjoyable as well as more efficient.
12. Demonstrate your __________________ to your boss by letting him know that you are on his side.

Key

Crossword Puzzle Diagram



Key

Crossword Puzzle Game

ACROSS:

1. Having confidence in yourself is the first big step toward assuming your duties and responsibilities successfully.
2. Try to lessen your employer's pressures, not create them.
3. True or False: Since your employer is more experienced than you, if he tells you to do something a certain way - DO IT! (True)
4. Try to retain a degree of poise no matter what the situation.
5. An employer wants a worker, not just an employee.
6. True or False: If you make good money, your work will be enjoyable. (True)

DOWN:

7. A person's attitude toward his employer and his job is reflected in his arrival time at work. Be punctual.
8. Relate to those around you.
9. You must have rapport with the public you serve.
10. An employer wants a person whose honesty is unquestioned; someone he can trust.
11. Self-improvement in the basic skills will often make your work more enjoyable as well as more efficient.
12. Demonstrate your loyalty to your boss by letting him know that you are on his side.

UNIT F - ANAGRAM MESSAGE GAME

Estimated Completion Time of One 55-Minute Period

Activities

1. The instructor prepares an overhead projection (transparency) of the anagram message shown on the following page.

2. Without any preliminary discussion about the nature of the possible message contained in the game, the instructor explains the game procedure in the following manner:

   "On the screen is the Anagram Message Game which we will try to complete. Raise your hand if you have an answer to contribute. If you are correct you receive one point per letter. Keep your own scores, and the student with the most points by the time the game is completed wins."

3. The instructor hands out the game clues provided in Form #1, page 34. Duplicate one for each student.

4. As the correct answers are given, the instructor fills them in with a felt pen directly on the transparency.

5. After the game is completed, a winner is declared.

6. Using the discussion method, the instructor encourages the students to agree or disagree with the game answers.

The keys to the Anagram Message Game are provided on pages 35 and 36.

Anagram Message Game

(Remember, the solution is a hint about your future.)

1	2	3	4	■	5	6	7	8	9	■	10	11	12
				13	14	15	16	■					
				17	18	19	20	21	22	■			
		23	24	25	26	27	28	■	29	30	■		
				31	32	33	34	35	■				
					36	37	38	■					
		39	40	41	42	43	44	45	46	47	48	■	
					49	50	51	■					
		52	53	54	55	56	57	58	59	60	61	■	

Program Goal 1.3 - Unit F
Form #1

Anagram Message Game Clues

1. When selecting $\overline{49}$ possible future career, keep these three things in mind: your wants, your needs, and your $\overline{3}\ \overline{23}\ \overline{32}\ \overline{2}\ \overline{29}\ \overline{19}\ \overline{36}$.

2. Don't waste valuable time, make sure your $\overline{7}\ \overline{10}\ \overline{31}\ \overline{58}\ \overline{42}\ \overline{30}\ \overline{35}$ are relevant.

3. Stick with your convictions, even if they are $\overline{15}\ \overline{4}\ \overline{56}\ \overline{37}\ \overline{44}\ \overline{18}\ \overline{57}\ \overline{5}\ \overline{46}$ at the time.

4. Try to be $\overline{6}\ \overline{45}\ \overline{1}\ \overline{41}\ \overline{59}$ in your career for you may work in it $\overline{8}$ long time.

5. Do you think that $\overline{55}\ \overline{11}\ \overline{53}\ \overline{22}\ \overline{13}$ should be the all-important guideline in selecting a career?

6. Check with your counselor to find what classes you $\overline{50}\ \overline{24}\ \overline{28}\ \overline{9}$ to take.

7. According to $\overline{25}\ \overline{16}\ \overline{54}\ \overline{52}\ \overline{61}$ and others, your work reflects your personality.

8. Your $\overline{39}\ \overline{33}\ \overline{17}\ \overline{14}\ \overline{20}\ \overline{40}\ \overline{51}\ \overline{43}\ \overline{48}$ actions now may show up later.

9. Unfortunately, you cannot $\overline{26}\ \overline{21}\ \overline{34}\ \overline{60}\ \overline{12}$ your future. Be prepared for changes.

10. Consult those who may know what is wise because to $\overline{27}\ \overline{38}\ \overline{47}$ the decisions you make does not change them.

1887

Key

Anagram Message Game

(Remember, the solution is a hint about your future.)

P 1	L 2	A 3	N 4	■	A 5	H 6	E 7	A 8	D 9	■	F 10	O 11	R 12
				Y 13	O 14	U 15	R 16	■					
				F 17	U 18	T 19	U 20	R 21	E 22	■			
		B 23	E 24	F 25	O 26	R 27	E 28	■	I 29	T 30	■		
				F 31	I 32	N 33	D 34	S 35	■				
					Y 36	O 37	U 38	■					
		U 39	N 40	P 41	R 42	E 43	P 44	A 45	R 46	E 47	D 48	■	
					A 49	N 50	D 51	■					
		U 52	N 53	E 54	M 55	P 56	L 57	O 58	Y 59	E 60	D 61	■	

Key

Anagram Message Game

1. When selecting $\underset{49}{\underline{A}}$ possible future career, keep these three things in mind: your wants, your needs, and your $\underset{3}{\underline{A}}\ \underset{23}{\underline{B}}\ \underset{32}{\underline{I}}\ \underset{2}{\underline{L}}\ \underset{29}{\underline{I}}\ \underset{19}{\underline{T}}\ \underset{36}{\underline{Y}}$.

2. Don't waste valuable time, make sure your $\underset{7}{\underline{E}}\ \underset{10}{\underline{F}}\ \underset{31}{\underline{F}}\ \underset{58}{\underline{O}}\ \underset{42}{\underline{R}}\ \underset{30}{\underline{T}}\ \underset{35}{\underline{S}}$ are relevant.

3. Stick with your convictions, even if they are $\underset{15}{\underline{U}}\ \underset{4}{\underline{N}}\ \underset{56}{\underline{P}}\ \underset{37}{\underline{O}}\ \underset{44}{\underline{P}}\ \underset{18}{\underline{U}}\ \underset{57}{\underline{L}}\ \underset{5}{\underline{A}}\ \underset{46}{\underline{R}}$ at the time.

4. Try to be $\underset{6}{\underline{H}}\ \underset{45}{\underline{A}}\ \underset{1}{\underline{P}}\ \underset{41}{\underline{P}}\ \underset{59}{\underline{Y}}$ in your career for you may work in it $\underset{8}{\underline{A}}$ long time.

5. Do you think that $\underset{55}{\underline{M}}\ \underset{11}{\underline{O}}\ \underset{53}{\underline{N}}\ \underset{22}{\underline{E}}\ \underset{13}{\underline{Y}}$ should be the all-important guideline in selecting a career?

6. Check with your counselor to find what classes you $\underset{50}{\underline{N}}\ \underset{24}{\underline{E}}\ \underset{28}{\underline{E}}\ \underset{9}{\underline{D}}$ to take.

7. According to $\underset{25}{\underline{F}}\ \underset{16}{\underline{R}}\ \underset{54}{\underline{E}}\ \underset{52}{\underline{U}}\ \underset{61}{\underline{D}}$ and others, your work reflects your personality.

8. Your $\underset{39}{\underline{U}}\ \underset{33}{\underline{N}}\ \underset{17}{\underline{F}}\ \underset{14}{\underline{O}}\ \underset{20}{\underline{U}}\ \underset{40}{\underline{N}}\ \underset{51}{\underline{D}}\ \underset{43}{\underline{E}}\ \underset{48}{\underline{D}}$ actions now may show up later.

9. Unfortunately, you cannot $\underset{26}{\underline{O}}\ \underset{21}{\underline{R}}\ \underset{34}{\underline{D}}\ \underset{60}{\underline{E}}\ \underset{12}{\underline{R}}$ your future. Be prepared for changes.

10. Consult those who may know what is wise because to $\underset{27}{\underline{R}}\ \underset{38}{\underline{U}}\ \underset{47}{\underline{E}}$ the decisions you make does not change them.

CHAPTER II

THE GOAL OF SELF-ACTUALIZATION

GOAL 2.0 APPRECIATE THE IMPORTANCE OF WORK TO PERSONAL FULFILLMENT AND TO GROWING INDEPENDENCE AND MATURITY

PROGRAM GOAL
2.1 (E, G, and V) Examine the concept of man's basic need for productive work in order to achieve personal fulfillment

UNIT A - WHAT ARE MAN'S BASIC NEEDS?

Estimated Completion Time of Three 50-Minute Periods

Activities

The objective of these three group-learning periods is to involve the students in a discussion of man's basic needs to promote awareness, understanding, and appreciation of these basic needs.

1. The instructor provides a period to discuss man's basic needs. Some examples of these follow:

   a. Good physical health

   b. Sound mental health

   c. A balanced diet

   d. A comfortable home

   e. Satisfying productive work

   f. Pleasurable use of leisure time

   g. Feel needed by others

   h. Regular physical exercise

   i. Avoid idleness and boredom

   j. Develop many good friendships

   k. Be a good parent

   l. Be a good citizen

   m. Develop and enjoy a sense of humor

2. The instructor selects a student from the class to list on the chalkboard the basic needs of man that the class identifies as important during the discussion.

3. Divide the class into discussion groups of five and have each group select a chairman. The chairman will report for his/her group upon the completion of this activity. Each group should determine, list, and rank in order of importance its:

   a. Basic needs now

   b. Basic needs five years from now

   c. Explain reasons for the differences or changes in a. and b. if there are any

4. Have each chairman from the small groups record on the chalkboard the results of a. and b. for his/her group and verbally report to the class the results of c. above.

5. Encourage members of the class to "challenge" and discuss the findings and conclusions of each group as recorded and reported.

6. The instructor, in summary, should make an effort to record on the chalkboard a consensus of the reports from the groups. Class discussion and a "show of hands" should help in determining a final overall class consensus of:

   a. Basic needs now

   b. Basic needs five years from now

   c. Differences and changes in a. and b.

UNIT B - PRODUCTIVE WORK AND PERSONAL FULFILLMENT

Estimated Completion Time of Three-Four 50-Minute Periods

Activities

The objective of these group-learning periods is to enable the student to appreciate the importance and relationship of being a productive worker to his/her own personal fulfillment and to recognize these factors as an acceptable "sign" of maturity.

1. The instructor provides a period to discuss the importance of personal fulfillment to each individual.

   a. Some examples of personal fulfillment needs are:

      (1) Social needs

         -Develop good friendships
         -Be a good citizen
         -Be entertained (movies, TV, sports, etc.)
         -Be with people often
         -Engage in conversation

      (2) Psychological needs

         -Be free from anxieties and fears
         -Feel self-confident
         -Feel needed by others
         -Have a positive self-image

      (3) Economic needs

         -Do satisfying productive work
         -Develop thrifty habits
         -Have a comfortable home
         -Acquire the comforts of life

      (4) Physical needs

         -Be in good physical health
         -Exercise regularly
         -Develop and maintain all the physical senses (sight, hearing, taste, etc.)

2. Ask the class to name some of the things that enable them to enjoy personal fulfillment. The instructor lists these characteristics of personal fulfillment on the chalkboard.

3. Duplicate and distribute the Student Survey of Needs, Form #1 on page 42 to each student. Have the students fill out the form and discuss their answers in class. The instructor can appoint two recorders to compile a consensus of the individual reports and present the results to the class.

4. The instructor should discuss the importance of being a productive worker' and the personal fulfillment one enjoys from productive work. The lists developed in Activities 1 and 3 can be used to support this important relationship.

5. Ask the class to identify the characteristics of a productive worker through class discussion. Some characteristics of a productive worker are job knowledge, work output, judgment, reliability, adaptability, perseverance, consistent quality of work, ability to think, ability to make decisions, awareness, and job planning.

6. Select a student to list the characteristics of a productive worker on the chalkboard as identified by the students during the discussion in Activity 5.

7. Divide the class into groups of four for the following role-playing activity:

    a. Each group should identify two members of its group to play the role of supervisors who will serve as counselors to nonproductive workers.

    b. Each group should select two members of its group to play the role of nonproductive workers. They will be counseled by the supervisor/counselor.

    c. Each group will identify characteristics of nonproductive workers and counseling techniques to be used to make the nonproductive worker improve and realize the personal fulfillment gained from being a productive worker. (The knowledge and experiences gained in Activities 1-6 can be utilized here.)

    d. Each group will rehearse its roles (two teams of a nonproductive worker and a counselor).

8. Each group should present its "role-playing" activity to the other members of the class.

9. Class reactions and discussion.

10. The instructor should summarize the entire lesson by reviewing the knowledge and attitudes gained from the activities in Unit A and Unit B.

    a. Examples of man's basic needs

    b. Students' basic needs now and in the future and how and why they change

    c. Examples of personal fulfillment needs, their importance, and how individual personal fulfillment needs change through the years

    d. Characteristics of a productive worker

    e. The importance of being a productive worker in order to achieve personal fulfillment

Program Goal 2.1 - Unit B
Form #1

Student Survey of Needs

Student's Name ______________________ Date ______________

Listed below are some typical needs of both adults and teenagers. They are based on what a group of teenagers reported as typical needs. There are probably others that you feel are important too. Add them to the list. Then rank the needs in importance to you now, 5 years from now, 10 years from now, and 20 years from now.

	Rank in Importance (use numbers 1 through 13)			
	Now	5 Years From Now	10 Years From Now	20 Years From Now
Independence				
Money				
Education				
Responsibility				
Family				
Honesty				
Health				
Opinion of Others				
Prestige and Recognition				
Helping Others				
Creativity				
Immediate Pleasure				
Personal and Social Relationships				
Other:				

PROGRAM GOALS

2.2 (E) Identify several careers which could provide you with personal fulfillment

2.2 (G and V) Give evidence of having achieved a degree of personal fulfillment through productive work

Although the outcomes for Program Goals 2.2 are different for Exploratory Work Experience Education students and General and Vocational Work Experience Education students, there is enough similarity and educational value in the basic concept of the relationship of careers to personal fulfillment and productive work that all students can benefit from Units A, B, C, and D on the pages which follow. Therefore, if the class meets in one section, it is not necessary to regroup the students for the activities prepared to achieve the instructional goals.

UNIT A - WHAT IS A CAREER?

Estimated Completion Time of Two 50-Minute Periods

Activities

1. The instructor provides a period to discuss and arrive at a class consensus of a definition of the word "career." (Webster's provides the following definition: "One's progress through life; one's advancement or achievement in a particular vocation; hence, a life work; profession; occupation.")[1]
2. Ask the students to identify a career they have observed at their Work Experience Education stations. Write these on the chalkboard.
3. Select a student to record the information on the chalkboard that will be generated in Activity 4.

---

[1] Webster's New World Dictionary of the American Language, College Edition (Cleveland and New York: The World Publishing Company, 1968), p. 220.

4. Ask the class to identify five careers that:

   a. Were in existence five years ago but are not in existence today.

   b. Are in existence today but may not be in existence five years from now.

   c. Are not in existence today but may be in existence five years from now.

5. Using the information recorded on the chalkboard during Activity 4, the instructor and the class should analyze the importance of student investigation and identification of many careers before selecting a career, using the following guidelines:

   a. Economic

   b. Social

   c. Psychological

   d. Qualifications for specific jobs

   e. Interest

6. The instructor and class should discuss ways to "explore" career choices, such as:

   a. Work Experience Education Programs; Exploratory, General, and Vocational

   b. Discussions with parents, friends, employees, and employers

   c. Guest speakers

   d. Field trips

7. The instructor should arrange for guest speakers who represent several careers to address the class. Survey the class and determine the type of speakers they would like to hear.

8. The instructor could encourage students to tell their classmates about their own on-the-job experiences.

UNIT B - Do You Have A Career "ID"?
(ID = Identification)

Estimated Completion Time of One-Two 50-Minute Periods

Activities

1. The instructor should review the following content covered in Unit A:

    a. What is a career?

    b. The importance of selecting a career

    c. Interesting comments by guest and student speakers

2. The instructor duplicates and distributes the Career ID, Form #1 on pages 46 and 47, to each student.[2]

3. Ask the students to place a number, 1-10, in the spaces provided on the margin of the form to rank their interests, fill in the space below each interest area to indicate his/her specific interest, and then state the reason for their interest in the preferred career.

4. Ask the students to report their 1, 2, and 3 rankings, career preference, and reasons for selecting these careers.

5. Ask the students if they feel their rankings or interest level will change during the next five years, ten years, and the reasons why these changes might occur.

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[2] Grady Kimbrell and Ben S. Vineyard, Succeeding in the World of Work (Illinois: McKnight & McKnight Publishing Company, 1970), pp. 114-115.

Program Goal 2.2 - Unit B
Form #1

Career ID

Student's Name ______________________ Date ______________

My Ranking

______ 1. OUTDOOR interest means that you prefer work that keeps you outside most of the time and usually deals with animals and growing things. Forest rangers, naturalists, and farmers are among those with high outdoor interests.

My career preference in this field is ______________

because ______________________

____

______ 2. MECHANICAL interest means you like to work with machines and tools. Jobs in this area include automobile repairmen, watchmakers, drill press operators, and engineers.

My career preference in this field is ______________

because ______________________

____

______ 3. COMPUTATIONAL interest means you like to work with numbers. A high score in this area suggests that you might like such jobs as bookkeeper, accountant, or bank teller.

My career preference in this field is ______________

because ______________________

____

______ 4. SCIENTIFIC interest means that you like to discover new facts and solve problems. Doctors, chemists, nurses, engineers, radio repairmen, aviators, and dietitians usually have high scientific interests.

My career preference in this field is ______________

because ______________________

____

Career ID (Continued)

My Ranking

__________ 5. PERSUASIVE interest means that you like to meet and deal with people and to promote projects or things to sell. Most actors, politicians, radio announcers, authors, salesmen, and store clerks have high persuasive interests.

My career preference in this field is __________________

because ______________________________________

____

__________ 6. ARTISTIC interest means you like to do creative work with your hands. It is usually work that has "eye appeal" involving attractive design, color, and materials. Painters, sculptors, architects, dress designers, hairdressers, and interior decorators all do "artistic" work.

My career preference in this field is __________________

because ______________________________________

____

__________ 7. LITERARY interest shows that you like to read and write. Literary jobs include novelist, historian, teacher, actor, news reporter, editor, drama critic, librarian, and book reviewer.

My career preference in this field is __________________

because ______________________________________

____

__________ 8. MUSICAL interest shows you like going to concerts, playing instruments, singing, or reading about music and musicians.

My career preference in this field is __________________

because ______________________________________

____

__________ 9. SOCIAL SERVICE interest indicates a preference for helping people. Nurses, Boy or Girl Scout leaders, vocational counselors, tutors, ministers, personnel workers, and hospital attendants spend much of their time helping other people.

My career preference in this field is __________________

because ______________________________________

____

Career ID (Continued)

My Ranking

__________10. CLERICAL interest means you like office work that requires precision and accuracy. Jobs such as bookkeeper, accountant, file clerk, salesclerk, secretary, statistician, and traffic manager fall in this area.

My career preference in this field is ____________________

because ____

____

UNIT C - CAREERS AND GAMES!

Estimated Completion Time of Two 50-Minute Periods

Activities

1. The instructor should review the ten areas of interest listed on the Career ID form (Unit B, Activity 2).
2. The instructor then divides the class into teams of four students each.
   a. The instructor writes his first and last name (can include Mr., Mrs., or Ms.) on the chalkboard.
   b. The members of each team write down as many careers as they can by using one letter from each name as the first letter of each career title.
   c. After an appropriate length of time, the teams should report their career titles to the class and the total number of careers listed.
   d. If time permits, play the game again, using the name of the principal, the high school, or the title, Work Experience Education.
3. If time permits, the careers can be listed on the chalkboard to illustrate the variety of careers identified during the game.

UNIT D - CAREERS AND PERSONAL FULFILLMENT

Estimated Completion Time of Three 50-Minute Periods

Activities

1. The instructor should review with the students the concept developed in Program Goal 2.1, Unit B, regarding the relationship of personal fulfillment to productive work.

2. Duplicate and distribute the Student Job/Career Information, Form #1 on page 51, to each student. Have them fill out the form prior to classroom discussion.

3. The instructor should ask each student to report his/her responses on the form to the class.

4. Opportunity should be given students to ask questions and seek information from those reporting.

5. The instructor should list Items 4 and 5 of the Student Job/Career Information form on the chalkboard and illustrate the relationship of "job duties and responsibilities" (productive work) with "things that I enjoy doing most on the job" (personal fulfillment).

6. Activity 5 will provide the instructor with an opportunity to demonstrate that there is a relationship between careers, productive work, and personal fulfillment.

Program Goal 2.2 - Unit D
Form #1

Student Job/Career Information

Student's Name ______________________________ Date ________________

1. My employer is ____
   (G and V) (Name of Company)

   ____
   (E) (At my Career Station)

2. Type of business ____

3. My job title ____

4. My job duties and responsibilities (productive work) are::

   ____

   ____

   ____

   ____

   ____

   ____

5. Things I enjoy doing most on my job (personal fulfillment) are:

   ____

   ____

   ____

   ____

   ____

   ____

PROGRAM GOALS

2.3 (E) Understand the relationship between work and growing independence and maturity

2.3 (G and V) Demonstrate growth in independence and maturity

Although the outcomes for Program Goal 2.3 are somewhat different for Exploratory Work Experience Education students and General and Vocational Work Experience Education students, there is enough similarity in the underlying concept of the program goals that all students can benefit from Units A, B, C, and D, which follow. Therefore, if the class meets in one section, it is not necessary to regroup the students.

UNIT A - WORK, INDEPENDENCE, MATURITY, AND ME

Estimated Completion Time of Three 50-Minute Periods

Activities

1. The instructor leads a class discussion on the relationship between work and growing independence and maturity. Questions which might be directed to the class follow:

    a. What is "work"?

    b. What is "growing independence"?

    c. What is "maturity"?

    d. Are the above related? How?

    e. Give a few examples of a, b, and c, and their relationship to the student's Work Experience Education assignment.

2. The instructor duplicates and distributes the Job Inventory, Form #1 on page 54, to each student. Have them fill out the form prior to class discussion.

3. Upon completion of the Job Inventory form, ask the students to share their answers with the class. Encourage student discussion, reactions, and comparisons of job duties and responsibilities, their contributions to growing independence and maturity, and note the changes in jobs, duties, and responsibilities with age and grade. (If there were no changes, why?)

4. The instructor should select two students to list the answers generated by the class discussion in Activity 3 on the chalkboard.

5. Have the class rank the results of Activity 4, by hand vote, in order of importance.

6. Divide the class into groups representing grade levels; i.e., 9th grade, 10th grade, 11th grade, and 12th grade. Have each group select one person to represent the group in a panel discussion to be held in class. The topic of the panel discussion will be "Independence and Maturity on the Job." Does grade in school make a difference? Defend answer. Each panel member will have five minutes for presentation. The class can respond to each presentation for an additional five minutes. (The instructor can adjust numbers in each grade group, if necessary.)

7. After appropriate preparation time, conduct Activity 6. The instructor should act as the moderator during the panel presentations and class responses.

8. Upon completion of the panel presentations and class responses, the instructor should lead the class in an overall discussion of the material presented.

   a. By a hand vote in the class, determine a consensus "answer" to the panel discussion question.

   b. List on the chalkboard the characteristics generated by the discussion that the class feels are important signs of independence and maturity.

ram Go 2.3 - Unit A
#1

JOB INVENTORY

Student's Name ______________________ Date ______________________

1. My present employer is ______________________
(G and V) (Name of Company)
____
(E) (At my Career Station)

2. Type of business of my employer ______________________

3. My job title is ______________________

4. I am enrolled in the ______________________ Work Experience Education Program.

5. List below the number of different jobs (pay or non-pay) you have had since the ninth grade. Identify things you did on the job that helped you to develop independence and maturity as a person.

Grade	Employer	My Job	Weeks on Job	Things I Did on the Job That Helped Me to Develop:	
				Independence	Maturity

6. From the above list, select three of the most important job experiences you have had to develop independence and three of the most important job experiences to develop maturity. Write them below.

Independence	Maturity

7. From your chart above, can you see growth in your "job independence" and "job maturity"? ______________________

What or who has been responsible for this growth? ______________________

UNIT B - INDEPENDENCE, MATURITY, AND ME

Estimated Completion Time of Four 50-Minute Periods

Activities

1. The instructor commences this unit by summarizing, through class discussion, the following material discussed in Unit A.

   a. What is independence on the job?

   b. How do we demonstrate independence on the job?

   c. How do we "convince" our supervisor that we deserve more independence on the job?

   d. What develops our maturity on the job?

   e. How do we demonstrate maturity on the job?

   f. How do we "convince" our supervisor that we have become more mature by working on the job and, therefore, would like to have opportunities to accept more mature responsibilities?

2. The instructor duplicates and distributes the <u>Student Inventory</u>, Form #1 on page 57, to each student. Have the students fill out the form prior to class discussion.

3. The instructor selects four students to record student responses to the following on the chalkboard:

   a. Student experiences on the job that enabled them to gain:

      (1) Independence (Recorder #1)

      (2) Maturity (Recorder #2)

   b. Student experiences on the job that they would have liked to have had to gain.

      (1) Independence (Recorder #3)

      (2) Maturity (Recorder #4)

4. The instructor then divides the class into groups of about five and asks them to develop "role playing material" to be portrayed by members of their group before the class. The "roles" will be a "supervisor" and a "working student."

   Scene One:

   The "student's" role is to convince the supervisor that he/she is mature enough to accept more independence and responsibility on the job. The "supervisor's" role is to make the student convince the supervisor that he is mature enough to accept more independence and responsibility on the job.

   Scene Two:

   (Reverse the roles.) The supervisor is "encouraging" the student to demonstrate more maturity, independence, and responsibility on the job.

   Scene Three:

   How not to convince your supervisor that you are mature, independent, and responsible. The student's role would include immature personal characteristics as well as immature job performance. The supervisor's role could be a "reaction role" including counseling techniques.

5. The instructor could ask for volunteers from the class to role play and "convince" another student (selected by the instructor) that he had demonstrated independence and maturity on the job and, therefore, should be given added responsibilities and a raise in his hourly wages!

Program Goal 2.3 - Unit B
Form #1

STUDENT INVENTORY

Student's Name ______________________________ Date ____________________

1. My employer is ____
(G and V) (Name of Company)

____
(E) (At my Career Station)

2. Type of business of my employer ____

3. My job title is ____

4. I am enrolled in the _______________ Work Experience Education Program.

5. A description of my job is as follows: ________________________________

____

____

____

6. Duties and responsibilities that I have accepted and performed on my job that have enabled me to demonstrate:

a. Growth in independence

____

____

____

b. Growth in maturity

____

____

____

7. Additional things I would like to do on my job that would enable me to gain:

a. Independence

____

____

b. Maturity

____

____

UNIT C - EVERYTHING A STUDENT SHOULD KNOW ABOUT INDEPENDENCE AND MATURITY ON THE JOB--AND WHAT TO DO ABOUT IT

Estimated Completion Time of One 50-Minute Period

Activities

1. The instructor should make arrangements for guest speakers to appear before the class (this could be an assignment for a student).

2. The guest speakers, a panel of four, provide the class with information and hints using the Unit C title, "Everything a Student Should Know About Independence and Maturity on the Job--And What to Do About It."

   a. The guest speakers could represent:

      (1) A personnel manager for a department store

      (2) A supervisor from the telephone company

      (3) An office manager from an insurance office, mortgage company, or bank

      (4) A supervising nurse from a hospital or convalescent home

   b. The guest speakers could include suggestions of:

      (1) How a student demonstrates independence and maturity on the job

      (2) How a student confers with his supervisor if he is not being afforded opportunities to demonstrate independence and maturity on the job

3. The instructor should provide time for a question and answer period after each speaker.

4. The class should summarize the suggestions and a student should list on the chalkboard the "dos" and "don'ts" of independence and maturity on the job

UNIT D - IDENTIFICATION OF PERSONAL CHARACTERISTICS THAT INDICATE INDEPENDENCE AND MATURITY

Estimated Completion Time of One 50-Minute Period

Activities

1. The instructor should ask the class to think about people that they work with or have observed at their career station and to identify the personal characteristics of these people that indicate independence and maturity on the job.

   a. Identify the type of job the person does.

   b. Indicate how long the person has had the job (if possible).

2. Ask the class to write these answers on paper and be prepared to discuss their answers in class.

3. The instructor then selects two students from the class to record suggestions from the class on the chalkboard under the categories "independence" and "maturity."

4. The instructor distributes job description and qualification materials secured from the local Department of Human Resources, school district, private employment agency, and city or county government. (If you do not have enough copies for each individual in the class, divide the class into groups.) The instructor refers to the materials and discusses the purpose and need for such materials with the class.

5. The instructor asks the students to list the requirements in the reading materials that indicate the employer expects independence and maturity in a prospective employee. These characteristics should be listed by the students on a piece of paper under the headings "independence" and "maturity."

6. After a given time, rotate the materials around the class.

7. At the appropriate time, have each student share with the class his/her list of independence and maturity characteristics that employers included in the printed materials as requirements of prospective employees.

8. Select two students to list on the chalkboard the reports from the students in Activity 7.

9. Discuss the information listed on the chalkboard in Activity 8.

   a. Is the employer reasonable in his requests? Why?

   b. Which characteristics of independence and maturity would you delete? Why?

   c. Which characteristics of independence and maturity would you add? Why?

10. If there is additional time, permit the class to read and share the printed materials for additional orientation, knowledge of job requirements, job opportunities, and to stimulate interest.

CHAPTER III

THE GOAL OF SELF-EVALUATION

GOAL 3.0 ANALYZE CAREER OPPORTUNITIES AND THEIR REQUIREMENTS AND COMPARE THESE TO PERSONAL POTENTIAL AND EXPECTATIONS

PROGRAM GOAL

3.1 (E, G, and V) Improve your understanding of yourself as an individual in terms of personal aptitudes, interests, career expectations, and degree of motivation to pursue short-range and long-range goals

UNIT A - INTERESTS

Estimated Completion Time of Two 50-Minute Periods

Activities

During the first 50-minute period, students are to complete one of the Kuder interest inventories (the specific inventory to be utilized is at the instructor's discretion). During the second 50-minute period, students are to:

1. Score their own interest inventories
2. Prepare their own interest profiles according to the instructor's directions

UNIT B - LIFESTYLES AND VALUES

Estimated Completion Time of 25 Minutes

Activities

1. Students are to discuss the lifestyles which appeal to them now and to which they aspire in five years, ten years, and twenty years.
2. Using Form #1 on the following page, students are to discuss the ten values listed, thinking of ways in which they have demonstrated that specific values are important to them.
3. Students are to use duplicated copies of Form #1 to rank the values listed according to the importance of each in the lifestyle to which the student aspires.

Program Goal 3.1 - Unit B
Form #1

Lifestyles and Values

Student's Name ______________________________________ Date ______________

The following list of values suggests the lifestyle a person prefers according to the importance of each value to the individual. Discuss these values, then rank each one according to its importance to you: 5=GREAT IMPORTANCE; 4=SOME IMPORTANCE; 3=UNDECIDED; 2=LITTLE IMPORTANCE; 1=NO IMPORTANCE.

___ 1. To become well known (FAME).

___ 2. To have lots of material things, become wealthy (MONEY).

___ 3. To make decisions for, and control the lives of, other people (POWER).

___ 4. To be active in religion (RELIGION).

___ 5. To be concerned for, and helpful to, others (HUMANISTIC).

___ 6. To do things for and with members of your family (FAMILY).

___ 7. To take special care of your own mental and physical health (HEALTH).

___ 8. To have opportunities for enjoying the beauty of art and music (AESTHETICS).

___ 9. To spend a great deal of time in creative work (CREATIVE).

___ 10. To do things for and with friends (SOCIAL).

UNIT C - VALUES APPRAISAL

Estimated Completion Time of One 50-Minute Period

Activities

1. Students are to complete the "Values Appraisal Scale," beginning on page 37 in Activities for Succeeding in the World of Work.[3]
2. Students are to score their own scales, with assistance from the instructor, and compare their profiles with the averages for boys and girls their own age.[3]
3. Based upon the information resulting from the values appraisal profile, students are to complete Form #1 on the following page which can be duplicated for class use.

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[3] Grady Kimbrell and Ben S. Vineyard, Activities for Succeeding in the World of Work (Illinois: McKnight & McKnight Publishing Company, 1972).

Program Goal 3.1 - Unit C
Form #1

Values Appraisal

Student's Name ______________________________ Date ____________

List the five values which, according to the appraisal you completed, are most important to you. Then, in the right column, write at least one (or more) careers which you think would satisfy each value.

VALUES	CAREERS
1. ______________________	______________________
	______________________
2. ______________________	______________________
	______________________
3. ______________________	______________________
	______________________
4. ______________________	______________________
	______________________
5. ______________________	______________________
	______________________

UNIT 2 - APTITUDES AND SKILLS

Estimated Completion Time of Four 50-Minute Periods

Activities

1. As a class activity, students are to be administered the GATB (General Aptitude Test Battery). Two hours should be scheduled during a single session for the test. (Another aptitude test may be used at the instructor's discretion.) If the GATB is used, those administering the test and those interpreting the test results to individual students must complete training sessions and be certified by the California State Department of Human Resources Development. The use of aptitude tests will assist the students in identifying their aptitudes, or potential skills, and will suggest occupations in which it is probable that individuals can succeed.

2. Following the interpretation of the test results, students should identify at least three occupations in which they are interested and in which it is probable that they could succeed according to the aptitude test. This information is to be recorded on duplicated copies of Form #1 on the following page.

3. The instructor is to assign one student to list on the chalkboard all skills that the class can think of which someone in the class possesses that might have value in an occupation. For example, students might list typing, driving a car, making change, operating a cash register, etc. When the list is complete, each student is to make his own list by starting with the skill in which he has the greatest ability and ending with the skill in which he has only a little ability. This should be recorded on Form #2 on page 68 which can be duplicated for the class. The individual lists can be compared to the class list to suggest appropriate skills for development.

    a. Lightface
    b. Boldface
    c. Vertical
        (1) Upper case
        (2) Lower case
  3. Composition
    a. Uniformity
    b. Stability
    c. Condensed
    d. Extended
  4. Guide lines
    a. Horizontal
    b. Vertical
    c. Condensed
    d. Extended
  5. Instruments
    a. Ames
    b. Braddock and Rowe
    c. Leroy
    d. Wrico
    e. Grid back-up sheets
C. Technical sketching
  1. Technique of sketching lines
    a. Straight lines
    b. Circles and arcs
    c. Ellipses

Assign exercises in lettering techniques for:
a. upper case vertical
b. upper case inclined
c. lower case vertical
d. lower case inclined

Use lettering instruments for drawing guide lines on all lettering practice

2. Technique of sketching solids	Sketch straight lines and arcs. Sketch simple geometric figures and solids.
a. Shape	
b. Proportion	
D. Orthographic projection	
1. Definition: orthographic projection	
2. Angles of projection	
a. Third angle	
b. First angle	
3. The glass box	
a. The projection plane	
b. Projection lines	
c. Folding lines	
4. The principal views	Practice sketching problems on the principal views from real objects. Begin with basic sketches. Construcion of principal views with instruments should be withheld until geometric construction has been introduced.
a. Front	
b. Right side	
c. Top	
d. Bottom	
e. Left side	
f. Rear	
5. Special features	
a. The most outstanding characteristic	
b. Normal or perpendicular surfaces	
c. Inclined surfaces and edges	

        d. Oblique surfaces and edges
        e. Angles
        f. Curved surfaces

E. Geometric construction

Demonstrate the proper use and care of drafting instruments. Emphasize proper technique and promote good work habits.

1. Making measurements
    a. Linear
    b. Angular
2. Using instruments correctly
    a. Pencil-type instruments
        (1) Pointing or sharpening leads
        (2) Drawing an arc with a compass
        (3) Drawing a line with a pencil and a straight edge
        (4) Drawing an irregular curve with a French curve and a pencil
    b. Ink-type instruments

Withhold demonstration and use of ink until trainees have command of fundamentals and definite technique with pencil. Inking may be included in the reproduction block.

        (1) Cleaning a draftsman's pen
        (2) Drawing an arc with a compass
        (3) Drawing a line with a draftsman's pen and straight edge
        (4) Drawing an irregular curve with a French curve and a pen

3. Making basic constructions
    a. Bisecting a line (compass and straight edge)
    b. Bisecting a line (triangles and T square)
    c. Trisecting a line (triangles and T square)
    d. Bisecting an arc
    e. Bisecting an angle
    f. Trisecting an angle
    g. Transferring an angle
    h. Constructing a perpendicular to a line at a given point on the line
    i. Constructing a perpendicular to a line and passing through a point off the line
    j. Constructing a line parallel to a given line at a given distance
    k. Dividing a line into a given number of equal parts
    l. Dividing a line into a given number of proportional parts
    m. Constructing a trangle with the sides given
    n. Constructing an equilateral triangle
    o. Constructing a square with a side given
    p. Constructing a regular pentagon

Make outside study assignments on geometric constructions. Demonstrate methods and assign problems (requiring geometric constructions) in drawing simple shapes.

Assign semi-complex and complex geometric problems as trainees master the execution of simple constructions.

Be alert for students experiencing difficulty. Give them additional instructions and drill in basic constructions.

q. Constructing a regular hexagon a given distance across the flats

r. Constructing a regular hexagon a given distance across the points

s. Constructing a regular octagon

t. Constructing a regular polygon when one side is given

u. Dividing the area of a triangle into a given number of equal parts

v. Drawing a circle or arc through three points not in a straight line

w. Locating the center of an arc or circle

x. Constructing an arc tangent to a line at a given point not on the line

y. Constructing a line tangent to a circle at a point on the circle

z. Constructing a line tangent to a circle and passing through a point not on the circle

aa. Constructing a line tangent to two circles

bb. Constructing an arc tangent to two perpendicular lines

cc. Constructing an arc tangent to two intersecting lines

dd. Constructing an arc of a of a given radius tangent to two arcs (internally, externally) ee. Constructing an ogee or reverse curve connecting two parallel lines

        ff. Drawing parallel curved lines about a curved center line

        gg. Constructing a line through a given point and the inaccessible intersection of two lines.

        hh. Drawing an ellipse (four-center method)

        ii. Drawing an ellipse (foci method)

        jj. Drawing an ellipse (Parallelogram method)

        kk. Drawing a line tangent to an ellipse

        ll. Constructing a parabola

        mm. Drawing a parabola through two given points

        nn. Drawing an involute of an arc

        oo. Drawing an involute of a circle

        pp. Drawing a helix

F. Dimensioning

    1. Theory of dimensioning

        a. Size description

        b. Location

    2. Terms and definitions used

Assign a simple object with basic dimensioning factors included and determine the techniques of size and location. Use guide lines for letters and numerals.

    a. Dimension lines
    b. Extension lines
    c. Dimension figures
    d. Arrowheads
    e. Leaders
    f. Notes
    g. Finish marks

3. Systems of dimensioning
    a. Aligned
    b. Undirectional

4. Preferred practices
    a. Placement
        (1) Off view
        (2) On view
    b. Function
        (1) According to function
        (2) According to manufacturing process
    c. Types
        (1) Fractional
        (2) Decimal
    d. Accuracy
        (1) Finished surface to finished surface
        (2) Finished surface to unfinished surface

Practice the location and placement of preferred dimensioning practices with emphasis on dimensioning in limited spaces and various shapes of geometric construction. Avoid superflous dimensions.

(3) Unfinished surface to unfinished surface	
5. Classes of fit	
a. Running	
b. Location	
c. Force	
d. Interference	
6. Surface quality control	Make an outside study assignment on limit dimensioning, ways of indicating tolerance, allowances, and surface quality control. Make a series of drawings to involve basic techniques of representing tolerances, allowances, and quality surfaces.
7. Supplementary notes	
G. Pictorial Representation	
1. Axonometric	
a. Isometric (1) Positioning of the axes (2) Drawing the box	Assign problems using the isometric scale. Contrast isometric projection and isometric drawing. Explain non-isometric lines.
(3) Using lines other than object lines (4) Representing regular and irregular objects (5) Dimensioning	Assign sketch diagrams of isometric projection and isometric drawing.
b. Dimetric and trimetric (1) Positioning of the axes	Demonstrate approximate dimetric drawing. Practice sketching dimetric representation with and without dimetric graph paper.

        (2) Determining the scale

        (3) Dimensioning

Show how to prepare trimetric scales, Sketch diagrams of trimetric representation.

2. Oblique

    a. Major characteristics

        (1) Relationship between object and projection plane

        (2) Relationship between object and projection line

    b. Types

        (1) Cavalier

        (2) Cabinet

    c. Methods of drawing

        (1) Positioning the axes

        (2) Drawing the box

        (3) Using lines other than object lines

        (4) Representing regular and irregular objects

Compare oblique and orthographic projections. Practice the steps in oblique representation by sketching problems. Assign one cavalier and one cabinet type

3. Perspective

    a. Importance to draftsman

    b. Major elements

        (1) Eye of the observer

        (2) Object being viewed

        (3) Plane of projection

        (4) Lines of projection

Demonstrate basic principles of perspective projection. Pass out examples of perspective pictorial representations, pictures, etc. Sketch diagrams in one-point, two-point, and three-point perspective representation.

c. Types of perspectives

(1) One-point

(2) Two-point

(3) Three-point

d. Methods of drawing

Make assignment of axonometric, oblique, and perspective drawings with instruments with a series of simple, semi-complex, and complex problems.

H. Auxiliary views

Select most desirable views of projection and instrument technique. Determine positions for reference planes for projection of primary and secondary auxiliary views. Practice auxiliary view drawings by choosing objects to give experience in one view at a time with simple problems first and more complex later. Assign at least two primary and two secondary view drawings.

1. Purpose

2. Types

a. Primary

(1) Height auxiliary

(2) Width auxiliary

(3) Depth auxiliary

b. Secondary

3. Technique

a. Using principal views

b. Using projection lines and reference lines

c. Partial view

4. Skew surfaces

I. Sectional views

Section and dimension selected problems to illustrate various types of sectioning. At least one problem involving each type of section is recommended.

1. Purpose

2. Full sections

a. Cutting plane line

    - b. Section lining
    - c. Lining technique
3. Half sections
    - a. Center line
    - b. Hidden lines
    - c. Assembly drawings
4. Broken-out sections
    - a. Break line
    - b. Center line
5. Revolved sections
6. Removed sections
    - a. Scale
    - b. Identification
7. Offset sections
8. Phantom sections
9. Auxiliary conventions
    - a. Ribs and spokes in sections
    - b. Aligned sections
    - c. Breaks
    - d. Half views and partial views
    - e. Treatment of shafts, ball bearings, and other parts
10. Partial views
11. Conventional breaks

Execute properly the conventional lines of section lining, cutting planes, hidden lines, center lines, and dimensioning.

Obtain sectioned models to clarify the various types of sectioning. Select and draw an object or construction requiring only a broken-out section to expose interior shapes.

Select an irregular object and draw an offset sectional view.

Select problems relating to the practices listed under item nine with special emphasis on ribs and spokes, sections, and breaks.

J. Revolutions

Examine carefully the rules of axis revolution and the distinction between primary and successive revolutions.

  1. Purpose
  2. Axis of revolution
  3. Types
     a. Primary
        (1) Horizontal plane
        (2) Frontal plane
        (3) Profile plane
     b. Successive

Assign basic problems and compare with auxiliary views.

        (1) Assignment of numbers or letters to corners
        (2) Circular arc description
  4. True length of lines

Arrange a series of problems relating to the processes of primary and successive revolutions.

  5. True size of plane surface
  6. Circles
  7. Conventions

Continue practices with supplementary problems to find line lengths, plane surface sizes, circle revolutions, and revolution conventions.

K. Working drawings
  1. Purpose
     a. Design
     b. Manufacture
     c. Building construction
  2. Drafting practice

Examine carefully good examples of working drawings in several drafting speciality areas.

     a. Description of shape
     b. Description of size
     c. Specifications

d. Materials	
e. Methods of finish	
f. Accuracy required	
g. Symbols	
3. Detailed drawing	Make completely dimensioned, detailed drawings. Check and revise.
a. Definition	
b. Layout and arrangement	
c. Representation	
d. Variations	Note: Drawings should be from examples of industrial objects and structures in common use today.
e. Title and record strips	
f. Parts lists	
g. Checking and revising	
4. Assembly drawings	Assign a general assembly drawing with the selected minimum views shown. Use sectioning whenever advisable to minimize hidden line delineation.
a. General assembly	
(1) Views	
(2) Dimensions	
(3) Hidden lines	
(4) Identification of parts	
(5) Sections	
b. Detailed assembly	Make an assembly drawing that involves half sectioning practice.
c. Diagram assembly	
d. Installation assembly	

e. Check assembly

sets of drawings from good examples of working drawings. Include both details and assemblies with parts identification and titles and record strips.

Stronger students should be assigned additional detail and assembly drawings.

Machine Drafting is to be taught in two sections. The first section should contain 170 contact hours. Advanced Machine Drafting should start with "Working Drawings," or at the point of completion during the first year. Advanced Machine Drafting includes 130 contact hours of machine drafting and 60 contact hours of sheet metal drafting.

II. MACHINE DRAFTING

(Contact hours 170)

Trade principles	*Trade practices*
A. Purpose	
B. Explanation of large and small industry	Make a study of machines of industry and uses. Use visual aids for familiarization.
1. Types of large and small industry	
2. Organization	
3. Equipment variation	
C. Raw materials	Bring samples of raw stock and demonstrate various characteristics.
1. Types of raw materials commonly used	
a. Shapes and sizes	
(1) Sheet	
(2) Plate	
(3) Flat	
(4) Square	
(5) Round	
(6) Hexagon	
(7) Octagon	
(8) Angle	
(9) Channel	
(10) Tee	
(11) I-Beam	
b. Types of raw stock	

- (1) Steel
    - (a) Low-carbon
    - (b) Medium-carbon
    - [illegible] on
    - (d) Special alloy
    - (e) High-speed carbon
    - (f) Cold rolled
    - (g) Hot rolled
    - (h) Cold drawn
    - (i) Cast
- (2) Steel alloys
    - (a) Nickel
    - (b) Chromium
    - (c) Manganese
    - (d) Molybdenum
    - (e) Tungsten
    - (f) Vanadium
- (3) Nonferrous metals
    - (a) Aluminum
    - (b) Copper
    - (c) Brass
    - (d) Bronze
    - (e) Zinc
    - (f) Silver
    - (g) Gold

- (h Magnesium
- (i) Lead
- (j) Tin
- (k) Babbitt
- (1) Pewter
- (m) Nickel

2. Physical characteristics of raw materials
   a. Relationship to draftsman
   b. Relationship to shop processes
   c. Relationship to finished product
3. Modification by shop processes

D. Related vocabulary

1. Metal thickness (gages)
2. Punches
3. Dies
4. Gears
5. Template cutter
6. Gaskets
7. Bushing
8. Bearing
9. Cast iron
10. Cam
11. Ream
12. Bore
13. Counter bore

14. Fillets and rounds
15. Chamfer
16. Rib
17. Knurling
18. Spot face
19. Countersink
20. Broach
21. Web
22. Spoke

E. Manufacturing methods and the drawing
   1. Casting and the drawing
      a. Sand casting
      b. Permanent mold casting
      c. Die casting

Bring sample manufactured objects and parts, and carefully study. Assign principal view drawings of these parts and objects. Draw complete with dimensions.

      d. Fillets and rounds
      e. Patterns for casting
      f. Castings and the foundry
      g. Allowances for shrinkage

Assign basic pattern drawings that could be used by the pattern department to construct patterns for use by the foundry. Include notes, dimensions, and finish marks.

   2. Machine tools and the drawing
      a. Engine lathe
         (1) Description
         (2) Operations performed and drawing representation
      b. Drill press
         (1) Types

Develop a series of working drawings illustrating the basic operations to be performed on objects and parts with an engine lathe, drill press, and milling machine. Show all dimensions

(2) Description	
(3) Operations performed and drawing representation	
c. Milling machines	
(1) Types	
(2) Description	
(3) Operations performed and drawing representation	
d. Shapers	Develop a series of working drawings illustrating the basic operations to be performed on objects and parts with a shaper, planer, and grinder. Show all dimensions.
(1) Types	
(2) Description	
(3) Operations performed and drawing representation	
e. Planer	
(1) Description	
(2) Examples of planer work	Assign a semi-complex working drawing representing several of the above operations to be performed on one object or part. Include notes, finish marks, and all dimensions.
f. Grinder	
(1) Types	
(2) Description	
(3) Operations performed and drawing representation	
g. Measuring tools	
(1) Semiprecision measuring tools (linear measurements)	Examine measuring tools
(a) Rules	

(b) Calipers(inside and outside)

(c) Squares

(d) Protractor

(2) Precision measuring tools(linear measurements)

(a) Vernied height gage

(b) Vernier caliper

(c) Dial indicators gage

(d) Telescope gage

(e) Depth gage

3. Welds,welding process, and the drawing

Stress the usefulness and importance of welding representation in drawing by visiting a shop that uses draftsmen and their work to make a finished product

a. Welding processes

(1) Gas welding

(2) Electric-resistance

(3) Electric-arc welding

(4) Atomic hydrogen welding

(5) Forge welding

(6) Oxygen cutting and flame machining

(7) Thermit welding

b. Bonding processes

(1) Brazing

(2) Soldering

c. Types of welded joints and their symbols (1) Butt joint (2) Lap joint (3) Tee joint (4) Corner joint (5) Edge joint	Make cross-sectional sketches of welded joints, and label. Practice drawing various joint symbols.
d. Welding symbol drawing (1) Individual basic symbols (2) Complete welding symbols	Differentiate between resistance, arc, gas, and supplementary welding symbols.
(3) Standard locations (4) Notes (5) Lettering in symbols	Begin by drawing basic individual symbols. Progress to complete welding symbols.
e. Types of welds and their symbols (1) Arc and gas welds (a) Bead (b) Fillet (c) Plug or slot (d) Groove	
(2) Resistance welds (a) Spot welds (b) Projection welds (c) Flash or upset welds	Develop a series of working drawings of machine parts and objects, and steel structures that require welding processes. Show adequate welding representation.

            (d) Butt-seam welds
            (e) Lap-seam welds
        (3) Supplementary welds

4. Forming processes and the drawing (sheet stock)
    a. Types of presses
    b. Classification of dies
    c. Classification of operations

Prepare drawings that represent the shape, tolerances, etc. of objects the press man must have to select dies for forming

5. Forging processes and the drawing
    a. Drop forging
        (1) Explanation of hammer and dies
        (2) Heat treatment
    b. Press forging
        (1) Purpose
        (2) Operations
    c. Machine or upset forging
    d. Explanation of cold forging operations

Prepare drawings that may be used by the forging department to make desired objects. Include the shape of the finished forging in full outline. Show the parting line and draft.

6. Fasteners
    a. Rivets
        (1) Uses
        (2) Size classification
        (3) Types of joints
        (4) Representation

Assign problems that give experience in the methods of representing common riveted joints, rivet types and sizes, and conventional rivet symbols.

b. Threads
   - (1) History
   - (2) Thread terms
   - (3) Thread uses
   - (4) Standardization of threads
   - (5) Thread forms
   - (6) Detailed thread representation
   - (7) Thread symbols
     - (a) Schematic
     - (b) Simplified
   - (8) Single and multiple threads
   - (9) American national thread series
   - (10) Unified screw threads
   - (11) Classes of fit and thread notes
   - (12) Dimensioning

Demonstrate why the true projection of a screw thread is not practical. Assign problems involving representation of the variou forms of screws and threads, classes of fit, and notes complete with dimensions. Special atte tion should be given th use of instruments.

c. Springs
   - (1) Classification
     - (a) Helical type (compression, extension, torsion)
     - (b) Flat type
   - (2) Detailed drawing method
   - (3) Schematic drawing method

Compare springs to screw threads for clarity. Assign a series of problems involving the three helical types of springs using the detailed and schematic approaches. Select one problem that involves sectioning.

    - (4) Sectioning
    - (5) Dimensioning
- d. Bolts and nuts

  Assign a series of problems in drawing bolts and nuts. Begin by laying out the major diameter, axis, and length of the bolt. Using the formulas, complete the drawings. Include all details and specifications.

    - (1) Bolt series
        - (a) Regular
        - (b) Heavy
        - (c) Light
    - (2) Finish
        - (a) Finished
        - (b) Semifinished
        - (c) Unfinished
    - (3) Classes of fit(threads)
    - (4) Drawing bolts and nuts

      Continue practice in drawing bolts and nuts by application to detail and assembly drawings.

        - (a) Formulas for drawing
        - (b) Specification to be included on the drawing
    - (5) Locknuts and locking devices

      Make a careful study of the various locknuts, locking devices, and stud bolts with particular attention to their use in working drawings. Use visual aids for familiarization.

    - (6) Stud bolts
- e. Screws
    - (1) Cap screws and machine screws

      Make one-view and two-view drawings of cap screws, machine screws, and set screws. Show all specifications and dimensions.

        - (a) Types
        - (b) Drawing
        - (c) Specification to be included in drawing

(2) Set screws	
(a) Types	
(b) Drawing (c) Specification to be included in drawing	Continue practice in drawing screws by application to detail and assembly drawings.
f. Machine pins and keyways (1) Types (2) Drawing methods	Make a study of the various machine pins and keys. Practice drawing machine pins and keyways in detail, and assembly drawings of collars, gears, shafts, etc.

SECOND YEAR

III. ADVANCED MACHINE DRAFTING
(Contact hours 190)

Trade principles	*Trade practices*
A. Working drawings	
1. Purpose	
a. Design	
b. Manufacture	
2. Detailed drawing	Make completely dimensioned detailed drawings. Check and revise. Drawings should be from practical industrial objects and structures in common use today.
a. Definition	
b. Layout and arrangement	
c. Representation	
d. Variations	
e. Types	
(1) Pattern drawing	
(2) Forging drawing	
(3) Machine drawing	
(4) Welding drawing	
(5) Stamping drawing	
(6) Other	
f. Title and record strips	
g. Parts list	
h. Checking and revisions	

3. Assembly drawings

Assign a general assembly drawing with the selected minimum views shown. Use sectioning whenever advisable to minimize hidden line delineation.

   a. General assembly drawings
      (1) Views
      (2) Dimensions
      (3) Hidden lines
      (4) Identification of parts
      (5) Sections
   b. Detailed assembly

Make sets of working drawings of models. Include both details and assemblies with parts identifications and titles and record strips.

   c. Diagram assembly
   d. Installation assembly
   e. Check assemblies

B. Cam and gears

1. Cams

Assign appropriate problems in cam drawing. Provide adequate data and examples to work from.

   a. Uses of cams
   b. Types
   c. Cam motion diagrams
   d. Cam curve outlines
   e. Timing outlines
   f. Drawing plate cams
   g. Drawing cylindrical cams
   h. Dimensioning

2. Gears

Make working drawings of a bevel gear, worm gear, and a spur gear. Include cutting data, accuracy required, material, etc.

   a. Uses of gears
   b. Basic gear forms

        (1) Spur
        (2) Spur and rack
        (3) Bevel
        (4) Worm
    c. Terms and formulas
    d. Specifications to be included on drawing
    e. Working drawings
        (1) Spur gears
        (2) Bevel gears
        (3) Worm gears

C. Sheet metal drafting

  1. Sheet metals and their characteristics

     Find sample sheet metals that have been exposed to weather for long periods of time. Compare for best performance.

     a. Coated materials
     b. Solid sheets
     c. Classification of sheet metals
        (1) Galvanized
        (2) Black iron
        (3) Tin plate
        (4) Copper
        (5) Aluminum
        (6) Stainless steel
        (7) Lead
     d. Oxides of sheet metal

  2. Explanation of tools and machinery used in sheet metal layout, cutting, and fabrication

3. Rivets, bolts, screws, etc. used in sheet metal fabrication	
4. Sheet metal hems, seams, and edges	Sketch pictorials of several types of hems, seams, and edges used in sheet metal work.
a. Classification of types	
b. Allowances in drawing for fabrication	
5. Air conditioning and heating transfer system	
a. Commercial	
b. Domestic	
6. Cornice and gutter work, etc. used in construction	
7. Basic development procedures	Review the following fundamentals: Orthographic projection; auxiliary views; and applied geometry.
a. Surfaces and geometric applications	
b. Intersections of planes and solid	Basic developments 1. Develop and fabricate a cube on heavy stock
c. Explanation of exact and approximate surface development	2. Develop and fabricate a three sided pyramid
d. Parallel line development	Parallel line developments (Review auxiliaries and curve plotting)
(1) Basic fixed principles	1. Develop a pattern for a rectangular duct
(a) Plan and elevation drawing	2. Lay out and fabricate a two-piece, 90° elbow
(b) Selection of view	3. Lay out and fabricate a four-piece, 90° elbow

        - (c) Stretch out line
        - (d) Measuring lines
        - (e) Construction of points for the outline
    - (2) Developing patterns for rectangular ducts
    - (3) Developing patterns for rectangular and round pipe intersections
    - (4) Developing practical cornice and gutter patterns
- e. Radial line development
    - (1) Basic principles
        - (a) Plan and elevation drawings
        - (b) Plan view and stretchout arc
        - (c) Locating points on the stretchout
        - (d) Measuring lines
        - (e) Construction of points for the outlines
    - (2) Developing cone patterns
    - (3) Developing patterns for tapers on pitches

4. Develop a pattern for a rectangular and round pipe intersection
5. Develop a series of patterns of various cornice and gutter miters

Radial line patterns
1. Make a pattern for a cone and a frustum
2. Develop the surface of a truncated cone

(4) Developing flaring patterns

(5) Developing intersections

f. Triangulation development

(1) The construction of the plan and elevation view

(2) Identifying true length

(3) Identifying foreshortened lengths

(4) Development of circular shapes (oblique cones, etc.)

(5) Development of transition pieces

(a) Square-to-square

(b) Square-to-round

(c) Rectangular-to-round

(d) Round-to-oblong

(e) Irregular joint

(f) Elbow

3. Develop and fabricate a pyramid intersected at 90° by a cylinder

4. Assign a series of radial pattern developments of tapers on pitches, flaring patterns, and intersections.

Triangulation development

1. Develop the surface of an oblique cone

2. Develop a rectangular-to-round transition piece

3. Develop an irregular joint transition

D. Drafting considerations of stock sizes (to eliminate waste)

IV. ARCHITECTURAL DRAFTING

(Contact hours 350)

Trade principles	*Trade practices*
A. Introduction to architecture	
1. Services performed by persons in architectural fields	
2. The role of the architectural draftsman	The principal duties of the beginning draftsman will stem from work handed to him by management, the engineer, the architect, or by the experienced draftsmen. The primary objective of this course should be to train the student in the development of working drawings from examples of designs, sketches, and rough drawings. Use should be made of visual examples of finished working drawings that characterize proper composition and technique of development.
B. Present-day building material	Visit residential, commercial, and institutional construction sites. Observe the different materials being used in construction
1. Types and uses	
a. Wood	
b. Metal	
c. Brick	
d. Tile	
e. Plaster	
f. Glass	
g. Insulation materials	

        h. Concrete
        i. Sheet metal
        j. Sheathing
        k. Other
    2. Durability of various materials
    3. Selection and cost variation
    4. Skills required in the use of materials

C. Symbols for plans and sections
    1. Soil
    2. Concrete solid
    3. Metals
    4. Brick
    5. Tile
    6. Insulation
    7. Concrete block
    8. Glass
    9. Sand

Acquire samples of printed symbols. Assign practices in drawing all types of symbols to be used in later drawings. Emphasize the development of speed and neatness.

D. Symbols for elevations
    1. Brick
    2. Concrete block
    3. Tile
    4. Shingles
    5. Flashing
    6. Stone
    7. Siding

E. Symbols for exterior walls

1. Brick on rubble
2. Brick on frame
3. Brick on tile
4. Brick on concrete block
5. Various types of siding on frame
6. Concrete footing

F. Window symbols

1. Double hung window in masonry wall
2. Double hung window in frame wall
3. Casement window in frame and masonry wall
4. Sliding window
5. Fixed window
6. Vent or louver

G. Door symbols

1. Exterior door in masonry wall
2. Exterior door in frame wall
3. Interior door
4. Double acting door
5. Accordian door
6. Folding door
7. Sliding door
8. Pocket door

H. Other symbols

   1. Plumbing and piping

   2. Electrical

   3. Air conditioning and heating

I. Definition of architectural terms

   1. Scale

   2. Working drawings

   3. Sections

   4. Details

   5. Other

J. Introduction to specifications

   1. Purpose

   2. Relationship of specifications and drawings

   3. General content of specifications

K. Schedules

   1. Window and door scheduling

Show samples of window and door schedules; examine with class.

      a. Purpose

      b. General contents

   2. Interior finish schedules

L. Architectural lettering

   1. Individuality of lettering in developing a style

Study the shape and form of suggested styles of architectural lettering. Practice first on individual letters, then upon letters

2. Artistic nature of lettering 3. Basic lettering style 4. Treatment of form, size, and composition 5. Spacing 6. Lettering of titles 7. Lettering of notes	combined in words. Continue by lettering sentences, Use vertical gothic forms as a basis for developing individual style.
M. Architectural scaling 1. Review of the use of the architect's scale 2. Normal use of scales a. Foundation plan b. Floor plan c. Elevations d. Details e. Wall sections f. Cabinet details	Assign practices in the use of the architect's scale. Use previously prepared working drawings. Practice several different scales for each drawing.
N. Architectural dimensioning 1. Review of lettering principles 2. Architectural practices a. Dimension lines b. Details c. Floor plans d. Elevations e. Doors and windows f. Other	Assign architectural dimensioning practice by using the above drawings.

O. Typical construction details (detail section and detail drawing)	Point out differences between detail sections and detail drawings.
1. Foundation	
2. Framing	Using examples of architectural working drawings to show composition and technique. Develop structural details for following: 1. Frame wall on concrete slab 2. Brick veneer on concrete slab 3. Solid block or masonry wall on concrete slab 4. Cabinets
3. Sill	
4. Wall	
a. Frame	
b. Solid masonry	
5. Roof pitch	
6. Elevations	
7. Door framing	
8. Cabinet	NOTE: Each student is to develop a minimum of one each of the above at the appropriate time; stronger students are assigned additional detail work.
9. Window	
a. Casement window in masonry wall	
b. Casement window in veneer	
10. Entrance	
11. Stair	
12. Fireplace	
P. General considerations in plan development (not specifically kin to the draftsman's work)	
1. Style of building	
2. Purpose or use	
3. Space needed	
4. Location	

5. Cost

6. Materials to be used

7. Plumbing, heating, and electrical planning

8. Equipment (in case of commercial and institutional)

Q. Developing working drawings

  1. Plot plan

    a. Bench marks and elevation

    b. Dimensions of the plot

    c. Lot and block number

    d. Location and dimension

      (1) Driveways

      (2) Walks

      (3) Steps

      (4) Terraces

      (5) Garage

      (6) Other accessory buildings

      (7) Septic tank and leaching field

      (8) Slopes

      (9) Trees

    e. Obstructions

      (1) Utility poles

      (2) Trees to be removed

Point out various features which are included on a survey or topographical drawing.

        - (3) Catch basins
        - (4) Hydrants
        - (5) Other obstructions not identified
    - f. Elevations
        - (1) Contours
        - (2) Slope
        - (3) Drainage
        - (4) Retaining walls
        - (5) Abrupt change in grade
        - (6) Basement
        - (7) Walls
    - g. Sketch of building

2. Floor plans
    - a. Traffic flow
    - b. Room layout
    - c. Space for furnishings
    - d. Wall thickness
    - e. Location and size of windows, doors, closets, stairs, and fireplace
    - f. Location and size of halls
    - g. Location and size of carport and storage room

Acquire copies of floor plan drawings of a house or houses with the following characteristics: two or three bedroom; 1½- or 2-baths; covered carport with a storage room. Develop floor plan drawings from these copies.

3. Footings
    a. Concrete
    b. Concrete block
    c. Chimney
    d. Porch and stairs
    e. Columns
4. Foundations
    a. Concrete
    b. Concrete block
    c. Brick
    d. Tile
    e. Stone
    f. Waterproofing materials
5. Materials considerations
6. Supports
    a. Purpose of supports
    b. Types of supports
        (1) Beams
        (2) Columns
        (3) Lintels
        (4) Trusses
        (5) Floor joists
    c. Materials used
        (1) Wood

Develop plans for the following:
1. Footings
2. Concrete slab foundation
3. Conventional foundation

Use examples of architectural working drawings, specifications, designs, or sketches.

        (2) Steel

        (3) Concrete

7. Strength of materials used in floors, roofs, and walls

8. Strength of floors, roofs, and walls

    a. Live loads

    b. Dead loads

    c. Roof loads

        (1) Wind loads

        (2) Snow loads

    d. Determining rafter sizes

    e. Attic floor loads

    f. First- and second-floor loads

    g. Spacing of joists

    h. Spacing of studs

    i. Determining girder sizes

    j. Total loads

    k. Size of floor joists

    l. Wood and steel posts for floor joists

    m. Partitions

    n. Exterior walls

Develop the following house elements from examples of working drawings or from architectural specifications:

1. Exterior framing construction

2. Interior wall framing

3. Roof construction

4. Cornice construction

5. Support members

Assign additional drawing problems to stronger students if necessary.

9. Determining natural sizes, and spacing to eliminate waste	
10. Developing elevations a. Purpose b. Views shown c. Wall shapes, heights, and widths d. External finish e. Roof slope and overhang f. Gable ends g. Exterior doors, windows, and trim h. Dimensioning	Develop the elevation plan for a construction to scale, complete with dimensions. Begin by studying the plans, completed elevations, and sections together. Develop openings and trim.
11. Sectional views	Study completed working drawings and develop appropriate sectional views.
12. Plumbing, heating, and air conditioning systems	Acquire working drawings that contain plumbing, heating, and air conditioning systems. Pass out copies for study of symbols and drawing methods.
13. Rendering a. Purpose b. Types (1) Perspective (2) Floor plan (3) Elevations (4) Plot plan	Examine rendered perspectives, floor plans, elevations, and plot plans.

c. Art media

Note: If time permits, introduce commercial and institutional methods of construction. This should be done through consultation and approval of the local advisory committee.

Assign appropriate problems in developing working drawings by using sample drawings, sketches, etc. The following construction elements might be included: reinforced concrete column and beam details, light structural steel, laminated wood structural members, and solid masonry wall construction details.

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APPENDIX

SUGGESTED JOBS

FUNDAMENTALS OF DRAFTING

1. Lay out a border and title block
2. Develop a record strip
3. Develop single-stroke upper-case lettering
4. Develop single-stroke lower-case lettering
5. Sketch straight lines and arcs
6. Sketch simple geometric figures and solids
7. Sketch principal views of objects
8. Make basic geometric constructions
9. Construct, with instruments, the principal views of several objects
10. Develop the size and location of dimensions on the principal views of an object
11. Make drawings to involve limit dimensions
12. Sketch diagrams of axonometric representation
13. Sketch diagrams of oblique representation
14. Sketch diagrams of one-point, two-point, and three-point perspective representation
15. Develop axonometric drawings with instruments
16. Develop oblique drawings with instruments
17. Develop perspective drawings with instruments
18. Draw primary auxiliary views
19. Draw secondary auxiliary views
20. Produce a full section drawing
21. Produce a half section drawing

22. Produce a broken-out section drawing
23. Produce a revolved section drawing
24. Produce a removed section drawing
25. Produce an offset section drawing
26. Develop a drawing showing auxiliary conventions
27. Make primary revolution view drawings
28. Make successive revolution view drawings
29. Make a detailed drawing
30. Make an assembly drawing

MACHINE DRAFTING

1. Develop principal view drawings from sample manufactured objects
2. Develop a pattern drawing for a pattern construction
3. Develop a drawing representing engine lathe operations
4. Develop a drawing representing drill press operations
5. Develop a drawing representing milling machine operations
6. Develop a drawing representing shaper operations
7. Develop a drawing representing planer operations
8. Develop a drawing representing grinding machine operations
9. Develop a working drawing representing several machine tool operations
10. Draw welded joint symbols
11. Make cross-sectional sketches of welded joints
12. Practice drawing arc and gas, resistance, and supplementary welding symbols
13. Locate welding representation on machine drawings

14. Locate welding representation on structural drawings
15. Locate tolerances and shapes on working drawings to be used for selecting dies for forming objects and parts
16. Show shapes, parting lines, and drafts on working drawings to be used for forging objects and parts
17. Draw rivet and riveted joint representation
18. Perform problems of schematic and detailed representation of screw threads
19. Perform problems of detailed and schematic spring representation
20. Develop details and specifications for bolts and nuts
21. Develop details and specifications for screws

ADVANCED MACHINE DRAFTING

1. Make detailed drawings of objects and structures
2. Make a general assembly drawing
3. Make sets of general assembly and detail working drawings
4. Develop details and specifications for a cam
5. Develop details and specifications for a gear
6. Sketch pictorials of hems, seams, and edges
7. Develop and fabricate a cube of heavy paper stock
8. Develop and fabricate a three-sided pyramid
9. Lay out and fabricate a two-piece 90° elbow
10. Lay out and fabricate a four-piece 90° elbow
11. Develop a pattern for a round pipe
12. Develop a pattern for a rectangular duct
13. Develop a pattern for a rectangular and round pipe intersection

14. Develop a cornice miter pattern
15. Develop a gutter miter pattern
16. Make a pattern for a cone and frustum
17. Develop the surface of a truncated cone
18. Develop and fabricate a pyramid intersected at 90° by a cylinder
19. Develop a radial pattern
20. Develop a radial pattern of flares and intersection
21. Develop the surface of an oblique cone
22. Develop an irregular joint transition
23. Develop a rectangular-to-round transition piece

ARCHITECTURAL DRAFTING

1. Draw architectural symbols
2. Practice architectural lettering
3. Dimension architectural working drawings
4. Develop structural details for a frame wall on a concrete slab
5. Develop structural details for a brick veneer on a concrete slab
6. Develop structural details for a solid block or masonry wall on a concrete slab
7. Develop structural details for cabinets
8. Develop a floor plan for a house
9. Develop a footing plan for a house
10. Develop a concrete slab foundation plan for a house
11. Develop a conventional foundation plan for a house
12. Develop exterior framing construction details for a house

13. Develop interior wall framing details for a house
14. Develop a roof construction plan for a house
15. Develop cornice construction details for a house
16. Develop a support members plan for a house
17. Develop an elevation plan for a house
18. Develop sectional structural details for a house

VOCATIONAL
INDUSTRIAL
DRAFTING

STUDENTS	FUNDAMENTALS								MACHINE								
JOB ASSIGNMENT	Lay out a border and title block	Develop a record strip	Develop single-stroke upper-case lettering	Develop single-stroke lower-case lettering	Sketch straight lines and arcs	Sketch simple geometric figures and solids	Sketch principal views of objects	Make basic geometric constructions	Develop a pattern drawing for a pattern construction	Originate a drawing representing engine lathe operations	Originate a drawing representing drill press operations	Originate a drawing representing milling machine operations	Originate a drawing representing shaper operations	Originate a drawing representing planer operations	Originate a drawing representing grinding machine operations	Develop a working drawing representing several machine tool operations	Draw welded joint symbols
1. BROWN, BILLY																	
2. CARTER, JIM																	
3. DRAKE, JOHN																	
4. ELLIS, SAM																	
5. HOLLIS, TOM																	
6. JOHNSON, JOE																	
7. KNIGHT, RAY																	
8. LANE, BOB																	
9. MORRIS, JACK																	
10. NEWBY, NED																	
11. OWENS, TED																	
12. PUGH, JOHN																	
13. QUINCY, CARL																	
14. ROBERTS, ROY																	
15. SAMS, MARK																	
16. SMITH, VIRGIL																	
17. TAYLOR, FRED																	
18. TURNER, BILL																	
19. VANCE, HARRY																	
20. WALKER, ED																	

OPERATIONS ANALYSIS

I. MEASUREMENT

1. Make linear measurements with a rule or scale
2. Make an angular measurement with a semicircular protractor
3. Transfer measurements with dividers

II. INSTRUMENTS

1. Draw an arc or a circle with a compass
2. Ink an arc or a circle with an inking compass
3. Draw a line with a pencil and a straight edge
4. Ink a line with a ruling pen and a straight edge
5. Ink a line with a technical fountain pen and a straight edge
6. Draw a curved line with an adjustable curve or spline
7. Draw a curved line with a French curve
8. Sharpen a wooden drafting pencil with a knife
9. Sharpen a wooden drafting pencil with a simple pencil sharpener
10. Point a mechanical drafting pencil with a sandpaper pad
11. Point a mechanical drafting pencil with an automatic sharpener

III. CONSTRUCTION (Using compass, dividers, rule or scale, straight edge, T square, triangles, and pencil or pen)

1. Bisect a line with a compass and a straight edge
2. Bisect a line with triangles and a T square
3. Trisect a line with triangles and a T square

4. Bisect an arc

5. Bisect an angle

6. Trisect an angle

7. Transfer an angle

8. Construct a perpendicular to a line at a given point on the line

9. Construct a perpendicular to a line, passing through a point off the line

10. Construct a line parallel to a given line at a given distance

11. Divide a line into a given number of equal parts

12. Divide a line into a given number of proportional parts

13. Construct a triangle with the sides given

14. Construct an equilateral triangle

15. Construct a square with a side given

16. Construct a regular pentagon

17. Construct a regular hexagon a given distance across the flats

18. Construct a regular hexagon a given distance across the points

19. Construct a regular octagon

20. Construct a regular polygon when one side is given

21. Divide the area of a triangle into a given number of equal parts

22. Draw a circle or arc through three points not in a straight line

23. Locate the center of an arc or a circle

24. Construct an arc tangent to a line at a given point on the line

25. Construct a line tangent to a circle at a point on the circle

26. Construct a line tangent to a circle and passing through a point not on the circle
27. Construct a line tangent to two circles
28. Construct an arc tangent to two perpendicular lines
29. Construct an arc to two intersecting lines
30. Construct an arc of a given radius to two arcs (internally, externally)
31. Construct an ogee or reverse curve connecting two parallel lines
32. Draw parallel curved lines about a curved center line
33. Construct a line through a given point and the inaccessible intersection of two lines
34. Draw an ellipse (four-center method)
35. Draw an ellipse (foci method)
36. Draw an ellipse (parallelogram method)
37. Draw a line tangent to an ellipse
38. Construct a parabola
39. Draw a parabola through two given points
40. Draw an involute of an arc
41. Draw an involute of a circle
42. Draw a helix

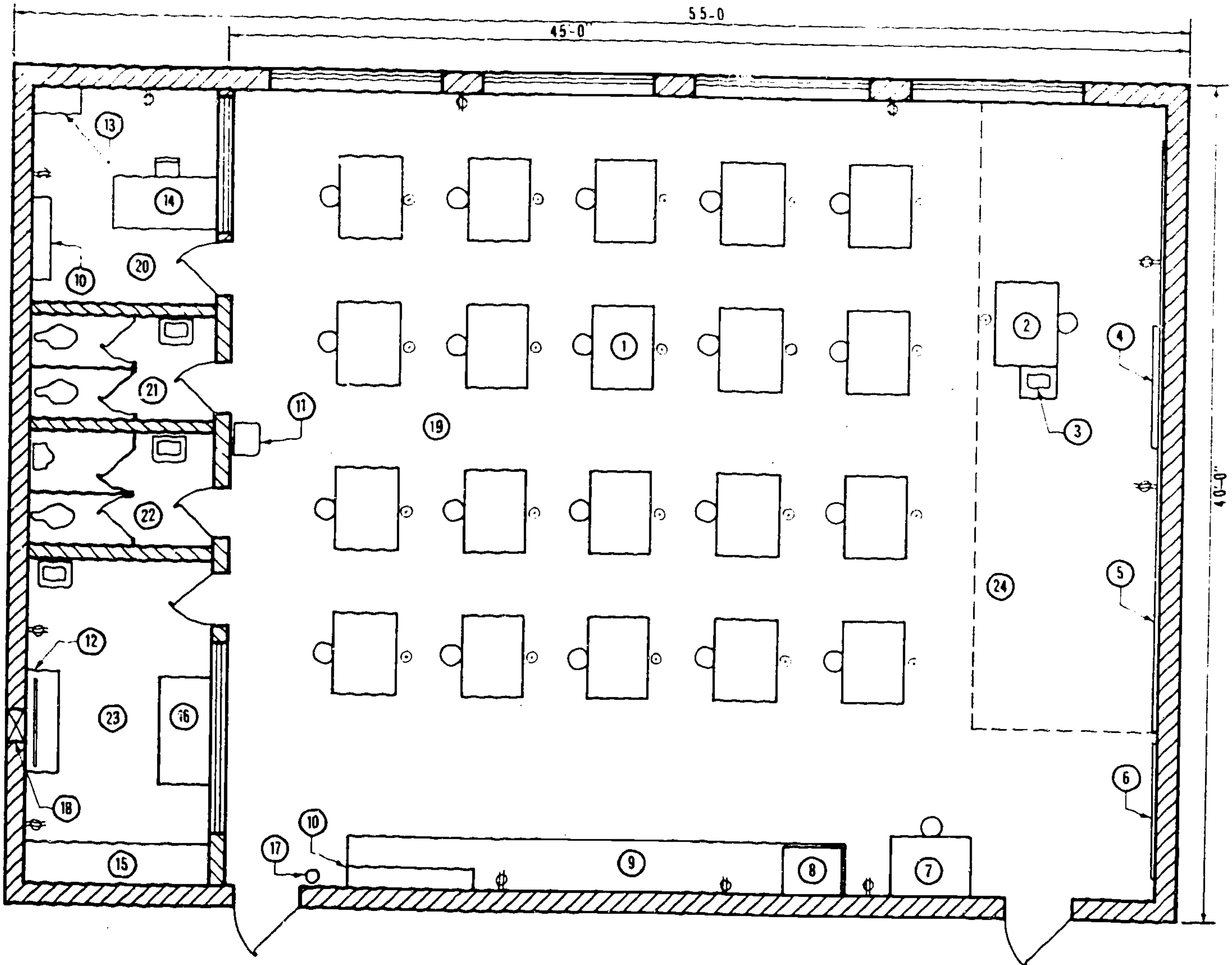
IV. MISCELLANEOUS

1. Align paper on a drawing board
2. Tape drawing paper to a drawing board
3. Apply press-on type symbols to construction drawings

LEGEND

1. Student drawing tables
2. Teacher's table
3. Overhead projector
4. Pull-down screen
5. Chalkboard
6. Tack board
7. Tracing table
8. Paper cutter
9. Storage cabinet (work space on top)
10. Bookshelf
11. Water cooler
12. Blueprint machine
13. File cabinet
14. Teacher's desk
15. Locked storage cabinet
16. Worktable
17. Fire extinguisher
18. Exhaust fan
19. Open-shop - 45' x 40'
20. Office - 11' 6" x 10'
21. Ladies' room - 10' x 5'5"
22. Men's room - 10' x 5'5"
23. Blueprint room - 10' x 17'
24. Instructor's platform: optional

⊙ 115-volt floor receptacles, flush mounted



INDUSTRIAL DRAFTING

VOCATIONAL INDUSTRIAL DRAFTING SUPPLIES

ACETATE FILM ROLL: for overhead projector

CLEANERS

- Correction solution
- Dusting powder for drafting tables
- Erasers

FASTENERS

- Drafting tape, opaque
- Drafting tape, transparent
- Rubber bands
- Staples
- Thumb tacks

MARKERS

- Drawing lead, for mechanical pencils
- File pads, for pencil pointing
- India ink, black
- Pencils, for drawing on transparent acetate
- Pencils, drawing: HB, F. 2H, and 4H
- Press-on letters, roll or sheet form
- Press-on symbols, roll or sheet form

PAPER

- Printing paper (for blueprints): 18" x 24"
- Non-reproducing paper, precut: 12" x 18"
- Vellum, precut: 8½" x 11"; 12" x 18"; and 24" x 36" (36" wide rolls)

FOUNDATION WALL FOOTINGS

Lesson Plan Code

OBJECTIVES:

1. The learner must be able to identify and list two types of wall footing construction from sample illustrations.
2. The learner must be able to identify, list, and describe six special features found in concrete slab and built up foundation footings.
3. The learner, when drawing a wall foundation footing, must be able to recall and apply, without assistance, drawing representation practices.

INSTRUCTIONAL MATERIALS:

1. Overhead projector, screen, and transparencies
2. Chalk and chalkboard
3. Straight edge
4. Pointer
5. Sample drawings or illustrations

INTRODUCTION:

The purpose of a house wall footing is to support the weight of the building and to distribute this weight to the ground below. Poured concrete is satisfactory and used widely as a material for footings.

PRESENTATION:

1. Construction of wall footings	Working drawings and illustrations
a. Types (1) Concrete slab (2) Built-up foundation	
b. Materials used in footings	

c. Forming and trenching	
d. Building code requirements	
e. Load-bearing requirements	
f. Footing sizes	
2. Special features	Working drawings and illustrations
a. Soils	
b. Reinforcement	
c. Moisture and vapor control	
d. Offsets	
e. Anchors	
f. Projections	
3. Drawing representation	
a. Symbols	
b. Scales	
c. Line technique	
d. Sections	

APPLICATION: Develop structural details for a concrete slab foundation footing.

TEST:

1. Complete the following statements by filling in the appropriate word or words in the space provided.

   1. The most common material used in wall foundation footings is ______________.

2. The slab and the footing are poured at the same time in a ____________ footing.

3. The [illegible] type and the building load will affect the footing ____________.

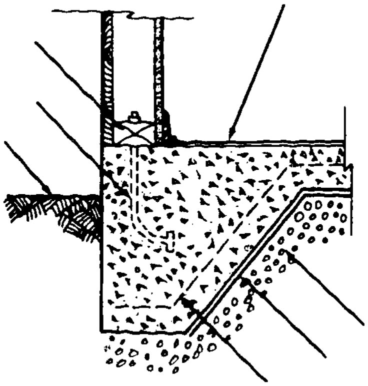
4. Concrete footing construction begins by ____________ or ________________.

5. Additional strength can be provided for footings by placing ____________ rods in footing.

6. The draftsmen can help economize on concrete by determining in the drawing where ____________ can be provided.

7. The footing sizes for ordinary residences are normally specified by local ________________________.

Identify and list under each drawing the type of footing construction represented. Name the special features identified on each drawing.



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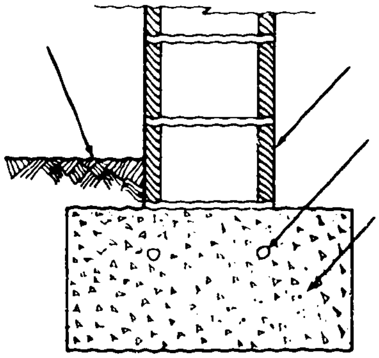

Type______________

STRAIGHT BOX CORNICE DRAWING

Job Sheet Code________

OBJECTIVES:

1. Given a straight box cornice illustration with a brief description of cornice construction features and dimensions, the learner must be able to develop in two class periods (6 hours) a sectioned straight box cornice with a 3/12 pitch roof complete with all details.
2. The learner must be able to describe on paper how four construction features could be changed to alter the appearance of a straight box cornice.

INTRODUCTORY INFORMATION:

In order to draw complete cornice details, the draftsman must at least have a basic understanding of cornice and wall construction. The ability to name the various members in cornice assembly will help to speed up the drawing process and insure a more complete detail drawing.

EQUIPMENT, TOOLS, AND SUPPLIES:

1. Drawing table: T square, stool
2. Brush, dust
3. Drafting instruments
4. Pencil
5. Pencil pointer
6. Scale, architect
7. Erasing shield
8. Triangle, 30-60°
9. Drafting tape
10. Non-reproducing paper, 12" x 18"

11. Dusting powder
12. Eraser

PROCEDURE:

Note: All features of this detailed section should be penciled in lightly at first and line emphasis developed later.

1. Align paper.
2. Fasten drawing paper to drawing board with tape.
3. Lay out a 3/12 slope-ratio pitch.
4. Lay out a rafter from the slope-ratio pitch with the bird's mouth resting on a double plate.
5. Draw lines to show break at the point of the wall where the section will begin.
6. Draw the stud from the break line to the double plate.
7. Develop the sectioned double plate.
8. Develop the outside wall sheathing on the stud to the top of the plate.
9. Develop the lookout blocks tied to the wall and rafter.
10. Draw the lookout plywood soffit board with a 3/8" outside projection to fit the fascia board groove.
11. Show a screened vent centered on the soffit board lookout.
12. Develop the sectioned roof decking on the rafter.
13. Show asphalt roofing paper applied to roof sheathing.
14. Develop roof shingles.
15. Develop ceiling joist flush with the outside stud wall.

16. Show insulation between ceiling joists.

17. Draw the fascia board with roof-pitch taper at top, flush with the roof decking top, and overhanging the soffit, with groove fitted to the plywood soffit.

18. Show metal flashing at the corner of the roof decking and fascia board. The flashing should be shown over the asphalt paper and overhanging the fascia board.

19. Show the sectioned gutter.

20. Draw the interior wall and ceiling finish.

21. Draw break lines at the ceiling and rafter

22. Show the trim and moulding at the intersection of the outside finished wall and soffit board.

PROBLEM:

Describe in complete sentences how you would change construction features of the above cornice to alter appearance if you were building your own home.

HOW TO APPLY PRESS-ON CONSTRUCTION SYMBOLS

Operation Sheet Code________

OBJECTIVE:

To select and apply with a burnishing stick press-on symbols on detail drawings of building constructions.

INTRODUCTORY INFORMATION:

Many detailed drawings of house plans require symbolic representation of such construction materials as brick, concrete, and metals. Proper representation of these may require several hours of drafting time on complex drawings. The use of press-on type symbols can reduce time while yielding a drawing which is acceptable in appearance and will make quality blueprints.

EQUIPMENT, TOOLS, AND SUPPLIES:

1. Drawing board, T square, stool
2. A drawing requiring construction symbols
3. Press-on symbols (sheet or roll form)
4. Burnishing stick

PROCEDURE:

1. Align the paper on the drawing table.
2. Attach the paper to the drawing table with drafting tape.
3. Select a symbol of the proper size and configuration.
4. Align the symbol on the drawing at the appropriate point. Be sure to place the adhesive side toward the paper.
5. Begin the transfer process by lightly burnishing the entire symbol to the applied area; after burnishing lightly, repeat the same process, but apply more pressure to the tool.

6. Make a visual inspection to see that the symbol has fully transferred.

7. Carefully pull back the sheet or tape.

Note: Some drawing papers have a coating to which the symbols will not adhere. Light erasure of the area before applying the symbol will roughen or remove this coating.

FOUNDATION WALL FOOTINGS

Information Sheet Code________

OBJECTIVES:

1. Given two factors that cause the earth's crust to go through periods of change, the learner must be able to recall and write three changes that take place.
2. The learner must be able to write the definition of "load-bearing capacity" of soils.
3. Given two methods for determining foundation wall concrete footing sizes, the learner must be able to give and apply the formula for both methods without assistance from the information sheet.

INTRODUCTORY INFORMATION:

A well-designed building requires that a firm foundation be constructed by starting below the surface of the soil. The footing is the base of the foundation and supports the superimposed load whether it be a concrete slab or built-up foundation. The following principles will explain the footing and load-carrying relationship; the next section will show how this principle is applied in planning various footing types and sizes for ordinary residential homes.

PRINCIPLE:

The earth's surface crust is continuously going through periods of contraction, expansion, and settling. There are many variations in the amount of this activity from one geographic location to another. Two factors affecting contraction, expansion, and settling are weather and soil conditions. Ice causes soil to expand, moisture causes soil to settle, and dry weather causes soil to shrink. The amount of this activity depends upon the soil type. It is important that these things be considered when drawing house foundation footings as a preventative for wall cracks, off-level floors, sticking doors and windows, and the danger of collapse.

The necessity for footings for buildings can be demonstrated by walking on soft ground or snow. Body weight causes one's feet to slide and sink. This can be prevented by extra wide supports on the shoe bottoms. In the same manner, a house will not rest securely without some form of support for the foundation. Additional width and depth of footings spreads the weight of the running foot over a greater area and gives the structure more footage.

There are tables which give load-carrying capacity of soils. Load-carrying capacity means the ability of soils to resist the sinking or settling of the foundation. As you might expect, solid rock has no limit. The kinds and sizes of footings for common residences must be determined by the draftsman in many instances. He must become familiar with the means for doing so. However, determining the load-carrying capacity of soils without the use of tables is generally the duty of engineers.

APPLICATION:

Many localities, especially cities, have building codes that specify the types and forms of foundation footings to be used in construction. The draftsman should have access to these codes and any other "guides" that affect the parties involved in residence construction. When specifications are not determined by codes, the draftsman must develop footing foundations to suit the home owner.

Generally, the footing for ordinary small residences is "stepped out" a distance from the foundation equal to ½ the wall width. The depth of the footing is equal to the width of the foundation. This is for normal soil conditions. Where the soil is soft, more depth and width is necessary. In extreme soil conditions of this nature, piers may have to be dug several feet below the surface and proper reinforcement placed in the footing and piers.

Designing footings for heavier-than usual houses requires more calculation. First, the load-bearing capacity of the soil in pounds per square foot must be found in prepared tables. The dead and live load of the building from the footing itself to the roof must be found and designated in pounds per square foot. There are prepared tables that indicate approximate weights of house materials. The total area of footing required per lineal foot of wall can then be determined by the following formula:

$$\text{Total area (sq. ft.)} = \frac{\text{Load}}{\text{Soil-bearing capacity}}$$

Footings for concrete slab foundations are quite different from those of conventional built-up foundations. Since they are part of the slab and the concrete is poured at the same time, they must be sloped on the inside to permit a good "tie" with the slab. The reinforcing materials in the footing should be properly tied to the slab reinforcement. Some building codes require an offset on the outside of the footing for the masonry wall to rest on.

It is essential that the draftsman include all details necessary for the construction of the desired foundation footings. Equally important is the development of the type of footing that will be most beneficial and economical to the home owner.

PROBLEM ASSIGNMENT:

Using the formula, find the total square foot area required for a wall foundation footing when the load- and soil-bearing capacity is given (check with the instructor). What size footing would be needed for an 8" foundation wall using the "stepped out" method?

FOUNDATION FOOTING DETAILS

Assignment Sheet Code ____________

OBJECTIVES:

1. To show material representation, notes, and dimensions on working drawings of concrete slab or built-up foundation footings.
2. To write a summary of three factors influencing the development of detail drawings of concrete footings.

INTRODUCTORY INFORMATION:

Detailed foundation footing drawings are essential members of the complete set of working drawings, especially for the more complex dwelling which may have several footing variations. Care must be taken by the draftsman in drawing details to include all necessary features.

REFERENCES:

Muller, Architectural Drawing, pp. 95-112, 211-216

Townsend and Dalzell, How to Plan a House, pp. 142-164

TOPICS FOR SPECIAL EMPHASIS:

1. Concrete slab and built-up foundation footing construction
2. Footing construction terminology
3. Two most common materials used for foundation footings
4. Three characteristics of materials in foundation beds
5. The importance of reinforcing steel in foundation footings
6. The relationship of footing detail drawings to the complete set of working drawings

7. Representation practices for detailed footing drawings

PROBLEM ASSIGNMENT:

Sketch from memory a foundation footing for a brick veneer wall. Add all details.

VT 016 180
TERRY, MARTHA, ED.
THE FOUR-STEP METHOD OF INSTRUCTION. A
PROGRAMMED COURSE FOR OCCUPATIONAL
INSTRUCTORS. MODULE 1.

REHABILITATION RESEARCH FOUNDATION, ELMORE,
ALA.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
OEC-2-7-006711-4542
PUB DATE - ND 23P.

DESCRIPTORS - *PROGRAMED MATERIALS;
INSTRUCTIONAL AIDS; *STUDY GUIDES; *TRADE AND
INDUSTRIAL TEACHERS; *EFFECTIVE TEACHING;
*TEACHER EDUCATION; TEACHER ORIENTATION

ABSTRACT - THIS MODULE IS THE FIRST IN A SERIES OF SIX WHICH CONSTITUTE A PROGRAMED COURSE IN TEACHING TECHNIQUES AND STRATEGIES OF INSTRUCTION FOR VOCATIONAL TEACHERS. DEVELOPED PRIMARILY FOR THOSE OCCUPATIONAL INSTRUCTORS WHO ARE SKILLED TRADESMEN, ASKED TO TEACH A COURSE, MODULE 1 ACTS AS AN INTRODUCTION TO THE TEACHING TASK AND CONTAINS INFORMATION RELATIVE TO THE UNDERLYING PURPOSE AND EXISTING NEED FOR THE PROGRAM. EMPHASIS IS PLACED ON ITS HELPFULNESS IN IMPROVING INSTRUCTIONAL COMPETENCY. OTHER COMPONENTS OF THE SET ARE AVAILABLE AS VT 016 181-VT 016 185 IN THIS ISSUE. (SN)

VT 016 180

THE FOUR STEP METHOD OF INSTRUCTION

A Programmed Course
For Occupational Instructors

MODULE 1

THE FOUR-STEP METHOD OF INSTRUCTION

A Programmed Course

for

OCCUPATIONAL INSTRUCTORS

Module 1

Developed by the

REHABILITATION RESEARCH FOUNDATION
Elmore, Alabama

John M. McKee, Ph.D., Director
Donna M. Seay, Assistant Director

Pursuant to a Contract with

U. S. Office of Education
Contract No: OEC2-7-006711-4542

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Manpower Development and Training
Georgia

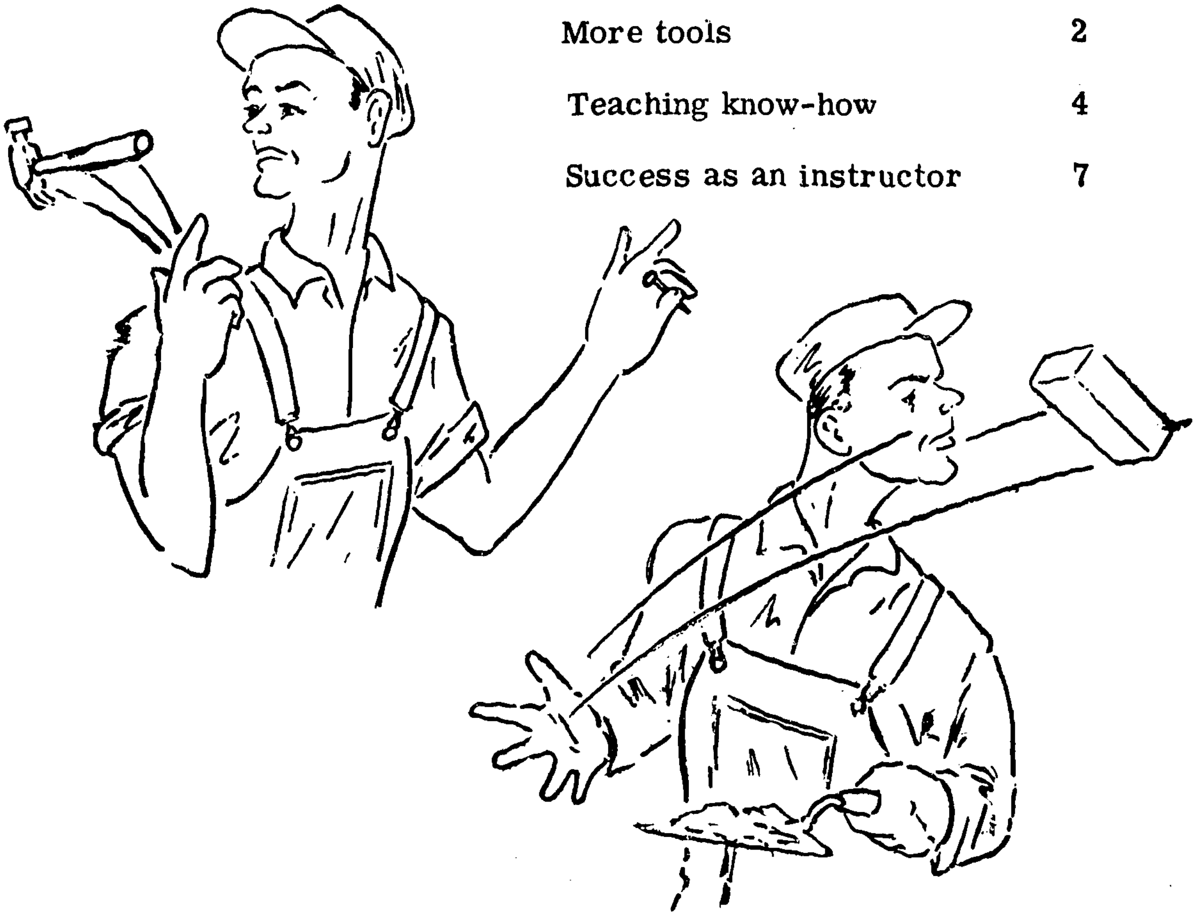
This program is designed for the skilled tradesman who has been asked to teach a course in his trade. Your reaction is, "But I already know my trade. I can show anybody in the world how to do it--backward, forward, or sideways." We know this. If you weren't one of the best in your trade, you would not have been chosen for this important job.

Suppose, however, that you are a bricklayer. You can lay brick better than any man in your county. How well could you lay brick without the brick? How far would a good carpenter go without a hammer? There is a tool that you need to do the new job you've been hired to do. Without it, you might get by, but you would have to learn to teach the hard way--by trial and error. That tool is "teaching know-how"!

Now we will give you a chance to see how this program works. Answer the following question by choosing the letter to the right of the correct answer. Then turn to the frame number indicated next to that response.

What do I need that this program can give me?

	FRAME NO.
More tools	2
Teaching know-how	4
Success as an instructor	7



(from Frame 1) 2

YOUR ANSWER: This program can give me more tools that I need in order to teach.

Let me caution you right now--be sure that you read very carefully each answer selection. Do not choose the first one simply because it sounds right. Sometimes answer choices will be partially right, but you must read and think through each answer choice to make sure you select the one that is completely correct.

We did refer to the "tools" that an instructor needs; of course, we were not saying that you would actually need more implements of your trade. We were simply using the examples of the carpenter and the bricklayer to show that, just as they need the tools of their trades to do their jobs well, you need the "tools" of the teaching trade (knowledge of lesson planning, a workable plan for instruction, understanding of the use of teaching aids and materials, and familiarity with the teaching principles that will make your teaching work) to do a good job of instructing and to make your job easier.

This frame may have caught you unaware. If you need to, you may return and read over the last frame before choosing another answer. If you just need to pay closer attention to the answer choices, you may go back to frame 1 and select the correct response.

(from Frame 4) 3

YOUR ANSWER: We have chosen Mr. Bright as an illustration of your teaching task because he is an experienced instructor.

No, Mr. Bright has never taught before. He is the owner of a tour guide service. He is in the same position that you are. He knows his trade, but he knows little about teaching. He realizes that anyone can show another person how to do something, but there is more to teaching than showing.

Return to frame 4 and re-read the material before making another answer selection.

(from Frame 1)

YOUR ANSWER: This program can give me some of the teaching know-how that I need in order to teach.

Good! You realized that we were not literally saying that you need more tools; we could not possibly know how well-equipped you are in that respect. We do know, however, that you have had little or no teaching experience or teacher training. That is why we have written this program. You need help. We know a method of instruction that really works, and we want to give you the chance to learn it. In other words, we have a "tool" for you. Once you have used it, you won't be without it! The ability you have as a skilled tradesman + the teaching knowhow we will offer you = a good vocational instructor!

You have started out on the right foot! Now is a good time to introduce you to Mr. Bright. Mr. Bright is the owner of Bright Tour Guide Service. He has a reputation for excellent service and a thorough knowledge of all the places of interest in his state. He is so good, in fact, that the State Chamber of Commerce has asked him to conduct a special tour. He will guide a committee to all the places of interest in the state so that they can prepare new material to attract tourists to this state. In other words, he will be teaching them the points of interest in the state and the facts and history connected with each.

GO ON TO THE NEXT PAGE.

(frame 4 continued)

Mr. Bright, we would like for you to meet our prospective vocational instructor:

You two have much in common. Mr. Bright knows his trade better than anyone in his state, but he knows nothing at all about teaching. He is asking himself, "What points of interest will they specifically need to see? What do they already know about these places. What will they need to know? What must I do to prepare for this tour? How much time will we have? What kind of equipment and materials will I need to take with me?" These are some of the same questions that you ask yourself as you prepare to teach.

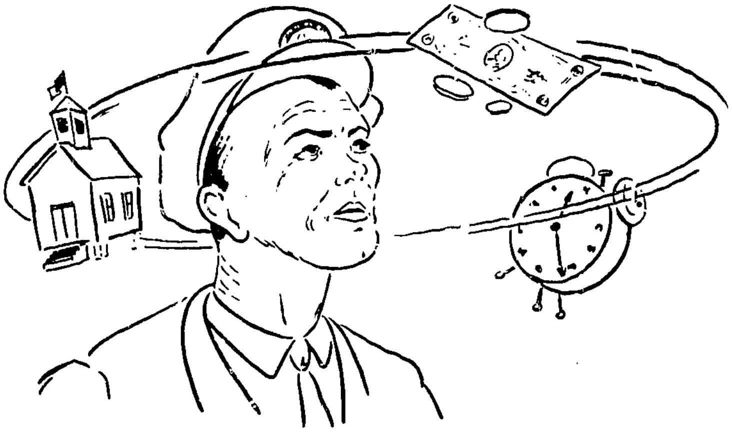
Why have we chosen Mr. Bright as an illustration of your teaching task?

	FRAME NO.
Because Mr. Bright is an experienced instructor	3
Because Mr. Bright is skilled in his trade	6
Because Mr. Bright is skilled in his trade but has never taught before	10

YOUR ANSWER: One important advantage of this program is that it allows me to pace myself.

Good! By arriving at this frame you have moved yourself forward. If you can answer the questions quickly and show an understanding of the material, you will be able to move forward quickly. However, even if you do not miss a question you may wish to review material before going ahead, and you can do this, too.

A programmed lesson, then, was chosen for you because it allows you to move at your own speed and because you need help immediately. Other considerations had to be kept in mind, too. Why not send you to school for the training you need? You are more than likely already on the job; school would be time-consuming, and regardless of how quickly you could advance you would still have to go at the rate of the rest of the class. The shortest course would probably last from four to six weeks and might not offer the information you need most--a plan of action that you can use with your classes now! The course would be an added expense to you as well. It might even require you to drive many miles to attend the classes.



Why wouldn't a teacher training course at an educational center be better for me than this programmed lesson?

	FRAME NO.
Because it wouldn't be as thorough as this program.	8
Because this program was written to suit my particular needs.	14
Because this program is easier to take than a course in teacher training.	17

(from Frame 4)

6

YOUR ANSWER: We have chosen Mr. Bright as an illustration of your teaching task because he is skilled in his trade.

This answer is partially correct. Mr. Bright is a skilled tradesman, but his problem like yours, is complex. He has been asked to teach what he knows about his trade to others.

By observing Mr. Bright you will be able to understand better how to go about preparing to teach and actually instructing.

Make sure you read each answer choice before making your selection. Return now to frame 4 and select the correct answer.

(from Frame 1)

7

YOUR ANSWER: This program can give me success as an instructor.

No one can give you success. Success is something thay you must work for. You can give a chef the ingredients to make a cake, but how he mixes it will determine how the cake turns out. We will give you some of the "ingredients" necessary to be a successful instructor. Then it is up to you to use them properly.

Ask yourself, "What 'ingredient' do I need most to be a good instructor?" The answer to this question will be the right answer choice for the previous frame. Return now to frame 1 and make the correct selection.

(from Frame 5)

8

YOUR ANSWER: A teacher training course at an educational center wouldn't be better than this programmed lesson because it wouldn't be as thorough as this program.

If we thought that programmed instruction was the most thorough method of instruction, we would not be wasting the time to help you learn to teach. We would replace you entirely with programmed lessons. This program might or might not be as thorough as a teacher training course; we would assume that a course would be more thorough, for it takes much longer and offers a variety of teaching methods if it is taught well. How thorough the course is would depend largely upon the teacher's ability.

You, however, have special needs--among which is speed. If a person injured in an accident has broken his leg and has also lost a lot of blood, which condition would you treat first? You would stop the blood flow, wouldn't you? The broken leg won't cost him his life, but loss of blood well might!

We have diagnosed your problems and have come up with a temporary solution to aid you. Return now to frame 5 and answer correctly.

(from Frame 10)

9

YOUR ANSWER: One important advantage of this program is that it teaches me everything I need to know about teaching.

To learn everything you need to know about teaching would take several years of teacher training and psychology courses plus years of experience. All we can expect to do in this program is to make available to you a convenient, practical lesson that gives you a plan of action to use immediately.

In order to select the correct response, ask yourself, "who determines when I am ready to go ahead in a lesson? Who determines if I need to review certain information?" You are ready to return to frame 10 and make the correct response now.

(from Frame 4)

10

YOUR ANSWER: We have chosen Mr. Bright as an illustration of your teaching task because he is skilled in his trade but has never taught before.

Yes! We thought it might be easier for you to understand the task before you if you could compare yourself with an imaginary character who faces a similar problem. As we discuss each step, Mr. Bright will show you how he used that step in his own situation.

Every part of this program was designed with you in mind. We analyzed your problems very carefully. You are a busy person. More than likely, you have already begun to teach. You need help NOW. Programmed instruction such as this allows you to study whenever you have the time. You are also free to review material if you need to before going on to the next frame. In other words, you determine how fast or how slowly you need to go.

What is one important advantage of this program?

	FRAME NO.
It allows me to pace mysel	5
It teaches me everything I need to know about teaching.	9
I do not have to take tests.	12

YOUR ANSWER: This program offers to help you become a better instructor by teaching you how to use the "Four-Step Method of Instruction."

You are correct! You are like someone who has been thrown into an airplane and told to fly it. You have to do it, yet you don't even know how to start the engine. You need a quick lesson that will get you off the ground and return you to earth safely. That is what the "Four-Step Method" is all about.

An instructor who does not know what he is doing in the classroom sticks out like a sore thumb. The trainees sense his uneasiness and lose confidence in his ability. By having a course of action, you will gain poise and confidence in yourself. You won't be standing in the classroom asking yourself, "What do I do next?"

Which saying best explains how learning the "Four-Step Method" gives you self-assurance?

	FRAME NO.
"If ignorance is bliss, 'tis folly to be wise." Gray	13
"A little learning is a dangerous thing." Coleman	16
"Knowledge is the antidote (remedy) to fear." Emerson	19

(from Frame 10) 12

YOUR ANSWER: One important advantage of this program is that I do not have to take tests.

Maybe we'd better ask ourselves what a test is. A test "evaluates" someone's knowledge or performance. Evaluate means to place a value upon. You might call it a "measuring stick." By measuring ourselves we can determine if we have "grown" or take action to decide what we need in order to grow. Each time you turn a page, you evaluate yourself. If you arrive at the wrong answer frame, you tell yourself that you need to read more carefully or that you should read the answer choices more thoughtfully. When you arrive at a right answer frame, you can see your progress and have a feeling of accomplishment.

Anytime you try something new, you are testing your ability. The more success you have with your trial, the more you'll work to succeed. Look at testing in a positive manner; your attitude will be contagious to your trainees.

This program does give you a chance to measure your progress, so there must be an answer which correctly responds to the question. Return to frame 10 and find it, please.

(from Frame 11) 13

YOUR ANSWER: The saying which best explains how the "Four-Step Method" can give you self-assurance is, "If ignorance is bliss, 'tis folly to be wise."

In some cases this might apply, but in your case ignorance would NOT be bliss! Your trainees will tend to remember another old saying, "He who knows not and knows not that he knows not is a fool--shun him!" If you apply yourself to learning the "Four-Step Method" and anything else that will help you be a good instructor, they will think of the rest of this saying, "He who knows and knows that he knows is wise--follow him."

Return to frame 11 and read the question carefully before making another choice.

YOUR ANSWER: A teacher training course at an educational center wouldn't be better than this programmed lesson because this program was written to suit my particular needs.

Certainly! A classroom has all kinds of people with all kinds of needs. This program was designed specifically for you--for your convenience and as a solution to your immediate problems.

By this time you are asking yourself, "All right, so I can study on my own time; so I can pace myself. This is all fine, but how will this program help me? What will it teach me that I can actually use in the classroom?" What do you need more than anything else right now? Do you know how to plan lessons? What is the best way to instruct? How will you know when the trainees have learned? How do you select and use teaching aids and materials? What are some of the principles of learning that will help the trainee be successful?

We have a product to offer guaranteed to provide immediate relief from these questions. It is called the "Four-Step Method of Instruction." Taken as prescribed, it will painlessly prepare the student to learn, completely heal raw presentations, help the trainee to learn to stand on his own two feet, and put him on the outpatient list. It is divided into four doses. The first dose is labeled, "Preparation"; the second, "Presentation"; the third, "Application"; and the fourth, "Evaluation."

GO ON TO THE NEXT PAGE.

(frame 14 continued)

What does this program offer to teach you that will help you to be a better instructor?

	FRAME NO.
How to use the "Four-Step Method of Instruction."	11
How to prepare the student to learn.	15
What aids and materials I need in order to instruct.	20

(from Frame 14) 15

YOUR ANSWER: This program offers to help you be a better instructor by teaching you how to prepare the student to learn.

This is an important part of the program, but where would you go from there? Suppose you were going to take a trip from Washington, D. C. to New York City. All the road maps you could find marked the highways between the two cities only one-fourth of the way. You would be left in the middle of the road not knowing where to turn.

This program has mapped out one course of action to guide you successfully through each lesson you teach. Preparation of the learner is only one-fourth of the task.

Return to frame 14 and reread the frame carefully before making another selection.

(from Frame 11) 16

YOUR ANSWER: The saying which best explains how the "Four-Step Method" can give you self-assurance is, "A little learning is a dangerous thing."

This may be true, but how much more dangerous is it NOT to know that nitro-glycerin is a powerful explosive than it is to be aware of this fact if you're driving a tank truck full of it? A better saying for you to remember might be, "Can the blind lead the blind? Might they not both fall into the ditch?"

Return now to frame 11 and make a better selection.

(from Frame 5) 17

YOUR ANSWER: A teacher training course at an educational center wouldn't be better than this programmed lesson because this program is easier to take than a course in teacher training.

It is true that a programmed lesson is easy to take. This is one reason that programmed lessons are good supplementary materials to be used in the classroom. A poor program can be a waste of time, too. Unless the program is suited to the person who takes it, it has no value at all.

There is a response which better answers the question. Return to frame 5 and find that response.

(from Frame 26) 18

YOUR ANSWER: The most important advantage of this program is that it replaces instructors.

This program is not designed to replace instructors. In your case, it must be used as a substitute for an instructor. You may not be close enough to a school which offers teacher training; you may not have the money that such a course would require; because you are already teaching, you might not have the time if you have the money.

We hope you will use appropriate programmed lessons in your own teaching, but not as a substitute for the instructor. As you will learn, programmed lessons are like all good teaching aids: They should not be used by themselves to teach; they are used to best advantage when they help the instructor to get the point across.

Now you may return to frame 26 and select the correct response.

(from Frame 11)

19

YOUR ANSWER: The saying which best explains how the "Four-Step Method" can give you self-assurance is, "Knowledge is the antidote to fear."

Very good! People were afraid to venture across the Atlantic Ocean in Columbus' day simply because they did not know what lay beyond and were afraid. Now, because we know what to expect, we think nothing of going around the world. The more you know about teaching, the easier it will be for you. The "Four-Step Method" will give you something concrete to start from so that you can have confidence from the beginning.

Let's see how well-prepared you are to begin your study of the "Four-Step Method." Please turn to frame 22.

(from Frame 14)

20

YOUR ANSWER: This program offers to help you become a better instructor by teaching you what aids and materials you need in order to teach.

Aids and materials are like the decorations on a cake. They aren't absolutely necessary but they surely do make the cake look more appetizing and taste better. We will tell you about the use of aids and materials, but dessert doesn't make the meal. We want to give you something more substantial to go along with it.

Read again the information in frame 14 to discover the plan of instruction that this lesson will offer you. Then you may make another selection.

(from Frame 26) 21

YOUR ANSWER: The most important advantage of this program is that it doesn't cost me anything.

Have you ever gotten something for nothing? This program will cost you a little of your time and effort; if you use both wisely, though, you will find that you will have to spend less time and effort than if you have to learn to be a good instructor the hard way--by blind experience.

Anything worthwhile costs you something. Keeping this in mind, look again at frame 26 and select the best response.

(from Frame 19) 22

Why was this program developed?

	FRAME NO.
To help me become a better instructor.	24
To replace other means of teacher training.	25
To squeeze a whole course in teacher training into one short lesson.	28

(from Frame 30) 23

YOUR ANSWER: I expect to learn nothing of any consequence from this program.

Where have we gone wrong? I think our first mistake was in giving you this answer choice! You are naturally doubtful of the merit of this program at this point. The most important ingredient for any new venture -- especially this one--is that you put yourself into it wholeheartedly. The old saying, "You usually get out of something what you put into it," is quite true.

With this in mind, put yourself into choosing the correct answer! Return to frame 30, please.

(from Frame 22) 24

YOUR ANSWER: This program was developed to help me become a better instructor.

You are correct! We know that you have the potential, or we wouldn't waste our time trying to help you. You are skilled in your trade; you simply have had no need for a course in teaching techniques and principles until now. You, like Mr. Bright, have an important task to accomplish and everything you need to accomplish this task except teaching know-how. You are like a good plumber who has all the tools he needs for the job except one. We will try to supply you with this tool so that you will have all the confidence and ability you need to perform your task completely.

Turn to frame 26 for your next question.

(from Frame 22) 25

YOUR ANSWER: This program was developed to replace other means of teacher training.

Once you have examined this answer, I think you will realize why it is not correct. It would be impossible to replace all other programs of teacher training with one programmed course. You need help now; you do not have time to go to a school for instruction. We cannot offer everything you need to know. All we can do is to give you some useful hints that will make your job easier and your teaching more effective.

With this in mind, return to frame 22 and select the correct answer.

(from Frame 24) 26

What is the most important advantage of this program?

	FRAME NO.
It replaces instructors.	18
It doesn't cost me anything.	21
It allows me to progress at my own speed.	27

Program Goal 3.1 - Unit D
Form #1

Aptitudes

Student's Name ______________________________ Date __________

Identify at least three (or more) occupations in which you are interested and in which it is likely that you would be successful according to your aptitude test results.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________

Write a brief paragraph on which of the occupations you listed are most interesting and/or appropriate for you, and why.

____

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Program Goal 3.1 - Unit D
Form #2

Skills Inventory

Student's Name ______________________________ Date ____________

As a result of class discussion on occupational skills, list your own skills, beginning with the skill in which you have greatest ability and continuing to the skill in which you have only a little ability.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________

Which of these skills do you think will be of greatest use to you in an occupation which interests you? ______________________________

What other skills would you like to develop? Where and how can you develop them?

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UNIT E - WORKING PREFERENCES

Estimated Completion Time of 20 Minutes

Activities

1. As an introduction to Unit E and to encourage students to take part in class discussion, the following information may be presented to the class:

    Some people are basically outgoing and prefer to be in the company of others most of the time. They enjoy talking with people and are never at a loss for words. They may even find it a special challenge to convince others to see things their way. Such people often make good salespersons and gain much personal fulfillment from this work. Others are not so socially inclined and prefer to be alone much of the time, or perhaps in the company of only one or two others. These people are usually less talkative, less persuasive. They seldom make good salesmen. Many of us have personalities somewhere between these two rather extreme types.

    Some occupations require that you work directly with other people a great deal of the time while other occupations allow infrequent contact with others. Some occupations also require that you work with data, things, or ideas. Whether you are satisfied with a career will depend, in part, upon whether you are well-suited to its demands for working with people, data, things, ideas, or combinations of these relationships.

2. As a group discussion activity, each person in class is to explain why he thinks he would be most satisfied in an occupation which calls for him to work in one of the following categories:

FREQUENT CONTACT WITH PEOPLE	LITTLE CONTACT WITH PEOPLE
a. Working with DATA only	a. Working with DATA only
b. Working with DATA & THINGS	b. Working with DATA & THINGS
c. Working with DATA, THINGS, & IDEAS	c. Working with DATA, THINGS, & IDEAS
d. Working with THINGS & IDEAS	d. Working with THINGS & IDEAS
e. Working only with IDEAS	e. Working only with IDEAS
f. Working only with THINGS	f. Working only with THINGS

3. After completion of the discussion, students are to complete Form #1 on the following page which can be duplicated for class use.

Program Goal 3.1 - Unit E
Form #1

Working Preferences

Student's Name ____________________ Date __________

As a result of your class discussion and your own feelings about yourself, do you think that you would enjoy working in an occupation in which you have frequent contact with people you do not know? ____________________

Would you enjoy working in an occupation in which you work with ten or more people on a regular basis? ____________________

Would you enjoy working in an occupation in which you work closely only with two or three other people on a regular basis? ____________________

Would you enjoy working in an occupation in which most of your duties and responsibilities are carried out alone? ____________________

Indicate by writing 1 for your first choice, 2 for your second choice, etc., in the spaces before each statement concerning working relationships:

_______ Working with data only.

_______ Working with data and things.

_______ Working with data, things, and ideas.

_______ Working with things and ideas.

_______ Working only with ideas.

_______ Working only with things.

UNIT F - ATTITUDES

Estimated Completion Time of One 50-Minute Period

Activities

1. As a group, students are to complete the Attitudinal Inventory on the following pages which can be duplicated for class use. To prepare the class for this activity, the following material may be presented:

   > Of the beginning and young workers who lose jobs, by far the greatest cause of the job losses is their lack of an attitude which the employer feels is appropriate. If your own values are not compatible with what your employer feels is important to carrying out your occupational responsibilities, you probably won't have a job very long. To help you appraise your own attitudes toward other people, complete the additudinal inventory provided.

2. Following the completion of this inventory, students are to score their own forms. A brief discussion of the significance of these inventories to probable success on the job may be beneficial.

3. To dramatize the affect of workers' attitudes on the job, the following situation may be presented by assigning roles to individual students:

   > John is the manager of a local drive-in hamburger stand. Larry has been working for John in the evenings and weekends for about a year. Larry has learned to fry hamburgers, make malts and shakes, take orders, make change rapidly, and is sometimes left in charge of the business. Because of an increase in business, John decided to hire another part-time boy for the evenings. Of several boys who applied for the job, Richard was hired. During the interview, John briefly mentioned some of the duties Richard would be expected to assume, but John did not refer to the necessary cleaning up which required about half-an-hour after closing each night. During the first three days at work, Richard performed his duties well but left all the cleaning up to Larry. Larry didn't think this was fair and mentioned it to John. John calls Larry aside and requests that he do his share of the cleaning, but Larry feels he was not hired to do clean-up work. (Students act out the parts and either resolve the problem or Richard is fired.)

Program Goal 3.1 - Unit F
Form #1

Attitudinal Inventory[4]

Student's Name ______________________________ Date __________

This inventory is designed to help you appraise your own attitudes toward others. Perhaps you will get a glimpse of yourself as others see you!

Read each question and answer honestly. Write the number that represents your answer in this way: 5=definitely yes; 4=mostly yes; 3=undecided; 2=mostly no; 1=definitely no.

ANSWERS

_______ 1. Do you make new friends easily?

_______ 2. Do you refrain from being a complainer?

_______ 3. Are you careful not to interrupt when another person is speaking?

_______ 4. Can you be optimistic when others around you are depressed?

_______ 5. Do you refrain from boasting or bragging?

_______ 6. Do you control your temper?

_______ 7. Are you genuinely interested in the other person's point of view?

_______ 8. Do you speak well of your employer (if employed)?

_______ 9. Do you keep the same friends for years?

_______ 10. Do you feel well most of the time?

_______ 11. Do you use proper English?

_______ 12. Do you keep promises?

_______ 13. Are you at ease with the opposite sex?

_______ 14. Do you have good table manners?

_______ 15. Do you organize your work and keep up with it?

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[4] Grady Kimbrell and Ben S. Vineyard, Succeeding in the World of Work (Illinois: McKnight & McKnight Publishing Company, 1970), pp. 135-137.

_______ 16. Do you get along well with your parents?

_______ 17. Do you readily admit your mistakes?

_______ 18. Can you be a leader without being bossy?

_______ 19. Is it easy for you to like nearly everyone?

_______ 20. Can you stick to a tiresome task without being prodded?

_______ 21. Do you finish each task you begin?

_______ 22. Do you realize your weaknesses and attempt to correct them?

_______ 23. Can you take being teased?

_______ 24. Do you avoid feeling sorry for yourself?

_______ 25. Are you courteous to your fellow workers and classmates?

_______ 26. Are you usually well groomed and neatly dressed?

_______ 27. Are you a good loser?

_______ 28. Do you enjoy a joke even when it is on you?

_______ 29. Do you like children?

_______ 30. Do you keep your own room in good order?

_______ 31. Are you aware of the rules of etiquette?

_______ 32. Do you refrain from giving alibis?

_______ 33. Are you tolerant of other people's beliefs?

_______ 34. Do you respect the opinions of your parents?

_______ 35. Do you introduce people easily and correctly?

_______ 36. Do you refrain from pouting when things go differently than you would like?

_______ 37. Are you a good listener?

_______ 38. Can you speak before a group without feeling self-conscious?

_______ 39. Do you like to attend parties?

_______ 40. Are you the kind of friend you expect others to be?

_______ 41. Do you accept compliments and gifts graciously?

Attitudinal Inventory (Continued)

_______ 41. Do you accept compliments and gifts graciously?

_______ 42. Can you disagree without being disagreeable?

_______ 43. Do you like to give parties?

_______ 44. Are you on time for social engagements?

_______ 45. Do you generally speak well of other people?

_______ 46. Do you usually take criticism without being resentful or feeling hurt?

_______ 47. Are you careful to pay back all loans, however small?

_______ 48. Are you always on time for your classes in school?

_______ 49. Does your voice usually sound cheerful?

_______ 50. Do you work well with those you dislike?

_______ 51. Do you contribute to the conversation at the family dinner table?

_______ 52. Do you try as hard to get along well with your family as with your friends?

_______ 53. Do you like people who are much older than you?

_______ 54. Are you pleasant to others even when you feel out of sorts?

_______ 55. Are you free from prejudices?

There are 55 questions; a perfect score would be 275. If you rate from:

250 - 275 You're too good to be true.

200 - 249 Your attitude toward others is commendable.

150 - 199 Your attitude needs improvement in certain areas.

Below 150 You need a general overhauling!

UNIT G - SUCCESS MOTIVATION

Estimated Completion Time of 50 Minutes

Activities

1. As a class activity, the meaning of success motivation and its relationship to present school activity may be discussed. To introduce this subject, the following material may be presented to the class:

   Success is the progressive realization of worthwhile goals. Those who progressively realize worthwhile goals, who are successful, all have one thing in common: a desire to succeed! This is the one most common characteristic among the most successful young men and women in a recent survey. The degree to which you are success motivated is indicated partly by the grades you have attained and your attendance in school. These also have special significance when considering possible career goals because many careers require years of post-high school education. However, unless you have set some realistic, worthwhile goals, it is not likely that your success motivation will be at a high level. If you know where you are going, you have a better chance of getting there! Success and goal setting are dependent upon each other. Unless you have set some appropriate goals, you will not likely be highly motivated--and unless you are achieving in school, certain goals soon become unrealistic for you.

2. Upon completion of the discussion, students are to complete Form #1, Success Motivation, on page 77 which can be duplicated for class use.

3. Students are to discuss the advantages of accomplishing certain goals before accomplishing others. This activity may be introduced by presenting the following material to the group:

   The education you desire will depend upon your success motivation in school and your career goal. The education you can afford financially will depend upon certain priorities. The list of behavioral activities we will discuss represents goals which require decisions of priority by young people.

PERSONAL GOALS

a. Begin full-time work

b. Get married

c. Rent an apartment

d. Buy a car

e. Buy a home

f. Buy furniture

g. Continue your education

h. Enter military service

After completion of the discussion, students should complete Form #2. Personal Goals, on page 78 which can be duplicated for class use.

Program Goal 3.1 - Unit G
Form #1

Success Motivation

Student's Name ______________________________ Date __________

What is your overall grade average in school? ______________

Of all the classes you have taken in school, which have been your favorites, and what grades did you earn in them?

CLASSES	GRADES
______________________	_____
______________________	_____
______________________	_____
______________________	_____

Write a paragraph explaining:

1. How you will know when you have become successful.
2. How motivated you are to succeed.
3. Whether, how, and when you may become motivated to a greater extent than you are now.

____

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Program Goal 3.1 - Unit G
Form #2

Personal Goals

Student's Name ______________________________ Date __________

As a result of the class discussion and your own feelings about your personal goals, list the following eight personal goals in the order you hope to accomplish them: first, second, etc.

1. Begin full-time work
2. Get married
3. Rent an apartment
4. Buy a car
5. Buy a home
6. Buy furniture
7. Continue my education
8. Enter military service

YOUR PRIORITIES

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________

Considering the list of priorities which you have just completed, how long do you feel you wish to delay taking full-time employment? ______________

How much post-high school education do you realistically desire and expect? ______________________________

How much will this education cost you? ______________

How do you expect to pay for this education? ______________

____

PROGRAM GOAL
3.2 (E and G) Identify a variety of possible career choices for you and group them into occupational clusters

UNIT A - OCCUPATIONAL RELATIONSHIPS

Estimated Completion Time of 25 Minutes

Activities

1. Based upon what class members have learned about their occupational interests, their values and lifestyle aspirations, and their aptitudes, students are to list at least four unrelated occupations on Form #1, Occupational Relationships, (to be duplicated from the following page) and indicate to which of the fifteen occupational clusters each occupation belongs.

2. Students are to identify at least one alternate occupational choice which is related to the four occupations identified first. These are also to be listed on Form #1.

Program Goal 3.2 - Unit A
Form #1

Occupational Relationships

Student's Name ________________________________ ____________

List at least four unrelated occupations which se [illegible] considering your interests, values and lifestyle aspirations, [illegible] udes. Then indicate which of the fifteen occupational clusters listed at the bottom of the page encompasses each occupation.

OCCUPATIONS	OCCUPATIONAL CLUSTERS
1. ____________________	____________________
2. ____________________	____________________
3. ____________________	____________________
4. ____________________	____________________
5. ____________________	____________________

Identify at least one alternate occupational choice which is related to the ones identified above.

RELATED OCCUPATIONS

1. ____________________	____________________
2. ____________________	____________________
3. ____________________	____________________
4. ____________________	____________________
5. ____________________	____________________

OCCUPATIONAL CLUSTERS

A. BUSINESS AND OFFICE OCCUPATIONS
B. MARKETING AND DISTRIBUTION OCCUPATIONS
C. COMMUNICATIONS AND MEDIA OCCUPATIONS
D. CONSTRUCTION OCCUPATIONS
E. MANUFACTURING OCCUPATIONS
F. TRANSPORTATION OCCUPATIONS
G. AGRI-BUSINESS AND NATURAL RESOURCES OCCUPATIONS
H. MARINE SCIENCE OCCUPATIONS
I. ENVIRONMENTAL CONTROL OCCUPATIONS
J. PUBLIC SERVICES OCCUPATIONS
K. HEALTH OCCUPATIONS
L. HOSPITALITY AND RECREATION OCCUPATIONS
M. PERSONAL SERVICES OCCUPATIONS
N. FINE ARTS AND HUMANITIES OCCUPATIONS
O. CONSUMER AND HOMEMAKING-RELATED OCCUPATIONS

PROGRAM GOALS

3.2 (V) Explore the current and emerging opportunities for employment in your present assignment and for advancement within related occupations

3.3 (E) Explore the current and emerging opportunities for employment in selected careers

3.3 (G) Explore the current and emerging opportunities for employment in the cluster of occupations related to your present employment

UNIT A - RESEARCHING OPPORTUNITIES

Estimated Completion Time of Two 50-Minute Periods

Activities

1. Using such sources as the Occupational Outlook Handbook, Bulletins from the Department of Labor and the Department of Human Resources Development, etc., students are to research the current and emerging opportunities for employment in two related occupations of the student's choice. This data is to be recorded on Form #1, Current and Emerging Opportunities, which may be duplicated from the following page for class use.

2. Students are to delineate current and emerging opportunities in occupations of their own selection by preparing a large bar graph. The size of the cardboard material on which the graph is to be drawn will determine how many students can take part in this activity together.

Alternate Activities

3. Students are to interview two working adults in each of two selected occupations to determine the workers' views of current and emerging opportunities for employment in their respective fields. This data is to be recorded on Form #1 which may be duplicated from the following page for class use.

4. Based upon the data collected in the previous activity, each student is to present a brief oral report, using the chalkboard to illustrate current and emerging opportunities locally, statewide, and nationally in the occupations he has researched. Current opportunities should be compared with anticipated needs during the next five years.

Program Goals 3.2 (V), 3.3 (E and G) - Unit A
Form #1

Current and Emerging Opportunities

Student's Name ________________________________ Date ______________

As a result of your research and class activities, list two occupations in which you are interested and indicate whether the opportunities are great or limited locally, statewide, and nationally. [illegible], indicate whether each occupation will require a growing number of workers during the next five years.

______________________________ (Name of first occupation)	______________________________ (Name of second occupation)
Opportunities locally are:	Opportunities locally are:
____Great	____Great
____Average	____Average
____Limited	____Limited
Opportunities elsewhere in California are:	Opportunities elsewhere in California are:
____Great	_____Great
____Average	_____Average
____Limited	_____Limited
Opportunities elsewhere in the United States are:	Opportunities elsewhere in the United States are:
____Great	_____Great
____Average	_____Average
____Limited	_____Limited
Opportunities in this occupation seem to be:	Opportunities in this occupation seem to be:
____Increasing	_____Increasing
____Decreasing	_____Decreasing

PROGRAM GOALS

3.3 (V) Identify the educational and training requirements of your present employment and compare them to the requirements for advancement within related occupations

3.4 (E) Identify the educational and training requirements of selected careers

3.4 (G) Identify the educational and training requirements of your present employment and compare these to the educational and training requirements of other careers

UNIT A - RESEARCHING REQUIREMENTS

Estimated Completion Time of Two 50-Minute Periods

Activities

1. Using such sources as the Occupational Outlook Handbook, Bulletins from the Department of Labor and the Department of Human Resources Development, etc., students are to research the educational and training requirements of the occupations selected. This data is to be recorded on Form #1, Educational and Training Requirements, which may be duplicated from the following page for class use.

2. Students are to delineate educational and training requirements of all occupations researched by preparing a horizontal bar graph on a large piece of cardboard. Several sections of cardboard will be required for a class of 30, with four to six students working on each section. The sections may then be fastened together for display.

Alternate Activities

3. Students are to interview two working adults in each of two selected occupations to determine the workers' views of the educational and training requirements of their respective fields. This data is to be recorded on Form #1 which may be duplicated from the following page for class use.

4. Students should be assigned in groups of three or four, according to related occupational interests, in order to present a series of short panel presentations and discussions concerning the educational and training requirements. The basis for the panel presentation will be the information recorded as a result of students' interviews with workers in the occupational fields which interest them.

Program Goals 3.3 (V), 3.4 (E and Unit A
Form #1

Educational and Training Requirements

Student's Name ______________________________ Date ____________

Based upon your research and your class activities, list two occupations in which you are interested and indicate the educational and training requirements for: (1) the beginning worker, and (2) for advancement in this occupation.

______________________________	______________________________
(Name of first occupation)	(Name of second occupation)

PROGRAM GOALS

3.4 (V) Compare the educational and training requirements needed for advancement within occupational areas related to your present assignment to your potential for success in them

3.5 (E and G) Compare the educational and training requirements of a variety of careers to your potential for success in those careers

UNIT A - CAREER PROFILE ANALYSIS

Estimated Completion Time of One 50-Minute Period

Activities

1. Determining whether a career goal is realistic and appropriate for a person is an individual matter. Based upon the information and experiences obtained during his related instruction in work experience education, each student is to complete Form #1, Career Profile Analysis, which may be duplicated from the following page for class use.

Program Goals 3.4 (V) and 3.5 (E and G) - Unit A
Form #1

Career Profile Analysis

Student's Name ______________________________ Date __________

Based upon your occupational research, class activities, and the information recorded previously on the forms provided for students included in this chapter, complete the following profile information:

A. My top three interest areas according to the interest inventory were:

1. ______________________________
2. ______________________________
3. ______________________________

B. My favorite leisure-time activities and hobbies are:

1. ______________________________
2. ______________________________
3. ______________________________

C. My top five values are:

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________

D. My strongest aptitudes seem to be:

1. ______________________________
2. ______________________________
3. ______________________________

E. Occupational skills which I now possess or am interested in learning are:

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________

F. I prefer to work with (indicate first, second, third choice):

____Large numbers of people that I do not know

____More than ten other people on a regular basis

____Only two or three other people on a regular basis

____Alone most of the time

G. I prefer to work with:

____Data (information) only

____Data and things

____Data, things, and ideas

____Things and ideas

____Ideas only

____Things only

H. My attitude toward people seems to indicate that I might be most successful . . . (this is an open-ended question; write whatever you feel best completes the statement):

____

____

____

____

I. The degree to which I am success motivated would probably allow for success in such occupations as ____________, ____________, and ____________, but I might have difficulty sticking it out to become successful in such occupations as ____________ or ____________.

J. The two occupations which, at this time, seem interesting to me are ____________ and ____________.

K. Some of my personal goals are:

1. ____
2. ____
3. ____
4. ____
5. ____

Career Profile Analysis (Continued)

In what ways are your personal goals compatible with the two occupations you listed in question J?

L. The demand for workers in these two occupations during the next five years appears to be:

M. Some of the duties and responsibilities of these occupations are:

(Name of first occupation)	(Name of second occupation)
Beginning salary for a full-time worker in this occupation is: $__________per month.	Beginning salary for a full-time worker in this occupation is: $__________per month.

Career Profile Analysis (Continued)

After working in this occupation for five years, the best workers earn about $_________per month.	After working in this occupation for five years, the best workers earn about $_________per month.

N. In order to meet the educational and training requirements of the occupations listed, it will be necessary for me to:

____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________

O. Of the two occupations which I have considered, _______________ seems like the best choice for me. I feel that it is a realistic, appropriate goal for me: ___yes ___no
If it is not a good choice, I think I would like to have more information on these occupations:

1. ______________________________
2. ______________________________
3. ______________________________

UNIT B - CHECK-UP CONFERENCE

Estimated Completion Time of One 50-Minute Period

Activities

1. Each student is to arrange for a conference with his counselor for the purpose of discussing whether either of the careers he researched in Unit A for program goals 3.2 (V), 3.3 (E and G) is realistic and appropriate for him.

2. As a result of the conference, each student should make a tentative career decision and formulate plans for working toward that goal. These plans should be outlined on Form #1, Tentative Decision and Educational Prescription, which may be duplicated from the following page for class use.

Program Goals 3.4 (V) and 3.5 (E and G) - Unit B
Form #1

Tentative Decision and Educational Prescription

Student's Name ______________________________ Date __________

After reviewing with my counselor all pertinent information about me, and relating it to the data researched on several careers, these occupations seem most appropriate and realistic for me:

1. ______________________________
2. ______________________________
3. ______________________________

As a result of discussion with my counselor, I plan to enroll in the following courses while still in high school:

After completion of high school, I plan the following educational program:

CHAPTER IV

THE GOAL OF INTERPERSONAL RELATIONS

GOAL 4.0 RELATE IN A POSITIVE MANNER TO WORK EXPERIENCE EDUCATION SPONSORS, TO EMPLOYERS AND THEIR EMPLOYEES, AND TO THE PUBLIC SERVED

PROGRAM GOALS

4.1 (E) Demonstrate understanding of the requirements for personal grooming and dress in a variety of work environments

4.1 (G) Maintain the personal grooming and dress required in your present work environment

4.1 (V) Maintain the personal grooming and dress required in the work environment of a selected career

UNIT A - GROOMING GAME

Estimated Completion Time of One 50-Minute Period

Activities

1. The students will act as contestants on a quiz show. The instructor will divide the class equally into two teams: Team A and Team B. Each team will have both boys and girls as participants. One student will be selected to act as scorekeeper and timekeeper. A score card is provided on page 94. Should this result in uneven numbers in the teams, the jobs of scorekeeper and timekeeper can be divided to accommodate two students.

2. Using a format similar to a television quiz show, the instructor, as moderator, will give each student a question to answer. Should the student fail to respond correctly within 30 seconds, the same question will be given to the corresponding student on the opposite team. Should this student fail to give the correct response, the question will be offered to the next student on the first team, and so on. The correct answer earns one point for the team. Should the opposite team challenge an answer and give a correct response, that team will be given the point. Should they fail to challenge correctly, that team will lose one point.

3. The team with the most points at the end of the question period will be declared the winner.

Resources

1. A list of appropriate questions and possible correct answers are provided on pages 95-99.

2. The score card is on page 94.

3. Stopwatch or timeclock

Score Card for the Grooming Game

TEAM A

1. ______
2. ______
3. ______
4. ______
5. ______
6. ______
7. ______
8. ______
9. ______
10. ______
11. ______
12. ______
13. ______
14. ______
15. ______
16. ______
17. ______
18. ______
19. ______
20. ______
21. ______
22. ______
23. ______
24. ______
25. ______
26. ______
27. ______
28. ______
29. ______
30. ______
31. ______
32. ______
33. ______
34. ______
35. ______
36. ______
37. ______
38. ______
39. ______
40. ______
41. ______
42. ______
43. ______
44. ______
45. ______
46. ______
47. ______
48. ______
49. ______
50. ______
51. ______
52. ______
53. ______
54. ______
55. ______
56. ______
57. ______
58. ______
59. ______
60. ______

TEAM B

1. ______
2. ______
3. ______
4. ______
5. ______
6. ______
7. ______
8. ______
9. ______
10. ______
11. ______
12. ______
13. ______
14. ______
15. ______
16. ______
17. ______
18. ______
19. ______
20. ______
21. ______
22. ______
23. ______
24. ______
25. ______
26. ______
27. ______
28. ______
29. ______
30. ______
31. ______
32. ______
33. ______
34. ______
35. ______
36. ______
37. ______
38. ______
39. ______
40. ______
41. ______
42. ______
43. ______
44. ______
45. ______
46. ______
47. ______
48. ______
49. ______
50. ______
51. ______
52. ______
53. ______
54. ______
55. ______
56. ______
57. ______
58. ______
59. ______
60. ______

Team A Total: ________

Team B Total: ________

Questions and Answers for the Grooming Game

QUESTION	POSSIBLE ANSWER
1. If we speak of physical health, what do we mean?	1. The ability to care for and maintain the human body in the most healthful way.
2. Does physical health have anything to do with grooming? If so, what?	2. Yes. To be well-groomed, a person should reflect good physical health.
3. Would you consider a daily bath or shower a part of maintaining physical health?	3. Yes. Body cleanliness is essential to good health and grooming.
4. If you were compiling a list of things to be done daily for maintaining physical health, name one item on your list.	4, 5, 6, 7, 8, 9, 10 Any of the following acceptable: Well-rested Use of deodorant Brushed teeth Clean breath Clean and combed hair Clean complexion Clean nails and hands Clean shaven/neat make-up
5. Name another.	
6. Name another.	
7. Name another.	
8. Name another.	
9. Name another.	
10. Name another.	
11. There are four different types of situations for which a person would dress. That is, four different kinds of grooming. Can you name one?	11, 12, 13, 14 Any of the following acceptable: Dress for work Dress for play Dress for school Dress for social activities
12. Name another.	
13. Name another.	
14. Name another.	
15. What do we mean by appropriate dress?	15. A person being dressed suitably for what he is doing.

Questions and Answers (continued)

16.	What is the best way to determine what dress is appropriate for a particular job?	16.	Either ask the employer what he desires in dress or observe other employees and see how they dress.
17.	There are certain things that are appropriate to all kinds of dress. If you were compiling a list of standards for determining appropriate dress, name one of the requirements on your list.	17, 18, 19, 20, 21, 22	Any of the following acceptable: Clean socks/stockings Clean underwear Clean outer-wear/garments neat and pressed Shoes polished and well-heeled Clothes color-coordinated and fashionable-figure flattering Appropriate ties and accessories Style
18.	Name another.		
19.	Name another.		
20.	Name another.		
21.	Name another.		
22.	Name another.		
23.	If you were setting up a schedule for grooming preparation, what things could be done best at night in getting ready for the following day? Name three things.	23.	Insuring garments are clean and pressed Laying out stockings, underwear, etc. Shining shoes Color-coordinating clothes
24.	What things must be done in the morning?	24.	All personal grooming
25.	What reasons could an employer find that would make him reluctant to hire a man with long hair or a beard?	25.	For safety or health standards and customer attitudes
26.	Which job situations might warrant mod dress?	26.	Fashion designer, clothing salesman, teacher, dance instructor, hair dresser, model
27.	What do you feel are the elements of good grooming that are most neglected? Why?	27.	Clean hands, nails, hair, feet, body odor, clean breath, etc. (Answers can include almost any physical health or grooming standard.)

Questions and Answers (continued)

28.	What type of occupation would probably be associated with a business suit?	28.	Banker, undertaker, priest, minister, Maitre de., office executive
29.	What type of occupation would probably be associated with a sport jacket and tie?	29.	Salesman, teacher, office executive
30.	What type of occupation would probably be associated with skirt and blouse?	30.	Student, office worker, factory worker
31.	What type of occupation would probably be associated with overalls or work clothes?	31.	Mechanic, farmer, carpenter
32.	What type of occupation would probably be associated with a uniform?	32.	Pilots, steward or stewardess, military service, waitress, station attendant, police, etc.
33.	What type of occupation would probably be associated with safety apparel?	33.	Welder, telephone lineman, construction worker, etc.
34.	Pick two (2) aspects of grooming or dress that are essential for each of the following occupations: (Example: Farming is the occupation. Two aspects of grooming and dress would be overalls and hat, and work shoes.) Baker is the occupation.	34.	Clean clothes, white apron, hat, clean hands and nails
35.	Dairyman is the occupation.	35.	Overalls or work clothes, heavy work shoes or boots
36.	Fireman is the occupation.	36.	Fireproof and waterproof outer-wear, hard hat, boots
37.	Librarian is the occupation.	37.	Sport shirt and slacks, or skirt and blouse, walking shoes
38.	News reporter is the occupation.	38.	Sport jacket, tie, dress with minimum of accessories or ladies suit
39.	Service station attendant is the occupation.	39.	Uniform and cap, work shoes, or work clothes

Questions and Answers (continued)

40. Waitress is the occupation.	40. Uniform, walking shoes, apron
41. Nurseryman is the occupation.	41. Uniform or work clothes, hats, gloves and boots
42. Maid is the occupation.	42. Uniform, apron, and cap
43. Secretary is the occupation.	43. Suit or skirt and blouse, hosiery
44. Bank teller is the occupation.	44. Suit or skirt and blouse, hosiery, conservative dress. Some banks furnish uniforms or smocks.
45. Security guard is the occupation.	45. Uniform, cap, gun
46. Saleswoman in a department store is the occupation.	46. Conservative dress or smartly tailored suit, usually fairly neutral colors. Hosiery, shoes that are comfortable.
47. Salesman in a department store is the occupation.	47. Sport jacket or suit, tie, shined shoes
48. If you are applying for a job, what is the most suitable attire to wear?	48. Something business-like and generally conservative. Cloth should be neat, clean, and flattering.
49. If you are a very tall person, which direction should the lines of your clothing emphasize?	49. Horizontal or the width, since it would tend to reduce the emphasis on height.
50. Even good and expensive clothes can look tacky. Name at least two (2) things that can contribute to a tacky or unkept look.	50. Loose threads Not pressed Not clean Poor fit--not form-flattering Wrong color combinations Not flattering style or colors
51. For what kind of a job would goggles be used?	51. Grinder, drill press operator
52. For what kind of a job would a face mask be used?	52. Welder
53. For what kind of a job would a hair net be used?	53. Waitress, machine operator

Questions and Answers (continued)

Question	Answer
54. For what kind of a job would a breathing mask be used?	54. Painter, diver
55. For what kind of a job would gloves be used?	55. Steel worker, gardener, etc.
56. For what kind of a job would a rubber apron be used?	56. Chemist
57. For what kind of a job would a hard hat be used?	57. Bridge, road, and building construction
58. For what kind of a job would hard shoes be used?	58. Construction worker, dairy and farm worker
59. If you wished to accent your height and not your width, which way should the stripes in your clothing go?	59. Up and down--not horizontal
60. Why should girls not wear curlers when out of the house?	60. Grooming is done in the privacy of one's home and not in public.

UNIT B - COSTING A MODEL WARDROBE

Estimated Completion Time of One 50-Minute Period

Activities

1. The students will develop and cost a model wardrobe of appropriate dress and accessories suitable for use at work, at school, for play, and for social activities.

2. The instructor will divide the class into four groups insuring that both boys and girls are included in all groups. One student in each group will be selected to act as a recorder for his group. Each group will be assigned one of the following grooming topics:

   a. Appropriate dress for work
   b. Appropriate dress for school
   c. Appropriate dress for play
   d. Appropriate dress for social activities

3. Each group will compile a list of appropriate dress, including accessories, for both boys and girls for the grooming topic assigned the group. Where possible, the lists compiled by each group will have colors, styles, and fabrics for the items of dress.

4. The items on the lists should then be given a dollar value.

5. After each group has completed its list, the group recorder will place the group's findings on the chalkboard.

6. The class, as a group, will then pick items which can be used in more than one type of grooming. Together, they will establish a model wardrobe for both a boy and a girl.

7. When the dollar values are placed on the items of clothing and totalled, the students will have some idea as to the cost of a wardrobe for both boys and girls.

Resources

1. Fashion magazines for both men and women

2. Local newspaper advertisements for clothing prices and styles

3. Mail-order catalogues

UNIT C - PANEL PRESENTATION ON GROOMING

Estimated Completion Time of Two 50-Minute Periods

Activities

1. A panel of professionals, such as office managers, store managers, personnel managers, etc., selected by the students, will make a class presentation on various grooming standards acceptable to their type of business. The instructor will lay the groundwork for the students by discussing techniques for selecting resource persons, letter-writing techniques (an excellent time to teach the business letter), and topic questions to be furnished to the resource person.

2. The instructor will divide the class into four committees. Each committee will be given one of the following topics:

    a. Grooming requirements for office occupations
    b. Grooming requirements for service occupations
    c. Grooming requirements for manufacturing occupations
    d. Grooming requirements for retailing occupations

3. Students in each committee will be asked to compile a list of questions they may have regarding the grooming requirements for their given topic. The list should also include questions regarding the reasons for specific types of grooming.

4. The students will also compile a list of individuals who they feel would best represent their topic professionally, such as personnel managers, store or department managers, etc.

5. Each committee will then select one individual from its list of professionals to invite as a panelist for a class presentation.

6. Each committee will compose a letter to the individual selected to present its topic, inviting him to participate with the others in a panel presentation to the class. The letter should include some of the questions raised by the committee and ask the speaker to comment on the questions during his presentation.

7. The panel presentation should be scheduled at least one or two weeks after the initial planning and letter-writing have been completed. The panelists should be given seating at the front of the room and each panelist should be given sufficient time to make his presentation.

8. A question and answer period should be provided following <u>all</u> of the presentations. It should be made clear to the students that the requirements for grooming are based on the occupation. This is also an excellent time for the students to explore the reasons behind certain grooming requirements that may appear to be unimportant or unnecessary to the students.

Resources

1. Typewriting books or other sources for samples of business letters

2. Community representatives as panelists

UNIT D - EVALUATION OF GROOMING

Estimated Completion Time of One 50-Minute Period

Activities

1. The students will be evaluated by each other for appropriate grooming on the basis of the grooming check-list. In preparation for the class period, the instructor will have directed each student to come to class groomed for his particular job, or in the case of no job, for a job he would like to have.

2. The instructor will divide the class into six groups. Each group will act as an evaluating team and each student will also act as a model. Groups 1 and 2 will work together, as will Groups 3 and 4, and Groups 5 and 6.

3. As each student of Group 1 acts as a model, each student of Group 2 will evaluate his grooming by using Form #1, *Grooming Check List for Men*, on page 104, or Form #2, *Grooming Check List for Women*, page 105, as appropriate. Simultaneously, the students of Groups 3 and 5 will also act as models while the students of Groups 4 and 6 will act as evaluators. When each student of Groups 1, 3, and 5 have been evaluated, the groups will switch roles with their partner group and the students of Groups 2, 4, and 6 will be evaluated by the students of Groups 1, 3, and 5 respectively.

4. If the student who is modelling is groomed appropriately for his job, the student evaluating him will place a plus (+) mark on the check list for those areas of appropriate grooming, a minus (-) mark on the check list for those areas of inappropriate grooming, and a zero (0) mark on the check list for those areas which are not applicable to the student's grooming.

5. After a student has completed his modelling assignment, he will be given the check lists by the evaluators and will be able to determine how others see him. Hopefully, the student will profit from the evaluations and strive to make the minus marks, plus marks.

Program Goal 4.1 - Unit D
Form #1

Grooming Check List for Men

Student's Name:______________________________ Date:______________

A. HAIR

- ☐ 1. Clean hair?
- ☐ 2. Neatly combed?
- ☐ 3. Trimmed?
- ☐ 4. Appropriate length?
- ☐ 5. Dandruff?

B. FACE

- ☐ 1. Clean shaven?
- ☐ 2. Neatly trimmed face hair?
- ☐ 3. Clear complexion?

C. HANDS

- ☐ 1. Nails short and clean?
- ☐ 2. Hands clean?
- ☐ 3. Rings not gaudy?

D. FEET

1. Shoes
   - ☐ a. Harmonize with outfit?
   - ☐ b. Polished?
   - ☐ c. In good repair?
   - ☐ d. Appropriate style?
2. Hosiery
   - ☐ a. Harmonizing color?
   - ☐ b. No holes?

D. DRESS

- ☐ 1. Is student's dress appropriate for his job?

E. CLOTHING

- ☐ 1. Clean of dirt and spots?
- ☐ 2. Not frayed?
- ☐ 3. All buttons sewed on all garments?
- ☐ 4. Clothing neatly pressed?

F. ACCESSORIES

- ☐ 1. Tie clean?
- ☐ 2. Tie conservative color and style?
- ☐ 3. Tie neatly tied?
- ☐ 4. Handkerchief clean?

Totals:
Plus (+) Marks ☐
Minus (-) Marks ☐
Zero (0) Marks ☐

Program Goal 4.1 - Unit D
Form #2

Grooming Check List for Women

Student's Name:______________________________ Date:______________

A. HAIR

☐ 1. Clean hair?
☐ 2. Neatly arranged in simple appropriate style?
☐ 3. If tinted, are dark roots showing?
☐ 4. No dandruff?

B. FACE

☐ 1. Minimum makeup neatly applied?
☐ 2. No false eyelashes?
☐ 3. No heavy mascara or eye shadow?
☐ 4. Complexion clear?
☐ 5. Eyeglasses of complementary style?

C. HANDS

☐ 1. Clean?
☐ 2. Nail polish neatly applied and not chipped?
☐ 3. Nails not too long?
☐ 4. Rings not gaudy?

D. FEET

☐ 1. Shoes harmonize with outfit?
☐ 2. Shoes in good repair & polished?
☐ 3. Heels of suitable height?
☐ 4. Hosiery free of runs and snags?
☐ 5. Hosiery well-supported without wrinkles?

Grooming Check List for Women (Continued)

E. DRESS

☐ 1. Is student's dress appropriate for her job?
☐ 2. Is student's dress appropriate for her age?

F. CLOTHING

☐ 1. Suitable support undergarments?
☐ 2. Tailored dress or suit?
☐ 3. Clothing not transparent?
☐ 4. Clean of dirt and spots?
☐ 5. Hemline stylish but modest?
☐ 6. Hemline in good repair?
☐ 7. Clothing not too tight?
☐ 8. Clothing not too loose?
☐ 9. Clothing in good repair?
☐ 10. Clothing neatly pressed?

G. ACCESSORIES

☐ 1. Modest use of jewelry?
☐ 2. Matching handbag of medium size?

Totals:
Plus (+) Marks ☐
Minus (-) Marks ☐
Zero (0) Marks ☐

UNIT E - PERSONAL HAIR CARE

Estimated Completion Time of Two 50-Minute Periods in one block of time.

It is recommended that if this block of time cannot be arranged during the school day that other arrangements for the time be made at the beginning of the school day or during the evening.

Activities

1. The instructor will invite three or more hair stylists to meet with the class; at least one of these stylists to be a male who styles men's hair and two or more female hair stylists.

   The purpose of this exercise is to utilize professional hair stylists to instruct the students in the importance of proper styling and grooming of the hair.

2. Pre-Assessment:

   All class members receive a sheet of paper containing drawings of faces that are typical of those illustrated in personal grooming instructions. These are provided on Form #1 on page 109.

   a. Students will be instructed to select the drawing which most closely represents their facial characteristics by placing an "X" under that drawing.

   b. The students will be instructed to list five factors they should consider when they style and groom their hair to complement the rest of their body, as well as their personality, to gain maximum effectiveness of their personal assets.

3. The class will meet as a group to view an audio-visual aid that relates to the importance of personal grooming when seeking employment. Suggestions are given under Resources on the following page.

4. The instructor will have organized the visiting stylists into a panel to discuss the visual aid presentation, as well as personal grooming in general and care of the hair in detail. This panel presentation will require 20-25 minutes.

5. At the termination of the panel discussion, the male stylist will meet in a separate room with the boys and the female stylists will meet with girls enrolled in the class.

   Through prior arrangement, the male hair stylist will select two boys who have long hair and are willing to have it styled as a class demonstration. During the demonstration the stylist will explain what he is doing and why this is appropriate. This will help to develop a rationale for boys to want to keep their hair properly groomed.

   Simultaneously, the female stylists each select a girl to style her hair. The girls will receive a complete treatment, from cutting and styling to setting, drying, and combing out.

6. At a pre-determined time, the class will reconvene as one group. The students will model their "new look" while each stylist comments on the strong points and objectives to be accomplished with each hair style.

7. Post-Assessment:

   After completion of this unit of instruction, all students will re-evaluate their prior decisions on the pre-assessments. The pre-assessments, upon return to the students, will be revised with any desired changes to the instrument as previously completed being made.

   Upon completion of this unit of instruction, each student should have a better understanding of how his hair can be styled to complement his facial characteristics, body physique, and his personality.

Resources

1. Audio-visual aids that relate to personal grooming:

   a. Film: Initial Interviews 16 min. color (Calif. Peace Off. Assoc.)

   b. Film strip: Selling Yourself to an Employer 42 fr. (McGraw-Hill)

2. Two rooms, one for boys and one for girls

   a. Running water available in each room
   b. Two hair dryers for each room (Can borrow from Girls P.E.)
   c. A large-sized mirror in each room
   d. A.C. 110 volt electrical outlets

3. The hair stylists will bring their own professional kits.

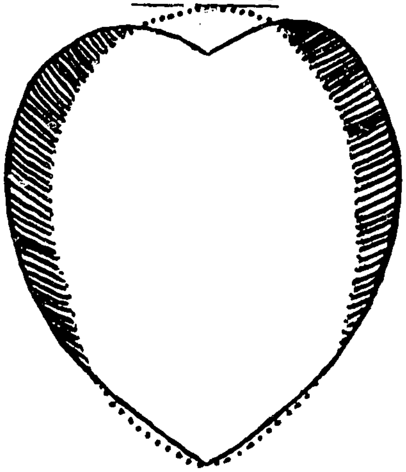
Program Goal 4.1 - Unit E
Form #1

Matching My Facial Contours with Hair Style

Student's Name ______________________________ Date ____________

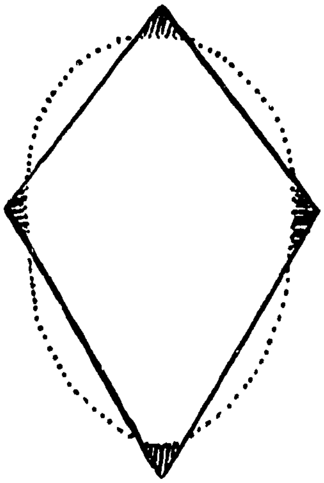
Place an "X" under that drawing which most closely resembles your facial contours.

The Heart



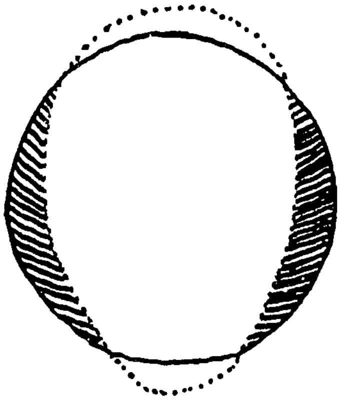
______

The Diamond



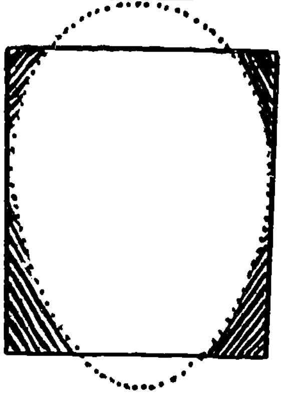
______

Round



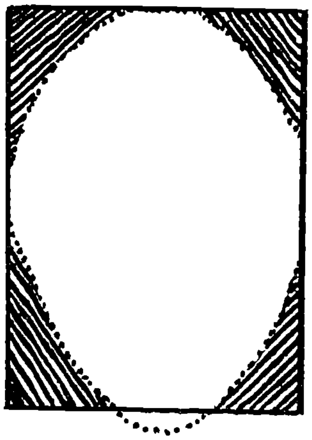
______

The Square



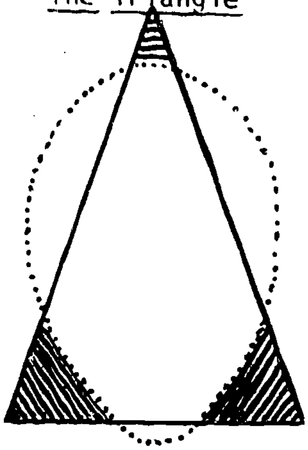
______

Oblong



______

The Triangle



______

List five factors that you feel you should consider when you style and groom your hair that will complement your body and personality.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________

PROGRAM GOALS

4.2 (E) Demonstrate understanding of the behaviors and attitudes appropriate to a variety of work environments

4.2 (G) Demonstrate the behaviors and attitudes required in your present work environment

4.2 (V) Demonstrate the behaviors and attitudes required in the work environment of a selected career

UNIT A - DESIRABLE ATTITUDES AND BEHAVIORS

Estimated Completion Time of One 50-Minute Period

Activities

1. The instructor will give a brief presentation on attitudes and behaviors which generally lead to job success.

2. The instructor will divide the class equally into two groups: Group A and Group B. Each group will have boys and girls as participants and will identify attitudes and behaviors in writing as follows:

   Group A: Desirable attitudes and behaviors of employee toward employer
   Group B: Desirable attitudes and behaviors of employee toward publics (customers, co-workers, others)

3. The instructor will move about generating discussion within groups.

4. The groups will re-convene as one, and with the instructor as leader, will distill the work of the groups in identifying common desirable attitudes and behaviors, compatible attitudes and behaviors, and areas of possible conflicts.

5. A student recorder will compile, on the blackboard, a master list of agreed-upon desirable attitudes and behaviors.

6. The master list will then be compared to Form #1, page 111, List of Desirable Attitudes and Behaviors, which is to be duplicated for student use and retention.

Program Goal 4.2 - Unit A
Form #1

List of Desirable Attitudes and Behaviors

1. Adaptability
2. Alertness
3. Ambition
4. Cheerfulness
5. Consideration
6. Cooperation
7. Courtesy
8. Dependability
9. Economical
10. Effective Speech
11. Efficient
12. Enthusiasm
13. Even Disposition
14. Flexibility
15. Foresight
16. Friendliness
17. Good Judgment
18. Honesty
19. Industry
20. Initiative
21. Interested
22. Loyalty
23. Maturity
24. Neatness
25. Orderliness
26. Patience
27. Persistence
28. Poise
29. Punctuality
30. Self-Confidence
31. Self-Control
32. Sense of Humor
33. Sincerity
34. Sociability
35. Sound Mental Health
36. Tact
37. Willingness to Work

UNIT B - UNDERSTANDING OTHERS

Estimated Completion Time of One 50-Minute Period

Activities

1. The students will be presented a 10-minute "prejudicial" lecture by the instructor detailing how blue-eyed people are superior to other people. (Brown-eyed instructors should be brown-eyed advocates; green-eyed instructors ..., etc.). The instructor should prepare by examining "Areas of Superiority" As Documented In London Scientific Review, page 114, and "Breaking the American Stereotypes," Time, February 14, 1972.

2. The instructor should emphasize that the "facts" being presented have been "known" for years but have only recently been documented. The "facts" prove superiority in skills, attitudes, and behaviors which lead to success in a wide range of learning and career fields.

3. Once the "case" has been presented, the blue-eyed students will be asked to share their present feelings as blue-eyed people in regard to the impact of the facts on:

    a. Their self-esteem
    b. Their attitude toward others in the class

4. The other students in the class will then be asked to react in the same manner in light of their inferior status.

5. The instructor will now facilitate dialogue among the entire group as to how these "facts" affect present and future relationships among people.

6. The instructor then discloses to the group that he has been role-playing and that the "facts" are not really facts.

7. The concluding message of the instructor should emphasize:

    a. That people should form opinions based only upon solid facts. What is the source?

    b. That surface characteristics do not dictate character and personality traits.

    c. That people must place themselves in the position of others if they are truly to understand. "Do not judge another man until you have walked a mile in his moccasins." That we are each unique human beings.

(Caution: The entire lesson must be concluded within one session so that students do not leave thinking erroneously. Also, students should be requested not to disclose their "trip" to others.)

Resources

1. "Breaking the American Stereotypes," <u>Time</u>, February 14, 1972.

"Areas of Superiority" As Documented in the London Scientific Review*

A. Physical Attributes

1. More agility
2. More strength per body weight
3. Better manual dexterity
4. Faster healing of wounds
5. Less susceptibility to infection
6. Less susceptibility to chronic diseases
7. Live longer
8. Etc.

B. Mental Attributes

1. Better computational ability
2. Better fact retention
3. More capable at inductive and deductive reasoning
4. Generally higher IQ's
5. Etc.

C. Personality Traits

More adaptable, cheerful, efficient, mature, patient, self-confident, and willing to work coupled with better mental health and sense of humor.

*Note: The reference is not factual. The instructor should embellish the "findings" and provide a recent date of publication.

UNIT C - DESIGNING AN EMPLOYEE EVALUATION FORM

Estimated Completion Time of One or Two 50-Minute Periods

Activities

1. The students will be informed that employees are generally evaluated in two areas: personal characteristics and job skills. The students will be presented Form #1, page 116, which is to be duplicated for student use, List of Desirable Attitudes and Behaviors. They will be asked to individually designate the ten they consider to be the most important.

2. The students will rank their lists of ten, giving ten points to the most important, nine points to the second most important, etc. A weighted class tally will be taken, and the group's top ten will be listed and ranked from most important to least important.

3. The students will be instructed that specific job skills are such things as ability to use the cash register or ability to tune up an engine.

4. The students will then be asked to list 5 specific and 5 general skills that are required either at the career station where they are assigned or in the career areas they are exploring.

5. The students will be instructed that general job skills are such things as ability to talk well with customers or the ability to calculate accurately.

6. The students will be shown samples of employee evaluation forms. Form #2, page 117, Personality Rating Scale; Form #3, page 118, Work Experience Education Program Evaluation Report for Student Trainee; and Form #4, page 119, Employee Progress Report, which should be duplicated for student use.

7. An evaluation form may be devised for use in the work experience education program based upon student consensus as to form and content.

Program Goal 4.2 - Unit C
Form #1

List of Desirable Attitudes and Behaviors

1. Adaptability
2. Alertness
3. Ambition
4. Cheerfulness
5. Consideration
6. Cooperation
7. Courtesy
8. Dependability
9. Economical
10. Effective Speech
11. Efficient
12. Enthusiasm
13. Even Disposition
14. Flexibility
15. Foresight
16. Friendliness
17. Good Judgment
18. Honesty
19. Industry
20. Initiative
21. Interested
22. Loyalty
23. Maturity
24. Neatness
25. Orderliness
26. Patience
27. Persistence
28. Poise
29. Punctuality
30. Self-Confidence
31. Self-Control
32. Sense of Humor
33. Sincerity
34. Sociability
35. Sound Mental Halth
36. Tact
37. Willingness to Work

Program Goal 4.2 - Unit C
Form #2

Personality Rating Scale

Student's Name______________________________ Date______________

TRAIT	RATING (Check)				
	Excellent	Good	Average	Poor	Very Poor
Ambition					
Cooperation					
Courtesy					
Dependability					
Enthusiasm					
Foresight					
Friendliness					
Mental Health					
Honesty					
Industry					
Initiative (self-starting)					
Loyalty					
Neatness					
Poise					
Punctuality					
Self-Control					
Sense of Humor					
Tact					
Willingness to Work					

Program Goal 4.2 - Unit C
Form #3

Work Experience Education Program

Evaluation Report for Student Trainee

Student's Name________________________ Job Title________________
Period Covered by
This Report____________to______________Date of Report______________

WORK HABITS AND ATTITUDES	Improvement Needed	Satisfactory Performance
1. Shows initiative; is a self-starter....................	1.______	
2. Responds well to suggestions...........................	2.______	
3. Willingly attends to "housekeeping chores" of the job....	3.______	
4. Organizes work routines efficiently....................	4.______	
5. Uses good judgement in performance of assigned tasks.....	5.______	
6. Is interested in learning new procedures and job information..	6.______	
PUNCTUALITY AND ATTENDANCE		
7. Is ready to begin work at the assigned time.............	7.______	
8. Is regularly present for work as scheduled..............	8.______	
9. Notifies employer in advance of absences if possible.....	9.______	
DEPENDABILITY		
10. Attends to duties in absence of supervision.............	10.______	
11. Follows written and oral directions in performance of job..	11.______	
12. Assumes responsibilities as directed; does not "pass the buck"..	12.______	
PERSONAL APPEARANCE		
13. Dresses appropriately for work done......................	13.______	
14. Is careful about personal grooming for clean, neat appearance..	14.______	
EFFICIENCY AND QUALITY OF WORK		
15. Completes job with a minimum of errors...................	15.______	
16. Finishes assigned work in allotted time..................	16.______	
17. Holds distractions from duties to a minimum..............	17.______	
RELATIONSHIPS WITH PEOPLE		
18. Cooperates and works effectively with other employees....	18.______	
19. Is courteous and mannerly to other workers and the public	19.______	
20. Is poised and self-confident............................	20.______	

Additional Comments____
Signature of Sponsor______________________ Name of Firm or Work Station______________

Program Goal 4.2 - Unit C
Form #4

Employee Progress Report

Name of Student_______________________________ Date__________

Employer_______________________________ Supervisor__________

1. JOB COMPETENCE: How well does this student meet your normal standards of performance?
   Very Well_____ Average_____ Below Average_____
2. PROGRESS ON THE JOB: Does this student show evidence of satisfactory growth?
   Yes_____ No_____
3. RELATIONS WITH OTHER PEOPLE:

	Very Well	Average	Below Average
a. How well does this student respond to supervision?			
b. How well does this student get along with fellow workers?			
c. How well does this student represent your company in public contact?			

4. ATTENDANCE: Is student's record of punctuality and regularity satisfactory?
   Yes_____ No_____
5. DEPENDABILITY: How well does student accept responsibility and follow instructions?
   Very well_____ Average_____ Below Average_____
6. INITIATIVE: Does student have constructive ideas? Is he a self-starter?
   Yes_____ No_____
7. APPEARANCE: Does this student meet your standards of grooming for this job?
   Yes_____ No_____ Comment:__________
8. GENERAL COMMENTS:
   a. Student could profit from suggestions in these areas:

   ____

   ____

   b. Student appears to show strength in these areas:

   ____

   ____

(use back for additional comments)

____
Employer's or Supervisor's Signature

PROGRAM GOALS

4.3 (E) Differentiate between various consumer publics and the kinds of services they require

4.3 (G) Identify the needs of the publics served in your present assignment

4.3 (V) Identify the needs of the publics served in the work environment of a selected career

UNIT A - NEEDS OF THE PUBLICS SERVED

Estimated Completion Time of One 50-Minute Period

Activities

1. The students will identify their career stations and the needs of the publics served. The word "publics" as used in this section refers to the people served.

2. The instructor will arrange the class in one large circle to achieve the best student interaction. The instructor will go around the circle and ask each student to identify his job to the class and to state precisely what he does, his responsibilities, and what is expected of him by his employer.

3. After each student has responded, the instructor will then go around the circle again, this time asking each student to identify what he feels the publics served expect of him and in what specific ways he is meeting those public needs.

4. The instructor may wish to appoint one student to tally these needs on the chalk board.

5. At the conclusion of the individual reports, the instructor will probably want to give a short recapitulation stressing the variety of jobs and the different ways of meeting the needs of the publics served.

UNIT B - LISTING THE NEEDS OF PUBLICS SERVED

Estimated Completion Time of One 50-Minute Period

Activities

1. The students will attempt to compile a list of the needs of the publics served in at least four different types of work environments.
2. The instructor will arrange the class in one large circle to achieve the best student interaction.
3. Each student will be given a copy of Form #1, page 122, List of Work Environments, and be asked to list on the form what he thinks are the four most important expectations of the public for each of the type of work environments given.
4. The instructor will go around the circle and ask each student to recite his findings for the first work environment (retailing). The instructor should allow for sufficient discussion on some of the items which students might question or wish to further expand. The instructor will select one student to tally the findings of the students on the chalk board, separating the responses for each type of work environment and also recording the number of times a particular response is repeated.
5. The instructor will then ask for each student to share his findings for the second work environment (government), and the results will be tallied on the chalk board.
6. The instructor will then ask for each student to share his findings for the third work environment (office occupations), and the results will be tallied on the chalk board.
7. The instructor will then ask for each student to share his findings for the fourth work environment (manufacturing), and the results will be tallied on the chalk board.
8. Finally, the results of all of the needs which have been identified on the chalk board will be tallied and a final list encompassing all of the work environments will be compiled, ranking the most common response first, and so on.

List of Work Environments

Student's Name______________________________ Date ____________

Under each of the four work environments listed below, identify what you consider to be the most important expectations of the public.

1. RETAILING ENVIRONMENT
    - a.
    - b.
    - c.
    - d.
2. GOVERNMENT ENVIRONMENT
    - a.
    - b.
    - c.
    - d.
3. OFFICE OCCUPATIONS ENVIRONMENT
    - a.
    - b.
    - c.
    - d.
4. MANUFACTURING ENVIRONMENT
    - a.
    - b.
    - c.
    - d.

UNIT C - FIELD SURVEY

Estimated Completion Time of Three 50-Minute Periods

Activities

1. The students will conduct a field survey to determine the needs of four different types of publics served. To prepare them for the activities, the instructor will lead a short orientation period in which field survey techniques are discussed with the class. It should be stressed that the students must obtain permission from owners or managers of the different locations selected prior to conducting the survey on their premises. Also, students should know that it is imperative for them to identify themselves to the persons to be interviewed.

2. The instructor will divide the class into four groups:

   a. a retailing group

   b. a civic group (local government)

   c. an office occupations group

   d. a manufacturing or fabricating group

3. The instructor will give each group instructions as follows:

   a. Retailing Group: The group should be divided into teams of three students. Each team is to ask permission of a large retail store or shopping center of their choice to conduct a field survey to determine the needs of the publics served in the retailing area. Using Form #1 on page 125, Interview Form For Retailing Group, each team will interview not less than ten persons shopping the area and record the responses of the persons interviewed. The survey may be conducted either during class time or after school.

b. Civic Group: The group will be divided into teams of two students. Each team will select one of the offices or departments of the local government and conduct an interview with not less than five persons in that office or department. Using Form #2 on page 126, Interview Form For Civic Group, the students will record the responses of the persons interviewed.

c. Office Occupations Group: The group will be divided into teams of two students. Each team will select a minimum of three different office managers to determine the needs of the publics served. Using Form #3 on page 127, Interview Form For Office Occupations Group, the students will record the responses of the persons being interviewed.

d. Manufacturing or Fabricating Group: The group will be divided into teams of three students. Each team will arrange interviews with the manager or personnel manager of at least three different firms of their choice. Using Form #4, on page 128, Interview Form For Manufacturing or Fabricating Group, the students will record the responses of the persons interviewed.

4. After all of the interviews have taken place (prior to the following related group meeting), the individual groups will convene during class time and compile their information into a final report for their group. One student from each group should be selected to report the group's findings to the class. Also, one student from each group should be selected to list the group's findings on the chalk board.

Note: The results of the survey are frequently of interest to the store owners and managers and as a gesture of goodwill could be made available to them.

Program Goal 4.3 - Unit C
Form #1

Interview Form for Retailing Group

Students' Names: ______________________________ Date__________

____

____

Directions to Students: Use one sheet per interview.
Identify yourself to the person being interviewed.
Try to record the exact response.

- -

Is person being interviewed a man______, a woman_____?

QUESTIONS:

1. What words would you use to describe the way you wish to be treated by the employees of a store when you shop?

2. What do you consider to be the most important attitude or behavior on the part of an employee?

3. What do you consider to be the most negative attitude or behavior an employee can exhibit?

Program Goal 4.3 - Unit C
Form #2

Interview Form for Civic Group

Students' Names: ______________________________ Date: ____________

____

Directions to Students: Use one sheet per interview.
Identify yourself to the person being interviewed.
Try to record the exact response.

- -

Is person being interviewed a man______, a woman______?

QUESTIONS:

1. What words would you use to describe the way you feel the persons coming into your office wish to be treated?

2. What do you consider to be the most important attitude or behavior on the part of a person employed in this office?

3. What do you consider to be the most negative attitude or behavior an employee can exhibit?

Program Goal 4.3 - Unit C
Form #3

Interview Form for Office Occupations Group

Students' Names:______________________________ Date:__________

____

Directions to Students: Use one sheet per interview.
Identify yourself to the person being interviewed.
Try to record the exact responses.

- -

Is person being interviewed a man______, a woman______?

QUESTIONS:

1. What words would you use to describe the way you feel the persons dealing with your office wish to be treated?

2. What do you consider to be the most important attitude or behavior on the part of a person employed in this office?

3. What do you consider to be the most negative attitude or behavior an employee can exhibit?

4. What specific personal characteristics do you look for when hiring an employee?

Program Goal 4.3 - Unit C
Form #4

Interview Form for Manufacturing Group

Students' Names: ________________________________ Date: ____________

____

____

Directions to Students: Use one sheet per interview.
Identify yourself to the person being interviewed.
Try to record the exact responses.

- -

Is person being interviewed a man______, a woman_____?

QUESTIONS:

1. What words would you use to describe the way you feel the persons dealing with your company wish to be treated?

2. What do you consider to be the most important attitude or behavior on the part of a person employed in this company?

3. What do you consider to be the most negative attitude or behavior an employee can exhibit?

4. What specific personal characteristics do you look for when hiring an employee?

PROGRAM GOALS

4.4 (E) Meet the needs of the publics served as you are given opportunities to assume adult roles and responsibilities in a variety of work environments

4.4 (G) Meet the needs of the publics served in your present work assignment

4.4 (V) Meet the needs of the publics served in the work environment of a selected career

UNIT A - THE USE OF EMPATHY

Estimated Completion Time of One 50-Minute Period

Activities

1. The instructor will prepare the class for this unit by defining the word "empathy" as the imaginary projection of one's self into the position of another person and reacting and feeling as that person might. Sympathy is the sharing of feelings with another person. A class discussion should follow stressing the differences between empathy and sympathy, with particular emphasis on the need to be empathic in situations dealing with other people. Through role-playing, the students will react to situations calling for the use of empathy.

2. Prior to class time, the instructor should have duplicated the role-playing situations described on Form #1 on page 131, Form #2 on page 132 and Form #3 on page 133. The instructor will select two students to role-play the situation described on Form #1 and ask them to leave the room and to study their parts separately. While they are out, the instructor will then read both situations to the class so the class will be able to follow what is to happen. After the explanation, the instructor will ask the two students to return to the room and will set the stage by acting as the employer anxious to resolve personnel difficulties. The two dramatists will then be allowed to develop and play out the situation. The instructor must be alert to stop the play when the purpose has been fulfilled. Following the dramatization, the instructor will ask the class to identify the areas of the presentation in which empathy did, or did not, bring about a turn in events and resolve the difficulty.

3. The instructor will then select two more students to role-play the second situation as given on Form #2. The same format as used for the first presentation will be utilized.

4. The instructor will then select two more students to role-play the third situation as given on Form #3. Again, the original format will be used to set the stage and for the class to develop a post-analysis of the presentation.

Program Goal 4.4 - Unit A
Form #1

The Role of JONES

You are Jones and you have worked in the sweater department for many years. You know the merchandise forward and backward. You know the prices. You have waited on many satisfied customers and many of them come back to you for advice since they know you have the [illegible] to give them the right sweater they are looking for. You know your fabrics, the recommended cleaning processes for the merchandise, and which sweater is for which occasion. A new worker, Lopez, has come into your department. You find that after two or three weeks, the new worker has still not completely mastered all of the product knowledge regarding the sweaters, is frequently trying to let the sweater "sell itself," and is also trying to sell the wrong type of sweater to your good customers of many years. Your store has a policy of giving the sales person a salary, but also a percentage of all sales over $1,000.00 per week. You have consistently gone over the $1,000.00 sales quota and consequently you have increased your income greatly by the extra percentage. The new worker feels you are "sales grabbing" and has complained to the manager. You have been asked to come to the office and help to straighten out this feeling of ill-will. This is what you are about to do.

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The Role of LOPEZ

You are Lopez. You have just started on your new job. You are in the sweater department. You are paid a salary, but you are also given an additional percentage of all your sales over $1,000.00 per week. Your store is quite busy and you can make your quota if you work hard. Others in the department are on the same set-up. Jones works in your department also. You think he is taking advantage of you because you are new and inexperienced. He is always running over and grabbing your customers, ending up with the sale, and also building up his quota. As a result, you did not make your quota for either the first or the second week. Consequently, your pay check was lower than it should be. You boss also notices that you have not made your quota and you are asked if there is anything wrong. When you tell him what the situation is, he suggests that you get together with Jones and reach some understanding. This is what you are about to do.

1984

Program Goal 4.4 - Unit A
Form #2

The Role of JOHNSON

Your name is Johnson. You are past middle-age and have been working for the Smith Department Store for many years. You have started by working in stock and have advanced until you are now department head. You have run the department to your liking and have based your decisions on your past experience and "tricks-of-the-trade" which you have picked up during the years. You have graduated from high school but have not gone on to college. Adams has come into your department to work. You have heard that Adams was hired by Mr. Smith personally, because Mr. Smith knew Adams and had admired Adams' work. Adams is a college graduate, a major in merchandising, and has really new and novel ideas for retailing. You feel many of these ideas are too radical for your tastes and consequently you do not put them into practice. In fact, Adams has become a problem because you are sure Adams wants your job. Your inability to get along with Adams has made the department suffer, and Mr. Smith has asked both of you into his office to get things straightened out. He has made it known that someone will be fired if agreement cannot be reached.

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The Role of ADAMS

Your name is Adams. You have been out of college for over a year. While in school, you majored in merchandising and consequently are really abreast of the latest methods in retailing. You are sharp in your knowledge, have excellent ideas, and want to put them into practice. You are currently working for the Smith Department Store. You got the job because you knew Mr. Smith personally, and he was very impressed with your work. However, you are having difficulty in "taking-over." The company has a very strong policy of seniority and you find that Johnson, who is the head of your department, is really not giving you much of a chance to do what you feel is necessary. Johnson is getting past middle-age, has been with the company for a number of years, and has run the department to his liking. He is not anxious to have a young, inexperienced, college graduate tell him what to do, since he learned the hard way--by experience--not by going to college. You are ambitious and want Johnson's job because you feel you can do a better job of it than he can. Because of your personality clashes, the sales for the department have dropped considerably, and Mr. Smith has asked you both to his office to get this thing straightened out. If no agreement can be reached, he has made it known that someone will be fired.

Program Goal 4.4 - Unit A
Form #3

The Role of BAKER

You are Baker. You are new on the job. You have worked for about two weeks. None of the other employees have given you much help. In fact, most of them say very little to you, and you have to find out things for yourself. This rather bothers you. You feel as if "your best friends won't tell you." You have checked your breath, you have checked your perspiration, you have checked the neatness of your clothing and have determined that you are well-groomed. You wait on your customers as best you can, but are getting little satisfaction out of the job because your fellow workers are avoiding you. You have not been making your sales quota because other members of the department seem to be ganging up on you and divide the customers among themselves, leaving you out. You must do something for you may not keep your job unless your performance record improves. You suddenly find yourself in direct confrontation with Wilson, the supposed ring-leader of the others. You decide there must be a show-down.

- - - - - - - - - - - - - - - - - cut here - - - - - - - - - - - - - - - - -

The Role of WILSON

You are Wilson. Baker has been hired as the new employee in your department. For weeks, you and the other members of the department have been working to get Mary Davis into your department. Mary is a part of your "gang" and you all like her. However, Baker was hired because of better qualifications. You really neither like nor dislike Baker. You resent the fact that Baker was hired for your department instead of Mary Davis and are determined to make it difficult for Baker so that perhaps he will be transferred and then Mary Davis could get the job after all. You line up all the other employees of the "group" and decide that perhaps by cutting Baker out of the sales, his showing will be so poor the management will take notice. You also decide to give Baker the "cold treatment," that is, not being particularly friendly to him. However, you now notice that Baker is quite concerned about your attitude and is about to talk to you in hopes of finding out what is happening. This is the show-down.

UNIT B - INAPPROPRIATE BEHAVIORS

Estimated Completion Time of One 50-Minute Period

Activities

1. The students will orally list inappropriate behaviors and comment in writing on how these behaviors affect fellow employees, the boss, and the customers. The instructor will ask students to orally name as many inappropriate behaviors as they can for as many different work environments as they can recall. He will list the inappropriate behaviors on the chalk board.

2. When at least 15 or 20 inappropriate behaviors are listed, the instructor will give each student a copy of Form #1 on page 135, *Effects of Inappropriate Behavior*. The students will be asked to select *five* inappropriate behaviors from the list on the chalk board and to describe the effects these inappropriate behaviors would have on fellow employees, the boss, and the customer.

3. When the students have completed the activity, the instructor will ask each student to share his findings with the class. The instructor should allow for comment and additional contributions from other class members as the recitations proceed.

Program Goal 4.4 - Unit B
Form #1

Effects of Inappropriate Behavior

Student's Name:____ Date ______________

	EFFECT ON		
BEHAVIOR	FELLOW EMPLOYEE	BOSS	CUSTOMER

UNIT C - STUDENT ESSAYS

Estimated Completion Time of One 50-Minute Period

Activities

1. The students will select a topic from a list of topics provided by the instructor and will write an expository essay. A copy of Form #1 on page 137, Essay Topics, should be duplicated for each student.

2. The students will use expository form, incorporating the development of the topic sentence. No specific number of words or length should be required. The only criteria should be that the student cover his subject matter thoroughly and cite examples where appropriate.

3. Students should be made aware that their spelling and sentence structure are an integral part of the assignment.

Program Goal 4.4 - Unit C
Form #1

Essay Topics

1. What, in your opinion, are the real reasons most employees are discharged?
2. How should an employee react to criticism from the boss?
3. How should a person react to uncomfortable situations on the job?
4. What, in your opinion, is behind making excuses, such as, being late, doing a poor job, etc., and how should they be handled?
5. Why must the boss set work rules and regulations for himself and his employees and adhere to them?
6. Differentiate between the duties and responsibilities of an employee.
7. Why are attitudes and behaviors stressed so much to the new employee?
8. What should the relationship between the employer and the employee be, and why?
9. How can a job help the individual get along better with people? Cite examples.
10. Why is it necessary for employees to think about consumer expectations? Cite examples where appropriate.

UNIT D - TELEPHONE TECHNIQUES

Estimated Completion Time of One 50-Minute Period

Activities

1. Students will practice the proper techniques for using the telephone in a business situation.

2. The instructor will contact the School Consultant of the Pacific Telephone and Telegraph Company or of the appropriate telephone company in the area. This person can usually be contacted through the local telephone business office. The consultant will provide telephone trainers and instructional material as well as role-playing skits for proper use of the telephone.

3. Some school districts have their own telephone trainer and materials which are available through the audio-visual department.

Resources

1. Telephone trainer units and instructional materials

UNIT E - SKILL PERFORMANCE TESTS

Estimated Completion Time of One 50-Minute Period

Activities

1. The students will be given skill performance tests.

2. The instructor will prepare the class by stating that meeting the needs of the public definitely include the ability to perform certain skills such as spelling, mathematics, filing, making change, etc.

3. The instructor will give each student Form #1 on page 140, Sample Basic Skills Test, and Form #2 on pages 141 and 142, Sample Mathematics Test, and have the students complete the forms.

4. When the students have completed the forms, the instructor, using Form #3 on page 143, Answer Sheet, will correct the tests with the students.

5. The instructor should work out any problems the students do not understand on the chalk board. If a student has a pronounced deficiency in any area, he should be given additional work to correct that deficiency.

Program Goal 4.4 - Unit E
Form #1

Sample Basic Skills Test

A. NUMBER COMPARISON: Instructions - put an X on the line between each pair of numbers or values if they are not exactly alike.

50566110 ________ 50566100
00321101 ________ 32110100
$1.66 ________ $11.6
477902 ________ 477902
7000000 ________ 7000000

29334221 ________ 29334421
65124783 ________ 65132831
67489321 ________ 48923167
99333 ________ 93333
$1.21 ________ $1.2

B. ARITHMETIC TEST: Instructions - Addition and Subtraction

4-3 = ( )
6+8 = ( )
9+7 = ( )
4+8 = ( )
3+7 = ( )

18-12 = ( )
12+18 = ( )
11-3 = ( )
9+3 = ( )
13-5 = ( )

C. SPELLING TEST: Instructions - Each word in this test is spelled three different ways. One of the spellings is correct. Place the number at the head of the column in which the correctly spelled word appears in the space provided at the left.

	1	2	3
( )	dissapeer	disappear	dissappeare
( )	accommodate	acommodate	accomodate
( )	equipped	equipt	equiped
( )	advertize	advertis	advertise
( )	occurred	ocurred	ocurd

D. FILING TEST: Instructions - The names in List A are to be filed in their proper alphabetical order with the names in List B. You will do this by placing the number corresponding to the name in List A in the proper space in List B.

List A

1. Sarnes, R. L.
2. Smith, T. C.
3. Silway, E. W.
4. Samuels, C. N.
5. Story, C. V.
6. Selray, N. D.

List B

( )
Sanderson, B. C.
( )
Sells, D. R.
( )
Selma, A. X.
( )
Selver, C. N.
Silver, P. J.
( )
Slewers, T. M.
( )
Smith, R. G.
( )
Smythe, T. C.
( )

Program Goal 4.4 - Unit E
Form #2

Sample Mathematics Test

Student's Name:______________________________ Date:__________

A. How much money do you have?

35	$10.00 bills	______	28	Quarters	______
63	$5.00 bills	______	96	Dimes	______
97	$1.00 bills	______	24	Nickels	______
50	Half-dollars	______	37	Pennies	______

Total Amount:______________

B. If you have $10.00 in 50¢ pieces, how many 50¢ pieces would you have?

____

C. If a customer bought $2.10 worth of ties, $4.80 worth of hose, $6.50 worth of hankies and gave you $20.00, how much change would you have to give the customer after you have added a 5% sales tax to the total of the purchases?

Amount of Change:______________

D. Subtract and then add the figures as indicated?

(a) 3,075.62	(b) 1,495.78	(c) 2,340.70
- 249.83	- 624.39	- 472.82
+ 784.25	+ 432.84	+ 934.67

E. Add these figures across and down. Then add the totals across and separately add the totals down. If you are correct, the final answer will be the same.

	2	6	1	5	4	1	8	9	=
	4	1	7	1	4	6	8	6	=
	3	1	5	0	3	2	1	0	=
	2	2	4	6	7	1	4	2	=
+	1	8	2	7	9	1	5	5	=
									+

Sample Mathematics Test (Continued)

F. Arrange the following numbers in order with the smallest number first, the largest number last:

120.3
400.2
119.2
1.100
.4000
1.060
43578
9.459
23.40
1.090
670.9
23009
54.87
457.1
213.4
.0090
.5678
5.678
30985
4.508
6.309
.0001
90.90
1.000
5.600
3.567
856.1
.0348

Program Goal 4.4 - Unit E
Form #3

Answer Sheet

Sample Basic Skills Test

A. Number Comparison:

50566110	X	50566100	65124783	X	65132831
00321101	X	32110100	67489321	X	48923167
$1.66	X	$11.6	99333	X	93333
29334221	X	29334421	$1.21	X	$1.2

B. Arithmetic Test:

4-3 = 1	18-12 = 6
6+8 = 14	12+18 = 30
9+7 = 16	11-3 = 8
4+8 = 12	9+3 = 12
3+7 = 10	13-5 = 8

C. Spelling Test:

Disappear, accommodate, equipped, advertise, occurred

D. Filing Test:

(4)	(6)	( )
Sanderson, B. C.	Selver, C. N.	Smith, R. G.
(1)	( )	(2)
Sells, D. R.	Silver, P. J.	Smythe, T. C.
( )	(3)	(5)
Selma, A. X.	Slewers, T. M.	

Sample Mathematics Test

A.

$10	=	$350.00	25¢	=	$7.00
$5	=	315.00	10¢	=	9.60
$1	=	97.00	5¢	=	1.20
50¢	=	25.00	1¢	=	.37
			Total:	=	$805.17

B. 20

C. $5.93

D. (a) 3,610.04 (b) 1,303.23 (c) 2,802.55

E. Across: 36, 37, 15, 28, 38, Total 154
Down: 12, 18, 19, 19, 27, 11, 26, 22, Total 154

F.

.0001	1.060	5.678	119.2	856.1
.0090	1.090	6.309	120.3	23009.
.0348	1.100	9.459	213.4	30985.
.4000	3.567	23.40	400.2	43578.
.5678	4.508	54.87	457.1	
1.000	5.600	90.90	670.9	

CHAPTER V

THE GOAL OF APPLICATION

GOAL 5.0 IDENTIFY WITH, AND PARTICIPATE IN, ADULT ROLES AND RESPONSIBILITIES IN THE WORLD OF WORK

PROGRAM GOALS

5.1 (E) Demonstrate knowledge of employment procedures and practices required for job placement

5.1 (G and V) Apply knowledge of employment procedures and practices required for job placement

UNIT A - EMPLOYEE SELECTION BY INTERVIEWS

Estimated Completion Time of One 50-Minute Period

Activities

1. Prior to the class meeting, the instructor will select five students to role play "Job Applicants" who are applying for positions in the sales training program. A copy of the applicant descriptions, Form #1 on page 146, will be supplied to each student.

   It is important that the "job applicants" be instructed to portray the person they represent as accurately as possible. This is necessary if the activity is to illustrate the various characteristics of applicants who are considered for positions in business and industry.

2. An experienced Applicant Interviewer from the Sales Department of a local business or industry is invited to meet with the class. He will make a brief presentation on interviews and interview techniques.

3. After his presentation, he will interview five "applicants" who are role playing as candidates for a position in the Sales Training Program that is being expanded by his employer.

4. Upon completion of the interviews, the interviewer will discuss the strong and weak points of each applicant. He will then select two applicants for referral to the Sales Department of his firm for additional information about the training program and for consultations with personnel in that department.

Program Goal 5.1 - Unit A
Form #1

Employee Selection by Interview

You are to play the role as you read the description of the person who is being portrayed. The success of this unit of instruction will be determined by how well the audience can visualize the person you represent. You may need to mention that you never had time to get dressed up, while another applicant might say she did go home and get her best party dress, etc. Each applicant will want to bring out every thing that is mentioned that pertains to his background as he portrays the role of the applicant.

Mary Jones--Age 18--high school graduate--average grades--engaged--needs money to set up housekeeping--has no car but girlfriend that now works for company will provide transportation--when in school quite active in student sports and government--no behavior problems with authorities--attendance at school average--no previous work experience--is neat and well-groomed--pleasing personality--quick smile and bright eyes--intelligence above average--speaks clearly and sincerely.

Bob King--Age 19--left high school to enlist in Army--obtained G.E.D.--convicted of A.W.O.L. so received a General Discharge from Army--high school courses mostly in the technical area--some problems with school authorities regarding cutting and smoking--good football player--well-liked by his peers--well-groomed--appears sincere about working--does not show further interest in schooling--wants money to support car--lives at home--well-taken care of.

Manuel Gonzales--Age 19--graduated from high school--college prep courses--better than average grades--excellent in sports--has invitation from two state colleges for football scholarship--no behavioral problems in record--attendance at school excellent--teacher recommendations good--has car--father is a wholesale representative for general area--family life above average--mother president of P.T.A.--father and son both active in scouts and church--claims he is looking for a company that will give him a solid future--wants work now to relieve family of his burden--poor eyes make him ineligible for service.

Joe Smith--Graduate of high school--average grades--1/2 year Junior College then Navy--honorable discharge--excellent prior work experience--age 20--engaged--claims to be looking for good future and feels he can really learn the business if given the proper training--suspended twice for smoking and once for being intoxicated at a school dance--girlfriend is 18--marriage plans as soon as he can locate a good job--has car--well-groomed--bites fingernails--wants three kids--doesn't want night work so he can attend night school.

Betty Kelly--Age 19--not graduated from high school but plans on returning to night school to get diploma--no record of any difficulties with authorities--grades better than average--has worked as waitress and sales girl--both businesses highly recommend her--very punctual and attentive--learns quickly--gets along with customers well--has steady who worked in filling station while attending Junior College--school record shows no extra-curricular activities--courses mostly business subjects--slightly overdone on the dress and makeup--attitude appears sincere--needs work so she can leave home and rent an apartment.

PROGRAM GOALS
5.2 (F, G, and V) Understand the rules, regulations, procedures, and practices related to employee wages, wage deductions, benefits, and working conditions

UNIT A - SHOTGUN QUESTIONING

Estimated Completion Time of One 50-Minute Period

Activities

1. The instructor invites 4-5 young adults from a variety of career stations who were previously enrolled in work experience education and are still locally employed to meet with the related class. The purpose of this activity is to enable high school youth to question a young worker about various aspects of his employment that relate to these program goals.

2. One of the young adults will be seated in the front of the room facing the related class enrollees. Five students are selected from the class and are seated, with their backs to the class, in a semi-circle facing the young employee. From this position, the students will direct short, concise questions to the visiting employee.

   Questions should not be long and drawnout but short and to the point. Questions will pertain to the many aspects of employment.

   If a question is asked that the young adult cannot answer or wishes not to answer he should be advised to say, "I'm sorry, I cannot answer that question." Such questions, or others requesting the same information, should not be asked again. If an employee is asked how much he makes, he should be instructed to say "The beginning entry level wage is between $______ and $______."

3. The questioning period will usually last from 8 to 10 minutes for each employed young adult. Students who are asking the questions will take turns. Upon completion of the questioning period, the young adult will be replaced by another, and five different students are selected to question that person. This system continues until all employees have been questioned.

4. After the question and answer sessions, the young adults should all be brought forward to appear before the class at one time. This will provide an opportunity for them to make statements concerning employment, school, or previous work experience education experiences. An opportunity is also provided for the instructor to have all guests in front of the room when summarizing the day's learning activities.

Resources

The variety and number of questions that can be asked by the students is endless. The following examples illustrate typical questions:

1. Do you punch a time clock?
2. Can you smoke at work?
3. What do you like best about your work?
4. How long are your lunch periods?
5. Do you get to have coffee breaks?
6. Where do you go during your coffee breaks?
7. Do you get a paid vacation?
8. Do employees at your place of employment have a credit union?
9. What fringe benefits does your company provide?
10. How often are you paid?
11. Do you like your supervisor?
12. Are other employees friendly?
13. How often are you evaluated by your supervisor?
14. Do you have any social friends where you work?
15. What kind of clothes do you wear at work?

UNIT B - INTERVIEWING AN EMPLOYER

Estimated Completion Time of One 50-Minute Period

Activities

1. The instructor will have employer representatives of medium to large size companies to appear before the related class. Work experience education enrollees will have an opportunity to ask questions they might think of but be afraid to ask during an employment interview.

2. The three employer representatives will be seated facing the class. Four enrollees will sit half-facing the employers in position to the sides of the room where they can face the employers to ask questions, yet not have their full back toward the class.

   A list of questions, Form #1 on page 150, will be provided for each student. He will use this list as a source of questions to ask the employer representatives. A copy of the list of questions will be duplicated for each student.

3. The employer representatives should be asked to explain their answers by citing examples and explaining company policy, regulations, union contracts or any other factors that may govern a business' relationship with its employees.

   After a 15 - 20 minute period, the questioning should be thrown open to the class as a whole with encouragement by the instructor for all class members to ask any questions they feel are pertinent to the instruction program.

4. As this session draws to a close, the students should have been provided ample opportunity to obtain any information pertaining to employment that has not been provided at their career stations.

Program Goal 5.2 - Unit B
Form #1

Interviewing an Employer

1. What dress and grooming restrictions do you have for employees?

2. Does your company assist a person to better himself by paying tuition or other costs of additional education?

3. Do you anticipate a 10 hour day, 40 hour week being implemented at your company?

4. Is overtime often required?

5. What is your policy concerning accumulation of paid sick leave?

6. What opportunities are available for advancement to higher level positions?

7. Do you have any unique fringe benefits?

8. How does your company's management feel toward unions?

9. How do you encourage employees to prepare for higher level positions?

10. Can employees smoke on the job?

11. Is the ladies lounge, where most everyone smokes, the only area provided for female employees to take their break?

12. How does your on-the-job training program work?

13. What is the starting salary that I might expect to be paid?

14. May I ask about the specific duties of a job?

15. Do any of your companies provide an opportunity for further education?

16. Do you send employees to training schools at company expense?

17. Do many companies sponsor after-work social and recreational activities? For women? For men?

18. What are the general procedures concerning rotating shifts? Extra pay for night work?

19. How long must I work before I'm eligible for a paid vacation?

20. Do you have a company cafeteria?

21. Are the typewriters in your company manual or electric?

22. How much time are employees allowed for lunch? Coffee breaks?

23. Are your employees called on to travel while on the job?

24. How and when can I qualify for a raise?

25. Do you have a pension plan? What happens if I am laid off or otherwise leave your employment before retirement age?

UNIT C - "HOLLYWOOD SQUARES": WAGES AND BUDGETS

Estimated Completion Time of One 55-Minute Period

Activities

1. The instructor divides the students into two teams, each with a captain, and names them the "O" and the "X" teams. Before each question is asked of a team, the captain must select the proper square on the tic-tac-toe chart which is provided on page 152 that his team would like. It would be desirable to have an overhead projector and a transparency of the tic-tac-toe chart. Instructors could cut out the X's and O's to place in the squares or use a grease pencil. If this equipment is not available, the blackboard will do.

2. The instructor asks the questions provided on pages 153-155 in any order. Alternate asking each team the questions, irrespective of which team wins the last point, unless a team makes a challenge and misses, then that team loses its turn. The team has 20 seconds to answer the question (a show of hands with a beginning of an answer). If the question is passed, it goes to the next team only if one of that team has a hand raised. If the team with the question answers correctly and the other team does not challenge the answer, that team gets the square. If the opposing team can challenge an incorrect answer with a correct one, they get the square. If they challenge and miss, they must miss their next turn. Any team to get a straight line on the tic-tac-toe chart, wins.

3. During progress of the game, the instructor makes note of those questions which are not answered or which appear difficult to answer. At the conclusion of the game, students are asked to discuss difficult or unanswered questions. This may lead to research by individuals, groups, or the entire class in order to resolve problems and gain information.

Hollywood Squares Game

Resources

Questions: Hollywood Squares Game

1. Take-home pay equals your gross salary minus various ____________________.

   Deductions

2. The money which you bring home must be worked into a ____________________ if you want to have enough to live on until your next paycheck.

   Budget

3. When preparing a budget, try to consider all expenses which are related directly and indirectly, to your work. For example, a married woman with children who works has expenses which another woman may not have. One such expense is a ____________________.

   Babysitter

4. If you are working as a salesperson and someone gives you a $5 bill and 3 pennies to pay for his bill of $1.08, what change do you give him. Be specific.

   2 dimes, 3 quarters, and 3 - $1.00 bills

5. When preparing your budget, what two categories of expenses must be considered? (Hint: One category occurs every month.)

   Fixed, Variable

6. All must be answered correctly for credit to be given on this question. Give two examples of each type of expense.

   Fixed: Housing, Insurance, Car, Utilities, Installments
   Variable: Food, Clothing, Medical, Car Expenses, Home Repairs

7. After all expenses have been deducted from income, any money which is left should be placed into what type of account?

   Savings - Emergency

8. Despite the once-common belief that a woman's place is in the home, the average woman today can expect to work __________ years if she is married, and __________ years if she is single.

   25, 45 years

Questions: Hollywood Squares Game (Continued)

The next six questions refer to income tax.

9. Your income tax return is due on or before ______________ each year.

April 15th, 17th in 1972.

10. True or False: You worked only one week of the year for your uncle. You grossed $52 and the basic deductions were withheld. You do not need to file a tax return.

False: You must file a return any time you have had income tax withheld, no matter what period it covers, who you worked for, or what amount you made.

11. Your employer will give you a __________ form during the month of January which must accompany your return.

W-2

12. Both answers must be correct: If you have made heavy payments of taxes, medical expenses, and interest, it may pay for you to ________________ your deductions rather than claim the ________________ deduction.

Itemize, Standard

13. You must fill in your filing status on your return. Six choices are given. Name five of these for credit.

(1) Single
(2) Married, filing jointly
(3) Married, filing separately and spouse is also filing
(4) Unmarried, head of household
(5) Surviving widow(er) with dependent child
(6) Married, filing separately and spouse is not filing

14. The Treasury Department lists the seven (7) most common errors in filing an income tax return. Name five of these.

(1) Failure to attach all W-2 forms
(2) Incomplete address or incorrect Social Security Number
(3) Incorrect checking of blocks to indicate filing status
(4) Incorrect checking of blocks for personal exemptions or listing of dependents
(5) Incomplete listing of itemized deductions
(6) Listing income, deduction, or tax items on wrong line
(7) Failure to sign return

15. True or False: The cheapest way to own a car is to trade it in every other year, thus avoiding most of the major repairs that result from the first 30,000 to 40,000 miles.

    False: The opposite is true. According to the United States Department of Transportation, it is cheaper to buy one car every 10 years and make repairs even in the $300 range than to buy new car after new car.

16. If you feel that you have been a victim of an unfair business practice by a merchant, whom do you contact? Name three.

    (1) State Consumer Protection Agency
    (2) Attorney General's Office
    (3) "Hot Line" of local newspaper or radio station
    (4) Nearest Better Business Bureau
    (5) And of course, your attorney or Small Claims Court

17. When you borrow money at a bank or other lending institution they will require that you produce evidence of your income, present assets, job situation, past payment record.

    (Must name three to get a correct answer)

18. Businesses must also make reports of their business activities. For this they hire accountants who prepare two basic financial reports called:

    (1) Balance Sheet
    (2) Income Statement (also Profit and Loss Statement)

19. When people and businesses are such poor managers that they become hopelessly in debt, the law allows them to go ________________.

    Bankrupt (or file bankruptcy)

20. Going bankrupt is a blow to your financial well-being because it seriously damages your credit reputation. To prevent people from taking undue advantage of the bankruptcy right you can go or declare bankruptcy only every ________ years.

    7 years

PROGRAM GOAL
5.3 (F) Compare adult responsibilities in a variety of work environments with present personal responsibilities

UNIT A - PRESENT VS FUTURE RESPONSIBILITIES

Estimated Completion Time of One 50-Minute Period

Activities

1. The instructor will introduce this activity by discussing how enrollment in the work experience education program can change the life style of a high school student, including personal habits and obligations.

   Various students will be asked to contribute to the discussion by elaborating on changes they have made in their life styles as a result of enrollment in the program.

2. The instructor will then distribute Form #1 on pages 157 and 158, to be completed during the remainder of the class session. One copy of the form should be duplicated for each student.

   This assignment will require the student to compare his responsibilities as a student on work experience education with those of an adult, fulltime worker.

3. After completion of the first page of the form, the student will be asked to list, using the second page of the form, three changes he would prefer not to make in order to assume an adult role. After each change, the student will write a paragraph explaining how he will adapt to that characteristic by changing his life style to meet the requirements of the adult world.

Program Goal 5.3 (E) - Unit A
Form #1

Present vs Future Responsibilities

Place a check in the appropriate column for each of the following responsibilities. Some of the responsibilities will necessitate a check in both columns, whereas in others you may check neither column.

RESPONSIBILITIES	As A Student Worker	As An Adult Worker
1. Must provide my own transportation to the job each day.		
2. Am required to work a full length shift each day.		
3. Am not required to train other workers on the job.		
4. Am generally free to arrange my own hours.		
5. Have major financial responsibilities to a family.		
6. Payment of bills takes a major portion of the pay check.		
7. Must purchase special clothing to wear on the job.		
8. Can arrange to have a day off most any day I want it.		
9. Must work in close cooperation with other workers by scheduling my work to fit into a production process.		
10. Am pretty well tied to a job with one company.		
11. Don't have opportunities to try out new career stations.		
12. The work done is usually not part of a definite scheduled operation.		
13. Must report for work at a specific time each day.		
14. May be required to work rotating shifts.		
15. Must work overtime whenever requested.		

Changes I must make but prefer not to make when I fully assume the role of an adult worker.

1. ______________________________

____

I will adapt to this change by: ______________________________

____

____

2. ______________________________

____

I will adapt to this change by: ______________________________

____

____

3. ______________________________

____

I will adapt to this change by: ______________________________

____

____

PROGRAM GOAL

5. (G) Assume adult roles and responsibilities in the present work environment

UNIT A - JOB SITUATION LEAD-IN QUESTIONS

Estimated Completion Time of One 50-Minute Period

Activities

1. This until will provide an opportunity for students to express themselves in matters that relate to on-the-job situations. They will discuss typical situations that occur on the job, thus providing an insight for each student into his background and fostering understanding of problems that relate to employment.

   The instructor will supply each student with a list of six questions, all of which have sample solutions listed beneath the question. There is no clear-cut answer or solution for any of the questions. Supply each student with a copy of Form #1 on page 160.

2. Four students are selected from the class to function as the first panel. Each student will draw a number from one through six from a container.

   The number they draw will indicate the question the panel is to discuss and the sample solutions of that question.

3. After a 5 to 10 minute discussion of possible solutions to the question, the panel will summarize its best possible solution. After discussion of the question by the panel, class members may challenge the solution chosen as well as suggest solutions of their own. Upon completion of that activity, the panel will be dismissed and a new panel selected to draw a number and discuss one of the remaining questions.

4. This procedure continues until all questions and solutions have been discussed. The teacher will then summarize the class activity by emphasizing the many reactions to situations that occur on-the-job. She should stress that every situation may have several possible solutions, many of which might be acceptable.

Questions Pertaining to Various Job Situations

1. You work directly under a man who is lazy and unimaginative. Would you:
   a. Take over some of your boss's work and then make sure that everyone knows you're doing his work as well as your own?
   b. Offer to help your boss with the work he is neglecting but avoid saying anything to anyone else about this?
   c. Concentrate on your own work and pay no attention to your boss's problem?
   d. Some other solution.

2. You work for an energetic, intelligent man who is headed for a top position in the company. Would you:
   a. Resign your job to avoid being overshadowed?
   b. Understudy your boss to learn his methods?
   c. Watch for your boss's errors and spread the word about his mistakes?
   d. Some other solution.

3. Your boss begins turning over much of his mail to you with the remark, "George, would you take care of this for me?" Would you say:
   a. "Why should I do this guy's work?"
   b. "I'll do this a lot better than he would just to show him up."
   c. "I'll do a good job on these things, and the boss will remember when I'm in line for promotion."
   d. Some other solution.

4. A very serious mistake has been made in your department. You were not directly involved, but your entire department is being held responsible. Would you:
   a. Resign so this error won't blight your career?
   b. Use the office grapevine to make it clear that you were not responsible?
   c. Take the lead in reducing the potential damage in figuring out a way to prevent future errors?
   d. Some other solution.

5. You are exceptionally good at fairly routine work and your boss recognizes this fact. To get a more responsible and better paying position, would you:
   a. Tell your supervisor you are bored with your present position and are thinking of looking for another job?
   b. Arrange to meet the top-level officer of your company in the elevator and offer suggestions for major improvements which your boss never thought of?
   c. Make it a regular practice to drop suggestions for improvements in the "Suggestion Box" after first discussing them with your immediate boss?
   d. Some other solution.

6. Your boss gets the flu just before you leave for a long-planned vacation. He has an important business trip the following Monday. Several men could substitute for him, including you. Would you:
   a. Wait to see if someone asks you to break into your vacation to take the trip?
   b. Get a message to your boss, offering to postpone your vacation if he wishes you to serve as his substitute?
   c. Telephone the top brass and offer to take the boss's place?
   d. Some other solution.

PROGRAM GOAL

5.3 (V) Assume adult roles and responsibilities in a selected career

UNIT A - INTERVIEW QUESTIONS

Estimated Completion Time of One 50-Minute Period

Activities

1. The instructor will select five students to be queried, using the list of questions on Form #1, pages 162 and 163. They represent the kind of questions an interviewer asks as researched by Frank S. Endicott, Director of Placement, Northwestern University. Another group of three classmates will be chosen to ask the questions from the list on the form, each of the three students will be provided with a copy of Form #1.

   This activity will be most interesting and meaningful when conducted in front of a class. The key to success will be determined by the attitude of the students asking the questions, as well as by those supplying the answers.

2. After an 8 to 10 minute questioning period, new groups of students are selected to play the roles of interviewers and interviewees.

Note: Prior to this exercise the instructor should comment on the value of such an activity as it pertains to threatening questions, ones with implications toward persons you know, requiring a person to organize his thoughts quickly as well as many other aspects of interviewing and interview techniques.

Program Goal 5.3 (V) - Unit 4
Form #1

Questions Frequently Asked During the Employment Interview

(As reported by 92 companies surveyed)

Compiled by Frank S. Endicott, Northwestern University

1. What are your future vocational plans?
2. In what school activities have you participated? Why? Which did you enjoy the most?
3. How do you spend your spare time? What are your hobbies?
4. In what type of position are you most interested?
5. Why do you think you might like to work for our company?
6. What jobs have you held? How were they obtained and why did you leave?
7. What course did you like best? Least? Why?
8. Why did you choose your particular field of work? Likes or dislikes.
9. How did you spend your vacations while in school?
10. What do you know about our company? Know its moneymaking prospect, business reports.
11. Do you feel that you have received a good general training?
12. What qualifications do you have that make you feel that you will be successful in your field?
13. What extracurricular offices have you held?
14. What are your ideas on salary?
15. How do you feel about your family?
16. How interested are you in sports?
17. Can you forget your education and start from scratch?
18. Do you prefer any specific geographic locations? Why?
19. Do you have a girl? Is it serious?
20. How much money do you hope to earn at age 30? 35?
21. Why did you decide to go to this particular school?
22. How did you rank in your graduating class in high school?
23. Do you think that your extracurricular activities were worth the time you devoted to them?
24. What do you think determines a man's progress in a good company?
25. What personal characteristics are necessary for success in your chosen field?
26. Why do you think you would like this particular type of job?
27. What is your father's occupation?
28. Tell me about your home life during the time you were growing up.
29. Are you looking for a permanent or temporary job?
30. Do you prefer working with others or by yourself?
31. Who are your best friends?
32. What kind of boss do you prefer?
33. Are you primarily interested in making money or do you feel that service to your fellow man is a satisfactory accomplishment?
34. Can you take instructions without feeling upset?
35. Tell me a story!
36. Do you live with your parents? Which of your parents has had the most profound influence on you?
37. How did previous employers treat you?
38. What have you learned from some of the jobs you have held?
39. Can you get recommendations from previous employers?
40. What interests you about our product or service?

Questions Frequently Asked During the Employment Interview (Continued)

41. What was your record in military service?
42. Do you feel you have done the best scholastic work of which you are capable?
43. What do you know about opportunities in the field in which you are trained?
44. How long do you expect to work?
45. Have you ever had any difficulty getting along with fellow students and faculty?
46. What is the source of your spending money?
47. Have you saved any money?
48. Do you have any debts?
49. How old were you when you became self-supporting?
50. Do you attend church?
51. Do you like routine work?
52. Do you like regular hours?
53. What size city do you prefer?
54. When did you first contribute to family income?
55. What is your major weakness?
56. Define cooperation!
57. Will you fight to get ahead?
58. Do you demand attention?
59. Do you have an analytical mind?
60. Are you eager to please?
61. What do you do to keep in good physical condition?
62. How do you usually spend Sunday?
63. Have you had any serious illness or injury?
64. Are you willing to go where the company sends you?
65. What job in our company would you choose if you were entirely free to do so?
66. Is it an effort for you to be tolerant of persons with a background and interest different from your own?
67. What types of books have you read?
68. What types of people seem to "rub you the wrong way"?
69. Do you enjoy sports as a participant? As an observer?
70. What jobs have you enjoyed the most? The least? Why?
71. What are your own special abilities?
72. What job in our company do you want to work toward?
73. Would you prefer a large or a small company? Why?
74. What is your idea of how industry operates today?
75. Do you like to travel?
76. How about overtime work?
77. What kind of work interests you?
78. What are the disadvantages of your chosen field?
79. Do you think that grades should be considered by employers? Why or why not?
80. Are you interested in research?
81. If married, how often do you entertain at home?
82. To what extent do you use liquor?
83. What have you done which show initiative and willingness to work?

PROGRAM GOAL
5.4 (E) Describe the types of adult responsibilities you have observed in a variety of work environments with which you can identify

UNIT A - I LIKE MOST - I LIKE LEAST

Estimated Completion Time of One 50-Minute Period

Activities

1. Four exploratory work experience education enrollees will be selected by the instructor to participate in this activity. They will be seated facing the class with the instructor seated to their side as part of the group.

   The instructor will initiate the presentation by describing some of the unique responsibilities other students have assumed at their career stations.

2. She will then call on each of her panel members, in turn, to tell the class about his career station and his responsibilities, as well as the values he feels he is gaining as a result of this experience.

3. Each of the panel members will then be asked to describe the two aspects of his career station he likes least and the three aspects of his career station he likes most.

   The remainder of the class period will be devoted to questions from the members of the class. They should have many questions they would like to ask the panel members that relate to their indicated likes and dislikes.

PROGRAM GOALS

5.4 (G) Demonstrate an acceptable level of proficiency in your present job assignment

5.4 ((V) Demonstrate job-entry level proficiency in a selected career

UNIT A - A FEELING FOR MY WORK

Estimated Completion Time of One 50-Minute Period

Activities

1. The instructor will select ten students from the related class to participate in this activity. The enrollees will be seated in a line across the front of the room facing the class.

   She will explain to the class that she will ask questions or make statements to the group and that they will be free to respond in a variety of ways. The response of each enrollee of the group of ten will be determined by his feelings toward the statement or the question that is asked. The students should be reminded that the activity provides for a variety of answers so they shouldn't be influenced by their neighbors' responses.

2. The student participants will be instructed to respond to each statement in one of the following ways:

   a. If you generally agree, raise your hand in front of your body in a "thumbs up" position (demonstrate).

   b. If you strongly agree, raise your hand over your head and make a circling motion (demonstrate).

   c. If you generally disagree give the "thumbs down" sign with one hand (demonstrate).

   d. If you strongly disagree, give it the "thumbs down" treatment by using both hands with thumbs down, moving them vigorously back and forth across your body (demonstrate).

   e. If you do not have feelings one way or the other, cross your arms over your chest and hold them there (demonstrate).

3. The instructor will then proceed to ask the questions or make the statements to the class which are provided on page 166, A Feeling for My Work. She should try to establish a rapport with the group so that this will be a learning activity, not just a fun session.

   This activity can be utilized to initiate a discussion of values, varied responsibilities of career stations, personal likes and dislikes, and other related topics.

Resource

A Feeling for My Work: Sample Questions and Statements

1. Is it desirable for youth in this day and age to remain in school until they earn a high school diploma?
2. It would be a good idea if the board of education provided a smoking area on campus.
3. If some employees at a company get a long coffee break then all employees should.
4. It would be best to have all students placed in work experience education whether they selected it or not.
5. All work experience education enrollees should master entry level skills at their career stations to the extent that they can hold down a job.
6. I can smoke as I please at my career station.
7. An agreeable career sponsor makes any job a pleasant experience.
8. I would be happy to remain with this company during all my working years.
9. I am stuck on a dead end job.
10. The only way I can advance is to seek a job with another company.
11. My job sponsor has suggested I continue my education beyond high school.
12. I would like my job more if all persons I work in close contact with used a deodorant.
13. I think I would like to be a supervisor over several workers.
14. Some employees sort of resent me because I am a student - worker.
15. Being the boss is worth the responsibility that goes with it.
16. I can perform most of my job assignments as well as the fulltime employees.
17. Do you agree with the standards of dress and conduct required by your job sponsor?
18. Could you improve the system used at your career station if the employer would accept your suggestions?
19. Do you require more supervision than most employees where you work?

A Feeling for My Work: Sample Questions and Statements (Continued)

20. I am holding my own and putting out as much work as other employees.

21. I can occasionally get by unnoticed coming to work when not dressed properly or bathed prior to reporting to the job.

22. I think I have a good chance to be offered employment during the summer vacation.

23. I can remain at my present career station after graduation from high school if I continue my education.

24. I think it's about time I get off this hot seat.

PROGRAM GOAL
5.5 (E) Assume adult roles and responsibilities during the exploratory period whenever possible

UNIT A - ROLE PLAYING AS JOB SPONSORS

Estimated Completion Time of One 50-Minute Period

Activities

1. The students will role-play the part of career sponsors and discuss the subject: "WHAT ARE THE MAJOR PROBLEMS EMPLOYERS HAVE RELATED TO THE EMPLOYMENT OF YOUTH?"

2. Previous to the related class meeting, the instructor will select five enrollees and request them to participate as a panel in this activity. The group should meet together to discuss possible topics such as, barriers they have experienced, or have heard of, that relate to the employment of youth.

   Examples of such barriers to employment follow:

   a. They raise my insurance
   b. Too much trouble getting work permits
   c. Hours they can work are too limited
   d. Need workers when students are in school
   e. Inexperienced
   f. They are lazy and won't work
   g. They all have long hair
   h. Most of them don't really want to work
   i. They aren't reliable
   j. Horse around when more than one is employed

3. After the presentation of the panel, the instructor will relate problems he has encountered when attempting to place students on the work experience education program.

   Discussion should follow to explore ways work experience education enrollees can assist to alleviate problems that preclude or limit the employment of minors.

VT 016 609
A COURSE OF STUDY GUIDE IN RANGE MANAGEMENT, FORESTRY, AND CONSERVATION.

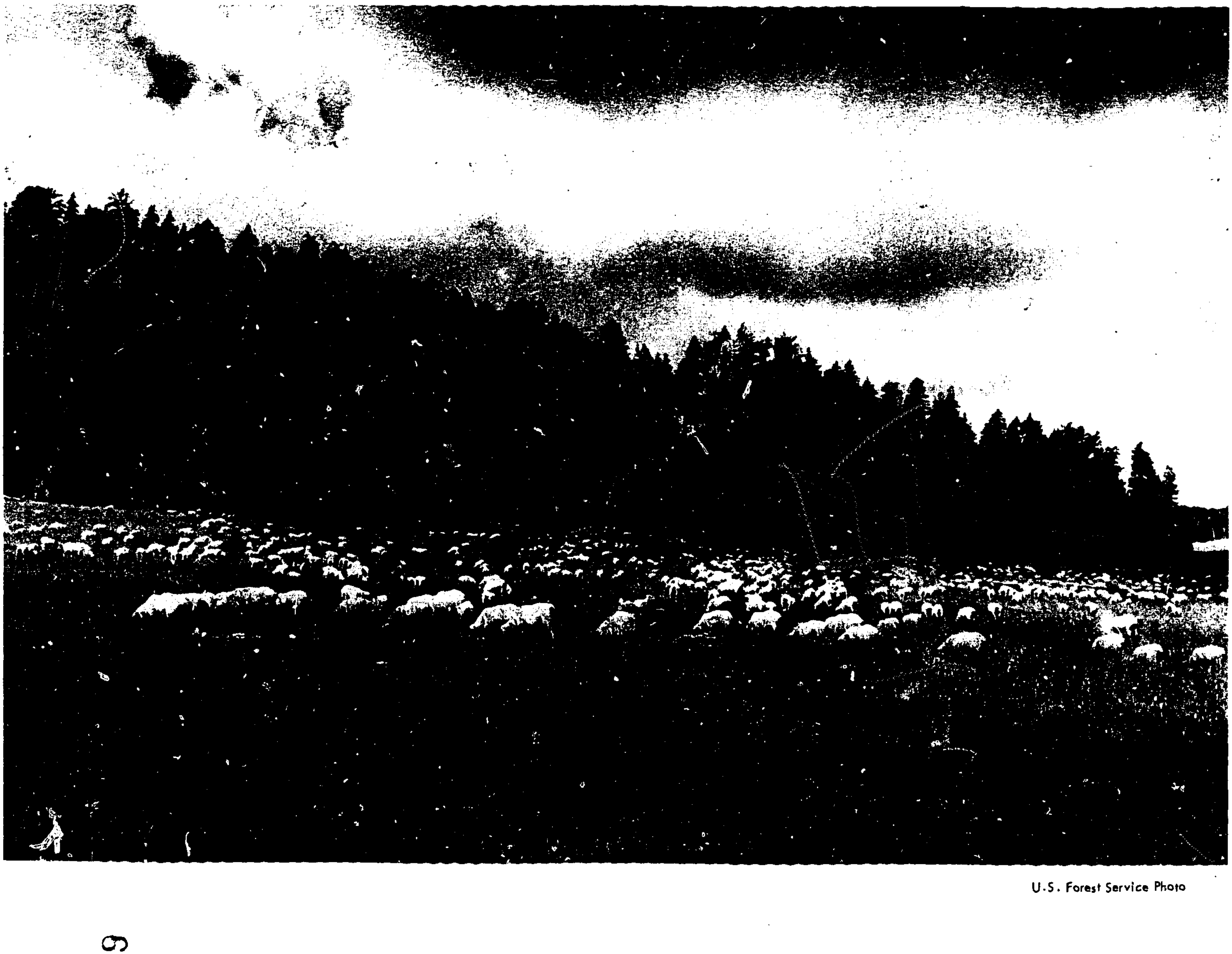
UTAH STATE BOARD FOR VOCATIONAL EDUCATION, SALT LAKE CITY.
MF AVAILABLE IN VT-ERIC SET.
UTAH STATE BOARD OF EDUCATION, OFFICE OF THE STATE SUPERINTENDENT OF PUBLIC INSTRUCTION, 1400 UNIVERSITY CLUB BUILDING, SALT LAKE CITY, UTAH 84111
PUB DATE - 67 87P.

DESCRIPTORS - *STUDY GUIDES; *STATE CURRICULUM GUIDES; SECONDARY GRADES; NATURAL RESOURCES; *CONSERVATION EDUCATION; *FORESTRY; VOCATIONAL EDUCATION; *WILDLIFE MANAGEMENT; VISUAL AIDS; VOCATIONAL AGRICULTURE; INSTRUCTIONAL MATERIALS; RESOURCE MATERIALS
IDENTIFIERS - EDUCATIONAL AWARENESS; *UTAH

ABSTRACT - THIS TENTATIVE STATE STUDY GUIDE, DEVELOPED FOR TEACHERS OF VOCATIONAL AGRICULTURE BY THREE ADMINISTRATORS IN VOCATIONAL EDUCATION AND A SPECIALIST IN AGRICULTURE, CONTAINS A SECTION ON CONSERVATION EDUCATION TO BE INTEGRATED WITH READING MATERIALS, AS WELL AS LINE DRAWINGS AND COURSE OUTLINES IN THE FIELDS OF RANGE MANAGEMENT AND FORESTRY. THE INSTRUCTIONAL MATERIALS, LOCALIZED FOR UTAH, CAN BE INCORPORATED INTO A 1-YEAR COURSE, A SEMESTER-LENGTH COURSE, OR INTO A UNIT OF STUDY. RESOURCE LISTS AND SUGGESTED QUESTIONS WITH ANSWERS FOR A HIGH SCHOOL CONSERVATION QUIZ ARE INCLUDED. (AG)

2022

A COURSE OF STUDY GUIDE
in
RANGE MANAGEMENT, FORESTRY AND CONSERVATION



U.S. Forest Service Photo

Utah State Board for Vocational Education

2023

A COURSE OF STUDY GUIDE
in
RANGE MANAGEMENT, FORESTRY, AND CONSERVATION

Utah State Board for Vocational Education
T. H. Bell, Executive Officer
Lerue Winget, Deputy Superintendent for Instruction
Mark Nichols, Administrator, Vocational-Technical Education
Elvin Downs, Specialist, Agriculture

1967

2024

FOREWORD

Agriculture is one of Utah's most important industries, yet, like everything else, it, too, has experienced many changes during the past few years. Today, agriculture has a different meaning and place in our economy and schools than it once had.

Recent changes in agriculture and stimulation to vocational education engenered by the National Vocational Education Act of 1963 have led to an effort to provide a broader basic education for our rural youth. These developments have placed a new obligation upon schools and Vo-Ag teachers for providing education for job entry into the many diversified areas of non-farm agriculture employment, as well as providing for those boys who will continue to provide food and fiber that our economy demands. In today's world, programs in range management, forestry, and conservation take on new importance.

This curriculum guide is being made available to teachers of vocational agriculture. It should be recognized that these materials are still developmental in nature, although considerable time and effort has been expended to bring them to this stage of completion. The guide should serve as a valuable teacher aid in exploring a new dimension in the broad field of agriculture. This area of study is important to the welfare of our State and the Intermountain West. Our economy depends, to a large measure, upon healthy, vigorous, well-managed range and forest lands.

This course of study guide is made available to districts in accordance with State law which requires the State Course of Study Committee to determine courses of study for the public schools of Utah.

Lerue Winget
Deputy Superintendent for Instruction

INTRODUCTION

Conservation education appears as the first section in the course of study guide. It is generally agreed that Conservation should not be taught as a separate course, but rather to have it incorporated as a part of many courses. Specific conservation practices are treated in both the sections on Range and Forest Management.

The treatment of Conservation in this section of the guide is designed to point up specific conservation concepts and basic understandings that must be developed with students if they are to fully comprehend the study of Range and Forest Management.

Range Management is treated in such a way as to give the instuctor some knowledge and scope of this broad educational area. Rather a detailed course outline is included which may serve as a guide in teaching this subject area as: (1) a unit of study, (2) a semester of work, or (3) a full year course.

Forest Management is also presented in such a way as to give the instructor depth and breadth of the subject area. The material is local in nature and is designed to challenge the thinking of both instructor and student. This unit fits well with the one of Range Management and combined, could be used for either a semester or year course.

Conservation and Resource Use*

1. Why Conservation?

Conservation is gradually becoming a way of life. More and more people are coming to accept the concepts of conservation and to govern their lives thereby. And yet, the number of our people who remain relatively unaffected by these concepts is distressingly large.

Effective conservation requires an attitude of appreciation toward natural resources--toward their value and the value of their wise use for one's self, for our fellow men, and for future generations. We should feel an obligation to generations yet unborn to leave this earth as liberally furnished with resources as we ourselves inherited. The agriculturist should feel obligated to leave the soil that has supported him in as good condition as he found it. The general public as well as specialists should come to realize that our trees should be utilized on a sustained yield basis. The stockman should feel an obligation to maintain and even improve the state of the grazing land that has fed and clothed him.

2. Some Significant Conservation Concepts

An effective conservation program may be developed around basic concepts.

1. People need to understand that man is a part of the natural world in which are many valuable materials that he has learned to utilize for human sustenance and for human betterment. These materials, or resources, are not man made. They are the result of natural processes. They include soil and water, fish and wildlife, forests, grass, and minerals, as well as human society. Man's economic, social and political welfare is largely dependent upon the manner and extent to which he utilizes and manages this natural wealth.

2. Natural resources, like certain of our minerals and fuels, are limited and can never be replaced once they have been used. Others, like soils, forests, and wildlife, if adequately managed, can provide essential sustenance for present populations with the confident expectation that future generations will not suffer because of current use.

3. Man's understanding of diminishing resources is limited by the brevity of the individual human life. This is in part responsible for the frequent failure to recognize the gradual disintegration and wasting away of certain of our more important resources. Leaching of mineral wealth from soils may not be a conspicuous process, noticed in a limited period, but the end result may be devastating and the area may eventually become incapable of sustaining living things.

---

*The material included in this section, with minor modifications, has been taken from the Conservation Handbook, prepared by the National Association of Biology Teachers.

4. Young people need help in establishing their own position in the calendar of the earth's history. They need help in understanding the causes of barren hills, gutted land, the disappearance of wildlife, and they need help in appreciating the esthetic. They cannot fail to observe these features of their environment, but they need help in understanding that natural conditions change just as man's modes of communication and transportation change.

5. Perhaps the most distinctive characteristic of both the living and the inanimate world is change. As applied to the area of our natural resources, we have been moving toward the depletion of certain of our basic resources at varying rates of speed. In many areas the depth and fertility of our top soil is rapidly being reduced. In areas where water supply is normally low, overuse of water has resulted in rapid lowering of water tables. Some species of wildlife have already become extinct while others are threatened with extinction.

6. It is desirable that young people explore the close relationships between soil, water, plant cover, and animal life, including man. This points out the importance of the ecological aspects of conservation. Barren soil lacks the absorbing layer provided by plant cover, and precipitation, instead of being held and permitted to soak into the ground, runs off, culminating, as in too many cases, in devastating floods, Flood water is water that should have soaked into the ground to recharge underground reservoirs and to supply needs of plants. Continuous, heavy run-off tends to lower the water table, drying springs and eroding lands. Proper plant cover tends to prevent floods, builds up ground water supplies, and helps provide food for livestock and man. Wildlife demands clear streams, plant cover, and wooded areas. Man, for the general welfare, must manage soil and plant cover in such a way that soil will be saved and be made or kept productive, and wildlife of many kinds encouraged to inhibit our watersheds.

7. Young people should know that the world's rapidly increasing population will continue to levy an ever greater demand upon natural resources. This may cause overuse, or increased misuse of resources, but enterprising populations, through technological advances may be able to maintain or even raise modern standards of living without threatening the depletion of basic resources.

8. It is essential that young people become alert to the problems arising from resource-use. It is likewise essential that they become acquainted with the activities of private, state, and national agencies that are concerned with the control and management of those resources so that they may help and improve the work of these agencies.

3. Modifications of American Attitudes Toward Natural Resources

The attitude of the early American colonist toward resource-use was that, in certain respects at least, resources constituted a barrier to the establishment of home and community. This attitude frequently led to destruction of valuable resources which can be justified on the basis of the colonist's position in American history. As the country developed, there appeared a social consciousness which led to the preservation of certain scenic areas, geologic features [illegible] historic records. Fortunately, large areas of the public domai [illegible] served for the use and enjoyment of the general public [illegible] national, state, and city parks, forests, and wildlif [illegible]

For a long time the term, conservation, carried only the limited connotation of preservation. For many it has come to include restoration. Plants and animals which are desirable from the changed human viewpoint, have been reestablished in some areas. Some species have been introduced and wisely cultured. More desirable species have replaced less valuable ones. The further development of conservation attitudes knowledge has led to more adequate management. For many, conservation became synonymous with wise management. The viewpoint has been ably expressed as managing our resources for the benefit of our own generation with due consideration for those yet to come. Currently, conservationists are forced to recognize all three viewpoints. Some resources are best preserved; others are best restored or properly developed in the light of present knowledge; still others need only proper management to assure the continuation of the foundations upon which our society is based.

4. Conservation Education is a Broad Field and Touches the Lives of Everyone.

A. Conservation education includes and shows the relationships of the natural, human, social, and economic resources. The Vo-Ag teacher is particularly responsible for instruction in techniques and information related to the wise use of the natural resources.

B. Conservation education is an integral part of the curriculum. The Vo-Ag teacher shares responsibility for a large part of the conservation emphasis and seeks to integrate biological information with the activities of other subjects and appropriate extra-class activities.

C. Conservation education is fitted to the experiences, needs, and interests of the pupils. Biological and agricultural interests which are stimulated by out-of-school activities are used in the school program and the conservation activities within the school are directed so as to carry over into out-of-school activities.

D. Conservation education develops proper attitudes toward the wisest use of all resources. Correct conservation attitudes are incorporated and allied with other character-building and citizenship efforts.

E. Conservation education provides pupils with information about careers in conservation and provides stimulating work experiences and contacts with professional conservationists.

F. Conservation education is a cooperative enterprise between school and community, bringing about a better understanding of resource problems and developing plans for the solution of them.

G. Conservation education is well-balanced with respect to content. It embraces a broad consideration of the biological interrelations which exist among wildlife, water, forests, grasslands, wastelands, soil, minerals, and people..

H. Conservation is taught as a science and biological and agricultural research provides the data for development of conservation plans and procedures. This scientific information is translated into social action, as good conservation is improved behavior.

I. Conservation education begins at home, but eventually includes the problems, the developmental plans, and proper attitudes and habits applicable to the county, state region, and nation, and the world.

J. Conservation applies to all people, rural and urban, and to be most effective a common viewpoint with respect to resource-use should be established which shows the interdependence of all groups.

SUGGESTED QUESTIONS FOR A HIGH SCHOOL CONSERVATION QUIZ

SELECTION TYPE

1. Which of the following statements best describes the problems of forest conservation? (c should be selected.)

- a It's too late now to do any but censure our ancestors for their wasteful use of the fore s. ides, by the time our timber is all used, substitutes wil ailable.

- b Forest conservation is a problem of concern only to the forest areas where there is lumbering.

- c Forest conservation is a challenging national problem involving the individual's responsibility to his community and nation, and the government's responsibility to the individual.

- d Forest conservation is a fine theory that can't be practiced today.

2. Which of the following statements best indicates the role of forests in control of soil erosion? (d should be selected)

- a The deforestation of one-third of our land has made no difference in the number and extent of floods.

- b Reforesting of denuded and eroding slopes will stop erosion of the slopes but will have little effect in reducing floods.

- c Flood control can be entirely taken care of by levees, dams, spreading basins, and proper tillage.

- d Forests help prevent rapid runoff and protect the forest soil from erosion. Therefore, they help reduce the damage from floods on lands along the stream bottoms.

- e If we would completely reforest the natural forest regions, there would no longer be floods in these areas.

3. Which of the following statements most nearly expresses the true conception of the forest fire problem? (Selection of c shows proper attitude)

- a If woners burn or fail to protect their forests, that is their concern and not the public's.

- b The forest fire losses and Christmas tree abuses are of about equal emportance, both having a sentimental and dramatic appeal that leads to overemphasis.

(Con't.)

c Forest fires affect everyone just as does any national calamity that destroys millions of dollars worth of property annually and therefore becomes largely a public responsibility.

d Since man causes more than 90 percent of forest fires, people should be kept out of the forests.

e Fighting forest fires is justified mainly as emergency employment.

TRUE or FALSE (Proper answer is underlined)

4. The only reason for forest conservation is to avoid a timber famine. (True, *false*)

5. In general, the standard of living on the land is indicative of its productivity. (*True*, false)

6. Forest insects and diseases are less conspicuous than fire. However, their total effect on the forest exceeds that of fire because they work every year and no forest is free of them. (*True*, false)

7. There are many conservation practices that are profitable to a private owner. (*True*, false)

8. The public can justifiably carry some of the cost of forest conservation because it derives benefits from it that the individual owner cannot always finance alone. (*True*, false)

9. To remove mature trees from a forest is a conservation practice. (*True*, false)

10. In the United States, there are about 500 million acres of commercial forest land. (*True*, False)

11. Most of our forest land is publicly owned. (True, *False*)

12. Hunters should be allowed to take approximately the annual increase of a species in an area each year when the game population is near the carrying capacity of that area. (*True*, false)

MULTIPLE CHOICE

13. Most of our lumber comes from (public, *private*) forests.

14. A basic consideration in wildlife management is (control of predators, maintaining the ratio between males and females, *maintenance of food and cover*).

15. Forest soil absorbs more water than bare soil because it is more (*porous*, fertile, compact).

16. Most forest fires in the United States are (*man-caused*, lightning-caused).

17. A tree shelterbelt is most valuable as (a source of fuel, shelter for game, *protection for soil*).

18. A forest fire burning in the tops of trees is called a (ground, surface, crown) fire.

19. Deer population in an area can best be held in check by (transplanting, shooting bucks only, harvesting both bucks and does).

20. Most of our cutover forest lands are (submarginal, profitable, marginal) for agriculture.

ESSAY TYPE

21. What is accelerated erosion? (It is excessive, i.e., more than normal, erosion resulting from the baring or improper cultivation of the soil). Give 3 causes of it. (Overgrazing of grasslands, careless logging, careless cultivation of croplands, over-concentrations of animals and humans on the land.) List two ways of preventing it. (By balancing the number of animals, both domestic and wild, with the amount of forage available, the use of which will not decrease the productivity of the land. By cutting and logging forest trees so that the forest floor remains intact and well protected.)

22. What indicators show that a watershed is in good condition? (Ground well covered with vegetation - grass, shrubs, trees; clear, clean streams; lack of erosion; absence of gullies; stable stream banks; litter or duff - leaves, twigs, dried grasses - covering the ground.)

23. Why is vegetation so important as cover for watershed lands? (It keeps the soil porous, thereby allowing for more absorption of rain and snow water).

24. List our renewable natural resources. (Soils, waters, forests, wildlife).

    non-renewable natural resources. (Minerals, oils, gases).

25. Give your definition of "conservation of renewable natural resources." (Conservation is the wise use of our renewable natural resources to keep them fully productive and in ample supply for the nation's present and future needs).

26. List the primary conservation problems of your home community or state and tell what is being done to solve them. (The answer depends upon the area involved).

27. Who is your State Forester and what is his address? What are his responsibilities?

28. Who is your extension Forester and what is his address? What is his main job?

29. What agency is responsible for the administration of the National Forests? (The Forest Service, in the United States Department of Agriculture).

30. What agency administers the National Parks? (The National Park Service in the Department of the Interior).

Conservation Pledge

I GIVE MY
PLEDGE AS AN AMERICAN
TO SAVE AND FAITHFULLY TO
DEFEND FROM WASTE THE
NATURAL RESOURCES OF
MY COUNTRY — ITS SOIL
AND MINERALS, ITS
FORESTS, WATERS,
AND WILDLIFE

RANGE MANAGEMENT

UTAH IS A RANGE STATE*

Utah is a range state: approximately 86 percent of the land acreage is covered by range vegetation. Barren and waste lands make up an additional 5 percent. Only 3 percent of the total 52,701,000 acres of land is cultivated.

Rangelands provide 54 percent of the forage requirements of all [illegible], cattle, and horses of the state. Sheep get about 86 percent of their annual forage from ranges. Beef cattle get 56 percent of their forage from this source. About 90 percent of the beef cattle feed upon range forage in the summer but only 25 to 35 percent in the winter.

The range livestock industry accounts for from 33 to 40 percent of the agricultural income within the Intermountain region. This industry makes use of lands otherwise unuseable because of low rainfall, shallow and rocky soils, salty soils or rough terrain.

Rangelands of Utah are characterized by a wide diversity in vegetation types, productivity and ownership. Federal lands amount to 73 percent of the land acreage. Most range operations depend on carefully integrated use of federal and private and even state lands. National forest lands in the mountains supply a majority of the summer grazing. Winter grazing comes principally from desert and semi-desert ranges administered by the Bureau of Land Management. Well-balanced livestock operations are often made difficult by a shortage of spring range. Trailing and trucking of both sheep and cattle between seasonal ranges, often widely separated, is typical.

RANGE FORAGE

Although grasslands are not extensive in Utah, grasses add greatly to the forage supply on areas dominated by browse plants. Grasses frequently produce most of the forage supply in mountain parks, on upland plains and valleys, and on sagebrush slopes following sagebrush control practices.

A diversified diet is generally more effective in supplying a balanced ration to grazing animals than a diet of either browse or grass alone. This is particularly true of winter range. The content of protein, phosphorus, and carotene (Vitamin A) in grasses is high during spring growth but declines with plant maturity. However, the levels of these nutrients in non-deciduous shrubs may vary only slightly as the season progresses.

On winter range, grasses are high in energy but low in protein, phosphorus and carotene. Browse plants at this time of year are much higher in protein, phosphorus and carotene but lower in energy than grasses. Shadscale and sagebrush winter ranges which contain cured grasses often require no supplemental feeds.

*By John F. Vallentine, Extension Range Management Specialist, U. S. U.,
Logan, Utah

A range type is a land area given a characteristic appearance by a single plant species or group of species. Range types are separated on the basis of appearance and vegetation composition. The following nine range types are used in this bulletin:

		% of State	% of total rangeland
1.	Juniper-pinon	23.8	27.6
2.	Salt-desert Shrup	22.4	26.0
3.	Sagebrush	16.1	18.7
4.	Blackbrush	7.0	8.1
5.	Mountain Brush	6.1	7.1
6.	Conifer	4.2	4.9
7.	Aspen	3.7	4.3
8.	Plains Grassland	2.4	2.8
9.	Mountain Grassland	.4	.5
	Total	86.1	100.0

RANGE MANAGEMENT*

I. Introduction

Utah is an important range state. Conservation of our "grass" resource is vital to everyone in Utah. Watersheds in Utah protected by this grass resource are vital to people in other states as well as to Utahns. Water of the great Colorado River flows from Utah to other states. Countless business enterprises and industries depend upon this water from our range and forests. It irrigates fertile valleys that support prosperous towns and cities. Wild game and fish depend upon range and water from the range.

Range covers 46,000,000 acres in Utah. Five-sixths of this is grazed by our livestock. More than one-sixth of it actually is owned by ranchers. There are 3.8 million acres of commercial forest and 1.8 million acres of cropland.

The manner in which all of our range is managed is important from the standpoint of income to agriculture, since the grass and browse crop from range furnishes one of the two greatest sources of agricultural income in Utah.

Range conservation and range management mean practically the same thing. When rangeland is well managed, it will be conserved; it will also produce food, fiber and water at the highest possible level.

The management and conservation of our great range resource is dependent upon a good working knowledge of range among the people who handle it. We look at management of range as an important job--one which takes know how and experience.

What is Range and Range Management?

A. Rangeland is land best adapted to the production of perennial plants for harvest and use by grazing animals. Rangeland is not suited for regular cultivation, due to climate, topography or soil.

B. Range Management is the handling of range in a way that will produce the most products over a long period of time.

Mismanagement exposes soil to the forces of erosion. Valuable water resources are wasted.

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*Karl G. Parker--Extension Range Specialist
U. S. U. Logan, Utah

II. Steps to Better Range Management Knowledge

A. What is on Rangeland?

Plants--the main resource with which we work. Livestock and wildlife on rangeland depends upon the plants and the strength of the plants in the range.
Group participation: How would you describe a grass plant?

1. A good range operator knows the important kinds of plants that grow on his range, such as:
   Grass--round, hollow, jointed stems; leaf veins parallel.
   Grasslike plants--Sedge--stems, three cornered; no joints.
   Ruch--stems, round; no joints
   Forb--(herbs)--Non-grasslike plants with annual tops and net-like veins in leaves.
   Shrub--Leaves with net-like veins, stems woody and branch at the base; not trees.

2. A good range operator knows his important range plants by name. The rancher can use a knowledge of these different kinds of plants to grow bigger and better crops of "grass" and to hold soil and water in place.

Activity:
1. Each camper collect a sample of each of the above kinds of plants.
2. Demonstration on collecting, pressing, mounting, and identification of range plants.
3. Group participation: Each member mount a plant for the herbarium.

B. What is its Value?

Each plant--its purpose.
What they furnish to animals:
Plants furnish energy and building materials to animals. What about the life regulators we get from plants? Some plants are better soil savers.

Exhibits:
1. Forage values.
2. Conservation value--compare root systems of grasses and shrubs.

C. What Happens to the Plants in the Range?

1. Range site
   We can call the different kinds of rangeland "sites." A range site is simply an area of range with one kind of soil, slope and climate. You can distinguish between the sites by the different kinds and amounts of plants that grow there under natural conditions (not affected much by

grazing). Grazing might change the types of vegetation on a range site, but the soil, slope and climate remain essentially the same.

The texture of the soil is determined by the percentage of sand, silt and clays that make up the soil. These three kinds of soil particles can be identified by the sense of touch, by "ribboning" a piece of moist soil between your fingers.

<u>Sand</u> is the gritty material which is felt.
<u>Silt</u> is the floury material.
<u>Clay</u> is the sticky material.
A combination of sand, silt, and clay is called loam.
Following are some of the common range sites with a Brief description of each.
<u>Moist, deep</u>--a fertile area with watertable up to two feet. It may be flooded or sub-irrigated periodically.
<u>Overflow</u>--areas receiving runoff from other land.
<u>Saline</u>--overflow site where plants are affected by salt accumulation.
<u>Sandy</u>--sandy loams and loamy fine sands.
<u>Silty</u>--very fine sandy loams, loams, silt loams, and silts.
<u>Clayey</u>--sandy clay loams, silty clay loams, and clay loams that take water readily.
<u>Shallow</u>--all soils ten to twenty inches deep over rock, shale or gravel.
<u>Heavy clay</u>--sandy clay, silty clay and clay; takes water very slowly.

2. Nature fits the plants to the range

In the first place, nature had a set of plants on the range which were best adapted to the soils, the available moisture and the climate in each area. Grazing these plants produces definite changes. The plants in the range react to grazing in different ways. To better understand that we <u>group the plants</u> according to the way they react <u>to grazing</u>. Fire, or the lack of fire also influences range plants.

a. <u>Green group plants</u>--were plentiful in the original, native range in "top" or "climax" condition. These plants are usually tall, highly productive and well-liked by grazing animals. The <u>green group</u> plants are the first ones to <u>decrease</u> when grazing becomes heavy. By their abundance in the range, they indicate that the range management plan is "going well"--that production is high. As the range goes downward in condition from "excellent" to "good," "fair" and finally to "poor" range, we find fewer of the <u>green group</u> plants. Examples of this group are: slender wheatgrass, bluebunch wheatgrass, and winterfat.

b. <u>Yellow group plants</u>--are also native plants that were part of the "top" or "climax" range but are less attractive to livestock. Many are short plants. They escape grazing because they are short, less palatable, or possibly because they are "spiney" (cactus).

These yellow group plants increase in numbers as grazing becomes moderate too heavy. They replace the green group plants which have become smaller and weaker. If heavy grazing continues long enough, even the yellow group plants will die out of the range.

If the yellow group plants in the range become numerous, weak and small, the operator should look at his grazing program with caution.

The range operator begins to lose valuable moisture and soil when both the Green and yellow groups become weak. When he keeps down the shoots, he shortens the roots. The plant roots are the best soil and water conservators. A healthy range plant renews its entire root system over a 3 year period, that is, if it has enough leaves to manufacture root building materials.
Examples of the "yellow" group are: Blue grama, curly grass, fringed sagewort and cactus.

c. Red group plants--are the plants which in the original range occupied only the disturbed areas, such as prairie dog towns, slide areas and washed or trampled soil. They may also be from other land areas. Rangelands which are grazed too heavily too long are often invaded by red group plants in the range simply mean DANGER to the soil and water resources and to the production of livestock, game animals and water. Examples of this group are: Russian thistle, cheatgrass brome, foxtail barley and halogeton.

3. Range condition judging. (Field trip)
   Range condition means range health. The kinds and amount (by weight) of the range plants determine range condition. Group participation: Range condition judging. Examples of range condition judging. Examples of range condition classes. (flannel board exhibit)

4. Making a range inventory.
   Exhibit: Making a range map.

D. Making Plans for Wise Use

Exhibit: Range map and map overlay. By workshop leader. A good range management plan is made up of practices that result in high production from the resources over a long period of time.

E. Range Improvement Practices

1. Grazing methods--are always needed.
   a. Rotation grazing--grazing different pastures in proper order.

b. Deferred grazing--letting the plants get a start before grazing time.

c. Range "rest"--the best medicine for "sick range."

2. Salting plans--for more even use of grass by livestock.

3. Stock water development.

4. Herding or drifting

5. Seeding--sometimes needed; re-established higher producing plants.

6. Burning--used occasionally (remember, can be a useful servant or a bad master).

7. Control of poisonous and noxious plants.
   a. Mechanical control.
   b. Chemical control

   c. Grazing management. Graze larkspur with sheep only.

III. Management of Grazing by Wild Animals

Do the same principles apply?

RANGELAND TYPES IN RELATION TO RANGE USE IN UTAH

Rangeland in the state of Utah furnishes needs and satisfactions important to the people of Utah, it is extensive in area.

To begin with, let's take a look at the land use, ownership and administration pattern of rangelands in Utah.

Pie chart of land use:

Area of Utah	52,700,000
Rangeland	45,000,000
Cropland	1,800,000
Commercial Forest	3,500,000
Special use area (defense, etc.)	3,000,000
Rangeland Ownership	8,500,000
Private	7,800,000
National Forest Rangeland	25,000,000
BLM	3,000,000
State and local government	
Range Use	
Grazing	
Cattle and Sheep	40,000,000
Big game animals (not all same area)	35,000,000
Recreation	
Intensive areas	90,000
Game Pursuit	30,000,000
Water Yield	32,000,000

Range livestock and big game animals in Utah get nearly 60 per cent and 95 per cent respectively of their feed from native range land.

There is a wide variety of rangeland in Utah. Each is suited to a particular purpose. (See map of Utah.)

1. Winter Range

This occupies most of western and central-eastern Utah. The Creosote bush type in Washington County is the lower producing part of the desert range. The Blackbrush community occurs along the southern border and along the alluvial benches and fans bordering the Colorado River. Production is also low, but not as low as in the Creosote bush type.

The east and west desert furnish a rich variety of feed for livestock and game animals if the range is in good condition.

Soil sodium content is high. Infiltration is impaired with heavy use.

While there are pure stands of winterfat, the typical plant cover is a mixture of big sagebrush, shadscale, saltbush and winterfat along with a few grasses such as squirreltail, and forbs such as scarlett globemallow.

Halogeton has invaded much of the desert ranges of Utah.

2. Spring and Fall Range.

The upper desert plateaus, foothills, and lower mountain ranges have a cover of sagebrush--bunchgrass type--in the lower elevations, and the pinyon-juniper types in the higher elevation in this part of the state. This is a fairly productive type, but which is now supporting only a stand of scrubby trees over bare soils, or sagebrush with a few herbacious plants as an understory.

An increasing amount of this vegetational type in Utah is being developed. Increases of from 500 to 1000 pounds of forage per acre are being obtained.

3. Summer Range

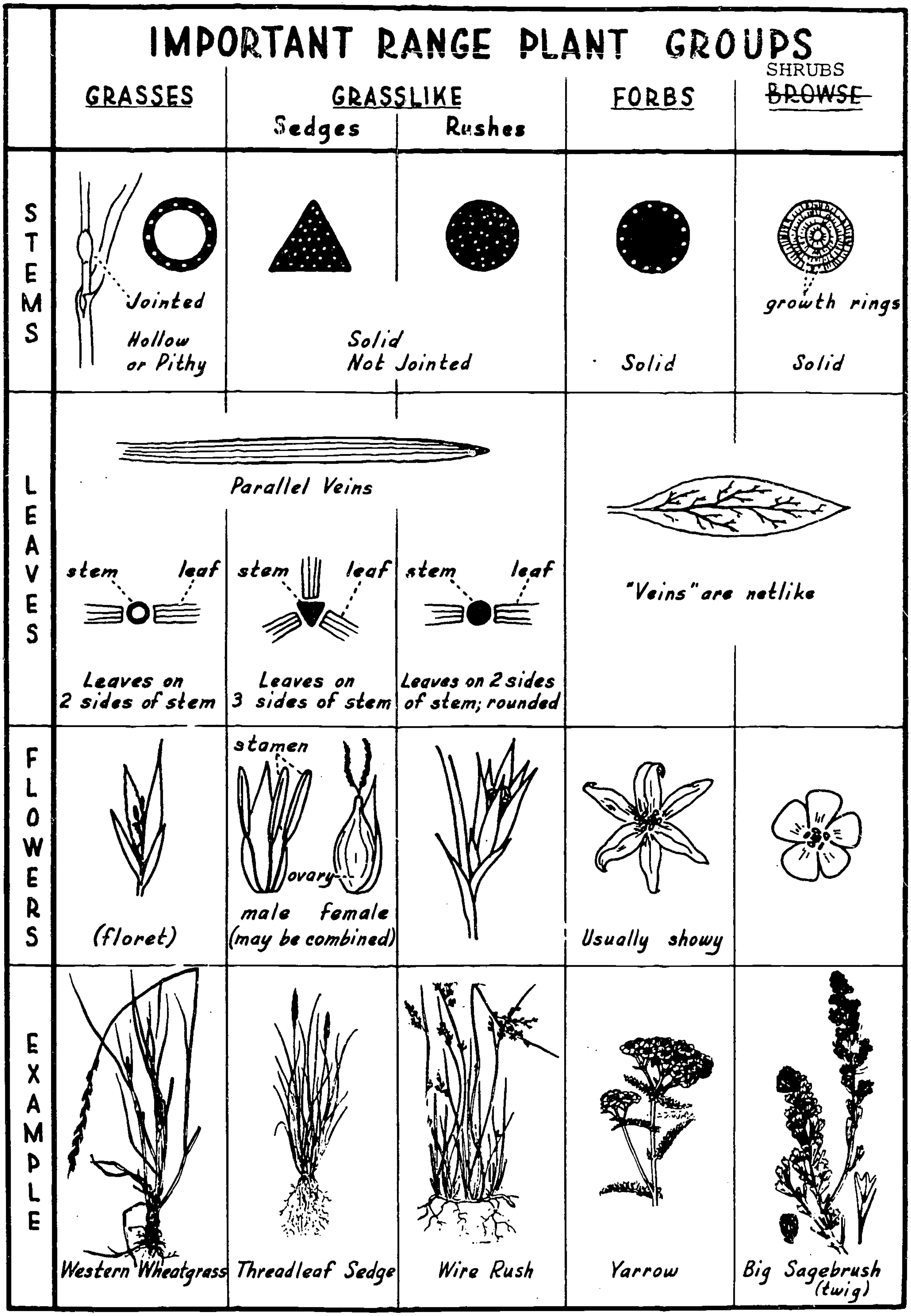
The oakbrush and maple type form the transition zone into the summer range area. Here we find widely varying kinds of vegetation, ranging from low producing shrub cover to highly productive meadows. Here we also find dense stands of trees about which there is some controversy regarding resource development.

Steepness of slopes is a major problem in the late spring and early summer range areas. Intensive livestock management and close cooperation among range-livestock operators where they run livestock in common are necessary if these types of lands are to be classed as "usable."

The aspen type is highly productive range. It, too, requires careful management. The normal understory of saterleaf, mountain brome, slender wheatgrass, and rich variety of other forbs and grasses is quite sensitive to grazing. The open parks and the open stands of aspen in many cases are now occupied by a misture of sagebrush and rabbitbrush.

The alpine grassland types used mostly as summer range for sheep also produce good forage. In these higher altitudes the climate near the ground becomes so harsh that only a few rather specialized types or plants are able to survive.

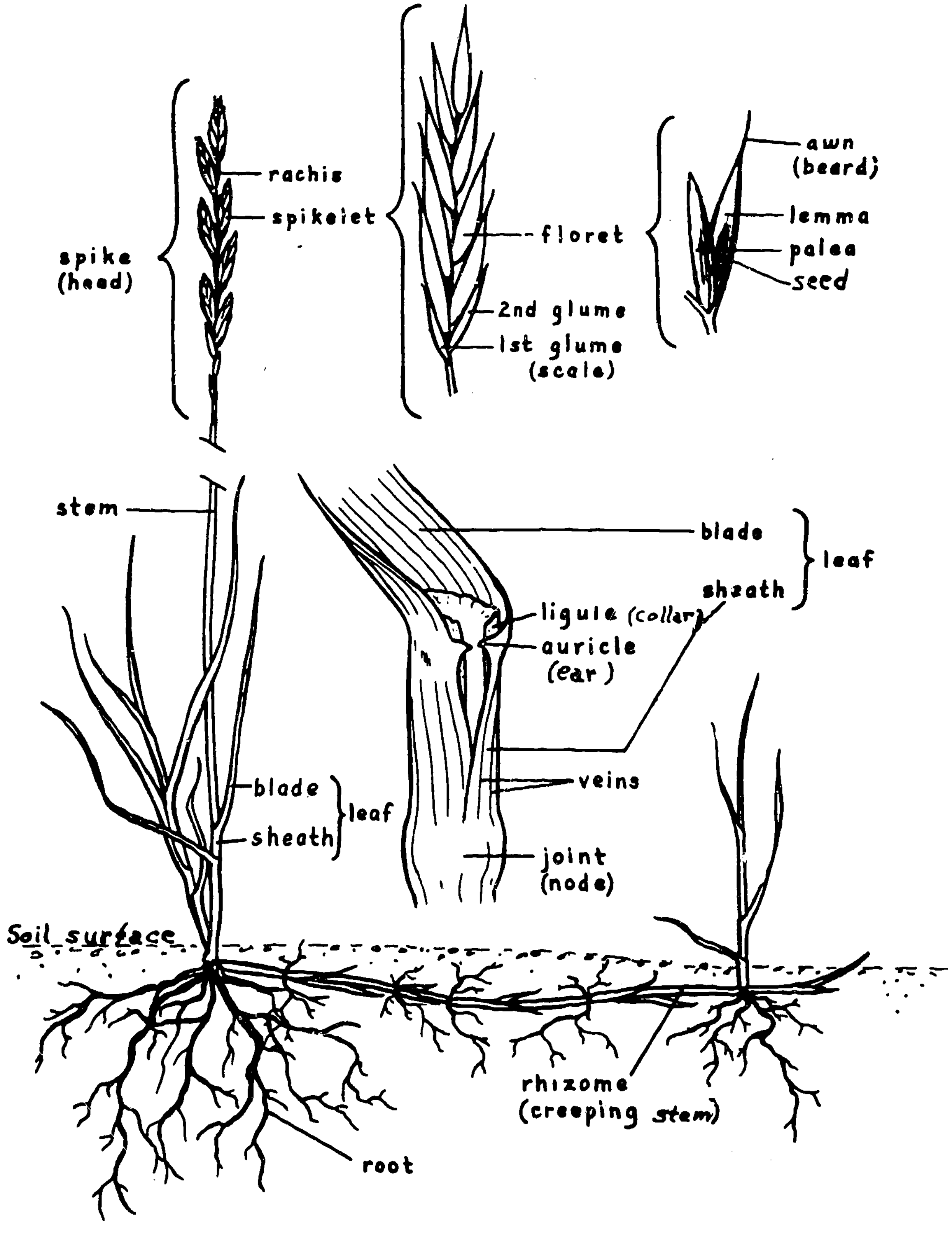
Since these are the highest producing watersheds of the state of Utah extremely heavy emphasis is placed upon effeciency of management of the plant cover.



IMPORTANT RANGE PLANT GROUPS

	GRASSES	GRASSLIKE		FORBS	SHRUBS ~~BROWSE~~
		Sedges	Rushes		
STEMS	Jointed Hollow or Pithy	Solid Not Jointed		Solid	growth rings Solid
LEAVES	Parallel Veins stem leaf Leaves on 2 sides of stem	stem leaf Leaves on 3 sides of stem	stem leaf Leaves on 2 sides of stem; rounded	"Veins" are netlike	
FLOWERS	(floret)	stamen ovary male female (may be combined)		Usually showy	
EXAMPLE	Western Wheatgrass	Threadleaf Sedge	Wire Rush	Yarrow	Big Sagebrush (twig)

PARTS of GRASS PLANTS



FOUR PRINCIPLES OF RANGE OPERATION*

Many things happen on range land that we don't understand, but there are some natural laws to be steered by. These natural laws apply on range land, whether in Texas or Utah. They give us reasons for managing different ranges in different ways and for adjusting to the seasons and years. They might be called principles of operation. There are four:

The first is: THE SHOOTS MAKE FOOD AND ROOTS! Green leaves manufacture all the food from which roots grow. In the summer and fall, roots store food that nourishes the new shoots in the spring. Plants are living things. You can make them grow or starve them. Suppose we graze off the shoot that comes from root storage in the spring. This is the shoot which was to have been the food manufacturing apparatus for this year. If the first shoot is grazed, there is usually enough storage to put out another shoot; but if we do this repeatedly in the same season we starve the root, we shorten it, reduce its agility to reach moisture and nutrients. It takes a big factory above ground to turn out much goods. The man whose pasture looks only half used each fall gets more grazing than the man whose pasture is kept short.

The second is: NATURE ABHORS A VACUUM! She doesn't like empty space. This is a law of physics but has an analogy on the range. On pasture, this means that she tries to keep the soil covered as long as any soil is left. What will she cover it with if we won't let anything grow that's fit to graze? That's why palatable plants on overstocked pasture give way to weeds and woody plants and even spiny plants. That's also why tall high-producing grasses give way to short low-producing grasses. When we keep a grass that normally grows three feet tall grazed down to a height of one and a half inches, we are removing over 90 per cent of the food manufacturing appartus of that plant. In the same pasture there are usually other grasses which are normally short grasses. It's hard for a cow to get more than half their leaves. We say they stand the grazing. Actually, they are so short they can escape being grazed too closely. They, therefore, increase in overutilized pastures. Half of what the big grasses produce is about as much as all of what the short grasses would produce if a cow could graze short ones that closely. Under good management, nature takes up the slack, and the taller kinds, if some are left, crowd out the weeds and push short grasses back down to their proper percentage of the plant cover. That means a more productive pasture.

The third principle is: NATURE IS ALWAYS TRYING TO PUT BACK THE KIND OF VEGETATION SHE HAD ON A PIECE OF GROUND IN THE FIRST PLACE! This is what plant ecologists call the natural law of plant succession. These changes in the kinds of plants on abandoned fields, in pastures that are rested, along road right-of-ways, are examples of the process. The changes, if unmolested, go on until there is a kind of vegetation that fits the soil and climate so perfectly that no other kinds of plants can move in. That kind of vegetation is called climax. The climax in forest climates will be some combination of forest. In grassland climate, it will be some combination of grasses. We can even predict what it will be when we know the <u>soil</u> and the <u>climate</u>. This makes range management fairly simple compared to managing a tame pasture. Natural plant succession will increase the better higher-producing plants on ranges in poor condition, if we simply give the pasture a rest. Sometimes a change in season of use or in numbers is all that is needed. However, rests usually get quicker results.

This same tendency of nature, to restore the original kind of vegetation will destroy our tame pastures unless we keep working with them--clipping weeds, fertilizing, renovating, reseeding, etc. The soil was built under nature's mixture of plants. They didn't take out more, it also takes more. That's why tame pastures get "sod-bound" or "run-down." They hit the bottom of the barrel and we have to fertilize or renovate. On either kind, native or tame pasture, we will manage better if we recognize this natural law of plant succession.

The fourth and last is: THE PRINCIPAL FACTOR LIMITING GROWTH IN GRASSLAND CLIMATES IS WATER SUPPLY! What can we do about water supply? Maybe someday it will be practical to make it rain. Meanwhile, we had better get more of what falls naturally each year stored in the ground. We know that a lot of the moisture that falls runs off because the very surface of the soil is puddled and sealed. We know that puddling is caused by raindrops striking bare soil. We know that if we keep soil covered with green vegetation or a mulch of old growth or with even a burlap sack, the soil is not puddled by raindrops and much more water soaks in.

We also know that water once stored in the soil in a grassland climate almost all stays there until it is used to raise plants, or moves into streams through natural channels. On range we don't worry about capillary rise. Capillarity doesn't work when the bottom of the wick isn't in the kerosene. Evaporation doesn't use much stored soil moisture. If it did, we couldn't summer-fallow wheat land to store two years of rain for one wheat crop. So, the answer is clear: Keep the ground covered and cash in on what the climate has to offer. The man with the bare-looking range needs a rain the most, but when the rain comes he will get less benefit from it than the man whose range is covered with forage. You can dig holes on two sides of a range fence a day after a good rain on dry soil, and you'll often find twice the depth of stored moisture on the side where the ground was covered with vegetation, dead or alive, compared with the bare side.

It's good business to graze about half the year's growth and leave half. The half for grazing will be a bigger half and the other half won't be wasted. The half left will mulch the ground so the surface won't seal. In that way, we'll get the water stored in the ground to raise more grass.

*(Excerpt: Journal of Range Management. Vol. 4, No. 5, September, 1951, USE OF ECOLOGY ON RANGE LAND by E. J. Dyksterhuis)

PLANT AND ANIMAL REQUIREMENTS

Success in using any intensive grazing management plan depends on how well the plan provides for two basic needs:

1. The needs of the forage plants.
2. The needs of the livestock (and livestock owner).

A management system which overlooks either plant or animal requirements will usually fall short of its goal. Either the range or the rancher suffers when the plan does not provide for these needs.

PLANT NEEDS

Because the forage plant is required for grazing, its physiology and reactions ought to be understood by anyone who undertakes to manage range land. Range plants must provide livestock forage and yet supply their own needs for growth and reproduction. A year in the life of a typical perennial range grass or forb could be described as beginning in the fall, as the plant becomes dormant after a season's growth.

To survive the winter and begin spring growth, the plant has stored reserves of carbohydrates in its roots and root crown. This food supply is used at a very slow rate during the winter. As the plant begins its spring growth, much of the remaining food reserve is used. Stored carbohydrates continue to be the sole source of food for the plant until enough chlorophyll-bearing leaves are grown to produce food needed for the plant's growth. After the initial spring growth, the plant depends largely on currently produced food for growth and seed production. Storage of carbohydrates reaches a peak between seed ripening and fall dormancy. Fluctuation in moisture and temperature affect the growth and storage patterns, which also vary between species. Detailed data on many major forage species have been published in scientific journals. This information, coupled with local observations, can be used for management planning.

Grazing--intensity, frequency and timing--can profoundly affect the growth and reproduction of the plant. During the dormant fall-winter period, dry leaves and seed stalks usually can be grazed without damaging the plant. The root crown, which contains stored plant food, must not be grazed and enough stubble should be left to protect the root crown from adverse weather, trampling and other effects. A critical period is when the plant starts spring growth, reducing stored food supply when producing the first leaves. However, once sufficient growth is available to manufacture plant food, grazing is not unduly detrimental provided (1) it is not too intensive and (2) it is terminated in ample time for the plant to regrow and complete its normal growth cycle.

Grazing during the period of flowering and seed production will interfere with seed production and reduce essential carbohydrate storage. Removal of green leaves and stems during the food storage period that follows seed production can deprive the plant of needed reserves, reducing its vigor and retarding its growth in the spring of the following year.

Cropping of seed stalks stimulates tillering (production of new shoots) in some cases, but benefits are lost if plants do not receive subsequent rest to allow the tillers to develop. Stolon (runners) and rhizome (rootstock) production depends on good plant vigor, which in turn depends in part on food reserve storage.

Weather conditions strongly affect plant growth, and hence plant response to grazing. Cold or dry spring weather can delay the development of the cool-season growers such as western wheatgrass, Arizona fescue and crested wheatgrass which depend largely upon winter and spring precipitation to make their growth. In the Southwest, warm-season grasses (blue grama, for example) make their annual growth largely after summer rains begin. Mixtures of cool-season and warm-season growers offer opportunities for broader realization of benefits from periodic deferment. Weather variations must be considered along with composition of cool-season and warm-season species in developing a management system for a range unit. Variable weather requires plant flexibility to allow adjustments for drought, "late" spring seasons and other unpredictable factors.

LIVESTOCK NEEDS

To be practical, a management plan must satisfy the needs of the livestock that harvest the forage. Livestock needs are perhaps better understood that those of the plants. Domestic animals are grazed for economic reasons--the rancher wants to profit from his operation. This means that a breeding herd or flock must produce a high percentage of offspring; animals destined for market need to gain in weight and condition while grazing.

Livestock often thrive best when not handled excessively, though many ranchers believe "the eye of the master fattens the cattle." Weight losses can result from moving or handling livestock unless the animals are accustomed to it, and unless the handling is done carefully. Most operations require gathering stock at least twice annually for branding, shipping, shearing, or moving to seasonal ranges; these moves can often be coordinated with the rotation system so as to result in little or no extra handling. "Fresh feed" periodically may appeal to grazing animals, and a move to untouched forage can result in improved livestock condition and even better rate of weight gain during the growing season; this benefit often can at least reduce detrimental effects of handling and moving.

Many operations involve breeding on the range; sires simply are turned in with the herd during the breeding season. In some cases, special pastures are used for this purpose. The size, topography and other characteristics of the range unit affect the number of sires necessary to achieve complete breeding. Animal husbandmen on many ranches find it necessary to separate their livestock by sex and age classes; for example, steers and heifers are usually kept separate and the cow-calf herd is run in separate pastures. These factors can affect the design or implementation of a management system.

Livestock have strong preferences for certain species of plants, and often, for individual plants of a species. The highly-preferred species have been referred to as "ice cream plants"; animals will heavily graze them while hardly touching equially nutritious but less palatable species. There is often a tendency for animals to return to the same individual plant in preference to another of the same species which has accumulated coarse growth from the previous season. This selective grazing is a characteristic of wildlife as well as domestic animals.

Livestock in general prefer certain areas of their range. For example, cattle tend to use heavily the areas adjacent to water, and seldom travel up steep slopes or over rough topography as long as any feed remains in the "bottoms" or "flats." In rough country, cows become "located" in a limited area, and will return to it at the first opportunity if driven away. This is particularly true of cows raised on a yearlong range unit.

RECONCILING PLANT AND ANIMAL NEEDS

The case histories of record offer evidence of advantages for intensive management from the standpoint of both forage plant and grazing animal. They also show that there are problems associated with their application. The results of actual applications of intensive management demonstrate that here is a strong challenge and opportunity to couple common sense and practical experience with scientific knowledge for better rangelands and sustained livestock production.

The variety of case histories used as examples show conclusively that there is no single "best" system that is universally applicable. Every range unit must be considered in the light of the combination of conditions that affect it. A management plan tailored to each ranch or grazing allotment is the "best" answer.

Most successful grazing systems are compromises which take advantage of both plant and animal characteristics while recognizing the undeniable requirements of both. For example, plants would do better if they were never grazed during their most active periods of growth and food storage. On the other hand, livestock must have feed during these periods. Most intensive management systems therefore provide for grazing some units while resting or deferring others. As case histories show, there are many ways of making this compromise.

IMPORTANT POISONOUS PLANTS OF UTAH*

Poisoning of grazing animals by the plants that they normally eat is not a common thing. Poisoning has become a problem on the range either because animals are forced, through shortage of non-poisonous forage, to eat more of the poisonous species, or because poisonous species have increased where other plants have been killed out.

Normal ranges have few poisonous species and those which do occur, are not abundant. Most poisonous species kill animals only if eaten in large amounts--often almost a straight diet of the poisonous plants. Where there is plenty of forage, animals naturally vary their diet, hence eating large amounts of any one species is unusual. With few exceptions, a normal range is safe for domestic livestock. Poisoning is nature's sign of a sick range!

When too many animals graze a range, they eat down the most tasty plants so frequently that these species do not reproduce and grow, and often are killed. As a result, there are bare spaces on the land. Other plant species that are less tasty to livestock invade these bare spaces. When the tasty plants are killed, it is like weeding a garden, the remaining plants that animals do not like now increase in size and abundance.

Poisonous plants fall into two groups. (a) those normal to the range but that may increase with heavy grazing and (b) those that invade or come in only after heavy grazing or other disturbance of the land (see table). While drought and many other factors may contribute to poor range conditions, too many animals is almost always the direct or indirect cause.

Almost all poisonous plants are disliked by grazing animals. This means that if other feed is available, few of the poisonous plants are dangerous. Possible exceptions to this rule are chokecherry, tall larkspur, lupine, and some species of loco. Arrowgrass apparently is well liked at times also. A possible cause for animals eating plants normally disliked, other than shortage of good forage, is a deficiency of salt or minerals such as phosphorus in their diet. In this case, animals often eat things that they normally would not, apparently seeking to satisfy their craving for minerals. An extreme of this is seen in the chewing of bones and sticks by phosphorus-deficient animals.

Much is unknown concerning forage preferences displayed by grazing animals. Weather seems to be an important factor. Extreme drought, heat, or cold may induce unusual foraging habits. Then even poisonous plants that are unpalatable are potentially dangerous and sudden losses may occur on previously "safe" range.

Surprising to most people is the fact that plants do not fall readily into a poisonous and a non-poisonous group. Probably thousands of

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* L. A. Stoddart, Arthur H. Holmgran, and C. Wayne Cook

plants would be poisonous if eaten in sufficiently large quantity. Some of these are excellent forage when not eaten too abundantly. Many plants definitely classed as poisonous are eaten daily by animals with no ill effect because they are taken in small amounts and the poison is eliminated by the animal as rapidly as it is consumed. Although a few species such as water hemlock and halogeton are violently poisonous at certain times of the year, even in small amounts, most poisonous plants are not dangerous except in large amounts and even then they may be harmless at certain times of the year and under certain conditions. Although this is fortunate, it does have the disadvantage of putting the rancher off guard. For example, lupine (wild bean) often is considered a first class sheep feed and is, in fact, highly palatable and nutritious. Many ranchers consider it among their best feeds and laugh at the idea of its being poisonous. Apparently on many ranges it is harmless year after year, especially if not in fruit. Then, under certain conditions, it becomes a ruthless killer. A northern Utah rancher grazed his high-elevation sagebrush range for years with but few losses. In 1942, he brought in 700 ewes with lambs from Oregon. The range was above average and lupine made excellent growth. On the first of July, when the lambs were 4 months old, the herd was turned onto the range at 4 p.m. and they "really went after that lupine" according to the herder. By dark many were dying and the whole herd was removed immediately--but 150 lambs and 110 ewes were dead. This man will not forget that lupine should be watched.

In summary, extensive poisoning of animals on the range is nature's danger signal that something is wrong. This usually means poor range resulting from misuse. The cause immediately suggests the solution--good range management.

Those occuring more or less normally on Utah ranges but that may increase in numbers with misuse	Those that come into Utah ranges largely as a result of misuse or other disturbances
Arrowgrass	Death camas
Chokecherry	Halogeton
Copperweed	Low larkspur
Greasewood	Milkweed
Horsebrush	Rubberweed
Loco	
Scrub oak	
Sneezeweed	
Tall larkspur	
Water hemlock	

GRAZING AND MANAGEMENT TO AVOID POISONOUS PLANT LOSSES

Although improving the range is the wise solution to the poisonous plant problem, this takes time and most stockmen look for an immediate solution to stop costly animal deaths. Certainly a fundamental rule should be that all livestock men learn to recognize the important poisonous plants. These are not numerous and can be learned by anyone in a short time.

Since hungry animals on short feed are most likely victims of poisonous plants, keeping animals well fed will pay dividends. The following rules should be considered:

(1) Reduce numbers of livestock so that ample feed is available to the remaining stock. A less desirable alternative is removing all livestock when the feed becomes short at the end of the grazing season. This is especially important during drought years when there is less feed than usual.

(2) Do not turn animals out on a range too early in the spring. Many poisonous plants are early growers, and in early spring before the grass has grown well, good forage may be scarce and animals be forced by hunger to eat poisonous species. This is made more serious by the fact that many plants are more poisonous in early spring than at any other time. Especially dangerous in early spring are low larkspur, death camas, loco, and oak.

(3) If possible, avoid turning hungry animals out on the range, especially those that have been in shearing corrals, shipping cars, or wintered on hay for a long time without green forage. This is especially important on halogeton, greasewood, and horsebrush range. Feed the animal to satisfy his hunger first; then he will graze slowly and take time to select plants according to his taste. Hungry animals may be turned in non-infested areas first and then, when hunger is satisfied, they may be safe on poisonous range.

(4) Avoid driving animals too fast when trailing. Allow them time to graze along the way or, if feed is not sufficient for normal grazing on long trails, stop frequently on the trail and feed the stock. Bighead of sheep from horsebrush is a poisoning of the spring trail. Halogeton is the most important poisonous plant found on sheep trails in the fall.

(5) Avoid areas where poisonous plants are abundant. Animals always concentrate at and overgraze waterholes, salt grounds, bed grounds, and trails. Avoid grazing around such places as much as possible because these overgrazed areas are likely to grow poisonous plants. Move sheep away from waterholes as quickly as possible after drinking. Use new bed grounds each year and occupy them only for two or three nights at a time. When possible, avoid established trails. Move cattle salting grounds frequently.

REDUCING LOSSES FROM POISONOUS PLANTS

Although good range management usually is the only economically sound plan to prevent range poisoning, there are certain rules that will help to reduce losses. Generally, little can be done to avoid cattle losses except in some cases changing the season a range is grazed or keeping animals off poisonous range. Sheep poisoning, however, often can be practically eliminated by avoiding poison areas in herding. Every herder should know the poisonous plants on his range and under what conditions they affect the animals. This seems to be a fundamental rule in good herding.

Treating poisoned animals on the range is always a "last resort" and never should be relied upon as a solution to the problem. The help and advice of a veterinarian is always desirable. In some cases he can save many animals that otherwise would die. Generally, however, this help comes too late. Always get all animals off the range when poisoning first becomes evident. If possible, take sick animals to a corral and feed them on good laxative feed. If they are down, turn them with head uphill where possible. Then call the veterinarian.

The following general principles may be helpful:

(1) Use plenty of salt on the range. It is cheap and is good insurance. In some areas, adding to the salt a supplement such as bonemeal or some other source of phosphorus (monosodium phosphate, disodium phosphate, deflourinated rock phosphate) is desirable. Also be sure animals have plenty of clean water.

(2) Graze with the kind of stock not poisoned by the plant in question. Many plants seriously poisonous to one kind of animal are not poisonous to another, or, at least under practical range conditions, are not dangerous. Some of these relationships are shown in the table below.

Some common Utah poisonous plants and the kinds of animals that are in danger of poisoning from each under usual range conditions.

Generally dangerous to cattle only	Generally dangerous to sheep only	Generally dangerous to both cattle and sheep
Low larkspur	Death camas	Arrowgrass
Oak	Greasewood	Chokecherry
Tall larkspur	Halogeton	Copperweed
Water Hemlock	Horsebrush	Loco
	Lupine	Milkweed
	Rubberweed	Selenium-bearing plants
	Sneezeweed	

(3) Changing the season of grazing is important in correcting many poisonous plant problems. In general, low larkspur, death camas, oak, and

water hemlock are spring poisons. Tall larkspur, sneezeweed, rubberweed, greasewood, arrowgrass, loco, milkweed, and selenium-bearing plants are summer-long poisons. Most lupines are poisonous when in fruit (midsummer) but some species of lupine are harmful at other times. Chokecherry is irregular but is likely to be most dangerous in spring. It loses much of its toxicity in midsummer. Copperweed increases in poison as the plants mature, fall being the most dangerous season. Halogeton is a late fall or early winter poison. At this season, the plant becomes more palatable to stock and is at the most poisonous stage.

(4) Poisonous plants may be eradicated by mechanical means or they may be fenced off. Since poisonous plants frequently are widely scattered over low-value land, eradication is seldom economical. Only when the plant is restricted in area is fencing practical. An example is a plant like water hemlock which is restricted to a wet river-bottom and does not normally spread from this area. Patches of poisonous plants may be eradicated by digging out the plants or in some cases by spraying with 2,4-D or calcium or sodium chlorate. Spraying with 2,4-D is still in the experimental stage. It is known to be effective on water hemlock and some species of loco; on sneezeweed and lupine it has been partially effective. Tall larkspur, halogeton, and milkweed do not appear to be as susceptible to 2,4-D as are other species and exact procedures for killing them have not been determined. Both grubbing and spraying are expensive and require going over the area for 2 or 3 years to be sure all individuals are eliminated. These methods might be considered in the case of the following species: tall larkspur, sneezeweed, lupine, rubberweed, chokecherry, loco, copperweed, water hemlock, and milkweed.

VOCATIONAL AGRICULTURE

SUGGESTED COURSE OF STUDY FOR RANGE MANAGEMENT

I. Introduction
  A. Definition
  B. History of the Range in Utah
  C. Uses of Range
    1. Livestock
      a. Cattle
      b. Sheep
    2. Conservation
      a. Watersheds
    3. Wildlife
    4. Recreation
    5. Food and Water for Human Consumption
    6. Water Power

II. What's in a range?
  A. Plants
    1. Types
      a. Grasses
      b. Grasslike
      c. Forbs
      d. Shrubs
      e. Trees
    2. Identification of common range plants
      a. Parts
        1. Leaves
        2. Stems
        3. Flowers
        4. Roots
        5. Seeds
      b. Growth habits
        1. Annual
        2. Biannual
        3. Perennial
        4. Stage of maturity
        5. Location
          a. Soils
          b. Elevation
          c. Water
      c. Non-poisonous or poisonous
  B. Productivity
    1. Size and quantity (clipping and weighing)
    2. Quality
      a. Palatability
      b. Nutritive Value
      c. Stage of growth in relation to grazing
  C. Reaction to grazing
    1. Stability of range plants under grazing conditions

        a. Decreasers---Green
        b. Increasers---Yellow
        c. Invaders-----Red

Color code--in reference to area and location

    2. Methods of evaluation
        a. Range transect experience

III. What's it good for?
  A. Forage Values
    1. Season of best use
    2. Comparative nutrional values of plants
  B. Influence on water resources
    1. Consumptive use by plants
    2. Conservation value
  C. Dependability (consistancy of production)

IV. What's happening to it?
  A. Range condition
    1. Basis for judging range conditions
    2. Evaluation of range
    3. Capabilities
    4. Abnormal conditions
        a. Fire
        b. Floods
        c. Drought
        d. Insects
  B. Trends in range condition
     (Explanation only--slides and maps)

V. What to do about it.
  A. Range use practices
    1. Controlled grazing
        a. Developing water
        b. Salting
        c. Fencing
        d. Rotation grazing
        e. Deferred grazing
        f. Number of animals
        g. Kinds of livestock and wildlife
        h. Riding
        i. Trail improvement
    2. Range management practices
        a. Clearing land
            1. chain
            2. Spray
            3. Burning
            4. Plowing
            5. Others
        b. Reseeding
            1. Seedbed preparation
            2. Methods of planting
        c. Fertilization
            1. Methods
            2. Kinds and amounts
            3. Conditions

VI. Public Relations

A. Relationship between:
   1. Forest service
   2. Fish and game (wildlife)
   3. Bureau of Land Management
   4. Rancher
   5. General public

VII. Principles of economy

A. Principles of deminishing returns
B. Fixed and variable costs
C. Optionality
D. Marginality
E. Opportunity costs
F. Time comparisons

SUGGESTED REFERENCES IN RANGE MANAGEMENT

1. Range, It's Nature and Use
   Extension Bulletin
   By Karl G. Parker
   Utah State University
   Logan, Utah

2. Important Poisonous Plants of Utah
   Special Report No. 2
   By Stoddard, Holmgren, Cook
   Experiment Station
   Utah State University
   Logan, Utah

3. Development and Use of Foothill Ranges in Utah
   Bulletin #461
   Experiment Station Bulletin
   By Cook
   Utah State University
   Logan, Utah

4. Range Seeding in Utah
   Extension Circular #307
   Utah State University
   Logan, Utah

5. 16 Plants Poisonous to Livestock in the Western States
   Farmers Bulletin #2106
   USDA

6. Important Utah Range Grasses
   Extension Circular #281
   By Vallentine
   Utah State University
   Logan, Utah

7. Range Management
   By Stoddard and Smith
   McGraw-Hill Book Co.
   New York

8. Utah Extension Services Range Plant Herbarium
   Extension Circular #338
   Available for use in County Atents Office
   By Parker and Hatch

FOREST MANAGEMENT

FORESTS IN UTAH*

Utah's forest lands--15 million acres of foothills, high mountains, and plateaus--comprise 28 percent of the land area of the State. These forested highlands, which provide contrast and scenic relief from the arid climate of the level expanses of the Great Basin to the west, and of the canyon country to the south and east, have long been highly important to Utah and the Nation. The water these highlands could furnish for irrigation and the timber needed for dwellings and many other uses, were important reasons why the Mormon migrants chose Utah as their stopping place in 1847. Subsequently, uses of forest lands have expanded in number and intensity until now some of Utah's forests are as heavily used as many in the country. The variety of uses and the effect one has on another, make it necessary to go beyond a discussion of the timber situation--the principal concern of this report. Water, recreation, and forage uses of forest lands also will be discussed in terms of values, trends, and some of the problems related to multiple use management.

The forests lie mostly between 5,500 and 11,000 feet in elevation.

On the average, the forests begin at 5,500 feet in elevation. They extend up to timberline of about 10,000 feet inthe northern part of the State and 11,000 feet in the southern. However, local conditions of soil and climate cause substantial variations. For example, near Santa Clara in southwestern Utah, pinyon and juniper trees grow at elevations as low as 3,200 feet.

Within the forested zone, precipitation and other climatic influences greatly affect the distribution of species. The general increase in precipitation from low to high elevations is a principal factor in the zonation of vegetation. Most of the pinyon-juniper lands receive from 10 to 16 inches of water a year. Above the 16-inch precipitation zone the general progression of species is (1) mountain brush and/or ponderosa pine, (2) aspen, Douglas-fir, white fir, lodgepole pine, (3) subalpine fir and Engelmann spruce (fir-spruce type) and, (4) White-bark, limber, and bristlecone pines. This zonation, however, is far from consistent. Wide local variations occur because of site factors, fires, logging, and other land uses.

Fire has greatly affected the distribution and extent of the forest area and of individual species. Many of the biggest fires that influenced or determined present forest patterns occurred before white men settled in Utah. As John Wesley Powell (1879) observed in his Utah explorations between 1868 and 1879, Indians habitually set fires to drive gave. His description of the vast acreages burned at that time and earlier is supported by the present area and age of stands of aspen and lodgepole pine. These species, which are noted for ability to regenerate after fire or to invade burned-over lands, now cover 2.0 million acres. Age of the stands indicates a great many started growing before 1850. After the Mormon pioneers settled in Utah the annual burn declined. Intensified detection and suppression efforts in recent decades reduced the forest

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* U. S. Forest Service Bulletin INT-4 1965

area burned in Utah from 21,000 acres annually in the period 1943-52 to about 16,000 acres annually in the decade 1953-62. One of the most important results of reduced annual burn has been more favorable conditions for pinyon-juniper.

<u>About one-fourth of the forest area is commercially valuable for timber production</u>.

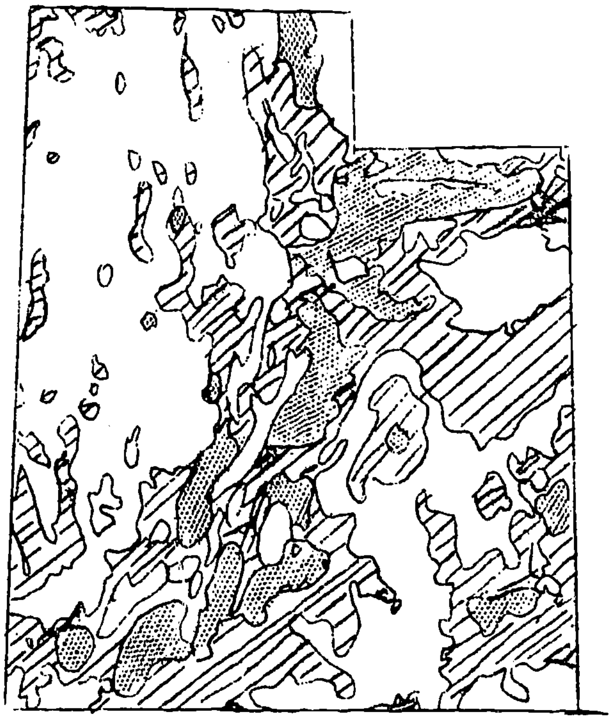
Four million acres, or 27 percent, of the forest area is classed as commercial. The other 73 percent of the forest is classed as noncommercial and consists mainly of lands not suitable for commercial timber production. Only 165,000 acres of commercial quality forest in Utah are reserved from timber cutting and are therefore considered noncommercial. These lands lie in parks and wilderness area.

<u>The noncommercial forest is mainly pinyon-juniper</u>.

Utah has a lot of pinyon and juniper. The 9.3 million acres covered with these scrub conifers is almost 18 percent of the area of the State, and about 86 percent of the total noncommercial forest area. One million acres of mountain brush and about 0.6 million acres in aspen, fir-spruce, Douglas-fir, and other types make up the remainder of the noncommercial area.

Most of the noncommercial forest is at low and relatively dry elevations below the commercial forest zone and consists largely of pinyon-juniper and mountain brush. However, adverse climate and soil conditions at the upper forest elevation cause some of the timber to be noncommercial also. At intermediate elevations there are still other patches of noncommercial forest on poorer, shallower soils within the commercial zone.

Ownership of the 10.9 million acres of noncommercial forest is largely (about 80 percent) public. Roughly, 50 percent of the total noncommercial forest is administered by the Bureau of Land Management.



	Million acres
░ commercial	4.0
▨ noncommercial	10.9
Total forest	14.9

Pinyon-juniper lands are important in a number of ways. These dwarf trees form the predominant vegetative type on a substantial percentage of Utah's rangeland. Many thousands of acres of pinyon-juniper land have had sufficient potential for forage and cropland to justify clearing by public agencies and private owners. Use of the estimated 1,573 million cubic feet of wood in the two species (pinyon 48 percent, juniper 52 percent) has been minor. Fenceposts, fuelwood, charcoal, and Christmas trees are the principal products. The Bureau of Land Management (in cooperation with Utah State Experiment Station, Utah State University) is sponsoring research that may lead to greater use of pinyon-juniper lands.

The commercial forest is largely on public lands.

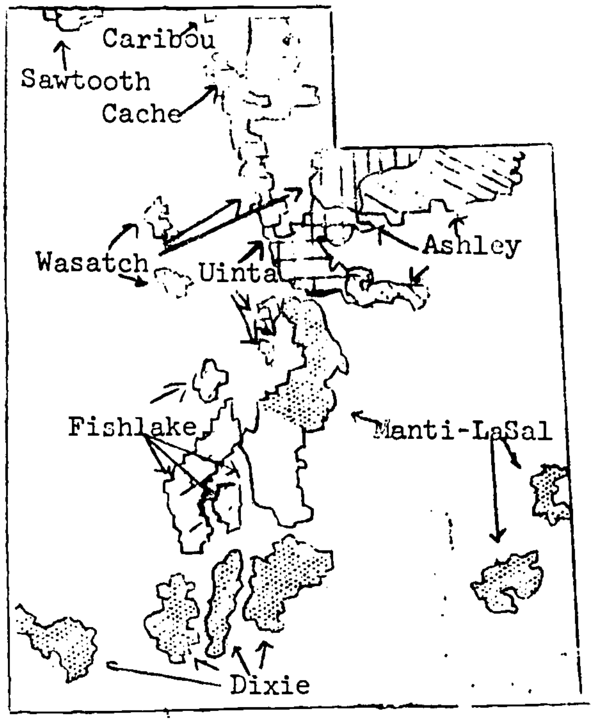
About 83 percent of the commercial forest area and approximately 90 percent of the timber volume are in public ownership--mainly as National Forest. The distribution among ownerships is as follows:

	Thousand acres	Million Cubic feet	Million board feet
National Forest	2,783	4,635	15,951
Bureau of Land Management	155	166	579
Indian	158	165	545
State	240	237	719
Farmer	540	500	1,354
Miscellaneous private	123	122	373
TOTAL	3,999	5,825	19,521

National Forests in Utah form a broken band running down the center of the State (see map on next page). They lie on the Wasatch Mountains at the north end and follow high plateaus--Wasatch, Markagunt, Paunsaugunt, Aquarius, and others--to the south. Other principal areas are the arm to the east along the Uinta Mountains, and isolated patches on the LaSal and Abajo Mountains in the southeast.

The lands that are now in nine National Forests were removed from the public domain between 1897 and 1908 as areas of particular importance for preservation of watershed and timber values. The Uinta was the first National Forest in the State, and one of the first in the United States.

Commercial forest lands administered by the Bureau of Land Management, or in State or private ownership, are generally in small and scattered parcels. Many of these tracts border or lie within the National Forests,



NATIONAL FORESTS

although some occur on isolated highlands within the Great Basin or Colorado Plateau.

Holdings are less dispersed in the Indian and National Forest lands. Indian lands are largely within the Uinta-Ouray and Navajo Reservations. (Only 13 percent of all lands within National Forest boundaries is not in National Forest ownership.)

Sawtimber stands predominate in the commercial forest.

About 66 percent of the commercial forest area is in sawtimber stands. Only 28 percent is poletimber, 5 percent saplings and seedlings and 1 percent nonstocked.

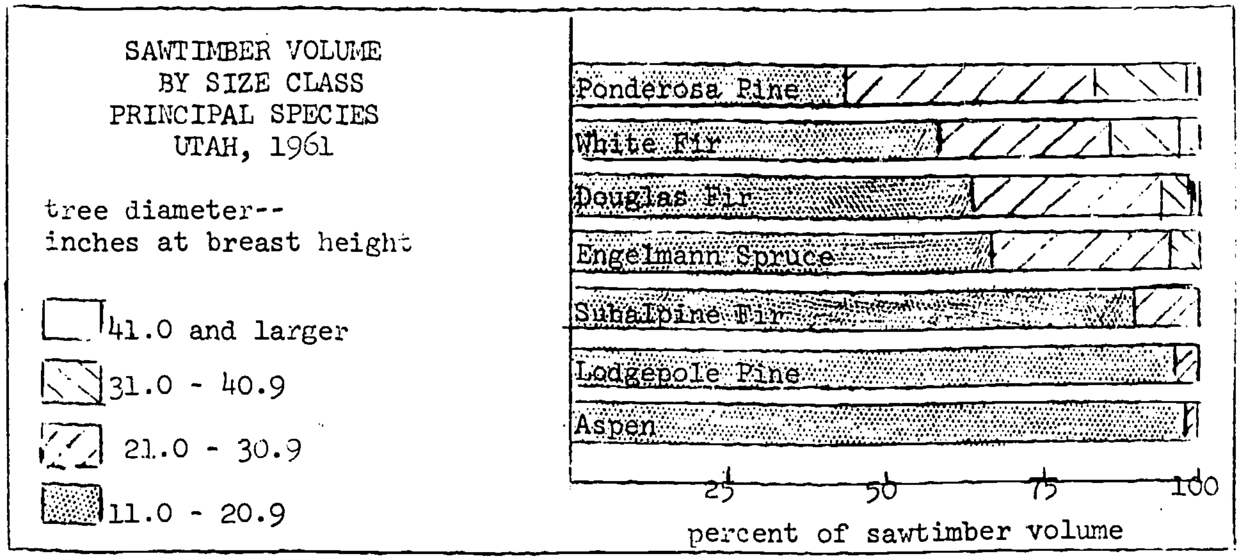
The figures below are for all commercial forest land, but the proportions are about the same for each of the principal classes of owners.

Of the 2.6 million acres of sawtimber stands in the State, only 22 percent is classed as large sawtimber. This compares with about 36 percent for the entire Rocky Mountain area. Twenty-eight percent of Utah's 19.5 million board feet of sawtimber is in large sawtimber trees.

Sawtimber stands in Utah have an average volume of 6,904 board feet per acre. In comparison, the average for Idaho is 12,560, Montana 9,661, and Colorado 7,317.

	Thousand acres
Large sawtimber[1]	572
Small sawtimber	2,057
Total sawtimber	2,629
Poletimber	1,125
Sapling and seedling	218
Nonstocked	27
Total all classes	3,999

[1] Stands in which most of the board-foot volume is in trees 21.0 inches d.b.h. and larger.


SAWTIMBER VOLUME
BY SIZE CLASS
PRINCIPAL SPECIES
UTAH, 1961

Average diameter of sawtimber trees varies greatly among species. Ponderosa pine has a greater percentage of sawtimber volume in larger diameter classes than any other species (chart above).

Height must also be considered in comparing tree sizes. Engelmann spruce sawtimber trees have a greater average total height than those of other species--although a height of more than 100 feet is not common for the species. White fir and Douglas-fir have relatively few trees over 90 feet high, while not many ponderose pine are taller than 80 feet--except on parts of the Dixie National Forest.

Tree height in relation to age is the criterion used as the measure or site quality (site index) in the table on this page. A close and reliable comparison of site quality in Utah with that of other Mountain States will not be possible until more data are available from some of the other States. Perhaps the best indication of productivity is yields of sawtimber stands. According to that criterion Utah is considerably below average.

PERCENT OF AREA OF PRINCIPAL TIMBER TYPES BY SITE INDEX CLASSES

Type	Site index class										Average site index
	20	30	40	50	60	70	80	90	100	110	
Fir Spruce	4	28	33	25	8	2					40
Douglas-fir	3	21	39	24	9	4					43
Ponderosa pine			22	9	43	10	14	2			59
Lodgepole pine			30	41	18	8	2	1			51
Aspen	12	37	22	12	4	2					36

Most stands are old; insect and disease losses are high.

Although precise figures on age of stands are lacking, rough estimates can be made. About 70 percent of the coniferous sawtimber stands are more than 100 years old. More that 85 percent of the aspen sawtimber stands are more than 80 years old and can therefore be considered overmature. Many lodgepole pine stands of poletimber size are also mature. Trees in these old stands are growing very slowly and many are dying. While sawtimber trees make a total annual growth of about 321 million board feet, trees that die reduce this gain by about 70 percent.

Old stands are especially susceptible to disease and to attack by certain species of insects. The primary effect of most disease is a reduction in growth rates, rather than a rapid killing of trees. On the other hand, insects--especially bark beetles--frequently kill trees very rapidly in old growth stands. For example, heavy attacks by Engelmann spruce and mountain pine beetles mean that infested trees will die within a year or two.

Among the many insects prevalent in Utah's forests, bark beetles have done the most damage in recent years and have been the most expensive to control. The mountain pine beetle has been particularly troublesome--expecially in lodgepole pine stands, and to a lesser extent in ponderosa pine. Control measures have greatly reduced populations within the major epidemic areas on the north slope of the Uinta Mountains.

Many areas have infestations of other bark beetles--Engelmann spruce beetle, Douglas-fir beetle, fir engraver beetle, and Black Hills beetle. Although epidemic populations of these beetles develop periodically, they are not now at high levels. Defoliating insects are also widespread--in epidemic proportions in some areas. They chiefly cause loss of growth rather than death of trees, but several species are known to be tree killers.

Diseases and decay, while usually less dramatic in their effects than insects, nevertheless take as big if not a bigger toll from Utah's forests. Dwarfmistletoe is one of the worst enemies of the forest. This parasite is particularly common on lodgepole pine and Douglas-fir, but also thrives on ponderosa pine, especially in southern Utah. Although there are no data to show the total effect of dwarfmistletoe on timber growth and volume in Utah, some idea may be gained from local studies. About 55 percent of an area of 283,000 acrea of lodgepole pine on the north slope of the Uinta Mountains has a significant amount of infection. Surveys in lodgepole pine stands in similar areas in Wyoming and Colorado showed that gross merchantable volumes in virgin stands free of dwarfmistletoe were 1.5 times as large as those in infected stands (Hawksworth 1958). These surveys also showed that dwarfmistletoe is especially prevalent in cutover stands such as those which were partially cut for railroad ties many years ago. Many such areas are included in the 216,000 acres of poorly stocked stands of lodgepole pine in Utah.

Many important diseases attack other species. Cull and growth loss caused by broom rusts are important in the fir-spruce type. Several native rusts of ponderosa and lodgepole pine deform many trees and cause cull, growth reduction, and mortality. In aspen, cankers are a major chronic affliction, and foliage diseases are periodically widespread.

Five timber types make up almost the entire commercial area.

Five timber types--fir-spruce, ponderosa pine, Douglas-fir, lodgepole pine, and aspen--comprise more than 99 percent of the commercial forest area. The distribution of area among these types is shown in the table below. Volumes of the seven principal species that occur in these types are as follows:

	Sound live trees[1]	Sawtimber trees
	Billion cubic feet	Billion board feet
Aspen	1.3	2.1
Engelmann spruce	1.2	5.8
Lodgepole pine	1.0	2.5
Douglas-fir	.9	3.9
Subalpine fir	.6	1.7
Ponderosa pine	.4	1.9
White fir	.3	1.3

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[1] Sawtimber and poletimber trees.

In addition to the five types listed above, there are two minor types--white-bark-limber-bristlecone pine, and cottonwood.

Whitebark, limber, and bristlecone pines are high-elevation species often intermingled with Engelmann spruce, subalpine fir, and Douglas-fir. Because they grow on thin soils and in exposed locations most of the trees of these species are noncommercial. However, the whitebark, limber, and bristlecone pines on 29,000 acres are of sufficiently good quality to be classified as a commercial timber type. Most of the 221 million board feet of sawtimber in these species is limber pine. Very little is being harvested.

Far more cottonwood grows in Utah than is shown by Forest Survey estimates of 2,000 acres of cottonwood type and 2.3 million cubic feet of wood. Probably several times this amount is in clumps and stringers along streams; such areas are too narrow to qualify as forest by Forest Survey standards, and are classed as nonforest or are included in other forest types. Because cottonwood grows at lower elevations than other species suitable for lumber, it was important as a timber species to the early settlers. Substantial amounts have been cut annually throughout the years and in 1960 and 1962 cottonwood lumber production was 1.3 and 0.6 million board feet, respectively.

COMMERCIAL AREA OF PRINCIPAL TIMBER TYPES BY STAND-SIZE CLASS

	All Stands	Sawtimber	Poletimber	Sapling-seedling	Nonstocked stands
	----------Thousand acres----------				
Aspen	1,280	386	753	124	17
Fir-spruce[1]	1,047	947	77	22	1
Douglas-fir	646	556	56	33	1
Lodgepole pine	563	311	223	28	1
Ponderosa pine	432	403	14	8	7

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[1] Included in the fir-spruce type is an area of 192,000 acres that is predominantly white fir. White fir is not recognized by Forest Survey as a major independent type.

THE FOREST IN USE

The nearly 15 million acres of forest land in Utah have many values to the State and the Nation. Practically all these lands are very important for the water they provide the otherwise arid lowlands. A large proportion of these same acres also provides forage for livestock and big game, and nearly every acre provides habitat for other species of wildlife. Trees have been cut and used from many of the 4 million acres of commercial timberland. And practically the entire forest area is available to the public for recreation in some form--hunting, camping, and so forth.

The forests have been important for water, forage, and timber supplies since pioneer days. Substantial recreation use is a later development. Some forest uses have developed to the maximum that the land will support in its present condition. Many areas have been overused, and problems have resulted when attempts were made to restore these lands or least prevent further deterioration. On the other hand, large areas remain untapped for some values.

The next few sections discuss in a general way forest values and trends in their use.

Forests mean water

The water that runs off Utah's forests and other lands within the elevational range of the forests is an important source of supply in the Western States. It is by far the principal water supply for irrigation, domestic, and other uses in Utah's valleys and flatlands. It is also essential to downstream States, particularly Arizona and southern California.

Forests and intermingled open lands within the forested zone of Utah's mountains and foothills comprise about 49 percent of the land area of the State, but they furnish 78 percent of the State's water runoff. The remaining 22 percent comes from the nonforest lands below or above the forest.

About 8.6 million acre-feet of water runs off all lands in the State each year. It flows in three drainages--Great Basin (56 percent), Colorado River (43 percent), and Columbia River (1 percent). The 78 percent of the State's total runoff that is contributed by lands in the forest zone is distributed among drainages in about the same proportion as the runoff from all lands in the State.

The total annual runoff of 8.6 million acrefeet represents an average of 1.9 inches over the entire State. However, as shown in the following tabulation, there are substantial differences in the yield of water from nonforest and forest areas, and from different types of forest areas.

	Runoff Inches
Nonforest	0.8
Pinyon-juniper	1.0
Other forest	7.8
All lands	1.9

The value of forest and high elevation rangelands for water production is underscored by the importance of the water itself. Runoff, together with ground water supplies, represents the total available water for irrigation, municipalities, industries, livestock, recreation, fisheries, waterfowl, and other wildlife. The State's water requirements are expected to increase about 21 percent by 1980 (Utah State University and Utah Water and Power Board 1963).

The importance of Utah's mountains for water clearly indicates the vital need for watershed protection and other management. To date, projects on public lands have attempted mainly to restore impaired watersheds and to maintain soil stability on watersheds which are still in good condition. However, the expected increase in demands for water point to the need for increasing the quantity of yields by forest management measures.

For many years the U.S. Forest Service has conducted research in Colorado and Utah into techniques for improving and increasing water supplies from forest lands in the Rocky Mountains. Studies in Colorado indicate that yields of water from the mountain snowpack and timing of the runoff vary significantly with the kind of forest (hardwood or softwood), size of trees, stocking of stands, degrees of thinning, harvesting patterns, and other factors. Evidence strongly indicates that yields of usable water can be increased by manipulating tree cover. However, much more research is needed before conversion from one type of tree cover to another can be considered economically practical. As part of this research the effects of such conversion on other forest values must be studied.

The forest range has a history of heavy and sustained use

Utah's forest ranges have been grazed for a long time. Pinyon-juniper, aspen, ponderosa pine, and other forested lands provided forage for deer, elk, antelope, and buffalo long before 1847 when Mormon pioneers drove in their herds of gaunt cattle. Livestock numbers were not long in building up. By 1880 at least 136,000 head of cattle and almost 600,000 head of sheep grazed on Utah ranges. Still greater increases in the boom period following 1880 resulted in statewide populations of 344,000 cattle and 3,818,000 sheep by 1900.

National Forest figures showing animals under permit provide a basis for indicating trends in use of the forest range since 1900. These data indicate the number of sheep on National Forests dropped from a peak of 1,001,000 in 1913 to 407,000 in 1962--a decrease of 59 percent. Cattle numbers were at their peak during World War I because of pressures for meat production. From a peak of 179,000 head of cattle on the National Forests in 1918, there was a drop of more than 40 percent to a level of 102,000 in 1962.

The largely uncontrolled grazing in early days left its mark on the range. As early as 1900 large areas of pinyon-juniper, aspen, ponderosa pine, and other forest rangelands were badly depleted of forage; even worse, soil cover was destroyed and the lands laid open for erosion. Depleted ranges, realization of the need for grazing controls, and economic difficulties in the sheep industry all contributed to the decline in number of livestock on the forest range.

Management of the range is complicated by the need for considering water, recreation, and wildlife values on practically the entire forest range. Competition for forage by deer and livestock has been a problem for many years, especially with the buildup of the deep population since 1930. However, competition is less acute in the mountain forest range than in the foothills because the amount of forage on the former is usually more plentiful. The foothill range, which generally is less productive and more limited in area than the summer range, is used more heavily--by deer in the winter and by livestock in the spring and fall seasons.

Many improvements are being made in management of the forest range. Programs of the Bureau of Land Management and the U.S. Forest Service (the two principal public administrators of the forest range) include: closer control of number of livestock, construction of check dams and reservoirs, contour trenching, more use of rotation and deferred grazing practices, and control of juniper and sagebrush followed by reseeding of thousands of acres to desirable species of grass and browse. Cooperative programs of public agencies and livestock operators have also been carried out successfully in several parts of the State.

Many of the methods for improving winter ranges for big game were developed cooperatively by the Utah State Department of Fish and Game and the Intermountain Forest and Range Experiment Station.

Recreational use of forests is especially intense in Utah.

Utah's forested mountains, which attract campers, picnickers, hunters, skiers, and many others, are some of the most heavily used recreational lands in the West. Use is especially heavy on the forest area along the heavily populated Wasatch Front.[1] For example in 1963 the Wasatch National Forest ranked third in recreational traffic among the 154 National Forests in the United States. The official tally showed 3.2 million man-days of recreation use.

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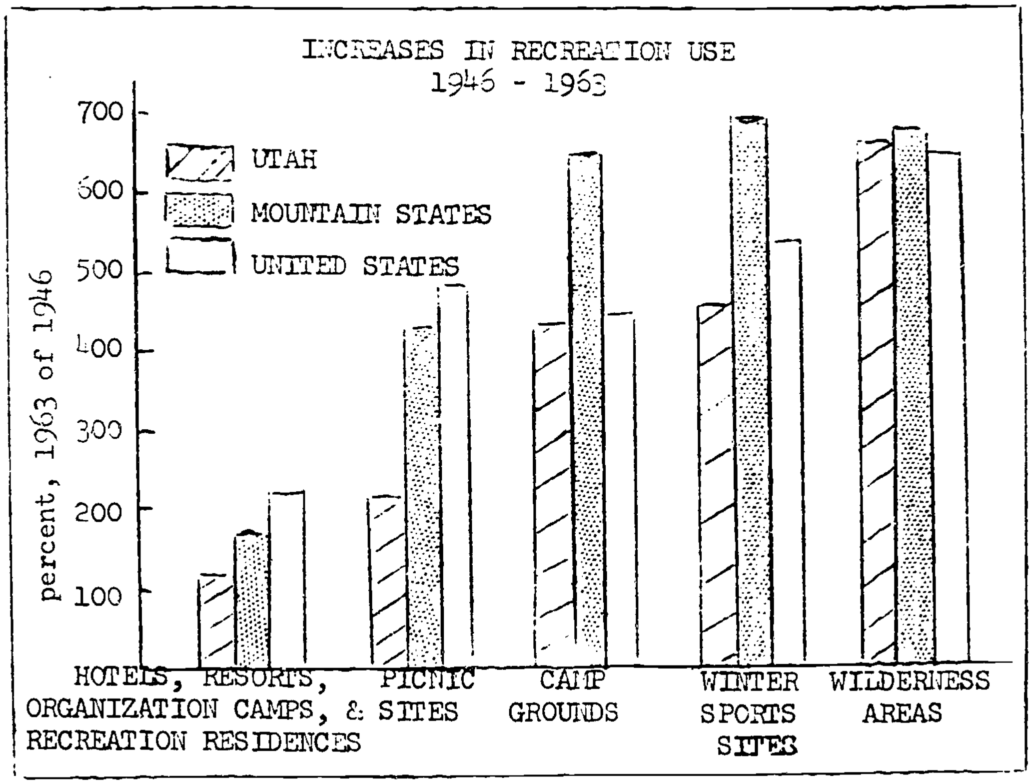
[1] In 1960, 82 percent of Utah's 891,000 people lived in the six Wasatch Front counties--Cache, Box Elder, Weber, Davis, Salt Lake, and Utah.



There are also indications that Utah ranks first among the Mountain and Pacific Coast States in recreastion visits per acre of forest land. Although figures are not available on the recreation use of all forest lands by States, National Forest estimates of number of visits by recreationists do permit certain comparisons. On this basis, the following tabulation shows Utah's preeminent position in 1963 in relation to other leading States, and in comparison with averages for western regions and the country as a whole.

	Number of visits per 1,000 acres of National Forest Land
Utah	1,127
Colorado	909
California	886
Mountain States	539
Pacific Coast States	665
United States	673

The number of visits to Utah's National Forests by class of use in 1963 were as follows:

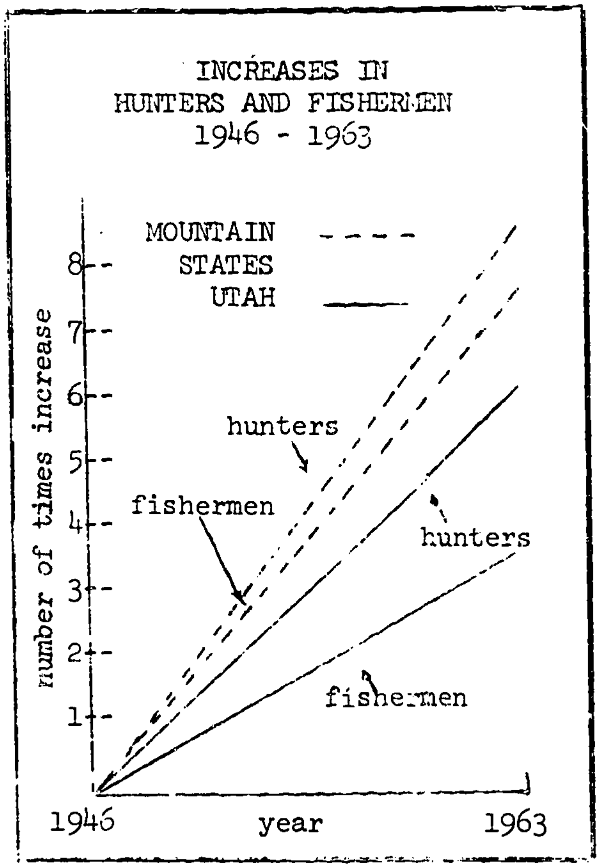
Picnic sites	2,617,900
Campgrounds	1,499,200
Winter sports sites	662,000
Hotels or resorts	75,600
Organization camps	68,700
Recreation residences	64,800
Wilderness areas	45,400
Other forest areas	3,847,900
Total	8,881,500

Many forest recreation areas outside the National Forests are probably just as heavily used. Private enterprises, both inside and outside National Forests, provide facilities for skiing, boating, packtripping, and other activities. The Utah State Park and Recreation Commission, National Park Service, and Bureau of Land Management all have active programs to foster outdoor recreational use of the forests.

Although Utah is the leading western State in intensity of recreation use of the forests (as indicated by National Forest data), the State has been falling behind in the rate of increase in recreation traffic since World War II. This situation is also illustrated by estimates of Utah's share of the recreation visits to National Forests of the Mountain States. In 1946, 36 percent of the visits were in Utah, but by 1963 the percentage dropped to 18. In other words, while Utah had a head start, other States have been catching up.

As in every other State, hunting and fishing have become increasingly popular since World War II. Between 1946 and 1963 there was almost a sixfold increase in the number of visits to National Forests for hunting deer, elk, moose, bear, and upland game birds. During the same period the number of visits by fishermen increased about 3.4 times. As shown by the chart on this page, both of these increases are less than Mountain States averages.

The estimated legal take of 96,000 head of big game on the National Forests in 1963 represents a substantial increase over the 35,000 in 1946.



Timber cut and economic returns are low in relation to inventory.

Utah's forests have never been heavily exploited for timber. In contrast to the very high value of forest lands for water, capacity use of the forest range, and the bustling demands of recreation, timber use has been moderate. Millions of trees have grown to sawtimber size and died without the touch of an ax or a saw.

Many factors discourage timber operations in Utah. Size of trees, grades of logs, and volumes per acre are generally less favorable for logging in Utah than in most areas of the Mountain States. Steep slopes, delicate soils, and the isolated location of much of the best timber result in high costs for constructing roads that will not cause erosion. As a result of these various considerations, a great many stands (although classed as commercial forest) are not profitable logging chances. This is particularly the case when the timber operator is required to bear all, or even a major portion of road construction costs. In other stands classed as commercial, existing or planned use of the forest for recreation or other purposes limits timber-harvesting opportunities. These limiting factors, as well as other considerations that enter into long-term timber management planning in Utah, are discussed later in this report.

In 1962, Utah's cut of 12,6 million cubic feet was only one-fifth of 1 percent of its inventory of 5.8 billion cubic feet of sound live trees. The following tabulation shows how low this cut is in comparison with other Mountain States and the United States.

	Percent of inventory cut, 1962, all species
Utah	0.22
Colorado	.22
Wyoming	.29
Nevada	.36
New Mexico	.60
Montana	.83
Idaho	1.02
Arizona	1.08
Mountain States	0.69
United States	1.62

Relationships among Mountain States are almost the same when sawtimber cut is considered in relation to sawtimber inventory.

Utah's low cutting rate is the principal factor in a low rate of economic returns from the timber resource. Data for 1958[1] (U.S. Forest Service 1963) can be used to compare Utah with the Mountain States average by certain economic measures. For 1958 the stumpage value of $47.62 per thousand cubic feet of timber cut in Utah was practically as high as the

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[1] 1958 is the latest year for which there is Census of Manufactures data of the type used for this analysis.

$48.84 average for the Mountain States. However, as shown in the following tabulation. Utah is far below the Mountain States average when value of products shipped from primary manufacturing plants is related to the inventory of wood in the forest.

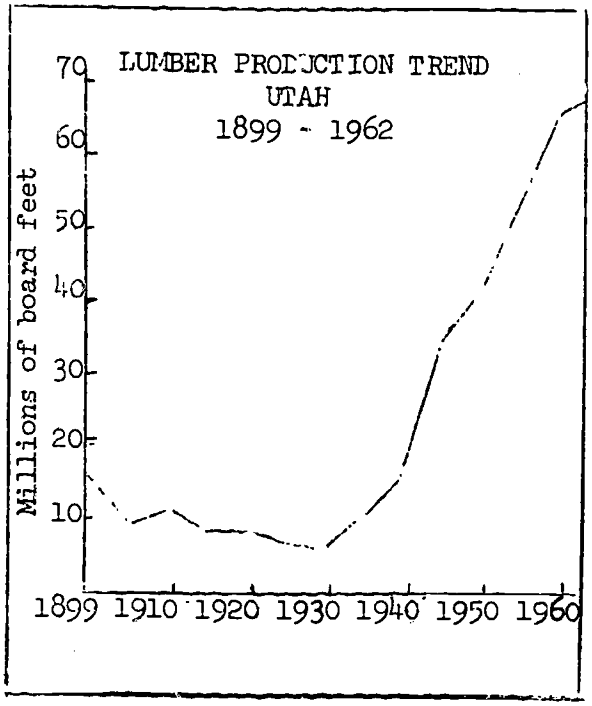
	Value of shipments	Value of shipments per billion cubic feet of inventory
	-------Thousand	dollars-----------
Utah	6,000	1,030
Mountain States	319,300	3.300

The primary reason for the low value shown above for Utah (actually the lowest of all Mountain States) is the small amount of wood processed in comparison with inventory volume. A related reason is that Utah does not have industries that convert wood to relatively high-value products such as plywood and pulp and paper. Utah is at a disadvantage in comparison with the West Coast in producing for national markets. The extensive areas of big timber on the coast favor establishment of large integrated mills with lower production costs.

A number of roadblocks standing in the way of a rapid increase in timber cut are discussed later in this report. To the extent that these problems can be reduced, the people of Utah will realize greater returns in wages, profits, and taxes from more timber harvesting and bigger wood conversion industries.

Lumber is the principal timber product.

Although demands for Utah timber have not been widespread and though the harvest and economic returns have always been well below the potential, local timber has played a very important role in the development of this State, as well as adjoining areas. The first sawmill was established in 1847, shortly after the arrival of the Mormon vanguard. As settlements spread from the Salt Lake City area, more mills were established to provide lumber for local development. In 1889 Utah had 30 sawmills. Undoubtedly, during these early years much less timber was used for lumber than for fuel and roundwood products such as houselogs, poles, posts, railroad ties, and mine timbers. In 1867-69 tracks of the transcontinental railroad were laid on countless ties that had been hewn by hand from lodgepole pine on the north slope of the Uinta Mountains and floated down such streams as the Blacks Fork and Smiths Fork. Other areas were also selectively cut for tie timber as railroads



were built throughout the State. Local forests also have been the source of round mine props for underground coal mines and metal mines.

In recent years roundwood products have gradually been replaced by sawed material. In 1962, 90 percent of all roundwood products was in saw logs for lumber.

	Thousand Cubic Feet
Saw logs (for lumber)	10,845
Converter poles, excelsior bolts, charcoal wood, and commercial poles	703
Round mine timbers	245
Posts, fuelwood, miscellaneous farm timbers	212
Total	12,005

There was a fairly steady upward trend in annual lumber production from the early 1930's until 1960; since then production has leveled off. Figures for lumber and total of all products cut in recent years as follows:

	Lumber Million board feet	All products Million cubic feet
1952	35	8.8
1960	69	14.8
1962	67	12.0

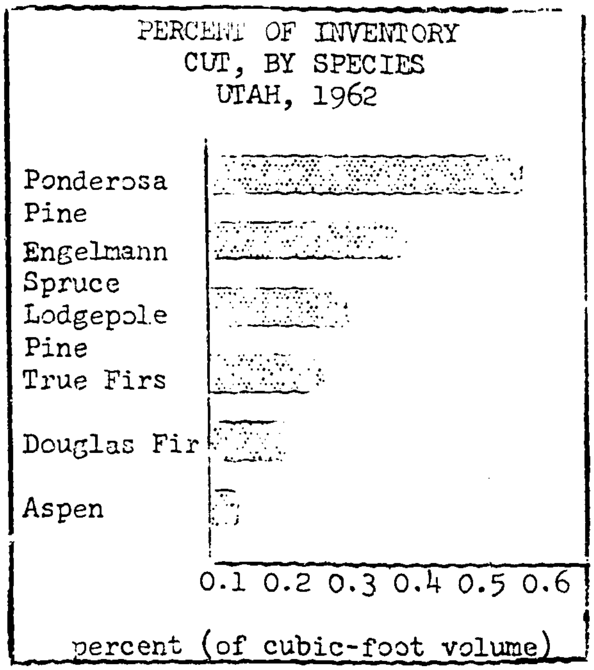
Utah's lumber industry has not been stable. Between 1889 and 1940, the number of mills fluctuated between 30 and 95. From 1941 to 1948 more than 100 mills were in operation, with a peak of 170 in 1948. By 1962, however, only 73 plants were operating. The number of mills by size classes were as follows:

Sawmill size class (Thousand board feet per year)	Number of mills
Less than 50	19
50 to 499	33
500 to 999	4
1,000 and over	17
Total	73

In Utah, as in the other Mountain States, the recent trend is toward fewer, but larger and more effecient, mills. The number of active mills in Utah dropped from 99 in 1960 to 73 in 1962; the concurrent increase in the State's lumber production resulted in greater average annual production per mill. This increase was from 700,000 to 918,000 board feet.

Since the early days of lumbering in Utah, there have been important shifts in the relative importance of species. In Utah, more ponderosa pine has been cut into lumber than any other species. The excellent lumber properties of ponderosa pine, as well as relative accessibility of the timber, have resulted in heavy use of this species ever since lumbering began. Despite year-to-year fluctuations in the volume of ponderosa pine cut since World War II, the overall trend has been fairly level--with an average of 18 million board feet a year. During this period the output of other species has increased.

Engelmann spruce replaced ponderosa pine as the leading species in 1959, and in 1962 accounted for slightly more than one-third of the total lumber output. The chart on this page compares species in terms of cut in relation to inventory in 1962.



PERCENT OF INVENTORY
CUT, BY SPECIES
UTAH, 1962

CAREERS IN FORESTRY*

The man who chooses a career in forestry has the opportunity to serve his fellowmen in a vitally important field. Forestry deals with the development of forests in such a way as to perpetuate their many services and benefits to mankind. The forests provide wood and other products for man's use; they prevent erosion of the soil and regulate streamflow and water supply for irrigation, for hydroelectric power, and for domestic use; they harbor wildlife, and give abundant opportunity for outdoor recreation.

When forestry is practiced, timber becomes a crop produced under scientific methods. American forestry has developed various techniques, applicable to different forest types and regions, in timber growing and harvesting; protection from fire, disease, and insects: watershed [illegible]; and wildlife and recreation management. Range management is also in the field of forestry, because in the western United States large areas of rangeland are intermingled with forest and must be handled coordinately.

Foresters are today charged with the solution of one of our Nation's major economic problems, that of putting to the best use for human welfare the 664 million acres of land most suitable for forest purposes. Complete and thorough training is fundamental to a career in the profession.

When the need for the practice of forestry was first recognized in this country in the 1870's, there were no schools of forestry on this side of the Atlantic. This situation prevailed until 1897 when Dr. C. A. Schenck, a German forester, started giving private instruction in connection with his work on the Vanderbilt estate at Biltmore, N. C. The following year Cornell University established a professional school of forestry. Then in 1900 the Yale Forest School was started, and, in the years that followed, other universities and colleges added forestry to their curriculums.

It is estimated that by 1912 there were approximately 500 men in the United States with some technical training in forestry. These were in addition to early-day forest rangers who began without a technical background, but through their own experience in Federal and State work had acquired considerable practical knowledge of certain phases of the subject. The pioneer foresters were zealous crusaders in the cause of conservation. Although the idea of conservation is more widely accepted today, the practice of conservation is still far from being generally applied. A crusading spirit in the public interest still is strong in the forestry profession; it must continue so.

Need for Technical Training

The importance of proper training now and in the future for a career in forestry cannot be overestimated. As the number of foresters steadily increases and competition becomes keener, thorough education will become more and more necessary. The technical forester should have an education comparable to that of the lawyer, civil engineer, or other well-trained professional man. Such an education usually requires a minimum of

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*Forest Service, Misc. Publication No. 249 U.S.D.A.

4 years of college work. A course of 5 or 6 years--1 or 2 of which are spent in postgraduate work--is desirable for those interested in forest research. The large number of men who look for employment in the lumber business or other forest-using industries will find college training in the principles of forestry as valuable to their success as it is to that of the men who plan to specialize in more scientific and technical forestry work.

College training is but a part of the preparation needed. It must be supplemented by first-hand experience in forest or conservation work. Many young men obtain part of this experience through summer-school camps and some get it through fieldwork during summer vacation periods in a Federal or State forest, a conservation organization, or in the employ of a lumber company. Men who plan to specialize in lumbering find several years of work in logging camps and mills valuable in learning the practical details of the business.

Courses leading to degrees in forestry are offered in about 40 institutions. Many other colleges also include forestry in their curriculums, the instruction being given on a nonprofessional basis as supplementary training in other degree courses. Enrollment of undergraduates in the forestry school in the United States prior to World War II totaled more than 6,000. Figures from the forestry schools indicated that about 500 degrees were being granted annually. More than 800 bachelor's degrees in forestry were granted in each of the years 1955 and 1956.

A list of the schools rated as accredited forestry schools by the Council of the Society of American Foresters can be obtained from the Forest Service, U.S. Department of Agriculture, Washington 25, D.C. In most cases a 4-year course is offered, leading to a degree of Bachelor of Science in Forestry. Several universities provide graduate instruction leading to Master of Forestry and doctorate degrees. As a Government agency, the Forest Service is not in a position to express an opinion as to the relative merits of the schools or their courses. Information concerning entrance requirements, tuition, etc., can be obtained by applying directly to the institution.

Character of Forestry Work

Many persons still have only a vague idea of the kind of life the forester really leads. Young men are often attracted to the profession because of the prospect of outdoor work. They are fond of camping in the open and of hunting and fishing.

One who is considering such a career should remember that the forester in his fieldwork sometimes must endure hardships that sportsmen do not encounter. Spending considerable time in the woods as part of one's regular business is quite different from camping out for a few weeks on a vacation.

A variety of tasks usually greets the forester on his first job. He may be involved in such work as cruising or marking timber, making range surveys, reforestation of cutover or abandoned farmlands, and possibly in planting or conservation work in soil-erosion or flood-control areas.

During his apprenticeship he is certain to be used on a number of different tasks in which his technical skill and ingenuity are put to use. If he shows outstanding ability, the young forester may find the apprenticeship period a short one although as the number of foresters increases and competition becomes more intense, the training period may be expected to lengthen.

The young forester is apt to have his headquarters shifted frequently, somewhat like the civil engineer. The places to which he is assigned may not always be the most desirable from the standpoint of personal comfort or convenience, especially for family life. Because of this shifting about, he may be unable for some time to establish a home. On the other hand, if he is an able man, he may ultimately advance to a position that will give him more permanent headquarters and greater opportunity for home life. He must not count himself secure, however, against a change of working field which will necessitate removal to a new place. Ordinarily, his home will be in a small town or its vicinity.

Even in the higher positions, whether in Government or private work, the forester may have to spend a great deal of time supervising or inspecting actual field operations. Trips away from his headquarters may be for only a day or so, or they may be for several weeks. In some positions such travel often includes long, hard journeys by horse and pack train. Frequently it means rough walking, and sometimes days of slow and laborious progress by snowshoe or canoe. Even with the greatest possible extension of good roads, much of the forester's travel for many years to come will neccessarily be arduous.

Variety of Tasks

The character of the work which foresters are called upon to do varies greatly. It may depend upon the aptitudes of the individual, his previous experience, and the degree and kind of his specialized training.

For many the work is largely administrative. They conduct timber sales, supervise range use, organize and maintain a fire-control organization, and handle various other operational jobs involved in the management of a forest area. Others spend the greater part of their time in such work as determining the amount and rate of timber growth on given tracts, or working out the best methods of cutting to obtain a second crop without recourse to planting. And still others work on all kinds of problems associated with the life history and productive capacity of the forest. Some foresters must concentrate on problems relating to the determination of grazing capacities and systems of range management that will improve and perpetuate this resource. Others must deal with wildlife and its management.

Groups of foresters are also engaged in devising methods of protecting the forest from fire, disease, and insects; in operating efficient systems of administration; and in dealing with the problems of utilization of the forest and its products. Special aptitudes or interests may lead some men permanently into flood-control or soil conservation work. Others may find employment in connection with various forest, watershed, and land surveys, or recreation work.

The majority of foresters have to deal with both the scientific and business aspects of the profession. In brief, they must be good businessmen with thorough technical education. They must be able to manage and develop the property under their own care in such a way as to make it yield high returns at low cost. Their scientific equipment is a matter of thorough schooling; the business equipment must be gained through experience. Both are essential.

REQUISITES FOR SUCCESS

Intelligence, industry, honesty, and soundness of character are important personal requisites of the successful forester. He must like the sort of life he will be called upon to lead; if he does not, he may find the work monotonous and even positively disagreeable. Although the profession is not purely a muscular one, good health and a constitution that can stand it are requisites.

Administrative and executive ability are necessary for many positions. The forester's work in such positions is concerned either directly or indirectly with the practical business administration of forest property. When he has advanced beyond an assistantship, he has charge of men and consequently must possess the ability to lead and direct. However, his advancement beyond an assistantship will depend, as in other professions, on whether he is capable of more than just carrying out plans others have made.

In the strictly research field the forester may not have large administrative responsibilities, but the results of his research are essential to proper handling of the forests. He must not only show a thoroughness in details but have, to a high degree, the qualities of foresight and breadth of vision. Modern conveniences and techniques owe their genesis in many instances to the painstaking search of scientists who labored to obtain the basic truths for which others found a practical application.

Many foresters must also have the qualities needed by a successful teacher. In their efforts to develop better public understanding of forest conservation problems, they perform the functions of educators. Such work is part of the forester's duties in many positions. Nearly every forester, whether consciously or not, is helping to mold public sentiment. Hence his job requires ability to meet people and gain the confidence of the public.

In public forestry the spirit of service is a most important requisite for success. It is the spirit that causes men to place the interests of society and of the group at large above the interests of one's self or of the few. It is exemplified in the policy that governs the administration of our national forests--of so managing the forests as to promote the greatest good for the greatest number of our people in the long run.

Conservation of our national resources is today one of the greatest internal problems of the Nation, and conservation with use is the essence of forestry. The forest is a resource that must be conserved; it is also an agency for the conservation of other natural resources such as soil, water, wildlife, and forage. The work done in forest conservation in this country has been accomplished by men imbued with the spirit of service and believing wholeheartedly in what they are doing. The task of carrying this work forward demands men capable of overcoming great obstacles.

THE FIELD OF WORK

Foresters are now employed by the Federal Government; the States, most of which have forestry departments; municipalities; lumber companies and private owners of timberland; wood-using industries; educational institutions; and organizations conducting research or promotional work in forestry.

Up to the close of the first decade of this century, the United States Government was the principal employer of American foresters. In 1912 it was officially estimated that 60 percent of the foresters in this country were in Federal Government work and that fully 95 percent had been so engaged at one time or another. Since then the States, municipalities, educational institutions, and private corporations have absorbed large numbers of graduating foresters. However, with the expansion of the Federal Government's forestry activities in recent years, it still remains the largest employer of trained foresters.

Although the majority of professional foresters now in Federal Government employ are in the United States Forest Service, a number of foresters are employed in the management of forest lands in Indian reservations under the Bureau of Indian Affairs of the Department of Interior. Foresters are also employed in the National Park Service, the Bureau of Land Management, and Fish and Wildlife Service of the same Department; in the Income Tax Unit of the Treasury; in the Tennessee Valley Authority; in the Department of Commerce; and in the Soil Conservation Service of the Department of Agriculture.

Careers in the Forest Service

The Forest Service is proud of its spirit of public service. In employing new personnel it seeks to obtain men and women who are not only properly trained for the work but have high ideals and a strong desire to serve the public.

All permanent Forest Service professional and scientific positions are in the classified civil service. These jobs require academic training at least equivalent to graduation from a recognized college or university offering a course of study in the professional or scientific field involved. The U. S. Civil Service Commission gives several entrance examinations through which the Forest Service recruits its professional and scientific force.

Lines of Advancement

Men who pass the junior professional examinations and receive appointments are first assigned to positions as assistant to district rangers on the national forests or to subordinate lines of technical work in research or in State and private forest cooperative work. They may be assigned as technical assistants on the staff of the forest supervisor. The beginner in the Service may thus supplement his academic training by experience that should qualify him for advancement to the position of district ranger, or to comparable positions in research or cooperative work.

In the early days of the Forest Service the forest ranger did not always have a background of technical training, nor did he carry the responsibilities that a district ranger now does. Such positions were often filled by men who passed examinations based mainly on practical experience in woodsmanship. The situation has changed with the times.

The district forest ranger is today an administrator of a large area and a supervisor of all the activities within his district. The business he conducts is often the largest of any in the community. Both technical training and practical experience are required. Ranger jobs are now filled through promotions, as are other key positions in the Service. The length of time a technically trained man may spend in subordinate positions before he becomes a district ranger will vary both with individual qualifications and with the opportunities offered.

After appointment in the Forest Service, a forestry graduate should expect to spend from 1 to 2 years as a junior forester. The first year of service is the probationary period, an extension of the examining process. Those who are not adapted to practical forestry work are separated from the Service during this period. Those who are retained beyond the 1-year period are ordinarily promoted to more responsible positions such as assistant district ranger, where training continues. From 3 to 10 years may elapse before the appointee is promoted to a district ranger position.

One line of advancement may lead the young forester from an assistant ranger, then assistant forest supervisor, from which he may advance to a supervisor's position. Additional promotions may eventually take him to the regional forester's office or even higher.

Another line of progress may be from technical assistant on a forest ranger district to technician on the supervisor's staff, followed by assignment as technician for an entire region. Other lines of promotion may be taken in the research field--starting, for example, as a technical assistant and advancing to project leader or specialist on some phase of the experimental work, or to a staff position at a forest and range experiment station. In State and private cooperation, a young forester is usually assigned to farm forestry or similar cooperative work only after some preliminary experience. He may advance to regional or headquarters staff positions in this field. Varying combinations of these lines of promotion may be applied in individual cases. To broaden his knowledge and experience, a man may be assigned at different times to national forest administration and to research or cooperative work.

Thorough technical training and wide experience are now considered prerequisite to success in the higher positions.

The career idea is thus carried out by advancement within the Service as men become more proficient in their work. Forest supervisors, assistant supervisors, and regional and national officers are men who have come up through the ranks.

Special Assignments and Positions

Technical assistants to the ranger may be assigned to fire control, road and trail construction, timber culture, or other special jobs. Similarly, staff technicians directly under the forest superivsor may also be assigned to any one of these functions on the entire forest: Fire control, watershed protection, timber plans and sales, wildlife, range management, improvements of various kinds, timber culture, recreation, flood and erosion control, or general technical work.

Experts for technical positions in a number of other lines of work in the Forest Service are recruited by special civil-service examinations. There are many of these jobs, such as: Forest ecologists, entomologists, pathologists, soil scientists, engineers in timber tests, chemical engineers, and wood technologists. Clerks, stenographers, accountants, and similar office workers are likewise appointed from civil-service registers established through the regular examinations for such positions.

Rates of Compensation

The force on the national forest comprises a number of grades. In general, the base salary ranges are as follows: Professional assistant (junior forester), $4,345 to $5,355; district forest ranger, $6,675 to $10,165; staff officer, $8,045 to $11,995; assistant forest supervisor, $9,475 to $11,995; forest supervisor, $9,475 to $16,245. Similarly, the salaries in higher administrative positions are in keeping with the responsibilities. When Government living quarters are furnished a salary deduction is made. The amount varies with the value and kind of accommodations, but ordinarily is from $500 to $1,000 annually.

Public Works Programs

The work of the Forest Service was considerably expanded from 1933 to 1942 by the emergency relief and recovery activities. Forest work for unemployed youth brought into the forests many thousands of men in Civilian Conservation Corps camps. With these activities came a demand for foresters and men otherwise qualified for field supervisory positions. Hundreds of young men recently graduated from professional schools found opportunities which offered an immediate chance to gain both a living and valuable forestry experience. The social and economic value of forest work is large, and as an outlet for unemployed labor forestry is now well recognized. Public works programs in forest conservation, or greater recognition of the need to have this work done as a regular continuing public activity, may broaden the field of the employment of forests as directing and technical personnel.

Forest Service Organization

Organization of the Federal Forest Service now includes 29 divisions. These are correlated into 6 groups. Some are fiscal and facilitating divisions in which the nature of the work calls for training entirely different from forestry, although forestry-school graduates with special aptitudes or experience often find opportunities in these divisions. Men with professional forestry training are employed, in the main, in work that may be grouped under the administration of national forests, forest research, or State and private forest cooperation. Certain other phases of Federal forestry work, such as the guayule rubber and other emergency projects undertaken during the war, and various phases of extension, information, and education work, allied to, or closely coordinated with the activities of one or more of the divisions, have also provided employment of many professional foresters.

The Forest Service employs a permanent force of approximately 18,000. About 5,000 are professional foresters, 2,500 in other professions, and the remainder administrative, custodial, and protection and construction forces. About two-thirds are employed on the national forests as supervisors, assistant supervisors, rangers,etc., and the remainder are engaged in administrative, scientific, and clerical work at the Washington and regional headquarters, the Forest Products Laboratory, and the forest and range experiment stations, or in State and private cooperation work in various parts of the country. In addition, about 10,000 lookouts, patrolmen, fire fighters, and other nonprofessional workers are temporarily employed each year on the national forests during the fire season.

Administration of the National Forest

The national forests cover a total net area of approximately 180 million acres. Of this area more than 138 million acres are in the States west of the Mississippi River, chiefly in the mountains of the far West. About 21 million acres in the eastern States and Puerto Rico.

The protection, administration, and development of this vast area constitute one of the principal tasks of the Forest Service and occupy the time and energies of a large number of its men. The management of these forest properties distinguishes the work of the Forest Service from that of most Government bureaus. Its practical requirements have been met by a highly decentralized form of administration whereby the responsibility for handling local problems has been placed in the forest officers on the ground.

Administration of the national forests necessarily centers in the Washington office, to which are attached certain higher officers engaged in general direction and inspection; but for promptness and convenience of field administration 10 national-forest regions have been established--9 in the States and 1 in Alaska. Each region is under the direct charge of a regional forester; associated with him are such technical assistants as may be necessary for the conduct of the work.

There are now about 155 national forests, averaging more than a million acres each. A supervisor is in charge of each forest, and his staff may include an assistant supervisor and a number of technicians. The forests are also divided into districts, each in charge of a district ranger, who is responsible for the protection of this area and for the conduct of its business. During the field season, fire-control assistants and other aides are employed to supplement the regular force.

The protection of the national forests from fire is of fundamental importance. Without adequate protection, all other efforts directed toward increasing the productivity of the forests might be entirely nullified. Continuous effort has therefore been directed toward this objective.

The use of the forests by the public is continually increasing and this has necessarily intensified the fire problem. In addition, it has necessitated the handling of an immense amount of current business. The large volume of business involved in the management of forest and forage and in the multiple use of land calls for constant and painstaking supervision.

All the different lines of work on a national forest are handled by the regular administrative force under the immediate direction of the supervisor. Since the very beginning, an effort has been made to apply the best forestry practice practicable under existing conditions and the more technical phases of the work have accordingly been handled as far as possible by the men with technical education--men who have entered the forest Service as junior foresters and range conservationists. These men have had to perform such duties as mapping and estimating the timber on the forest, marking the trees to be removed in timber sales, raising stock at nurseries for field planting, reforesting treeless areas by planting, and looking after the varied phases of flood control and range management. The rangers also are called upon to do work of this character in addition to their regular protection and administrative duties.

The second step in the development of the forests has been the preparation of detailed plans for the administration and use of the resources of each forest. Such plans require sound technical training for their preparation and execution. Their perfection will be achieved only through the painstaking work of years, but already the results of better management clearly justify their application.

Forest Research

Forest research offers an opportunity within the Forest Service for constructive work having a high public-service value. No other phase of forestry offers a more attractive career for men having the creative impulse.

Research conducted by the Forest Service includes four main fields of work: Forest and range management, forest products, forest resources, and forest production. Primary objectives of these research activities are to lay the scientific foundation for such management of forest and rangelands as well help to insure (1) supplies of timber and forage suitable in quality and ample in quantity for national needs; (2) effective utilization of wood and other forest products and reduction of waste; (3) regulation of streamflow; prevention of erosion; furtherance of public health and outdoor recreation; maintenance of fish, game, and other wildlife, scenic benefits, etc.; and (4) protection of timber crops from fire, insects, and disease.

The research program is carried on at 10 regional forest and range experiement stations, the Forest Products Laboratory at Madison, Wis., and more than 100 smaller research centers. More than 1,000 technical men are engaged in the research program. Additional temporary assistants are employed in some phases of the work in accordance with demands. The majority of the technical men are forestry-school graduates, but geologists, entomologists, pathologists, botanists, chemists, engineers, economists, statisticians, and others are also used.

Most of the technicians employed in research have had advanced training; many have doctors' degrees or their equivalent. The various phases of forest research require as a foundation broad training in natural science with emphasis on forestry, regardless of whether the technician is to deal with forest management and protection, watershed management, range management forest products, or forest economics. Advanced work--beyond this foundation training in forestry--may be in any one or more of a large group of biological or other sciences, such as plant physiology, pathology, entomology, ecology, soils, genetics, taxonomy, mathematics, and organic chemistry.

State and Private Forest Cooperation

About 386 million acres, or nearly four-fifths of our total commercial timber-growing area, are now in State or private ownership. Of this, 359 million acres are privately owned and include 165 million acres in farm woodlands. The area under State or county ownership is continuously increasing through public acquisition for State forest purposes and through tax delinquency.

The future of forestry in the United States depends in no small degree upon acceptance and operation of better forestry practices on private lands. The problem of bringing about this improvement constitutes a challenge to the profession. Advancement in these phases of forestry has been the objective of several acts of Congress.

The Federal Government is cooperating in the protection of State and private lands from fire through financial aid to the States under provisions of the Clarke-McNary law of 1924. Forty-nine States cooperate in fire protection, and the total area of forest lands covered in 1960 was approximately 402 million acres. This was more than 92 percent of the area in need of protection. The fire-protection projects are administered by or under direction of the State forestry departments, the

Forest Service cooperating in development of plans, establishment of standards of procedure, and inspection of the work. Under the terms of the law, the Federal Government limits its expenditures in a given fiscal year to a sum not greater in each State than the funds expended jointly by the State and qualifying private owners.

The Forest Service is also cooperating under the Clarke-McNary law with 48 States, in addition to Puerto Rico, in the production and distribution of young trees for planting windbreaks, shelterbelts, and forests. Under this program about 845 million trees were distributed to woodland owners in 1960.

Additional assistance is offered by the Government under the Clarke-McNary law in the form of information for farm woodland owners on the management and care of their timber. In this project the Department of Agriculture cooperates with the States in the maintenance of extension foresters to provide demonstrations and advice on the more efficient management of farm woodlands, the reforestation of those farmlands not now suitable for agricultural crops, and the marketing and utilization of farm timber.

Under the Cooperative Forest Management Act of 1950, the Forest Service cooperates with the States in providing on-the-ground technical advice to owners of private forest lands and to processors of primary forest products. In 1960, about 450 projects in 46 States were carried on in cooperation with State foresters.

Forestry in the States

Forestry work in the States has made notable progress in recent years, and most States now employ foresters in various capacities. The State forester usually carries heavy responsibilities as directing head of a large organization and has under his control the annual disbursement of large appropriations.

The character of a State forester's work varies among the States. Where forestry is just beginning to receive attention, his first efforts must be largely of an educational and organizational nature. His chief task is to develop a forest policy for the State and to educate the people to protect and improve the handling of the forests within its borders. He must study the needs of the State and then go before the people and show them what must be done to put into effect the policy which he has formulated. He usually has to make a great many public addresses, issue bulletins, write articles for magazines and newspapers, and in every other possible way bring this message to the people. He must also obtain basic legislation and appropriations in addition to engaging in technical forestry work.

On the other hand, in those States where there is already a settled forestry policy the State forester's work is of a different character. His major activities are usually fire prevention and control, forest planting, educational work, and management of State-owned forests.

Scope of State Forestry Work

In the aggregate, some 27 million acres of land are in State forests. The type of administration given these State-owned lands varies. Many State forests are managed intensively, along lines similar to national-forest management. Some State forests and parks are devoted primarily or entirely to public recreational use. In some States, substantial areas of State forest land--particularly scattered tracts which have come into State ownership through tax delinquency--has as yet received little attention.

State activity in protecting forests from fire, with the cooperation and financial aid of the Federal Government, has opened a field for the employment of many foresters. Trained men are also used in the propagation and distribution of planting stock. In those States where an active State forestry program has been developed, a number of trained foresters are employed. The State forester's staff may include technical assistants in immediate charge of the various lines of activity carried on by the State organization. District foresters or State forest rangers may be assigned responsibility for the development and maintenance of the fire-control organization and other State forestry work in a designated part of the State. The work of the State district forester corresponds generally to that of a national district ranger except that usually he deals cooperatively with private forest landowners rather than supervising work on lands under his own direct charge. About 5 percent of the State and private forest land needing fire protection was still not covered by organized protection in 1962, and the protective work on some of the areas covered was inadequate to meet critical fire conditions. Extension and intensification of cooperative fire protection to a degree commensurate with the needs would call for employment of many additional trained men in State forestry work.

Extension Foresters

Forestry extension work is another field in which professional foresters find employment in the States in the capacity of extension foresters. These men are associated with the Federal-State cooperative extension program, which emphasizes the use of technical information and practices in the growing and management of timber as a crop on the farm. Every effort is made to build up the forestry knowledge of woodland owners so that they will have sufficient know-how for carrying on work in this field as they do with other crops. This is accomplished by providing owners with practical forestry information, and by conducting tours to forestry research units and successful operations of individual owners.

Service Foresters

At present 49 State forestry departments are working with the Forest Service in providing technical assistance to owners of private forests and to small sawmill operators and other processors of primary forest products. The Cooperative Forest Management Act of 1950, which replaced earlier legislation under which the work started, is the basis for this cooperative program. In 1960, technical assistance in woodland management was given to approximately 82,000 small owners and 8,100 forest products operators.

Both farm and nonfarm owners of small forests are now given help in making simple plans for the management of their woodlands; in marking the trees in need of cutting; in measuring these trees and estimating their volume; in determining the proper cutting and logging methods to use in the harvesting operation; and in marketing the harvested products. In addition, many owners are advised on planting, thinning, and pruning operations, as well as on the protection of their forests from fire, insects, and disease. The local forester who handles this cooperative forest-management project work is called the service forester. In some localities, however, he is referred to as the farm forester, county forester, or district forester.

Community Forests

A new field of employment for trained foresters is opening up through the development of community public forests by counties, municipalities, school districts, and other local government units or public institutions. Some of the town forests in New England were the earliest public forests in the United States and have yielded financial returns and other benefits to the communities for more than two centuries. In recent years the number of community forests has increased greatly.

Reports to the Forest Service in 1953 showed more than 3,000 community forests aggregating about 4½ million acres in 40 States. Of the total, 800,000 acres were maintained by municipalities, 3½ million acres by counties and townships, 130,000 acres by schools or school districts; and 40 thousand acres by other organizations.

In addition to parks for recreational purposes and purchases of forested watersheds for the protection of sources of domestic water supplies, many cities and counties are acquiring forest lands for investment and development purposes. Managed under multiple-use plans, similar on a smaller scale to those applied on the national forests, such community forests can supply numerous services to the public, including facilities for outdoor recreation, habitat for wildlife, watershed protection, a reservoir of work for local unemployed, and income to the community from forest products. Often the rehabilitation of a tract of cut-over land can be undertaken as a community enterprise. Local public forests as living memorials to war dead have been proposed in some communities.

A number of schools maintain forests which not only serve as outdoor classrooms for the teaching of elementary forestry, conservation, and natural history, but provide an income to the schools from the growing and selling of forest products. The United States Forest Service is encouraging and cooperating in the establishment of community forests as part of a broad program of public forest development.

The proper management of community forest properties naturally requires the services of trained foresters. At present, most of the community forest enterprises that are being given technical forestry advice or direction obtain such service from State foresters or Federal forestry agencies. There is a growing tendency, however, toward the direct employment of trained foresters as community-forest managers.

Opportunities in Private Forestry

Though Federal and State agencies, educational institutions, and semi-public associations will doutless continue to lead in research and extension, the largest field for professional foresters in the long run will be in private work. Three-fourths of all the commercial forest land in the 48 contiguous States, or 359 million acres, is in private ownership. This fact alone clearly indicates a large and fruitful field in private work for the trained forester.

Private owners may be classified in a general way as industrial, including lumber, pulp and paper manufacturing companies, and other large manufacturers of wood products; public-service corporations, such as railroads and water companies; recreation and hunting clubs; mining companies; owners of large private estates; and farmers and other small woodland owners.

Private owners provided some of the earliest examples of professional forest management in the United States, and some have handled their timberlands carefully for many years. In recent years, many more, especially among the larger industrial owners, have been adopting measures for continuous timber production. The Forest Service has set up as a permanent activity a project to work with the States, lumbermen's associations, and timberland owners to the end that improved woods practices may be extended. Lumbermen's and pulp and paper manufacturer's associations are also encouraging good forestry practice on industrial forest lands. In the past few years, several million acres of industrial holdings have been included in a "tree farm" program sponsored by industry associations. Recent State regulatory laws in several States look to increased attention to good forestry practice on private timberlands. All of these movements point to new opportunities for employment in private industrial forestry.

Forest Products Industries

Until recently, most of the industrial concerns employing graduates of forestry schools have used them mainly in logging engineering and allied work. Before World War II only about 1,000 foresters were employed by the forest products industries in forest-land management. As forestry practice has expanded and intensified on industrial holdings, private industry has employed several times this number.

The forester who enters the lumber, pulp and paper, or other forest products industries may be required to estimate standing timber, appraise stumpage, determine the best methods of cutting, estimate future growth, lay out logging roads or railroads, reduce waste, increase utilization, or participate in actual logging and milling operations. Experience for such work often must be gained by entering the business at the bottom and learning its practical and administrative details in a long and exacting apprenticeship. Many foresters find opportunities in this field, with possibilities of advancement to important managerial positions.

There is a growing field for specialization in industrial forestry. Some of the large operators conduct reforestation activities and other silvicultural work on their cutover lands. Many operators or associations maintain their own fire-control organizations. Industrial forest research is increasing, particularly in wood utilization. The growing use of wood in all sorts of products, as in the manufacture of plywoods, wallboards, plastics, and rayon, and the increasing use of such equipment as dry kilns and preserving plants to procure better utilization of lumber products, are creating opportunities for specialists in the industrial phases of wood use. Industry is also attempting to find new uses for little-used species and to create byproducts and new products which will broaden markets and utilize materials now wasted in the manufacture of primary products.

Though a knowledge of forestry is not essential to a retail or wholesale lumber dealer, a knowledge of woods and their properties gives the dealers an opportunity to speak with authority on the technical qualities of the woods and materials handled.

Other Private Forestry Work

There is a broad and as yet largely undeveloped field for forestry among public-service corporations owning timberlands. Many railroads own extensive tracts of this kind. Some of these corporations have already adopted a consistent and permanent policy of holding their timberlands and are introducing systematic forest production and management. Some of the eastern railroads have considered the acquisition of forest lands and planting of trees, wherever necessary, for the production of ties and other wood supplies. Many have technical foresters in their industrial departments.

Many water companies hold extensive timber tracts on the drainage areas from which their water supplies are derived. These companies for the most part have adopted a definite policy of maintaining such land in forest growth. In many cases, they might find it advantageous to employ professional foresters to keep the forest cover in the best possible condition while at the same time yielding cash revenue.

Frequently mining companies own lands covered with tree growth. Many companies in the southern mountains, especially coal-mining companies, hold considerable areas for mineral development and also for the production of wood and timber for use in the mines. Some are already treating timbers with chemical preservatives and others have taken up the problem of conservative forest management on their hands. Some companies are attempting reforestation of areas ruined by mine dumps or open-pit operations.

Another class of private owners consists of clubs or individuals who have acquired forest property for hunting and other recreational purposes. Relatively few large tracts of land in private estates, however, are managed at present under forestry principles with a technical forester in charge. Usually work on the ground is supervised by a resident ranger or woods foreman. Where technical work is done, it is often directed by a consulting forester who visits the tract at intervals. Most of the forestry so far practiced on private estates has been, and, except for the largest owners, will probably continue to be of this character.

There are now more than 400 private firms and individuals who act as consulting foresters. This is a natural goal of some of the more mature and experienced men who have acquired a solid footing in the profession. Younger men are sometimes employed as assistants and as members of field parties. Some consulting or private practicing foresters conduct a very prosperous business, especially when they have an established reputation which brings a demand for their services in solving particularly important problems.

The operation of private holdings is likely to tend more and more toward conservation practices. This development will probably be accompanied by a growth in cooperative timber production and marketing associations among small landholders and farmers. Already, some mills are being supplied with needed timber through such organizations. A few cooperatives operate their own sawmills or wood-processing plants. Trained foresters are employed by the cooperatives in directing the operation of their members and in marketing the timber produced.

Compensation in private forestry depends largely upon the earning capacity of the individual. Ordinarily, foresters in private employ are paid at a somewhat higher rate than public forest officers in the same grade of work. Furthermore, where the forester works into a regular business, as, for example, in the lumber business, his remuneration will depend not only upon his technical attainments but his business capacity and value to the company.

Trade and Conservation Associations

Many of the national and regional trade associations of lumbermen, pulp and paper producers, and other forest-industry groups employ technical foresters as staff advisers or as directors of certain lines of promotional work. The top executive directors of several of these associations, in fact, are professional foresters whose experience and abilities led to their selection for these positions. The National Lumber Manufacturers Association, American Forest Products Industries, Inc., Western Pine Association, and American Paper and Pulp Association are some of the groups that employ technical foresters.

A number of foresters have found interesting opportunities with conservation organizations such as the American Forestry Association, and various State forest conservation associations. Men chosen for executive secretaryships of such associations usually have demonstrated ability in public relations. From time to time, some of these associations sponsor and finance special studies or surveys which call for the services of trained foresters. Men with experience in the particular line involved are selected to conduct such projects.

The professional organization of foresters in the United States is the Society of American Foresters, with headquarters in Washington, D. C., and regional sections in various parts of the country. The purpose of this organization is the maintenance of high standards in professional practice and promotion of the interests and welfare of the profession generally. Professional forestry training or practical experience substantially equivalent to that obtained in a school of forestry is the requisite for membership.

Teaching

Teaching offers opportunities to the technical forester. As noted earlier, 40-odd colleges and universities in the United States have schools or departments offering forestry courses. Advanced technical training plus teaching ability are requisites for appointments to a faculty position. Practical woods experience, in addition, often is an advantage.

Many foresters have gone into teaching after some years in forestry work with the Federal Government, States, or private industry. Occasionally, outstanding graduate students receive appointments as instructors, from which they can rise, if qualified, to assistant professorships and full professorships.

Compensation varies with the colleges. Top faculty positions in the leading universities pay salaries that compare favorably with those of principal Government forestry positions, but do not equal salaries in the higher brackets of private industry. The academic surroundings, privileges, and campus life, however, have a special appeal to some individuals. The teacher of forestry who is interested in research usually also has the advantage of being able to carry on original studies in connection with his regular schoolwork.

Conservation and elementary forestry are taight in some secondary and vocational schools, but the subject matter is seldom so technical as to call for advanced forestry training. Some foresters, however, have gone into high school teaching, and have found their forestry training useful.

LOOKING TO THE FUTURE

Forestry is one of our youngest professions. Fifty years ago there were practically no trained foresters in the United States. Starting from scratch, the forestry movement in just a few decades has made notable gains. Forest conservation as an ideal has won general approval. As yet, however, the practical methods and principles of forestry by which real conservation may be achieved are too little understood by the general public.

Forestry's greatest possibilities lie in the future. Forestry practice now is being applied only to a fraction of the Nation's forest area. National interest and security eventually will demand the institution of sound forest management on <u>all</u> of our forest land--one-third of the country's land area. The need for men with professional forestry training should increase. How rapidly this need will increase will depend ultimately upon public demand for the intensification of sound forest practice on the public lands and the progress made by private owners in placing more of their forest lands under adequate management.

ORIENTATION TO FOREST OCCUPATIONS

A. Type of Work

1. Technical sales and service
2. Association, technical writing, publicity, editorial
3. Teaching
4. Machinery operation
5. Consulting (industrial forester)
6. Research and development
7. Timber and wood procurement
8. Protection specialist
9. Administration
10. Nursery (production)
11. Forest pathology
12. Range management
13. Engineering (logging, road construction)
14. Forest recreation
15. Forest entomology
16. Forest wildlife management
17. Watershed management
18. Processing
19. Forest management (specialist)
20. Scaling and grading
21. Forestry aid
22. Foresters (self-employed)
    a. Tree preservation
    b. Cost studies of forest operations
    c. Forest management
    d. Forest protection
    e. Surveying and mapping
    f. Timber valuation and appraisal
    g. Timber volume and quality estimates (cruising)
    h. Reforestation

B. Organizations Employing Forestry Trained Persons

1. U.S. Forest Service
2. State forestry and conservation departments
3. Tree farms and nurseries
4. Industry
    a. Lumber
    b. Furniture
    c. Pulp and paper
5. Public and private institutions (schools and colleges)
6. City and community agencies

C. Laboratory Experiences

1. Class visit local forest or park. Make oral and written reports of visit.
2. Class visit local wood using industries. Make oral and written reports of visit.

TEACHING OBJECTIVES

To enable students--

- To develop an understanding of the opportunities and educational needs for occupations in forestry.
- To develop an understnading of the underlying principles of plant science and soil science as related to forestry.
- To develop an understanding of the scope of forestry and its importance in the national economy.
- To develop an understanding of tree anatomy and physiology.
- To develop reasonable abilities required to manage a forest and make forestry measurements.
- To develop an understanding of forestry products and their uses.
- To develop reasonable skills needed in the application of the principles of establishing, managing, harvesting and marketing forestry products.
- To develop a consciousness of safety and desirable safety habits in all forestry operations.

Suggested Course of Study*

Orientation to Forestry as an Occupation (Page 3 of Bulletin)

Botany for the Forester (Page 6 of Bulletin)

Tree Identification (Page 7)

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*This Course of Study is taken in part from the Bulletin, "The Forestry Aide" OE-87011, U.S. Office of Education.

ORIENTATION TO FORESTRY AS AN OCCUPATION

Objectives

To orient trainees to the nature and scope of the Forestry Aide's work and to provide a general overview of the knowledge and skills trainees will need for successful employment.

Course Unit Outline

A. Forests

   1. Nature and characteristics
   2. Uses and value of--
      a. Lumber and wood products
      b. Pulp and paper products
      c. Plywood and veneer
      d. Chemical products
      e. Food and medicinal products
      f. Other forest products
      g. Water conservation and source of supply
      h. Grazing
      i. Recreation
      j. Food and habitat for wildlife
      k. Esthetics
   3. Geographic location and general characteristics of U. S. forests

B. Forest management

   1. Management plans
      a. Importance
      b. Development and application
   2. Tree farms
      a. Purpose and role
      b. Importance
   3. Reforestation and afforestation
      a. Purposes
      b. Techniques
         (1) Direct seeding and care and planting of seedlings
         (2) Intermediate cuttings to improve forest stand and to speed growth (improvement cuttings, weedings, thinnings, release cuttings, and prunings)
         (3) Harvesting to encourage high-quality, maximum, continuing yields of the desired species

C. Forest protection

   1. Fire
      a. Causes and detection
      b. Prevention and control

2. Insects
3. Wildlife and livestock
4. Diseases
5. Harmful natural phenomena
   a. Wind
   b. Snow and ice
   c. Landslides
   d. Heat and drought
   e. Lightning
   f. Weed trees

D. Work of the Forestry Aide

1. Scope of the Work
   a. Assist supervisor in surveying and measuring
      (1) Topographic features of land and distances
      (2) Tree dimensions and species
      (3) Boundaries
   b. Assist supervisor in conservation activities
      (1) Cone collection
      (2) Tree planting
      (3) Direct seeding
      (4) Seedling care
      (5) Tree thinning, pruning, etc.
      (6) Animal pest, insect, and disease control
      (7) Watershed protection
   c. Assist supervisor in enforcing rules and regulations pertaining to--
      (1) Camping
      (2) Hunting
      (3) Fishing
      (4) Recreation
      (5) Picnicking
      (6) Grazing
   d. Assist in fire prevention and control
   e. Assist in marking trees for harvest or removal
2. Organizations which employ Forestry Aides
   a. U.S. Forest Service; National Park Service
   b. State forestry and conservation departments
   c. Tree farms and nurseries
   d. Industry--manufacturers of lumber and wood products, furniture and fixtures, pulp and paper products
   e. Public and private institutions--school and colleges
   f. City and community agencies and bureaus--for recreation areas, parks, woodlands, and conservation areas
3. Employment policies
   a. Hours of work
   b. Compensation
   c. Social Security contributions

E. Effective human relations

1. Nature of effective human relations

2. Common human needs or desires
    a. Respect
    b. Security
    c. Recognition and achievement
    d. Self-confidence and self-respect
3. Some characteristic behaviors when common human needs are not met
4. Some implications for the Forestry Aide
5. Some desirable personal qualities to cultivate
    a. Courtesy
    b. Reliability
    c. Honesty
    d. Conscientiousness
    e. Dependability
    f. Patience
    g. Good management of time, money, and materials
    h. Ability to cope with emergencies and unexpected natural phenomena

BOTANY FOR THE FORESTER

Objective

To develop competence in the science of trees, shrubs, and plants, especially those of the particular geographical area in which the trainees will work as forestry aides.

Course Unit Outline

A. Dendrology

1. Taxonomy of woody plants
2. Use as means of identification
3. Important types of forest trees of the United States
    a. Geographic distribution
    b. Characteristics
    c. Habitat

B. Tree Physiology

1. Anatomy
2. Growth
3. Reproduction
4. Adjustment to environment

C. Transpiration

1. Functions
2. Amounts of water or moisture

D. Geology and forest soils

E. Silviculture

1. Forest growth
2. Thinning and cutting

F. Ecology

1. Soil and nutrients
2. Climate and seasons--weather factors

Suggested Laboratory or Field Exercises

1. Examine and identify parts of numerous forest plants.
2. Visit a park or nursery.
3. Make sketches of various forest plants and identify their parts.

TREE IDENTIFICATION

Objectives

To gain a general knowledge of all genera of trees in the United States; to learn to identify and to understand the characteristics, range, uses, importance, and habitat of all common species in the particular geographic region of expected employment.

Course Unit Outline

A. Genuses and species

1. Pine and larch
    a. Characteristics
    b. Habitat
    c. Major commercial use
2. Fir, hemlock, and spruce
    a. Characteristics
    b. Habitat
    c. Major commercial use
3. Cedar
    a. Characteristics
    b. Habitat
    c. Major commercial use
4. Sequoia, redwood, juniper
    a. Characteristics
    b. Habitat
    c. Major commercial use
5. Oak, maple, ash
    a. Characteristics
    b. Habitat
    c. Major commercial use
6. Others (according to local growth)

B. Specimens and photographs

    1. Preparation
    2. Examination

Suggested Laboratory or Field Exercises

1. Visit a forest, park, woods, and/or nursery
2. Draw a map of the United States, locating the various forests.
3. Examine the layers and rings of a cut tree trunk.
4. Identify trees in a marked forest area or plot.
5. Collect and examine various kinds of tree leaves.

FOREST MANAGEMENT

Objective

To learn the basic principles of forest land management and the application of these principles to the establishment, growth, protection, harvest, and utilization of the products of the forest land.

Course Unit Outline

A. Management activities

    1. Planning
        a. Forest utilization
            (1) Timber-stand utilization
            (2) Tree harvesting
            (3) Maximum production and use of timber
            (4) Watershed and water conservation
            (5) Grazing and forage for livestock
            (6) Food supplies for animal life
        b. Forest protection
            (1) Excessive use of lands--cutting, overgrazing, damage by recreationists and wild animals
            (2) Destructive agents--fire, natural phenomena, insects, disease, animals
    2. Operations
        a. Mensuration
            (1) Inventory
            (2) Computation of new growth
            (3) Estimate of timber and forest products yields
            (4) Cutting and harvesting
        b. Road systems
            (1) Construction of new roads and trails
            (2) Maintenance of roads, paths, and trails
        c. Logging
        d. Salvaging dead and diseased timber
        e. Timber growing

        f. Soil conservation
        g. Water conservation
        h. Wildlife protection
        i. Forage for livestock
        j. Recreation areas
    3. Administration
        a. Interpretation of forestry codes
        b. Personnel management
            (1) Selection
            (2) Training
            (3) Assignment
            (4) Compensation

B. Commercial considerations

    1. Production
    2. Supply and demand
    3. Markets and marketability of products
    4. Finances and investments
    5. Accounting

Suggested Laboratory or Field Exercises

1. Arrange field trips to observe, examine, and/or participate (in some activities): Scaling on the pond and/or in the woods
   Relationship between tree stands and the environment
   Site preparation, tree planting, reproduction surveys
   Thinning, pruning, and sanitation cuts
2. Visit recreational area that has good programs and facilities

FOREST PROTECTION

Objectives

To provide an overview of the agents that damage or destroy forests and, specifically, to teach trainees how to identify and control the most harmful of those agents.

Course Unit Outline

A. Forest Fires

    1. Causes
        a. Natural--lightning
        b. Accidents or human negligence
            (1) Arson
            (2) Cigarettes, matches, and campfires
            (3) Chimney sparks, oil stoves, lumbering operations
            (4) Burning of debris--wind-blown embers
    2. Detection
        a. Fixed point detection

            (1) Lookout houses
            (2) Fire towers
        b. Ground detection--mobile patrols
        c. Aerial detection
        d. Combined ground-air detection
    3. Prevention and control
        a. Fire-fighting organization
        b. Use of water and chemicals
        c. Prescribed or control burning
        d. Slash burning
        e. Maintenance of roads and access routes
        f. Use of fire equipment
        g. Use of radio, tele visual signals
        h. Felling snags
        i. Aerial reconnaissance and chemical bombing
    4. Fire prevention programs
        a. "Keep America Green" program
        b. "Smokey Bear" Campaign
        c. Other public information and education programs

B. Insects

    . Destructive types
        a. Characteristics
        b. Symptoms of damage
        c. Identification
        d. Regional variations
    2. Control
        a. Insecticides
            (1) Common types
            (2) Methods of use
        b. Biological control
        c. Other control measures

C. Diseases

    1. Destructive types
        a. Characteristics
        b. Symptoms of damage
        c. Identification
        d. Regional variations
    2. Control
        a. Fungicides
        b. Other methods

D. Wildlife and livestock

    1. Destructive types
        a. Symptoms of damage
        b. Identification
        c. Regional variations
        d. Control measures

Suggested Laboratory or Field Exercises

1. Visit laboratories in which insect and disease specimens are identified.
2. Field exercises--Suppress small forest fire-fighting equipment of various types
3. Observe the fire--detection network and how it works.
4. Where possible, visit a burned-over area or plot.

USE OF FOREST LANDS

Objective

To provide the trainee with knowledge of the many products and resources of forest lands and an understanding of the principles and practices of "Multiply Use" forest land management.

Course Unit Outline

A. Forestry research

   1. Role of industry
   2. Role of Federal and State Governments

B. Forest products

   1. Lumber
   2. Pulpwood
   3. Chemical and fuel wood
   4. Turpentine, resin, rosin wood tar, rosin oils, pitch
   5. Other products
      a. Maple syrup and sugar
      b. Medicinal roots, barks, and herbs
      c. Decorations--huckleberry branches, fern fronds, evergreen branches, pine cones, holly, christmas trees, mistletoe

C. Water conservation

   1. Humidity
   2. Precipitation
   3. Evaporation
   4. Soil moisture
   5. Erosion and floods
   6. Watershed management

D. Range management

   1. Advantages
      a. To ranchers and stockmen
      b. To forest lands

E. Wildlife management

  1. Practices and problems
  2. Relationship between forester and wildlife manager
  3. Advantages
     a. To the fur industry
     b. To gamesmen (animal, fowl, fish)
     c. To sportsmen

F. Recreation areas

  1. Administration
     a. Private lands
     b. Municipal and county parks
     c. State lands
     d. Federal lands
  2. Uses
     a. Picnicking and camping
     b. Hunting and fishing
     c. Other recreational activities--ski courses, etc.

Suggested Laboratory or Field Exercises

1. Visit a sawmill and a tree-felling area.
2. Visit a game preserve.
3. Visit a sugar grove.
4. Visit a lumber yard.

PUBLIC AND PRIVATE FORESTRY POLICIES AND PROGRAMS

Objective

To acquire knowledge of Federal and State forestry policies, public and private forestry responsibilities, and past and present programs aimed at improving forest administration in general.

Course Unit Outline

A. Federal responsibilities

  1. Forest Service, Department of Agriculture
     a. Manages Nation's forest lands
     b. Maintains experimental research stations
     c. Cooperates with States in forest protection and reforestation
  2. Soil Conservation Service, Department of Agriculture
     a. Develops conservation methods and techniques
     b. Advises on conservation problems and policies
  3. National Park Service, Department of the Interior
     a. Advises on preserving park lands in natural state
     b. Provides staffs for national parks
     c. Maintains national monuments

B. State responsibilities

  1. State forestry departments
     a. Direct State experimentation and conservation programs
     b. Acquire and manage State forests
     c. Direct reforestation of State lands
     d. Conduct public information and education programs
     e. Cooperate with private owners and Federal Government in forest management and research

C. Private forestry activities

  1. American Forestry Association
     a. Conducts national research and information programs
     b. Promotes and encourages improvement in use of forests
  2. American Forest Products Industries, Inc.
     a. Originates national programs of information and education
     b. Coordinates national "Keep America Green" fire-prevention programs
     c. Coordinates American Tree Farm System
  3. School and Future Farmers of America forests
  4. "Busy Acres" program
  5. Forestry camps and experimental stations
  6. 4-H Clubs
  7. Farm and civic organizations

D. Forestry legislation

  1. Need
     a. Protect forest lands
     b. Guarantee best usage of land
     c. Renew harvested and devastated areas
  2. The Weeks Laws of 1911
     a. Keystone of interstate and Federal-State cooperation in the protection of watersheds of navigable streams
     b. Authorized appropriation of funds for the purchase of forest lands at the headwaters of navigable streams
  3. National Park Service establishment act of 1916--authorized full-time supervisory and protective responsibility for national parks
  4. McNary-McSweeney Act of 1928--authorized Federal appropriations for nationwide forestry research
  5. Civilian Conservation Corps establishment act of 1933--authorized appropriations for forestation, fire control, and research
  6. Cooperative Forest Management Act of 1956
     a. Authorized appropriations for reforestation
     b. Approved encouragement of private services to timberland owners
  7. State and local laws

SUGGESTED REFERENCES IN FORESTRY MANAGEMENT

1. Careers in FORESTRY
   Forest Service
   Miscellaneous Publication No. 249
   United States Department of Agriculture

2. Conquest of the Land Through 7,000 Years
   Agriculture Information Bulletin No. 99
   U. S. Department of Agriculture
   Soil Conservation Service

3. Forests in Utah
   U. S. Forest Service Resource Bulletin INT-4
   Grover A. Choate
   Division of Forest Economics
   and Recreation Research

4. Forest Recreation for Profit
   U. S. Department of Agriculture
   Forest Service
   Agriculture Information Bulletin No. 266

5. Forest Service Films 1967
   U. S. Department of Agriculture
   Forest Service

6. Indicators of Condition and Trend on
   High Range-Watersheds of the
   Intermountain Region
   Agriculture Handbook No. 19
   U. S. Department of Agriculture
   Forest Service

7. The Intermountain Region's Timber Story
   The U. S. Department of Agriculture
   Forest Service
   Intermountain Region
   1963

8. Mountain Water
   Intermountain Region
   Forest Service
   U. S. Department of Agriculture
   1964

9. Outdoor Recreation in the National Forests
   Forest Service
   U.S. Department of Agriculture
   Agriculture Information Bulletin 301

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SAFETY IN INDUSTRY, INSTRUCTOR OUTLINE--
CONSTRUCTION SAFETY, PILE DRIVING AND
COFFERDAMS.

BUREAU OF LABOR STANDARDS (DOL), WASHINGTON,
D.C.
MF AVAILABLE IN VT-ERIC SET.
BULL-305
PUB DATE - 67 65P.

DESCRIPTORS - CONSTRUCTION (PROCESS);
*CURRICULUM GUIDES; *UNITS OF STUDY (SUBJECT
FIELDS); *TRADE AND INDUSTRIAL EDUCATION;
ADULT VOCATIONAL EDUCATION; TRAINING
TECHNIQUES; CHARTS; *SAFETY EDUCATION;
INDUSTRIAL TRAINING; CONSTRUCTION INDUSTRY;
SAFETY; *OPERATING ENGINEERING; GOVERNMENT
PUBLICATIONS
IDENTIFIERS - PILE DRIVING; COFFERDAMS; SHEET
PILING; EDUCATIONAL AWARENESS; ATTITUDES
APPRECIATIONS; CAREER AWARENESS

ABSTRACT - THIS BASIC TEACHING OUTLINE FOR A COURSE IN CONSTRUCTION SAFETY, PILE DRIVING, AND COFFERDAMS CONTAINS SUGGESTIONS FOR SAFETY TRAINING TECHNIQUES, 24 CHARTS, DESCRIPTIONS OF SAFETY ENGINEERING PROCEDURES, AND THREE SEPARATE CURRICULUM OUTLINES IN A 2-COLUMN FORMAT COVERING PILE DRIVING, SHEET PILING, AND COFFERDAMS. DEVELOPED IN THE OFFICE OF OCCUPATIONAL SAFETY, THIS CURRICULUM GUIDE INCLUDES THE SCOPE AND PURPOSE OF EACH INSTRUCTIONAL UNIT. (AG)

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[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] Additional [illegible] [illegible] [illegible] illustrations should be [illegible] for a complete presentation suitable to the conditions, locality, industry, or occupational group.

This instructor outline was developed in the Office of Occupational Safety by Francis [illegible] Otto.

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C., 20402 - Price 15 cents

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SAFETY IN INDUSTRY
INSTRUCTOR OUTLINE

construction safety pile driving and cofferdams

EPARTMENT OF LABOR
Wirtz, Secretary
BUREAU OF LABOR STANDARDS
Nelson M. Bortz, Director

2113

SAFETY TRAINING TECHNIQUES

It is of utmost importance that the instructor become acquainted with some of the basic training techniques in order to better prepare himself to conduct the course successfully.

Planning

1. The instructor should have such visual aids as are pertinent to the subject matter of the course. These should be set up in proper sequence. An indication or note on the instructor's outline could be very helpful as a guide that a particular visual aid should be used.

2. The course outline as well as the handout material and the visual aids should be checked at regular intervals. This should be done by the instructor in order to revise, improve, and modernize the course presentation. The material should also be checked to make sure that it conforms with policies of labor and management in the area where it will be presented.

3. The instructor's outline should be adapted by him to his particular method of presentation, keeping in mind that this is a discussion conference type of session.

4. The instructor would do well to get an advance list of the students who will participate and their positions and backgrounds. A study of such information could be very helpful to the instructor when he faces his class.

Preparation of Classroom

Many conferences and courses have failed simply because no preparation was made for the classroom facilities.

1. The classroom should be located in an area where there is the least amount of noise or distraction.

2. Good ventilation, lighting, and sufficient room are important aspects to consider.

3. The seating arrangement and seats should be comfortable as well as informal. A round-table seating arrangement is the most effective for discussion-conference sessions.

4. The room should be equipped with a good blackboard, sufficient chalk, and a clean eraser. A stand should be available for mounting the charts and visual aids to be used during the conference. A 35-mm. slide projector should be available.

Teaching

1. An official of the organization should open the first session with a statement regarding the general objectives of the course. He then should introduce the instructor to give him the proper prestige in relation to the group he will teach.

2. At the first session, the instructor should open with an explanation of the course objectives and its method of presentation. At this time, he should draw upon his experiences to relate an illustrative incident that will bring him in closer relationship with the group, and at the same time, enable him to introduce the theme of the first session.

3. The course should be presented by employing the discussion-conference method.

4. The instructor should have the class follow a predetermined schedule and maintain order at all times. Only one participant should be permitted to give his viewpoint at a time. The instructor should keep the class discussion within the subject matter as contained in the instructor's outline.

5. If possible, an official should be asked to speak at the termination of the course.

Tips for Instructors

Learning is actually the acquisition of new ideas, abilities, and skills acquired through the senses of hearing, seeing, and feeling by touch.

1. New ideas are conveyed through the presentation of knowledge, and thought is stimulated through the student's sense of hearing.

Abilities and skills are presented through the media of telling, demonstrating, and having students demonstrate under the supervision of the instructor. Students acquire abilities and skills via the sense of hearing, seeing, and feeling by touch.

2. An important aspect of teaching is to remember that the student absorbs more when he participates in a discussion. The instructor therefore strives to get 100-percent class participation.

3. The instructor should become aware of outstanding characteristics of his students. This could be very helpful when leading discussions. For example:

A. Some may be more mature.
B. Some may have a knowledge of safety.
C. Some may have actual experience to draw on in the discussion.
D. Some may have a faster learning speed than others.
E. Some may be "stallers" who can slow down the discussion.

F. Others may be aggressive and want to monopolize the discussion.

G. There may be a "know-it-all" in the group who must be properly controlled.

H. Some may be constant latecomers who ask questions about previous discussions and delay the class.

4. The teaching process consists of:

   A. Telling—this means giving background information to introduce a subject.

   B. Showing—a demonstration of some equipment pertaining to the subject to be discussed is very impressive.

   C. Illustrating—using charts, blackboard, slides, or films are very helpfull to highlight specific points in the discussion.

   D. Discussion conference—the participation of the students in formulating their thinking about the subject under discussion is fundamental to getting the most out of the session.

   E. Conclusions–the instructor's summation of the session should knit together the points discussed during the session, and should include other important details that may have been overlooked by the group.

   F. Questions–during the session, the instructor should use questions to stimulate discussion, and also to help bring the discussion back to the subject matter if it has strayed.

Guest Instructors

It is necessary that the instructor be granted full responsibility for conduct of the class; at times, however, he may wish to call in an expert in a particular field as a guest instructor (or lecturer). In such event, it is essential that the instructor maintain control of the course.

The instructor must tie in the work of the guest instructor with the balance of the course; he must outline the phase of the subject to be covered by the guest and satisfy himself that the guest limits himself to the field as outlined; he should summarize the guest's contribution, pointing out its relative importance in the field of accident prevention. While the use of a few guest instructors (properly utilized) can add to the effectiveness of the course, a series of "lecturers" whose topics are not correlated will inevitably result in confusion.

It is recommended that "guest experts" be used only for *supplementary* training, and not to replace even part of this course which should be taught by *one instructor*.

PILEDRIVING

Contents

Piledriving

SCOPE AND PURPOSE

Today, there are very few contractors who have not used piling at one time or another.

This course, a study in safety engineering procedures, deals with the problems of fabrication, transportation, and installation of piles.

The safety recommendations and principles are not intended to be specifications.

This course is intended to cover the basic requirements of safety, and should be considered as minimum standards or recommendations flexible enough to afford a uniform and adequate degree of safety when applied to the several types of piles and the methods used in their installation.

INSTRUCTOR'S NOTE: Sheet piling is mentioned briefly here but is covered in the second section of this outline.

THE PROBLEM

Piledriving is a dangerous operation.

Although, only a small percentage of those employed in construction work are engaged in piledriving, the high accident and injury rates make it a fertile field for preventive efforts.

INSTRUCTOR'S NOTE: Discuss the latest available frequency and severity rates here.

Types of Injury

Many possibilities for serious injuries are produced by the environmental conditions and work methods.

The three leading injury causes are:

1. Falls.
2. Struck by.
3. Caught in or between.

WHAT PILING IS
Definition and
Purpose

Piling refers to support beams, slabs, or columns of wood, concrete, or steel placed in the soil for the purpose of transmitting a load through water or strata of poor bearing capacity to a stratum of adequate bearing capacity.

Piling may transmit a load downward or laterally and, in some cases, may anchor an upward pull.

The transfer of the load by the piling to the bearing soil may be by soil friction, end bearing, or both.

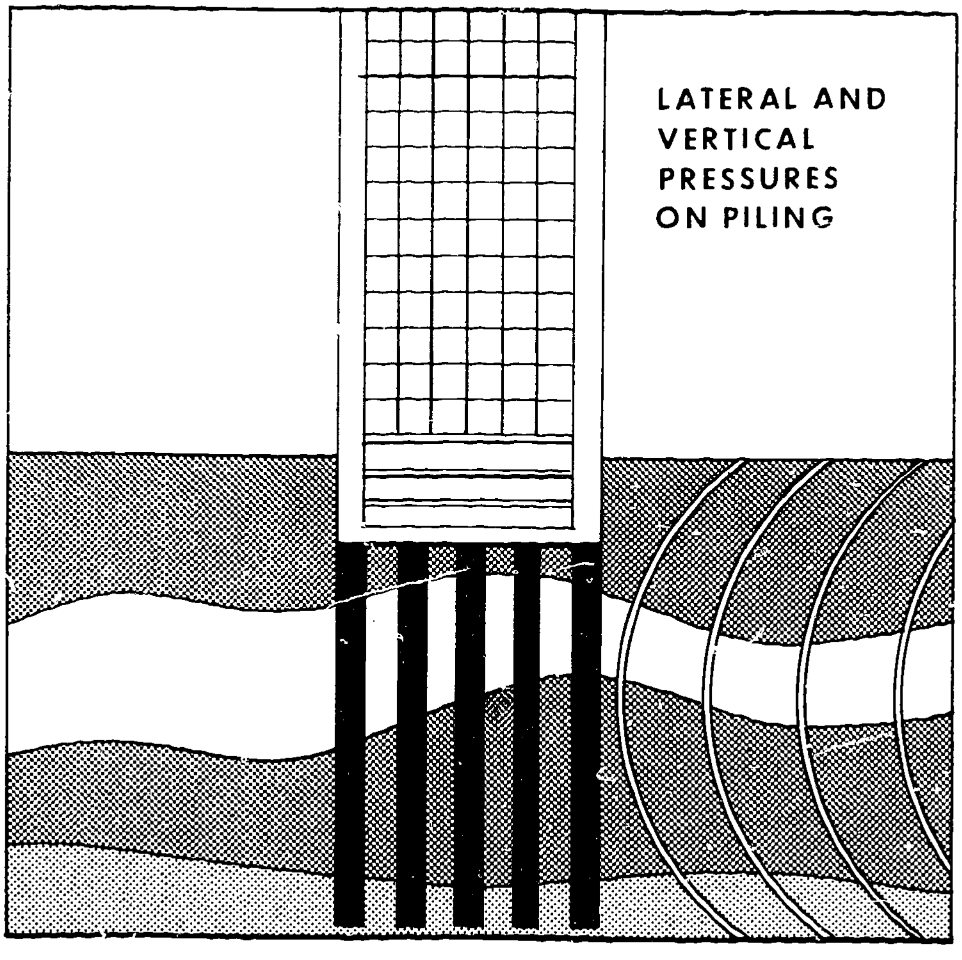


Chart 1

USE OF PILES

Chart 1 illustrates how piling must be designed to resist lateral effects (such as earthquakes), as well as vertical loading.

Piling may be used to resist vertical, inclined, or horizontal loads. Vertical use is the more common application.

Vertical application may be to either bearing or tension (uplift) loads. When horizontal loading is applied to vertical piles, anchored tiebacks or batter piles may be necessary to combat the lateral forces.

When lateral loading is not resisted properly, progressive bending and ultimate failure of the piling can occur.

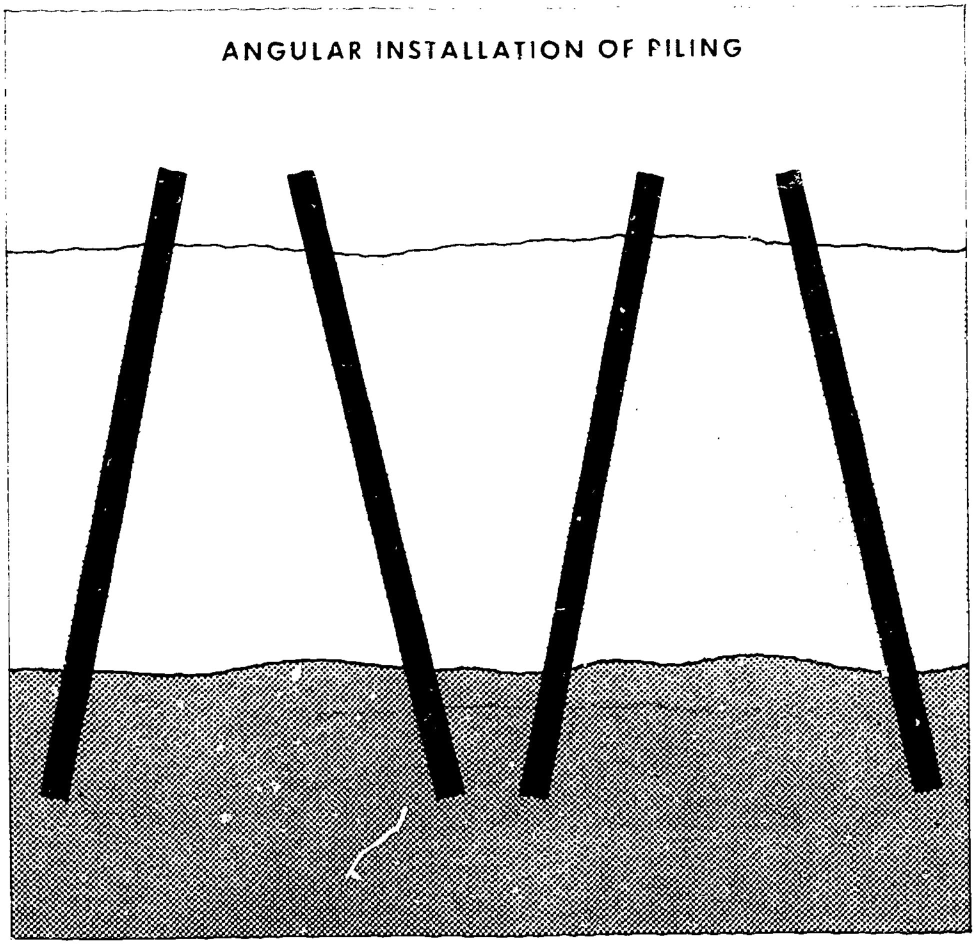


Chart 2

SUBSURFACE EXPLORATION

Chart 2 illustrates angular piling installation through material such as swampy soil to firm underlying sand. Designed to resist appreciable horizontal *and* vertical thrusts.

Subsurface conditions determine what type of piling should be used.

Unless sub-surface conditions are known, exploration is necessary.

INSTRUCTOR'S NOTE: Sub-surface exploration is thoroughly covered in the "Excavation" Instructor's Outline of the Construction Industry Series.

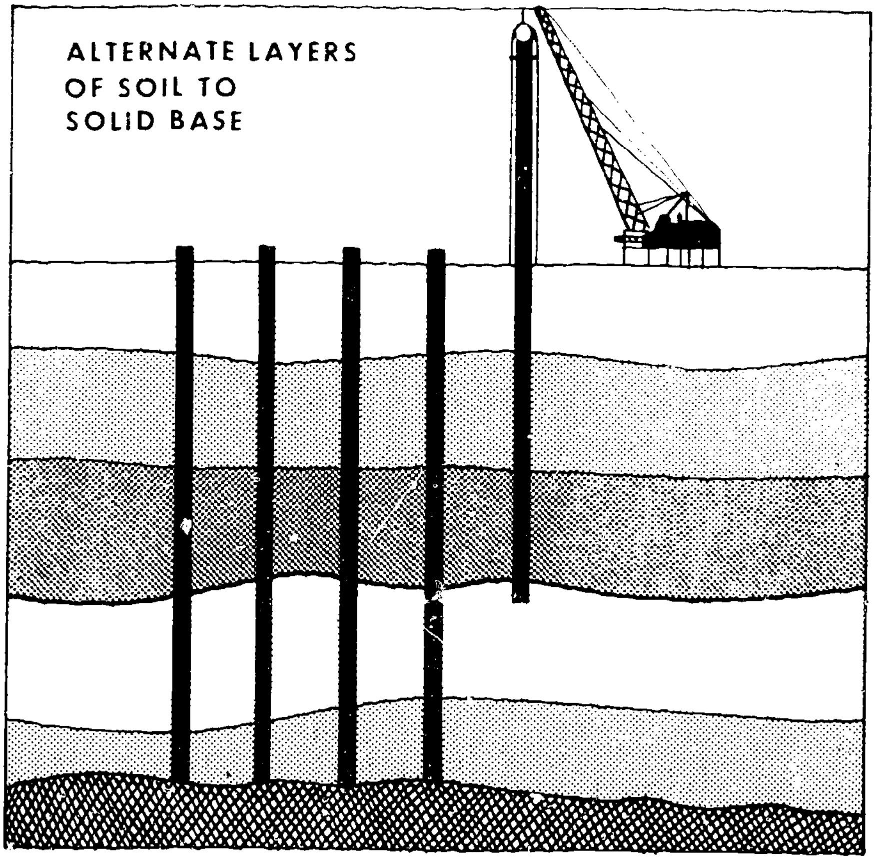


Chart 3

PILE FOUNDATIONS

Chart 3 illustrates penetration of alternative layers of weak and dense soils to reach sound bearing material.

The purpose of a pile foundation is for transmitting the load to the soil without detrimental settlement of the structure.

The bearing capacity of the pile foundation depends upon:

1. The material strength of the individual pile.
2. The load-carrying capacity of the soil into which the piles are installed.

TYPES OF PILING	Pile classifications are: timber, steel, concrete, and composite.
Timber Piles	A timber pile is a dimension timber, having the natural taper of a tree. It should be made of rather dense wood, such as southern pine, Douglas fir, spruce, or various hardwoods. It is reasonably light for its strength and is easily handled. Timber piles are generally used for relatively light axial and lateral loads, and where foundation conditions indicate they will not be damaged by driving. Where they are continuously submerged (as when cut off below the ground-water level), timber piles can remain indefinitely. Where they are not continuously submerged or when exposed to attack by marine borers or termites, they should be chemically treated.
Concrete Piles	The two types of concrete piles—precast and cast-in-place—are immune to attack by most marine borers and termites, are more fire resistant, and can carry a larger load than wood piles. Protruding sections of concrete piles are subject to weathering action the same as other types of concrete structures. Deterioration is caused by the abrasive action of sand, ice, debris, waves, and spray, and in salt water, by alternate wetting and drying between low tide and the spray line. Evaporation leaves crystalline deposits in the cracks, which expand and spall the concrete. In cold climates, the severe action of freezing and thawing also takes its toll. Imbedded concrete piling is considered permanent unless the ground water or soil contains destructive elements.
Precast Piles	Because of their weight, precast concrete piles lend themselves well to water jetting installations.

	Disadvantages of precast piles are: the space required for manufacturing and storage, time for cutting, and heavy equipment necessary for handling and driving them. Additional operations are necessary when piles are too long or too short.
Cast-in-Place Piles	A cast-in-place pile is formed by digging a hole and filling it with concrete. The shell type consists of steel heavy enough to be driven without a mandrel, or a light steel shell driven with a mandrel which is removed after driving. The shell (form) is filled with concrete and left in place. The shell-less (uncased) type is made by driving a mandrel which is removed before the concrete is poured. Efficiency and safety advantages of using cast-in-place piles are: 1. Cutting-off and building-up to meet required lengths (as with precast piles) is not necessary. 2. Storage space is not a problem. 3. Special handling equipment is not necessary. 4. Possible damage or injuries from handling is eliminated. 5. The hazards of driving brittle piles are eliminated.
Composite Piles	Composite piles may be in several forms; for example— 1. Timber piling below the permanent water table level, where decay is not a problem, with cast-in-place concrete piling used for the upper part of the pile structure. 2. Steel piling in the lower part, with a concrete upper section.
Sheet Piles	Sheet piles may be made of concrete, steel, or wood.
Wood Piles	Wood sheet piles are used primarily on cutoff walls or for handling light loads. Where watertightness is not a factor, single or double planks may be used.

Where watertightness or additional strength tongue-and-groove or Wakefield sheeting sho (Wakefield sheeting consists of three planks nailed together with the center plank protruding to create a tongue-and-groove joint.)

Steel Piles

The most common sheet piles are made of steel.

The advantages of steel over wood and concrete are its simplicity, strength, salvage value, and economy when doing heavy work.

Concrete Sheet Piles

Concrete sheet piles are reinforced precast units, with tongue-and-groove interlocking joints.

Grouting interlocking joints is usually necessary for watertightness.

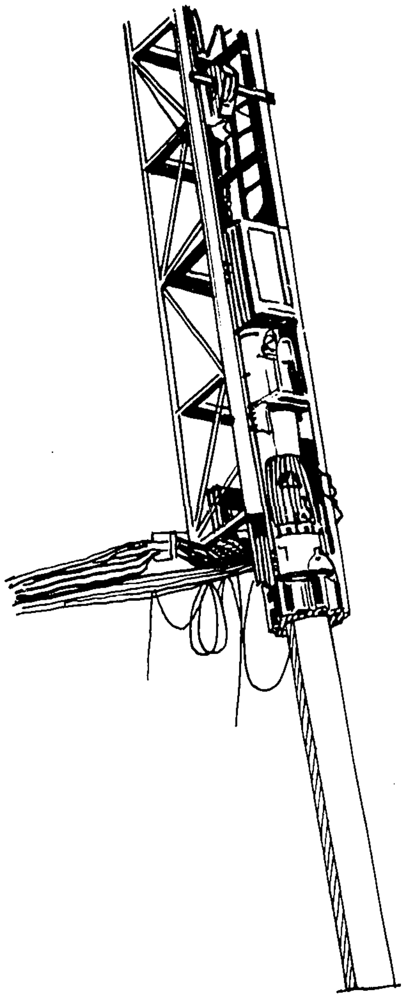
Bottoms are usually beveled to force each sheet toward the adjacent pile as it is being driven.

Determining the Type of Pile

The safety of the worker, and efficiency of the operation, and the effectiveness of the end result are all dependent to some degree upon the selection of the best type of pile for any given situation.

The question of the best pile to use is not only that of material, length, size, loading capacity, etc.

Selection is also predicated upon the purpose to be served by the pile, whether it is to be permanent or temporary, soil and ground material conditions, ground water level problems, friction which will be encountered, the length needed, the loads and pressures it will be required to meet, driving stresses, and ready availability of the type of pile desired to meet these needs.



DRIVING PRESTRESSED BATTER PILE

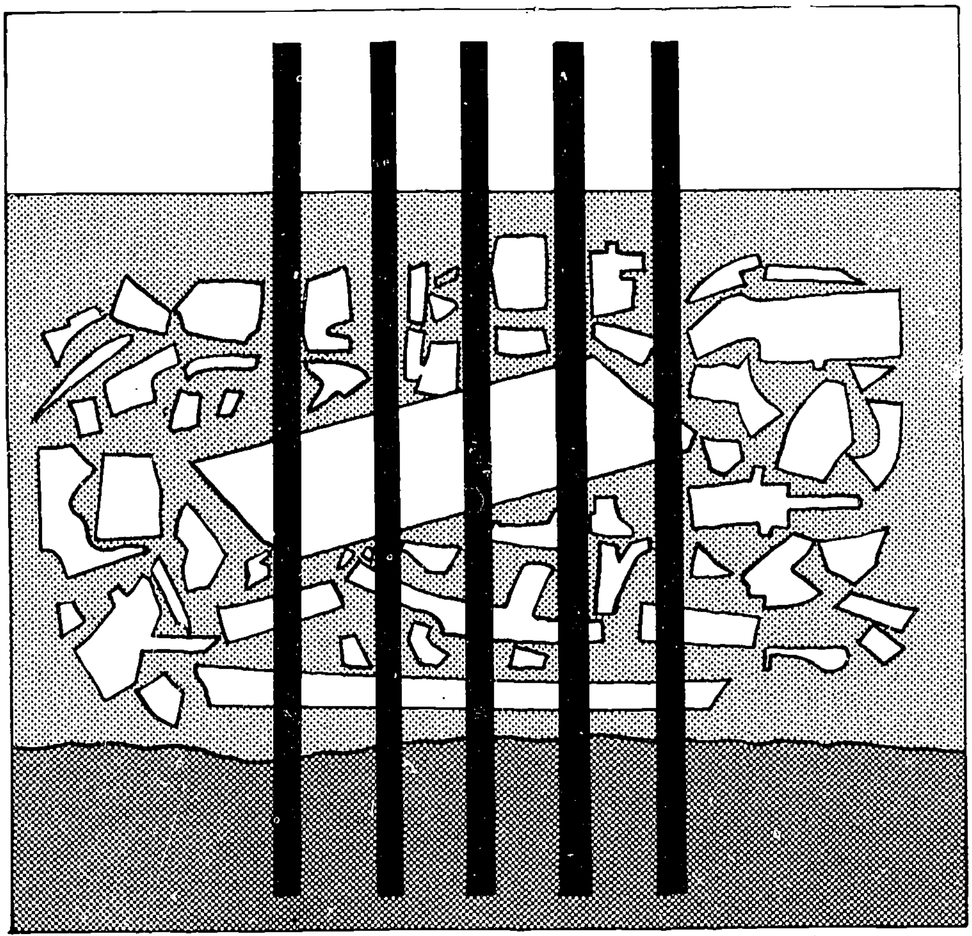
Chart 4

Batter and Fender Piles

Chart 4 illustrates the driving of a prestressed concrete *batter* pile.

BATTER (leaning) piles (also called "brace piling") are used to carry substantial lateral loads where the foundation material does not provide sufficient resistance to lateral force applied to vertical piles. Batter piles are also used in a compressible foundation to distribute the vertical loading over a wider area.

FENDER piles are used to prevent wear and absorb shock: for example, ferry slip entrances.



PENETRATION OF MISCELLANEOUS DEBRIS
Chart 5

BEARING CAPACITY

Chart 5 is an illustration of penetration of soil material containing miscellaneous debris.

Bearing capacity is a load that can be sustained by a pile foundation without producing enough settling—initial or progressive—to damage the structure or interfere with its use.

The load of a pile is transferred to the soil by either end bearing or friction along the length of the imbedded portion of the pile, or both. Therefore, the load-bearing capacity of the soil must be determined before any decision can be made as to which of these transfer mechanisms will prevail, and to what extent.

PILE DAMAGE	Damage to piles may result in only an economic loss, but circumstances, conditions, or acts which cause damage to piles can, and often do, cause accidents and injuries. Any sudden change in hammer blows, unless accounted for by boring d[illegible] investigated. A pile may seem to be penetrati[illegible] actually it is being crushed.
Overdriving	When driving piles into rock or hardpan, or soils comparatively hard to penetrate, care should be taken to halt driving if damage starts to occur.
Bending	If penetration per blow decreases, this is an indication of trouble. If the pile departs from vertical because of its shape or because of the soil, efforts to bend it back may place destructive initial stress upon it. It is important to use STRAIGHT piles. It is important to START piles correctly.
Obstructions	Obstructions may exist below ground surface, such as buried timbers, masonry, boulders, or other materials or conditions. Explorations or studies of old plans should be made to disclose, as far in advance as practical, the existence of such conditions. If an obstruction is encountered: It may be removed. The pile (particularly a steel pile) may be driven through it. The obstruction may be forced out of the way. It may be necessary to relocate the pile.

EQUIPMENT, METHODS, AND OPERATING HAZARDS

There are five basic types of piledrivers:

1. Drophammer.
2. Steam or air hammer.
3. Diesel hammer.
4. Hydraulic hammer or driver.
5. Sonic or vibratory driver.

Drophammers

The drophammer is raised in an A-frame by a hoist line running over a sheave at the top of the frame.

It is released by a trip and falls freely, or it may be released by loosening the friction band on the hoisting drum.

Drophammers are rarely used in modern piledriving; they are used mostly in isolated work on lightly loaded piles, since heavily loaded piles require a ram effect, which the drophammer cannot provide.

The automatic release should be inspected on every shift. Perfect alinement must be maintained to prevent accidental release.

The fit of the hammer, in the leads, should be checked regularly.

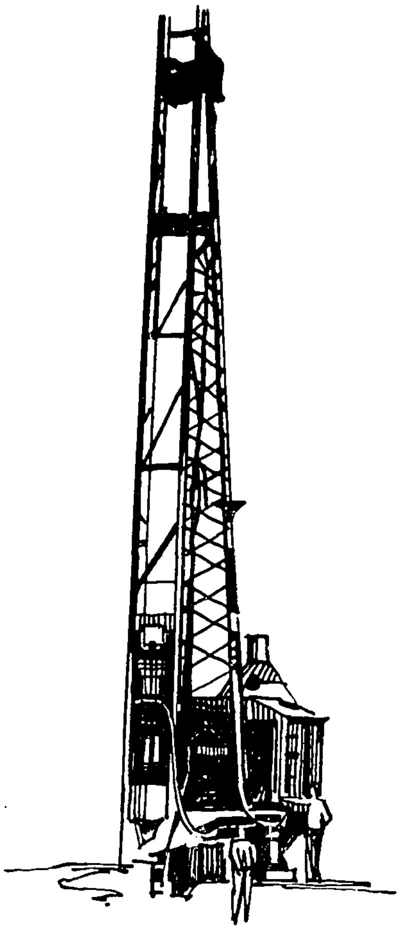
Leads should be kept well greased.

The hammer and leads should be kept free of burrs or other projections.

The hammer line should be checked on every shift, and replaced when necessary.

Hammer lines should have no splices.

When the equipment is being moved or the hammer is not in use, a cleat or timber support should hold the hammer in place at the bottom of the cleats.



STEAM POWERED PILE DRIVER

Chart 6

Steam and Compressed Air Hammers

The original steam hammer (a single-action type) was developed about 1900; it was the first meaningful advance made in piledriving since its inception thousands of years ago.

Its development eliminated the uncertainty of the energy produced by the ordinary drophammer, and permitted precise calculations.

A steam hammer is made up of a cylinder with a piston or ram as the striking part.

Today's steam or air hammers are either single-action, double-action, or combination type.

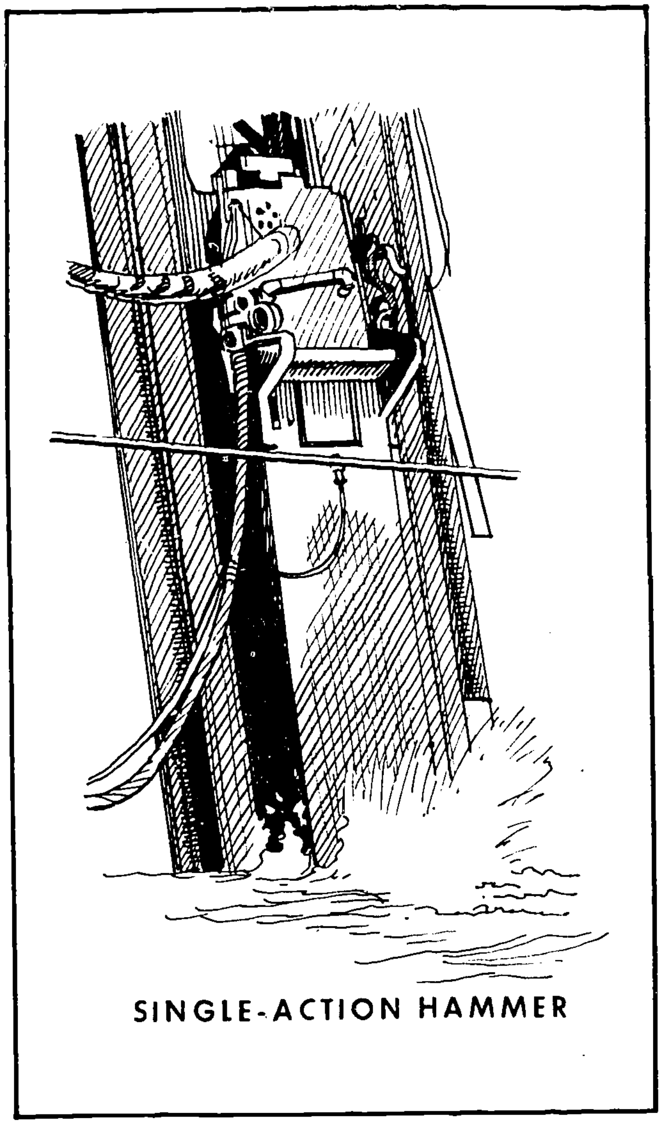


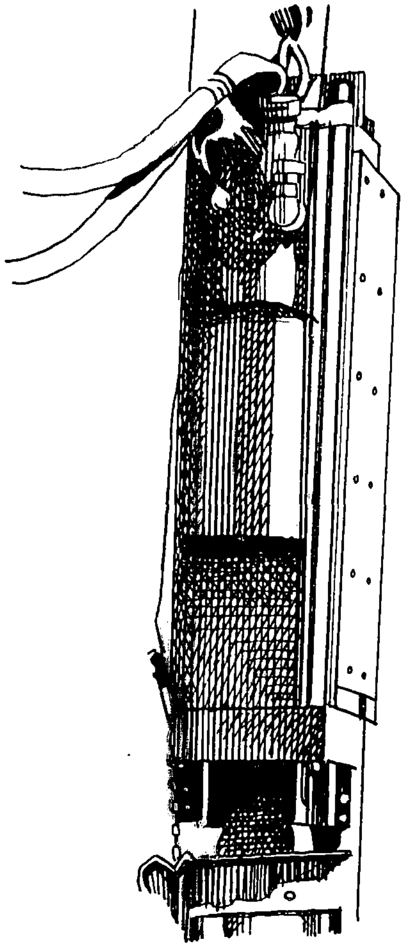
Chart 7

Chart 7 is an illustration of a single-action hammer.

1. Single-action hammer.

   Steam or air pressure is used on the underside of the weight to raise it. The piston is then allowed to fall free.

   Although much faster than the drophammer, it has a low striking velocity.



DOUBLE-ACTION HAMMER

Chart 8

Chart 8 illustrates a double-action hammer.

2. Double-action hammer:

The ram is raised by power, as with the single-action type, but it is also powered downward by steam or air pressure. This type is faster than the single-action driver.

The pressure at the top of the stroke, while forcing the ram downward, also tends to lift the hammer housing off the top of the pile. The housing must, therefore, be heavy enough to prevent its leaving the pile head.

3. Combination type:

This type involves the combination of gravity plus steam or air pressure.

Hydraulics have also been adapted to the steam or air hammer through the use of hydraulic power to replace steam or air.

The steam or air hammer operates with lighter but more uniform and rapid blows on the pile head than are delivered by a drophammer. This reduces possible damage to the pile being driven.

The equipment necessary for generating either steam or air pressure presents its own inherent operational hazards.

It is also unwieldy and offers transportation and handling problems.

Air and steam line connections should be kept tight.

The lines should be secured with chains or equivalent means to prevent snaking, should the hammer break loose.

Loose, threshing lines can cause a variety of injuries, including scalds from steam lines.

Two shutoff valves should be provided for steam lines; one should be the lever quick-acting type and within easy reach of the operator.

The tie rods and cotter keys which hold this equipment together should be inspected on every shift.

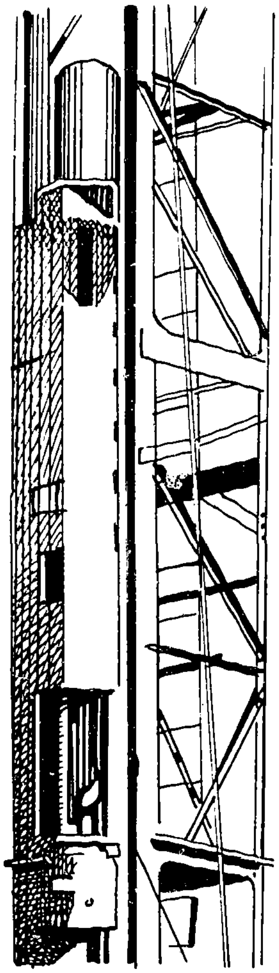
Condensation should be removed from the low point of the steam line with drain cocks or bleeders.

Steam hammers should be permitted to cool before being handled for packing.

The steam hose should be disconnected before the hand hold plate is removed.

In cold weather, applying full steam to a cold hammer can burst the cylinder. The hammer should be gradually warmed by slowly admitting the steam into the cylinder. Then, several soft blows should be made with the ram before normal operation.

In cold weather, the rapid expansion of compressed air can chill exhaust pipes to the point of freezing out ice on the nozzle. The high velocity of the exhaust air may blow this ice off, creating an eye-injury hazard.



DIESEL POWERED HAMMER

Chart 9

Diesel-Powered Hammers

Diesel-powered hammers as illustrated in Chart 9 are self-contained units, usually suspended from a crane by a hanging lead or attached to the frame of a piling.

They are self-contained and require no supplementary equipment, such as a boiler or compressor; they are easily transported.

They operate by compression-ignition as a result of the weight falling and compressing the contents of the cylinder.

The explosion-and-recoil returns the ram unit to the top of the cylinder.

There are both single-acting and double-acting types of diesel hammers.

The single-acting type has an open top cylinder through which the ram protrudes at the top of the stroke.

The double-acting type has a closed top cylinder into which the rising ram compresses air, which, in turn, imparts extra drive to the downstroke of the ram.

Diesel hammers are particularly effective on hard-to-drive piles, since such piles provide a resistant base against which the combustion gases can push.

Because these units need no compressors, boilers, or generators, and are portable, they are safer to use.

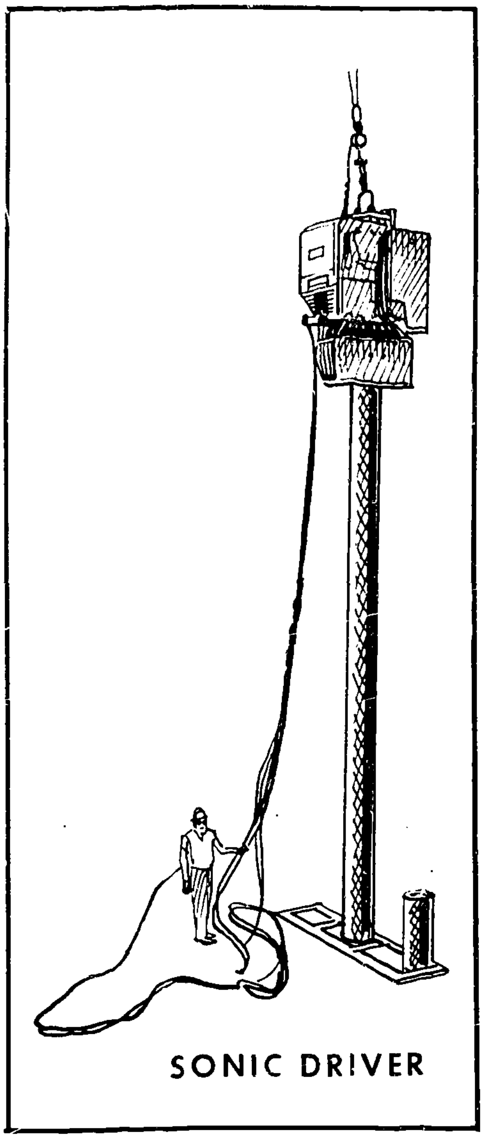


Chart 10

Sonic (Resonant) and Vibratory Drivers

Chart 10 is an illustration of a sonic driver.

Sonic and vibratory drivers have essentially the same action. Both types "slide" the pile into the ground.

They are powered by diesel or gasoline engines (with the exception of one type which is electrically powered); the driver consists of an oscillating unit attached to the pile being driven.

The *sonic* type vibrates, or oscillates, at a frequency predetermined to be compatible with the frequency and length of the pile.

The pile is alternately expanded and contracted lengthwise, in a 60- to 120-stroke-per-second lengthwise motion, by the oscillation.

The frequency is set to provide the maximum effect at the top of the pile.

The oscillation causes fluidizing of the soil at the tip which, together with the lengthwise movement of the pile and its load, virtually slides the pile into the soil.

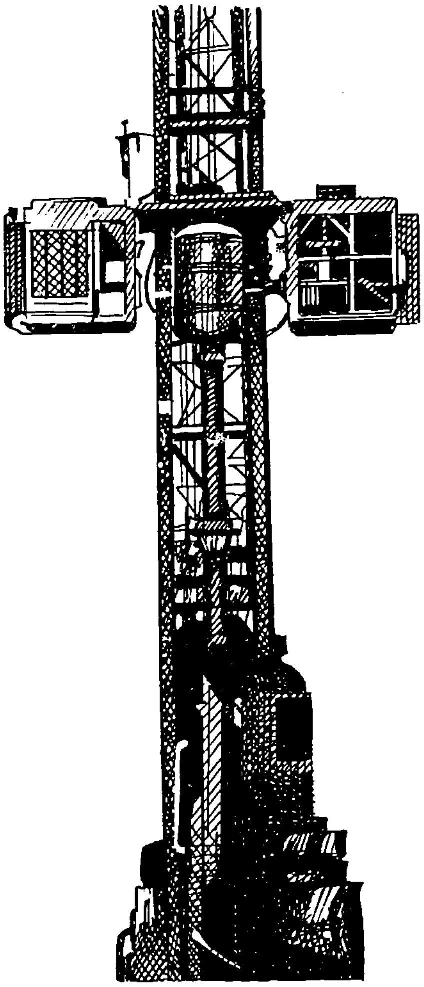


Chart 11

Chart 11 illustrates a vibratory driver.

The *vibratory* drivers also slide the piles into the ground.

In the vibratory operation, soil displacement also occurs and the pile is "driven" by its own weight, together with that of the driving mechanism attached to it.

The oscillation rate is not as great in vibratory driving, and the natural frequency of the pile is not involved.

	Sonic and vibratory driving techniques, still in the developmental stage, have both advantages and disadvantages. It is often claimed that this type driving can be done only in certain types of soils. Proponents of this method, however, claim that all conditions may be met. On the other hand, the method is fast, it does not disturb the soil nor affect nearby structures as other methods do; and it has a very low noise level. The initial cost of the equipment and the power requirements are very expensive.
Hydraulic Hammers	The driver is suspended from a crane or attached to a partially driven pile, leaving the crane available for other use. Power for the unit must be provided from an outside source. This type has the advantage of silence and speed. They are considered good drivers for clays and fine granular soils, but there may be difficulty with harder soils.
Auxiliary Equipment	Various protective devices are used to prevent excessive stresses on piles during the driving process, which, of course, helps to reduce the accident potential.
Chamfering	Wooden piles are protected against "brooming" or splitting by chamfering the edges of the pile head, and by placing a metal hood or a steel band or cable around the pile head.
Cushioning	Heads of concrete piles may be protected during driving by use of a cushion; woven rope or wood blocks can be used. Steel piles need less protection during driving than other types. A cap may be used to hold and guide the pile and to insure an axial blow. The driving cap should be shaped to fit the pile section.
Follower	A follower is a member interposed between the pile and the hammer when the head of the pile is to be driven deeper than the hammer can reach. The ends of the follower should be square, and its axis should coincide with that of the pile to avoid eccentric driving.

Cribbing	Good maintenance is very important with this equipment. Timbers used for cribbing become rounded from continual use. To maintain their stability, they should be squared off.
Chains, Cables, etc.	Shackles, hooks, ropes, chains, and cables should be subjected to frequent, periodic inspection. Broken rope fibers reduce its carrying capacity. Inner surface wear and elongated chain links are also danger signs. A stretched chain indicates that it has been subjected to undue strain and should be replaced. Breakage of individual strands and reduction in the diameter of wire ropes are signs of excessive wear or undue strain. Standards for the use, inspection, care, storage, handling, maintenance, and repair of this equipment are available from many sources, including the National Safety Council, insurance associations, standards organizations, numerous companies which manufacture chain and wire rope and their industry associations.
Fastening Equipment	Vibration of piledriving rigs tends to loosen bolts and other connections. Parts can easily come loose and fall. Daily inspections should be made to prevent these hazards.
Handling and Storage	Methods of handling equipment and materials in piledriving operations are an important segment of the safety program.
Unloading Piles	Piles are usually delivered to the jobsite in railroad flatcars or trailer trucks. Unloading piles can be extremely hazardous if the job is poorly planned or not controlled. Piles can fall, roll, or slip during unloading. If hoisting equipment is used for unloading, the hazard is reduced. When hoisting equipment is not available and drop unloading must be used, the following procedures are suggested:

1. Install temporary rope securing lines between opposite stakes.
2. Mount skids along the unloading side of the carrier.
3. Be sure the skids are strong enough and cannot slip from the carrier supports.
4. Notch end stakes (on unloading side) about one-third through at about their midpoints. Install a pull line to the upper section of each end stake.
5. Cut and remove reinforcing wire. Men should not be allowed on top of the load after stake wires have been removed.
6. Remove temporary securing lines on all but end stakes.
7. Remove all stakes but end stakes.
8. Remove temporary securing lines from end stakes.
9. One or more men, stationed away from the fall direction of the piles, will be sufficient to break off the stakes and allow the piles to roll down the skids.

If the key pile will not start, cant hooks may be used at each end. Men using cant hooks should stay in the clear at the ends of the load.

The same procedure should be used on the bottom half of a load (replace some stakes and securing ropes while rigging end stakes again).

Handling Piles at the Driving Rig

Piles should be properly positioned for handling by the driving rig, headed as close to the hoisting center as possible.

The hoisting line should be secured when placed around the pile. Everyone should be in the clear before the signal is given to hoist.

Guidelines or tag lines should be used to help in proper placement of the pile in the rig.

Only after the pile is in driving position should the men be allowed to guide it directly.

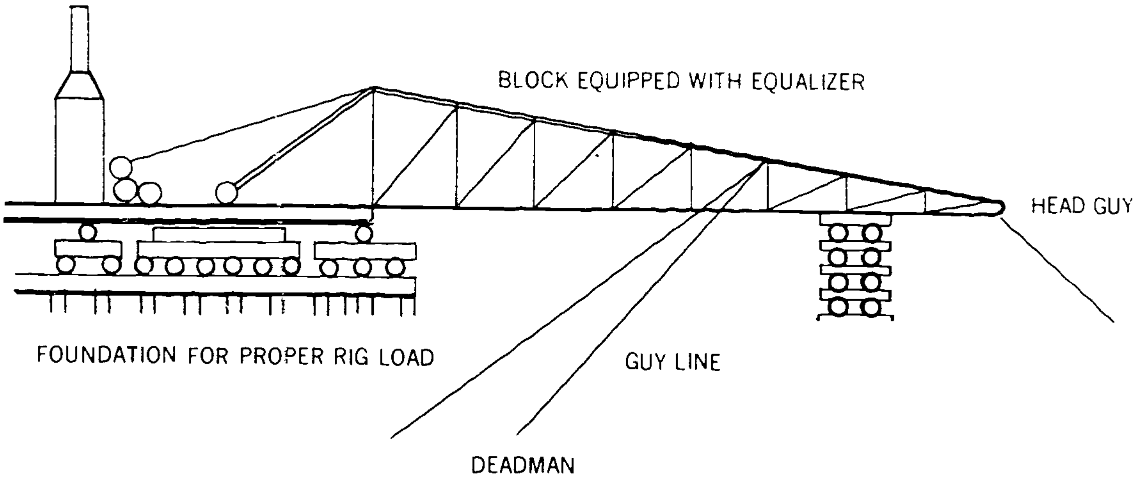

RAISING AND LOWERING OF RIG

Chart 12

Setting Up and Moving Piledriving Rigs

Erection or movement of piledriving rigs should be at a deliberate, steady pace.

Coordinated action can best be achieved by each worker knowing his part in the operation.

Ropes, cables, scaffolds, blocks, jacks, shores, and other equipment to be used by the riggers should be closely examined before assembly. The rig should be established on solid ground.

The rig should be firmly supported by heavy timber sills or substantial cribbing.

Steel blocks and wire rope should be used for hoisting and pulling.

Piledriving leads should be assembled separately and erected with power equipment.

PUBLIC LIABILITY

Protecting the public and its property should be a major concern during piledriving operations.

Damage to nearby structures from vibration, particularly in spongy clays, is an ever-present hazard.

To determine property damage possibilities, surveys of such structures should be made before operations begin.

The general public should be excluded from proximity to all functions pertaining to piledriving.

Major property damage and injuries to bystanders can result from this type of work, as well as many minor "nuisance" claims.

For example, a strong wind can blow spray from a diesel hammer quite a distance. Possible result: cleaning or repairing a suit or car; possible skin or eye injury to passersby.

Other workers on the construction job should be kept away from these operations.

If other workers must be present, it may require more effort to protect them from the hazards of pile erecting and handling operations than from the more obvious dangers of piledriving.

The location of underground piping, wiring, or other utilities must be determined prior to driving. This can be done from plans or by careful test excavation.

Overhead utilities must also be protected. If there is the slightest possibility of their being damaged, they should be relocated or properly protected.

If these operations are near certain specialized industries, such as chemical and similar industrial plants, tests should be made for the presence of combustible gases and liquids in the soil.

SUMMARY OF OPERATING SAFETY RULES

1. Guy lines and leads should be frequently inspected and maintained.
2. Ladders and platforms should be inspected regularly, since they receive rough usage during driving operations.
3. Good housekeeping and proper tool storage are essential since men move quickly during operations, and stumbling hazards can result in very serious injuries.
4. Every part of the piledriving rig demands close attention at all times, since the men work under the rig a great portion of the time.

5. Ends of steam or air hoses should be securely lashed to prevent the hose from whipping, should a connection fail.
6. When hammers are not in actual use, they should be blocked at the base of the leads to prevent them from falling.
7. Each member of a driving crew should be carefully chosen and trained for an individual operation, and he should have a general working knowledge of piledriving.
8. The ground crew should be kept to a minimum during driving operations.
9. Ropes, slings, and chains should be inspected frequently, and any that appear unsafe should be immediately replaced. Particular attention should be given to lines used for hoisting the hammer, piles, or leads.
10. Standard signals should be used. Except for an emergency stop signal, the operator should recognize signals only from his signalman.
11. Men should wear safety shoes, hard hats, gloves, and eye protection.
12. Ample washing and sanitation facilities should be provided.
13. Workmen should be kept in the clear during pile unloading. Standard procedures should be followed for this operation.
14. When a pile is being positioned in the leads, the topman should use a rope, keeping his hands and arms away from the pile and the guide and off the top of the pile.
15. Working platforms on the rig should be inspected frequently, and kept in good repair. Platforms should be kept clean and clear, and should be equipped with toeboards.
16. A safe, securely fastened ladder should extend the full height of the rig, and should be subject to regular inspections.
17. All gears, flywheels, driveshafts, boilers, hoisting drums, brakes, and other incidental and auxiliary equipment should be kept in safe operating condition.
18. Pile leads should be kept securely bolted, and the entire rig should be checked daily for loose parts.

19. All necessary precautions should be taken to combat effects of vibration on persons and property.

20. The entire area around a piledriver should be kept clear of materials, equipment, and personnel not actually being used in the operation.

21. Stockpiles should be positioned and stored in a safe manner and according to a plan which will permit easy skidding to the piledriver.

22. Positioning, securing, and cribbing the equipment in a safe manner is essential.

23. The rig should not be operating nor have air or steam pressure up during maintenance or repair work.

24. When the rig is shut down, pressure should be relieved from the lines, and the hammer should be lowered to the leads base and blocked.

SHEET PILING

Contents

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Sheet Piling

USES OF SHEET PILING

RETAINING WALLS

- STRAIGHT WALL
- CANTILEVER
- ANCHORED

CELLULAR

- SINGLE WALL COFFERDAM

Chart 13

SCOPE AND PURPOSE

The general increase in construction activity, the improvement of existing types of sheet piling, as well as the development of new types, and changes and new methods of installation have resulted in increased use of sheet piling.

This increased use, plus the fact that this work has always been hazardous, provides ample reason to examine these operations from a safety and health standpoint.

This discussion presents basic safety standards and requirements which should be considered as minimal. It is not a text nor does it provide specifications, but it can be used as a guide to the accident prevention problems inherent in this type of work. Numerous other sources of valuable information and guidance available on this topic should be consulted by both instructor and student.

USES OF SHEET PILING

Interlocking sheet piles of various, special shapes are used

To form a continuous wall to resist pressure from earth or water loads.

As cutoff walls under structures to retard the flow of water.

For load bearing.

Retaining Walls

One of the principal uses for sheet piling is for retaining walls.

There are two types of retaining walls:
1. Straight wall.
2. Cellular type.

The straight wall has two classifications:
1. Cantilever wall.
2. Anchored wall.

The cantilever wall combats lateral forces by the bending resistance of the piling itself and through the penetration of the piling below the surface, which develops the passive resistance of the soil.

The anchored sheet pile wall uses tieback anchors, plus the bending resistance of the piling itself, and the passive resistance developed by insertion of the piling into the soil to resist lateral forces.

The cellular-type retaining walls compare to cellular cofferdams and will be discussed later.

Retaining Wall Failures

The use-value of the retaining wall is dependent upon its structural members and the soil for its stability.

No recorded failures have been charged to bending the sheet piles, or to tension in the anchor rods.

Known failure causes are from movement of upper anchors, or from the embedded sections of the piling.

These failures have been charged to the low safety factors used for soils in which the piling has been installed.

The usual safety factor for structural members is four, whereas a safety factor of one or two has been applied to the soil.

Because of the many intricacies relative to these factors and to the other aspects of design, applicable sources are too technical and too vast to be included in this discussion.

Cellular Retaining Walls and Cofferdams

Cellular retaining walls and cellular cofferdams have four basic safety problems:

1. The interlocking tension must not be greater than the manufacturer's specification for allowable tension.
2. The vertical shear, on a plane through the cell's center, must not be excessive.
3. The structures must be stable enough to prevent their overturning.
4. They must be stable enough to prevent their sliding.

For purposes of this discussion, the principle involved is simply that there is practically no danger of sliding if the piling is driven deep enough to meet the potential presented. The calculation of the actual depth needed is complex.

Where the stratum into which the piling is installed is inclined, the problem is usually more pronounced than when it is horizontal.

Overturning and sliding can be a dual concern, since both can occur simultaneously.

Single Wall Cofferdams

Most of the problems inherent in the cellular cofferdams can also occur here.

In addition, internal bracing is always an important factor.

The safety of this type structure is dependent upon control of the maximum stresses.

Maximum stresses are applied when excavating takes place, during installation of the internal bracing, and under the excavated surface.

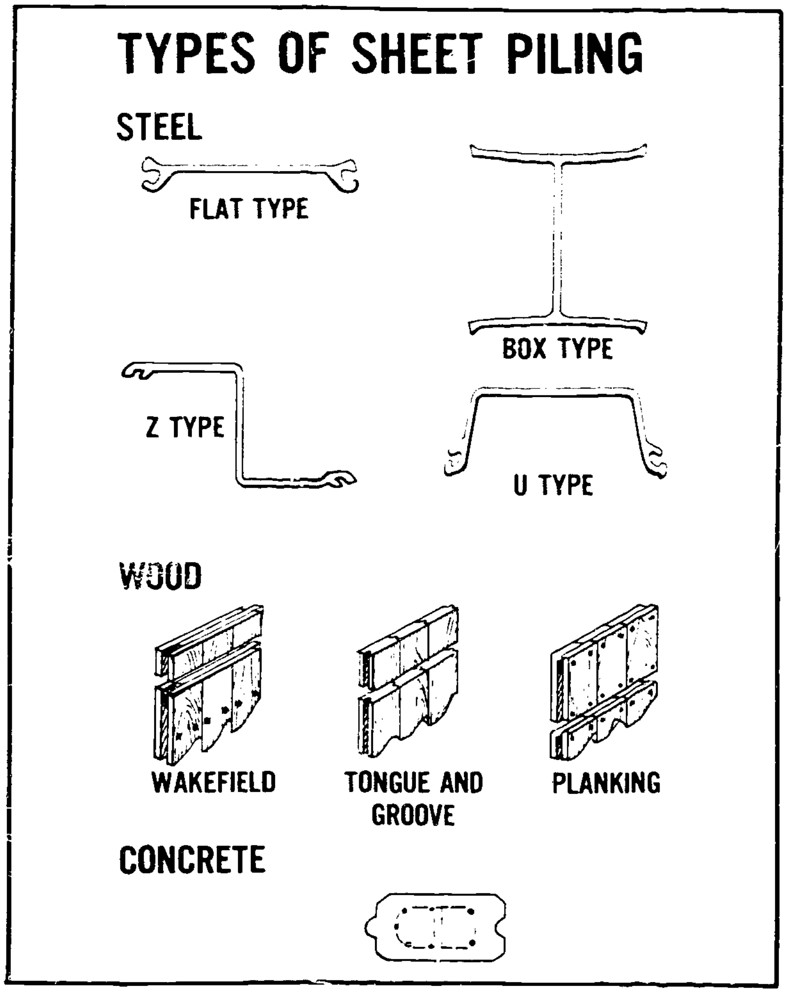

Chart 14

TYPES OF SHEET PILING	Sheet piling is made of steel, precast concrete, and wood.
Steel	Steel sheet piling is made in many shapes, all derived from four basic types: "U," "Z," "flat," and "box." For example, rolled corner steel sheeting would be a variety of the "U" type. In addition to some advantages over other types from a safety standpoint (e.g., handling and breaking), steel is the most commonly used material because of its strength, economy and salvage value, and simplicity in handling.

Wood	The use of wood has decreased steadily, probably because of the durability factor. The basic types of wood sheet piling are tongue-and-groove and Wakefield, in addition to the ordinary single or double row of planking very commonly used. The principle used in tongue-and-groove piling is the same as used in tongue-and-groove flooring—each plank has a tongue-and-groove cutout on its opposite edge so that it fits into the adjoining one. Wakefield piling is constructed by nailing three planks together with the middle plank offset to give a tongue-and-groove effect.
Concrete	Concrete used in piling is usually in the form of reinforced, precast sheet piles, rectangular in cross-section, with a beveled bottom, and is usually tongue and groove. Where watertightness is desired, grouting the tongue-and-groove joints is necessary.

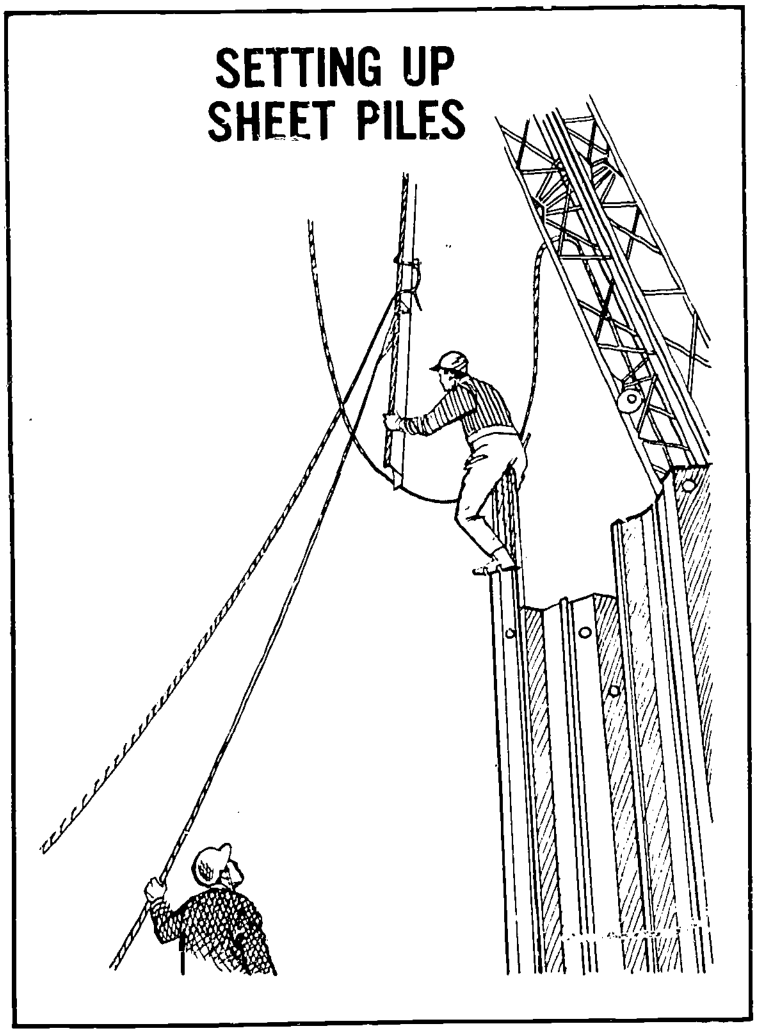

Chart 15

SETTING UP SHEET PILES

Setting up sheet piles, also known as pitching and threading, is a hazardous function.

Usually, setting the first pile is not as hazardous as threading or interlocking subsequent sheets.

While subsequent sheets are being interlocked, numerous safety precautions should be observed.

The top man—the worker who guides the pile onto the top of the preceding sheet—should be aided with stirrups hooked into the top of the previously driven piles.

When working over water, he should also wear a Coast Guard approved work vest.

He should be provided with gloves, and, when guiding the new section into place, he should keep his hands well above the point of contact.

A guiding device may also be attached to the top of the driven pile to aid in guiding the following sheet.

Tag lines should be used to assist in guiding sheet sections. This is imperative on windy days.

The top man should never try to force a sheet into the groove.

Overhead room is important for this job. The crane which lifts the section into place must be equipped with a boom long enough to hold a pile vertically above the previously driven pile.

Therefore, headroom at least twice the length of the individual sheets is necessary.

Electric wires or structures, either overhead or nearby, should be avoided.

If wood sheeting is creosote impregnated, precautions should be taken to prevent creosote burns. Eye protection, gloves, protective creams, and sweat bands (in hot weather) are other precautionary measures.

Steel sheeting can be handled more safely if a handling eye is attached, or the sheeting has a handling hole.

Sheeting with interlocking grooves should be checked to determine that the grooves are straight and undamaged.

Rust accumulations and materials which have become wedged in interlocking grooves should be removed before the sheeting is set.

Slotting

Sheet piling in individual straight walls can best be set and guided by use of a slot between two parallel wales.

The slotting wales may be held in place by a movable template, or on temporary piles. On water, a barge may be used for this purpose.

On waters involving strong currents, shields or slotting may be held in place by cables, or cables and temporary piles, to offset the current pressure.

When parallel walls of sheet piling are to be driven, as in trench work, the "slotting" effect can be achieved by simultaneously setting and driving both parallel walls against an internal template or box guide which is slid along the ground.

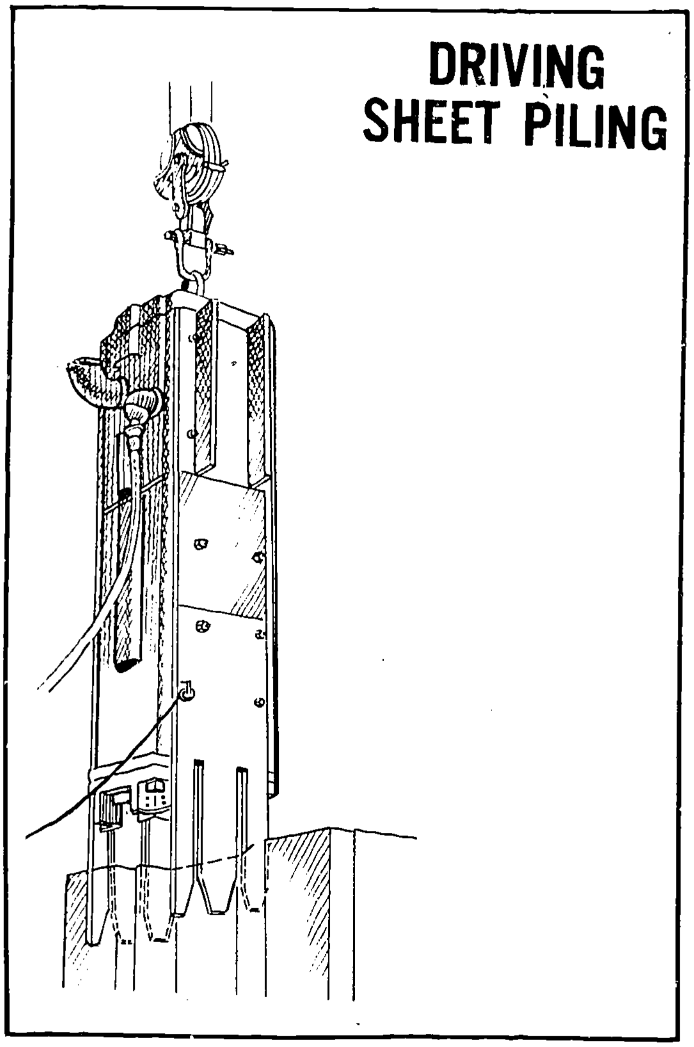

Chart 16

DRIVING SHEET PILING	Many principles involved in driving sheet piling are similar to and generally parallel those of piledriving.
Hammer Selection	Selection of the most practical type hammer has some bearing on the efficiency and safety of the job. For example, in very soft material, the double-acting hammer has a "safety" advantage in its first strikes because the rig operator can retain complete control of the hammer by applying short, light, starting blows. The single-acting hammer has the "safety" advantage of the low velocity of its ram when it strikes the pile.

One Rig	One rig is recommended for use in setting up the sheeting and a second rig for driving, because in most cases when only one rig is used, the hammer will be hanging at the tip of the boom as the sheeting is hoisted into place from a boom extension. This sets up a hazardous situation where either the sheeting or the hammer could drop prematurely. When the one-rig method must be used, all personnel should stand safely away until the sheeting has been interlocked and the hammer placed in position.
Special Problems	Headroom limitations, tight clearance, and strong currents (in water work) often complicate the installation of sheet piling and make it more hazardous. Installation inside structures, beneath bridges, and close to overhangs are situations where these problems prevail. In such situations, using a special hammer suspension as from cross-shaped frames, using short sheets with extra splicing, preassembling and sliding piling into place, or driving an end-pile attached to other sheeting by steel plates bolted across the group at an angle are some of the procedures which should be followed. All such methods which deviate from a normal procedure add to the hazards of the work. When such procedures must be used, all necessary precautions should be taken to prevent injury.
Efficiency Aids Safety	The more efficiently work is performed, the safer it is. This is also true of sheet pile installation. Driving in pairs and in stages preparing for obstructions, preventing leaning, walking, and overdriving, and similar effects all help to improve job results and, consequently, eliminate job hazards.

Specialized Techniques

Two recently developed, novel techniques for installing lightweight sheet piling illustrate the application of ingenuity in this operation.

The first method: a simple woodwork platform suspended from a crawler crane by four cables. Standing on this platform, the workers get into position to handle the piles. A pneumatic hammer, also suspended from the crane boom, is used to drive the sheeting.

The second method: a pneumatic hammer bolted to the end of a pipe length which, in turn, is mounted between the forks of a forklift. A heavy weight, such as a box of steel washers, is secured across the forklift arms to keep pressure on the hammer. This method has been used where the soil is loose, and driving does not exceed 10 feet in depth.

The ramifications of both of these ingenious methods from a safety standpoint should be readily apparent.

The importance of designing and applying adequate safety precautions to the development of unusual methods cannot be overemphasized.

BRACING
SHEET PILING

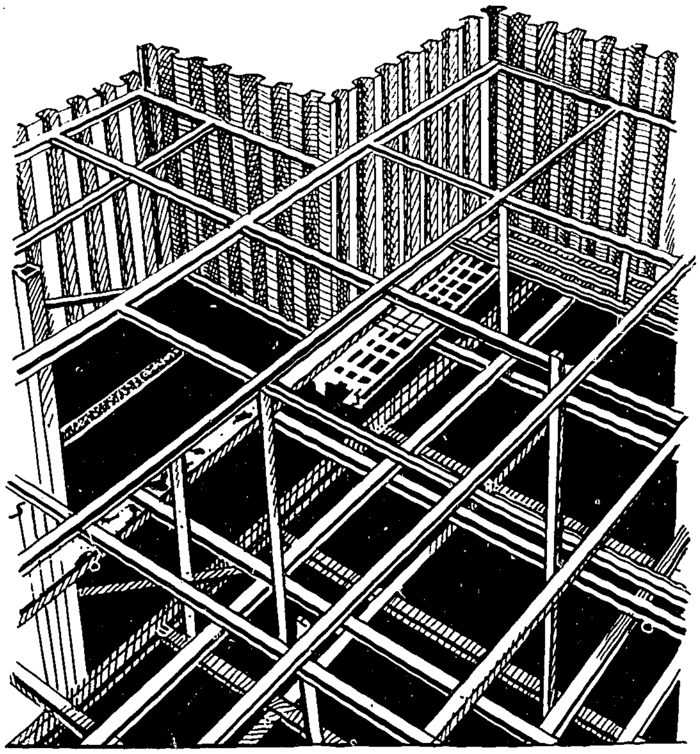

Chart 17

BRACING OF SHEET PILING

Bracing as such, and the purposes it serves, are both important to accident prevention in sheet piling operations.

Soil pressures, superimposed loads, and weather factors should all be considered, particularly if the excavation involved is to remain open for a lengthy period.

Spring thawing, for example, must be countered by the supports.

In some situations, the use of walers or struts and walers may be sufficient.

In other cases, the necessary additional support may be achieved by tieing the sheeting back to "deadmen."

	The deadmen should be located well back from the face, always beyond the angle of repose. Cross-lot bracing may also be used if the bracing can be carried across to the opposite side of the excavation for its support base. Cross-lot bracing may interfere with the activities within the excavated area.
Walers, Struts, and Spur Bracing	Foot blocks, which support the struts, which in turn bear against the walers, are usually necessary. Spur bracing is the use of two or more struts supported by a single foot block, each of which bear against a different waler, or different points of the same waler or walers. All bracing must be tightly wedged in place to keep movement to a minimum. In strut and wale bracing (assuming H-beams are used), the flanges of the strut must be vertical to meet the vertical flange of the wale. Otherwise, the web will absorb most of the load. This could cause the bracing to collapse.
Bracing of Trench Sheeting	Wales and cross braces should be cut in advance so they are ready to be set in place promptly. Wales and braces should be installed immediately after sheeting has been driven into place. Cleats should be provided to keep the cross braces in place. Bracing should be installed level. Sometimes braces must be removed because they interfere with an operation, such as pile laying, etc.

Braces should not be removed unless absolutely necessary. If they must be removed, then the sheet piling should be braced or held in place by an effective alternate method.

Bracing for Larger or Deeper Jobs

Bracing for larger structures, such as deep cofferdams, must often be more thorough.

The safety of the ultimate structure depends upon erection of a frame-type bracing structure internally braced vertically, transversely, and longitudinally, making it, in effect, a self-contained structural unit.

This bracing frame should be very rigid to withstand pressures, being struck, or accidental damage of any type.

These bracing frames often perform a dual purpose in that they may be used as a template against which sheet piling may be set and driven.

Special bracing other than internal framing is often necessary on unusual jobs; for example, bracing for an excavation in ground with a sharply sloped surface, particularly a cofferdam located on a steep bank.

In one case, batter piles were installed on the water side and anchor piles were driven horizontally on the land side.

In another unusual situation in water work, tie rods were externally anchored to batter piles; the batter piles functioned as deadmen, anchoring tie rods on land. This obviated the need for internal bracing, which would have interfered with operations in the cofferdam.

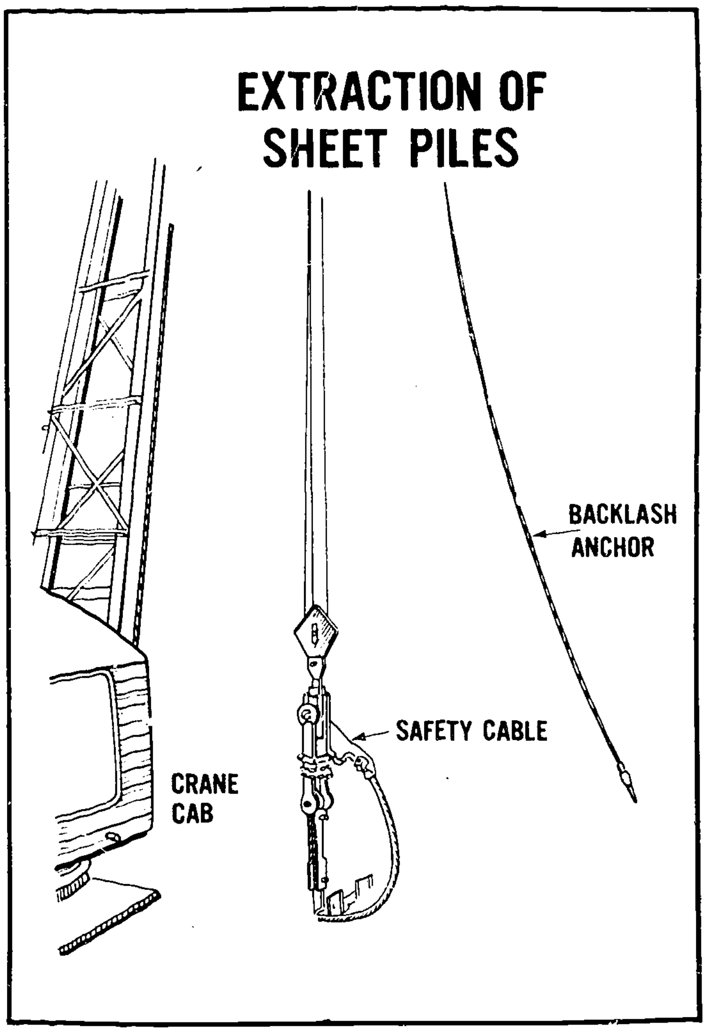

Chart 18

EXTRACTION OF SHEET PILING

Extraction of sheet piling (particularly steel) develops extreme stresses on equipment, and the removal of sheet sections, especially in water where the current is strong, is probably more hazardous than the installation.

To prevent accidents, expected or potential problems should be thoroughly analyzed before work starts.

Some conditions which contribute to extraction hazards include:

1. Deep penetration when originally installed.
2. Exposure to severe bending movement.

3. Damage which occurred during original driving.
4. Sand, rust, dirt, or other material which has lodged in the interlocks.
5. Locking action caused by grouting.
6. Piling which has been in place for a long time.

Removing, as much as possible, the material and soil which lies against the sheet piling before the extraction starts helps to reduce skin friction and aids removal.

Normal extraction is done with an extracting hammer designed for this purpose. It is shorter and lighter than a driving hammer, and applies quick, sharp blows to the sheeting being removed. This has the effect of vibrating the sheeting, while a derrick or crane simultaneously attempts to extract the pile.

Special extractors are made specifically for this function, while several types of hammers can be inverted for this purpose. The vibratory and sonic hammers now available can also be used.

Extraction can be performed by connecting the lifting arm of an extractor through holes in the sheeting.

Lifting may also be done by clamps which fit over the top of the sheeting.

Hooks may also be used.

More than one method may be necessary; this could be the result of an extractor connection ripping a pile, or the hole being torn out. In such an event, the clamp can be used.

Some of the most prevalent hazards involved in this operation are:

1. Loss through vibration of the screwbolt in extractor connections. This can be prevented by using a safety pin to hold the bolt in place.

2. Failure or crystalization of hooks. Hooks should have an ample breaking strength rating (safety factor) for the job to be done, and should be regularly checked for signs of failure.
3. Sheets being extracted from water having a strong current should be prevented from lateral movement by the use of cables or other guidelines.
4. Extracting derricks and cranes have been upset when sheaves or cables broke under stress. This may be prevented by anchoring the boom from the front to prevent the equipment from going over backward.
5. Cable failure can also cause backlash and subsequent injury. Cables should be closely examined regularly.

COFFERDAMS

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Cofferdams

SCOPE AND PURPOSE

Although excavation, general piledriving, and sheet piling operations are a part of cofferdam work, there are enough other individual characteristics involved in the construction of cofferdams to warrant discussion as a separate topic.

Extensive coverage on technical literature relating to this work is available, and the student should take advantage of it.

This discussion is limited to the review and consideration of the essential accident producing conditions and functions.

Cofferdams are often constructed from floating equipment, and the heavy equipment and materials involved are major contributing factors to the continuing acute accident problem.

DEFINITION AND USE

The terms "caisson" and "cofferdam" are interchangeable to some degree.

Webster's dictionary defines a cofferdam as "a watertight enclosure from which the water is pumped to expose the bottom (of a river, etc.) and to permit work to be done there; also a caisson."

Kellogg, in "Construction Methods and Machinery," says, "a cofferdam is a somewhat watertight enclosure within which excavation can proceed to a firm foundation."

There are differences, however, which relate to size, basic methods of construction, and use.

In a strict sense, cofferdam construction is most usually thought of in relation to the construction of docks, bridges, piers, dams, and similar structures where the foundation is beneath, or in, water.

The term, however, is also used in relation to sheet pile structures erected to allow excavation of earth through ground water for buildings and other construction on land.

ELEMENTS

The "step-by-step" procedures usually connected with a cofferdam are:

1. Constructing the cofferdam.
2. Removing any water in the cofferdam (by pumping).
3. The excavation process.
4. Any foundational treatment necessary.
5. Erecting the structure for which the cofferdam is built.
6. Razing the cofferdam.

A cofferdam can be made of steel sheet piling, timber, earth, or any combination of them.

Steel sheet piling is the material used most often, so the hazards of sheet piledriving must be considered in any safety program for cofferdam construction.

STANDARDS

The United States of America Standards Institute safety requirements for Excavation, A10.7, says:

"(5.1) Cofferdams shall be carefully planned and designed. Working drawings shall be provided and available on the job.

"(5.2) Cofferdams shall be constructed in accordance with the working drawing.

"(5.3) Cofferdam shall be inspected during construction for compliance with design and working drawings. A competent person shall make daily inspections thereafter.

"(5.4) If overtopping of the cofferdam by high waters is possible, design shall include provisions for controlled flooding of the work area.

"(5.5) Scabs shall be securely fastened by welding or bolting.

"(5.6) Walers and braces shall be securely supported.

"(5.7) Cell type cofferdams with tight sheeting shall be provided with weep holes or drains.

"(5.8) Where men or equipment are required or permitted on cofferdam walkways, bridges or ramps with guardrails or equivalent protection shall be provided.

"(5.9) At least two ladders, or other means of rapid exits, shall be provided for men working in cofferdams.

"(5.10) A plan, including warning signal, for controlled flooding and evacuation of men and equipment in case of emergency shall be provided and posted.

"(5.11) Sheathing shall be marked in a manner which will provide a positive point from which to measure penetration at any time."

MAJOR HAZARDS

Probably the two most spectacular types of accidents involving cofferdams are those of flooding or collapse.

Advanced planning, to the degree of sometimes constructing models to appraise the possibility of floods, under-seepage and stability of the structure, is an essential part of accident prevention for this work.

Planning is also important for entrance ramps, the flow of traffic, the sequence of functions, and similar factors.

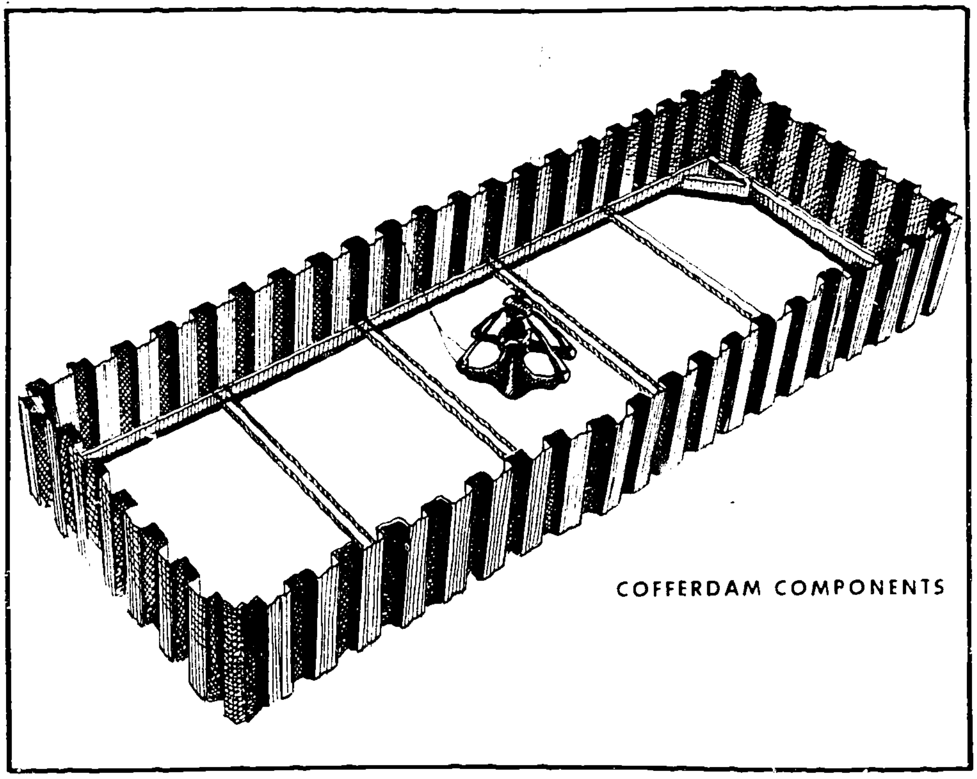


Chart 19

COMPONENTS

The basic components of most cofferdams are piling and bracing (when not self-supporting).

The interlocking steel sheet piling commonly used may be of the straight-web, arch-web, or Z-type (plus rolled corner piles).

Chart 19 is an example of one type of standard cofferdam, illustrating the installation of either "U" or "Z" type sheet piles, internally supported by soldier beams and one-way cross-lot bracing.

The shape and comparative dimensions of the structure illustrated allow the use for internal support of four equally spaced "cross-lot" internal braces. This, in turn, permits considerable freedom of movement and location for excavation and other necessary operations within the cofferdam structure.

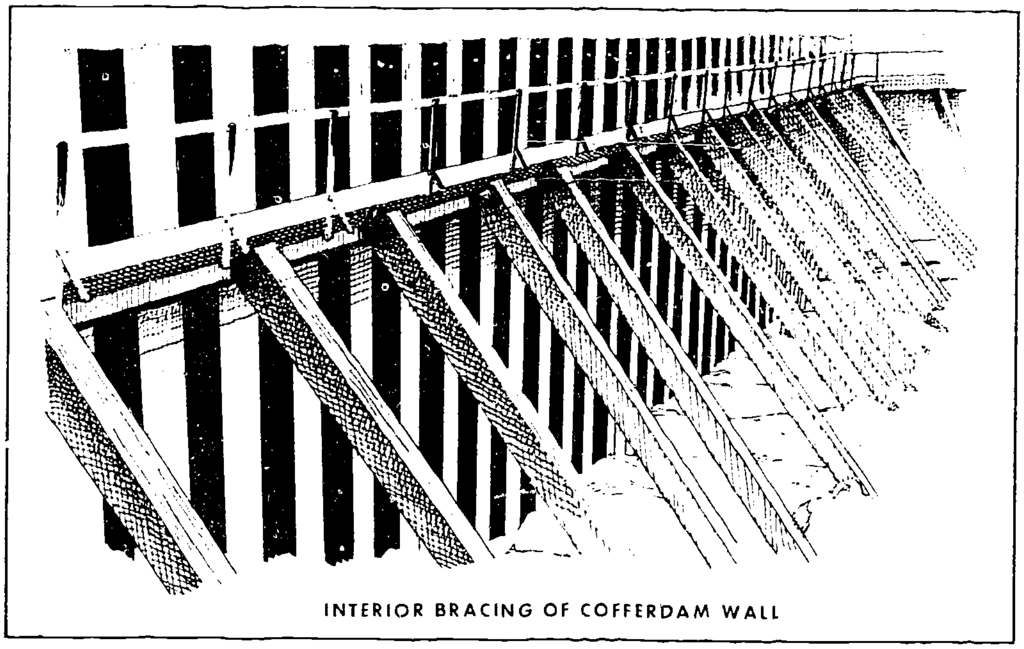


Chart 20

BRACING AND TYPES OF COFFERDAMS

Bracing may be either external or internal, or both.

Bracing includes struts, cross-lot beams, arcs, rakers, ribs, and tiebacks.

Cross-lot bracing is often needed for safety, particularly in the deeper cofferdams which may require multilevel, multidirectional, complex support structures.

Chart 20 shows a section of sheet pile bracing using raker-type braces. When multiple-row raker bracing of varying heights is used, it may be held in place by centralized mats in the cut area. Individually mounted rakers, as shown in this illustration, may be supported by deadmen, or by the soil structure if capable of providing proper support.

In this illustration, "H" beams are used to serve as the rakers which support the cofferdam wall. When the distance between the sheet pile walls of a cofferdam is appreciable, rakers are usually preferred to cross-lot bracing for economical reasons. In addition, this method of raker installation presents less interference with operations, thereby contributing to safer operating conditions.

Note this illustration of the safety handrail which has been mounted on the soldier beam. While it is not a "standard" handrail, it is nevertheless a good example of an effort to provide the type of protection which should be included when erecting cofferdam structures.

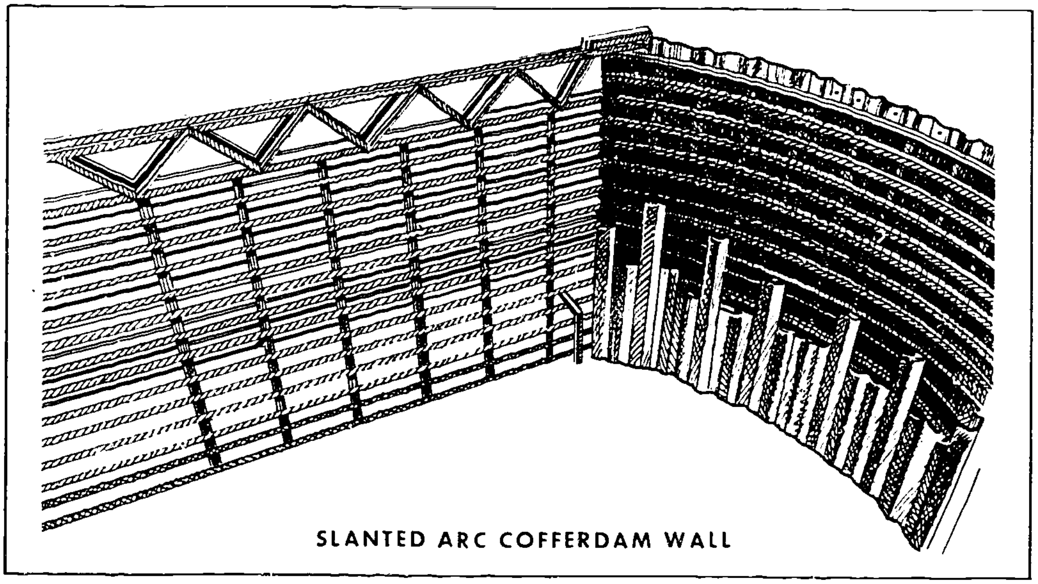


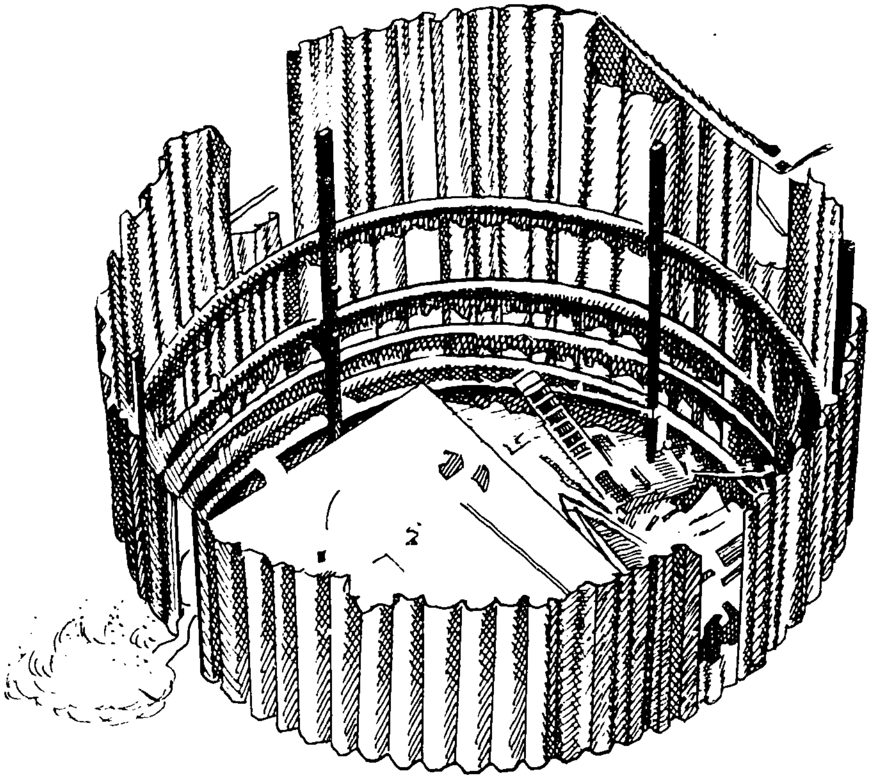
Chart 21

Slanted-Arc Walled Cofferdams

Slanted-arc walls, strengthened by rib bracing, which are supported by full-height cross-lot bracing structures spanning the excavation, are also used, as illustrated here. These provide an "operational safety factor" in that the minimal number of such cross-excavation supports required permits maximum unobstructed working area in the cofferdam.

In this chart, a cofferdam consisting of a series of the type section shown is represented. The arced and slanted wall of the cofferdam is braced with curved wales. These are, in turn, given lateral internal support by the type of cross-lot bracing shown.

The vertical piling shown at the base of the slanted arc wall illustrates the additional base support structure which is often necessary to resist high water pressures or other forces which may be exerted against the piling at the base of the cofferdam walls.



CIRCULAR COFFERDAM WITH RIB BRACING

Chart 22

Circular Cofferdams

Rib bracing, as used in circular cofferdams (as shown in Chart 22) provides an unobstructed work area within the structure.

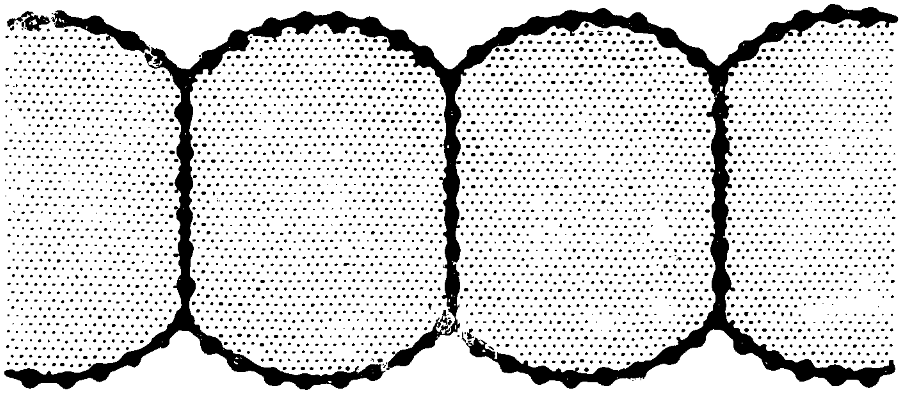
In this illustration, the internal ribs shown act as compression rings to support the circular structure.

Such circular excavations, when made in earth and of limited diameter and depth, are usually constructed of straight-web or flat-arch sheet piling.

Excavations which require higher beam strength necessitate the use of arched-web sections, or "Z" piles in some cases.

In water, circular cofferdams have come to be used as permanent structures, both as individual structures and as sections of cellular complexes.

The advantages of their use in this manner is that they can be erected in water of considerable depth, on subsoil which is unstable, on rock, etc. The hazards of cofferdam construction are reduced somewhat with circular structures because as soon as they are filled, they become self-supporting.



DIAPHRAGM TYPE COFFERDAMS

Chart 23

Diaphragm-Type Bracing

The diaphragm type is essentially a cellular type cofferdam. This construction permits the building of very wide cofferdams by reducing the radii of the arcs, thus spacing the diaphragms closer, which, in turn, permits the use of longer diaphragms.

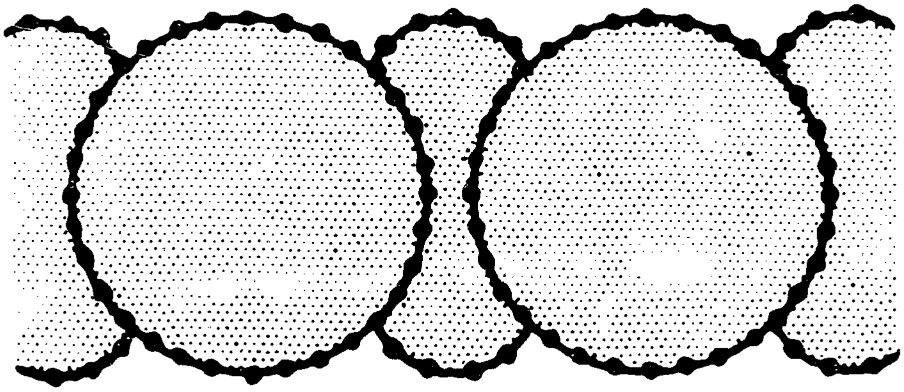
Chart 23 above is an example of a semi-circular cofferdam complex, with straight diaphragm "cross-lot walls," supporting vertical outer walls.

This construction principle is very similar to that used for a series of circular cofferdams joined by interconnecting ribs.

The interconnected circular cell type has the safety feature in water work of providing security during construction against the action of waves, flash floods, and similar aquatic disturbances.

The filling of the diaphragm type cell must also be done with care so that the level of the fill in any given cell does not greatly exceed that of adjoining cells.

The diaphragm type depicted above has a safety "disadvantage" in that if one section should fail, it would quite likely cause a similar failure to at least those sections on both sides of the cell which fails.



INTERCONNECTED SHEET PILE ARC BRACING

Chart 24

Interconnected Sheet Pile Arcs

Cellular cofferdams are completely circular, rib-braced structures built in series and interconnected by sheet pile arcs. This construction provides a meaningful safety factor since failure of one cell will not cause failure of an adjoining cell. In the diaphragm type, failure of one cell will cause the failure of at least one cell on each side of the collapsing cell.

In a circular, cellular cofferdam of any consequential depth, interlocking strength of the structure is an important factor.

Circular cofferdam cells may be filled individually; but the diaphragm type must be filled in series and carefully controlled to prevent variance in the fill levels so that one cell does not appreciably differ in fill level from an adjoining cell.

COFFERDAMS FOR BUILDINGS

Braced cofferdams are the conventional application in building construction on land. The smaller ones usually are cross-braced; the wider ones are usually raker-braced.

There is very little *essential* difference in the problems encountered, or the principles involved, between construction of cofferdams on land or in water.

The presence of buildings or other nearby structures which must be protected from damage by either the piledriving or excavation processes is much more common in operations on land.

Use of preassembled bracing cages, common in water work, is impossible in land cofferdam operation.

The safety practices prescribed in the Construction Safety Course Outline for "Excavation," and in the sections on "Piledriving," and "Sheet Piling" in this outline, are applicable to land-based cofferdam operations.

OVER-WATER OPERATIONS

The most distinctive characteristic of this work is the need for precautions relating to work over and on water.

All boats, trestles, and other water-borne structures should be equipped with liferings and lifelines.

Water equipment, such as barges, should have closely spaced safety ropes hanging from their sides and ends to the water line.

Lifelines should be provided for personnel, where necessary.

Lifejackets should be worn by all personnel.

Pumping facilities to handle emergency conditions should be maintained in the cofferdam.

Artificial illumination should be provided.

When there is navigation in the area, warning lights should be mounted on the cofferdam.

In some situations boats for personnel should be provided for emergency use.

Strategically located stairways should be provided, both for general use and emergency situations.

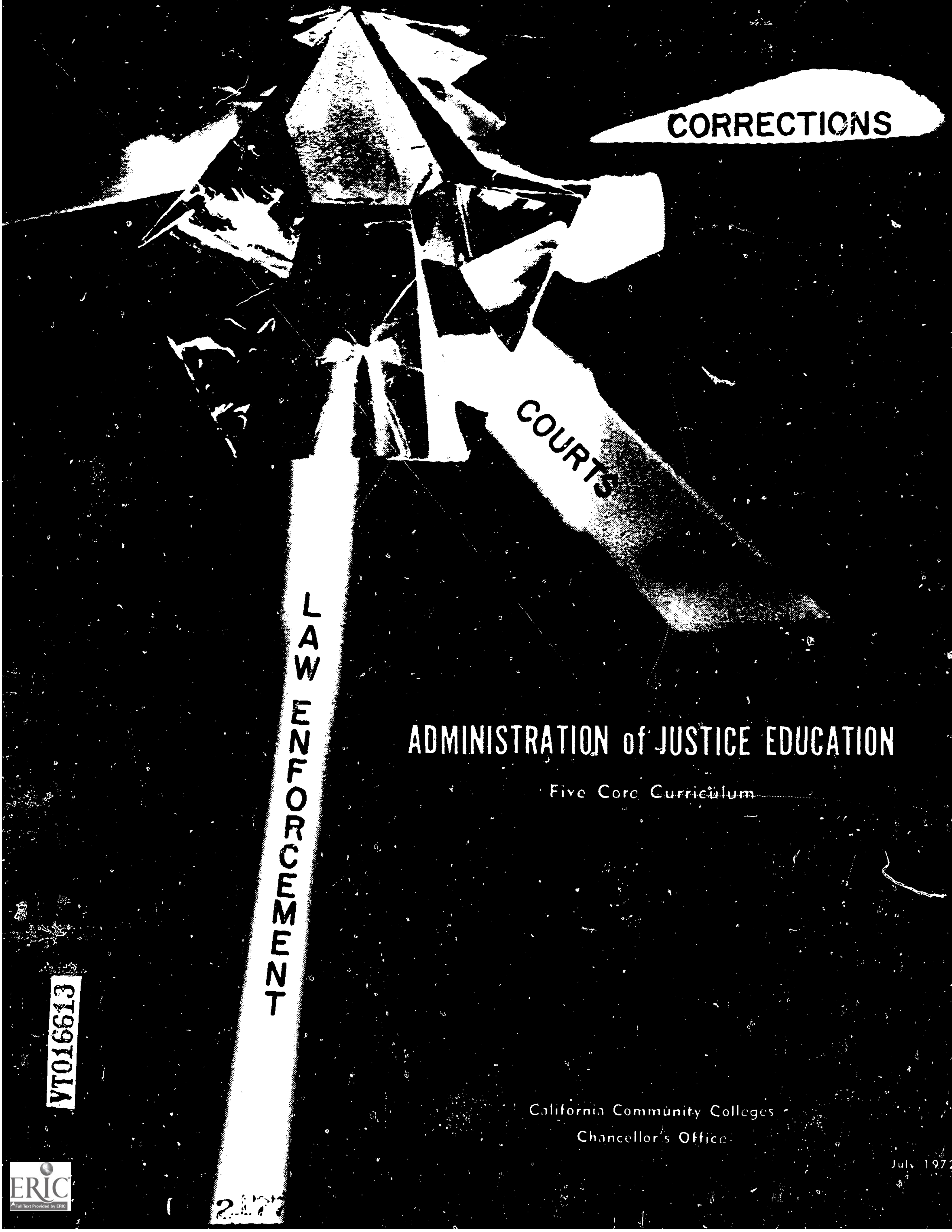
★ U.S. GOVERNMENT PRINTING OFFICE : 1967 OF—277-978

VT 016 613

VT 016 613
BLANCHARD, BOB, AND OTHERS
ADMINISTRATION OF JUSTICE EDUCATION (PART I).
FIVE CORE CURRICULUM.

RIVERSIDE CITY COLL. DIST.,
CALIF.;CALIFORNIA COMMUNITY COLLEGES,
SACRAMENTO. OFFICE OF THE CHANCELLOR.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
DESCRIPTORS - *POST SECONDARY EDUCATION; *CORE CURRICULUM; *CURRICULUM GUIDES; BEHAVIORAL OBJECTIVES; *INSTITUTIONAL ADMINISTRATION; PUBLIC ADMINISTRATION EDUCATION; WELFARE; VOCATIONAL EDUCATION; COMMUNITY COLLEGES; VOCATIONAL DEVELOPMENT; *LAW INSTRUCTION; COURSE DESCRIPTIONS; ADMINISTRATOR EDUCATION
IDENTIFIERS - CAREER AWARENESS; EDUCATIONAL AWARENESS; CRIMINAL LAW; JUSTICE EDUCATION

ABSTRACT - THIS CORE CURRICULUM GUIDE CONTAINS OUTLINES AND DESCRIPTIONS OF FIVE BASIC COURSES FOR PHASE I OF A TOTAL CURRICULUM IN ADMINISTRATION OF JUSTICE EDUCATION FOR CALIFORNIA COMMUNITY COLLEGES. INCLUDED ARE: (1) AN INTRODUCTORY COURSE, (2) PRINCIPLES AND PROCEDURES OF THE JUSTICE SYSTEM, (3) CONCEPTS OF CRIMINAL LAW, (4) LEGAL ASPECTS OF EVIDENCE, AND (5) COMMUNITY RELATIONS. DEVELOPED BY A CURRICULUM DEVELOPMENT TASK FORCE OF FIVE EDUCATORS FROM COMMUNITY COLLEGES WITH THE HELP OF LEADERS IN THE JUSTICE SYSTEM, THIS SPIRAL BOUND GUIDE WILL BE USEFUL FOR THE DEVELOPMENT OR IMPROVEMENT OF PROGRAMS IN THIS AREA FOR COMMUNITY COLLEGES. INTRODUCTORY COMMENTS ARE INCLUDED CONCERNING THE EDUCATIONAL PHILOSOPHY, HISTORICAL DEVELOPMENT, AND METHODOLOGY OF CURRICULUMS FOCUSING ON ADMINISTRATION OF JUSTICE. GENERAL AND SPECIFIC COURSE GOALS AND BEHAVIORAL OBJECTIVES ARE PROVIDED. SUGGESTED TEACHING AND EVALUATION TECHNIQUES ARE GIVEN FOR THE COURSES, AS WELL AS LISTS OF SELECTED READINGS. (AG)



ADMINISTRATION of JUSTICE EDUCATION

Five Core Curriculum

California Community Colleges
Chancellor's Office

July 1972

ADMINISTRATION OF JUSTICE EDUCATION

(PART I)

FIVE CORE CURRICULUM

DEVELOPMENT COMMITTEE:

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This publication was prepared by Riverside City College District in cooperation with the California Community Colleges, pursuant to a funding under the Vocational Act of 1968 (Public Law 90-576).

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FOREWORD

This core of basic courses for the Administration of Justice curriculum in the California Community Colleges has been developed to be used as a guide for the development of new programs or improvement of existing programs in the Administration of Justice education. The core of courses provide Phase I of a total curriculum that has been structured and developed by a curriculum development task force. The task force was assisted by practitioners from agencies in the justice system.

The project chairman was Mr. Robert Blanchard, Assistant Professor, Administration of Justice Education, Riverside City College. The overall project was planned and coordinated by the Chancellor's Office, Division of Occupational Education under the supervision of J. Winston Silva, Specialist in Criminal Justice Education, California Community Colleges.

This core curriculum guide provides the necessary material for the five basic courses in the Administration of Justice Education and completes Phase I of the total curriculum. Phase II to be published in June 1973, will contain material for occupational choices open to students who aspire to a career in the justice system; choices may be: law enforcement, judicial process, corrections, industrial security and others.

This model includes certain suggested behavioral objectives. These are not intended to be all-inclusive and administration of justice instructors may wish to revise or expand these objectives in their individual program implementation.

Leland P. Baldwin

Leland P. Baldwin
Assistant Chancellor
Occupational Education

PREFACE

California Community Colleges are sensitive to the needs of people in their districts. Each college strives to provide the necessary occupational programs to meet the employer demands as well as those of its students.

Special occupational programs are designed to fulfill the obligation of the college to the community. These programs are constantly examined and revised for compatibility with local practices as well as national standards used as a base for planning. The administration of justice program is structured in this way to allow for growth of the student and for mobility in his chosen field. A segment of the administration of justice program, of which this core curriculum is the basic component, may be used as a foundation for education that leads to a higher degree of achievement.

This curriculum guide for the core curriculum in the administration of justice is Phase I of a total curriculum being prepared to assist Community Colleges to achieve high standards of preparation and hopefully will be used as a model for the basic program elements.

I hope this material will provide the guidance for continued high performance by college personnel participating in preparing students for a career in the administration of justice occupations.

Sidney W. Brossman
Chancellor

ACKNOWLEDGMENTS

I wish to express my appreciation to those who, by their most generous effort, made this first phase course description guide possible.

First, I would thank the committee members, Tom Adams, Bob Ferguson, Paul Howard and Al Nottingham, who gave so freely of their time and knowledge. A secondary nod of gratitude goes to the entire membership of the California Association of the Administration of Justice Educators, who provided the substantive content of this document. A great degree of appreciation is also due the practitioners in the justice system, other disciplines within the college community and the Ad Hoc articulation committee (for Criminal Justice to the articulation conference) for providing valuable contributions.

Bob Blanchard

Bob Blanchard
Project Chairman
Assistant Professor
Riverside City College

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INTRODUCTORY COMMENTS

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INTRODUCTORY COMMENTS

Statement of Philosophy

The many Administration of Justice agencies throughout the State and the Nation have evolved from a variety of historical origins at different times and have developed into what we now see as a conglomoration of professions, occupations, and paraprofessions with each requiring certain tangible and intangible skills and bodies of knowledge characteristic to their respective disciplines. The agencies within the Administration of Justice, in broad terms, consist of law enforcement, the courts, and corrections.

During the past several years, Presidential Crime Commissions and numerous other segments representing a cross section of interests have continuously concluded that education of criminal justice system careerists should be based on two primary theses:

1. Sub-systems are no longer in a position to function in a vacuum of isolation from one another, lacking concern for the impact the operation of one sub-system has on the other; and,

2. It is of paramount importance that all system members have a deep sensitivity and understanding of human beings and the society in which they exist. This understanding should include the origin and styles of deviant behavior and current theories and practices on dealing with and treatment of these human weaknesses.

Historically, members of the Administration of Justice system have been educated and trained in an atmosphere of almost total segregation from their sub-system colleagues. Law enforcement, judicial and correctional personnel were educated individually with only a cursory coverage of the other member's subject matter. The segregation of the educational process has even included the almost total isolation of training facilities. Except for their sometimes concurrent attendance at an occasional college class, the members of each component were kept separate. They learned little of what the other members of the system were required to know, and the result has been what sometimes appears to be a total lack of knowledge and understanding of each other's respective roles in justice administration. Sub-system members, training for future involvement within the system, rarely had the opportunity to cross-pollinate ideas and theories on critical issues involving each of the segments. Generally, the first meeting of system members took place in the crucible of "real life", instead of in a laboratory setting which offers a safer environment to exchange points of views and resolve difficulties. This isolationist attitude continues throughout the system in varying degrees today.

It appears inane to provide indepth education for current and future practitioners in atmospheres of isolation and then to expect system members to magically work harmoniously in the "real world" of their constant interaction and overlapping responsibilities. The highly cooperative nature of each segment's inter-relationships in the Administration of Justice requires more than a cursory orientation of the roles and responsibilities of the other segments. A common reservoir of knowledge would aid measurably in developing and maintaining this cooperative nature.

A common foundation of educational insights into the entire system would assist greatly in developing an understanding and sensitivity to the many difficult problems that face all members within the system. The educational approach needs to be handled on a system-wide basis. This committee has developed a core of five courses with the contents organized to include a "systems approach" to the entire Administration of Justice.

The committee feels that these five courses include a core of knowledge that is common to all segments of the system and will serve as a basic foundation in the building-block concept of the development of a totally integrated system. These courses have been developed with the thought of establishing a proper blend of the liberal arts and behavioral sciences with studies from the justice system.

The program for the Administration of Justice major in a community college should consist of a total of 24 units, including the five courses contained in this guide, which total 15 semester units. The balance of 9 units on a semester basis should be directed toward one of the sub-system components the student chooses as a specialization within the Administration of Justice program. Whether the student chooses Law Enforcement, Courts, Corrections, Criminalistics, Industrial Security, or some other specialization will be determined by how he plans the balance of his schedule in addition to the five core courses. The core courses should be introduced at the lower division level in the college program. The five core courses contained in this project are classified as Part I of a multi-phased master plan program. Part II will include a course outline guide of elective courses the student may take to complete his major requirements.

The committee does not perceive the five core courses as eliminating any elective courses or major courses within law enforcement, judicial or corrections. It views the core curriculum as a common starting block, logically leading into the many choices of elective courses.

In the past police science curriculums, as taught in most colleges, have been duplicated in varying degrees in most police academies. There appears to have been a high degree of overlap in the technical training courses and educational offerings. The academic approach seemed to take a back seat in favor of more traditional training methods and course content. The trend currently tends to avoid this particular approach; however, a relatively few institutions still maintain a somewhat parochial viewpoint on this issue. In some colleges, due to the alleged degree of comparable course content, transferable college units are offered for completion of a basic training academy. These units are not classified as elective credit, but part of the current block of required police science subjects.

It is the intent of the committee to establish a positive position on these controversial issues. In this light, the following points are set forth:

1. The course content as outlined in the proposed five core courses in this guide is academically developed and is not intended to include material which can be construed as training or technically related subject matter.

2. The proposed five core courses are designed to completely articulate to upper division status at 4-year colleges and universities.

3. Transferable unit credit for the five core courses should be granted only if completed in an academic college environment. Peace Officer training academies do not appear to fit this definition.

4. Transferable unit credit for the 9 (semester) units of elective work within the student's area of selected expertise should be awarded only if completed in an academic college environment.

Historical Development and Methodology

The genesis of the five core curriculum development had its inception from the 1970 Annual California Association of the Administration of Justice Educators (then known as the Police Educators Association of California). At that time, the five core courses were standardized and accepted as required classes for all police science majors. The membership adopted these courses with the proviso that the course content be revised and articulate to four year colleges. The project was funded through the California Community Colleges Office late in 1971, and established two major objectives:

1. To develop course content which provides for an academic approach and separated from training or vocationally oriented subject matter; and,

2. To broaden the approach to systematically include all system members within the Administration of Justice.

Reaching these objectives required the following revisions:

1. Restructuring and redesigning course content to be more palatable to all system members.

2. Restating the philosophical viewpoint to include other system members and the elimination of skill techniques or specialized emphasis in areas of interest to only one member within the system.

3. Retitling the courses to fit the system concept.

The committee met initially during October 1971, to establish the methodology of the project. A "request for help" letter went out to over 130 members within the educational field. This included a large percentage of community college educators and many four year college representatives. The request specified the need for current course outlines on the five core courses and more importantly, how they perceived these courses being taught to keep abreast of future changes and to include the entire justice system.

The returns from the field survey were reviewed, itemized, researched and consolidated and preliminary drafts were developed for each course by each committee member. Each course outline was then discussed at length by the committee sitting en mass and numerous changes were made. During March 1972, a package consisting of a rough draft of each course outline was sent again to the field asking for a critical analysis of each item contained in the courses. Mailings were sent to over 130 professional educators, training officers, and practitioners currently involved in the justice system. Evaluative comments with numerous changes were received from the field and each item was considered for inclusion in the final draft. Personal interviews were held with representatives from disciplines in the college community not associated with the justice system curriculum, practitioners within the justice system, professional educators and training officers. In May 1972, the committee met for an intensive two day course content review and preliminary final draft study seminar. At this time comments received from the field were discussed and necessary changes in the content were effected.

The course content, as now constituted, reflects the collective opinion of many professionals within the justice system. The committee recognizes the impossible task of "being all things to all people" and completely satisfying the numerous human opinions about every point within each course outline. However, during the entire project, the committee has been sensitive to the constructive evaluations from the field and made every attempt to properly and fairly resolve each issue.

The members of the committee have maintained an attitudinal posture which provided for inclusion of as many varying viewpoints as possible in the developmental phase of these courses. It is felt that this attitude of openness to suggestion and review has aided measurably the validity of course content and objectives.

COURSE CONTENT AND DESCRIPTIONS

* INTRODUCTION TO THE ADMINISTRATION OF JUSTICE

** PRINCIPLES AND PROCEDURES OF THE JUSTICE SYSTEM

*** CONCEPTS OF CRIMINAL LAW

**** LEGAL ASPECTS OF EVIDENCE

***** COMMUNITY RELATIONS

INTRODUCTION TO THE ADMINISTRATION OF JUSTICE

INTRODUCTION TO THE ADMINISTRATION OF JUSTICE

COURSE OUTLINE

LENGTH OF COURSE: 3 semester units or 4 quarter units.

COURSE DESCRIPTION: The history and philosophy of administration of justice in America; recapitulation of the system; identifying the various sub-systems, role expectations, and their inter-relationships; theories of crime, punishment, and rehabilitation; ethics, education and training for professionalism in the system.

COURSE GOALS:

1. To provide a knowledge of the various agencies encompassing the administration of justice system and the inter-relationships between them.
2. To develop the ability of the student to recognize the administration of justice agency best suited to his or her talents and aspirations.
3. To develop an appreciation of the complexity of the total system and importance and dignity of being a part of the system.

GENERAL PERFORMANCE OBJECTIVES:

1. The student completing this course of instruction will be able to demonstrate his knowledge of the evolution of the administration of justice system, its objectives, role expections, and trends through oral presentations and written examinations with an accuracy of ninety percent.
2. Completion of this course of instruction will develop an awareness of the crime problem. The student will demonstrate his knowledge of causal theories, criminal types, and the implications of crime statistics through a term paper and written examinations with a ninety percent competency level.
3. Instruction shall provide the student with an overview of the organization and operation of administration of justice agencies. The student shall demonstrate his knowledge of the various agency organizational structures and their interrelationships through short essay assignments and written examinations with a ninety percent competency level.
4. The student completing this course of instruction will develop an appreciation of education, training, and professionalism in the administration of justice system. The student shall demonstrate his knowledge in this area through class discussion, research papers and written examination with ninety percent accuracy.

SCOPE:

I. The Need for Administration of Justice Agencies.

- A. Roles and objectives within the Administration of Justice System.
    1. Law Enforcement
    2. Judicial
    3. Corrections
- B. Explanations of Crime.
    1. Casual Theories
        - a. Evolution of theories
        - b. Socio-cultural factors
        - c. Psychological considerations
        - d. Political-economic implications
    2. Criminal Classifications
        - a. White-collar criminal
        - b. Organized crime
        - c. Professional vs. casual
        - d. Victimless crime
- C. Scope of the Crime Problem.
    1. Implications of criminal statistics
    2. Volume and rate
    3. Crime related factors
        - a. Human
        - b. Time
        - c. Environmental
    4. The correctional system and its relation to the problem
        - a. Theories of punishment
        - b. Treatment concepts
        - c. Dynamics of recidivism
    5. The court system and its relation to the problem.
        - a. Time factors
        - b. Sentencing procedures

II. Evolution of the Administration of Justice System

- A. Development of law enforcement.
    1. Early history
    2. Development of the English police
    3. Development of the United States police
- B. Development of the judicial system in the United States.
- C. Development of the correctional system.

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III. Overview of the Organization and Operation of Justice Agencies.

A. Organization and operation of law enforcement agencies

1. Local
2. State
3. Federal

B. Organization and operation of the court system

1. Local
2. State
3. Federal

C. Organization and operation of the correctional system

1. Local
2. State correctional institutions
3. Federal
4. Probation and parole

IV. An Analysis of Role Expectations in the Administration of Justice System.

A. Law Enforcement

B. Judicial

C. Corrections

D. Private Sector

V. Education and Training

A. Community college programs

1. Academic programs
2. Technical training
3. Academy training

B. State college and university programs

1. Academic
2. Technical

C. Relationship of professional associations

VI. Professionalism

A. Canons and codes of ethics

B. Responsibilities to society

C. Discretionary powers

VII. Trends in the field of administration of justice

A. Current

B. Future

INSTRUCTIONAL METHODS:

1. Lecture and discussion
2. Guest speakers
3. Informational sheets
4. Demonstrations
5. Field trips
6. Transparencies, slides, films, audio-tapes, and video-tapes
7. Outside special projects and reports
8. Exploratory work experience

EVALUATION METHODOLOGY:

1. Written examination
2. Special projects and/or report
3. Attendance
4. Class participation

MINIMUM STANDARD OF ACHIEVEMENT:

Satisfactory achievement on all parts of the evaluation process.

SELECTED READINGS:

Adams, Thomas F., Law Enforcement: An Introduction to the Police Role in the Community, Englewood Cliffs, New Jersey: Prentice Hall.

Adams, Thomas F., Criminal Justice Readings Pacific Palisades: Goodyear Publishing Company, Inc.

Barnes, Harry Elmer, The Story of Punishment, Montclair, New Jersey: Patterson Smith 1972.

Brandstatter, A. F., and Allen A. Hyman, Fundamentals of Law Enforcement, Beverly Hills: Glencoe Press, 1971.

Caldwell, Harry, Basic Law Enforcement, Pacific Palisades: Goodyea Publishing Company, Inc., 1972.

Carter, Robert M., Daniel Glaser, and Leslie T. Wilkins, Correction Institutions, New York: J. B. Lippincott Company, 1972.

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Eldefonso, Edward; Alan Coffey, and Richard C. Grace, Principles of Law Enforcement, New York: Wiley and Sons, Inc., 1968.

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Hill, Stuart L., Crime, Power, and Morality: The Criminal Law Process in the United States, Scranton: Chandler Publishing Company, 1971.

Hood, Roger, and Richard Sparks, Key Issues in Criminology, New York McGraw-Hill Book Company, 1970.

Ives, George, A History of Penal Methods, Montclair, New Jersey: Patterson Smith, 1970.

Lansberry, J. Robert, Introduction to Criminal Justice, Santa Cruz: Davis Publishing Co., 1968.

Leonard, V. A., and Harry W. Moore, The General Administration of Criminal Justice, Brooklyn: The Foundation Press, Inc., 1967.

Newman, Charles L., Sourcebook on Probation, Parole and Pardons, Springfield, Illinois: Charles C. Thomas, Publisher, 1970.

Niederhoffer, Arthur, and Abrahem S. Blumberg, The Ambivalent Force Perspectives on the Police, Massachusetts: Ginn and Company, 1970.

Salottolo, A. Lawrence, Modern Police Service Encyclopedia, New Yor ARCO Publishing Company, Inc.

Smith, Alexander B., and Harriet Pollack, *Crime and Justice in a Mass Society*, Massachusetts: Xerox College Publishing, 1972.

Sullivan, John L., *Introduction to Police Science* 2nd ed., New York: McGraw-Hill Book Company, 1971.

Weston, Paul B., and Kenneth M. Wells, *Law Enforcement and Criminal Justice: An Introduction*, Pacific Palisades: Goodyear Publishing Company, Inc., 1972.

PRINCIPLES AND PROCEDURES OF THE JUSTICE SYSTEM

PRINCIPLES AND PROCEDURES OF THE JUSTICE SYSTEM

COURSE OUTLINE

LENGTH OF COURSE: 3 semester units or 4 quarter units

COURSE DESCRIPTION: An in-depth study of the role and responsibilities of each segment within the Administration of Justice System: law enforcement, judicial, corrections. A past, present and future exposure to each subsystem procedures from initial entry to final disposition and the relationship each segment maintains with its system members.

COURSE GOALS:

1. To provide the student with a knowledge of the procedures involved in the justice system from arrest to release; and,
2. To develop skills in applying this knowledge to an understanding of the operation of the justice system; and,
3. To develop an appreciation of the necessity for the justice system to operate as a cooperating entity so the most effective handling of cases can be provided; and,
4. To develop an ability to utilize the material presented in this course in making appropriate, discretionary decisions as to how to proceed while operating as a member of the system.

GENERAL PERFORMANCE OBJECTIVES:

1. When presented with the procedures involved in the justice system from arrest to release, the student will be able to demonstrate his ability to understand these concepts by passing a written examination with an accuracy of 90%.
2. After developing skills in applying knowledge of the procedures involved from arrest to release to an understanding of the operation of the justice system, the student will be able to give an oral presentation to the class that will demonstrate his understanding.
3. After developing an appreciation of the necessity for the justice system to operate as a cooperating system, the student will demonstrate his knowledge of his appreciation by writing a research paper describing his competency.
4. After developing an ability to utilize material in making appropriate decisions on how to operate as a member of the system, the student will demonstrate his knowledge of system membership by passing an essay examination with an accuracy of 90%.

SCOPE:

I. Conceptualization
   - A. Sub-systems: from arrest to release
   - B. Role Identification
   - C. Role Conflict
   - D. System or non-system
   - E. The Challenge of sub-system cooperation

II. Legal Authorization for System
   - A. U. S. Constitution
   - B. California Constitution
   - C. California Penal Code
   - D. Other related legal provisions

III. Implications of Civil Rights
   - A. Its effects on system members
   - B. Constitutional Guarantees
   - C. Bill of Rights

IV. The Police Process
   - A. Police Powers
   - B. Process of Arrest
     1. Definitions
     2. Purpose
     3. Discretionary Powers
        a. As last alternative
        b. Psychological and social impact

     4. Peace Officer
     5. Private Person
     6. Warrant
     7. Citation
     8. Responsibility of arrestee
   - C. Initial Confinement
     1. Why Jail

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        2. Alternatives
        3. Process of Bail
            a. Historical aspects of bail
            b. Purpose
            c. Injustice
            d. Reform

V. Coroner - Medical Examiner

    A. Historical and legal considerations

    B. Responsibilities of the office

    C. The Inquest process

VI. Prosecuting Attorneys

    A. Types

        1. Attorney General
        2. District Attorney
        3. City Attorneys

    B. Functions

        1. Role and Responsibilities
        2. Legal Authority - Discretionary Powers
        3. Organization/Staffing
        4. Relationship to City, State, Federal Prosecution
        5. Political Implications
        6. Strengths and Weaknesses
        7. Contemporary Issues

VII. Defense Attorneys

    A. Public Defenders

        1. Role and Responsibilities
        2. Legal Authority
        3. Organization/Staffing
        4. Political Involvement
        5. Fees
        6. Relationship with system members

    B. Private Counsel

        1. Politics of Defense
        2. Fees
        3. Manipulating the System
            a. Continuances
            b. Jury Selection

C. Legal Aid Society

  1. Purpose
  2. Historical Development
  3. Fees
  4. Organization/Staffing
  5. How Supported
  6. Political Problems

VIII. State and Federal Regulatory Agencies

A. ABC

B. Public Utilities Commission

C. F.C.C.

D. F.A.A.

E. Federal Security

F. Consumer Affairs Council

G. Labor Commission

H. State Compensation

I. DMV

IX. Courts

A. Court Structure and Jurisdiction

  1. Justice
  2. Municipal
  3. Superior
  4. State Appellate
  5. State Supreme
  6. Federal District Court
  7. Federal Appellate Court
  8. Federal Supreme Court

B. Magistrate and Referee

  1. Historical Significance
  2. Responsibilities and Duties
  3. How Selected
  4. Qualifications
  5. Political Implications
  6. Discretionary Powers
  7. Tenure
  8. Removal

C. Court Officers

1. Clerk
2. Constable, Marshal and Sheriff
3. Recorder

X. Grand Jury

A. Functions of the Jury

1. Criminal Process
    a. Recommendations
    b. Indictments

2. Civil Obligations

B. Historical Factors

C. Grand Jury Proceedings

1. Selection Process
2. Tenure

D. Contemporary Issues

XI. Judicial Process

A. Accusatory Pleadings

1. Complaints
2. Information
3. Indictments

B. Jurisdiction and Venue

1. Definition
2. Types of Jurisdiction

C. Court Appearances and Proceedings

1. Purpose - Rights of Defendant
2. Arraignments
    a. Types of pleas
    b. Negotiated Plea

3. Preliminary Examination
4. Grand Jury Indictment
5. Trials
6. Appeals
7. Sentencing Hearing
8. Court Role of Probation Officer

D. The Verdict

1. Instruction to Jury
2. Deliberation
3. Types of verdicts

E. Sentencing Process

1. Probation review and recommendation
2. Diagnostic Research
3. Definite/indeterminate sentance
4. Sentence as prescribed by law
5. Granting probation
6. Inequity of sentences
7. Adult authority
   a. Responsibilities
   b. Constituted Authority

XII. Correctional Concepts

A. General Philosophy

1. Stated objectives
2. Success factor

B. Process upon sentencing

1. Reception Guidance Centers
   a. Classification and assignment

2. Role of Adult Authority
   a. Determination of sentence
   b. Assessment of rehabilitation

C. Security Facilities

1. Maximum
2. Medium
3. Minimum
4. Locations

D. Rehabilitation - Reality or Myth

1. Purpose
2. Models
3. Contemporary Issues

E. Present concept of treatment

1. Community treatment centers
2. Model centers for treatment
   a. Prisons without walls

3. Responsibility of educational institutions

F. The Functions of Parole

1. Objectives
   a. Rehabilitation under supervision
   b. Social reintegration

2. The Parolee
3. Role of the Parole Officer as a change agent
4. Case load
5. Success factor
6. Conditions of Parole

XIII. Community Service Organizations

A. Purposes

1. Reason for development
2. Relationship with the Justice System
3. Objectives of service

B. Organizations

1. Teen challenge
2. Youth centers
3. Free clinics
4. Narcotics rehabilitation homes
5. Alcohol rehabilitation homes
6. Suicide Prevention Centers
7. Crash pads

<u>INSTRUCTIONAL METHODS</u>:

1. Lecture
2. Seminar Style Discussion
3. Guest Lecturers
4. Demonstration
5. Case Studies
6. Community based field trips
7. Resource texts
8. Correlary readings
9. Special projects or papers and present for class evaluation

<u>EVALUATION METHODOLOGY</u>:

1. Essay Examination
   a. Quizzes
   b. Mid-term
   c. Final

2. Active participation during class discussion
3. Special project, paper or case study presentation to class
4. Attendance

MINIMUM STANDARD OF ACHIEVEMENT:

1. Satisfactory completion of all stated performance objectives. A minimum score of 70% out of a possible 100% on all examinations, papers, presentations and special projects.

SELECTED READINGS:

Bristow, Allen and John B. Williams, *Criminal Procedure and the Administration of Justice*, Beverly Hills: Glencoe Press, 1966.

Carlson, Ronald L., *Criminal Justice Procedure for Police*, Cincinatti: The W. H. Andersen Company, 1970.

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Task Force Report: Courts, President's Commission on Law Enforcement and Administration of Justice, Washington, D.C.: Superintendent of Documents, U. S. Government Printing Office, 1967.

Task Force Report: Police, President's Commission on Law Enforcement and Administration of Justice, Washington, D.C.: Superintendent of Documents, U. S. Government Printing Office, 1967.

The Challenge of Crime in a Free Society, President's Commission on Law Enforcement and Administration of Justice, Washington, D.C.: Superintendent of Documents, U. S. Government Printing Office, 1967.

Weston, Paul B., and Kenneth M. Wells, *Administration of Justice*, 2nd Edition, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1973.

Wright, R. Gene and John A. Marley, *The Police Officer and Criminal Justice*, New York: McGraw-Hill, Inc., 1970.

CONCEPTS OF CRIMINAL LAW

COURSE OUTLINE

LENGTH OF COURSE: 3 semester units or 4 quarter units

COURSE DESCRIPTION: Historical development, philosophy of law and constitutional provisions; definitions, classification of crime, and their application to the system of administration of justice; legal research, study of case law, methodology, and concepts of law as a social force.

COURSE GOALS:

1. To provide the student with a knowledge of the historical development of law and the philosophy of law.
2. To familiarize the student with the United States Constitution and to integrate constitutional provisions with the fundamentals of law.
3. To introduce the student to basic legal definitions and concepts which provide a foundation for law.
4. To develop within the student an appreciation for the value of case study and legal research as a means of interpreting court decisions in relation to the written statutes.

GENERAL PERFORMANCE OBJECTIVES:

1. When presented with an historical perspective of law, the student will be able to give an oral presentation to the class that would demonstrate his understanding of the cultural evolution of law. Each student will also be able to answer questions in a written examination pertaining to the philosophical and historical development of law with accuracy of 90%
2. When confronted with a legal problem, the student will be able to locate appropriate cases and exercise sound discretion based upon legal research methodology and will be able to write briefs concerning decisions rendered in these cases that will demonstrate his understanding of the application of legal research.
3. When confronted with constitutional amendments, the student will develop a perception of contemporary issues relating to the administration of justice and will be able to demonstrate his knowledge of the legal concepts examined in class by writing a term paper describing these concepts.

4. When introduced to the basic legal definitions and concepts of law for non-lawyers, the student will develop the ability to cope with operational experiences by applying these definitions and concepts to the relevant legal codes in the administration of justice. The student will be able to demonstrate his ability to understand legal definitions and concepts by passing a written examination with accuracy of 90%

SCOPE:

I. Legal Research and Methodology

A. Ramifications of legal research

B. Orientation to case citations

C. Outline of the legal brief

D. Use of the law library

E. Attorney General Opinions

II. Philosophical and Historical Development

A. General and Specific sources of law

B. Development of common law

C. The concept of Stare Decisis

D. Pre-emption

E. Repeal

F. Mala in Se vs. Mala Prohibita crimes

G. Crimes without victims

H. Federal constitutional provisions

I. Police power

J. Substantive vs. procedural

III. The Nature of Criminal Law

A. The definition of crime

B. The purpose of criminal law

C. The language and construction of penal statutes

D. Conflicts between statutes

E. Distinction between crimes and torts

F. Criminal and civil liability

G. Judicial review

IV. Classification of Crimes

A. Distinction between felonies, misdemeanors, and infractions

B. Punishments

C. Prior convictions

D. Lesser and included offenses

E. Double jeopardy

V. Corpus Delecti - Elements of Crime

A. Role of corpus delecti

B. Act and intent - negligence

C. Proximate cause

D. General intent

E. Specific intent

F. Transferred intent

VI. Capacity to Commit Crime

A. Exemptions to criminal liability

B. Diminished capacity

C. Capital crimes

D. Malice

E. Motive

F. Intoxication

G. Parties to a crime

H. Attempts

I. Conspiracy

VII. Overview of Specific Crimes

A. Crimes against the person and property

1. General application of segments V and VI

B. Crimes against public decency, morality and the public peace.

1. Historical development
2. Constitutionally related discussion
3. Community standards

C. Related enforceable laws

1. Health and Safety
2. Business and Professions
3. Welfare and Institutions
4. United States Code
5. Fish and Game
6. City and County Ordinances

INSTRUCTIONAL METHODS:

1. Lecture and discussion
2. Case study of recent court decisions
3. Students to brief and discuss case and its implications to the administration of justice
4. Field trip to county law library
5. Handouts
6. Texts and supplemental resources

EVALUATION METHODOLOGY:

1. Written Examinations
    a. Quizzes
    b. Mid-term
    c. Final

2. Active participation in class discussion
3. Presentation of research papers to class
4. Attendance

MINIMUM STANDARD OF ACHIEVEMENT:

Satisfactory achievement on all evaluation methods, with a minimum score of 70% on a possible total of 100%.

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SELECTED READINGS:

Black's Law Dictionary

California Law and Procedure, California Bar review course.

Chamelin and Evans, *Criminal Law for the Policeman*, Pub. Prentice Hall.

Corpus Juris Secundum and California Jurisprudence Encyclopedias.

Cox, *The Warren Court*.

Fleming and Hunt, *California Criminal Law Manual*, Pub. Burgess Publishing Company.

Fricke and Alarcon, *California Criminal Law*, Pub. Legal Book Store.

Levy, Leonard, *Judicial Review and the Supreme Court*, Pub. Harper Torch Books.

Menninger, *The Crime of Punishment*.

Pantaleoni and Bigler, *California Criminal Law*.

Pollac, Louis, *The Constitution and the Superior Court*, Pub. World Publishing Company.

Sheppard's Citator

West Co. Digest

Williams, *Criminal Law Case Book*, Pub. Glencoe Press.

LEGAL ASPECTS OF EVIDENCE

LEGAL ASPECTS OF EVIDENCE

COURSE OUTLINE

LENGTH OF COURSE: 3 semester units, 4 quarter units

COURSE DESCRIPTION: Origin, development, philosophy and constitutional basis of evidence; constitutional and procedural considerations affecting arrest, search and seizure; kinds and degrees of evidence and rules governing admissibility; judicial decisions interpreting individual rights and case studies.

COURSE GOALS:

1. To provide the student with a working knowledge of the rules of evidence, the various kinds of evidence, and the admissibility of evidence.
2. To develop in the student the ability to evaluate the various kinds of evidence available in a given case in order to determine its admissibility in court.
3. To develop in the student skill in handling case material so that evidence admissibility will not be destroyed by improper techniques or procedures.
4. To develop in the student an appreciation of the value of all kinds of evidence and the need to use proper procedures and techniques so as to maintain the value and admissibility of evidence.
5. To impress upon the student that legally admissible evidence is the end product of all the work and effort of the crime investigator, and that it is essential that he possess a sound knowledge of the rules of evidence.

GENERAL PERFORMANCE OBJECTIVES:

1. The student will be able to demonstrate a working knowledge of the rules of evidence, the various kinds of evidence, and the admissibility of evidence by passing a written examination.
2. The student will be able to evaluate the various kinds of evidence available in a given case and will demonstrate this ability by writing a term paper concerning its admissibility in court.
3. The student will demonstrate his ability to use proper procedures in maintaining the value of evidence by performing statisfactorily in a roll playing setting, involving a hypothetical case.

4. The student will demonstrate that he knows how to relate legally admissible evidence to the corpus delecti of the crime under investigation by passing a written examination.

SCOPE:

I. Evolution of Evidence

- A. What is evidence?
- B. Proof and burden of proof
- C. Reasons for rules of evidence
- D. The evidence code
- E. Application of rules of evidence
- F. Doctrine of judicial notice
- G. Presumption

II. Detention and Arrest

- A. Constitutional authority
- B. Procedures - Probable Cause
- C. Evolution of case law
  1. Weeks
  2. Cahan
  3. Rochin
  4. Wolf
  5. Mapp
  6. Miranda

III. Search and Seizure

- A. History and Development - case law
- B. The exclusionary rule - definition
- C. Define
  1. What is a search
  2. What is a seizure
- D. Search warrants
- E. Search incidental to arrest

F. Consent search

G. Search and seizure incidental to arrest

  1. Cursory Search
  2. Temporary detention
  3. Stop and frisk

H. Search of

  1. Houses
  2. Vehicles
  3. Other places

IV. Discovery

A. Reporting and discovering procedures

B. What is the right of discovery

C. Importance to investigator

D. Pre-Trial Discovery

E. Right of discovery through preliminary hearing

F. Prosecution's right of discovery

G. Unavailability of original notes

V. Types of Evidence

A. Real evidence

  1. Defined
  2. Examples

B. Direct

  1. Defined
  2. Examples

C. Circumstantial

  1. Defined
  2. Examples

D. Prejudice

E. Specific kinds

  1. Character
  2. Manner of proof
  3. Character of victim

F. Similar or related acts of circumstances

  1. General
  2. Intent, motive, and knowledge
  3. Common scheme or design
  4. Inter-connected offenses

G. Other circumstances

  1. Possession of recently stolen property
  2. Sudden affluence
  3. Flight or other evasion
  4. Complaint in sex offenses
  5. Threats and prior difficulties

VI. Witnesses - Competency

A. Definition

B. Grounds for qualification and disqualification

C. Analysis of statutory grounds

VII. Privileged Communication

A. Basic statutes - evidence code

B. General

C. Attorney and Client

  1. Nature of privilege
  2. Requirements
  3. Exceptions

D. Husband and wife

  1. Privilege not to testify against spouse
    a. Nature of privilege
    b. Requirements
    c. Exceptions

  2. Privilege for confidential marital communication
    a. Nature and purpose
    b. Requirements
    c. Exceptions

E. Physician and Patient

  1. Nature of privilege

F. Psychotherapist and Patient

    1. Nature of privilege
    2. Requirements

  G. Clergyman and Confessor

    1. Nature of privilege

  H. Identity of Informer

    1. Nature of privilege
    2. Disclosure necessary for fair trial
    3. Where disclosure not required

  I. News Media

    1. Nature of privilege

VIII. Self incrimination and nontestimonial compulsion

  A. Basic statutes - evidence code

  B. Nature of privilege

  C. Distinction between defendant and witness privilege

  D. Scope of privilege

  E. Granting immunity and effect

  F. What constitutes compulsion to testify

  G. Nontestimonial compulsion

  H. Brutal body examination

  I. Reasonable body examination

IX. The Opinion Rule

  A. Basic statutes - evidence code

  B. Non-expert testimony

  C. Expert opinion

    1. Common knowledge

X. Impeachment, Corroboration and Refreshing Memory

  A. Basic statutes - evidence code

  B. Impeachment

- C. Corroboration
- D. Refreshing recollection of memory
- E. Past recollection recorded

XI. Hearsay

- A. Defined
- B. Dying declaration
- C. Spontaneous or contemporaneous statements
- D. Statements against interest
- E. Mental state
- F. Business records
- G. Official records
- H. Family history

XII. Confessions and Admissions

- A. Basic statutes - evidence code
- B. Statement of constitutional rights
- C. Miranda Warning
- D. Case law affecting interviewing

XIII. Documentary Evidence

- A. Basic statutes - evidence code
- B. Best evidence rule
- C. Recordings
- D. Official writings

XIV. Photographic Evidence

- A. Photographs as evidence
- B. First rule of admissibility - relevancy
- C. Second rule of admissibility - accurate representation

D. Identification of a Photograph

E. Posed photographs

F. Gruesome photographs

G. Nude photographs

H. Motion pictures as evidence

I. Colored photographs

J. Prints to be used as evidence

XV. Introducing Evidence at Trial

A. Proper handling of evidence and maintaining chain of evidence

B. Connecting evidence with issues of trial

C. Tactics of defense to discredit evidence

INSTRUCTIONAL METHODS:

1. Lecture - Discussion
2. Demonstration
3. Guest Speakers
4. Information Sheets
5. Transparencies, slides, films, and video tape
6. Moot Court (Role Playing)
7. Field Trips to a court in action
8. Special projects or case study and report

EVALUATION METHODOLOGY:

1. Written examinations
    a. Mid-terms
    b. Final exam

2. Written project or case study report
3. Attendance
4. Active class participation

MINIMUM STANDARD OF ACHIEVEMENT:

1. Satisfactory completion of all stated performance objectives. A minimum score of 70% out of a possible 100% on all examinations, papers, presentations and special projects.

SELECTED READINGS:

Louisell, David W., John Kaplan, Jon R. Waltz, Principles of Evidence and Proof, Mineola, New York: The Foundation Press, Inc., 1968.

Stuckey, Gilbert B., Evidence for the Law Enforcement Officer, New York: McGraw-Hill Book Company, 1968.

Weston, Paul B., Kenneth M. Wells, Criminal Evidence for the Police, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971.

COMMUNITY RELATIONS

COMMUNITY RELATIONS

COURSE OUTLINE

LENGTH OF COURSE: 3 semester units or 4 quarter unit

COURSE DESCRIPTION: An in-depth exploration of the roles of the Administration of Justice practitioners and their agencies. Through interaction and study the student will become aware of the interrelationships and role expectations among the various agencies and the public. Principal emphasis will be placed upon the professional image of the system of Justice Administration and the development of positive relationships between members of the system and the public.

COURSE GOALS:

1. Acquire a broad base of information regarding the social and ethnic structure of the community and the variety of cultural influences.
2. Develop an awareness of the many real and/or imagined problems of the various segments of the community in relationship to the Criminal Justice System. This shall be accomplished by means of an opinion survey, survey of available literature, lectures, and guest appearances.
3. Participate in discussions and group projects to acquire an awareness of the social and personal needs of the various individuals and groups of individuals in the modern society that may have previously been foreign to the awareness and experience of the students.
4. Identify conflicts in principles and philosophies of individuals and groups of individuals that contribute to confrontations and physical conflict with different segments of the criminal justice system.

GENERAL PERFORMANCE OBJECTIVES:

1. The student will demonstrate his fundamental knowledge of police procedures and philosophy and ability to explain them in informal dialogue session in real and simulated sessions. He will be rated by his fellow students on a five point chart and will meet the minimum standards agreed upon by the rating group.

2. Each student will participate in a group project consisting of one of the topics decided upon during the first three meetings of the course. He will perform according to the minimum standards decided upon by the project team, and the final product of each group must be acceptable according to the requirements of a chief of police, probation officer, judicial process representative, or department head or his designee whos agency has the need for such a project. (This is determined by the instructor prior to the beginning of the course).

3. The student will prepare a report or critique that reflects his critical evaluation of class activity or guest appearance. He will describe the activity, evaluate it in terms of relativity to the course objectives, and will make positive recommendations for future activities of a similar nature. The critique will meet the requirements of the form.

4. In simulated and actual situations, each participant will demonstrate his ability to engage in dialogue with people from a variety of backgrounds and different points of view, and will explain the justice system and policies to the satisfaction of a team of his peers serving as evaluators with a score of at least seventy out of a possible one-hundred points.

SCOPE:

I. Lecture Outline

   A. History of change in community relations in the Administration of Justice.

      1. "Public" vs "Community" Relations
      2. Agency Responsibility to the communities they serve

   B. Agency Based Community Relations Programs

      1. Description and Discussion of on-going programs
      2. Police - Courts - Corrections

   C. Human Relationships and Cultural Consideration

   D. Communications

      1. Verbal
      2. Non-Verbal
      3. Listening
      4. Blocks to effective communications
      5. Overcoming the blocks

E. Dynamics and Media

1. Criminal Justice-Press Relationships
2. Policies and Procedures of agencies
3. Agency-Community Relationships

F. Militant and Dissident Organizations

1. Current trends
2. Identification of organizations and [illegible]ers
3. Philosophies and methods utlized by [illegible] organization

G. Students Culture and Justice System

1. Relationships

H. Discretionary Decision Making

1. Alternatives
2. Psychological Impact

I. The System Image

1. Law Enforcement
2. The Courts
3. Corrections

II. Role Play and Actual Dialogue Sessions

Suggested topics. Guest speakers and simulated representatives chosen from the class or elsewhere, should be utilized to expose the student to a wide variation of points of view.

A. Current Topics from news items

B. Law Enforcement

1. The police and civil rights
2. Local minority group - police relationships
3. Police policy on when to shoot
4. Probable cause for field interviews
5. Police responsibility at family disturbances
6. Police weapons, are they humane?
7. Too much "police protection" of certain neighborhoods
8. Officer powers of arrest and search
9. Prejudicial - Preferential treatment by police
10. Lack of uniformity in law enforcement
11. Traffic control and law enforcement
12. Unpopular narcotics laws and enforcement

C. Courts

1. What is the value of the Bartered Plea?
2. Why do the courts let arrested criminals off on technicalities?
3. Discussion of equity in meeting out sentences
4. How do judges determine length of sentence?
5. Is the Supreme Court exceeding its authority?
6. Describe the role of the District Attorney
7. Why does an attorney defend a c[illegible]t he knows is guilty?
8. Is there a value to th[illegible]ender system?

D. Corrections

1. Why give 72 hour passes to criminal convicts?
2. What factors determine a good probation risk?
3. What types of punishment is administered in prisons?
4. Does parole fail?
5. Community centered treatment programs
6. Parolees as parole officers
7. Is the prison system working as it should?
8. Is probation better for rehabilitation than imprisonment?

III. Group Projects

Topic and procedure for study and development to be determined by the instructor and the class. It should be related to the lecture topics and a group presentation may take the place of a lecture.

INSTRUCTIONAL METHODS:

1. Lecture
2. Seminar Style Discussion
3. Guest Lecturers
4. Demonstration
5. Case Studies
6. Community based field trips
7. Resource texts
8. Correlary readings
9. Special projects or papers and present for class evaluation

EVALUATION METHODOLOGY:

1. Essay examination
    a. Quizzes
    b. Mid-term
    c. Final

2. Active participation during class discussion
3. Special project, paper or case study presentation to class
4. Attendance

MINIMUM STANDARD OF ACHIEVEMENT:

1. Satisfactory completion of all stated performance objectives. A minimum score of 70% out of a possible 100% on all examinations, papers, presentations and special projects.

SELECTED READINGS:

Readings should cover literature which provides a variety of viewpoints to offer the student a total perspective of the complexity of the problems within the system.

A National Survey of Police and Community Relations, National Center on Police and Community Relations, School of Police Administration and Public Safety, Michigan State University, Field Survey, Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1967.

Banton, Michael, The Policeman in the Community, New York: Basic Books, Inc., 1964.

Berson, Lenora E., Case Study of a Riot: The Philadelphia Story, New York: Institute of Human Relations Press, American Jewish Committee, 1966.

Biderman, Albert D., Louis A. Johnson, Jennie McIntyre and Adrianne W. Weir, Report on a Pilot in the District of Columbia on Victimization and Attitudes Toward Law Enforcement - Field Surveys I, Washington, D.C.: Superintendent of Documents, U. S. Government Printing Office, 1967.

Bordua, David J., (ed.) The Police: Six Sociological Essays, New York: John Wiley & Son, 1967.

Coffey, Alan, Edward Eldefonso and Walter Hartinger: Human Relations: Law Enforcement in a Changing Community, New Jersey: Prentice-Hall, 1971.

Cray, Ed., The Big Blue Line: Police Power Versus Human Rights, New York: Cowan McCann, Inc., 1967.

Earle, Howard H., Police Community Relations, Springfield, Illinois: Charles C. Thomas, Publisher, 1967.

Gellhorn, Walter, When Americans Complain: Governmental Grievance Procedures, Cambridge, Massachusetts: Harvard University Press, 1966.

LaFave, Wayne R., Arrest: The Decision to Take a Suspect into Custody, New York: Little, Brown & Co., 1965.

Law Enforcement: A Report on Equal Protection in the South, Washington, D.C.: Superintendent of Documents, U. S. Government Printing Office, 1965.

Lohmann, Joseph D., and Gordon E. Misher, *The Police and the Community. The Dynamics of Their Relationship in a Changing Society*. Volumes 1, 2 and 3, Field Surveys, Washington, D.C.: Superintendent of Documents, U. S. Government Printing Office, 1967.

Memboisse, Raymond M., *Community Relations and Riot Prevention*, Springfield, Illinois: Charles C. Thomas Publisher, 1967.

National Survey of Police and Community Relations. President's Commission on Law Enforcement and Administration of Justice, Washington, D.C.: Superintendent of Documents, U. S. Government Printing Office, 1967.

Niederhoffer, Arthur, *Behind the Shield: The Police in Urban Society*, New York: Doubleday & Co., Inc., 1967.

Pfiffner, John M., *The Function of the Police in a Democratic Society*, Los Angeles School of Public Administration Civic Center Campus, Center for Training and Career Development, University of Southern California, 1967.

Radano, Gene, *Walking the Beat*: Cleveland World Publishing Co., 1968.

Reiss, Albert, Jr., *Studies in Crime and Law Enforcement in Major Metropolitan Areas*. Volumes 1 and 2, Field Surveys, Washington, D.C., Superintendent of Documents, U. S. Government Printing Office, 1967.

Task Force Report: The Police, President's Commission on Law Enforcement and Administration of Justice, Washington, D.C.: Superintendent of Documents, U. S. Government Printing Office, 1967.

The Challenge of Crime in a Free Society. President's Commission on Law Enforcement and Administration of Justice, Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1967.

Waskow, Arthur I., *From Race Riot to Sit-In*, Garden City, New York: Doubleday & Co., 1966.

Watson, Nelson A., *Police-Community Relations*, Washington, D.C.: International Association of Chiefs of Police, Research and Development Division, 1966.

An excellent Bibliography may be found in:

Hewitt, William H. and Charles L. Newman, *Police-Community Relations: An Anthology and Bibliography*. Mineola, New York: The Foundation Press, 1970.

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HUNT, EDWIN C., JR.
SAFETY TRAINING COURSE FOR CONSTRUCTION SUPERVISORS.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA, WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 71 101P.

DESCRIPTORS - SAFETY; *LESSON PLANS; *SUPERVISORY TRAINING; *SAFETY EDUCATION; INSTRUCTIONAL AIDS; *TEACHING GUIDES; *ACCIDENT PREVENTION

ABSTRACT - THIS GUIDE CONSISTS OF 15 BASIC LESSON PLANS TO BE USED BY THE INSTRUCTOR AS OUTLINES IN TEACHING THE SAFETY TRAINING COURSE FOR CONSTRUCTION SUPERVISORS. BASED LARGELY ON THE ASSOCIATED GENERAL CONTRACTORS (AGC) MANUAL OF ACCIDENT PREVENTION IN CONSTRUCTION, THESE PLANS HAVE BEEN REVIEWED AND REFINED BY TWO OF THE AGC COMMITTEES, THE SAFETY COMMITTEE, AND THE SAFETY ENGINEERS--AGC, JOINT COOPERATIVE COMMITTEE. EACH LESSON PLAN, IN A 3-COLUMN FORMAT, PROVIDES SPACE IN THE LEFT MARGIN FOR TIME ALLOWANCE NEEDED FOR EACH TOPIC AND IN THE RIGHT MARGIN FOR NOTES CONCERNING RESOURCES WHICH THE INSTRUCTOR CAN FILL IN AS HE USES AND REUSES THE OUTLINE. OBJECTIVES, TEXTS MATERIAL, AND SHORT TESTS ARE INCLUDED IN EACH LESSON PLAN. TWO OPTIONAL LESSONS AS WELL AS AN APPENDIX HAVE BEEN INCLUDEED. CONTAINED IN THE APPENDIX ARE LISTS OF SLIDES, FILMS, MOTION PICTURES, AND OTHER VISUAL AIDS AND MATERIALS WHICH APPLY TO SAFETY. THE PROMOTION OF A GREATER SENSE OF WORTH AND APPRECIATION WITH RESPECT TO SAFETY PREVENTION PERSONNEL IS A MAJOR OBJECTIVE OF THE PROGRAM. (SN)

2227

Safety Training Course for Construction Supervisors

By Edwin C. Hunt, Jr.
Training Specialist

Save Lives, Time and Money
Through Safety in Construction

THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA
1957 E Street, N.W. Washington, D.C. 20006

2229

INTRODUCTION

The Safety Training Course for Construction Supervisors was developed to provide supervisory personnel with a greater appreciation for their role in preventing accidents and a better understanding of the practices they should follow in carrying out this important part of their job.

The lesson plans are based principally on the revised *AGC Manual of Accident Prevention in Construction*, and have been reviewed and revised by members of two AGC Committees:

Safety Committee
Safety Engineers-AGC, Joint Cooperative Committee

In addition to the 15 basic lesson plans, there are 2 optional lesson plans which may be used by the instructor if they are more suitable for the type of construction firm represented by the particular group of supervisors. Material should also be taken from other sources when appropriate to the local situation.

Lesson plans are set up so that in the left hand margin under "Time" the instructor can estimate and record the time required to complete each topic in the outline, based on his own rate of delivery and experience. Following this time schedule will assure that all points are adequately covered, and that time is available to complete and discuss the quiz.

In the right hand margin under "Aids," the instructor should mark down notes to himself, such as references to specific sources he wishes to refer to or materials he wishes to show to the group. These might include certain pages in the AGC Manual, National Safety Council publications, insurance company materials, etc. They might also be reminders of examples he wishes to use, or other data tailored to the types and needs of the supervisors attending.

It is obvious that lesson plans can only be outlines. The instructor must draw upon his own experience, and prepare himself by referring to every source of help he can find in order to make the session meaningful and interesting.

CONTENTS

INSTRUCTOR'S LESSON PLAN

LESSON NO. 1
INTRODUCTION
ACCIDENT PREVENTION ORGANIZATION
PERSONAL PROTECTION
2-HOUR CONFERENCE

OBJECTIVES: To discuss the importance of planning a program for the prevention of costly accidents and, through knowledge of various methods, organize for safety to fit job conditions.

TEXT: AGC's Manual of Accident Prevention in Construction (Introduction, Accident Prevention Organization, Personal Protection).

TIME

LESSON OUTLINE

AIDS

INTRODUCTION

Accidents in the construction field cost billions of dollars each year. This cost is not necessary nor are the job stoppages, equipment damage, spoiled work, suffering and loss of men that go along with these accidents. (Cite an example of this cost).

It is true that construction work is inherently hazardous, but at least half of the accidents could be prevented by the application of preventive "know-how".

Accidents cannot be eliminated by writing up and attempting to enforce hard and fast rules. The automotive regulatory laws are an excellent example of this.

Accidents will only be reduced by education, vigilance, and cooperation of the workman, foreman, and superintendent.

The purpose of this lesson and other lessons provided by the Associated General Contractors of America is to help provide this needed education. This lesson will cover the organization of an effective accident prevention program. It will not be academic or theoretical but will be based on common sense.

DEVELOPMENT

1. Cost

Q: What is involved in the cost of an accident? (Stress the high cost, the need for an effective prevention system, and the details of the following.)

A: (1) Loss of skilled workers.
(2) Hidden costs such as damaged equipment.
(3) Increased insurance premiums.
(4) Wasted time, delays.
(5) Lowered morale.

2. Management Duties

Q: What are management's duties in accident prevention organization? (Stress importance of each and the need for vigor and cooperativeness on the part of management.)

A: (1) Good planning.
(2) Personal interest and sincerity.
(3) Leadership and encouragement.
(4) Definite policy statement.
(5) Procedural manual, instructions.
(6) Assignment of responsibility.
(7) Provision of approved types of safety devices and equipment.
(8) Provision for safety in estimates.

(9) Medical and first aid.
(10) Keeping foremen and supervisors informed about safety measures and policies.

3. Organization

Q: What are some of the group activities that should be planned in an effective safety program? (Develop details, importance, and ways of best providing for each.)

A: (1) Pre-job meetings.
(2) Accident prevention committees.
(3) Supervisory meetings.
(4) Safety meetings, various kinds.
(5) Including sub-contractors.
(6) Including law enforcement agencies, police, fire department.

4. Protecting the Public

Q: The public is always curious about construction projects. How can the contractor protect them? (Develop specific methods.)

A: (1) Contact area residents.
(2) Survey adjacent properties.
(3) Set up barricades.
(4) Provide safe route for pedestrians and vehicles.
(5) Provide night lighting.
(6) Provide signs, posters.
(7) Inform the public through any available medium of communication.

5. Programs

Q: What are some of the programs that assist in making the job safer? (Develop the specific method of utilizing each.)

A: (1) Employee selection.
(2) Safety indoctrination.
(3) Training—foremen and crafts.

6. Encouraging Employee Participation

Q: Workmen should participate in the safety program. What are some of the ways this can be promoted? (Develop methods and examples.)

A: (1) Encourage suggestions.
(2) Put employees on safety committees.
(3) Have employees assist in inspections.
(4) Give proper credit and recognition.

7. Accident Investigation

Q: What is the purpose of accident investigation?

A: (1) Get the facts.
(2) Identify action needed.
(3) Prevent similar occurrences.
(4) Assist insurance handling.

8. Personal Protection

Q: Effective accident prevention requires cooperation by everyone. This includes wearing proper clothing and suitable protective equipment. What are some items to consider?

A: (1) Hard hats.
(2) Gloves.
(3) Shoes.
(4) Eye and face protection.
(5) Clothing in general.
(6) Other devices.

9. Accident Records
   - **Q:** When an accident occurs, what is necessary in the way of records? (Develop effective method of preparation, also include terminology, evaluations, and classification.)
   - A: (1) Compile accurate records.
     - (a) Daily record of all injury cases (medical department).
     - (b) Case record card (medical department).
     - (c) Notification of absence (medical department or superintendent).
     - (d) Return to work notice (medical department).
   - (2) Insurance company report.
     - (a) Statement of witnesses.
     - (b) Sub-contractor report.
     - (c) Supervisor report.
   - (3) Tabulating for common or costly types.
   - (4) Accident prevention results (DIT).

10. Management
   - **Q:** How can a supervisor himself help to make that expected profit on a job? (Stress the importance of each aspect; develop the necessity of going further than observing and telling to make sure that safety exists on all jobs.)
   - A: (1) Display proper attitude toward safety.
     - (a) Enthusiasm.
     - (b) Good example to men.
   - (2) Communicate with his workmen in a clear and understandable way.
     - (a) The advantages of following safe practices.
     - (b) The costly results of not following safe practices.
     - (c) The necessity of following company rules.
   - (3) Set an example for his men.
     - (a) Survey the job for hazards daily.
     - (b) Stress good housekeeping.
     - (c) Watch for workmen who take chances.
     - (d) Correct unsafe acts or conditions promptly.
     - (e) Train the new men.
     - (f) Observe the rules himself.

QUIZ ON
INTRODUCTION
ACCIDENT PREVENTION ORGANIZATION

True-False:

1. Accident records are compiled and collected mainly because they are interesting to read.
2. It is not necessary to report minor injuries.
3. By knowing the causes of one accident, it is sometimes possible to correct accident-producing conditions before another similar accident occurs.
4. The prevention of accidents depends largely upon how effectively management and employees work together for a common objective.
5. Personal protective equipment should be worn only if the man thinks he needs it.

Multiple Choice:

6. The most important reason that the safety department, superintendent, or foreman should be notified immediately about lost-time injuries is:
   (a) So they can make arrangements to replace the injured person.
   (b) So they can investigate circumstances surrounding accidents and correct any hazardous practices or conditions.
   (c) So they can fire the person responsible for the accident.
   (d) So records can be kept of the duration of sick leave.

7. The reason it is necessary to tabulate work injury experience is:
   (a) To determine need for greater accident prevention activities in certain areas.
   (b) To assist in determining the seriousness of the accident problem in an area.
   (c) To assess the effectiveness and progress of safety activities.
   (d) All of the above.

8. Safety meetings have been proved to pay off when properly conducted. To be most effective, meetings should:
   (a) Be held only after a serious accident.
   (b) Prod workers to be careful and work safely.
   (c) Review specific situations that the men know about.
   (d) Be held only when top management can be present.

9. An accident prevention plan should be prepared for:
   (a) Unsafe jobs.
   (b) Jobs which are new and may be hazardous in nature.
   (c) Jobs that employ a safety engineer.
   (d) All jobs.

10. The best rule in making posters effective and successful is:
    (a) To select them to fit the job.
    (b) To place them in the company office.
    (c) To display them for a long period of time.
    (d) To make them small and simple.

ANSWERS TO QUIZ ON INTRODUCTION ACCIDENT PREVENTION

1. False.

2. False.

3. True.

4. True.

5. False.

6. b.

7. d.

8. c.

9. d.

10. a.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 2
SCAFFOLDING AND LADDERS
2-HOUR CONFERENCE

OBJECTIVES: To provide the construction supervisor with a sufficient knowledge of design, construction, and proper use of safe scaffolds and ladders so that he will be able to recognize unsafe features and conditions and be able to correct them.

TEXT: AGC's Manual of Accident Prevention in Construction (Scaffolding, Ladders).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

The use of improper scaffolds and ladders for access to elevated work is a major hazard to construction workers. We have repeatedly heard how workmen have prepared makeshift means of performing work at elevated locations and have heard of the careless use of them with resulting serious accidents. (The instructor should cite an example that he has experienced or one that has recently been in the news. Stress importance of safe scaffolds and ladders.)

If the workman were educated in the ways that scaffolds and ladders should be designed, built, inspected, and used, plus stopped and thought about what could happen to the scaffold or ladder that he is about to mount, many accidents could be avoided. The purpose of this conference is to discuss these features of the various types of scaffolds and ladders.

DEVELOPMENT

1. Scaffolding
   a. Types
      Q: What are the types of ground mounted scaffolds? (Review the general details of each.)
      A: (1) Tubular steel pole.
      (2) Wood pole.
      Q: What are other types of scaffolds? (Develop the general details and differences of each.)
      A: (1) Outriggers.
      (2) Swing stage.
      (3) Suspended.
      (4) Ladder jack scaffolds.
      (5) Rolling scaffolds.
   b. Ground mounted scaffold construction
      Q: What do we consider when adequately designing scaffolds? (Include particulars about each and the features that make for rigid, safe scaffolds.)
      A: (1) Footing.
      (2) Plumbness.
      (3) Load and safety factors.
      (4) Deck space and planking.
      (5) Cross bracing.
      (6) Means of accessibility.
      (7) Overhead protection.
      (8) Hand rails and intermediate rails.
      (9) Toe-boards.
      Q: What do we watch for in checking construction lumber for scaffolds? (Include limitations of each.)

A: (1) Quality and strength.
(2) Cured lumber.
(3) Defects such as knots and splits.

Q: What do we check when examining nailing?

A: (1) Tightness.
(2) Size.
(3) Number per joint.

c. Outriggers

Q: What should we consider before using outrigger scaffolds? (Develop details on each.)

A: (1) Is there some other type that can be used?
(2) Are there skilled and experienced mechanics available to construct them?
(3) Method of testing.

Q: What do we consider when determining adequacy of outrigger scaffolds? (Develop detail on each.)

A: (1) Method of securing or anchoring to structure.
(2) Type and quality of timber.
(3) Spacing, size, length of outriggers.
(4) Method of bracing outriggers to prevent overturn.
(5) Need for and method of bracing from end of outrigger.
(6) Platform of structure.
(7) Toe-board and railing.

d. Swing stage

Q: What do we consider when providing adequate swing stage scaffolds?

A: (1) Hanger or stirrup supporting.
(2) Device for lowering and raising.
(3) Ropes or cables.
(4) Hooks, blocks, and tackles for sheaves.
(5) Platform.
(6) Toe-board and railing.
(7) Cover.
(8) Safety line.

e. Rolling scaffolds

Q: What precautions should be observed when using rolling scaffolds?

A: (1) Workmen riding scaffolds.
(2) Use of brakes.
(3) Adjusting screws.
(4) Working platform height.

f. Single pole scaffolds

Q: How are they supported and constructed?

A: (1) One side supported by building.
(2) Ledgers.
(3) Cross braced.

g. Suspended scaffolds

Q: Who uses them and how are they supported?

A: (1) Light trades.
(2) Hung.
(3) Cantilevered supports.
(4) Rope tie downs, weights.
(5) Cables.

h. Inspection and maintenance

Q: What do we inspect scaffolds for other than construction features noted above? (Develop details of each.)

A: (1) Unapproved changes.

(2) Freedom from rubbish, ice, snow, unnecessary materials, open fires, etc.
(3) Protection from collision with vehicles.
(4) Support four times anticipated load.
(5) Level platforms.

Q: What other features do we inspect about machine-operated scaffolds? (Develop details of each.)

A: (1) Maximum of two people on scaffold.
(2) Safety line for each person.
(3) Scaffold secured so it won't swing when in use.
(4) Multi-scaffolds operated independently.
(5) Lowering and raising devices have locking feature.
(6) Scaffolds lowered when not in use.

i. Storage

Q: How and when should scaffolds be stored?

A: (1) When not in use.
(2) Neatly and properly supported.
(3) Out of the weather.

2. Ladders

a. Introduction

Q: What are the major causes of accidents on ladders? (Stress the importance of good ladder construction and proper use.)

A: (1) Ascending, descending.
(2) Ladders not secured.
(3) Structural failures.
(4) Improper handling of objects while on ladders.

b. Ladder jacks

Q: What do we inspect about a ladder jack? (Make sure everyone knows the details of ladder jacks and understands the following answers.)

A: (1) Construction of ladders.
(2) Construction of platform.
(3) Attachment of platform to ladders.
(4) Support and security of ladders.
(5) Levelness of platform.
(6) Only one worker to a jack.
(7) Height.

c. Inspection and maintenance of stock ladders

Q: What do we inspect in checking a ladder before use? (Develop details for the various types of ladders and materials, sizes, quality, and fabrication.)

A: (1) Construction.
(2) Freedom from defects and deterioration.
(3) Support.
(4) Slope.
(5) Securing top and bottom.
(6) Necessity for and construction of landings.
(7) Intermediate bracing.
(8) Never to be used in horizontal position.
(9) Storage.

d. Use

Q: What should we warn people about in using ladders? (Develop general trouble areas.)

A: (1) Proper ascending and descending.
(2) Limited work from a ladder.
(3) Reaching too far when on a ladder.
(4) Electrical conductors.

  (5) Placement.
  (6) Stepladders.
  (7) Job built ladders.

3. Stairways

Q: What do we check in examining safety of stairways? (Stress importance of using stairways instead of ladders when possible and safety features of construction.)

A: (1) Construction.
  (2) Uniformity of riser.
  (3) Uniformity of tread.
  (4) Lighting.
  (5) Temporary treads.

QUIZ ON
SCAFFOLDING AND LADDERS

True-False:

1. Landing platforms are not required if rails or safety cages are used.

2. Ladders and scaffolds should be kept painted.

3. The safety line of a swing stage scaffold should hang independently of the scaffold and reach to the ground.

4. Ladder jacks should be used with all frequently used ladders that are [illegible] much as 30 feet high.

5. The thrustout of an outrigger scaffold should not extend over 6 feet from building or structure.

Multiple Choice:

6. Maintenance and safe use of ladders involves the following procedures:
   (a) Weather-protected storage.
   (b) Securing top and bottom.
   (c) Extension 36" above landing.
   (d) All of the above.

7. To prevent materials falling, scaffolds should be constructed with:
   (a) 1-inch thick planking.
   (b) 1 x 3 guard rails.
   (c) 1 x 6 toe-boards.
   (d) All of the above.

8. The footing of a scaffold should be:
   (a) 2-inch thick lumber and metal plates.
   (b) Staked to prevent movement.
   (c) Single piece construction.
   (d) All of the above.

9. When access over a long period is needed for workmen to a second or third floor during construction, this should be accomplished by:
   (a) Ladders with safety devices.
   (b) Stairways.
   (c) Hoist tower.
   (d) Any of the above.

10. It is most important in assuring that a scaffold is safe to:
    (a) Inspect daily.
    (b) Prevent accumulation of rubbish and material piled on and around scaffolding.
    (c) Keep platform free from ice, snow, and oils.
    (d) All of the above.

ANSWERS TO QUIZ ON SCAFFOLDING AND LADDERS

1. False.

2. False.

3. True.

4. False.

5. True.

6. d.

7. c.

8. d.

9. b.

10. d.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 3
EXPLOSIVES
2-HOUR CONFERENCE

OBJECTIVES: To increase the construction supervisor's knowledge of the danger of explosives and to provide him with the knowledge of the proper methods of transportation, handling, storage, and use of explosives.

TEXT: AGC's Manual of Accident Prevention in Construction (Explosives).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

In the construction industry, explosives play a vital part in accelerating production. Some of the more common uses are the excavation of tunnels, the removal of rocks, stumps, earth, etc.

An explosive is a substance or mixture of substances which when suitably ignited is capable of violent and rapid chemical reaction. Needless to say, this rapid combustion is very hazardous and results in many accidents each year. The hazard is always present, but through the proper use and handling of these explosives, the operation can be safe. The objective of this lesson will be to discuss the danger areas and the methods of utilizing explosives safely.

DEVELOPMENT

1. Laws and Regulations

Q: What laws and regulations govern the transportation, storage, handling, and use of explosives? (Instructors should be familiar with laws and regulations and develop them generally at this time and more specifically throughout this lesson.)

A: (1) Federal.
(2) State.
(3) Local.

2. Personnel

Q: From a safety standpoint, what should be the considerations in employing people in explosive work? (Discuss the importance and characteristics.)

A: (1) Minimum number.
(2) Intelligence and experience.
(3) The ones who won't take chances.

3. Transportation

Q: What should always be checked in the transportation of explosives? (Develop the specifics of each.)

A: (1) Vehicle.
  (a) Strength.
  (b) Spark proof.
  (c) Size and capacity.
  (d) Tightness.
  (e) Condition.
  (f) Identification signs.
(2) Separation of explosives from detonators.
(3) Fire extinguishers.
(4) Cover.
(5) Method of stacking.
(6) Routing.

4. Storage

Q: What type of space should be provided to store explosives? (Develop detailed requirements

A:
(1) Fire and bullet resistant
(2) Dry and well ventilated.
(3) Locked.
(4) Separation of explosives from detonators.
(5) Marked area.
(6) Isolated area.
  (a) Distance from various items
  (b) Keep away from children, animals, and unauthorized persons.
(7) Organized for accurate inventory.

5. Handling

Q: What do we watch for in the handling of explosives? (Discuss the specifics of each.)

A:
(1) Following of manufacturer's instructions.
(2) Actual lifting, handling, and setting down.
(3) Damaged cases.
(4) Use of metal tools.
(5) Metal plates or nails in shoes.
(6) Fire or smoking.
(7) Method of opening cases.
(8) Special flashlights and lanterns.
(9) Right side up.
(10) Method of handling blasting caps.
(11) Method of destroying cases.

6. Drilling

Q: How can we make the drilling operation safe?

A:
(1) Holes greater diameter than cartridge.
(2) Drill minimum 25 feet from holes being loaded.
(3) Watch for unfired explosives.
(4) Don't drill in the old holes.

7. Loading

Q: How can we make the loading operation safe? (Stress the common hazardous areas.)

A:
(1) Determine condition of hole.
(2) Don't use metal rods.
(3) Avoid loading when an electrical storm is in the area.
(4) Check manufacturer's recommendations.
(5) Select proper grade or kind of explosive and type of detonator.
(6) Keep explosives and detonators apart as much as possible.
(7) Prepare holes before bringing explosives to site.
(8) Load only holes to be immediately fired.
(9) Make up primer in safe area.
(10) Use proper cap crimpers.
(11) Follow proper methods of inserting detonator in cartridge.
(12) Use only non-cap sensitive blasting agents with pneumatic equipment.

8. Tamping

Q: What are the do's and don'ts of tamping operation? (Elaborate on each.)

A:
(1) Don't remove dynamite from the cartridge.
(2) Don't tamp harder than necessary.
(3) Don't tamp the primer.

(4) Don't kink or injure fuse or wire.
(5) Use wood tamping tools.
(6) Confine with sand, earth, or clay.

9. Warning Signals

Q: How should warning signals be used to make blasting safer? (Develop best ways to use.)

A: (1) Utilize standard signals.
(2) Publish signs.
(3) Educate the public.
(4) See that signals are promptly obeyed.

10. Fuses

Q: What do we watch in using fuses? (Develop the methods of making the fusing safe.)

A: (1) Cracking of water-proof covering.
(2) Sufficient length.
(3) Cutting of fuse.
(4) Seating.
(5) Securing.
(6) Lighting operation.

11. Detonation

Q: What can detonate electric blasting caps? (Explain importance of preventing the latter three.)

A: (1) Electric circuit.
(2) Fuses.
(3) Radio transmitter.
(4) Television transmitter.
(5) Radar transmitter.
(6) Lightning.
(7) Static electricity.
(8) Stray currents.

12. Firing

Q: How can we make the firing safe? (Develop the methods of each.)

A: (1) Fire immediately after loading.
(2) Inspect all connections.
(3) Expert supervision.
(4) Check necessity of blasting mats.
(5) See that all persons are in the clear.
(6) Carefully check electrical firing.
  (a) Short circuits and breaks.
  (b) Sufficient currents.
  (c) Following the manufacturer's recommendations in wiring.
  (d) Condition and capacity of blasting machine.
  (e) Use of detonators of proper type and from same manufacturer.
  (f) Damage to wire insulation.
  (g) Resistance in each circuit.
(7) Immediately disconnect power source after firing.
(8) Thoroughly search for misfires.

13. Mudcapping

Q: What is necessary in accomplishing a safe mudcap shot? (Explain limitation of this type shot and develop better methods of obtaining the same results.)

A: (1) Minimum of 5 or 6 inch cap of mud.
(2) No rocks in the mud.
(3) Firing all shots instantaneously.

14. Misfires

Q: How do we handle misfires? (Stress prevention as the best cure.)

A: (1) Investigate and check for possible cause.
(2) Use experienced man.
(3) Shoot if practicable.
(4) Insert new primer.

15. Disposal

Q: Whom do we use in disposing of dynamite? (Discuss reason for disposal of packaging material.)

A: (1) Experienced and competent man.
(2) Representative of United States Bureau of Mines.
(3) Representative of explosive manufacturer.

16. Ammonium Nitrate

Q: How should ammonium nitrate be used in a safe explosive operation? (Stress that even though it is a safer explosive than some, it is still very dangerous. Thoroughly develop dangers.)

A: (1) Handle like gasoline.
(2) Avoid extreme heat.
(3) Avoid extreme shock.
(4) Provide good ventilation.
(5) Don't store in stone or concrete building.
(6) Avoid contamination with foreign material.
(7) Segregate in 50 ton units or smaller.
(8) Provide water for effective fire fighting.
(9) Keep loose material cleaned up.

QUIZ ON
EXPLOSIVES

True-False:

1. For accessibility, explosives should be stored relatively close to the blasting area.
2. Firing should be accomplished immediately after loading.
3. Ammonium nitrate should be stored in stone or concrete buildings.
4. Ten feet is a safe distance between loaded holes and drilling operations.
5. Metal rods are recommended for tamping.

Multiple Choice:

6. Handling or use of explosives or detonators should not be done when there is:
   (a) An approaching electrical storm.
   (b) Radio, television, or radar transmitters in the area.
   (c) Smoke in the area.
   (d) Any of the above.

7. One of the procedures to observe in making tamping safe is:
   (a) Use maximum force.
   (b) Remove dynamite from cartridge.
   (c) Tamp the primer.
   (d) Confine with earth, sand, or clay.

8. Loading operations can be made safer by:
   (a) Keeping explosives and detonators close together.
   (b) Loading only holes to be immediately fired.
   (c) Bringing explosives to site before holes are prepared.
   (d) Using a knife, or teeth for crimping.

9. Hazards from misfires may be reduced by:
   (a) Making proper use of high-grade explosives.
   (b) Testing each electric cap with a galvanometer before loading.
   (c) Shooting if practicable.
   (d) All of above.

10. Blasting operations should be conducted in accordance with the following:
    (a) The contractor's own rules.
    (b) "Short-cuts" of the powder man.
    (c) Federal, state, or local code, whichever prevails.
    (d) The surveyor's recommendations.

ANSWERS TO QUIZ ON EXPLOSIVES

1. False.
2. True.
3. False.
4. False.
5. False.
6. d.
7. d.
8. b.
9. d.
10. c.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 4
HOUSEKEEPING, SANITATION, AND FIRST AID
2-HOUR CONFERENCE

OBJECTIVES: To teach supervisors the importance of good housekeeping, sanitation, and first aid, and the best methods of providing them.

TEXT: AGC's Manual of Accident Prevention in Construction (Housekeeping, Sanitation, First Aid).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

Approximately one third of all accidents result from slips and falls. This is partly the result of poor housekeeping. It has been said that good housekeeping is just as easy as haphazard housekeeping, and it pays dividends in the form of accident prevention and conservation of materials. In this section, we will discuss the importance of good housekeeping and the means of accomplishing it.

Often when a person is hurt, the person trying to help harms the injured, because he does not know first aid, or attempts to transport the victim in a way that leads to further injury. In this section, we will also discuss various injuries and the ways that first aid should be given. Knowledge of first aid may some day save a life.

DEVELOPMENT

1. Housekeeping

Q: What basic actions must be taken to assure a well kept job?

A:
(1) Establish a procedure.
(2) Assign responsibilities.
(3) Have it well understood that good housekeeping is required.
(4) Make housekeeping a daily routine.

Q: What are the daily housekeeping tasks?

A:
(1) Keep trash removed.
(2) Maintain neat, orderly stockpiles.
(3) Have a designated clean-up crew.
(4) Don't accumulate oil, grease, and other liquids.
(5) Remove all nails.
(6) Provide receptacles.
(7) Provide lighting.

2. Sanitation

Q: What sanitary facilities must be provided (Develop the requirements with the first two.)

A:
(1) Toilet facilities.
(2) Drinking water.
(3) Washing facilities.

Q: What are our safety problems with drinking water?

A:
(1) Unfit for human consumption.
    (a) Not tested.
    (b) Not approved by local authorities.
    (c) Not treated when necessary.
(2) Unsafe water not posted.
(3) Disease carrying dispenser used (paper cups not provided).

(4) Fountain and dispensers not sterilized weekly.
(5) Use of contaminated ice.

3. First Aid

Q: How can an organization prepare to meet the needs for first aid? (Develop the importance of assigning responsibilities and details for each of the following.)

A: (1) Have key personnel trained.
(2) Provide sufficient first aid supplies.
(3) Keep records on injuries.
(4) Follow up on injuries treated.
(5) Report lost-time accidents.

Q: What should we check about a first aid kit? (Discuss contents.)

A: (1) Properly assembled—under the direction of a doctor, if possible.
(2) Centrally located—near a telephone, if possible.
(3) Minimum of a 24 unit kit.
(4) Contents checked weekly and, if needed, supplies replaced.

Q: Normally what are the only two injuries which call for speedy action? (Discuss others such as fractures that need careful deliberate action. Where possible utilize demonstrations, movies, and Red Cross assistance in developing the following.)

A: (1) Bleeding.
  (a) Dressing.
  (b) Position of victim.
  (c) Pressure principles.
  (d) Tourniquets.
  (e) Cold water.
(2) Breathing stoppage. (Drowning, gas poisoning, electric shock, suffocation, sedative poisoning.)
  (a) Mouth-to-mouth resuscitation.
  (b) Back pressure-arm lift method.

QUIZ ON
HOUSEKEEPING AND SANITATION
FIRST AID

True-False:

1. Housekeeping should be part of the daily routine of any construction job.

2. Water unsafe for human consumption may be used for fire protection if each tap is posted with a notice.

3. The reason adequate sanitary precautions and toilet facilities should be provided as one of the first operations on a construction job is to prevent disease.

4. If there is a possibility of broken bones, the type of artificial respiration that should be applied is mouth-to-mouth.

5. If a victim must be pulled to safety, he should be pulled sideways and not in the direction of the long axis of his body.

Multiple Choice:

6. Good housekeeping should be planned:
   (a) When material begins to accumulate on the job.
   (b) At initial stages of construction.
   (c) When trash and debris start to accumulate.
   (d) Only on jobs where there is a lot of form work or other types of debris are likely to accumulate.

7. The best method to provide water for workmen is the utilization of:
   (a) Pails and dippers.
   (b) A keg with ice in the water and cups.
   (c) Bubbler type dispensers with cups.
   (d) All of the above are satisfactory.

8. Water dispensers and portable fountains usually require sterilization:
   (a) Daily.
   (b) Weekly.
   (c) Monthly.
   (d) Everytime they are filled.

9. First aid is mainly administered for the purpose of:
   (a) Curing.
   (b) Temporary care.
   (c) Assisting the doctor.
   (d) Taking the place of hospital care.

10. Bleeding is usually best controlled by:
    (a) Direct pressure applied to the wound.
    (b) Moving the victim to a better position.
    (c) Wetting the wound.
    (d) Keeping the wound clean.

ANSWERS TO QUIZ ON HOUSEKEEPING AND SANITATION, FIRST AID

1. True.

2. True.

3. True.

4. True.

5. False.

6. b.

7. c.

8. b.

9. b.

10. a.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 5
WELDING AND CUTTING
2-HOUR CONFERENCE

OBJECTIVES: To introduce and develop the various hazardous areas in the welding and cutting processes, and through the knowledge of these hazards and the means of eliminating them, improve the safety of this portion of construction.

TEXT: AGC's Manual of Accident Prevention in Construction (Welding and Cutting).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

Welding and cutting operations are not essentially hazardous; but they do involve certain factors which, when neglected, lead to serious accidents.

The electric current connected with arc welding, the flammable and explosive compressed gas used in gas welding, and the heat created in the welding and cutting processes are very dangerous. Thus certain precautions for safety and health must be taken. (Interject from your personal experience an incident which will develop interest and stress the importance of applying safety to all welding and cutting jobs.)

Since practically all accidents can be traced to abuse or mishandling of equipment and lack of personal protection, the lesson will stress these aspects in arc and gas welding.

DEVELOPMENT

1. Welding and cutting

Q: What are the major causes of accidents in any welding and cutting operations? (Fully develop details.)

A: (1) Unsafe equipment.
(2) Lack of personal protection of those in the area as well as the bystander. (Develop shielding, ventilation, and clothing. Develop chart on lens densities.)

Q: What do we check to assure safety in welding equipment? (Develop details of arc and gas welding but delay full discussion of cylinders.)

A: (1) Standard approved equipment in good condition.
(2) Proper use of equipment.
(3) Voltage of equipment against wiring.
(4) Grounding.
(5) Coupling of circuit cables.
(6) Storage of cylinders and handling.

Q: What protective measures can be taken with your clothing while welding? (Elaborate on necessity for each, stressing when the clothing should be worn.)

A: (1) Utilize flame-resistant gauntlet gloves and aprons.
(2) Keep free of oil and grease.
(3) Limit or button collar, cuffs, and pockets.
(4) Wear fire-resistant leggings or high boots.
(5) Wear safety shoes.
(6) Utilize fire-resistant cape or shoulder cover when welding overhead.
(7) Utilize ear protection when welding in confined places.
(8) Wear high quality welding helmet.

(9) Wear safety goggles or spectacles when chipping or cleaning.

(10) Use combination safety hat-welding helmet when there is hazard of falling objects.

(11) Make sure protection is provided for handling hot materials, or warning provided until materials have cooled.

a. Fires

Q: How can we prevent fires caused by welding and cutting?

A: (1) Remove loose, easily combustible, and volatile materials.

(2) Shield combustible materials that cannot be removed.

(3) Inspect after each welding and cutting operation.

(4) Have fire extinguishers ready.

(5) Adhere to good safety practices.

(6) Proper maintenance and use of welding equipment.

(7) Caution in handling electrode stubs.

b. Flying chips from chipping, cleaning, and grinding

Q: What safety aspects are we concerned with when performing these operations? (Develop methods of making these operations safe.)

A: (1) Wearing safety goggles or protective face shields.

(2) Protecting hands and wrists.

(3) Eliminating danger to other personnel in the area.

(4) Utilizing safe methods.

(5) Avoiding metal slivers and sharp edges.

c. Explosions

Q: How do we handle the cutting and welding of containers which have contained flammable liquids? (Instructors should be familiar with American Welding Society's pamphlet on this subject and discuss details.)

A: (1) Follow published safety practices.

(2) Thoroughly steam clean or fill with water or inert gas.

2. Cylinders used in gas welding and cutting

Q: What are the safety problems we have with cylinders? (Develop the dangers in misuse, improper handling, and storage.)

A: (1) Improper use.

(2) Improper handling.

(3) Improper storage.

a. Improper use

Q: What are the precautions in using cylinders?

A: (1) Locate away from moving equipment, materials, and the like.

(2) Secure against tipping over.

(3) Use in the order received.

(4) Valve off and mark empty cylinders.

(5) Prevent contact with electrical wires.

(6) Shield from sparks or flames.

(7) Prevent storage on top of cylinders.

b. Improper handling

Q: What are the unsafe practices in handling cylinders?

A: (1) Leaving valve protection caps off.

(2) Using valves or caps for lifting.

(3) Careless raising and lowering.

(4) Dropping or jarring cylinders.

(5) Lifting with an electromagnet.
(6) Dragging and sliding cylinders.
(7) Allowing cylinders to be loose in hand truck.

c. Improper storage

Q: What are the principles to remember in the storage of cylinders?

A: (1) Keep away from sources of heat.
(2) Keep away from highly combustible materials.
(3) Store securely.
(4) Keep cylinders of oxygen away from acetylene or other fuel gas.
(5) Protect from accumulations of ice and snow.
(6) Shield from direct rays of the sun.
(7) Keep valves closed.
(8) Keep valve protecting caps on when not connected.
(9) Provide visual identification of contents.
(10) Keep valve key wrench on valve spindle.

QUIZ ON
WELDING AND CUTTING

True-False:

1. Respiratory protection is necessary when cutting or welding certain coated metals.

2. It is not necessary to wear safety goggles or spectacles when chipping and cleaning if the welding helmet is worn.

3. Cylinders may be used when they are lying on their sides if they are securely blocked from rolling.

4. The protective clothing to be worn varies with the size, nature, and location of the welding job.

5. Welder's clothing should have no open pockets or cuffs.

Multiple Choice:

6. What do you use to ground the frames of electric welding machines?
   - (a) No. 12 gauge wire or heavier.
   - (b) No. 8 gauge wire or heavier.
   - (c) Size is not important as long as the circuit is continuous to the ground.
   - (d) It is not necessary to ground frames.

7. The major cause of fires is:
   - (a) Welding operation.
   - (b) Welding equipment.
   - (c) Cutting operation.
   - (d) Misuse of cylinders.

8. In a chipping and cleaning operation, you should be especially concerned about protecting the:
   - (a) Eyes.
   - (b) Hands and wrists.
   - (c) Other personnel in the area.
   - (d) All of the above.

Cylinders of oxygen and acetylene should be kept away from:
   - (a) Combustible materials.
   - (b) Sources of heat.
   - (c) Accumulated ice and snow.
   - (d) All of the above.

10. The best way to move and handle cylinders is with:
   - (a) Valve protection cap.
   - (b) Electromagnet.
   - (c) Sling or cradle.
   - (d) Loose in hand truck.

ANSWERS TO QUIZ ON WELDING AND CUTTING

1. True.
2. False.
3. False.
4. True.
5. True.
6. b.
7. c.
8. d.
9. d.
10. c.

INSTRUCTOR'S LESSON PLAN

LESSON 6
FLAMMABLE GASES AND LIQUIDS
HANDLING AND STORAGE OF MATERIALS
FIRE HAZARDS
2-HOUR CONFERENCE

OBJECTIVES: To provide construction supervisors with the knowledge required for the safe handling, storage, and use of flammable and irritating gases, liquids, and other building materials and substances.

TEXT: AGC's Manual of Accident Prevention in Construction (Flammable Gases and Liquids, Handling and Storage of Materials, Fire Hazards, Occupational Diseases).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

New substances are continually being utilized in the construction field about which little is known by the layman.

This lesson will cover such flammable gases as acetylene, hydrogen, ethylene, illuminating gas, natural gas, and such flammable substances as ether, gasoline, naphtha, benzol, alcohol, kerosene, fuel oil, petroleum, hydrocarbon, liquid petroleum gas, turpentine, paints, varnishes, dryers, polishing solutions, cleaning fluids, adhesives, and epoxies. A list of these gases and liquids should be presented to the class in a manner which affords a few minutes to study them. The question is then asked, are there any other gases known to the class which are common to their work and should be covered? Make sure, if any are furnished that have different characteristics from those listed, that they are discussed later in the lesson. Determination of hazards with flammable gases and liquids lies partly in classifying the substances to determine the conditions under which they are flammable or explosive and partly in there being little knowledge of proper methods of safe usage, handling, and storage of flammable gases and liquids. This being the case, the lesson will cover the properties of liquids and gases as well as the preventive measures to take in handling, storing, and using the hazardous substances.

The instructor should also point out that many of the liquids and chemical substances used on construction jobs can, if not safely handled, produce serious occupational diseases. Many substances are irritating to the skin and eyes, and others are toxic through inhalation and ingestion. Operations such as tunneling, sandblasting, grinding, and stone cutting can also produce harmful dust and vapors.

In addition to the gases, liquids, and chemical substances, the lesson will cover the handling and storage of other materials such as lumber, miscellaneous steel, sacked material, brick, tile, and pipe and such operations as unloading railroad cars, storage bins, and hoppers.

The importance of "Planning For Safety" should be emphasized at the beginning of the lesson. Explain that it has been estimated that at least 80% of all accidents can be prevented by pre-job planning which makes it possible to recognize and control hazards before they cause an accident or loss such as a fire. Planning a fire prevention and control program can be given as an example with the following points being made.

1. The need for cooperation between the contractor and the fire department.

2. The need for adequate equipment (extinguishers, hydrants, sprinklers, hoses, etc.) and reporting procedures designed to meet the needs of the job.
3. The importance of regular fire inspections.
4. Use and care of temporary heating devices.
5. Cooperation with the fire insurance carrier.

DEVELOPMENT

1. Flammable gases and liquids
   a. Properties
      Q: What are the physical and chemical properties of flammable liquids and gases? (Develop the full meaning, characteristics, and safe aspects of these properties.)
      A: (1) Flash point.
      (2) Fire point.
      (3) Ignition temperature.
      (4) Specific gravity.
      (5) Vapor density.
      (6) Rate of diffusion.
      (7) Boiling point.
      (8) Spontaneous heating.
      (9) Mixability with water.
      (10) Extinguishing agent.
      (11) Toxicity.
   b. Ignition
      Q: The danger with flammable gases and liquids is the igniting. What are the ways they are ignited? (Develop fire triangle.)
      A: (1) Spontaneous.
      (2) Flame.
      (3) Spark.
      (4) Heat.
      Q: How can the hazard of sparks be eliminated around flammable materials? (Fully develop precautionary measures.)
      A: (1) Electrically ground moving and stationary parts of machinery.
      (2) Use enclosed motors and switches.
      (3) Check electric wiring and fixtures for arcing.
      (4) Use keyless type lamp sockets.
      (5) Enclose lamp bulbs in vapor-proof glove.
      (6) Don't strain gasoline through chamois skin.
      (7) Avoid striking together two pieces of metal.
      (8) Don't wear shoes with nails.
   c. Handling, storage, and use
      Q: What are the most prevalent safety violations in handling, storage, and use? (Discuss ways to eliminate each.)
      A: (1) The failure to read, understand, and follow the labeling instructions as provided by the manufacturers.
      (2) Poor housekeeping.
         (a) Oily rags, waste, and other substances.
         (b) Open containers.
      (3) Cleaning with gas.
      (4) Spillage or leakage of gases.
      (5) Transferring of flammable liquids in unventilated areas.
      (6) Entering area containing toxic gases.

(7) Not wearing proper clothes (especially when handling acids, benzol, and caustics).
(8) Storing in a nonfire-resistant structure or next to other structures.
(9) Improper ventilation or improper use of respiratory systems.
(10) Failure to protect skin and apply first aid.
(11) Improper use of solvents.
(12) Failure to post and enforce warning signs.
(13) Improper method of repairing tanks or drums.
(14) Failure to wear the required personal protective equipment such as goggles, respirators, gloves, etc.

Q: What are the proper methods of cleaning tanks before repairing? (Discuss details of each.)

A: (1) Steaming.
(2) Inert gases.
(3) Natural gas.

d. Fueling equipment

Q: What are the safety rules to observe in fueling equipment?

A: (1) Shut off engine.
(2) Avoid spillage.
(3) Don't smoke.
(4) Have fire extinguishers available.
(5) Use proper equipment.

2. Handling and Storage of Materials

a. General

Q: What are ways to provide safe storage? (Discuss improper as well as proper methods.)

A: (1) Segregate as to kind, size, and length.
(2) Place in neat, orderly pile safe from falling.
(3) Provide passageways in storerooms or warehouses.
(4) Collect and dispose of scrap.

Q: What are some of the general requirements for a storage area? (Develop methods of accomplishment.)

A: (1) Adequate fire extinguishing equipment.
(2) Fire resistant construction.
(3) Located away from other buildings.
(4) Free from spillage.
(5) Well ventilated.
(6) Adequately lighted.
(7) No smoking.

Q: What should be required of dispensing equipment? (Develop specific requirements for pumps, cans, funnels, etc.)

A: (1) Clean and free of contamination.
(2) Good condition.
(3) Stored in safe place when not in use.
(4) Identify purpose of equipment.

b. Personal handling

Q: What are some of the factors to be concerned about in lifting and moving heavy objects? (Illustrate the general rules for proper lifting.)

A: (1) Proper method.
(2) Possible back injury and hernia.
(3) Enough people.

c. Lumber

Q: What is the safe method to stack lumber? (Elaborate on details of each.)

A: (1) Cross-strip or cross-pile stack over 4 ft. high.

(2) Remove nails before stacking.
(3) Use two men to handle long or heavy boards.
(4) Keep piles as level as possible.
(5) Watch plumbness of corners.

d. Sacked materials

Q: What should we watch for in safely storing sacked materials? (Develop details for storing such items as cement and lime.)

A: (1) Height and stability of piles. (Not more than 10 sacks high.)
(2) Strength of supporting members.
(3) Best method of cross-piling and step backs.
(4) Mouth of bags facing center of pile.
(5) Keeping piles level especially during removal.
(6) Condition of storage place.
(7) Wearing proper clothes for protection.
(8) Keeping lime dry to prevent skin burns.

e. Brick and tile

Q: What are the best practices to observe in storing bricks and tile? (Develop safety reason for each.)

A: (1) Maximum height six feet.
(2) Piles over four feet high should be stepped back.
(3) Freedom from tipping or dislodging.
(4) Stack tile in vertical position.
(5) Don't store on scaffolds or runways.
(6) Stack in such a manner as to make handling easy.
(7) Protect from rain and freezing.

f. Pipe and reinforcing steel

Q: What are the precautionary measures to take in handling and storing pipe and reinforcing steel? (Explain safe measures for the two separately as appropriate.)

A: (1) Method of stacking.
(2) Method of removal from stacks.
(3) Use of personnel.
(4) Use of dollies, cranes, pipesticks, etc.
(5) Pipe 2" in diameter or larger should be handled with mechanical equipment.

g. Bulk cement and lime

Q: What are we concerned with in safely handling and storing cement and lime? (Develop details of each.)

A: (1) Posting of "Warning" signs.
(2) Design of bins and hoppers.
(3) Method of entering bins and hoppers.
(4) Respirators and goggles.
(5) Tight-fitting clothing.
(6) Personal cleanliness.

h. Unloading railroad cars

Q: What safety precautions should be taken when unloading railroad cars?

A: (1) Proper warning signs and signals.
(2) Workmen stay clear of material being moved by equipment.
(3) Proper use of gangplank.
(4) Proper method of moving cars.
(5) Chocking of cars.
(6) Use of safety wrenches on drop bottom cars.

i. Petroleum products

Q: What are the precautions to take in handling and storing petroleum products? (Develop methods to accomplish each.)

A:
(1) Identify containers.
(2) Grounding of containers.
(3) Avoiding contamination.
(4) Keeping storage area free of accumulations of spillages, debris, and other hazards.
(5) Storing away from other buildings and compressed gases.
(6) Proper fire-extinguishing equipment provided.

QUIZ ON
FLAMMABLE GASES AND LIQUIDS
HANDLING AND STORAGE OF MATERIALS
FIRE HAZARDS

True-False:

1. The basic cause of most accidents is poor planning.

2. A big cause of back injury is lifting; therefore, the lifting of heavy loads should be accomplished with back straight and lifting by straightening the legs.

3. When removing materials from high piles, tops of piles should be maintained as level as possible.

4. Cans containing flammable liquids need not be identified as to content if they are Underwriters' Laboratories labeled.

5. When stripping form lumbe , nails need not be removed or bent down until all stripping has been completed.

Multiple Choice:

6. The oil house should be a space:
   (a) In the opposite end of the building from the office space.
   (b) Near the point of greatest usage.
   (c) Built of fire-resistant construction.
   (d) All of the above.

7. The rules to follow in fueling equipment are:
   (a) Shut off the engine.
   (b) Have filled fire extinguisher available.
   (c) Sand spillages immediately.
   (d) Do not smoke when over the gas tank.
   (e) All of the above.

8. Keeping equipment well maintained and in a safe condition can *best* be accomplished by:
   (a) Keeping operating parts well oiled or greased.
   (b) Doing all major repair work promptly.
   (c) Having a well-organized maintenance system.

9. Flammable liquids should be stored in spaces that are:
   (a) Ventilated.
   (b) Isolated.
   (c) Of fireproof construction.
   (d) All of the above.

10. Liquids in unmarked containers should be:
    (a) Considered safe for use.
    (b) Considered non-flammable.
    (c) Considered flammable, toxic, and irritating until otherwise identified.

ANSWERS TO QUIZ ON FLAMMABLE GASES AND LIQUIDS HANDLING AND STORAGE OF MATERIALS FIRE HAZARDS

1. True.

2. True.

3. True.

4. False.

5. False.

6. c.

7. e.

8. c.

9. d.

10. c.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 7
EXCAVATION AND SHORING,
FLOOR AND WALL OPENINGS,
PIPELINES
2-HOUR CONFERENCE

OBJECTIVES: To provide the construction supervisor with a thorough knowledge of the causes of accidents in the field of excavation and pipe laying and ways to prevent these accidents. Shoring, floor and wall openings for both excavations and building construction will be stressed.

TEXT: AGC's Manual of Accident Prevention in Construction (Excavation and Shoring, Floor and Wall Openings, Pipelines).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

How many times have we heard of fatalities or near fatalities at a construction site which were caused by the failure to shore for excavation or by inadequate shoring? The same can be said about failure to observe safety precautions in laying pipe and inattention to floor and wall openings in construction. (Cite an appropriate experience relating to the above.)

This lesson will be in these three fields: 1. Excavation and Shoring; 2. Pipelines; 3. Floor and Wall Openings.

Since these areas have a high incidence of accidents, each should be thoroughly explored to see if the reasons for related accidents can be determined and ways found to prevent these accidents.

DEVELOPMENT

1. Excavation and shoring
   a. Excavation
      Q: Before commencing an operation, what precautionary measures should be taken? (Discuss methods of handling the problems to provide for a safe operation.)
      A: (1) Check for foundation cracks and uneven settlements.
      (2) Check for existing utilities, especially underground.
      (3) Check out hauling route and disposal area.
      Q: How can we provide for safety around open cuts adjacent to thoroughfares? (Develop methods.)
      A: (1) Barricade and post warning signs.
      (2) Lighting during hours of darkness.
      (3) Observance of local ordinances.
      (4) Proper handling of traffic.
   b. Sidewalk and walkway construction
      Q: What should we watch for in assuring safe sidewalks to protect traffic? (Develop details of each with emphasis on maximum protection for workmen and public.)
      A: (1) Use guard rails or fences.
      (2) Watch for and shore undermines.
      (3) Routing traffic and barricading.
      (4) Providing overhead protection when necessary.
      (5) Lighting and proper posting.
      (6) Utilizing signalmen.
      (7) Bracing when near excavating holes.
      Q: How can we provide safe plank walkway? (Develop means of accomplishing.)

A: (1) Sturdy lumber free from nails, large knotholes, and splinters.
(2) Planking should be parallel to the movement of traffic.
(3) Securely fastened down.
(4) Eliminate tripping hazards.
(5) Bevel exposed ends of planks.
(6) Provide steps or ramps for rises.
(7) Cleat steep inclines.
(8) Cover pipes, hoses, power lines, etc.

c. Equipment

Q: What are some of the safety procedures to observe when operating excavating equipment? (Develop the detailed methods of accomplishing each.)

A: (1) Only the operator in the cab during the operation.
(2) Use mats or heavy planking on soft ground.
(3) Keep workmen away from swing of equipment and out of buckets.
(4) Watch for need for bracing and shoring to prevent cave-ins.
(5) Operator should never leave cab when motor clutch is engaged.
(6) No one should climb on the boom when machine is operating.
(7) Keep equipment clean.
(8) Check wear on such items as ropes, drums, and shackles.
(9) Lifting equipment should be kept on ground or blocked when not in use.
(10) Moving parts of the machinery should be guarded.
(11) When using electric-powered equipment, check for proper insulation and guarding of wire.
(12) When equipment is fueled, watch for leaky fuel lines and storage tanks.
(13) Fire and first-aid equipment should be kept handy and operator and oiler instructed in their use.
(14) Watch for unsafe storage of gasoline.
(15) Provide necessary ramp and runways.

Q: What is to be considered in the construction of ramps and runways for equipment? (Discuss reasons for and means of accomplishing each.)

A: (1) Strength.
(2) Slope and grade.
(3) Minimum width.
(4) Provide towing winch if ramp slope is over 15 degrees.
(5) Guard rails or curbs.

d. Shafts

Q: What are the safety precautions to take in the sinking of shafts? (Develop the safe procedures.)

A: (1) Guard around the opening.
(2) Protection from falling materials.
(3) Check for hazardous gases and sufficient oxygen for breathing.

e. Cofferdams

Q: What are some of the safety worries in the construction of a cofferdam?

A: (1) Design and construction of sufficient size and strength.
  (a) Connections.

(b) Binding of top of sheet piling to prevent inward movement.
(2) Means for rapid personnel exit.
(3) Workmen must wear hard hats.
(4) Tools or loose lumber lying around.

f. Shoring
Q: How do you provide for safe shoring? (Discuss methods of shoring and minimum requirements included in Manual of Accident Prevention in Construction, AGC.)
A: (1) Have solid bearing for sole pieces.
(2) See that lower end of diagonal bracing has adequate bearing.
(3) Have diagonal bracing and jacks of sufficient strength.
(4) Properly center load on jacks.

2. Floor and wall openings
a. Operations
Q: How do we protect the workmen and the public from falls and falling objects?
A: (1) By covering or barricading all floor openings over 16 square inches in area.
(2) By use of guard or safety rails on wall openings.
(3) Covered, well lighted walkways for public passage.
Q: Where are guard rails, barricades, covered walkways, and ramps needed?
A: (1) Around floor or wall openings, excavations, or trenches where possibility exists of injury to passersby or damage to equipment or material.

b. Requirements
Q: What are the general requirements for floor and wall opening protection?
A: (1) Use sound material for covers, guard rails, and barricades.
(2) Top guard rail height between 36" and 42".
(3) Toe-boards of proper material located close to edge of platform or opening.

3. Pipelines
a. Trench excavation
Q: What can be done to make trench construction safe? (Stress caution in preventing cave-ins and discuss characteristics of soils.)
A: (1) Shore and/or brace when excavating below four feet unless banks are sloped to angle of repose or in solid rock, regardless of length of time trench will be open.
(2) Carry shoring and bracing down with the trench and keep it up with excavating operation.
(3) Place excavation material at least two feet back from top edge of trench.
(4) Keep personnel away from excavating machinery.
(5) Keep workmen separated.
(6) Wear hard hats in trenches.
(7) Wear safety shoes.
(8) Provide ladder every 50 feet.
(9) Utilize sheet piling when in unstable material.
(10) Barricade with lights on open trenches.

b. Handling pipe
Q: What is the proper way to handle pipe? (Discuss specific methods for various sizes, stressing the safety aspects.)
A: (1) Roll from truck using skid.

(2) Utilize proper type sling.
(3) Use mechanical equipment for pipe over 50 pounds.

c. String pipe
Q: What is necessary in making the string pipe safe? (Develop these methods.)
A: (1) Unload pipe from end, making sure everyone is clear.
(2) Use special pipe handling tools.
(3) Keep intersections, driveways, and walkways free of pipe.
(4) Lights and barricades where danger to passersby exists.

d. Machine trenching
Q: What precautions do you take to provide safety with trenching machines?
A: (1) Don't grease or oil while in motion.
(2) Guard moving parts.
(3) Keep unnecessary people away from machinery.
(4) Operations and equipment lighted by night and flagged by day.
(5) Use safety cans for fueling and ground container to prevent static electric sparks.

e. Hand trenching
Q: What are some of the hazards in hand trenching operations? (Develop methods of eliminating hazards.)
A: (1) Men too close together.
(2) Rock or tools falling or sliding into trench.
(3) Pebbles or small stones flying from tires of adjacent traffic.
(4) Cave-ins.
(5) Inadequate staging or platforms.

f. Pipe laying
Q: What precautions should be taken before laying pipe?
A: Check all shoring, ladders, boxes, or shields before use.
Q: What precautions should be taken before working inside a pipe line?
A: (1) Check for fire hazard around gas or oil lines.
(2) Check that proper ventilation is provided for workmen.
(3) Never have a person alone in a line unattended. Use life line.

g. Leaking lines
Q: What is the safest method to uncover a leaking gas or oil line? (Stress danger.)
A: (1) Utilize the greatest care.
(2) Purge or dilute affected area.
(3) Use hand tools.
(4) Watch for stone and metals.

QUIZ ON
EXCAVATING AND SHORING, FLOOR AND WALL OPENINGS
PIPELINES

True-False:

1. The usual way that pedestrian traffic can be protected from excavated holes is with guard rails.

2. Location and protection of underground utilities should be determined before starting any trenching or excavation operations.

3. Only floor openings over 6 square feet in area should be covered and guarded.

4. The only special protection necessary for a paving breaker operator is gloves.

5. Personnel excavating in trenches should be a shovel's length apart.

Multiple Choice:

6. What should be your usual guide on when to use shoring in a deep pipe laying operation?
   (a) Width of trench.
   (b) When excessive rain is expected.
   (c) Angle of repose of material in trench sides, or trench cut in solid rock.
   (d) All of the above.

7. Walkways over excavated holes or trenches that are used continually should be provided with:
   (a) Guard rails.
   (b) Toe-board.
   (c) Lights.
   (d) All of the above.

8. When heavy excavating equipment is operated on soft or unstable ground, it is necessary to:
   (a) Wait until it stops raining.
   (b) Use flagmen.
   (c) Use mats or heavy planking under equipment.
   (d) None of above.

9. Shoring and bracing of deep trench should be done:
   (a) As soon as the trenching is completed.
   (b) When required by the safety engineer.
   (c) Carrying down with the trench.
   (d) Before an expected rain storm.

10. Heavy pipe weighing 50 pounds or more should be unloaded from trucks by:
    (a) Easing off with pick handles.
    (b) Mechanical handling.
    (c) Rolling off on rope mats.
    (d) Any of the above.

ANSWERS TO QUIZ ON
EXCAVATING AND SHORING
FLOOR AND WALL OPENINGS
PIPELINES

1. True.

2. True.

3. False.

4. False.

5. False.

6. c.

7. d.

8. c.

9. c.

10. b.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 8
PILE DRIVING
2-HOUR CONFERENCE

OBJECTIVES: To provide the construction supervisor with a knowledge of the hazards of pile driving, enabling him to recognize unsafe features and conditions and be able to rectify them.

TEXT: AGC's Manual of Accident Prevention in Construction (Pile Driving, Marine Equipment).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

In a pile driving operation safety depends on the workmen having steady nerves, and on them and their supervisor being alert, skilled, and experienced, but most of all it depends on their having foresight: on their always being alert to what could happen next, or how to correct a situation before getting into it. This course is designed to give the supervisor a knowledge of the many hazards that could exist and the ways to eliminate or minimize these hazards. His being aware of the hazards will prepare him with the needed foresight.

This knowledge is very important because the pile driver supervisor many times finds himself not only responsible for valuable pieces of equipment, but also entrusted with the lives of other workmen.

DEVELOPMENT

1. Clothing

Q: What clothes should workmen wear when handling piles? (Discuss the importance of each and the occasions when they should be worn.)

A: (1) Heavy gloves.
(2) Safety shoes.
(3) Shin and foot guards.
(4) Hard hat.

2. Unloading

Q: What are two common ways of unloading piles from train cars? (Develop safe method of accomplishing task by both methods.)

A: (1) Winch.
(2) Hand.

3. Preparing (Wood)

Q: What are some safe measures that should be taken in preparing wood piles?

A: (1) Men trimming or pointing piles should be spread out and should watch for flying chips.
(2) Place driving cap on pile before lifting into position.

4. Positioning

Q: What are the precautions to take in positioning piles? (Develop details of each.)

A: (1) Have only necessary people in area.
(2) Arrange piles in the order they will be driven.
(3) Have driving end of pile nearest operator.
(4) Use tagline for steadying pile.
(5) Make sure machine is stable.

5. Driving

Q: How can the pile driving operation be made safe? (Develop detailed methods.)

A: (1) Guide man must avoid putting arm or hand between pile and inside guide.
(2) Use ropes for guides.
(3) Use experienced, alert personnel.
(4) Keep ropes neatly coiled.
(5) Protect personnel from sheaves.
(6) Guard against injury from [illegible]
(7) Wear protective clothing.
(8) Use agreed, effective signals [illegible] designated signal man.

6. Equipment

Q: What measures should be taken to make the equipment safe? (Develop reasons and methods.)

A: (1) Have moving parts enclosed.
(2) Keep in good condition. Be especially watchful of boilers, drums, and brakes.
(3) Have strong ladder securely fastened to entire height of rig.
(4) Keep steam or air hoses securely fastened to hammer.
(5) Avoid blowing down lines when personnel are near.
(6) Have steam or air supply line shutoff valve in reach of operater.
(7) Use metal-armored hose.
(8) Keep hose in good condition, watch couplings.
(9) Watch for necessity for guys, mats, and cribbing.
(10) Have a good inspection and maintenance system.
(11) Don't make repairs while equipment is operating.
(12) When equipment is shut down, relieve pressures, lower hammer, and block.

QUIZ ON
PILE DRIVING

True-False:

1. When shutting down a rig, all [illegible] should be drawn so there will be a tension on each.
2. A workman should use foot stirrups to sit astride the adjacent pile when guiding new sections of cofferdam piles into place.
3. Gears, fly wheels, and drive shafts of pile driving rigs should be fully enclosed.
4. The best time to place the cap over a wood pile is after it is set into position.
5. When driving steel sheet piles, one rig should be used for setting and another for driving.

Multiple Choice:

6. All men handling piles should wear
   (a) Heavy gloves.
   (b) Safety shoes.
   (c) Hard hats.
   (d) All of the above.

7. The best way to unload piles from the side of a railroad car when most of the supports have been released is:
   (a) Jump back and stand clear.
   (b) Prop timber on side being unloaded and use jack to release timber
   (c) Use temporary manila rope held on opposite side from where piles are being unloaded and release rope with caution
   (d) Any of the above.

8. Removal of cofferdam piles is very hazardous. These hazards are:
   (a) Breakage of extractor hook or cables.
   (b) Bending of boom or overturning of machinery.
   (c) Screwbolt coming out of extractor pin.
   (d) All of the above.

9. When pile driving apparatus is required to work in soft soil, the following should be used:
   (a) Mats.
   (b) Cribbing.
   (c) Guying.
   (d) All of the above.

10. It is important to maintain a cofferdam by building and maintaining a substantial berm:
    (a) On the upstream side.
    (b) Alongside.
    (c) At the outer ends.
    (d) All of above locations.

ANSWERS TO QUIZ ON PILE DRIVING

1. False.
2. True.
3. True.
4. False.
5. True.
6. d.
7. c.
8. d.
9. d.
10. d.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 9
MARINE EQUIPMENT
2-HOUR CONFERENCE

OBJECTIVES: To provide the construction supervisor with a knowledge of the hazards of marine operations, enabling him to recognize unsafe features and conditions and to rectify them.

TEXT: AGC's Manual of Accident Prevention in Construction (Pile Driving, Marine Equipment).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

Many times the safety of a marine operation is dependent on the alertness and knowledge of the supervisor of the operation. This lesson will provide the supervisor with a knowledge of the many and probable hazards and show ways to eliminate or minimize them. (Cite an interesting and appropriate example of the above.)

DEVELOPMENT

1. Marine Operation
   a. Personnel safety
      Q: What are some of the things that should be provided to make it safe for personnel working above water? (Discuss details for use of each.)
      A: (1) Life lines with ring buoys.
         (2) Skiff or personnel boat.
         (3) Secure gangplank provided with cleats and handrails.
         (4) U.S. Coast Guard approved life vests.
         (5) Hard hats and proper eye protection.
      Q: When should life preserver vests be worn? (Discuss each and discuss method of testing vest.)
      A: When in or on:
         (1) Small open craft.
         (2) Floating pipe line.
         (3) Barges and floating plant not protected with guardrails.
         (4) Structures extending over water.
         (5) Vessel, when working alone at night and drowning hazard exists.
   b. Setting and driving steel piles
      Q: Besides measures taken to protect personnel just covered, what other safety measures should be taken in setting and driving interlocking steel sheet piling in water?
      A: (1) Tagline lower end of piles.
         (2) Use foot stirrups over top of adjacent pile when setting.
         (3) Wear gloves in handling piles.
         (4) Keep unnecessary personnel away from operation.
         (5) Watch where hands are placed in guiding piles.
         (6) Use different rigs for setting and driving whenever practicable.
         (7) Watch to keep parts of the body from between piles.
         (8) Brace bottom of sections when involved with current.
   c. Cofferdams, placement and use
      Q: How do we maintain safe cofferdams and protect person-

nel working in them? (Develop best methods to accomplish.)

A: (1) Frequent inspection of washouts.
(2) Adequate pumping capacities.
(3) Stairways for emergencies.
(4) Have life preservers and personnel boats available.

d. Cofferdam removal

Q: Why is the removal operation so hazardous? (Develop ways to minimize the hazards.)

A: (1) Piles become rusty and joints are filled with dirt.
(2) Deformed piles.
(3) Strain placed on extractor hook, cables, and boom.
(4) Current.

2\. Marine Equipment

a. General

Q: What makes marine equipment such as barges, dredges, quarterboats, and power-propelled boats safe?

A: (1) Experienced crew.
(2) Life preserver vest for each person.
(3) Adequate and proper type fire extinguishers.
(4) Adequate guard rails.

b. Clothing

Q: What are some of the types of protective equipment and clothing that should be worn when working on marine equipment? (Discuss when each is applicable.)

A: (1) Hard hats. (Dielectric recommended.)
(2) Proper eye protection.
(3) Special shoes.
  (a) Nonskid soles.
  (b) Safety toes.
  (c) Metal-free heel and toe plates.
(4) Work gloves.

c. Fire hazards

Q: What are the best ways to protect marine equipment from damage by fire? (Develop specifics of each and use inspection checklist in AGC's Accident Prevention Manual.)

A: (1) Make continuous inspections for:
  (a) Filled fire extinguishers of adequate number and type.
  (b) Extinguishers located in prominent, accessible places.
  (c) Gasoline and oil fumes.
  (d) Method of containing or valving-off the above.
  (e) Adequate ventilation.
(2) Provide drill at least once a month and educate crew in method of spreading the alarm and putting out the fire.
(3) Prohibit smoking in unsafe areas.

d. Dredges

Q: What are the precautionary measures to be taken to make a dredge and its operators safe? (Explain proper method of accomplishing.)

A: (1) Inspect ropes, cables, chains, buckets, cutterheads, bridles, sheaves, and fittings regularly for worn or broken parts and report findings to supervisor.
(2) Shut down machine for oiling, greasing, and repairing.
(3) Keep unnecessary persons from entering gear rooms

and provide safe procedure of lockout and communications.

(4) Provide necessary rigid and sturdy handrails with walkways.
(5) Wear proper clothes and use proper methods when handling pipes and equipment.
(6) Use care in locating underwater cables, pipelines, and other hazards.
(7) Use care when working in polluted or toxic waters that contaminated equipment or parts are thoroughly flushed clean before working on them.

e. Derricks

Q: What are the precautionary measures to be taken to make a derrick boat and its operations safe? (Explain best methods of accomplishing.)

A:
(1) Wear proper protective clothes.
(2) Keep deck clean.
(3) Keep items such as hooks, slings, cables, and sheaves in good condition.
(4) Have only one man at one location give the standard signals to hoist operator.
(5) Use tag lines on unwieldy loads.
(6) Don't allow workmen to stand under loads.
(7) When taking strain off of a load, hold hooks or slings in place with a short stick.
(8) Shut down machinery for oiling, greasing, and repairing.

f. Power boats, quarter boats, and small craft

Q: What are the general safety requirements for most small craft such as barges, powerboats, quarterboats, etc.? (Elaborate only on new items and difference in requirements from those listed previously.)

A:
(1) Use life vest and nonskid type shoes.
(2) Keep decks and walking space clean and free from grease, oil, and debris.
(3) Watch for the hazardous storing and handling of fuels and lubricants.
(4) Don't allow stumbling hazards to exist.
(5) Equip boats with bails, preservers, life vests, boat hooks, lines, lights, oars, and other useful emergency equipment.
(6) Forbid smoking around flammable material and use of leaky fuel hoses, funnels, and cans.
(7) Flush and vent area containing flammable materials before welding or cutting.
(8) Provide necessary guardrails for personnel.
(9) Keep ladders and stairways lighted and clean from debris.
(10) Maintain sanitary facilities and drinking water.
(11) Provide proper lighting and ventilation in living quarters.
(12) Prevent personnel from jumping to and from boats.
(13) Operate crafts by navigational rules and regulations.
(14) Provide safety boat or personnel carriers and keep personnel informed of their application for emergency use.
(15) Make continual inspection of all of the above.
(16) Provide adequate access facilities for servicing or repairing sheaves and fittings in a free fall area.

QUIZ ON
PILE DRIVING, MARINE EQUIPMENT

True-False:

1. Gangplanks with handrails are not necessary when boarding floating rigs or crossing between barges if they are within a couple of feet of each other.

2. Railings should be 42 inches high.

3. All craft should be lighted in accordance with the applicable navigational rules and regulations.

4. The best type of gloves to wear when handling pipes and cables is cotton.

5. Floating pipe lines should be provided with walkways a minimum of 20 inches wide.

Multiple Choice:

6. Derrick crewmen, exposed to normal hazards of deck operations, should wear:
   (a) Hard hats.
   (b) Leather-palm gloves.
   (c) Life vests.
   (d) All of the above.

7. Life preservers should always be worn when working with a crew:
   (a) Inside a quarterboat.
   (b) In the galley.
   (c) Where and when drowning hazard exists.
   (d) None of the above.

8. Railing should be provided on barges and boats at:
   (a) Outer 6 inches of deck.
   (b) Open hatches.
   (c) Ladders.
   (d) All of the above.

9. Safety committees should be organized aboard dredges, large tugs, and other craft with relatively large permanent crews. Usually the person to head these committees is the:
   (a) Safety supervisor.
   (b) Captain or mate.
   (c) Engineer.
   (d) Any of the above.

10. Life preserver vests should be capable of floating a helpless person face up in fresh water. To assure that the vest is adequate, it should be tested:
    (a) Every 2 years.
    (b) At frequent intervals.
    (c) Every year.
    (d) None of the above.

ANSWERS TO QUIZ ON PILE DRIVING, MARINE EQUIPMENT

1. False.
2. False.
3. True.
4. False.
5. True.
6. d.
7. c.
8. d.
9. d.
10. b.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 10
CONCRETE CONSTRUCTION
STEEL ERECTION
POWDER ACTUATED TOOLS
SAFETY NETS
2-HOUR CONFERENCE

OBJECTIVES: To provide the construction supervisor with a better knowledge of the accident prevention measures that should be taken in working with concrete, masonry, and steel construction, and when working with powder actuated tools.

TEXT: AGC's Manual of Accident Prevention in Construction (Concrete Construction, Steel Erection, Explosives, Powder Actuated Tools).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

Many millions of dollars are spent each year on construction utilizing the materials to be covered by this lesson—concrete, masonry, and steel.

As a general rule, these materials become a part of a structure without being involved in a fatality; and the only injuries usually involve those workers whose attitude is that there is nothing hazardous about working with these materials.

Awareness of the hazard will usually eliminate the accident. Developing means to provide safe construction when utilizing these materials will be the goal of this lesson.

DEVELOPMENT

1. Concrete Construction
    a. Clothing
        Q: How do we keep from harming the body when handling cement? (Develop applicability.)
        A: (1) Cleanliness.
            (2) Goggles.
            (3) Durable, close-fitting clothing, with snug wrist, ankle, and neck bands.
            (4) Protective cream.
    b. Forms
        Q: What do we consider in selecting forming lumber supports? (Develop details.)
        A: (1) Loading factors.
            (2) Spans.
            (3) Setting temperature.
            (4) Rate of pour.
            (5) Working loads.
        Q: What are the safety hazards in a forming operation? (Develop ways of preventing these.)
        A: (1) Poor housekeeping.
            (2) Falling objects.
            (3) Poor scaffolding.
            (4) Workmen falling.
            (5) Inadequate walkways and form scaffolding.
    c. Shoring
        Q: What makes good shoring for supporting concrete forms? (Discuss general or specific method as needed for the class.)
        A: (1) Conformance with design.
            (2) Proper approved materials.

(3) Adequate footings.
(4) Erect and maintain in plumb.
(5) Properly bolted when required.
(6) Securely locked.
(7) Securely braced.
(8) Protected from damage.
(9) Watch and wedge during placement operation.

d. Removal of forms and shoring

Q: How can we make a safe operation of the removal of forms and shoring? (Develop necessity and procedures.)

A: (1) Test for strength of concrete.
(2) Personnel wearing proper clothing and protections.
(3) Centering well supported.
(4) Watching for backlash when cutting wires under tension.
(5) Using safety belts and lines when scaffolding is impracticable.
(6) Care in final release and rigging of forms.
(7) Adequate tying off and utilizing of hand lines on panel forms.

e. Towers, chutes, and spouts

Q: What do we consider in the construction and operation of good strong towers, chutes, and spouts? (Develop methods.)

A: (1) Carefully built.
(2) Supporting.
(3) Guying.
(4) Kept in good repair.
(5) Flushing out at the end of each run.
(6) Barricade below spouts.

f. Equipment

Q: What should be watched for to assure safe operation of equipment such as cranes, mixers, pavers, trucks, buggies, and concrete batching and screening plants? (Stress safety features necessary for each type of equipment.)

A: (1) Careful planning and laying out of operation.
(2) Maintaining equipment in good condition.
(3) Alert and active operators.
(4) Keeping workmen out of the wrong places.
(5) Necessary signalmen.
(6) Loud warning bells or horns.
(7) Guards around moving parts.
(8) Deep-throated hooks with swivel and safety latches in lifting cables.
(9) Prevent waste from accumulating.
(10) Inspect equipment daily, watching ropes and sheaves.
(11) Keep equipment clean.
(12) Buggy operator wears guards.
(13) Check lifting capacities of lifting equipment.
(14) Check concrete buckets, hoppers, tremies, etc.

g. Runways

Q: What are the requirements for safe runways? (Develop best ways to accomplish.)

A: (1) Strongly built.
(2) Well supported.
(3) Smooth surface.
(4) Sufficient width.
(5) Inclines provided with railing and cleats.
(6) Kept free of ice, snow, grease, mud, etc.

h. Tilt-up and preformed members

Q: What are the hazards in a tilt-up and preforming operation? (Explain operations and develop details.)

A:
(1) Organizing and planning safe operation is lacking.
(2) Overstraining equipment.
(3) Mishandling of slab.
(4) Signalman not provided.
(5) Inadequate lift attachment.
(6) Improper hooks and slings.
(7) Workmen under or near slab while it is being tilted.
(8) Slab not adequately braced in place.
(9) Bracing removed before slab is securely supported.

i. Lift-slab

Q: How can a lift-slab operation be made safe? (Develop methods and explain operation when necessary.)

A:
(1) Have knowledgeable engineer or architect.
(2) Keep columns reasonably plumb.
(3) Lift uniformly.
(4) Use scaffolding and shoring when necessary.
(5) Brace and guy for sway.
(6) Inspect before releasing load.

j. Slip forms

Q: What is dangerous about slipforming concrete? (Develop safe methods.)

A:
(1) Lifting devices not adequately or uniformly spaced.
(2) Scaffolds and platform don't provide adequate protection.
(3) Lifting devices not provided with automatic holding.
(4) Forms moved before concrete obtains sufficient strength.
(5) Lifting not steady and uniform.
(6) Forms not securely locked.
(7) Careless workmen.

k. Prestressed concrete

Q: What safety precautions should be taken in the manufacturing of prestressed concrete? (Discuss ways to implement.)

A:
(1) Keep area clean.
(2) Use experienced personnel
(3) Continually inspect equipment for wear and tear.
(4) Use extreme care in cleaning and keeping equipment clean.
(5) Use extreme caution in all operations involving stressing equipment.
(6) Keep anchor turned up close to anchor plate.
(7) Watch where workers are with respect to the jacking operation.

Q: How should prestressed units be moved? (Discuss reasons and detail methods.)

A:
(1) By specific picking points.
(2) Usually avoid handling by middle of the beam.
(3) Keep braced during transportation.
(4) Keep member upright.

Q: To assure safety in the erection of the prestressed unit, what should be checked? (Develop detailed methods.)

A:
(1) Equipment.
(2) Reach of crane.
(3) Capacity of lifting machine for radius to be used.

(4) Lift eyes.
(5) Use of spreader bar.
(6) Personnel under members.
(7) Signaling of lifting operation.
(8) Electrical wires that could touch equipment.
(9) Guying and bracing of members.

l. Cold weather concreting

Q: What makes cold weather concreting hazardous? (Develop best methods of protecting concrete.)

A: (1) Fire hazard from heater.
(2) Inadequate ventilation and lighting when covered.

2. Steel Erection

a. Riveting

Q: What precautionary measures should be taken to make riveting safe? (Develop the measures.)

A: (1) Care in throwing rivets to prevent falling, striking, or burning of persons or property.
(2) Secure snaps and plungers of pneumatic hammers.
(3) Constantly inspect nozzle of hammer.
(4) Use canvas, leather, or rope slings for riveting dollies.
(5) Keep rivets, dollies, wrenches, etc., in boxes.
(6) Prevent fires from riveters and rivet heaters.
(7) Use soft-wood, false-bottomed, cone-shaped pails.

b. Flooring

Q: Why is temporary flooring necessary in steel skeleton structures? (Develop detail of safe floor construction and use of net when flooring is not practical.)

A: (1) Protection for those below.
(2) Solid flooring for workers.
(3) Limiting fall.

c. Miscellaneous

Q: What are other safety precautions to take in working with steel? (Develop details.)

A: (1) Secure bundles of material before hoisting.
(2) Do not allow hoisting or lowering of personnel with erection equipment.
(3) Securely bolt pieces before taking off line.
(4) Secure side of cross brace trusses until they are permanently braced.
(5) Prevent overstraining of chains or slings.
(6) Carefully and frequently inspect equipment.
(7) Do not allow materials to be hoisted before they are needed.
(8) Watch for power line that may come into contact with cranes or derricks.

3. Powder Actuated Tools

a. Operator and equipment

Q: What are the safety features that should be examined about the equipment and its operator? (Develop the details of each.)

A: (1) Trained and qualified operator.
(2) Operator wears face and eye protection as needed.
(3) Check for defective or malfunctioning tools.
(4) Guard or jig is provided to confine flying particles, and tool is incapable of being fired without it.
(5) Tool operates only when there is a pressure against it.

(6) Tool won't operate if there is too much tilt of bearing surface.
(7) Tool will fire only when it is in correct position.
(8) Tool fires by two separate and distinct operations.

b. Use

Q: What should be checked before and during firing operation? (Develop safety hazards of each.)

A: (1) Use tools, fasteners, and powder as recommended by by the manufacturer.
(2) Test tools before each use.
(3) Material at which firing is directed.
(4) Breakage of edge of material and ricochets are possible.
(5) Studs may go completely through the material.
(6) Explosive or flammable atmosphere.
(7) Knowledge of corrective action required when tool misfires and jamming results.
(8) Load tool only when it is to be used.
(9) Proper handling of tool.
(10) Secure to prevent unautherized possession.

QUIZ ON
CONCRETE CONSTRUCTION
STEEL ERECTION
POWDER ACTIVATED TOOLS
SAFETY NETS

True-False:

1. Size of concrete-forming member is dependent solely on the height of the concrete to be placed.

2. Buckets of concrete pavers should be provided with alarm bells.

3. Handles of concrete buggies should be counterbalanced with loose weights for ease of handling the buggies.

4. Prestressed concrete member should usually be handled and supported at the middle point.

5. In placing concrete on a roof, the best signaling method is to have one man signaling for the raising of the bucket and another for the lowering and positioning.

Multiple Choice:

6. In lifting concrete, the equipment operator, to provide maximum safety, should be concerned with:
   (a) Cable clamps and hooks.
   (b) Capacity of equipment.
   (c) Safe reach of equipment.
   (d) All of the above.

7. When erecting steel trusses, they should be:
   (a) Temporarily fastened at ends after the line is taken off.
   (b) Side or cross-braced until permanent braces are installed.
   (c) Set in place and anchored later when permanent braces can be installed.
   (d) Securely anchored on one end.

8. The requirement that should govern the need for safety nets is:
   (a) Workmen working alone.
   (b) Type of surface under working area.
   (c) Working area is higher than 25 feet.
   (d) All of the above.

9. Workmen should be permitted to ride hoisting steel:
   (a) When traveling a short distance.
   (b) When place of location of steel is hard to get to by other means.
   (c) If steel is a large member that would not be likely to be off-balanced.
   (d) Never.

10. Runways for concrete buggies should be built with:
    (a) Even supports.
    (b) Smooth surfaces.
    (c) Handrails at inclines.
    (d) All of the above.

ANSWERS TO QUIZ ON CONCRETE CONSTRUCTION STEEL ERECTION

1. False.

2. True.

3. False.

4. False.

5. False.

6. d.

7. a. or b.

8. c.

9. d.

10. d.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 11
HOISTS, CRANES & DERRICKS
2-HOUR CONFERENCE

OBJECTIVES: To teach the construction supervisor the hazards in working on and around mobile cranes, derricks, and tower cranes and how to minimize or control these hazards.

TEXT: AGC's Manual of Accident Prevention in Construction (Mobile Cranes, Derricks, and Tower Cranes).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

The handling of heavy loads and the raising of materials to higher levels requires the use of equipment such as mobile cranes, derricks, and tower cranes. The operation of this equipment presents many hazards.

This lesson will be devoted to discussing these hazards and the methods and means by which they can be reduced.

DEVELOPMENT

1. Hoists

Q: What are the three most important considerations for the safe operations of hoisting equipment?

A: (1) Selection of qualified, able-bodied operators.
(2) Adequate training and supervision of operators.
(3) Good maintenance of equipment.

2. Mobile Cranes

Q: What are the dangers of crane operation?

A: (1) Necessary signals not provided or confusing.
(2) Crane overturning.
(3) Improper or inadequate slings.
(4) Needed taglines not used.
(5) Workmen riding loads.
(6) Improper lifting of loads.
(7) Workmen jumping from moving crane.
(8) Crane contacting electrical lines.
(9) Crane not secured when shut down.
(10) Leaving the crane with a suspended load.

3. Derricks

a. Guy derricks

Q: What do we look for in checking a guyed derrick? (Develop details of installation and importance of frequent inspection.)

A: (1) Well anchored.
(2) Securely braced.
(3) Good foundation.
(4) Secure anchorage for guy lines.
(5) Sufficient horizontal shoring securely anchored against foot block.
(6) Cracks or wear on gudgeon pin.
(7) Regular oiling of gudgeon pin, sheave pin, and foot bearing.
(8) Boom lowered when not working.
(9) Double sets of bolts to fasten legs of a stiff leg derrick.
(10) Gooseneck or spider held down with string holding down guys.

b. Stiff leg derrick

  Q: What are the special considerations for stiff leg derricks? (Describe structure, uses, and precautions.)

  A: (1) Weighting should be adequate and secure.
  (2) Special precautions needed when boom is longer than mast.

c. Gin poles

  Q: How should a gin pole be set so as to be safe? (Discuss safe usages.)

  A: (1) Use select timber, sound and free of knots.
  (2) Securely fasten at bottom.
  (3) Anchor at least one half distance of height of pole from base.
  (4) Secure end of guy lines well.
  (5) Provide at least four guys equally spaced.
  (6) Avoid splicing but if it is necessary use:
    (a) Four foot planking.
    (b) Bolt all four sides.
    (c) Guy at splice point.

d. Slings

  Q: What do we look for in a good sling and what is the proper use of slings? (Stress importance of one man being responsible for condition of slings.)

  A: (1) Lubrication of wire.

QUIZ ON
HOISTS, CRANES AND DERRICKS

True-False:

1. Shaftways should be enclosed at each floor with a railing.

2. Watch for kinks in wire rope because this is one of the most common causes of failure.

3. It is safe to ride on a bucket handling concrete and other material if there is a place to secure yourself and if the bucket isn't raised over 25 feet.

4. The use of a whistle is the best way to signal the hoist operator.

5. The safety of a crane is dependent on the capacity of load as well as the operating boom angle.

Multiple Choice:

6. Wire rope used for hoisting should be inspected at least once a week and rope use discontinued if there is:
   (a) Marked signs of corrosion.
   (b) Two per cent of the total wires broken in any running foot.
   (c) Wires on the crown of the strands are worn down to 15% of their area.
   (d) Any of the above.

7. When handling a load with a crane, to make the operation safe:
   (a) Hook should be on the side of the load being lifted.
   (b) Shackle or moused hook should be used with a swinging bucket.
   (c) Use of a tagline should be avoided.
   (d) All of the above measures should be employed.

8. The distance that should be maintained between electrical power lines and the crane boom is:
   (a) Minimum of 2 feet.
   (b) Dependent on current in the line.
   (c) Minimum of 6 feet.
   (d) A few inches, since the electricity is harmless to the operator.

9. In securing cranes at night, the operator should leave:
   (a) Boom raised.
   (b) Controls unlocked.
   (c) Gear in high.
   (d) On firm and secure ground.

10. The proper use of slings is very important. The sling:
    (a) Should be used until completely worn out.
    (b) Should be wrapped around the materials so as to conform to the sharp corners.
    (c) Should be kept dry of all liquids.
    (d) Eye splices should have thimbles in them.

ANSWERS TO QUIZ ON HOISTS, CRANES AND DERRICKS

1. False.
2. True.
3. False.
4. False.
5. True.
6. a.
7. b.
8. c.
9. d.
10. d.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 12
TRAFFIC CONTROL
2-HOUR CONFERENCE

OBJECTIVES: To teach the means for planning and controlling traffic during the construction of highways and streets, stressing the various methods of handling traffic and eliminating interference between traffic and construction operations.

TEXT: AGC's Manual of Accident Prevention in Construction (Traffic Control).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

Street and highway construction poses a greater variety of safety problems than most other fields of heavy construction. The main reason for this is that the construction work area is either shared by or in close proximity to public traffic. The workman finds the hazards fivefold: the public, his fellow workmen, equipment and materials, public utilities, and the completed work. There always exists the problem of how the work can be most economically accomplished in the safest way with the most convenience to the contractor and the least inconvenience to the public.

The purpose of these lessons is to provide the knowledge that will help make the solution to the problem easier and also reduce the number of accidents by making workmen aware of the hazards and of the ways to eliminate or prevent them.

DEVELOPMENT

1. Planning

Q: What are the considerations in planning a safe job? (Discuss importance of thorough planning, ways to accomplish the safest job, and rules for traffic signs, lighting, marking, barricades, etc.)

A:
- (1) Protection of workmen.
- (2) Protection of public.
- (3) The least inconvenience to the public.
- (4) Amount and composition of traffic.
- (5) Job conditions:
  - (a) Approach speed.
  - (b) Sight limitations.
  - (c) Complicated intersections.
  - (d) Roadside conditions.
- (6) Need for:
  - (a) Safety, direction, and warning devices.
  - (b) Lighting and marking.
  - (c) Barricades.
  - (d) Flagmen.

Q: What should be investigated in determining the qualifications of a flagman? (Discuss qualities of each.)

A:
- (1) Average or better intelligence.
- (2) Physical condition.
- (3) Alertness.
- (4) Courteous but firm manner.
- (5) Appearance.
- (6) Personality and mannerisms.
- (7) Sense of responsibility.

Q: What should be the requirements for a flagman? (Develop specifics.)

A: (1) Wear suitable clothing, especially at night.
(2) Use large, clear, appropriate flags.
(3) Use lights at night.
(4) See workmen and equipment and know their activities.
(5) Make himself seen soon enough.
(6) Know where to stand.
(7) Know how to handle traffic flags, paddles, and lanterns.
(8) Know how to inform drivers of reasons.
(9) Stay with the job.
(10) Know traffic signals.

2. Application of Signs and Devices

a. Barricades

Q: What are the types of barricades and fence? (Develop details and application of each.)

A: (1) Fence barricades.
(2) Horse barricades.
(3) Pedestrian fence.
(4) Flexible cones.

b. Lights and marking devices

Q: What are the types of lighting and marking devices? (Develop details and applications.)

A: (1) Reflective sheeting.
(2) Reflector buttons.
(3) Reflective paint.
(4) Battery operated lights.
(5) Electric lights.
(6) Lanterns.

c. Marking

Q: What is the purpose of marking traffic area? (Develop necessity of application and methods.)

A: (1) Advance warning.
(2) Instructions or specific warning.
(3) Point of application.
(4) Termination.

d. Detours

Q: How could you apply the above marking for detours? (Discuss information [illegible] should be included on marking and appropriate time [illegible] all.)

A: (1) Advance—500 feet.
(2) Intersections—near turn.
(3) Point of application—half-mile intervals.
(4) Termination—75 to 100 feet beyond.
(5) One-way traffic.

Q: What should be the guide for requiring and handling one-way traffic? (Develop problem areas and solutions.)

A: (1) Roadway less than 18 feet wide.
(2) No detour route available.
(3) Length of one-way section.
(4) Speed traffic can maintain.
(5) Maximum waiting time for vehicles.

3. Equipment

Q: When is road construction equipment hazardous to traffic? (Discuss importance of controlling construction equipment and traffic.)

A: (1) Close to or part of traffic.
(2) Crossing traffic.

4. Urban Construction

Q: In urban areas, space for construction activities is often limited. What steps can be taken to minimize the traffic interference problem? (Develop methods.)

A: (1) Provide storage off site.
(2) Prompt removal of anything not in use.
(3) Work nights and off-peak times.
(4) Use combination detour and one-way traffic.

Q: What are some differences in traffic problems in urban and country work?

A: (1) Intensity of light.
(2) Spacing of signs and warnings.
(3) Visibility of signs.
(4) Consult with mass transit company about rerouting.
(5) Close liaison with traffic authorities.

5. Location of Traffic Control Devices

Q: What governs the location of traffic control devices?

A: (1) Knowledge of conditions.
(2) Laws and regulations.

QUIZ ON
TRAFFIC CONTROL

True-False:

1. Only one good sign properly installed is necessary for marking construction zones.

2. At crossings where there is a flagman, private vehicles should be given the right-of-way over construction equipment.

3. In order that signs may be comprehended and executed safely, they should be limited to three or four words.

4. Advance warning signs should be placed only at project limits.

5. The lighting intensity on urban construction work should usually be higher than in rural areas.

Multiple Choice:

6. In planning the safety of a road construction job, it is *not* necessary to know the:
   (a) Complexity of the nearest intersection.
   (b) Approaching traffic speed.
   (c) Local laws and regulations.
   (d) Volume of traffic.

7. To assure that signs are in proper position, clean, and legible to traffic, they should be:
   (a) Mounted on rigid post in the middle of the road so that maintenance will not be necessary.
   (b) Inspected daily.
   (c) Mounted 8 feet high.
   (d) Installed within a couple of feet to the right of the traffic lane.

8. One-way traffic should be required when road is:
   (a) Dusty.
   (b) Used by trucks.
   (c) Less than 18 feet wide.
   (d) Being crossed by equipment.

9. For controlling traffic, the flagman should use:
   (a) Yellow or yellow-and-white flag in daylight.
   (b) A white lantern at night.
   (c) Red clothes in daylight.
   (d) Dark clothes at night.

10. In planning for a safe job, the contractor should consider:
    (a) Protection of public.
    (b) Protection of workmen.
    (c) Convenience to the public.
    (d) All of the above plus protection of equipment and materials.

ANSWERS TO QUIZ ON TRAFFIC CONTROL

1. False.
2. True.
3. True.
4. False.
5. True.
6. a.
7. b.
8. c.
9. c.
10. d.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 13
HEAVY EQUIPMENT, MOTOR TRUCKS, GARAGES AND REPAIR SHOPS
2-HOUR CONFERENCE

OBJECTIVES: To teach construction supervisory personnel the safety precautions applicable to heavy equipment, trucks, garages, and repair shops, the hazards and unsafe practices, and the way to prevent accidents in these fields.

TEXT: AGC's Manual of Accident Prevention in Construction (Earth Moving and Handling Equipment, Motor Vehicles, Equipment Maintenance).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

Accidents with construction equipment and trucks are generally caused by inadequately qualified operators and inadequate maintenance. The equipment supervisor should carefully select his operators and should instruct them in the safety precautions they must observe. He should see to it that the manufacturers' maintenance recommendations are followed.

In this lesson we will discuss the safety precautions necessary in equipment operation as well as some of the safety precautions which should be observed in garages and repair shops.

DEVELOPMENT

1. Heavy Equipment
   a. General

Q: Often accidents are caused by inadequately planning the layout for the construction site. What should be considered when laying out roads for equipment? (Develop specifics.)

A: (1) Adequate width.
(2) Minimum grade.
(3) Proper means for maintaining.
(4) Utilities, particularly high-voltage lines.
(5) Traffic flow plan.

Q: Since all roads often become dusty and hazardous, what can be done to eliminate this problem? (Develop best methods.)

A: (1) Sprinkle.
(2) Water.
(3) Treat chemically.

Q: What characteristics should be expected of an equipment operator? (Develop significance of each and methods of determining.)

A: (1) Active.
(2) Able-bodied.
(3) Possess visual acuity.
(4) Trained and qualified.
(5) Know the hazards of his work.

Q: All equipment should be maintained in good working order. What are some of the parts that should be checked each day? (Develop details of checks.)

A: (1) Motor.
(2) Chassis.
(3) Blades.

(4) Drives.
(5) Tracks.
(6) Transmission.
(7) Hydraulic mechanisms.
(8) Sheaves and wire rope.
(9) Wheel and motor bolts.
(10) Steering linkage.

Q: What should you be watching and checking to assure that an equipment operator is performing a safe job? (Stress necessity for continual patrol to assure operators are safe.)

A: (1) Proper equipment with necessary safety features in use for a job.
(2) Knowledge of the details of his job.
(3) Knowledge of equipment manufacturer's instructions.
(4) Observes safety regulations.
(5) Speed consistent with road and traffic conditions and loading.
(6) Planned his operations.
  (a) Adequate width working room.
  (b) Minimum of dust.
(7) Machine not left on incline or on loose material when idling.
(8) Checks to be sure that workmen are clear of machines.
(9) Prohibits riders.
(10) Forbids jumping on and off machine at any time.
(11) Doesn't direct traffic while operating machine.
(12) Parks off roadway.
(13) Marks or lights equipment when it is necessary to leave it in roadway or with parts projecting into roadway.
(14) Avoids operating equipment near edge of cuts or fills.
(15) Places equipment in neutral and sets brakes before coupling to other equipment.
(16) Follows safe fueling practices.
(17) Blocks equipment during repairs.
(18) Drops all buckets, bowls, or blades when leaving equipment.

b. Motor graders

Q: How can traffic hazards be reduced when operating motor graders on highways?

A: (1) Operate on right side.
(2) Flag and barricade when necessary to work against traffic.
(3) Display high-mounted flag in hilly country.

c. Bulldozers and tractors

Q: What are some of the general safety precautions a bulldozer operator should observe? (Develop specifics.)

A: (1) When leaving machine: set brake, land blade, and shift to neutral.
(2) Park machine on level ground and in an inaccessible place when possible.
(3) Keep blade close to ground when climbing a steep grade.
(4) Doze dirt in front of machine when riding down a slope.
(5) Don't use blade for brake.
(6) Check around machine before moving it.

(7) Forbid other persons to be on the operating platform and drawbar.
(8) Watch fingers when cranking.

d. Scrapers
Q: What safety aspects should we be concerned with in safe operation of scrapers? (Develop methods.)
A: (1) Attach safety line to pull unit during operation.
(2) Block up scraper or bowl when replacing blade.
(3) Use retarders to control speed.
(4) Tailgate is back at end of travel when replacing wire rope.
(5) Establish traffic patterns giving loaded equipment the right-of-way.

e. Maintenance and servicing
Q: What should be the extent of maintenance and servicing of heavy equipment? (Develop safe precautions and rules for maintenance and servicing of equipment.)
A: (1) Keep in good working condition.
(2) Have regular maintenance schedule.
(3) Housekeeping.
(4) Fire protection in shops.

2. Motor Trucks

a. Operators
Q: What are the qualifications for a good motor truck operator? (Develop extent of qualifications.)
A: (1) Experience.
(2) Licenses.
(3) Physically fit, with good visual acuity.
(4) Knows and observes local ordinances and state traffic laws.

b. Equipment
Q: All parts and accessories should be kept in safe condition. What are the parts of equipment that should be especially watched?
A: (1) Lights and reflectors.
(2) Horns.
(3) Brakes.
(4) Steering mechanism.
(5) Road flares and fire extinguishers.
(6) Windshield wipers.

c. Loading
Q: What are the safety rules to observe when loading a truck? (Develop requirements for the different types of trucks.)
A: (1) Properly block truck.
(2) Leave truck while being loaded by excavating equipment unless it has a protected cab.
(3) Don't overload.
(4) Avoid projection beyond truck body.
(5) When projection is necessary, use flag; use light at night.
(6) Prevent loading that will result in spillage.

d. Operating
Q: What should be the safety concern of drivers operating on public roads and highways? (Develop details of and requirements.)
A: (1) Weight and clearance limitations.
(a) Bridges.
(b) Power lines.

(c) Overhead structures

(d) Other restrictions

(2) Speed limits.

(3) Backing.

(4) Clean windshield, mirrors, and lights.

(5) Rough terrain.

(6) Special precautions for such activities as hauling explosives.

e. Construction site roads

Q: What are some things that should be considered when building construction site roads? (Develop means of accomplishment.)

A:
(1) Ease of maintenance.
(2) Safe width
(3) Avoidance of sharp curves and steep grades.
(4) One-way traffic where possible.
(5) Adequate markers and signs.
(6) Avoidance of cross-traffic and pedestrian crossings.
(7) Dust control.
(8) Lighting in work areas.

f. Transporting personnel

Q: What are the dangerous acts that are prevalent in transporting personnel? (Develop ways to eliminate.)

A:
(1) Transporting in unsafe seats with open sides and ends.
(2) No convenient means of mounting and dismounting.
(3) Jumping on and off of truck.
(4) Riding on running boards, fenders, bumpers, and elsewhere.
(5) No wind protection for long trips.
(6) Dump trucks without dump lock being used.
(7) Overloading.
(8) Distracting operator.

g. Maintenance

Q: What is the best maintenance system? (Discuss use of check list and proper ways of fueling.)

A:
(1) Inspect daily.
(2) Report and have corrected any failures or damages.

3. Garages and Repair Shops

Q: What are the common hazards to workmen in garages and repair shops? (Develop means to eliminate the hazards.)

A:
(1) Carbon monoxide.
(2) Fires.
(3) Flash burns.
(4) Vehicles falling off jacks and hoists.
(5) Hoisting equipment.
(6) Inadequate lighting.
(7) Poor housekeeping.
(8) Cleaning with solvent and flammable liquids.
(9) Improper lifting.
(10) Foreign objects in eyes

QUIZ ON
HEAVY EQUIPMENT, MOTOR TRUCKS, GARAGES AND REPAIR SHOPS

True-False:

1. The ideal cleaner for removing oils and grease spillages in repair shops is gasoline.
2. Two items that should be carried on trucks at all times are road flares and fire extinguishers.
3. Operating parts of trucks should be inspected each month.
4. Bulldozers and tractors should be serviced on a regular schedule.
5. Deck plates and steps of equipment should be kept free of mud.

Multiple Choice:

6. When parking equipment for the night, make sure:
   (a) Shift lever is in low.
   (b) The brakes are set.
   (c) The boom or blade is close to the ground.
   (d) All of the above.

7. Trucks used to transport personnel should have:
   (a) Seats with open ends and sides.
   (b) Personnel available to help people climb from the ground onto the truck bed.
   (c) Provision of holds for those people riding on the back bumper
   (d) Wind protection for long-distance trips.

8. In designing a roadway system for traffic at a construction site, we should consider the use of:
   (a) Minimum grade.
   (b) Maximum two-way traffic.
   (c) Avoidance of sharp curves and cross traffic.
   (d) All of the above.

9. On a routine operation, truck operators unable to see when backing should utilize:
   (a) Signalman.
   (b) Horn.
   (c) Brake, go look, then back up.
   (d) All of the above.

10. When a truck is being filled with excavation from a dragline, the driver should:
    (a) Get out of the truck.
    (b) Check for overloading.
    (c) Watch for loading that might result in spillage.
    (d) All of the above.

ANSWERS TO QUIZ ON HEAVY EQUIPMENT, MOTOR TRUCKS, GARAGES AND REPAIR SHOPS

1. False.
2. True.
3. False.
4. True.
5. True.
6. b.
7. d.
8. c.
9. a.
10. d.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 14
TUNNELS
COMPRESSED AIR WORK
2-HOUR CONFERENCE

OBJECTIVES: To teach construction supervisors the hazards of tunnel and compressed air work; to provide them with a knowledge of the precautionary and corrective measures to be taken to make this type of work safe.

TEXT: AGC's Manual of Accident Prevention in Construction (Tunnels and Shafts, Compressed Air Work

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

The two subjects to be discussed in this lesson—tunneling and working in compressed air spaces—are possibly the most hazardous of construction operations if adequate provisions are not made for safety. The many natural and inherent hazards necessitate an aggressive safety program and safety consciousness and knowledge by the supervisors.

This lesson is for the purpose of alerting construction supervisors to the many hazards in tunnel and compressed air work and show them ways to make the jobs safer.

DEVELOPMENT

1. Tunneling
   a. Personnel requirement
      Q: What should be required of personnel doing tunnel work? (Stress need for observing safety rules and reporting unsafe conditions.)
      A: (1) Experience.
      (2) Competence.
      (3) Familiarity with safety rules.
   b. Personnel protection
      Q: What are things that should be provided for the personnel working in mining to make for a safe operation? (Develop specifics, including need, best methods and application, and possible results if not used.)
      A: (1) Hard hats.
      (2) Safety shoes.
      (3) Respirators.
      (4) Flame safety lamps.
      (5) Gas detectors.
      (6) Sanitary facilities.
      (7) Safe drinking water.
      (8) Salt tablets.
      (9) Washing facilities.
      (10) Fire protection equipment.
      (11) Adequate lighting.
      (12) Communication systems.
      (13) Ventilating system.
      (14) Sign prohibiting smoking.
      (15) Non-flammable water gear.
   c. Dangerous gas
      Q: What should be done when dangerous gas is discovered? (Discuss Bureau of Mines requirements and rules.)

A: (1) Disconnect [illegible]
(2) [illegible]

d. Hauling

Q: What rules should be established for the manual hauling equipment? (Develop guides or requirements.)

A: (1) Operating speeds.
(2) Operator's experience.
(3) Approved equipment.
(4) Equipment furnished with:
(a) Head and tail lights
(b) Gongs
(c) Automatic safety couplers
(d) Locks preventing accidental dumping.
(5) Standing cars blocked.
(6) Riding in or on cars not designated for this purpose forbidden.

e. Tunneling in soils

Q: Tunnels in soils should be securely timbered. How is this accomplished? (Develop the details.)

A: (1) Keep timbering up with tunneling.
(2) Use good quality, well-fitting timber.
(3) Keep void spaces back of sheathing solidly filled.
(4) Inspect timbering frequently.

f. Tunneling in rock

Q: What can be done to make the safest drilling operation? (Develop methods.)

A: (1) Carefully designed and constructed platforms.
(2) Wet drilling.
(3) Tools kept in good condition.
(4) Proper bits.
(5) Hoses and connections protected.

Q: What are the causes of serious accidents in blasting? (Develop details.)

A: (1) Workmen not out of tunnel or in wrong places.
(2) Primers and explosives not separated in transportation.
(3) Failure to examine face carefully after firing.
(4) Not continually checking for loose rock.
(5) Drilling into unexploded holes.
(6) Stray currents and static electricity.
(7) Lack of audible blasting signals.

2. Compressed Air Work

a. Health requirements

Q: When should men working in compressed air be required to take physical examinations? (Stress need for physicals, when physi[illegible]uld be required for the job, and precautions ne[illegible]y for good health.)

A: (1) Before starting to work.
(2) After absence of 10 successive days.
(3) After working in compressed air for 2 months.

Q: What are some of the dangers in working in compressed air areas? (Develop each in detail, including dangers, ways to avoid, and proper methods.)

A: (1) Not fully complying with labor laws, rules, and regulations.
(2) Not being properly instructed.
(3) Being under pressure for too long a period.

(4) Not knowing how to avoid discomfort of pressure.
(5) Improper decompression.
(6) Smoke and gas from blasts.

Q: What facilities should be provided for employees engaged in compressed air work? (Develop means of accomplishing.)

A: (1) Properly heated, lighted, and ventilated dressing room.
(2) Adequate toilet facilities.
(3) Means of keeping all areas free of decaying refuse and other objectionable matter.

b. Air compressing equipment

Q: What are the important features of equipment that should be provided for maintaining compressed air?

A: (1) Sufficient capacity.
(2) Separate and independent power source for each plant.
(3) Duplicate air lines.
(4) Nonreturn valves.
(5) Proper gauges.

c. Lighting

Q: What is special about lighting of compressed air chambers? (Develop specifics.)

A: (1) Two independent lighting systems with independent sources of power.
(2) Additional intensity.
(3) Compliance with National Electrical Safety Code for damp or hazardous locations.
(4) Special fixtures within 8 feet of floor.
(5) Special portable lamps.
(6) Special check of cords or conductors.

d. Signals

Q: What are the important features needed for assuring the most reliable means of communication? (Develop installations and operation details.)

A: (1) Bells or whistles.
(2) Conspicuously posted code.

e. Caissons

Q: What is needed to eliminate some of the dangers in working with caissons? (Develop specifics.)

A: (1) Shields.
(2) Adequate locks, reducers, and shafting.
(3) Staircase or ladders.
(4) Proper method of sinking.
(5) Ventilation.

QUIZ ON
TUNNELS, COMPRESSED AIR WORK

True-False:

1. Locks, chambers, and working areas in compressed air space should be lighted, utilizing two independent systems and sources of power.

2. It is usually best to wait and check the physical condition of a worker employed in a compressed air chamber after he has been working in the chamber a few days.

3. The air in a working space of a chamber should be analyzed and test results recorded each day.

4. The rate at which a person enters the compressed air chamber is more dangerous than the rate of departure.

5. Men should be allowed to ride between locomotive cars in a tunneling operation if they stand or sit clear of the outside of the cars.

Multiple Choice:

6. What is the best way for miners to determine the existence of flammable gas?
   (a) Match.
   (b) Smell.
   (c) Flame safety lamp.
   (d) Beam of light.

7. Where should combustible materials for shafting and tunnel operations be stored?
   (a) In a fireproof room in the facilities being constructed.
   (b) In an isolated place in the facilities.
   (c) At least 100 feet away from the facilities.
   (d) Any of the above.

8. During a blasting operation, it is important that ceilings and side walls be inspected for loose rocks at least:
   (a) After each blast.
   (b) Daily.
   (c) Before and after each blast.
   (d) When unsafe conditions are reported.

9. In tunneling in soils or mixed rock and soil, the materials should be securely timbered and braced. The timbering should be carried on within:
   (a) Two feet of excavation.
   (b) The same day's operation.
   (c) The same shift.
   (d) No set time but dependent on progress of the operation.

10. The maximum working time under low pressure compressed air in any 24 hours should be:
   (a) Two 6-hour shifts with half hour open air rest.
   (b) Two 4-hour shifts.
   (c) Two 4-hour shifts with half hour open air rest.
   (d) Dependent on the priority for completing the job.

ANSWERS TO QUIZ ON TUNNELS COMPRESSED AIR WORK

1. True.
2. False.
3. True.
4. False.
5. False.
6. c.
7. c.
8. b.
9. a
10. c.

INSTRUCTOR'S LESSON PLAN

LESSON NO. 15
INSPECTION CHECKLIST
2-HOUR CONFERENCE

OBJECTIVES: To teach the construction supervisor the importance of an inspection checklist, its preparation, and its effective use.

TEXT: AGC's Manual of Accident Prevention in Construction (Inspection Checklist).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

A checklist of safety items to be inspected should be used on each job to serve as a reminder of the features to be checked.

The checklist should be considered as a working tool; and, like any tool, it is only as valuable as the use to which it is put.

In this lesson, we will discuss the preparation of a useful and effective list and the methods for applying it to the best use.

DEVELOPMENT

1. Inspection Checklist
   a. Preparation
      Q: Who should prepare the safety inspection checklist? (Develop importance of thorough preparation.)
      A: (1) A person familiar with the job and the probable conditions that will be encountered.
      (2) A person familiar with all of the facets of construction safety.
   b. Listing
      Q: What should be included in a checklist? (Discuss items in AGC's Manual of Accident Prevention in Construction, and develop interest in finding additional items that could be included in each grouping. If appropriate, have class prepare a checklist for a particular job.)
      A: (1) Housekeeping and sanitation.
      (2) First aid.
      (3) Demolition.
      (4) Welding and cutting.
      (5) Flammable gases and liquids.
      (6) Handling and storage of materials.
      (7) Excavation and shoring.
      (8) Barricades.
      (9) Explosives.
      (10) Pile driving.
      (11) Concrete construction.
      (12) Hoists, cranes, and derricks.
      (13) Steel erection.
      (14) Masonry.
      (15) Scaffolding.
      (16) Ladders.
      (17) Power tools.
      (18) Powder-actuated tools.
      (19) Hand tools.
      (20) Highway construction.
      (21) Heavy equipment.
      (22) Conveyors and cableways.

(23) Motor trucks.
(24) Equipment upkeep.
(25) Garages and repair shops.
(26) Tunnels.
(27) Shafts.
(28) Compressed air work.
(29) Boilers.
(30) Pressure vessels.
(31) Railroad construction.
(32) Quarries and gravel pits.
(33) Pipelines.
(34) Marine equipment.
(35) Electrical installations.
(36) Fire prevention.
(37) Special conditions.
    (a) Soil conditions.
    (b) Access roads.
    (c) Storage area.
    (d) Power and utility lines.
    (e) Special equipment.
    (f) Heating.
    (g) Camp housing.
    (h) Others.

c. Use

Q: How can a checklist be used to the greatest advantage? (Encourage ideas on use from the class and develop specifics, not only for items listed, but applicability to all jobs, frequency of use, etc.)

A: (1) Furnishing applicable lists to all workmen, foremen, etc.
(2) Comparing list with job conditions.
(3) Making notations of deficiencies.
(4) Taking action to correct unsafe conditions.

QUIZ ON
INSPECTION CHECKLIST

True-False:

1. All inspection checklists should be tailored to the requirements of each individual operation.

2. A checklist can usually be made to include *all* items to be checked for preventing possible accidents.

3. The preparation of an inspection checklist will eliminate accidents on a job.

4. An inspection checklist is a very valuable tool for the elimination of accidents on construction jobs.

5. The more general a checklist, the more effective.

Multiple Choice:

6. A checklist for use in checking safety on a job can best be prepared by:
   (a) Workman and the foreman.
   (b) Safety engineer.
   (c) Superintendent.
   (d) Combination of the above.

7. Items to be included in an inspection checklist should be:
   (a) Copied from AGC's Accident Prevention Manual.
   (b) From an architectural engineer's file on a similar job.
   (c) Prepared by a person knowing job conditions and using the AGC Manual of Accident Prevention as a guide.
   (d) Prepared by the heavy equipment operators.

8. The frequency of use of the inspection checklist should depend on:
   (a) Job conditions.
   (b) Schedule approved at the beginning of the job.
   (c) Convenience of the safety engineer.
   (d) Guide set forth in AGC Manual.

9. It is most important for safety deficiencies noted during the utilization of the checklist to be:
   (a) Recorded.
   (b) Reported to the safety engineer.
   (c) Reported and followed through for correction.
   (d) Reflected in grading or rating of the workman.

10. A checklist is most beneficial to a contractor when:
    (a) Possessed by the safety engineer.
    (b) Used by inspectors, workmen, and foremen.
    (c) Kept in his files for future reference.
    (d) Furnished the superintendent.

ANSWERS TO QUIZ ON INSPECTION CHECKLIST

1. True.
2. False.
3. False.
4. True.
5. False.
6. d.
7. c.
8. a.
9. c.
10. b.

LESSON PLAN

OPTIONAL LESSON
DEMOLITION

OBJECTIVES: To emphasize the high injury potentials of demolition operations and to stress the key points that the supervisor should constantly keep in mind.

TEXT: AGC's Manual of Accident Prevention in Construction (Demolition), ANSI A10.6-1969.

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

Redevelopment projects all over the country have made necessary extensive demolition operations, and this will probably continue for many years. Although a highly specialized industry, with many contractors having developed organizations and methods for conducting demolition safely, there are many instances where demolition is undertaken by companies having little or no experience. Injury rates are high, in both frequency and severity (refer to NSC Accident Facts and other records), and there are serious exposures to damage of adjacent properties and injuries to the public. Careful planning and supervision are necessary even on small structures.

DEVELOPMENT

1. Planning

Q: What are some of the points to consider prior to starting demolition operations?

A: (1) Examine structural design of building.
(2) Any previous damage due to fire or other causes, which might have weakened structure.
(3) Electric, gas, water, sewer, etc., lines cut off by proper authority.
(4) Flammable or other hazardous materials from previous occupancy.
(5) Strength of floors.

2. Protecting Adjacent Properties

Q: What precautions should be taken to protect adjacent buildings, party walls, etc.?

A: (1) Protection of adjacent roofs lower than demolition.
(2) Replacing flashing to prevent water damage.
(3) Bracing or shoring of party walls until permanently restored.
(4) Seal openings in party walls.

3. Protection of the Public

Q: How can the project be carried on without endangering members of the public?

A: (1) Close off streets or sidewalks whenever possible.
(2) If building not over 25' high, and sidewalk not closer than 15', erect solid wood fence 6' high at inner edge of sidewalk.

Q: When should a sidewalk shed be constructed to provide pedestrian protection?

A: (1) When building is over 25' high, and sidewalk closer than one-half height of building.
(2) When materials or debris are to be moved over sidewalk being used by public.

Q: How should a sidewalk-shed be constructed?

A: (1) Roof capable of withstanding 150 pounds per square foot: if designed for storage of materials. 300 pounds per square foot.
(2) Minimum 2" planking roof.
(3) Enclosure at ends and outer edge of roof.
(4) Inner and outer walls or fences.
(5) Inside lighting where needed.

Q: What additional protection is needed around perimeter of site?

A: (1) Catch platforms. 5' wide, around exterior of building, capable of withstanding live load of 125 pounds per square foot; located not more than 35' below walls being removed, but not usually required when within 40' of ground.
(2) Barricades, warning signs, lights, or flares.
(3) Watchman desirable under some conditions.
(4) Clearly mark and protect access to fire hydrants or alarm boxes.

4. Order of Procedure

Q: What is the sequence of operations, in general, to minimize danger and accomplish job most easily?

A: (1) Shut off all gas, electricity, other utilities.
(2) Remove glass, other fragile fixtures.
(3) Cover unneeded floor and wall openings.
(4) Remove suspended ceilings, similar items.
(5) Work from the top floors down.

5. Removing Material from Upper Floors

Q: What are the various ways to lower materials from upper floors to ground?

A: (1) Use of cranes to lower into protected area.
(2) Chutes.
(3) Dropping or throwing should not be permitted.

6. Material Chutes

Q: Chutes are troughs or enclosed tubes used to transport sliding material, objects, or debris to lower levels. What are some key points to remember in constructing and using them?

A: (1) Consult local codes, if any, on construction requirements.
(2) Enclosed. if at an angle of more than 45% from horizontal.
(3) Openings for receiving material not over 48", kept closed when not being used.
(4) Not more than 2 stories in unbroken line, so that material will not drop too fast.
(5) Discharge end protected, warning signs provided, gate provided for emptying into trucks; material should not be removed with hands.

7. Removing Walls in Sections

Q: How should wall sections be removed?

A: Walls should be removed part by part—never allowed to fall as single masses upon the floors of building being demolished; workers should not stand on walls while picking them apart.

Q: Why is it hazardous to leave chimneys and walls in unstable condition?

A: They may be toppled by wind, or other force; provide temporary support.

8. Removing Structural Steel

Q: How should structural steel members be removed?

A: Steel should be lowered by crane, or other hoisting and lowering devices.

Q: What are some of the items that should be considered when using a derrick?

A: (1) Determine whether floor on which it is placed will carry the additional load.

(2) Supports should be spread to distribute load over the floor.

(3) Foot blocks should be firmly anchored against any movement.

(4) Taglines should be used to guide material.

Q: What precautions should be observed when cranes are used?

A: (1) Crane should be used on solid, level ground.

(2) Equipment should never be overloaded.

(3) Proper signalling system should be established.

Q: What other general safety considerations should be given to removal of steel?

A: (1) Workmen should not be permitted to ride the load.

(2) Gas cylinders, used for cutting operations, should be placed in boats or crates when handled by crane or derrick.

(3) Structural columns or beams should not be under any stress other than their own weight.

9. Fire Protection

Q: What should be done with existing standpipe systems to aid the local fire department?

A: (1) Systems should be maintained in operable condition.

(2) Standpipe risers should be capped above the outlet on the floor immediately below the floor being demolished.

(3) Connections should be marked by a suitable metal sign and a red light at night.

Q: How should existing sprinkler systems be treated?

A: Systems with siamese hose connections should have risers capped immediately below the floor being demolished.

10. Mechanical Demolition

Q: What are some of the precautions that should be considered when demolition is performed by a power shovel, demolition ball, or other mechanical device?

A: (1) Building should not exceed 80 ft. in height.

(2) An area of at least one and one-half times the height should be barricaded off beyond the perimeter walls.

(3) Only those engaged in actual demolition should be permitted on the job site; when mechanical device is used for wrecking, workmen should not be allowed to enter the building being demolished.

(4) Where a swinging weight is used, the supporting cables should be of such length, or so restrained that the weight cannot strike against any structure other than the one being demolished.

(5) Two or more separate slings should be used to attach the weight onto the crane hook.

11. Personal Protective Clothing and Equipment

Q: When should safety goggles be worn?

A: When flying chips and dust particles exist.

Q: What other protective devices should be worn?

A: Hard hats, heavy soled safety shoes, and suitable gloves.

Q: When is it necessary to use lifelines or safety belts?

A: While working on sloping roofs, narrow ledges, or skeleton frames.

12. Miscellaneous

Q: What protection should be afforded from falling objects?

A: Such areas should be barricaded off, unless the floor above is intact and all vertical openings are enclosed with substantial planking.

Q: What kind of scaffolding is recommended for demolishing walls?

A: Self supporting.

Q: What are the dangers of allowing material to accumulate on a floor?

A: (1) It might overload the floor.
(2) Causes poor housekeeping and unnecessary material handling.

QUIZ ON
DEMOLITION

True-False:

1. Sidewalk sheds should be constructed if building to be wrecked is less than 25' high.

2. Existing standpipes and sprinkler systems should be completely removed before demolition begins.

3. Material chutes should be enclosed if at angle of more than 45° to horizontal.

4. Wall sections should be allowed to fall as single masses to speed up the job.

5. Lifelines or safety belts should be worn when working on sloping roofs or narrow ledges.

Multiple Choice:

6. Hard hats should be worn:
   (a) When there is more than one level to be demolished.
   (b) At all times.
   (c) If walls are of brick or masonry.
   (d) Only when working within the building.

7. One precaution to observe in protecting adjacent properties is:
   (a) Make sure these properties have good fire protection systems.
   (b) Put a watchman on the job.
   (c) Brace or shore party walls until permanently restored.
   (d) Protect adjacent roofs if higher than demolition work.

8. Demolition balls should not be used when:
   (a) Building is of fireproof construction.
   (b) Adjacent structures are over 10' away.
   (c) Building to be demolished is over 80' high.
   (d) Sidewalk sheds are not required.

9. The proper demolition procedure is to:
   (a) Shut off all gas and electricity at the outset.
   (b) Strip all lath and plaster throughout the building.
   (c) Make sure work on upper floors is completed before any supporting members are disturbed.
   (d) All of above.

10. One of the safe procedures to observe in removing structural steel is:
    (a) To use heavy planking under derrick supports to spread the load.
    (b) Permit the steel to drop.
    (c) Forget about crane signals as they do not apply in demolition work.
    (d) To permit riding the load to insure proper placement of the steel member.

ANSWERS TO QUIZ ON DEMOLITION

1. False.
2. False.
3. True.
4. False.
5. True.
6. b.
7. c.
8. c.
9. d.
10. a.

INSTRUCTOR'S LESSON PLAN

OPTIONAL LESSON
HAND TOOLS
POWER TOOLS
POWDER ACTUATED TOOLS

OBJECTIVES: To discuss the hazards involved and safety practices required in the use of various types of tools in common use.

TEXT: AGC's Manual of Accident Prevention in Construction (Hand Tools, Power Tools, Powder Actuated Tools).

TIME | LESSON OUTLINE | AIDS

INTRODUCTION

So many types of tools are in such common use today that there is a tendency to accept their use and assume that everyone knows how to use them properly and safely. Accident records prove that this is not necessarily true, and this outline, or those portions of it applicable to the local situation, can be used by the instructor instead of or to supplement other scheduled topics.

Cite examples from personal experience, if possible, or ask group to tell about accidents involving tools from their own experience. Cite accident records to show number of cases of this type.

DEVELOPMENT

1. Hand Tools

Q: What are some of the important points to consider in the care of tools? Why is each important?

A:
(1) Clean.
(2) Sharpened.
(3) Storage.
(4) Repairs.

Q: In using hand tools safely, what are some key points to remember?

A:
(1) Right tool for job. (Why?)
(2) Electrical shock.
(3) Explosive or flammable materials.
(4) Chisels and punches.
(5) Hatchets, axes.
(6) Saws.
(7) Other.

2. Power Tools

Q: What are some key points that, if followed, would probably prevent most power tool accidents? (Discuss why each is important.)

A:
(1) Good housekeeping and storage of tools.
(2) Systematic maintenance (testing, repair).
(3) Proper guards provided and used.
(4) Personal protective equipment worn for the job and tool being used.
(5) Only trained and authorized personnel permitted to use power tools.

Q: What should you check for when using electrical tools?

A:
(1) Grounded, unless insulated case.
(2) Electric cables and extension cords in good condition.
(3) Wet areas.

Q: What are some precautions to take when using gasoline-powered tools?

A: (1) Adequate ventilation.
(2) Storage of fuel in approved containers.
(3) Fueling practices.

Q: Power saws are responsible for more serious injuries than most other types. What are some of the important rules to remember in using each of the following types?

A: (1) Portable hand saws.
(2) Table or bench saws.

Q: What other types of power tools are in use on your job? What have you learned from observation that might help other supervisors avoid serious accidents?

A: Discuss examples from the experience of group.

3. Powder Actuated Tools
   a. Operator and equipment

Q: What are the safety features that should be examined about the equipment and its operator? (Develop the details of each.)

A: (1) Trained and qualified operator, certified by competent source.
(2) Operator and helpers wear face and eye protection as needed.
(3) Check for defective or malfunctioning tools.
(4) Guard or jig is provided to confine flying particles and tool is incapable of being fired without it.
(5) Tool operates only when there is a pressure against it.
(6) Tool won't operate if there is too much tilt of bearing surface.
(7) Tool will fire only when it is in correct position.
(8) Tool fires by two separate and distinct operations.

   b. Use

Q: What should be checked before and during firing operation? (Develop safety hazards of each.)

A: (1) Use only fasteners and powder loads recommended by the manufacturer.
(2) Test tools before each use.
(3) Check material at which firing is directed.
(4) Do not drive too close to edge of material.
(5) Studs may go completely through the material.
(6) Explosive or flammable atmosphere.
(7) Knowledge of corrective action required when tool misfires or jams.
(8) Load tool only when ready to use.
(9) Proper handling of tool.
(10) Keep tools locked up to prevent unauthorized possession.

QUIZ ON
HAND TOOLS, POWER TOOLS, POWDER ACTUATED TOOLS

True-False:

1. Sharp tools are always dangerous, but are less likely to cause cuts than if dull.

2. When using a chisel, always keep your eyes on the head.

3. Damaged or worn tools should be returned to th [illegible] isfactory repairs cannot be accomplished on the job.

4. Electric power tools need not be grounded if you are working in dry areas.

5. Belt sanders can create explosive dust.

Multiple Choice:

6. Which of the following are important in using any power tools:
   (a) Keep tools neatly stored when not in use.
   (b) Clean and inspect tools regularly.
   (c) Make sure guards are in place.
   (d) Wear protective clothing as required.
   (e) All of the above.

7. When using gasoline engine-driven tools, all of the following should be observed except:
   (a) Make sure ventilation is adequate.
   (b) Keep fuel in U.L. approved safety cans.
   (c) To save fuel, idle down engine while refueling.
   (d) Check all operators to make sure they are experienced.

8. When operating table or bench saws:
   (a) Remove guards when cutting long boards.
   (b) Clean up work area at the end of each day.
   (c) Use metal pusher stick when cutting short stock.
   (d) When cutting warped stock, set blade at full height.
   (e) Provide lock on switch to prevent unauthorized use.

9. A powder actuated tool is considered to be the Low Velocity Piston type if:
   (a) The stud will not leave the muzzle of the gun.
   (b) The muzzle velocity of stud is not enough to cause injury.
   (c) The muzzle velocity at 6½ feet does not exceed 300 ft./second.
   (d) Only the lowest three power level loads are used.

10. When using powder actuated tools, which of the following safety rules should be observed:
    (a) All operators should have card or certificate showing training by competent source.
    (b) Tools should be loaded only when ready for actual use.
    (c) When firing, hold tool firmly against and perpendicular to work.
    (d) Use only loads and studs designed for the tool being used.
    (e) All of above.

ANSWERS TO QUIZ ON HAND TOOLS, POWER TOOLS, POWDER ACTUATED TOOLS

1. True.

2. False.

3. True.

4. False.

5. True.

6. e.

7. c.

8. e.

9. c.

10. e.

Safety

Construction Safety Motion Picture
And
Slide Film, and other Safety Visual
Materials.

CONSTRUCTION SAFETY MOTION PICTURE AND SLIDE FILMS AND OTHER SAFETY VISUAL MATERIALS

GENERAL CONSTRUCTION

THE INNER MIND OF MILTON WHITTY - 16mm, sound, color, 19 min. Milton Whitty is a contractor who thinks he has abided by all the rules of safety. In an imaginary court scene his conscience is pitted against a jury comprised of his co-contractors and his own workmen.

See Code 7

THE RETURN OF MILTON WHITTY - 16mm, sound, color, 18 min. Milton Whitty returns to the screen with a new safety problem: An opinionated foreman who thinks he knows all the answers. He does, except for one—and that is how to prevent accidents. Only when tragedy strikes does he realize that "an ounce of prevention is worth a pound of cure."

See Code 7

NO LAUGHING MATTER - 16mm, sound, B&W, 15 min. General discussion of falls in industry. Outlines prevention of falls involving vehicles, ladders, and scaffolds, then points out miscellaneous fall hazards.

See Code 3

GOOD HOUSEKEEPING—FOR MEN ONLY - 16mm, sound, color, 13 min. Designed for showing to supervisor groups on construction operations.

See Code 11

BLASTING VIBRATIONS—CAUSES AND EFFECTS - 16mm, sound, color, 26 min. The film explains the necessity of using explosives in construction work, the safety precautions exercised, and then describes the theory of vibrations and their effects.

See Code 12

ROPES OF STEEL - 16mm, sound, color, 34 min. This is a film about wire rope—how it is made, what it does, where it's used. The film points out how the ultimate use of the wire rope determines the number, size, and arrangement of wires and strands.

See Code 13

BLASTING CAPS - 16mm, sound, color or B&W, 15 min. Warning to public, especially children, of the dangers. Shows appearance and how and when used.

See Code 14

CRANE OPERATIONS: SAFETY PRECAUTIONS - 16mm, sound, B&W, 14 min. Safe procedures and rules in mobile crane operation.

See Code 15

CONSTRUCTION CAN BE SAFE - 16mm, sound, B&W, 20 min. Changing conditions on building construction; follows a superintendent around a job pointing out unsafe conditions and practices and corrective action.

See Code 3

CONSTRUCTION EQUIPMENT SAFETY - 16mm, sound, B&W, 20 min. Causes of most accidents in the use of heavy construction equipment such as dozers, cranes, tractors, shovels, etc.

See Code 15

BANDAGE BAIT - 16mm, sound, B&W, 12 min. Entertaining comedy showing unsafe practices when using hand tools and when working on scaffolding, ladders, on a loading dock, and in a garage.

See Code 1

KNOWING'S NOT ENOUGH - 16mm, sound, color, 28 min. A new safety program is presented to a group of employees, based on the theme of the four IMPS—Improvising, Impunity, Impatience, and Impulsive.

See Code 17

FALLS - 16mm, sound, B&W, 5 min. Advises workers to watch their step, keep floors clean, and report danger spots immediately. (Accidents Don't Happen Series.)

See Code 3

CHAIN REACTION - 16mm, sound, color and B&W, 20 min. Dramatized eight basic rules for safe handling of loads with chain slings. Shows how to avoid overload conditions and to prevent early wear. Proper procedures for storage, inspection, and maintenance of chain slings is explained.

See Code 1

SAFETY EVERYWHERE . . . ALL THE TIME - 16mm, sound, color, 23 min. A completely integrated, well balanced safety campaign planned around an easily identified symbol and easily remembered theme. Recall materials (posters, stickers, banners, leaflets, etc.).

See Code 19

SHOP SAFETY - 16mm, sound, B&W, 28 min. Discusses the causes and prevention of accidents, and safety rules which apply to arc and gas welding, hoisting methods, working with machinery and on engines, use of tools, lifting and pushing heavy objects, and handling of gasoline.

See Code 20

HIGH-LOW BID - 16mm, sound, color, 28 min. To impress contractors with the knowledge that insurance costs can determine the difference between the high and low bid. An explanation of how the functional safety program eliminates needless accidents and reflects in lower insurance costs.

See Code 21

LIBERTY - 16mm, B&W, silent, 20 min. Laurel and Hardy get into their usual difficulties, and seek refuge on a building under construction, with only the steel girders between them and the ground. A lot of excitement as they make their way along the girders while being pursued.

See Code 1

PIPING SAFETY - 16mm, sound, color, 30 min. This film was made for the construction industry, but is applicable to just about every plant safety program. Covers such items as ladders and scaffolding, hand tools, power tools, protective equipment, etc.

See Code 1

TO FALL OR NOT TO FALL - 16mm, sound, color, 10 min. An animated cartoon showing the principal causes of falls. Has a segment on ladders and scaffolding.

See Code 1

OXYACETYLENE CUTTING - 16mm, sound, color, 12 min. An instructional film, giving a step-by-step demonstration that emphasizes the why, as well as the how, in the proper use of oxyacetylene cutting equipment.

See Code 1

BRAIN BEATS BRAWN - 35mm slides, B&W, 20 min. Teaches foremen the best material handling practices so they, in turn, will be able to instruct their workers.

See Code 3

CALL 'EM ON THE CARPET - 16mm, sound, B&W, 12 min. Carrying handling of feelings further, this film covers the tricky subject of correcting faults without incurring ill will.

See Code 3

DECIDE TO BE SAFE - 16mm, sound. Proves safety comes with decision. We must decide to be safe and begin to build up a bank of safety knowledge, so we will know what to do in any situation.

See Code 3

EVERYBODY'S DIFFERENT (Human Factor Series) - 16mm, sound, B&W, 15 min. Shows supervisors how to make allowances for individual differences—how to handle the tough guy, the show-off, the loud-mouth, the day dreamer, and the practical joker.

See Code 3

WHAT'S YOUR SAFETY I.Q.? - 16mm, sound, B&W, 15 min. Deals with off-the-job safety. Illustrates safety in home, traffic, and recreation. Makes use of audience participation by means of question-answer pictures.

See Code 3

LOOK UP AND LIVE - 16mm, sound, color, 19 min. A very good general treatment of safety around power lines. The film is suitable for a great variety of industrial locations, covering precautions to be taken to keep crane booms out of lines, TV antennas, pipes and well drilling rigs, metal kite or model airplanes, etc.

See Code 3

OPERATING HEAVY DUTY TRUCKS SAFELY - 16mm, sound, B&W, 12 min. Covers hazards in operating heavy duty trucks over roadways, on the dump, towing, and in other phases of their use. Designed principally to point out the practices necessary to prevent the most serious accidents, but also discusses unsafe practices that result in minor damage.

See Code 3

THE DANGEROUS PLAYGROUND - 16mm, sound, color, 20 min. Shows the danger of possible accidents to children when playing on a construction site. Primarily for elementary school age level.

See Code 7

THE SCRIBE - 16mm, sound, color, 30 min. Thirty minutes of lively slapstick entertainment when Buster Keaton – in his last film – visits a jobsite as a newspaper reporter to do a story on construction safety.

See Code 7

DANGER ALIVE - 16mm, sound, color, 20 min. Shows possible danger involved in electrical construction and how to avoid electrical accidents on the jobsite.

BUILDING FOR SAFETY - 16mm, sound, color, 14 min. See the story of a massive organization quietly working [illegible] the scenes, to make our everyday work and play activities danger-free through built-in safety features.

See Code 23

BEFORE THE BLAST - 16mm, sound, color, 10 min. This film outlines numerous safety rules and suggestions concerning the storage, transporting, and use of commercial high explosives.

See Code 25

CONSTRUCTION CREW PLANNING - 35mm, sound, B&W, 29 min. Solutions to typical construction problems, showing how maximum safety and efficiency are obtained through proper planning.

See Code 28

HIGHWAY CONSTRUCTION

THE LAST MILE - 16mm, sound, color, 22 min. Compares walk to death chamber with approach to accidental death on the highway. Deals with safety precautions necessary on highway construction: warning signs, safety devices, etc., help prevent accidents, but all are dependent on motorists' observance.

See Code 24

AN OUTSIDE LOOK - 16mm, sound, color or B&W, 25 min. Stresses hazards and controls important to road construction operations.

See Code 21

CRAWLER TRACTOR SAFETY PRESENTATION FOR OPERATING AND MAINTENANCE PERSONNEL - 35mm, slides, color, 20 min. This presentation was developed to meet the increasing demand for visual operator safety training aids tailored for group instruction. The slides graphically depict basic messages essential to safe crawler tractor operation.

See Code 8

THE ROADBUILDERS - 16mm, sound, color, 20 min. A total of 25 points helps to make the viewer conscious of the need to work safely during all roadbuilding operations. The motorist is made aware of his responsibility for his own safety and others when travelling through a construction zone. He is also made aware of the need to obey a flagman's signals.

See Code 7

THE OPEN ROAD - 16mm, sound, color, 32 min. Illustrates the many uses of steel in modern highway construction. Steel is shown as the supporting element in bridges and overpasses. It is imbedded in various forms in the pavement for greater strength and durability. In safety devices such as guard rails and fencing, steel protects life and property.

See Code 13

BUILDING CONSTRUCTION

LADDERS, SCAFFOLDS AND FLOOR OPENINGS - 16mm, sound, color, 9 min. This film shows the proper construction of ladders, scaffolds, and guards for floor openings, and gives suggestions for their use and maintenance.

See Code 25

IF YOU TOOK YOUR FAMILY TO WORK WITH YOU - 16mm, sound, color, 9 min. This illustrates the working day of a building construction worker. It demonstrates in a dramatic way what would happen to a worker's attitude if his family were watching him.

See Code 7

DANGER – ROOFERS AT WORK - 16mm, sound, color, 20 min. This film depicts clearly the hazards encountered in roofing operations and how simply they may be avoided.

See Code 3

SKYLINES - 16mm, sound, color, 29 min. The story of structural steel: Builders were set free to race for the sky when they gave up piling stone on stone and began to erect buildings [illegible] frames of structural steel

See Code 13

[illegible] STEEL AND EARTHQUAKE - 16mm, sound, color, 28 min. What causes an earthquake? And how [illegible] seismic forces measured? Why do some buildings collapse during an earthquake while others stand?

See Code 13

WATCH YOUR STEP - 16mm, sound, B&W, 12 min. Explains and illustrates safety in the building industry. A general interest film suitable for employee or supervisor.

See Code 26

WATCH YOUR STEP - 16mm, sound, B&W, 12 min. A very good British film showing normal hazards in building construction, including falls from elevations, trenching, hoist operations, scaffold use, etc. A general interest film suitable for employee or supervisor.

See Code 3

CONSTRUCTION CAN BE SAFE - 16mm, sound, B&W, 12 min. This film produced by the Department of Industrial Safety deals with hazards found on a building construction job. The film is for both supervisors and employees. It points out specific unsafe acts and conditions and seeks to prescribe corrective measures which should be taken.

See Code 3

CONSTRUCTION CAN BE SAFE??? - 16mm, sound, color, 9 min. This is a satire featuring clowns of the Florida State University Circus as they try to construct a house.

See Code 3

SOMETHING CONCRETE - 16mm, sound, color, 20 min. Shows the necessary steps to be taken to prevent such an accident as is shown – an authentic structural collapse. Through animation we learn of the properties of concrete, and how it behaves.

See Code 7

SAFE AS HOUSES - 16mm, sound, color, 22 min. The problems of a home builder whose production is delayed by accidents and loss of vital manpower.

See Code 7

ROOFER'S PITCH - 16mm, sound, color, 20 min. When a roofer is seriously injured by falling through a hole in the roof, we learn how such an accident affects not only the injured man, but his family, his co-workers, his boss, and his company.

See Code 7

MEN OF IRON - 16mm, sound, color, 22 min. Film covers the training of a young man as a construction worker – emphasizing safety factors involved in "on-site" activities. Also describes new types of materials used in constructing modern buildings.

See Code 7

THE STORY OF S.J.I. - 35mm, slides, sound, color, 27 min. The story of the never-ending search for a better way to span space and gain shelter – traced from the brush roofs of prehistoric man to today's steel joists.

See Code 6

HEAVY CONSTRUCTION

THE QUOTA - 16mm, sound, color, 26 min. Dramatizes accidents that occur to construction equipment operators.

See Code 16

BUILDING THE GOLDEN GATE BRIDGE - 16mm, sound, color, 42 min. This picture of one of the greatest engineering achievements of our time. With a 4,200 ft. main span, the Golden Gate Bridge is the largest and most spectacular suspension bridge in the world. Scenes taken in one of Bethlehem's fabricating shops show the bridge sections in prefabricated form, followed by illustrations of transporting the steel work to the bridge site.

See Code 13

CHALLENGE AT CARQUINEZ - 16mm, sound, [illegible] ows the design and [illegible] ion of the unique Carquinez Strait Bridge and safe practices of the [illegible] es Steel Company.

See Code 13

THE GAMBLERS - 16mm, sound, color, 20 min. Safe operation of heavy equipment in construction operations. Principally for viewing by construction equipment operators and construction personnel.

See Code 24

USE OF SAFETY NETS IN HEAVY CONSTRUCTION - 16mm, sound, color, 15 min. Shows application of safety nets to high bridge and dam construction on Corps of Engineers projects and structural steel work done by the Corps for others.

See Code 21

STEEL SPANS THE CHESAPEAKE - 16mm, sound, color, 37 min. Featuring six different types of bridge spans, the Chesapeake Bay Bridge is one of the notable structures of the Twentieth Century. This film tells the story of building that bridge. Photography has recorded the erection of each of the principal types of spans to show the construction methods used.

See Code 13

STEEL IN CONCRETE - 16mm, sound, color, 38 min. This film discusses many of the technical aspects of reinforced concrete. A laboratory demonstration shows that concrete properly reinforced with steel has great resistance to tensile and comprehensive forces. The film discusses the important mechanical properties of reinforcing bar steel. Cracking of concrete, bond and anchorage between steel reinforcement and concrete, and working stresses for reinforced concrete design are shown.

See Code 13

THE ROLL OF DRUMS - 16mm, sound, color, 20 min. Deals with earth-moving equipment. Shows that hitchhiking a ride on such equipment is bad business, and that horseplay and inattention are other major causes of accidents on the job. It contr[illegible] the carefully calculated odds accepted by thrill act performers to the short odds brought on by carele[illegible]ss around heavy construction machinery.

See Code 1

TALKING ABOUT TRENCHING - 16mm, sound, color, 10 min. The shoring of trenches is most important—until shored the occupants could be buried alive if the walls cave in. Two voices—one of whom is an authority, the other a skeptic—discuss the matter. As they talk the camera visualizes the theme of their arguments, examining trenches on jobsites.

See Code 7

DOWN TO EARTH - 16mm, sound, color, 18 min. This film was made to stress safety for tunnel workers. It covers all aspects of tunnel safety from clamming out the shaft, concreting, grouting, and the safe operation of locomotives, including track switching.

See Code 7

PERSONAL PROTECTIVE EQUIPMENT
and
FIRST AID

FIFTEEN MINUTES TO GO - 35mm, slide, sound, color. Dramatizes the extreme risk involved in delaying or neglecting first aid for all injuries. Convinces workers that it's smart to get first aid immediately for even the smallest hand or finger cut or harmless-appearing burn.

See Code 3

STRAIGHT TALK ON EYE SAFETY - 13mm, sound, color, 12 min. A discussion of how eye injuries occur in industry, and how they can be prevented. Two veterans in the campaign for eye safety speak out to your employees on this subject. Bill Frank, blinded in a shop accident, warns of the tragic consequences that result from blinding accidents—what it means to the employee, his wife, and kids.

See Code 1

PROTECTING THE EYES, FEET AND HANDS - 16mm, sound, color, 10 min. A unique film: a glamour girl protects her eyes from a variety of hazards by wearing safety glasses; a pair of naked feet tiptoe through many hazards unprotected by safety shoes; traps are intriguingly set for a lithe pair of hands.

See Code 1

A NEW WAY TO LIFT - 16mm, sound, color, 10 min. Shows employees the right way to lift heavy objects Demonstrates a method that can be used in any lifting situation, regardless of the size or shape of the load, as well as lowering objects, turning the body to move a load, or when two men are working together.

See Code 19

THE SHIELD - 16mm, sound, color, 12 min. Built around the concept of the employees in industry who have had their eyes saved because they followed the safety rules. Scenes show how eye injuries can be prevented through management-employee cooperation.

See Code 1

JUST ONCE - 16mm, sound, color, 14 min. An eye protection film which features scenes of men involved in construction activities which could cause blindness if an accident occurred. Workers are encouraged to wear safety glasses.

See Code 7

RESCUE BREATHING - 16mm, sound, color or B&W, 22 min. This film shows the correct method to follow in using mouth-to-mouth resuscitation on infants and adults for electric shock, carbon monoxide poisoning, drowning, overdoses of sleeping pills, in disaster or war, and when just the top part of the body may be reached.

See Code 18

SKILLED HANDS AND SURE FEET - 16mm, sound, color, 14 min. An instructional film illustrating the wisdom of protecting hands and feet from injury. The purpose of this film is to overcome the excuses and objections often voiced by workers concerning their reluctance to wear protective equipment on the job.

See Code 7

SAFETY SHOES—POSITIVELY OUR MOST NEGLECTED ARTICLE OF CLOTHING - 16mm, sound, color, 12 min. An informal, humorous and entertaining approach covering the use of safety footwear in a new way . . . it will hold audience attention.

See Code 2

ONE OUNCE OF SAFETY - 16mm, sound, B&W, 17 min. Shows the advantage of wearing safety shoes on the job. Construction of safety shoes also illustrated.

See Code 27

STRAIGHT TALK ON EYE SAFETY - 16mm, sound, color, 14 min. Filmed interview between James O'-Neill, National Society for Prevention of Blindness, and a man who lost his sight. He explained how he hung his safety glasses by one side piece, and was struck across one eye by a broken grinding wheel. Clearly outlines how blindness in both eyes usually follows loss of one.

See Code 5

WEAR YOUR HARD HAT - 16mm, sound, color, 8 min. This film explains, by means of humorous diagrammatic and descriptive still pictures, the reasons for the wearing of hard hats. The structural properties of the hat show how it protects the head from injury.

See Code 7

HARD HATS AND THINKING CAPS - 16mm, sound, color, 29 min. Designed to establish a constant awareness that thoughtlessness causes most accidents and that the "hard hat" must give way to the "thinking cap."

See Code 4

A SAFER WAY DOWN WITH SKY GENIE - 16mm, sound, color, 15 min. Describes use of special product which can be used as life protection device on life lines, controlled descent to inaccessible areas, rescue operations.

See Code 22

ADDRESS GUIDE

CODE
NO.

(1) Greater Chicago Safety Council
10 N. Clark St.
Chicago, Ill. 60602

(2) Lehigh Safety Shoe Co.
First and Minor Sts.
Emmaus, Pa. 18049

(3) Florida Department of Commerce
Industrial Safety Department
Tallahassee, Fla. 32304

(4) U.S. Steel Corp.
Pittsburgh Film Distribution Center
525 William Penn Place
Pittsburgh, Pa. 15230

(5) Harvest Films, Inc.
11 W. 42nd St.
New York, N.Y. 10036

(6) Steel Joist Institute
2001 Jefferson Davis Highway
Arlington, Va. 22202

(7) Association Films
600 Grand Ave.
Ridgeville, N.J. 07657

(8) C.I.M.A.
Suite 1700, 111 E. Wisconsin Ave.
Milwaukee, Wis. 53202

(9) Bureau of Reclamation
Building 67, Denver Federal Center
Denver, Colo. 80225

(10) Clark Equipment Co.
Construction Machinery Div.
Benton Harbor, Mich.

(11) Public Education Department
Affiliated Aetna Life Cos.
Hartford, Conn. 06115

(12) Hercules Powder Co.
Advertising Department
Wilmington, Del. 19898

(13) Bethlehem Steel Co.
Publications Department
Bethlehem, Pa. 18016

(14) Makers of Explosives
420 Lexington Ave.
New York, N.Y. 10017

(15) Potomac River Naval Command
Assistant for Public Information
U.S. Naval Gun Factory
Washington, D.C. 20225

(16) Pilot Productions, Inc.
1819-23 Ridge Ave.
Evanston, Ill. 60204

(17) Welding Picture Productions, Inc.
3 Gateway Center
Pittsburgh, Pa. 15222

(18) American Film Producers
1600 Broadway
New York, N.Y. 10019

(19) National Safety Council
425 N. Michigan Ave.
Chicago, Ill. 60611

(20) Department of the Army
Office of the Chief of Engineers
Washington, D.C. 20315

(21) Employers Mutual Insurance Co.
2000 Westwood Drive
Wausau, Wis. 54401

(22) Descent Control
P.O.Box 387
Fort Smith, Ark. 72901

(23) Underwriters' Laboratories, Inc.
207 E. Ohio St.
Chicago, Ill. 60611

(24) Caterpillar Tractor Co.
Administration Bldg.
100 N.E. Adams St.
Peoria, Ill. 61602

(25) Aetna Life and Casualty
151 Farmington Ave.
Hartford, Conn. 06115

(26) Contemporary Films, Inc.
267 W. 25th St.
New York, N.Y. 10001

(27) Hy-Test Safety Shoes
Div. International Shoe Co.
1509 Washington Ave.
St. Louis, Mo.

(28) Bell Telephone Co.
(Contact your local offices)

VT 016 629
QUARTERMASTER 3 AND 2. NAVY TRAINING COURSE.

DEPARTMENT OF THE NAVY, WASHINGTON, D.C.
BUREAU OF NAVAL PERSONNEL.
MF AVAILABLE IN VT-ERIC SET.
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PUB DATE - 71 321P. 1968 REVISION.

DESCRIPTORS - GOVERNMENT (ADMINISTRATIVE BODY); WORKSHEETS; *MILITARY TRAINING; NAVIGATION; *STUDY GUIDES; MANUALS; VISUAL AIDS; MILITARY PERSONNEL; *SEAMEN; *TRADE AND INDUSTRIAL EDUCATION; *VOCATIONAL DEVELOPMENT; ADULT VOCATIONAL EDUCATION; TABLES (DATA); INDEXES (LOCATERS)
IDENTIFIERS - CAREER AWARENESS; EMPLOYMENT SKILLS; QUARTERMASTER 3 AND 2

ABSTRACT - THIS TRAINING COURSE, WRITTEN FOR NAVY AND NAVAL RESERVE PERSONNEL, WILL HELP PREPARE THOSE WHO ARE STUDYING FOR ADVANCEMENT TO THE RATES OF QUARTERMASTER 3 AND 2 WITH THEIR RATING EXAMINATIONS. WORKSHEETS ARE INCLUDED IN THE 19 CHAPTERS, WHICH COVER VARIOUS TOPICS, FROM NAVIGATION TO COMMUNICATIONS. A WIDE RANGE OF VISUAL AIDS ARE PROVIDED, INCLUDING LINE DRAWINGS, TABLES, AND PHOTOGRAPHS. AN INDEX IS INCLUDED. (AG)

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QUARTERMASTER 3 & 2

BUREAU OF NAVAL PERSONNEL

NAVY TRAINING COURSE NAVPERS 10149-E

PREFACE

This training course was written for men of the Navy and Naval Reserve who are studying for advancement to the rates of Quartermaster 3 and 2. Combined with the necessary practical experience and a thorough study of the related basic Rate Training Manuals, the information in this course will help the reader prepare for Navywide advancement in rating examinations.

Quartermaster 3 & 2 was prepared for the Bureau of Naval Personnel by the Training Publications Division, Naval Personnel Program Support Activity, Washington, D. C. Technical assistance was provided by the Fleet Training Center, Newport, Rhode Island; the Naval Examining Center, Great Lakes, Illinois; and the Naval Oceanographic Office, Washington, D. C.

Original edition 1951
Printed with minor corrections 1952
Reprinted with changes 1954
Revised 1958
Revised 1963
Revised 1968

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON D.C. : 1971

Stock Ordering No.
0500-046-0110

2331

THE UNITED STATES NAVY

GUARDIAN OF OUR COUNTRY

The United States Navy is responsible for maintaining control of the sea and is a ready force on watch at home and overseas, capable of strong action to preserve the peace or of instant offensive action to win in war.

It is upon the maintenance of this control that our country's glorious future depends; the United States Navy exists to make it so.

WE SERVE WITH HONOR

Tradition, valor, and victory are the Navy's heritage from the past. To these may be added dedication, discipline, and vigilance as the watchwords of the present and the future.

At home or on distant stations we serve with pride, confident in the respect of our country, our shipmates, and our families.

Our responsibilities sober us; our adversities strengthen us.

Service to God and Country is our special privilege. We serve with honor.

THE FUTURE OF THE NAVY

The Navy will always employ new weapons, new techniques, and greater power to protect and defend the United States on the sea, under the sea, and in the air.

Now and in the future, control of the sea gives the United States her greatest advantage for the maintenance of peace and for victory in war.

Mobility, surprise, dispersal, and offensive power are the keynotes of the new Navy. The roots of the Navy lie in a strong belief in the future, in continued dedication to our tasks, and in reflection on our heritage from the past.

Never have our opportunities and our responsibilities been greater.

CONTENTS

CHAPTER 1

ADVANCEMENT

This training manual has been prepared for men of the Navy and Naval Reserve who are studying for advancement to the rates of Quartermaster 3 and Quartermaster 2. The Quartermaster qualifications used as a guide in the preparation of this training manual are those contained in the latest revision (change 4) of the *Manual of Qualifications for Advancement*, NAVPERS 18068. Changes occurring after this revision are not reflected in this text.

The remainder of this chapter gives information on the enlisted rating structure, the Quartermaster rating, and references that will help you both in working for advancement and in performing your duties as a Quartermaster. This chapter includes information on how to make the best use of rate training manuals. Therefore, it is strongly recommended that you study this chapter carefully before beginning intensive study of the remainder of this manual.

ENLISTED RATING STRUCTURE

The two main types of ratings in the present enlisted rating structure are general ratings and service ratings.

GENERAL RATINGS identify broad occupational fields of related duties and functions. Some general ratings include service ratings; others do not. Both Regular Navy and Naval Reserve personnel may hold general ratings.

SERVICE RATINGS identify subdivisions or specialties within a general rating. Although service ratings can exist at any petty officer level, they are most common at the PO3 and PO2 levels. Both Regular Navy and Naval Reserve personnel may hold service ratings.

QUARTERMASTER RATING

SCOPE OF RATING

The Quartermaster rating is a general rating at all petty officer levels. Among the many duties required of a QM are those connected with navigation, steering and ship control, communication, weather, recordkeeping, and supervision of personnel.

Quartermasters are assigned to all combatant ships and to all but the smallest types of auxiliary vessels. Ashore, Quartermasters are assigned to signal stations, weather stations, and small craft units; or they may be assigned to general duties, such as master at arms or ceremonial guard.

Aboard ship, a Quartermaster 3 or 2 will stand watches on the bridge as the assistant to the OOD. To function effectively as his assistant, you must know his duties nearly as well as your own. As QM of the watch, you will spend your duty time in the limelight, and for this reason, you must meet standards of appearance and performance that are more exacting than those of any other department on board.

Special Qualification

Note in figures 1-1 and 1-2 that certain specified ratings must complete applicable performance tests in order to be eligible for advancement. Quartermaster is one such rating. At the E-4 level, Quartermasters must demonstrate their ability to transmit and receive, by flashing light, code groups and plain language at an approximate rate of 8 words per minute. They must, moreover, be able to transmit and receive semaphore at an approximate speed of 8 words per minute.

Leadership

As you advance in the Quartermaster rating, you will have more responsibility and authority. You will be required to exercise more leadership than so far has been required of you. You must learn how to handle men. You must set high standards so that your men will follow your example. The type of PO you are, your personal behavior and attitude toward your job, and your professional advancement will influence the type of work your men do.

Information on the practical application of leadership and supervision may be obtained from the current revision of *Military Requirements for Petty Officers 3 & 2*.

ADVANCEMENT

Some of the rewards of advancement are easy to see. You get more pay. Your job assignments become more interesting and more challenging. You are regarded with greater respect by officers and enlisted personnel. You enjoy the satisfaction of getting ahead in your chosen Navy career.

But the advantages of advancement are not yours alone. The Navy also profits. Highly trained personnel are essential to the functioning of the Navy. By each advancement, you increase your value to the Navy in two ways. First, you become more valuable as a specialist in your own rating. And second, you become more valuable as a person who can train others and thus make far-reaching contributions to the entire Navy.

HOW TO QUALIFY FOR ADVANCEMENT

What must you do to qualify for advancement in rating? The requirements may change from time to time, but usually you must:

1. Have a certain amount of time in your present grade.
2. Complete the required military and occupational training courses.
3. Demonstrate your ability to perform all the PRACTICAL requirements for advancement by completing the Record of Practical Factors, NavPers 1414/1. In some cases the Record of Practical Factors may contain the old form number, NavPers 760.
4. Be recommended by your commanding officer, after the petty officers and officers supervising your work have indicated that they consider you capable of performing the duties of the next higher rate.
5. Demonstrate your KNOWLEDGE by passing written examinations on the occupational and military qualification standards for advancement.

Some of these general requirements may be modified in certain ways. Figure 1-1 gives a more detailed view of the requirements for advancement of active duty personnel; figure 1-2 gives this information for inactive duty personnel.

Remember that the qualifications for advancement can change. Check with your division officer or training officer to be sure that you know the most recent qualifications.

Advancement is not automatic. Even though you have met all the requirements, including passing the written examinations, you may not be able to sew on the crow" or "add a stripe." The number of men in each rate and rating is controlled on a Navywide basis. Therefore, the number of men who may be advanced is limited by the number of vacancies that exist. When the number of men passing the examination exceeds the number of vacancies, some system must be used to determine which men may be advanced and which may not. The system used is the "final multiple" and is a combination of three types of advancement systems: Merit rating system, personnel testing system, and longevity, or seniority, system. The Navy's system provides credit for performance, knowledge, and seniority, and, while it cannot guarantee that any one person will be advanced, it does guarantee that all men within a particular rating will have equal advancement opportunity.

The following factors are considered in computing the final multiple:

Factor	*Maximum Credit*
Examination score	80
Performance factor (Performance evaluation)	50
Length of service (years x 1)	20
Service in pay grade (years x 2)	20
Medals and awards	15
	185

All of the above information (except the examination score) is submitted to the Naval Examining Center with your examination answer sheet. After grading, the examination scores, for those passing, are added to the other factors to arrive at the final multiple. A precedence list, which is based on final multiples, is then prepared for each pay grade within each rating. Advancement authorizations are then issued, beginning at the top of the list, for the number of men needed to fill the existing vacancies.

HOW TO PREPARE FOR ADVANCEMENT

What must you do to prepare for advancement? You must study the qualifications for advancement, work on the practical factors, study the required rate training manuals, and study other material that is required for advancement in your rating. To prepare for advancement, you will need to be familiar with

REQUIREMENTS*	* E1 to E2	E2 to E3	#† E3 to E4	#E4 to E5	† E5 to E6	† E6 to E7	† E7 to E8	† E8 to E9
SERVICE	4 mos. service—or completion of	6 mos. as E-2.	6 mos. as E-3	12 mos. as E-4	24 mos. as E-5.	36 mos. as E-6. 8 years total enlisted service.	36 mos as E-7. 8 of 11 years total service must be enlisted.	24 mos. as E-8. 10 of 13 years total service must be enlisted.
SCHOOL	Recruit Training.		Class A for PR3, OT3, PT3, AME 3, HM 3, PN 3, FTB 3, MT 3.			Class B for AGC MUC, MNC. ††		
PRACTICAL FACTORS	Locally prepared check-offs.	Record of Practical Factors, NavPers 1414/1, must be completed for E-3 and all PO advancements.						
PERFORMANCE TEST			Specified ratings must complete applicable performance tests before taking examinations.					
ENLISTED PERFORMANCE EVALUATION	As used by CO when approving advancement.		Counts toward performance factor credit in advancement multiple.					
EXAMINATIONS**	Locally prepared tests.	See below.	Navy-wide examinations required for all PO advancements.				Navy-wide, selection board.	
RATE TRAINING MANUAL (INCLUDING MILITARY REQUIREMENTS)		Required for E-3 and all PO advancements unless waived because of school completion, but need not be repeated if identical course has already been completed. See NavPers 10052 (current edition).					Correspondence courses and recommended reading. See NavPers 10052 (current edition).	
AUTHORIZATION	Commanding Officer		Naval Examining Center					

* All advancements require commanding officer's recommendation.

† 1 year obligated service required for E-5 and E-6; 2 years for E-7, E-8 and E-9.

Military leadership exam required for E-4 and E-5.

** For E-2 to E-3, NAVEXAMCEN exams or locally prepared tests may be used.

†† Waived for qualified EOO personnel.

Figure 1-1.–Active duty advancement requirements.

REQUIREMENTS *	E1 to E2	E2 to E3	E3 to E4	E4 to E5	E5 to E6	E6 to E7	E8	E9
TOTAL TIME IN GRADE	4 mos.	6 mos.	6 mos.	12 mos.	24 mos.	36 mos. with total 8 yrs service	36 mos. with total 11 yrs service	24 mos. with total 13 yrs service
TOTAL TRAINING DUTY IN GRADE †	14 days	14 days	14 days	14 days	28 days	42 days	42 days	28 days
PERFORMANCE TESTS	▨		Specified ratings must complete applicable performance tests before taking examination.					
DRILL PARTICIPATION	Satisfactory participation as a member of a drill unit in accordance with BUPERSINST 5400.42 series.							
PRACTICAL FACTORS (INCLUDING MILITARY REQUIREMENTS)	Record of Practical Factors, NavPers 1414/1, must be completed for all advancements.							
RATE TRAINING MANUAL (INCLUDING MILITARY REQUIREMENTS)	Completion of applicable course or courses must be entered in service record.							
EXAMINATION	Standard Exam		Standard Exam required for all PO Advancements. Also pass Military Leadership Exam for E-4 and E-5.				Standard Exam, Selection Board.	
AUTHORIZATION	Commanding Officer		Naval Examining Center					

* Recommendation by commanding officer required for all advancements.

† Active duty periods may be substituted for training duty.

Figure 1-2.–Inactive duty advancement requirements.

(1) the *Quals Manual*, (2) the Record of Practical Factors, (3) a NavPers publication called *Training Publications for Advancement*, NavPers 10052, and (4) applicable rate training manuals. The following sections describe them and give you some practical suggestions on how to use them in preparing for advancement.

Quals Manual

The *Manual of Qualifications for Advancement*, NavPers 18068B (with changes), gives the minimum occupational and military qualification standards for advancement to each pay grade within each rating. This manual is usually called the "Quals Manual," and the qualifications themselves are often called "quals." The qualification standards are of two general types: (1) military qualification standards, and (2) occupational qualification standards.

MILITARY STANDARDS are requirements that apply to all ratings rather than to any one particular rating. Military requirements for advancement to third class and second class petty officer rates deal with military conduct, naval organization, military justice, security, watch standing, and other subjects which are required of petty officers in all ratings.

OCCUPATIONAL STANDARDS are requirements that are directly related to the work of each rating.

Both the military requirements and the occupational qualification standards are divided into subject matter groups; then, within each subject matter group, they are divided into PRACTICAL FACTORS and KNOWLEDGE FACTORS. Practical factors are things you must be able to DO. Knowledge factors are things you must KNOW in order to perform the duties of your rating.

In most subject matter areas, you will find both practical factor and knowledge factor qualifications. In some subject matter areas, you may find only one or the other. It is important to remember that there are some knowledge aspects to all practical factors, and some practical aspects to most knowledge factors. Therefore, even if the *Quals Manual* indicates that there are no knowledge factors for a given subject matter area, you may still expect to find examination questions dealing with the knowledge aspects of the practical factors listed in that subject matter area.

You are required to pass a Navy-wide military/leadership examination for E-4 or E-5, as appropriate, before you take the occupational examinations. The military/leadership examinations are administered on a schedule determined by your commanding officer. Candidates are required to pass the applicable military/leadership examination only once. Each of these examinations consists of 100 questions based on information contained in *Military Requirements for Petty Officers 3 & 2*, NavPers 10056 (current edition) and in other publications listed in *Training Publications for Advancement*, NavPers 10052 (current edition).

The Navywide occupational examinations for pay grades E-4 and E-5 will contain 150 questions related to occupational areas of your rating.

If you are working for advancement to second class, remember that you may be examined on third class qualifications as well as on second class qualifications.

The *Quals Manual* is kept current bv means of changes. The occupational qualifications for your rating which are covered in this training manual were current at the time the manual was printed. By the time you are studying this manual, however, the quals for your rating may have been changed. Never trust any set of quals until you have checked it against an UP-TO-DATE copy in the *Quals Manual*.

Record of Practical Factors

Before you can take the servicewide examination for advancement, there must be an entry in your service record to show that you have qualified in the practical factors of both the military qualifications and the occupational qualifications. The RECORD OF PRACTICAL FACTORS, mentioned earlier, is used to keep a record of your practical factor qualifications. This form is available for each rating. The form lists all practical factors, both military and occupational. As you demonstrate your ability to perform each practical factor, appropriate entries are made in the DATE and INITIALS columns.

Changes are made periodically to the *Manual of Qualifications for Advancement*, and revised forms of NavPers 1414/1 are provided when necessary. Extra space is allowed on the Record of Practical Factors for entering additional practical factors as they are published in changes to the *Quals Manual*. The Record of Practical Factors also provides space for recording demonstrated proficiency in skills which are within the general scope of the rating but which are not identified as minimum qualifications for advancement.

Until completed, the NavPers 1414/1 is usually held by your division officer; after completion, it is forwarded to the personnel office for insertion in your service record.

If you are transferred before you qualify in all practical factors, the NavPers 1414/1 form should be forwarded with your service record to your next duty station. You can save yourself a lot of trouble by making sure that the form is actually inserted in your service record before you are transferred. If the form is not in your service record, you may be required to start all over again and requalify in the practical factors which have already been checked off.

NavPers 10052

Training Publications for Advancement, NavPers 10052 (revised), is a very important publication for anyone preparing for advancement. This bibliography lists required and recommended Navy Training Courses and other reference material to be used by personnel working for advancement. NavPers 10052 is revised and issued once each year by the Bureau of Naval Personnel. Each revised edition is identified by a letter following the NavPers number. When using this publication, be SURE that you have the most recent edition.

If extensive changes in qualifications occur in any rating between the annual revisions of NavPers 10052, a supplementary list of study material may be issued in the form of a BuPers Notice. When you are preparing for advancement, check to see whether changes have been made in the qualifications for your rating. If changes have been made, see if a BuPers Notice has been issued to supplement NavPers 10052 for your rating.

The required and recommended references are listed by pay grade in NavPers 10052. If you are working for advancement to third class, study the material that is listed for third class. If you are working for advancement to second class, study the material that is listed for second class; but remember that you are also responsible for the references listed at the third class level.

In using NavPers 10052, you will notice that some rate training manuals are marked with an asterisk (*). Any manual marked in this way is MANDATORY–that is, it must be completed at the indicated rate level before you can be eligible to take the servicewide examination for advancement. Each mandatory manual may be completed by (1) passing the appropriate enlisted correspondence course that is based on the mandatory training manual; (2) passing locally prepared tests based on the information given in the training manual; or (3) in some cases, successfully completing an appropriate Class A course.

Do not overlook the section of NavPers 10052 which lists the required and recommended references relating to the military qualification standards for advancement. Personnel of ALL ratings must complete the mandatory military requirements training manual for the appropriate rate level before they can be eligible to advance.

The references in NavPers 10052 which are recommended but not mandatory should also be studied carefully. ALL references listed in NavPers 10052 may be used as source material for the written examinations, at the appropriate rate levels.

Rate Training Manuals

There are two general types of rate training manuals. RATING MANUALS (such as this one) are prepared for most enlisted ratings. A rating manual gives information that is directly related to the occupational qualifications of ONE rating. SUBJECT MATTER MANUALS or BASIC MANUALS give information that applies to more than one rating.

Rate training manuals are revised from time to time to keep them up to date technically. The revision of a rate training manual is identified by a letter following the NavPers number. You can tell whether any particular copy of a training manual is the latest edition by checking the NavPers number and the letter following this number in the most recent edition of *List of Training Manuals and Correspondence Courses*, NavPers 10061. (NavPers 10061 is actually a catalog that lists all current training manuals and correspondence courses; you will find this catalog useful in planning your study program.)

Each time a rate training manual is revised, it is brought into conformance with the official publications and directives on which it is based; but during the life of any edition, discrepancies between the manual and the official sources are almost certain to arise because of changes to the latter which are issued in the interim. In the performance of your duties, you should always refer to the appropriate official publication or directive. If the official source is listed in NavPers 10052, the Naval Examining Center uses it as a source of questions in preparing the fleetwide examinations for advancement. In case of discrepancy between any publications listed in NavPers 10052 for a given rate, the Examining Center will use the most recent material.

Rate training manuals are designed to help you prepare for advancement. The following suggestions may help you to make the best use of this manual and other Navy training publications when you are preparing for advancement.

1. Study the military qualifications and the occupational qualifications for your rating before you study the training manual, and refer to the quals frequently as you study. Remember, you are studying the manual primarily in order to meet these quals.

2. Set up a regular study plan. It will probably be easier for you to stick to a schedule if you can plan to study at the same time each day. If possible, schedule your studying for a time of day when you will not have too many interruptions or distractions.

3. Before you begin to study any part of the training course intensively, become familiar with the entire book. Read the preface and the table of contents. Check through the index. Look at the appendixes. Thumb through the book without any particular plan, looking at the illustrations and reading bits here and there as you see things that interest you.

4. Look at the training manual in more detail, to see how it is organized. Look at the table of contents again. Then, chapter by chapter, read the introduction, the headings, and the subheadings. This will give you a pretty clear picture of the scope and content of the book. As you look through the book in this way, ask yourself some questions:

* What do I need to learn about this?

* What do I already know about this?

* How is this information related to information given in other chapters?

* How is this information related to the qualifications for advancement?

5. When you have a general idea of what is in the training manual and how it is organized, fill in the details by intensive study. In each study period, try to cover a complete unit–it may be a chapter, a section of a chapter, or a subsection. The amount of material that you can cover at one time will vary. If you know the subject well, or if the material is easy, you can cover quite a lot at one time. Difficult or unfamiliar material will require more study time.

6 In studying any one unit–chapter, section, or subsection–write down the questions that occur to you. Many people find it helpful to make a written outline of the unit as they study, or at least to write down the most important ideas.

7. As you study, relate the information in the training manual to the knowledge you already have. When you read about a process, a skill, or a situation, try to see how this information ties in with your own past experience.

8. When you have finished studying a unit, take time out to see what you have learned. Look back over your notes and questions. Maybe some of your questions have been answered, but perhaps you still have some that are not answered. Without looking at the training manual, write down the main ideas that you have gotten from studying this unit. Don't just quote the book. If you can't give these ideas in your own words, the chances are that you have not really mastered the information.

9. Use enlisted correspondence courses whenever you can. The correspondence courses are based on rate training manuals or on other appropriate texts. As mentioned before, completion of a mandatory rate training manual can be accomplished by passing an enlisted correspondence course based on the training manual. You will probably find it helpful to take other correspondence courses, as well as those based on mandatory training manuals. Taking a correspondence course helps you to master the information given in the training manual, and also helps you see how much you have learned.

10. Think of your future as you study rate training manuals. You are working for advancement to third class or second class right now, but some day you will be working toward higher rates. Anything extra that you can learn now will help you both now and later.

SOURCES OF INFORMATION

Besides training manuals, NavPers 10052 lists official publications on which you may be examined. You should not only study the sections required, but should become as familiar as possible with all publications you use.

One of the most useful pointers you can learn about a subject is how to find out more about it. No single publication can give you all the information you need to perform the duties of your rating. You should learn where to look for accurate, authoritative, up-to-date information on all subjects related to the military requirements for advancement and the occupational qualifications of your rating.

PUBLICATIONS YOU SHOULD KNOW

Some of the publications mentioned here are subject to change or revision from time to time–some at regular intervals, others as the need arises.

When using any publication that is subject to change or revision, be sure that you have the effective (latest) edition. When using any publication that is kept current by means of changes, be sure you have a copy in which all official changes have been made. Check with your senior petty officer or division officer if you are not certain you have the latest editions with all official changes. Studying canceled or obsolete information will not help you to do your work or to advance; it is likely to be a waste of time, and may even be seriously misleading.

A great deal of written material with which a Quartermaster should be familiar is in reference books. It is recommended that the following works be referred to for valuable elaboration of subjects discussed in this manual: ACPs 118, 125, 129; *Manual for Ship's Surface Weather Observations*, OpNav P3140.37 series; *American Practical Navigator* (Bowditch), H.O. Pub. No. 9; *Maneuvering Board Manual*, H.O. Pub. No. 217; and *The Watch Officer's Guide*; *Dutton's—Navigation and Piloting*.

If some section of this training manual puzzles you, or you feel a need to know more details about a specific operation, you should refer to the books just listed. These books should be readily available aboard your ship. If they are not, your division officer will request them through proper channels.

TRAINING FILMS

Training films available to naval personnel are a valuable source of supplementary information on many technical subjects. A selected list of training films that may be useful to you is given in appendix I of this training manual. Other films that may be of interest are listed in the *United States Navy Film Catalog*, NavWeps 10-1-777. This catalog, published in 1966, supersedes three earlier publications: the former catalog with the same title but numbered NavPers 10000-A; the *Supplement*, NavWeps 10-1-772; and the *Navy Classified Film Catalog*, NavPers 10001-A.

When selecting a film, note its date of issue listed in the film catalog.

As you know, procedures sometimes change rapidly. Thus, some films become obsolete. If a film is obsolete only in part, it may still have sections that are useful, but you should note procedures that have changed. If there is any doubt, verify current procedures by looking them up in effective publications on that subject.

CHAPTER 2

QUARTERMASTER WATCHES

It is the aim of this chapter to familiarize you with the bridge, bridge personnel, bridge equipment, and the duties a Quartermaster performs while standing quartermaster watches.

BRIDGE WATCHES

One of the most important bridge watches is the quartermaster watch. As a member of the watch team, every Quartermaster must serve as an observer and as recorder.

Being an observer is one of the duties of the quartermaster of the watch. He should make every effort to find out as much as he can about the bridge, its functions, and its personnel, because he frequently is assigned the job of enlisted supervisor of the watch. This assignment occurs particularly on smaller ships that have no boatswain's mate of the watch, and on all ships during general quarters. The quartermaster of the watch must keep his eyes open for any routine that is overlooked or neglected. He also must be on the alert for any out-of-the-ordinary occurrences.

Everything that happens during the QM watch should be recorded in the quartermaster's notebook. These events are recorded as soon as they occur. Chapter 4 of this training course includes some examples for making correct entries in the notebook.

The QM of the watch should not hesitate to bring any unusual incident to the attention of the OOD, the Boatswain's mate of the watch, or any other member of the watch. The purpose of a watch is to maintain the safety of the ship and the men. It behooves all members of the watch to be vigilant.

BRIDGE EQUIPMENT

The bridge contains instruments or apparatus for–

Steering;
Depth sounding;
Indicating ship's heading;
Indicating rudder angle;
Measuring speed;
Measuring temperature and atmospheric pressure;
Communicating speed orders to engineroom;
Taking bearings and ranges;
Making celestial observations;
Plotting ship's position and course;
Controlling running and speed lights;
Indicating revolutions made by the engines;
Communicating with other departments in the ship and with other ships; and
Measuring wind direction and speed.

A rated Quartermaster seldom stands routine steersman watches nowadays. He does, however, take over during emergencies and in some special circumstances. Some ships whose steering engines are controlled by a "streetcar" controller have only a miniature wheel, or sometimes just a lever, for putting over the rudder. Most ships have a steering unit similar to that shown in figure 2-1.

Forward of the wheel, where the steersman can see it best, is the magnetic steering compass in its binnacle, and to one side, either one or two gyro repeaters. Nearby is the engine order telegraph, with a separate handle, port and starboard, for twin screws, or a single handle for a single-screw ship. The engine revolution indicator usually is rigged on or near the telegraph. A rudder angle indicator is on the forward bulkhead, or in some position where it can be seen easily by the steersman. Ordinarily a wheel angle indicator is mounted on the steering post itself. Voice tubes, telephones, the PA system, and the howler and gong control are customarily on the after bulkhead. Light switchboards and various indicators, such as the aneroid barometer and deck clock, usually are on one of the side bulkheads. In the pilothouse on most ships is a radar repeater with a plan position indicator (PPI) scope that shows the position of all the ships in formation, or other objects nearby.

The charthouse normally is abaft the wheelhouse but may be located on another deck some distance away. Here the chart portfolios are laid out on shelves, or are stowed away in drawers. A table, for

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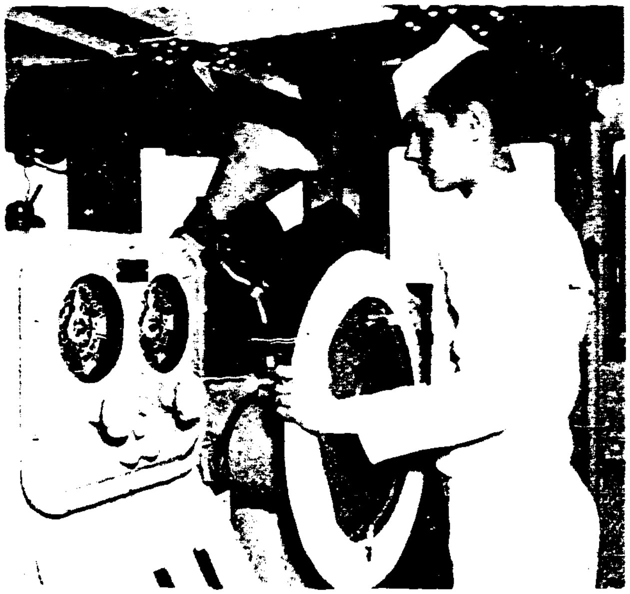


Figure 2-1.–Bridge of a destroyer. 69.1

laying out charts, generally is equipped with a universal drafting machine. The dead reckoning tracer (DRT) may be set up here too.

Shelves in the charthouse contain the navigational instruments–sextants, stadimeters, bearing circles, stopwatches, etc. Plotting tools stowed in boxes or drawers include parallel rulers, dividers, protractors, Star Finder and Identifier (No. 2102-D), Hoey position plotters, and such paraphernalia as pencils, stamps, inks, and erasers.

A chronometer case usually is installed in the charthouse. Built-in shelves contain the navigator's library, H.O. publications, tide and current tables, and so on.

WATCH PERSONNEL

The watch on the bridge, underway, normally consists of the following personnel:

- Officer of the deck;
- Junior officer of the deck;
- Boatswain's mate of the watch;
- Quartermaster of the watch;
- Steersman;
- Lee steersman (who usually mans the engine order telegraph);
- Sound-powered telephone talker;
- Messenger;
- Lookouts.

The numbers and assignments of personnel on watch vary from ship to ship, depending on the ship's size and availability of personnel. You should know all these people by name and assignment. You should also know, at sea, which is the duty division; in port, the duty, liberty, and standby sections, the name of the command duty officer, the duty department heads, the name and location of the PO of the watch, and whether the captain and executive officer are ashore.

RELIEVING THE WATCH

Always arrive on station at least 15 minutes ahead of scheduled time for relieving the watch: nothing is more aggravating than a late relief. More important, you must obtain much information about the general situation before you can assume responsibility.

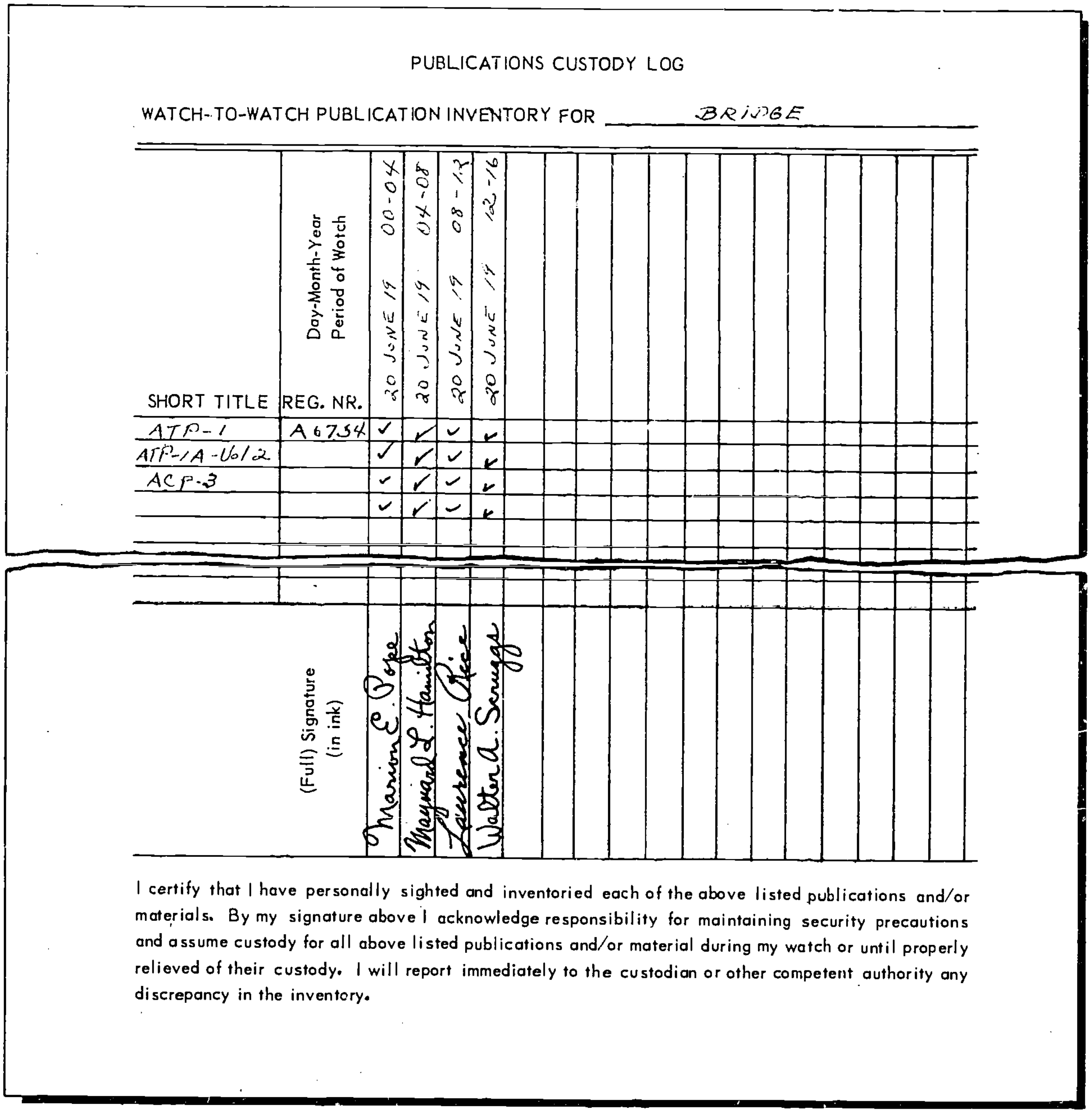
You must be able at all times to locate the various notebooks and records you are to use during the watch. These record books include the quartermaster's notebook, the deck log, the captain's night order book, the morning call book, and the magnetic compass record.

A publications inventory log is required to ensure watch-to-watch accounting of classified publications. Any publications used by the OOD or the quartermaster of the watch are accountable to the quartermaster of the watch. The publications custody form shown in figure 2-2 is not a standard form, but usually any record that contains the same information is acceptable. The important point is that a custody log must be maintained and kept on file.

When you take over the watch, you and the QM being relieved should inventory the publications assigned to the quartermaster watch before you relieve him. When the publications are accounted for, you should sign the custody log. If any of the publications are missing, you should report that fact to the officer of the deck and the navigator.

The morning call book contains a list of the people who are to be called early. When you relieve the midwatch, take a look at the call book at once and note the time the earliest call is to be made. Because you shouldn't leave the bridge during your watch, the calls should be made by the messenger; but you are responsible for keeping the messenger informed.

The captain's night order book contains a summary of the duties of the bridge watch. Although actually addressed to the officer of the deck, its contents must be equally familiar to his assistant, the quartermaster of the watch, whether they apply to him or not. Standing orders usually are posted inside the front cover of the night order book. Each day on a separate page the captain inserts a description of



PUBLICATIONS CUSTODY LOG

WATCH-TO-WATCH PUBLICATION INVENTORY FOR BRIDGE

SHORT TITLE	Day-Month-Year Period of Watch REG. NR.	20 JUNE 19 00-04	20 JUNE 19 04-08	20 JUNE 19 08-12	20 JUNE 19 12-16													
ATP-1	A 6754	✓	✓	✓	✓													
ATP-1A-U6/2		✓	✓	✓	✓													
ACP-3		✓	✓	✓	✓													
		✓	✓	✓	✓													
	(Full) Signature (in ink)	Marion E. Pope	Maynard L. Hamilton	Lawrence Rice	Walter A. Scruggs													

I certify that I have personally sighted and inventoried each of the above listed publications and/or materials. By my signature above I acknowledge responsibility for maintaining security precautions and assume custody for all above listed publications and/or material during my watch or until properly relieved of their custody. I will report immediately to the custodian or other competent authority any discrepancy in the inventory.

Figure 2-2.–Publications custody log. 31.58

the general situation at the end of that day, and any special orders (called current orders) that apply to succeeding watches.

The OOD and usually the JOOD, CIC watch officer, and CIC watch supervisor are required to initial the current night orders to signify they have read and understand them. When you check the orders, as QM of the watch, be sure you are looking at the correct page. It has happened that wrong pages have been read, and the resulting troubles can be serious. For this reason, always check the date of the current orders you are inspecting. Shortly in advance of the time for the officer of the deck to execute the orders directed to him in the night order book, it is advisable to remind him of this duty.

You must also be able to find the apparatus you are to use–engine order telegraph, rpm indicator, echo depth sounder, barometer, bearing circle, stadimeter, light switches, and controls for any electrical signal equipment operated from the navigation and signal bridges, even under conditions of total darkness. If you've just come aboard the ship, you should explore the bridge and charthouse before you take over, especially if your first watch is to be during the hours of darkness.

WATCH ROUTINE

When you relieve the watch, make sure you obtain any special information the man you relieve may have for you. Such information includes verbal orders to the wheel that still are standing, steering peculiarities due to unusual weather situations, or anticipated aids to navigation.

Consult the night order book and examine the current orders. Look over the deck log entries of the previous watch and see if there is anything pertaining to your watch, then report officially to the OOD that you have relieved the watch.

Inform yourself of the general situation. You should have some knowledge of what is happening aboard your ship. The material to follow will give you an idea of some of the information you must know when you stand watch. How much information you need depends to some degree on whether you are anchored, at sea, alongside, or in some other situation.

First (and most important), as the quartermaster of the watch, you must serve as the assistant to the OOD. In this capacity you are very close to events occurring on the bridge and at other stations. Your nearness makes it possible for you to observe the watch personnel and the jobs they are performing. Frequently, the officer of the deck is involved in a problem of maneuvering or navigation, and may fail to notice the omission of small details in the ship's daily routine. Pages from the ship's organization book, listing the routine of the day, are available in the pilothouse. It is an important part of your job as quartermaster of the watch to remind people concerned when the time approaches for performing each detail.

When standing watch, you should observe all instruments and equipment that register and perform significant functions. If, for instance, the steersman wanders off course, you should, by your observation of the compass, be the first to discover what happened. This incident should be reported to the OOD immediately. The barometer is another instrument that you should keep your eye on. The barometer readings are entered in the weather log every hour, but the readings can change drastically if a storm of hurricane proportions should come up. Other instruments that you should observe closely are the compass, rudder angle indicator, course recorder, and revolution indicator. Anything that might affect the ship should be reported to the OOD.

The condition of the ship's motive powerplant must be known at all times. Underway, the boilers and engines in use must be recorded. When in port, you must advise the OOD of the boilers that are being held in readiness and of any repairs, already in progress, which may interfere with the ship's getting underway.

As watch quartermaster you must know your ship's standard speed, and how many revolutions per minute are required to make standard speed. Naturally, you must know the speed she is making presently, her base course by steering, standard and gyrocompass, and her present course. The gyrocompass must be adjusted for material changes in latitude, but you do not make the actual adjustment; you must notify the electrical gang when an adjustment must be made.

Check to see that the required running lights and auxiliary lights are on. If you have the watch at sunrise or sunset, turn the required lights on or off at the proper instant. Having the proper lights on is a must for every naval vessel. A knowledge of lights enables you to determine the direction another ship is traveling. If the wrong lights are used, your ship may become endangered. For correct ship's lights, refer to chapter 9 of this training manual.

As quartermaster of the watch, you should know the cruising formation of the ship, the name and location of the formation guide, and the names of the other ships present. You must know your ship's relative position in formation, and check it repeatedly during the watch. You should know how to work basic maneuvering board problems. The maneuvering board problems are essential in determining courses and speeds to use if the formation is altered.

Find out which boat is designated ready lifeboat, and learn the plan for manning it. Keep an eye on the weather situation, tendency of the barometer, wind velocity and direction, cloud formations, and any other conditions that might endanger your ship. If any of the ship's boats are in the water, you must know their location and any special orders applicable to them. You must have the compass course to the regular landing worked out for boat coxswains, and be prepared to work out a course for any boat making a trip to another point.

One of your main duties on the quartermaster watch on an anchored ship is to see whether the ship drags her anchor. You must know what kind of holding ground the anchor is in (mud, sand, gravel) and how deep the water is. Be alert at all times to detect the first indication of dragging, especially when circumstances make it a definite possibility. Poor holding ground, deep water, a strong wind or tide, or any combination of these conditions mean that the drift lead should be put over at once and checked often. Repeated bearings and ranges must then be taken. You must report to the OOD any indication of a drag, even though it is only a suspicion. You must learn to distinguish between a change of bearing caused by a swing, and the actual change due to dragging.

Immediate action must be taken when the anchor starts to drag. It may be necessary only to veer chain and get another good bite. In a crowded anchorage or near a lee shore or shoal water, however, another anchor must be dropped at once. Preparations usually are made for getting underway, and emergency signals are made to warn ships to leeward or downstream that they may have to maneuver out of the way.

If conditions indicate that dragging is a possibility, it is a good idea to walk forward now and then and check the chain. Under normal circumstances, with the chain veered to proper scope, it should hang in a slight catenary (downward curve). If it is taut, the hook may be about to drag. When it drags on a hard bottom, a loud rumbling sound ordinarily indicates that condition. However, on an oozy bottom it may slide along noiselessly. In that event, if you put your foot on the chain, usually you can feel a definite vibration.

If your ship is moored with two anchors, you must know whether a swivel is in use. If not, or if the swivel is not functioning properly, you must keep record of how the ship swings, so you can inform the OOD before the chain becomes fouled. This action entails a knowledge of the state of the tide. If you are moored alongside, you must know what lines are in use, whether they are doubled up, and whether they are taut or slack. If your ship is one of a nest, you must know which ship in the nest has the buoy.

PREPARATIONS FOR GETTING UNDERWAY

A ship cannot get underway unless extensive preparations are made. During these preparations, every department and nearly every man has some duties to perform. As Quartermaster, you have some of the most important duties.

Your duties in connection with getting underway may be separated into two broad categories. First, you must lay out and set up equipment. Second, you must check or test the operating equipment on the bridge.

SETTING UP EQUIPMENT

You must set up the navigational chart of the area in which your ship is anchored or moored. Provide pencils, dividers, drawing compasses, parallel rulers, and erasers for the use of the navigator. Set up a drafting machine, bearing circle, and alidade. When required, you may also need a three-arm protractor, sextant, and stadimeter. You must also provide binoculars for the bridge personnel.

CHECKING AND TESTING EQUIPMENT

The operating equipment on the bridge must be tested (usually by the QM of the watch) to ensure that it will function properly when the ship is underway. You must check the helm and rudder by turning the wheel full to the right (or left) and watching the rudder angle indicator to see that it follows the wheel angle indicator to the proper angle. When this check is made, turn the wheel full in the opposite direction, and again watch the rudder angle indicator for proper reaction. While this test is being carried out, you should have someone in after steering standing by to see that the wheel and the rudder angle indicator at that steering station are functioning properly.

The QM of the watch tests the annunciator and propeller revolution telegraph to ensure that the necessary signals can be transmitted to the engineroom. Prior arrangements for the test must be made with engineroom and I.C. room personnel. To test the annunciator, move the handle on either the port or starboard side to one of the positions that indicates a desired speed (ahead or astern); wait for the engineroom personnel to acknowledge receipt of the order by moving their indicator to the same position. When the engineroom acknowledges, repeat the procedure by using a different indication of speed. Continue in this manner until all handle positions on the annunciator are indicated and acknowledged.

Test the propeller revolution indicator by turning the indicator knobs, thereby causing different numbers of desired revolutions to be transmitted to the engineroom. Personnel in the engineroom should acknowledge by indicating the same number of revolutions rung up by the bridge. This procedure should be repeated, using several different combinations of numbers.

Check the gyrocompass repeaters to see that they are aligned with the master. Accomplish this procedure by "marking" the repeaters and the master simultaneously, then compare the readings. If the reading at the lubber's line of a repeater differs from the master by half a degree or more, you should realign it. Proceed by pushing in and rotating an adjusting knob, located near the base of the repeater, either clockwise or counterclockwise, so that the compass card on the repeater can be rotated to coincide with the master gyro.

The ship's whistle and siren (if installed on your ship), as well as the general, chemical, and collision alarms, are additional checks you must make for their proper operation. Before testing any noise-making equipment, however, you must obtain permission from the commanding officer.

CHAPTER 3

HONORS AND CEREMONIES

Since the days when the United States emerged as an independent nation, tradition has played an important role in the ceremonial functions of our Navy. At first, most of the honors and ceremonies rendered by our Navy were carried over from the British Navy. Before many years went by, however, the United States Navy began changing these carryover honors and ceremonies to conform to its own concept of ceremonial functions. As a result, the United States Navy now has a rigid set of rules covering all ceremonies.

All types and phases of ceremonial functions rendered by and on board naval vessels are presented in this chapter. Quartermasters must know what is required, and also when, how, why, where, and by whom the honors and ceremonies are given.

PASSING HONORS

Passing honors are those honors, except gun salutes, rendered by ships and boats when ships, embarked officials, or officers pass (or are passed) close aboard. Close aboard means passing within 600 yards for ships, and within 400 yards for boats. To ensure that appropriate honors are given, these distance limitations should be interpreted liberally.

Passing honors consist of sounding the command "Attention," followed by a hand salute by all persons on deck and not in ranks. Passing honors are exchanged between ships of the U. S. Navy, and between ships of the Navy and the Coast Guard, passing close aboard.

Table 3-1 prescribes the honors for a ship of the Navy passing close aboard a ship or naval station displaying the flag of the officials indicated, and for naval stations (insofar as practicable) when a ship displaying such flag passes close aboard. These honors are acknowledged by returning the same honors.

Table 3-2 lists the honors to be rendered by a ship of the Navy being passed close aboard by a boat displaying the flag or pennant of a civil official or a naval officer.

FOREIGN DIGNITARIES AND WARSHIPS

The honors prescribed for the President of the United States are given by a ship of the Navy being passed close aboard by a ship or boat displaying the flag or standard of a foreign president, sovereign, or member of a reigning family. The foreign national anthem is played instead of the national anthem of the United States.

Passing honors are exchanged when foreign warships pass close aboard. The honors consist of parading the guard of the day, sounding "Attention," rendering the hand salute by all persons in view on deck, and playing the foreign national anthem.

RENDERING PASSING HONORS

The command "Attention" is sounded by the junior when the bow of one ship passes the bow or stern of the other vessel. If a senior is embarked in a boat, "Attention" is sounded before the boat is abreast, or nearest abreast the quarterdeck.

The guard, when required, calls "Present arms," and all persons on deck salute. Music is played, when required. The order "Carry on" is sounded when the prescribed honors are rendered and acknowledged.

Passing honors are not rendered after sunset nor before 0800, except when international courtesy requires. Passing honors are not exchanged between ships of the Navy when they are engaged in tactical evolutions outside port. The senior officer present may direct that passing honors be dispensed with in whole or in part.

PRECEDENCE OF SHIPBOARD MEANS OF ANNOUNCING

There are a number of ways to call attention to cermonies, events, departures, arrivals, etc. aboard a Navy ship. The preferred order of use is as follows:

1. Bugle
2. Whistle
3. Passing the word.

No more than one means should be used for a

Table 3-1.-Passing Honors Rendered by a Ship or Naval Station 69.125

Official	Uniform	Ruffles and flourishes	Music	Guard	Remarks
President	As prescribed by senior officer present.	4	National anthem.	Full	Man rail, unless otherwise directed by senior officer present.
Secretary of State when special foreign representative of the President.	do	4	do	do	Crew at quarters.
Vice President	Of the day	-	do	do	Do.
Secretary of Defense, Deputy Secretary of Defense, or Secretary of the Navy.	do	-	do	do	Do.
Assistant Secretary of Defense, Under Secretary or an Assistant Secretary of the Navy.	do	-	do	do	Do.

given event and the same means should be used throughout that event, e.g. "Attention to port" should not be announced by a whistle and followed by the same order given orally over the ship's loudspeaker; "Carry on" should not be announced using a different device than that used to announce "Attention."

Bugle and Whistle Signals

In order to standardize bugle and whistle signals when used for passing/side honors, the following are prescribed:

One Blast	Attention to starboard.
Two Blasts	Attention to port.
One Blast	Render salute.
Two Blasts	Terminate salute, remain at attention.
Three Blasts	Carry on.

GUN SALUTES

Gun salutes prescribed in *Navy Regulations* for officers and officials entitled to 17 or more guns are fired on the occasion of each official visit of the individual concerned. Gun salutes designated in Navy Regulations for officers and officials entitled to 15 guns or fewer are not fired unless so ordered by the senior officer present or by higher authority. Normally, the interval between guns in salutes is 5 seconds.

During the gun salute, persons on the quarterdeck, or in the ceremonial party if ashore, render the hand salute; other persons on deck, or in the vicinity of the ceremonial party if ashore, stand at attention.

Officers being saluted give the hand salute during the firing of the gun salute. If practicable to do so, the boat or vehicle in which a person being saluted is embarked is stopped during the firing of the gun salute.

Table 3-2.-Passing Honors Rendered by a Ship
Being Passed by a Boat 69.126

Official	Ruffles and flourishes	Music	Guard	Remarks
President	4	National anthem.	Full	"Attention" sounded, and salute by all persons in view on deck. If directed by the senior officer present, man rail.
Secretary of State when special foreign representative of President.	4	do	do	"Attention" sounded, and salute by all persons in view on deck.
Vice President, Secretary of Defense, Deputy Secretary of Defense, Secretary of the Navy, Assistant Secretary of Defense, Under Secretary or an Assistant Secretary of the Navy.	4	Admiral's march.	do	Do.
Other civil official entitled to honors on official visit.	---	---	--	Do.
Officer of an armed service.	---	---	--	Do.

HONORS FOR OFFICERS

The honors due officers of the Armed Forces are set forth in table 3-3. These honors are rendered by ships and stations on the occasion of an official visit. Ashore, the single gun salute (when required) is given on arrival instead of on departure.

An officer departing for or returning from an official visit is rendered, by his flagship or command, the honors established for such a formal visit. Aboard his flagship, however, the uniform of the day normally is worn, and gun salutes are not fired.

Upon arrival or departure of a visiting Navy captain or commander (or officer of equivalent grade in the other services) who is not a Chief of Staff, Commanding Officer, or whose command identity is not known to the Officer of the Deck, the words "Staff gangway" are substituted for the official title.

NOTE: The term "official visit" means a formal visit of courtesy requiring special honors and ceremonies. An informal visit of courtesy requiring no special ceremonies is a "call."

PROCEDURE FOR OFFICIAL VISIT

The honors specified for an official visit are rendered on arrival as follows:

1. When the rail is manned, men are spaced uniformly at the rail on each weather deck, facing outboard.
2. The command "Attention" is sounded as the visitor's boat or vehicle approaches the ship.

Table 3-3.–Honors Required for Officers of the Armed Forces 69.127

Officer	Uniform	Gun salute		Ruffles and flourishes	Music	Guard	Side boys[2]
		Arrival	Departure				
Chairman, Joint Chiefs of Staff.	Full dress.	19	19	4	General's or Admiral's march.	Full	8
Chief of Staff, U.S. Army.	do	19	19	4	General's march.	do	8
Chief of Naval Operations.	do	19	19	4	Admiral's march.	do	8
Chief of Staff, U.S. Air Force.	do	19	19	4	General's march.	do	8
Commandant of the Marine Corps.	do	19	19	4	Admiral's march.	do	8
General of the Army	do	19	19	4	General's march.	do	8
Fleet Admiral	do	19	19	4	Admiral's march.	do	8
General of the Air Force.	do	19	19	4	General's march.	do	8
Generals	do	17	17	4	do[1]	do	8
Admirals	do	17	17	4	Admiral's march.	do	8
Naval or other Military Governor, commissioned as such by the President, within the area of his jurisdiction.	do		17	4	General's[1] or Admiral's march.	do	8
Vice Admiral or Lieutenant General.	do		15	3	do[1]	do	8
Rear Admiral or Major General.	do		13	2	do[1]	do	6
Commodore or Brigadier General.	do		11	1	do[1]	do	6
Captain, Commander, Colonel, or Lieutenant Colonel.	Of the day.					Of the day.	4
Other commissioned officers.	do					do	2

[1] Marine Corps general officers receive the Admiral's march.
[2] Not appropriate on shore installations.

3. If a gun salute is prescribed on arrival, it is fired as the visitor approaches and still is clear of the side. The proper flag or pennant is broken on the first gun and hauled down on the last gun, except when it is to be flown for the duration of the visit. Other ships firing a concurrent salute also haul down, on the last gun, the flag or pennant displayed in honor of the visitor. NOTE: If the ship visited is moored to the pier in such a position that it is impracticable to render the gun salute before arrival on board, the salute is rendered–provided local regulations do not forbid gun salutes–after the official arrives on board and the commanding officer assures himself that the dignitary and his party are moved to a position in the ship that is well clear of the saluting battery.
4. The boat or vehicle is piped as it comes alongside.
5. The visitor is piped over the side, and all persons on the quarterdeck salute and the guard presents arms until the termination of the pipe, flourishes, music, or gun salute, depending on which is rendered last.
6. If the gun salute is not prescribed on arrival, and a flag or pennant is to be displayed during the visit, it is broken at the start of the call.
7. The piping of the side, the ruffles and flourishes, and the music are executed in the order named. In the absence of a band, "To the Colors" is sounded on the bugle in lieu of the national anthem, when required.
8. The visitor, if entitled to 11 guns or more, is invited to inspect the guard upon completion of the gun salute or such other honors as may be accorded him.

On departure, the honors prescribed for an official visit are as follows:

1. The rail is manned, if required.
2. The command "Attention" is sounded as the visitor arrives on the quarterdeck.
3. When the visitor is ready to leave the ship, the guard presents arms, all persons on the quarterdeck salute, and ruffles and flourishes are sounded. The visitor then is piped over the side. The salute and present arms terminate with the call. If no salute is fired, the flag or pennant displayed in honor of the visitor is hauled down.
4. The boat or vehicle is piped away from the side.
5. If a gun salute is directed upon departure, it is fired when the visitor is clear of the side. If a flag or pennant is displayed in honor of the visitor, it is hauled down with the last gun of the salute.

When possible, the same honors and ceremonies are rendered on the occasion of an official visit to a naval station.

SIDE HONORS

On the arrival and departure of civil officials and foreign officers, and of United States officers when directed by the senior officer present, the side is piped and the appropriate number of side boys paraded.

Side boys are not paraded on Sunday nor between sunset and 0800 on other days. They are not paraded during meal hours of the crew, general drills and evolutions, nor periods of regular overhaul. As an exception to the foregoing rules, side boys may be paraded at any time during daylight hours in honor of civil officials or foreign officers.

Except for official visits and for other formal occasions, side boys are not paraded in honor of officers of the armed services of the United States, unless the senior officer present directs otherwise.

The side is piped when side boys are paraded, but not at other times. When side boys are not ordered, the guard and band are not paraded in honor of the arrival or departure of an individual.

HAILING AN APPROACHING BOAT

A boat approaching a ship at night is hailed by the QM of the watch or the OOD with "Boat ahoy." The coxswain's answering hails, indicating the rank of the senior person in the boat, are as follows:

President or Vice President of the United States	"United States."
Secretary, Deputy or an Assistant Secretary of Defense	"Defense."
Secretary, Under Secretary or an Assistant Secretary of the Navy	"Navy."
Chief of Naval Operations or the Vice Chief of Naval Operations	"Naval Operations."

Fleet, Force, or Type Commander	Fleet or abbreviation of administrative title (e.g. PHIBLANT)."
A Flag Officer	"Flag Officer."
A General Officer	"General Officer."
A Chief of Staff	"Staff."
A Flotilla Commander	FLOT (Type) (Number)
A Group Commander	GRU (Type) (Number)
A Squadron Commander	RON (Type) (Number)
A Division Commander	DIV (Type) (Number)
A Marine Officer Commanding a Brigade	"Brigade Commander."
A Commanding Officer of a Ship, Station, etc.	(Name of Ship, Station, etc.)
A Marine Officer Commanding a Regiment	"Regimental Commander."
Any Other Commissioned Officer	"Aye, Aye."
Other Officer (not commissioned)	"No, No."
Enlisted Men	"Hello."
A Boat not intending to go alongside, regardless of rank of passenger	"Passing"

It is not strictly accurate to say that the answering hail indicates the rank of the senior person on board. The actual rank of some of the individuals in the foregoing list may vary. During daylight you are interested chiefly in knowing how many side boys are required, and this number depends on the actual rank of the person coming aboard. For a flag officer, the number of side boys can be decided easily from the number of stars on his flag. But a commanding officer or a squadron or flotilla commander does not always have a specific rank.

To simplify the question of side boys, it is customary, during daylight, for the OOD to hail boats with a clenched fist and for the coxswain of a boat carrying persons of sufficient rank that they rate side boys to indicate the rank of the senior person in the boat by holding up fingers equal in number to the number of side boys rated by that person. In other words, the OOD might hail a boat by holding up a clenched fist and the coxswain of a boat carrying a captain would then hold up 4 fingers, warning the quarterdeck personnel that they should have 4 side boys standing by.

In addition to the aforementioned manner of signifying the rank of the senior person in an approaching boat, it is also possible to find out by observing the insignia on the fore and aft flagstaffs. These insignia are as follows:

President	Spread eagle.
Secretary of Defense	Spread eagle.
Secretary of the Navy	Spread eagle.
Fleet Admiral	Spread eagle.
Chief of Naval Operations	Spread eagle.
Assistant and Under Secretaries of the Navy	Halberd.
Cabinet officers.	Halberd.
Flag officer (not listed above).	Halberd.
Captain	Gilt ball.
Commander	Gilt star.
Officer of lower rank	Flat truck.

FLAG OFFICER OR UNIT COMMANDER RELIEVING COMMAND

When a flag officer or unit commander relieves a command or departs after being relieved, the same honors are rendered as for an official visit, subject to the regulations pertaining to gun salutes.

When assuming a command, an officer reads his orders to the assembled officers and crew. Immediately after reading his orders, his personal flag or command pennant is broken. Thereupon the gun salute is fired, if required by *Navy Regulations*.

If the flag officer or unit commander is relieving another officer in command, the officer being relieved reads his orders to the assembled officers and crew. On completion thereof, or after the gun salute (if fired), his flag or command pennant is hauled down. The officer succeeding to command then reads his orders, after which his flag or command pennant is broken. The commission pennant is not displayed aboard ship if a personal flag or pennant is flying.

HONORS AT OFFICIAL INSPECTION

When a flag officer or a unit commander boards a ship of the Navy to make an official inspection, honors are rendered as for an official visit, except that the uniform is prescribed by the inspecting officer. His flag or command pennant is broken upon his arrival and is hauled down on his departure. When his flag is flying on board the vessel being inspected, his personal flag is hauled down on board his flagship. If the vessel being inspected is his flagship, his flag remains flying. Insofar as practicable and appropriate, the same provisions apply when a flag officer in command ashore makes an official inspection of a unit of his command.

HONORS FOR CIVIL OFFICIALS AND FOREIGN DIGNITARIES

A ship or station must render honors to civil officials of the United States as indicated in table 3-4. Foreign dignitaries are honored as shown in table 3-5. As with honors for officers of the Armed Forces, ashore, the single gun salute (when required) is given on arrival instead of on departure.

When a civil official of the United States takes passage officially in a ship of the Navy, he is rendered the same honors on embarking and disembarking as prescribed for an official visit. Additionally, if he is entitled to a gun salute, it is fired when he disembarks in a port of the foreign nation to which he is accredited.

DRESSING AND FULL-DRESSING SHIP

When dressing ship, the largest national ensign the ship has is flown from the flagstaff. Except as prescribed for a ship displaying a personal flag or command pennant, a national ensign also is displayed from each masthead. The national ensigns at the mastheads should be uniform in size. If there is a substantial difference in heights of mastheads, however, a variation in the size of the national ensigns is appropriate.

When the ship is full-dressed, the mastheads are dressed as described in the preceding paragraph. A rainbow of signal flags also is displayed. They should reach from the foot of the jackstaff to the mastheads and then to the foot of the flagstaff. On peculiarly masted or mastless ships, the display is modified as little as possible from the rainbow effect.

When dressing or full-dressing ship in honor of a foreign nation, the national ensign of that nation replaces the United States national ensign at the main (or at the masthead of a single-masted ship).

If circumstances necessitate half-masting the national ensign during dressing or full-dressing ship, only the national ensign at the flagstaff is half-masted.

When full-dressing is prescribed, the senior officer present may direct that dressing be substituted if, in his opinion, weather conditions make it advisable. Under such circumstances, he also may direct that the ensigns be hauled down from the mastheads after they are hoisted.

Ships not underway must be dressed or full-dressed from 0800 until sunset. Underway, they are not dressed or full-dressed.

Only clean flags should be used in full-dressing ship. More than one set of flags may be needed to fill all the dressing lines on large ships. Flags should be stopped to the dressing lines the day before the ship is to be full-dressed. Otherwise, something unforeseen might develop and the dressing lines would not be ready for hoisting at 0800.

FLAGS OF PRINCIPAL MARITIME NATIONS

Preceding sections of this chapter dealt with the honors and ceremonies for civil officials and officers of the United States and foreign countries. Another of your duties as Quartermaster is identifying flags flown by ships of the United States Navy as well as the national and merchant flags of the principal maritime nations. The remainder of this chapter discusses and illustrates these flags and some of the ceremonies that pertain to them.

NATIONAL ENSIGN

For nearly 200 years the ensign (see fig. 3-1) has served as a symbol of our country's greatness. Because it represents our country, we owe it every respect and honor to which it is entitled.

During the ceremony of hoisting and lowering the national ensign, or when the ensign is passing in a parade or review, all persons who are not part of a military formation should stand, face the colors, and come to attention. Armed services personnel in uniform render the hand salute. A man in civilian dress should remove his hat with the right hand and hold it at a point on the left shoulder so that the hand is over the heart.

Personnel in civilian dress, but hatless, should stand at attention with the right hand over the heart. If the ensign is carried in a moving column, the hand salute should be made as the flag passes.

When the ensign is displayed as the national anthem is being played, military personnel should salute while facing the ensign. The same salute

Table 3-4. —Honors for Civil Officials of the United States 69.128.1

Official	Uniform	Gun salute		Ruffles and flourishes	Music	Guard	Side boys	Crew	Within what limits	Flag		
		Arrival	Departure							What	Where	During
President	Full dress:	21	21	4	National anthem.[1]	Full	8	Man rail	. . . .	President's	Main truck.	Visit.
Ex-President or President-elect.	. . .do. . . .	21	21	4	Admiral's march.	. do.	8	Quarters	. . . .	National . .	. do . .	Salute.
Secretary of State when acting as special foreign representative of the President.	. . .do	19	19	4	National anthem.	.do .	8	. . do . .	. . . .	Secretary's	. do . .	Visit.
Vice President	. . .do	. .	19	4	Admiral's march.	.do .	8	. . do . .	. . . .	Vice President's.	. do . .	Do.
Speaker of the House of Representatives.	. . . do	. .	19	4	. . do. . .	. do.	8	. . . . . .	. . . .	National . .	Fore truck.	Salute.
Governor of a State of the United States.	. . . do. . . .	. .	19	4	. . do. . .	. do.	8	. . . . . .	Area under his jurisdiction.	. . . do. . . .	. do. .	Do.
Chief Justice of the United States.	. . . do. . . .	. .	19	4	. . do. . .	. do.	8	. . . . . .	. . . .	. . . do. . .	. do. .	Do.
Ambassador, High Commissioner, or special diplomatic representative whose credentials give him authority equal to or greater than that of an Ambassador .	. . . do. . . .	. .	19	4	National anthem.	. do.	8	. . . . . .	Nation or nations to which accredited.	. . . do. . .	. do. .	Do.
Associate Justices of Supreme Court.	. . . do. . . .	. .	19	4	Admiral's march.	. do.	8	. . . . . .	. . . .	. . . do. . .	. do. .	Do.
U.S. representative to the UN.	. . . do. . . .	. .	19	4	. . do. . .	. do.	8	. . . . . .	. . . .	. . . do. . .	.do . .	Do.
Secretary of Defense	. . . do. . . .	19	19	4	Honor's march.[3]	. do.	8	Quarters	. . . .	Secretary's	Main truck.	Visit.
Deputy Secretary of Defense.	. . . do. . . .	19	19	4	. . do. . .	. do.	8	. . do. . .	. . . .	Deputy Secretary's.	. do. .	Do.
Cabinet Officer[2] (other than Secretary of Defense).	. . . do. . . .	. .	19	4	Admiral's march.	. do.	8	. . . . . .	. . . .	National. . .	Fore truck.	Salute.
Secretary of the Army . . .	. . . do. . . .	19	19	4	Honor's march.[3]	. do.	8	. . . . . .	. . . .	. . . do. . .	. do. .	Do.
Secretary of the Navy . . .	. . . do. . . .	19	19	4	. . do. . .	. do.	8	Quarters	. . . .	Secretary's	Main truck.	Visit.

See footnotes at end of table.

Table 3-4. – Honors for Civil Officials of the United States – Continued 69.128.3

Official	Uniform	Gun salute		Ruffles and flourishes	Music	Guard	Side boys	Crew	Within what limits	Flag		
		Arrival	Departure							What	Where	During
Secretary of the Air Force.	. . do. . .	19	19	4	. . do. . .	. do.	8	. . . . . .	. . . .	National . .	Fore truck.	Salute.
Director of Defense Research and Engineering.	. . do. . .	19	19	4	. . do. . .	. do.	8	. . . . . .	. . . .	Director's .	. do. .	Visit.
President pro tempore of the Senate.	. . do. . .	. .	19	4	Admiral's march.	. do.	8	. . . . . .	. . . .	National . .	. do. .	Salute.
Assistant Secretaries of Defense.	. . do. . .	17	17	4	Honor's march.[3]	. do.	8	Quarters	. . . .	Assistant Secretary's.	Main truck.	Visit.
General Counsel of the DOD.	. . do. . .	17	17	4	. . do. . .	*Full*	8	. . . . . .	. . . .	National . .	Fore truck.	Salute.
Under Secretary of the Army .	. . do. . .	17	17	4	. . do. . .	. do.	8	. . . . . .	. . . .	. . . do. . . .	.*Do*. .	Do.
Under Secretary of the Navy .	. . do. . .	17	17	4	. . do. . .	. do.	8	Quarters	. . . .	Under Secretary's.	Main truck.	Visit.
Under Secretary of the Air Force .	. . do. . .	17	17	4	. . do. . .	. do.	8	. . . . . .	. . . .	National . .	Fore truck.	Salute.
Assistant Secretaries of the Army.	. . do. . .	17	17	4	. . do. . .	. do.	8	. . . . . .	. . . .	. . . do. . . .	. do. .	Do.
Assistant Secretaries of the Navy .	. . do. . .	17	17	4	. . do. . .	. do.	8	Quarters	. . . .	Assistant Secretary's	Main truck.	Visit.
Assistant Secretaries of the Air Force.	. . do. . .	17	17	4	. . do. . .	. do.	8	. . . . . .	. . . .	National . .	Fore truck.	Salute.
Governor General or Governor of a Commonwealth or possession of the United States, or area under United States Administration .	Full dress	. .	17	4	Admiral's march.	Full	8	. . . . . .	Area under his jurisdiction.	National . .	Fore truck.	Salute.
Other Under Secretaries of Cabinet, the Solicitor General, the Deputy Attorney General, and the Deputy Postmaster General.	. . do. . .	. .	17	4	. . do. . .	. do.	8	. . . . . .	. . . .	. . . do. . . .	. do. .	Do.
Members of Congress . . .	. . do. . .	. .	17	4	. . do. . .	. do.	8	. . . . . .	. . . .	. . . do. . . .	. do. .	Do.
Envoy Extraordinary and Minister Plenipotentiary.	. . do. . .	. .	15	3	. . do. . .	. do.	8	. . . . . .	Nation to which accredited.	. . . do. . . .	. do. .	Do.

See footnotes at end of table.

Table 3-4. —Honors for Civil Officials of the United States—Continued 69.128.2

Official	Uniform	Gun salute		Ruffles and flourishes	Music	Guard	Side boys	Crew	Within what limits	Flag		
		Arrival	Departure							What	Where	During
Minister Resident	. . do. . .	. .	13	2	. . do. . .	. do.	6	. . . . . .	. . . do. . . .	. . . do. . .	. . do. .	Do.
Charge d' Affaires	. . do. . .	. .	11	1	. . do. . .	. do.	6	. . . . . .	. . . do. . . .	. . . do. . .	. . do. .	Do.
Career Minister, or Counselor of Embassy or Legation .	. . do. . .	. .	. .	1	. . do. . .	. do.	6	. . . . . .	. . . do. . . .	. . . .	. . . . .	
Consul General, or Consul or Vice Consul when in charge of a Consulate General.	. . do. . .	. .	11	1	. . do. . .	. do.	6	. . . . . .	District to which assigned.	National .	Fore truck.	Do.
First Secretary of Embassy or Legation.	Of the day	. .	. .	.	. . . .	Of the day	4	. . . . . .	Nation to which accredited.	. . . .	. . . . . .	
Consul or Vice Consul when in charge of a Consulate .	. . do. . .	. .	7	.	. . . .	. do.	4	. . . . . .	District to which assigned.	National . .	Fore truck.	Salute.
Mayor of an incorporated city.	. . do. . .	. .	. .	.	. . . .	. do.	4	. . . . . .	Within limits of mayoralty.	. . . .	. . . . . .	
Second or Third Secretary of Embassy or Legation .	. . do. . .	. .	. .	.	. . . .	. . .	2	. . . . . .	Nation to which accredited.	. . . .	. . . . . .	
Vice Consul when only representative of United States, and not in charge of a Consulate General or Consulate.	. . do. . .	. .	5	.	. . . .	Of the day	2	. . . . . .	District to which assigned.	National . .	Fore truck.	Salute.
Consular Agent when only representative of the United States .	. . do. . .	. .	. .	.	. . . .	. . .	2	. . . . . .	. . . . do. . . .	. . . .	. . . . . .	

1/ See Article 2161 of Navy Regulations regarding musical honors to President.

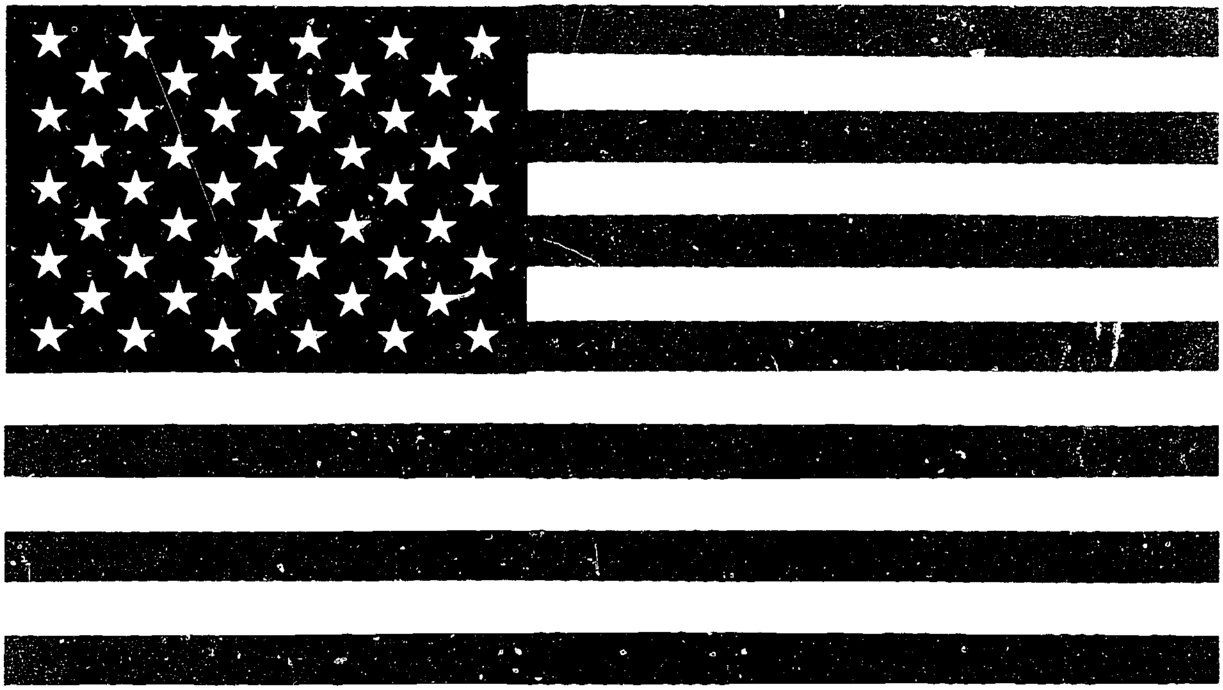
2/ In the order of precedence as follows:

Secretary of State
Secretary of the Treasury
Attorney General
Postmaster General
Secretary of the Interior
Secretary of Agriculture
Secretary of Commerce
Secretary of Labor
Secretary of Health, Education and Welfare

3/ 32-bar melody in the trio of "Stars and Stripes Forever."

Table 3-5.–Honors for Foreign Officials and Officers 69.129

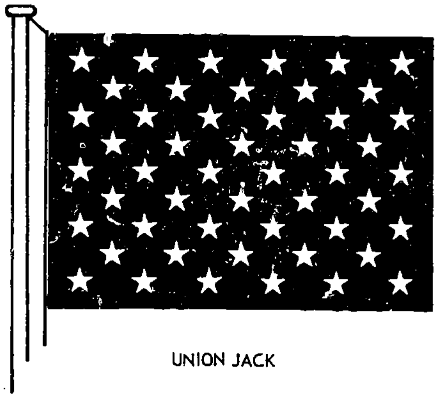
Official or officer	Uniform	Gun salute		Ruffles and flourishes	Music	Guard	Side boys	Crew	Flag		
		Arrival	Departure						What	Where	During
President or Sovereign .	Full dress	21	21	4	Foreign national anthem.	Full . .	8	Man rail .	Foreign ensign.	Main truck.	Visit.
Member of reigning royal family.	. . . do. . .	21	21	4	. . . . do. . . .	. . do .	8	. . . do. .	. . do. .	. . do. .	Salute.
Prime Minister or other cabinet officer .	. . . do. . .	. .	19	4	Admiral's march.	. . do .	8	. . . .	. . do. .	Fore truck.	Do.
Officer of Armed Forces, diplomatic or consular representative in country to which accredited, or other distinguished official.	Civil officials: Honors as for official of the United States of comparable position. For example, foreign civil officials occupying positions comparable to U. S. Department of Defense civil officials receive equivalent honors. Officers of Armed Forces: Honors as for officer of the United States of the same grade, except that equivalent honors are rendered foreign officers who occupy a position comparable to Chairman, JCS; CNO; Chief of Staff, Army; Chief of Staff, Air Force; or CMC.										
Official not provided for herein .	Honors as prescribed by the senior officer present. Such honors normally are the same as those accorded the foreign official when visiting officially a ship of his own nation, but a gun salute, if prescribed, does not exceed 19 guns.										



NATIONAL FLAG
ENSIGN AND MERCHANT FLAG

DIMENSIONS

HOIST (WIDTH) OF FLAG	1.0
FLY (LENGTH) OF FLAG	1.9
HOIST (WIDTH) OF UNION	7/13
FLY (LENGTH) OF UNION	.76
WIDTH OF EACH STRIPE	1/13



UNION JACK

Figure 3-1.–The United States national ensign and the union jack. C17.69

should be executed, facing the music. if the ensign is not visible to the person rendering the salute.

When the ensign is carried in a procession with another flag, or with several flags, the ensign should be on the marching right of a single line. Alternatively, it should be by itself in front of the center of the line in which the other flags are carried.

When a number of flags, including the ensign, are flown from adjacent poles or masts. the ensign is hoisted first and lowered last. No other flag should be placed to the right of the ensign, that is, to the flag's right.

If the ensigns of two or more nations are displayed, they are flown at the same height from separate masts, and should be approximately equal in size. International custom forbids flying one nation's ensign above that of another nation.

Flags flown from fixed masts or flagpoles are placed at half-mast to indicate mourning. Because the ensign cannot be placed at half-mast on a small portable staff, such as that carried in a parade, mourning is signified by attaching two black crepe streamers to the spearhead. Crepe streamers are used only when ordered by the President. When the ensign is to be flown at half-mast, it first should be hoisted to the peak for an instant, and then lowered to the half-mast position. Before the colors are lowered for the day, they should be raised again to the peak.

NATIONAL ENSIGN ABOARD SHIP

The national ensign on a Navy ship at anchor is hoisted at 0800 on the flagstaff. The union jack is hoisted on the jackstaff. Both flags are kept flying until sunset.

If two or more vessels are in company in port, the senior officer present signals at 0745 to specify the size of colors to display for the day. If his signal is made after 0800 the ensign is hauled down upon execution of the signal, and an ensign of the prescribed size is hoisted.

When a naval vessel gets underway, and there is enough light for the ensign to be seen, it should be hoisted, even though it is earlier than 0800 or after sunset. When falling in with other ships, or when near land, the ensign also should be displayed.

Naval shore stations follow the same rule as ships concerning showing the national ensign from 0800 to sunset. The base commander designates where the ensign is to be displayed.

On a Navy ship underway, the ensign is flown from the gaff, which is a spar extending outward at an angle from the mainmast.

If a Navy ship enters a foreign port during the night. she hoists her ensign at daylight for a short time to enable port authorities to distinguish her nationality. It is customary for other ships in port to show their colors in return.

In wartime, no action is commenced nor is a battle fought without displaying the national ensign.

Displaying National Ensign in Boats

The national ensign is displayed in waterborne boats belonging to naval vessels under the following circumstances:

1. Underway during daylight in a foreign port.
2. When ships are required to be dressed or full-dressed.
3. Going alongside a foreign vessel.
4. When an officer or official is embarked on an official occasion.
5. When a flag officer or general officer, a unit commander, a commanding officer, or a chief of staff, in uniform, is embarked in a boat of his command or in one assigned for his personal use.
6. At such other times as may be prescribed by the senior officer present.

Answering a Dip

When a vessel of any nation, formally recognized by the United States, salutes a ship of our Navy by dipping her national ensign, the salute is returned by the U. S. Navy ship dip for dip. If the original salute is given before 0800, after sunset, or at any other time when the ensign is not displayed, the Navy ship hoists her colors, returns the salute, then hauls down the colors after a short interval. An ensign displayed at half-mast is hoisted to the peak or truck before a dip is answered. Ships of the U. S. Navy never dip the national ensign unless in return for such compliment.

It should be noted that the United States may recognize a government although it may not have, or may have broken, diplomatic relations with that government. The following governments are not now (April 1970) formally recognized by the United States and are not entitled to the dip:

Albania
Communist China
East Germany
Mongolia
North Korea
North Vietnam

Figure 3-7a shows the flags of nations NOT formally recognized by the United States. Since Mongolia is landlocked and no merchant fleet registered, the chance of seeing their flag (fig. 3-7b) on a ship is small. (Refer to explanatory note in fig. 3-8.)

National Ensign During Gun Salutes

While firing a salute in honor of a United States national anniversary, as on Washington's Birthday or the Fourth of July, the national ensign is displayed at the main. It also is flown at the main during a 21-gun salute honoring a United States civil official, unless the ship is displaying the personal flag of that official. During a salute to any other United States civil official, except by a ship displaying the personal flag of the official, the national ensign is displayed at the fore. In addition to showing the ensign from the main or the fore, it also is displayed from the gaff or the flagstaff.

Half-Masting Ensign

The custom of flying the ensign at half-mast is observed as a tribute to the dead. The Navy has specific rules for all occasions of half-masting the ensign. They are as follows:

1. Whenever the ensign is to be half-masted, it first is raised to the peak (closed up) and then is lowered to the halfmast position. The same procedure is used when lowering the ensign. It first must be raised to the peak and then lowered.
2. On Memorial Day, the ensign is flown at half-mast from 0800 until completion of the 21-guns salute fired at 1200, or until 1220 if no salute is fired.
3. Ships underway and in port are required to half-mast the national ensign in accordance with the appropriate articles of the *U. S. Navy Regulations* relating to such procedure.

During burial at sea, the ensign is at half-mast from the beginning of the funeral service until the body is committed to the deep. A longer period for displaying the ensign at half-mast may be prescribed, according to circumstances, by the senior officer present. Boats participating in a funeral procession also fly the national ensign at half-mast.

MISCELLANEOUS FLAGS AND PENNANTS

Miscellaneous flags and pennants authorized to be displayed, as circumstances dictate, are the (1) union jack; (2) commission pennants; (3) U.S. Navy flag; (4) U.S. Navy infantry battalion flag; (5) Red Cross flag; (6) church pennant; (7) CNO flag; (8) personal flags of Navy flag officers; (9) personal flags and pennants in boats and automobiles; (10) personal flags of staff corps officers; (11) broad command and burgee command pennants; (12) United Nations flag; and (13) special flags of U.S. civil officials. The miscellaneous flags and pennants are described individually in ensuing topics.

Union Jack

The union jack is a replica of the blue, star-studded field in the corner of the national ensign. (Refer to fig. 3-1.) It symbolizes the union of the states of the United States. Each star represents a state, but not a particular state.

When a naval ship is at anchor, the union jack is flown from the jackstaff, in the bow of the ship, from 0800 to sunset. In addition to flying from the jackstaff, the union jack is hoisted also at the yardarm to indicate that a general court-martial or a court of inquiry is in session.

The union jack is flown in boats as follows:

1. When a diplomatic official of the United States of or above the rank of Charge d' Affaires pays an official visit afloat in a boat of the U. S. Navy.
2. By a governor general or governor commissioned as such by the President, when embarked in a boat in his official capacity, and within the area under his jurisdiction (the Governor of the Virgin Islands for instance).

When displayed from the jackstaff, the union jack is half-masted if the national ensign is half-masted. The union jack is not dipped when the national ensign is dipped in return for such honor being rendered it.

The union jack is issued in several sizes; but, when flown at the jackstaff, it must be the same size as the union of the ensign flown at the flagstaff.

Commission Pennant

Every Navy ship in commission flies the commission pennant except when it is replaced by a personal flag or a command pennant. The commission pennant (fig. 3-2) is flown at the after truck of a

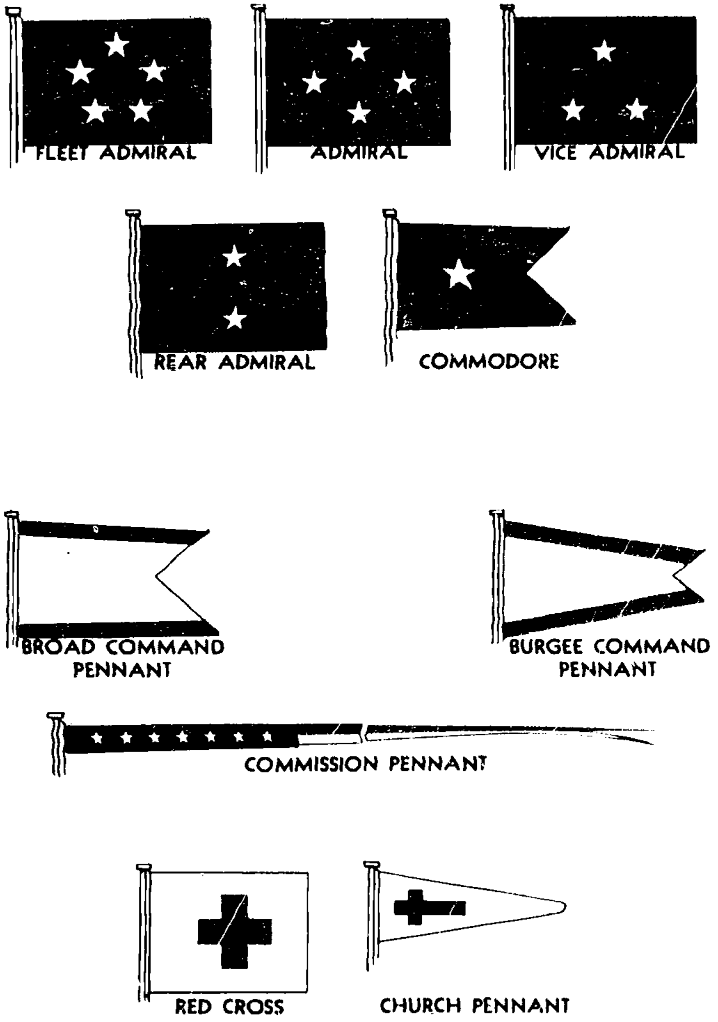
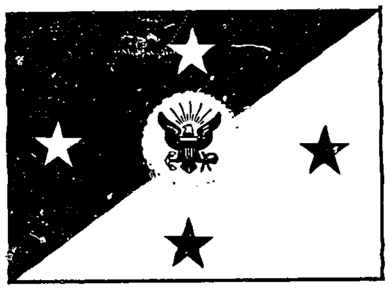


Figure 3-2.–Personal, command, and miscellaneous flags and pennants.
C17.71:89(69)



naval vessel or, if a mastless ship, at the highest and most conspicuous point of hoist. It also is flown from the bow of a boat when a commanding officer, not entitled to a personal flag, is embarked on an official visit.

The commission pennant is not a personal flag, but sometimes it is regarded as the personal symbol of the commanding officer. Along with the ensign and union jack, it is half-masted upon the death of the commanding officer of a ship.

U. S. Navy Flag

Before 1959, the U. S. Navy had not adopted an official flag. Until then, the U. S. Navy infantry battalion flag and, on rare occasions, the union jack were used semiofficially to represent the Navy. The flag shown in figure 3-3 fulfills the requirement for an official flag to represent the Navy on a wide variety of ceremonial, parade, and display occasions.

Figure 3-3.–The United States Navy flag.
C69.2

U. S. Navy Infantry Battalion Flag

The U. S. Navy infantry battalion flag (fig. 3-4) is used only as an organization color for ships' landing party battalions and for battalion organizations of naval shore activities. When participating independently in operations, ceremonies, or street parades, battalions may carry their own organization colors.

Figure 3-4.–U. S. Navy infantry battalion flag.
C69.3

Naval units entitled to fly the U. S. Navy infantry battalion flag as an organization color may show thereon the name and location of the battalion.

Red Cross Flag

In time of war, hospital ships fly at the main truck the Red Cross flag (fig. 3-2) instead of the commission pennant. Boats engaged in sanitary service, also hospital boats of landing parties, fly the Red Cross flag from a staff in the bow.

Church Pennant

The church pennant is the only flag ever flown over the national ensign at the same point of hoist. It is displayed only during church services conducted by a chaplain on board vessels of the Navy. (See fig. 3-2.)

CNO FLAG

The Chief of Naval Operations flag (fig. 3-2) is a blue and white rectangle, divided diagonally. In its center is the official seal of the Chief of Naval Operations–an eagle clutching an anchor and surrounded by a chain of 50 gold links. The CNO flag is displayed in the same manner as required for displaying flags of flag officers.

Personal Flags of Navy Flag Officers

When a flag officer of the Navy–a commodore, rear admiral, vice admiral, admiral, or fleet admiral–assumes command of a fleet or a unit of a fleet, his personal flag (fig. 3-2) is hoisted and kept flying until he turns over his command to his successor. If he is absent from his command for a period exceeding 72 hours, his flag is hauled down.

A flag officer's flag never is displayed simultaneously from more than one ship. It is flown at the main truck by the ship he is aboard. Normally, no personal flag or pennant is shown at the same masthead with the national ensign. When a double display is required, the personal flag or pennant should be flown at the fore truck, and the national ensign is displayed at the main truck. When a single-masted flagship is dressed or full-dressed, however, the personal flag or pennant is hoisted at the starboard yardarm.

During a gun salute the ensign is displayed at the main truck. Any personal flag is lowered clear of the ensign.

Personal Flags and Pennants in Boats and Automobiles

When embarked in a boat of the naval service on official occasions, an officer in command, or a chief of staff acting for him, displays his personal flag or command pennant from the bow. If not entitled to either a personal flag or command pennant, a commission pennant is used.

An officer entitled to a personal flag or command pennant may display a miniature of his flag or pennant in the vicinity of the coxswain's station when embarked in a boat of the naval service on any trips except official occasions.

An officer entitled to display a personal flag or command pennant may, when riding in an automobile on an official occasion, display his flag or pennant forward on the vehicle.

Personal Flags of Staff Corps Officers

The personal flag of a flag officer not of the line has a white field with blue stars. Officers entitled to such flags may fly them at shore activities they command, but they are never hoisted on board ship.

Broad Command and Burgee Command Pennants

The broad command pennant is flown by an officer below flag rank when in command of a force, flotilla, squadron, battleship division, carrier division, cruiser division, or an aircraft wing. If the officer is in command of any other division, or a major subdivision of an aircraft wing, the burgee command pennant is displayed.

If the officer is the regularly assigned commander of the unit, or is temporarily in command, the pennant is shown at the after truck of his ship whether underway or in port. When so displayed, the command pennant replaces the commission pennant.

The broad command or burgee command pennant also is exhibited in the bow of a boat in which the officer is embarked officially. (See fig 3-2.)

United Nations Flag

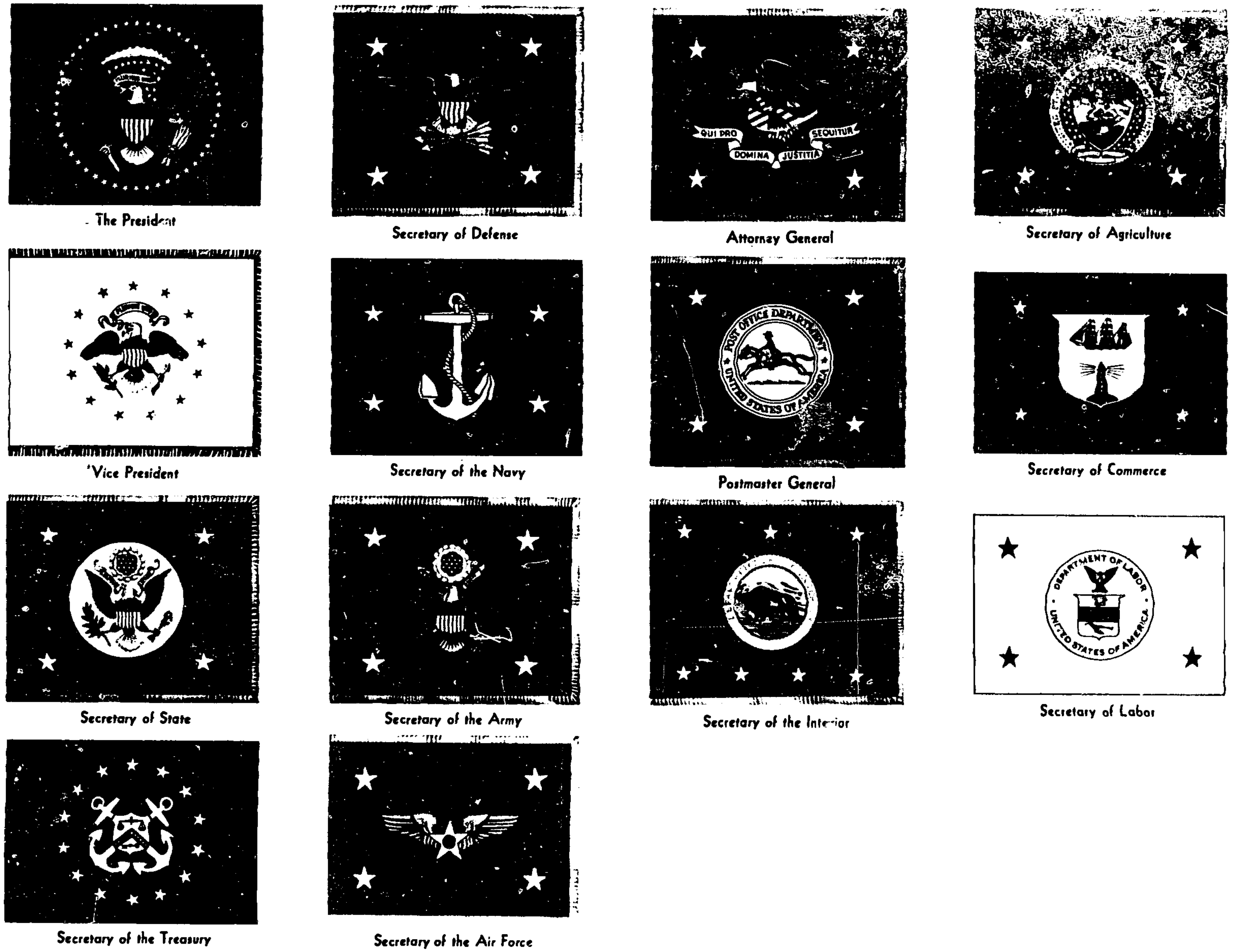
The flag of the United Nations (U. N.) consists of the official emblem of the United Nations centered on a blue background. (See fig. 3-5.) The emblem is white and appears on both sides of the flag.

The U. N. flag flies from all buildings, offices, and other property occupied by the United Nations. The manner and circumstances of displaying it conform, insofar as appropriate, to the laws and customs applicable to flying the national flag of the country in which the display is made.

The United Nations flag is shown at installations of the Armed Forces of the United States only upon occasions of visits of high dignitaries of the United Nations, or on other special occasions in honor of the United Nations. At such times it is displayed with the United States flag. Both flags should be of the same approximate size and on the same level, with the flag of the United States in the position of honor on the right (observer's left).

When United Nations dignitaries are to be honored, U. S. Navy vessels display the United Nations flag in the same manner as they present a

Figure 3-5.-The United Nations flag. C69.4



The President

Secretary of Defense

Attorney General

Secretary of Agriculture

Vice President

Secretary of the Navy

Postmaster General

Secretary of Commerce

Secretary of State

Secretary of the Army

Secretary of the Interior

Secretary of Labor

Secretary of the Treasury

Secretary of the Air Force

Figure 3-6.–Personal flags of civil officials of the United States. C69.5

foreign ensign during visits of a foreign president or sovereign.

The President of the United States may authorize the display of the United Nations flag for other national occasions than those named.

Special Flags of U. S. Civil Officials

The personal flag of the President of the United States is shown in figure 3-6. His flag is hoisted at the main truck the moment he reaches the deck of a naval vessel, and it is kept flying until he departs. It is hauled down with the sounding of the last gun of the Presidential departure salute. The President's boat flag is smaller in size but of the same design. When he is embarked in a boat of the Navy, his boat flag is flown from a staff in the bow of the boat.

In addition to the President, the personal flag of each of the following civil officials is also displayed at the main truck; (1) Vice President; (2) Secretary of State (when acting as a special foreign representative of the President); (3) Secretary, Deputy Secretary, and Assistant Secretary of Defense; (4) Secretary, Under Secretary, and Assistant Secretaries of the Navy.

When two or more civil officials are embarked on board a ship of the Navy, or in a boat of the Navy, only the flag of the senior official is flown.

FLAGS OF OTHER MARITIME NATIONS

Figure 3-8 shows the flags of other maritime nations of the world. As a result of wars and gain and loss of independence by different nations, this combination of flags has undergone many changes during the past 40 years. An attempt is made every few years, by our Government agencies, to bring plates of maritime nations up to date.

Presently, the Oceanographic Office of the United States Navy issues H. O. Misc. 15181, which illustrates different flags as of August 1964. The Oceanographic Office also processes H. O. Pub. 100, which contains much of the information found in the DNC 27 series. Further, it covers foreign flags, flags of civil officials, stack markings, and house flags.

Any future changes in the flags and ensigns will supersede those in this training manual.

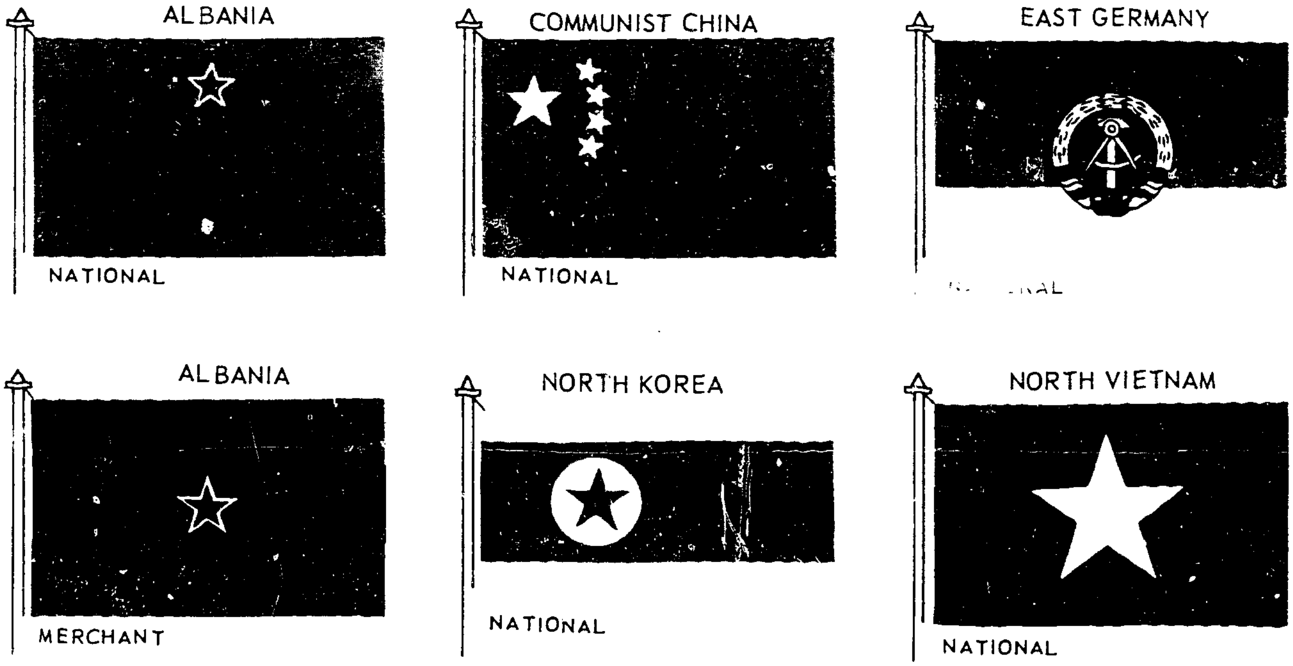


Figure 3-7A. — Flags of nations not formally recognized by the United States. C101.31.1

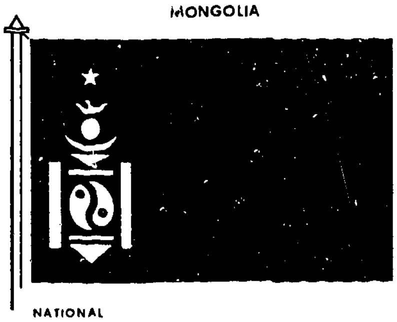


Figure 3-7B. — Flag of Mongolia. C101.31.2

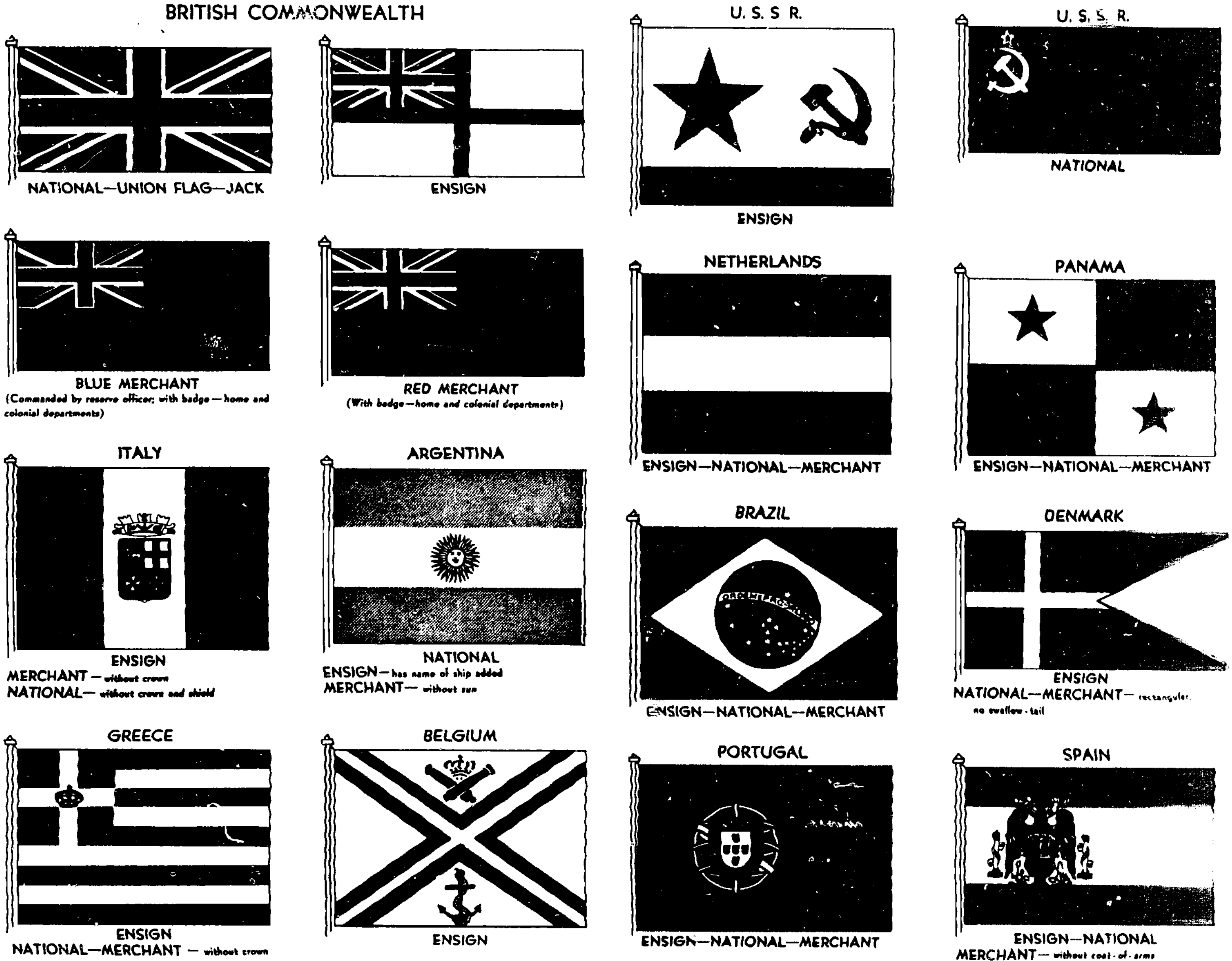
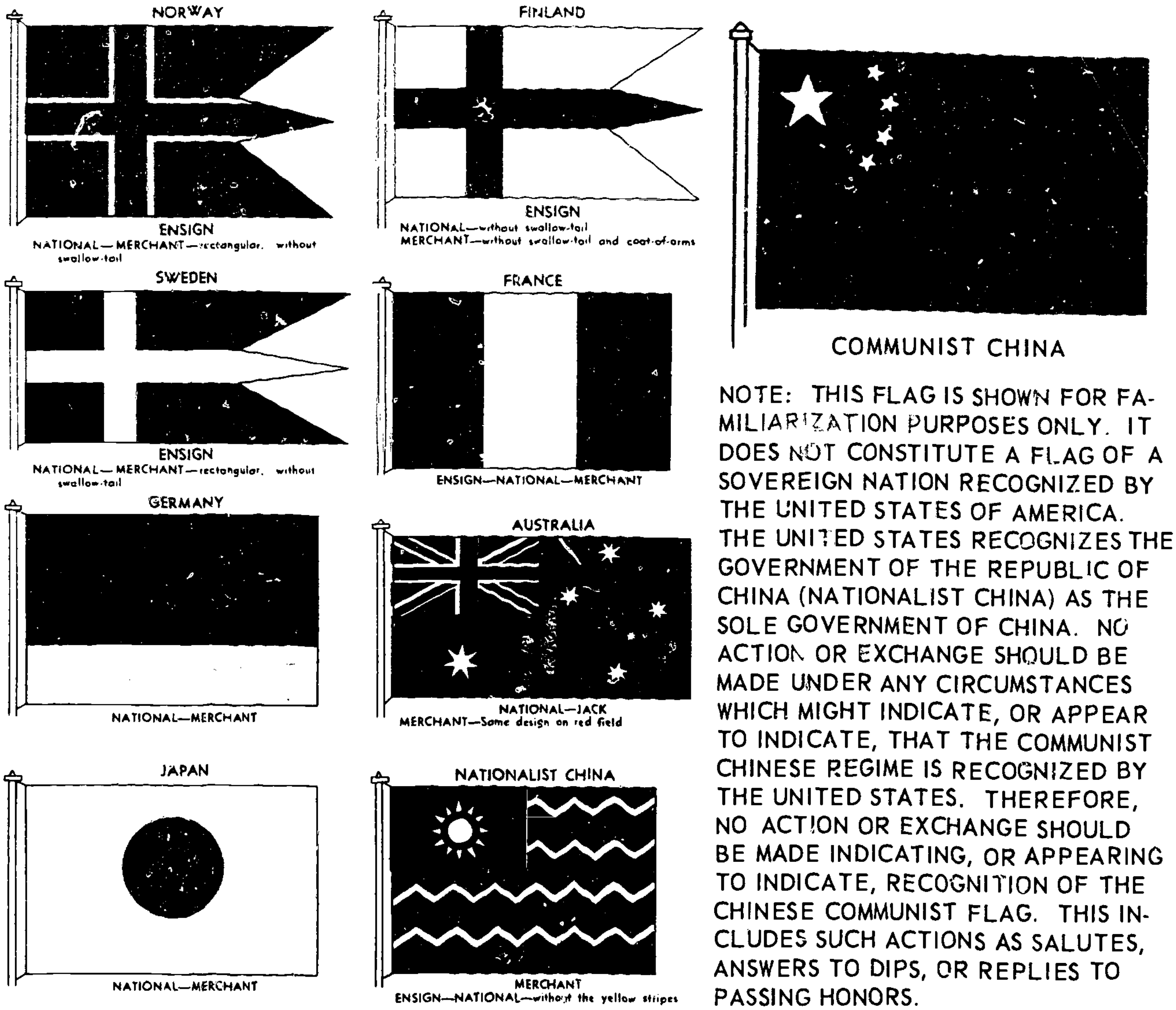


Figure 3-8.–Flags of some of the leading maritime nations. C69.6.1



NOTE: THIS FLAG IS SHOWN FOR FAMILIARIZATION PURPOSES ONLY. IT DOES NOT CONSTITUTE A FLAG OF A SOVEREIGN NATION RECOGNIZED BY THE UNITED STATES OF AMERICA. THE UNITED STATES RECOGNIZES THE GOVERNMENT OF THE REPUBLIC OF CHINA (NATIONALIST CHINA) AS THE SOLE GOVERNMENT OF CHINA. NO ACTION OR EXCHANGE SHOULD BE MADE UNDER ANY CIRCUMSTANCES WHICH MIGHT INDICATE, OR APPEAR TO INDICATE, THAT THE COMMUNIST CHINESE REGIME IS RECOGNIZED BY THE UNITED STATES. THEREFORE, NO ACTION OR EXCHANGE SHOULD BE MADE INDICATING, OR APPEARING TO INDICATE, RECOGNITION OF THE CHINESE COMMUNIST FLAG. THIS INCLUDES SUCH ACTIONS AS SALUTES, ANSWERS TO DIPS, OR REPLIES TO PASSING HONORS.

Figure 3-8.–Flags of some of the leading maritime nations–Continued. C69.6.2

CHAPTER 4

LOGS

A ship's logbook contains a complete chronological record of her history, from the time she is first commissioned to the day the commission pennant comes down and she terminates her seagoing career. It presents a complete, accurate narrative of noteworthy incidents in the life of the ship and events affecting her officers, passengers, and crew. Most of what we know about the actions of old fighters like the *Constitution* and *Constellation* has been obtained from the yellowed pages of their logbooks.

Besides its historical importance, the log has legal standing, and may be required to be produced in naval, admiralty, or civil courts. When, as frequently happens, the witnesses to an incident involving a vessel, passenger, or crewmember are dead or widely dispersed, the log may be the only available evidence upon which important legal decisions can be rendered. For this reason, entries must be absolutely clear, concise, and accurate. Logbooks are preserved for an indefinite period, because claims may be entered long after occurrence of events that give rise to claims.

SHIP'S DECK LOG

A ship's deck log is a looseleaf book in which is kept a complete record of the ship. It contains a description of every circumstance and occurrence of importance, interest, or historical value that in any way concerns the crew and the operation and safety of the ship.

DECK LOG REMARKS SHEET

The deck log remarks sheet (fig. 4-1) is a record of each watch. Entries must be made in the handwriting of the OOD who actually stands the watch. He is guided in his writing by provisions contained in Instructions for Keeping Ship's Deck Log (NavPers 15876), *Navy Regulations*, and *Manual of the Judge Advocate General* (JAGInst P5800.7). In selecting items he thinks should be recorded, the OOD refers to the weather observation sheet, quartermaster's notebook, and his own recollection of happenings during the watch. Only the original remarks sheet should be prepared. Typewritten or carbon copies are unacceptable. The navigator inspects the log sheets and signs them daily. The commanding officer approves the log monthly. On the first day of each month, or within 10 days thereafter, the log for the previous month is sent to the Chief of Naval Personnel (Pers-E244).

Only one type of deck logbook is used in the Navy today. It has been designed to meet the requirements of both large and small ships. All vessels in commission must keep and submit a deck log, except where specifically exempted by competent authority. All ships use the following forms: (1) Deck log–Title Page (NavPers 3100/1 formerly NavPers 716), and (2) Deck Log–Remarks Sheet (NavPers 3100/2) (formerly NavPers 719).

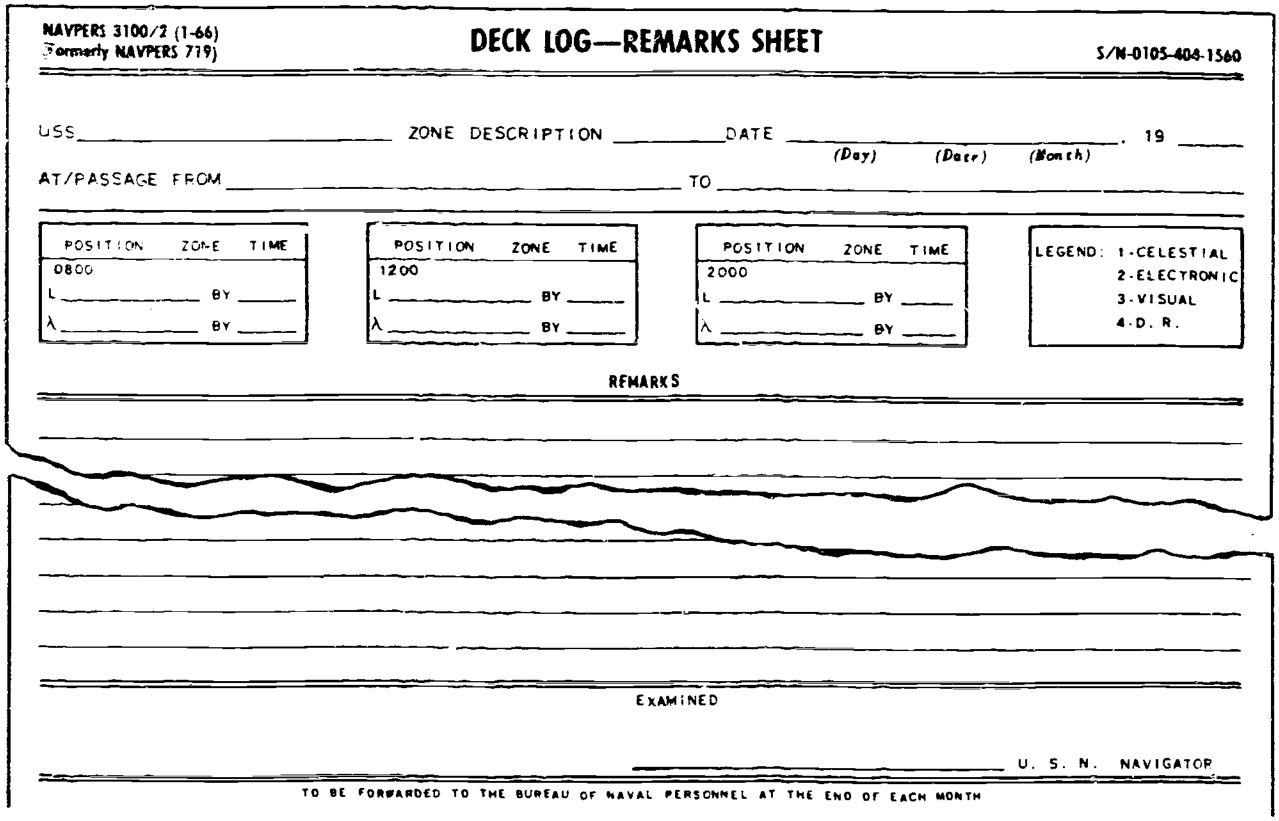
WEATHER OBSERVATION SHEET

The ship's deck logbook (weather observation section) is used as a cover and onboard temporary stowage for the weather observation sheet (OpNav 3144-1). The weather observation sheet, however, is not a part of the ship's deck log.

Entries on the weather observation sheet normally are made by the quartermaster of the watch. The OOD is responsible for seeing that all entries are correct. Entries must be made carefully, using black lead pencil. Everything written on the sheet should be clear and legible, because it will be microfilmed later. A carbon should be made for retention and use by ship's personnel in future comparison with the discrepancy list, which is supplied by the National Weather Records Center. A partially filled-in weather observation sheet is seen in figure 4-2.

The heading of the sheet is completed by entering the name and identification number of the ship, date (GMT), and geographical location. Two tables comprise the weather observation sheet.

Table I: While at sea, the state of the weather must be entered every hour. When in port, the



NAVPERS 3100/2 (1-66)
(Formerly NAVPERS 719)

DECK LOG—REMARKS SHEET

S/N-0105-404-1560

USS ______ ZONE DESCRIPTION ______ DATE ______ (Day) (Date) (Month), 19 ____

AT/PASSAGE FROM ______ TO ______

POSITION	ZONE	TIME
0800		
L ______ BY ______		
λ ______ BY ______		

POSITION	ZONE	TIME
1200		
L ______ BY ______		
λ ______ BY ______		

POSITION	ZONE	TIME
2000		
L ______ BY ______		
λ ______ BY ______		

LEGEND: 1-CELESTIAL
2-ELECTRONIC
3-VISUAL
4-D. R.

REMARKS

EXAMINED

______ U. S. N. NAVIGATOR

TO BE FORWARDED TO THE BUREAU OF NAVAL PERSONNEL AT THE END OF EACH MONTH

Figure 4-1.–Deck log remarks sheet. 95.39.2

weather observation must be recorded hourly, unless the commanding officer directs otherwise. The commanding officer may specify that no weather entries are to be made under the following circumstances: (a) when in a naval shipyard undergoing overhaul; or (b) when two or more ships are moored in the same nest or in the same general group while alongside a pier and the senior officer present in this group or nest designates one of these ships to take the hourly weather observations for all ships.

Table II: Synoptic observation data must be prepared in accordance with instructions and special code contained in *Manual for Ship's Surface Weather Observations* (OpNavInst P3140.37).

All ships sailing singly or the senior ship in company must take and record synoptic observations in table II of the observation sheet at 0000, 0600, 1200, and 1800 GMT, except when observing aerological personnel are aboard ship, in which case these observations are recorded in the meteorological weather logs. A report of these observations must be transmitted by radio to the U.S. Fleet Weather Central Facility whose area of responsibility the ship is operating. When entries are omitted, a suitable notation should be made across the table indicating the reason for not making such entries. Examples of such notations are "Meteorological unit embarked," "Not senior ship," etc.

Synoptic weather reports normally are not sent during conditions of radio silence. If a ship finds it necessary to send an encrypted message, however, a synoptic report may be appended to it.

Each day the navigator examines and signs the weather observation sheet. At the end of each month they are bound and sent by registered first class mail to–

National Weather Records Center
U.S.W.B. Section, Navy Unit
Federal Building
Asheville, North Carolina 28801.

An observation sheet for each day in port need not be submitted if there were days when no entries were made. The missing days may be accounted for by making an entry on the remarks line of the first page after the missing sheets, such as "Records for ____, ____, ____, etc., not included.

QUARTERMASTER'S NOTEBOOK

The quartermaster's notebook is a bound book consisting of approximately 120 pages. Detailed remarks regarding the happenings during each watch are recorded chronologically in it by the quartermaster of the watch.

Preparing the quartermaster's notebook is much the same for the quartermaster as the deck logbook is for the OOD. Instructions for Keeping Ship's Deck Log, NavPers 15876, may be used as a guide. These instructions are on the inside of the front cover of the deck log folder.

In following the instructions for keeping logs, some modifications must be made in applying them to the quartermaster's notebook. Many more entries are made in the quartermaster's notebook than in the deck logbook in order to cover every detail accurately and chronologically. The quartermaster's notebook, for example, must include each change of course and speed. Remarks of the OOD in the deck logbook for entering or leaving port or conducting an exercise, however, may summarize this information as "Steering various courses at various speeds," if the exercise was accomplished without incident. It often has happened that the quartermaster's notebook has not shown the sequence of events leading up to a collision or grounding. Thus, it is important that the notebook be kept current with the chronology of events, including rudder and engine commands, whistle signals made or heard, and bearings and ranges of initial contacts. Remember that the quartermaster's notebook must be detailed and up to date as well as completely accurate.

A situation may arise that makes it difficult to fulfill the foregoing requirements. When confronted by such an instance, the Quartermaster should consult the OOD or JOOD regarding the extent of entries in the notebook. It is up to them to advise what should be recorded and what should be omitted.

The Quartermaster should strive to maintain a neat and coherent notebook. Correct spelling, neatness, and clarity make the quartermaster's notebook more useful as a guide for writing the deck log, and more presentable if it is used as evidence in court cases.

The quartermaster of the watch writes up his own watch in his own handwriting in either pencil or ink. When he is relieved, he records the time of relief and signs the notebook after the last entry for that watch.

The format of the quartermaster's notebook has recently been modified as a result of requirements of automated data collecting systems. The new form (NavPers 3100/4), shown in figure 4-3, has revised both the types of entries and methods of annotating these entries. Instructions for keeping the quartermaster's notebook are located on the reverse side of the cover page. For your information, instructions for filling out the top section of the page and making entries in the columns of the notebook follows.

Fill in the top section of each page as follows:

A. In spaces 3 and 4, enter the first two letters of ship type and enter remaining letters as appropriate in the next two shaded unnumbered spaces. In spaces 5-7 enter three-digit ship hull number; if hull number consists of four digits, enter the first digit in the shaded unnumbered space.

B. In box 12, enter last digit of current year. In boxes 13-14, enter two digits to indicate current month. Start a new page when the day or time zone changes.

C. In box 78, enter the appropriate code for highest security classification of data entered on this page. T=TOP SECRET; S=SECRET; C=CONFIDENTIAL; U=Unclassified.

D. An entry in box 79 indicates special security handling; leave blank unless special instructions are received.

Make entries in the column of the notebook as follows:

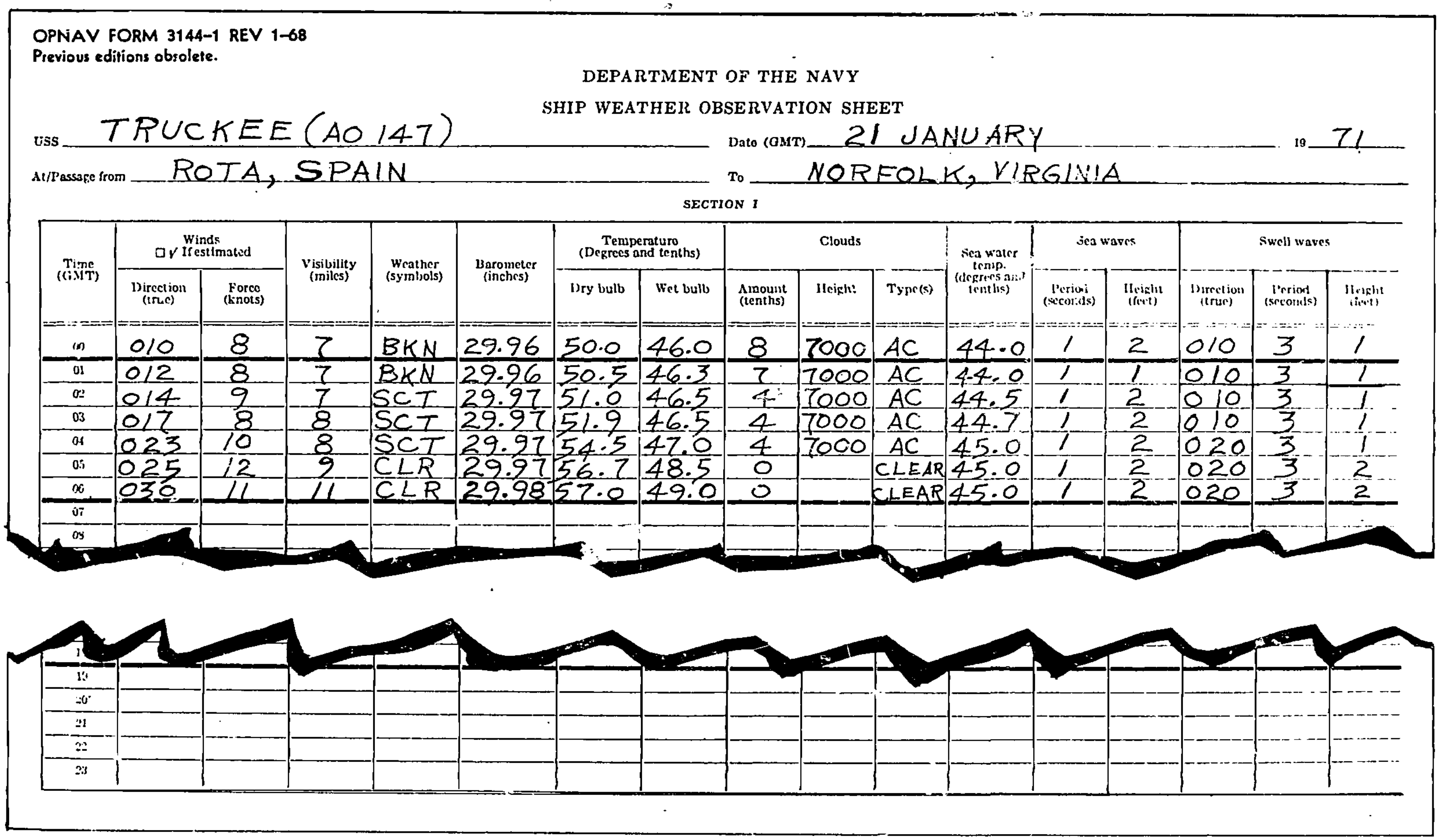
A. *ORDER*: Enter the standard abbreviation (maximum of seven characters) for any orders requiring course, speed, or depth change. Orders consisting of more than seven characters are to be recorded in EVENTS OF THE DAY.

B. *COURSE, SPEED, DEPTH*: Enter changes resulting from the order entered in columns 23-29 (e.g., after rudder order and steady-on, the resulting course should be entered).

C. RECORD OF ALL EVENTS OF THE DAY: Make other required entries here. Remarks occurring at a different time than, or not pertinent to, the line entry should be made on a separate line. Ships other than submarines will start recording events of the day in column 37.

When directed to make duplicate pages of this notebook, use duplicate quartermaster's notebook sheets (NavPers 3100/5 (1-69)) and follow the additional instructions on the back of that form.

Realizing that there is no present standard abbreviations, the attempt to provide standardization through this manual should permit some latitude in the choice of abbreviations. However, it might be



OPNAV FORM 3144-1 REV 1-68
Previous editions obsolete.

DEPARTMENT OF THE NAVY

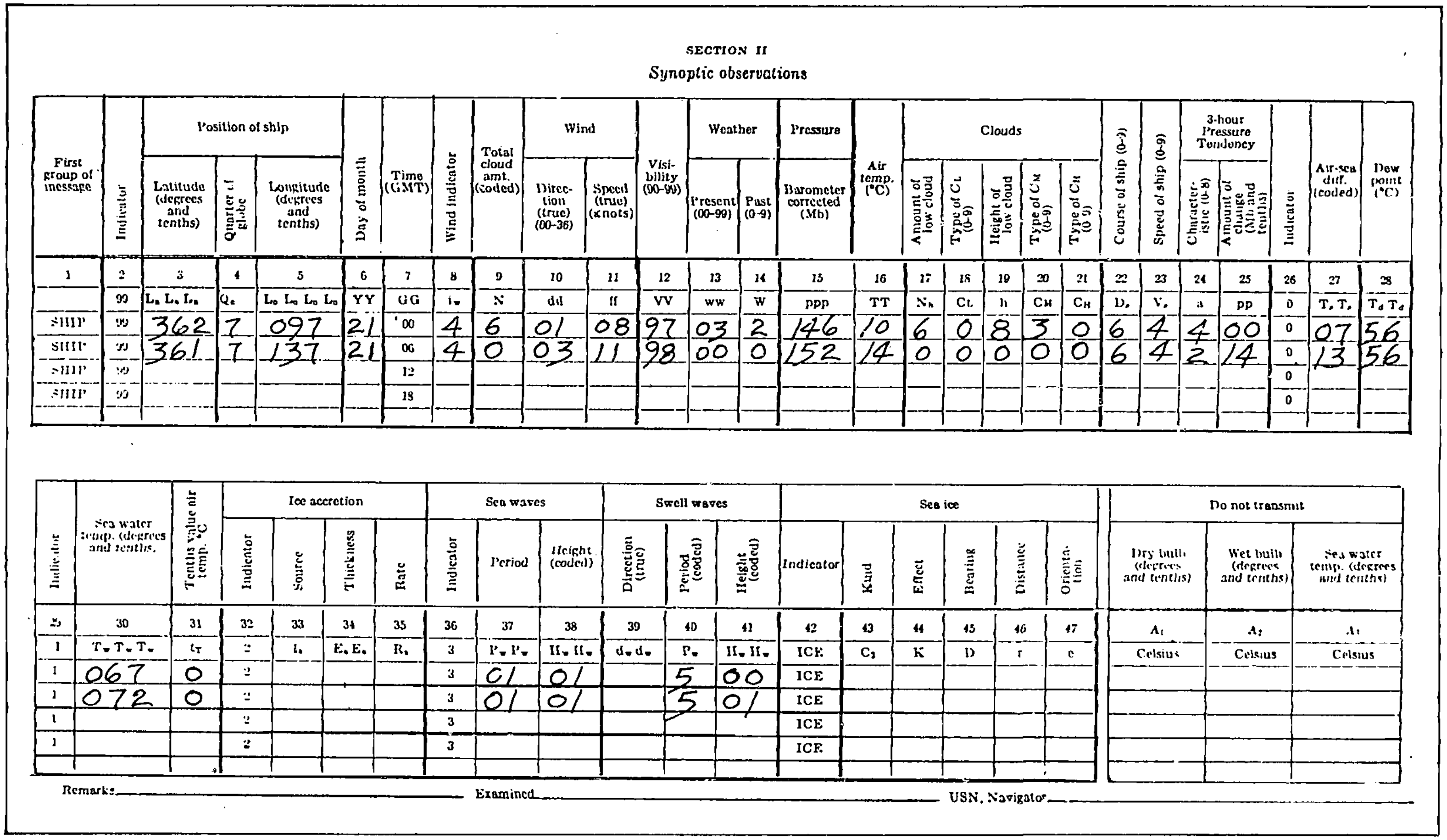
SHIP WEATHER OBSERVATION SHEET

USS TRUCKEE (AO 147) Date (GMT) 21 JANUARY 19 71

At/Passage from ROTA, SPAIN To NORFOLK, VIRGINIA

SECTION I

Time (GMT)	Winds ☐√ If estimated		Visibility (miles)	Weather (symbols)	Barometer (inches)	Temperature (Degrees and tenths)		Clouds			Sea water temp. (degrees and tenths)	Sea waves		Swell waves		
	Direction (true)	Force (knots)				Dry bulb	Wet bulb	Amount (tenths)	Height	Type(s)		Period (seconds)	Height (feet)	Direction (true)	Period (seconds)	Height (feet)
00	010	8	7	BKN	29.96	50.0	46.0	8	7000	AC	44.0	1	2	010	3	1
01	012	8	7	BKN	29.96	50.5	46.3	7	7000	AC	44.0	1	1	010	3	1
02	014	9	7	SCT	29.97	51.0	46.5	4	7000	AC	44.5	1	2	010	3	1
03	017	8	8	SCT	29.97	51.9	46.5	4	7000	AC	44.7	1	2	010	3	1
04	023	10	8	SCT	29.97	54.5	47.0	4	7000	AC	45.0	1	2	020	3	1
05	025	12	9	CLR	29.97	56.7	48.5	0		CLEAR	45.0	1	2	020	3	2
06	030	11	11	CLR	29.98	57.0	49.0	0		CLEAR	45.0	1	2	020	3	2
07																
08																
1																
19																
20																
21																
22																
23																



SECTION II

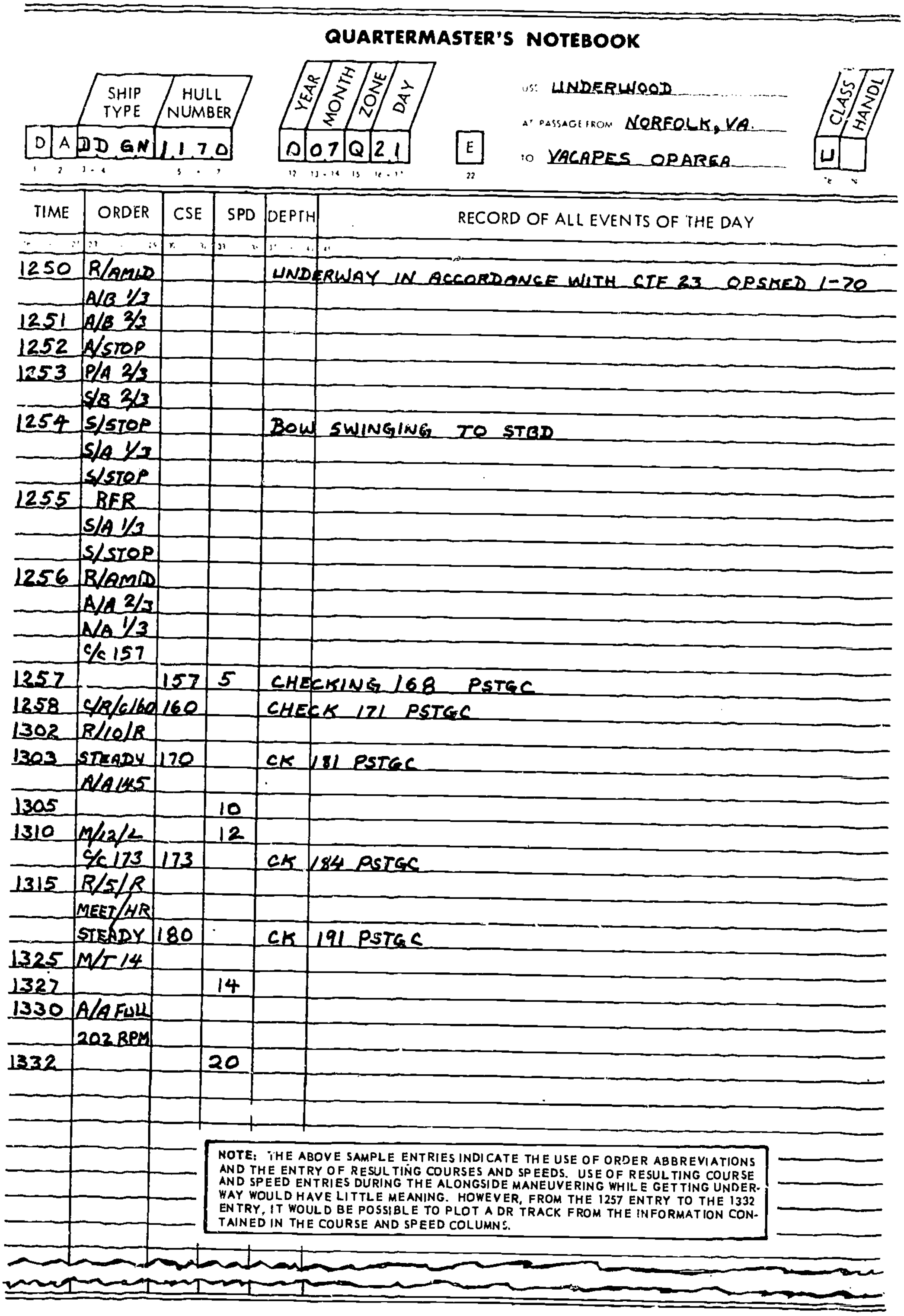
Synoptic observations

First group of message	Indicator	Position of ship			Day of month	Time (GMT)	Wind indicator	Total cloud amt. (coded)	Wind		Visi-bility (90-99)	Weather		Pressure	Air temp. (°C)	Clouds					Course of ship (0-9)	Speed of ship (0-9)	3-hour Pressure Tendency		Indicator	Air-sea diff. (coded)	Dew point (°C)
		Latitude (degrees and tenths)	Quarter of globe	Longitude (degrees and tenths)					Direc-tion (true) (00-36)	Speed (true) (knots)		Present (00-99)	Past (0-9)	Barometer corrected (Mb)		Amount of low cloud	Type of C_L (0-9)	Height of low cloud	Type of C_M (0-9)	Type of C_H (0-9)			Character-istic (0-8)	Amount of change (Mb and tenths)			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
	99	$L_a L_a L_a$	Q_c	$L_o L_o L_o L_o$	YY	GG	i_w	N	dd	ff	VV	ww	W	ppp	TT	N_h	C_L	h	C_M	C_H	D_s	v_s	a	pp	0	$T_s T_s$	$T_d T_d$
SHIP	99	362	7	097	21	00	4	6	01	08	97	03	2	146	10	6	0	8	3	0	6	4	4	00	0	07	56
SHIP	99	361	7	137	21	06	4	0	03	11	98	00	0	152	14	0	0	0	0	0	6	4	2	14	0	13	56
SHIP	99					12																			0		
SHIP	99					18																			0		

Indicator	Sea water temp. (degrees and tenths.	Tenths value air temp. °C	Ice accretion				Sea waves			Swell waves			Sea ice						Do not transmit		
			Indicator	Source	Thickness	Rate	Indicator	Period	Height (coded)	Direction (true)	Period (coded)	Height (coded)	Indicator	Kind	Effect	Bearing	Distance	Orienta-tion	Dry bulb (degrees and tenths)	Wet bulb (degrees and tenths)	Sea water temp. (degrees and tenths)
29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	A_1	A_2	A_3
1	$T_w T_w T_w$	t_T	2	I_s	$E_s E_s$	R_s	3	$P_w P_w$	$H_w H_w$	$d_w d_w$	P_w	$H_w H_w$	ICE	c_2	K	D	r	e	Celsius	Celsius	Celsius
1	067	0	2				3	01	01		5	00	ICE								
1	072	0	2				3	01	01		5	01	ICE								
1			2				3						ICE								
1			2				3						ICE								

Remarks__________ Examined__________ USN, Navigator__________

Figure 4-2.–Ship's weather observation sheet.
95.39.3



QUARTERMASTER'S NOTEBOOK

D	A	SHIP TYPE	HULL NUMBER	YEAR	MONTH	ZONE	DAY		CLASS	HANDL
D	A	DD GN	1170	0	07	Q	21	E	U	

USS UNDERWOOD
AT PASSAGE FROM NORFOLK, VA.
TO VACAPES OPAREA

TIME	ORDER	CSE	SPD	DEPTH	RECORD OF ALL EVENTS OF THE DAY
1250	R/AMID				UNDERWAY IN ACCORDANCE WITH CTF 23 OPSKED 1-70
	A/B 1/3				
1251	A/B 2/3				
1252	A/STOP				
1253	P/A 2/3				
	S/B 2/3				
1254	S/STOP				BOW SWINGING TO STBD
	S/A 1/3				
	S/STOP				
1255	RFR				
	S/A 1/3				
	S/STOP				
1256	R/AMID				
	A/A 2/3				
	N/A 1/3				
	C/C 157				
1257		157	5		CHECKING 168 PSTGC
1258	C/R/C/160	160			CHECK 171 PSTGC
1302	R/10/R				
1303	STEADY	170			CK 181 PSTGC
	A/A 145				
1305			10		
1310	M/12/L		12		
	C/C 173	173			CK 184 PSTGC
1315	R/5/R				
	MEET/HR				
	STEADY	180			CK 191 PSTGC
1325	M/T 14				
1327			14		
1330	A/A FULL				
	202 RPM				
1332			20		

NOTE: THE ABOVE SAMPLE ENTRIES INDICATE THE USE OF ORDER ABBREVIATIONS AND THE ENTRY OF RESULTING COURSES AND SPEEDS. USE OF RESULTING COURSE AND SPEED ENTRIES DURING THE ALONGSIDE MANEUVERING WHILE GETTING UNDERWAY WOULD HAVE LITTLE MEANING. HOWEVER, FROM THE 1257 ENTRY TO THE 1332 ENTRY, IT WOULD BE POSSIBLE TO PLOT A DR TRACK FROM THE INFORMATION CONTAINED IN THE COURSE AND SPEED COLUMNS.

Figure 4-3.–Quartermaster's Notebook page.
69.148

prudent to standardize on some of the abbreviations presently used by the fleet. In this regard, it appears that the use of slant signs could be optional. The entry R/5/R could well be written R5R, depending upon preference.

Orders to the helm and engine orders should be entered in the order column of the quartermaster's log in abbreviated form. The following sample abbreviations are examples only and should not be construed as the only correct manner of making entries. The intent is to enter a shorthand-like record of the order which will ease the logging effort of the Quartermaster and yet provide a faithful record of the orders of the conning officer.

Sample Entries:

Order	*Log Entry*
Right Full Rudder	RFR
Left Full Rudder	LFR
Right 10° Rudder	R/10/R
Left 10° Rudder	L/10/R
Right Hard Rudder	RHR
Left Hard Rudder	LHR
Rudder Amidships	R/AMID
Meet Her	Meet/HR
Steady As You Go	STEADY
Right to Course 250°	R/250
Left to Course 152°	L/152
Shift Your Rudder	SHIFT/R
Come to Course 150°	C/C 150
Come Left to Course 160°	C/L/C 160
All Engines Ahead 1/3	A/A 1/3
All Engines Back 1/3	A/B 1/3
All Engines Stop	A/STOP
Port Engine Ahead 1/3	P/A 1/3
Starboard Engine Ahead 1/3	S/A 1/3
Port Engine Back 1/3	P/B 1/3
Starboard Engine Back 1/3	S/B 1/3
Port Engine Stop	P/STOP
Starboard Engine Stop	S/STOP
All Engines Ahead Standard	A/A STD
All Engines Ahead Full	A/A FULL
All Engines Ahead Flank	A/A FLK
All Engines Ahead, Indicate 145 RPM	A/A 145
Port Engine Ahead, Indicate 125 RPM	P/A 125
Starboard Engine Ahead, Indicate 110 RPM	S/A 110
Make Turns for 16 Knots	M/T 16
Make 10 Knots by Log	M/10/L
All Engines Ahead Full, Indicate 180 RPM	A/A FULL 180 RPM

Amplifying information related to an order may be entered under "Events of the Day." More than one line of the order column may be used under one time entry, when more than one order is given in rapid sequence.

A separate entry in the course column should be made each time an order to the helm results in a new course. This entry can be made at the time of the order, for slight changes in course, or at a later time entry for major course changes. As a general rule, the new course should be entered when the helmsman announces that he is "checking" a certain course. In reviewing the log, the course column should contain entries for each "steady" course of the ship.

Engine orders which cause a change in the speed of the ship should result in a separate speed entry in the speed column of the log. For slight changes in speed, the speed column entry can be made at the same time as the order entry. For major changes in speed, the resulting speed entry should be entered at the time the ship is steady at the new speed. During maneuvering situations, such as getting underway from alongside a pier where the ship is continually accelerating or decelerating, entries in the speed column are not necessary. Like entries in the course column, the entries in the speed column should reflect the steady-state maneuvers of the ship. It should be possible for the navigator to use the entries in the course and speed columns of the log to plot a dead reckoning track of the ship.

ALTERATIONS IN DECK LOG AND QM NOTEBOOK

Often the quartermaster's notebook and the rough deck log are required as evidence in court cases involving claims against the United States. Consequently, nothing should appear in either record that might imply that entries were changed or that material was added. For this reason, no blanks should be left where entries might be made later.

For the same reason, neither the notebook nor deck log must ever be altered by erasure. If you make an incorrect entry, draw a single line through it, and enter your initials in the margin. Write the correct entry immediately afterwards, if possible. If not, write it in the first available space, label it with the proper time, and indicate by an arrow the place above where the correction should appear.

DISPOSAL OF QM NOTEBOOK

Quartermaster's notebooks are retained onboard for a minimum of 3 years after completion. Retention for this period is a safeguard if they should be required by a naval court or board or by the Navy Department. At the expiration of 3 years, they are destroyed.

SAMPLE LOG ENTRIES

Sample entries in the remainder of this chapter are offered as guidance in writing the remarks for a watch. Most of these examples are taken from Instructions for Keeping Ship's Deck Log, NavPers 15876. Any procedural changes will be incorporated in later revisions of that publication. Examples of log entries cannot, of course, be all-inclusive, nor can they be considered the only acceptable entries. Any entry is acceptable that is complete, accurate, clear, and in standard Navy phraseology.

* Abbreviations: In general, abbreviations in the deck log must be limited to those normally accepted throughout the naval service by reason of long and continued usage. Obscure or communication-type abbreviations must not be used. Following is a partial listing of the more commonly used abbreviations.

Changed course	c/c
Changed speed	c/s
Closest point of approach	CPA
Officer conducting the exercise	OCE
Officer of the deck	OOD
Officer in tactical command	OTC
Senior officer present	SOP
Senior officer present afloat	SOPA
Unauthorized absence	UA
Uniform Code of Military Justice	UCMJ
Commands and bureaus	DESDIV 21, COMDESDIV 21, VC 23, BUPERS, etc.
States (Massachusetts, Florida)	Mass., Fla., etc.

DRILLS AND EXERCISES

1100 Exercised at general drills.
1115 Commenced training battle problem. All entries during duration of problem simulated unless otherwise stated.
(NOTE: Precede each actual event with the word "ACTUAL.")

Abandon Ship

1105 Held abandon ship drill, provide.
1145 Secured from abandon ship drill.

NBC Attack

1440 Set material condition ______ and NBC condition ______.
1450 Set NBC condition ______.
1500 (Simulated) nuclear underwater (or air) burst, bearing ______ distance ______ yards. Maneuvering on various courses at various speeds to avoid base surge and fallout.
1530 Rejoined formation and took station ______ in formation ______. Axis, course, speed, etc.

Gunnery

1245 Went to general quarters. Set material condition ______.
1300 Commenced __________ exercise.
1304 Commenced firing (or fired one ______ missile) to starboard (or port).
1308 Ceased firing.
1320 Set material condition ______.
1325 Secured from general quarters. Ammunition expended:

24 rounds 5"/38-cal. high explosive projectiles with 24 rounds full service smokeless (or flashless) powder cartridges with no casualties.

(NOTE: For several exercises fired in close succession, the ammunition expended for all may be grouped in one entry. Normally material condition is set and batteries secured before securing from general quarters.)

FUELING

In Port

1000 Commenced fueling from USS SALAMONIE (AO 26) (or Naval Fuel Depot, Cheatham Annex), draft forward______, aft______.
1200 Fueling completed, draft forward______, aft______, received_____gallons of fuel at______°F.

At Sea

1945 Set the special sea and replenishment detail. Commenced preparations for refueling from USS CIMARRON (AO 22).
2026 Maneuvering to take station astern USS CIMARRON (AO 22).
2038 On station, replenishment course______, speed______.
2042 Commenced approach, Captain at the conn (or conning).
2053 On station alongside portside of CIMARRON.
2056 First line over.
2110 Received first fuel hose.
2115 Commenced receiving fuel.
2159 Fueling completed.
2206 All lines and hoses clear. Maneuvering to clear portside of CIMARRON.
2210 Clear of CIMARRON.
2212 Secured the replenishment detail.

FORMATION

0700 Maneuvering to take station_______in formation_____, axis_____, course_____, speed_____ knots. Guide is USS BOSTON (CAG 1) in station______.
0800 Rotated formation axis to______.
0900 Formation changed from 49 to 52. New course and axis______, speed______knots. Formation guide is USS TOPEKA (CLG 8) in station______.

Officer in Tactical Command (OTC)

0900 COMCARDIV 16, embarked in the USS LAKE CHAMPLAIN (CVS 39), assumed OTC.
1000 Commanding officer, USS FRANKLIN D. ROOSEVELT (CVA 42), designated OTC. (NOTE: Log all shifts of tactical command. When the OTC is the commanding officer of your vessel, use the following terminology: "OTC is commanding officer, USS FRANKLIN D. ROOSEVELT (CVA 42)." In every instance, use command title of OTC, not his name and rank; for example, COMCARDIV 2. State in which vessel the OTC is embarked.)

INSPECTIONS

Administrative and Readiness

0930 RADM S. DECATUR, USN, COMTRAPAC, accompanied by members of his staff and inspecting party from USS ORISKANY (CVA 34), came on board and commenced surprise administrative (or readiness) inspection. Broke flag of COMTRAPAC.
1100 COMTRAPAC, members of his staff and inspecting party, left the ship. Hauled down flag of COMTRAPAC.
1110 COMTRAPAC broke his flag in USS ORISKANY (CVA 34).

Personnel

0900 Mustered crew at quarters for Captain's inspection (or inspection of personnel and upper decks).

1010 Secured from inspection

MIDWATCH ENTRIES

Underway

00-04 Steaming in company with Task Group 58.1, composed of CARDIV 1, CRUDESFLOT 3, and DESRON 5, plus USS AULT (DD 698) and USS BORIE (DD 704), en route from Pearl Harbor, Hawaii, to Guam, M.I. (or Operating at sea off the coast of California), in accordance with CTG 58.1 serial 061.

This ship in station______ in bentline screen ______. Formation course______, speed______ knots. Formation axis____. SOPA is CTG 58.1 in USS SPRINGFIELD (CLG 7), OTC is COMGARDIV 1 in USS CONSTELLATION (CVA 64). SPRINGIELD is guide, bearing______, distance______ yards. Condition of readiness TWO and material condition______ set. Ship darkened (except for running lights). (NOTE: On succeeding watches the first entry is "Underway as before.")

In Port

00-04 Moored starboard side to USS HARLAN R. DICKSON (DD 708) with standard mooring lines in a nest of three destroyers. USS KNAPP (DD 653) moored outboard of HARLAN R. DICKSON to starboard. HARLAN R. DICKSON moored fore and aft to buoys B-5 and B-6, San Diego, Calif. Ships present: ______, SOPA______.

00-04 Anchored in berth B-4, U.S. Naval Operating Base, Trinidad, The West Indies, in 12 fathoms of water, mud bottom, with 60 fathoms of chain to the starboard anchor on the following anchorage bearings: South Point Light 060, etc. Ship in condition of readiness THREE, material condition______ set, and darkened except for anchor lights. Engineering department on 30 minutes notice before getting underway. Heavy weather plan in effect. Anchor detail standing by. Wind 45 knots from 070. Weather reports indicate possibility of winds up to 60 knots before 0400. Ships present:_____, SOPA ______. (NOTE: On suceeding watches the first entry is "Moored as before," "Anchored as before," or "Drydocked as before.").

PERSONNEL

Absentees

0800 Mustered the crew at quarters (or at foul weather parade, or on stations, or at quarters for Captain's insepection). Abesentees: None. (or NEDOPS, John Q., 123 45 67, SA, USN, absent without authority from muster.) (or BADEGG, Rosco, 234 56 78, FN, USNR, UA since 0700 this date.) (or SNEVIG, Thomas H., 281 12 61, SN, USN, UA since 0730, 2 January 1967 was this date declared a deserter from this vessel, having been UA for a period of thirty (30) days.) (Note: There is no legal distinction between absence over leave and absence without leave. Both absences are logged as unauthorized absence or UA. In the case of a man's continued absence, the initial entry indicating absence or UA will suffice until the man returns, is declared a deserter, or is otherwise transferred or detached from the ship.)

SUNRISE, SUNSET, COLORS

In Port

0620 Observed sunrise; secured anchor, aircraft warning, and all unnecessary lighting.

0800 Observed morning colors.

1930 Observed sunset and evening colors. Turned on all anchor, aircraft warning, and standing lights.

At Sea

0540 Observed sunrise; secured navigation and unnecessary lights.

043 Observed sunset; turned on navigation lights.

CHAPTER 5

STEERING AND STEERING GEAR

A Quartermaster striker probably did not reach that status without standing a good many wheel watches as a Seaman. Much of this chapter, consequently–possibly all of it–may be familiar to you already. But don't forget: You are now taking over a job in which you are expected to become an expert at steering. In other words, you never can know too much about it. Much of the textual material that follows is discussed in the *Seaman* training manual, but it won't do you any harm to review it.

RUDDER

Every ship is provided with a rudder located aft. When moved to one side, the rudder causes water to pile up under the ship's counter. This piled-up water, in turn, forces the ship's stern off the centerline in the direction opposite that toward which the rudder was moved. In ship handling, the most important fact to remember is that the stern, not the bow, moves off the centerline first.

In the days of the Norsemen, a ship's rudder was turned by means of a lever called a helm, corresponding to the tiller on most motor whaleboats. From this early usage arose the custom of calling the man who steered a helmsman. Helms no longer are a feature in ship's steering gear, but the custom of calling a steersman a helmsman still persists among seafarers.

When the helm on an oldtime ship was moved athwartships across the deck, the rudder motion was in the opposite direction. The result was that the ship's head would go off in the direction opposite that in which the helm was moved, and this action still is true of any small craft steered with a tiller. On all ships equipped with steering wheels, however, the wheel, rudder, and ship's head all move in the same direction. That is, when you turn the wheel to port, the rudder goes to port, and the ship makes her turn to port. Remember, though, that she begins by sending her stern to starboard.

The more headway a ship has, the more water piles up against her rudder under the counter, and the quicker her stern is pushed off. Consequently, a ship always turns faster and answers her rudder sooner at high speeds than at low speeds. Also, a greater angle on the rudder is required to turn a slowly moving ship than one moving faster.

STEERING MACHINERY

The amount of steering machinery a ship has aboard varies, usually according to the size of the ship. The machinery may be the same type as that in some small vessels, or it may be the modern type carried on most large naval vessels.

In small boats, power is transmitted to the rudder by a system of wire cables connecting the wheel to the rudder. Such a steering system is illustrated in figure 5-1. The cables, called tiller lines, are arranged on the drum in such a manner that, by turning the wheel in one direction–say starboard–the corresponding shortening of the starboard cable acts on the rudder to bring the bow of the vessel to starboard. Turning the wheel in the opposite direction brings about the opposite effect, that is, it swings the bow to port. The system just described is not feasible aboard larger vessels, because of the increased distance between wheel and rudder, size of the steering gear, and the large force required to move the rudder.

Some small- and medium-sized ships use steering machinery consisting of the wheel, rudder, and tiller lines, along with a steering engine. Figure 5-2 illustrates this system. As the wheel is turned, the order is transmitted to the steering engine, which, in turn, performs the work required to move the rudder. To employ this system on large vessels would necessitate large chains or cables to handle the enormous turning effort required at the tiller. It is for this reason that large ships are not equipped with this system.

The most commonly used system is comprised of the wheel, rudder, and the steering engine, without the cables. In this arrangement the steering engine operates the rudder by hydraulic means.

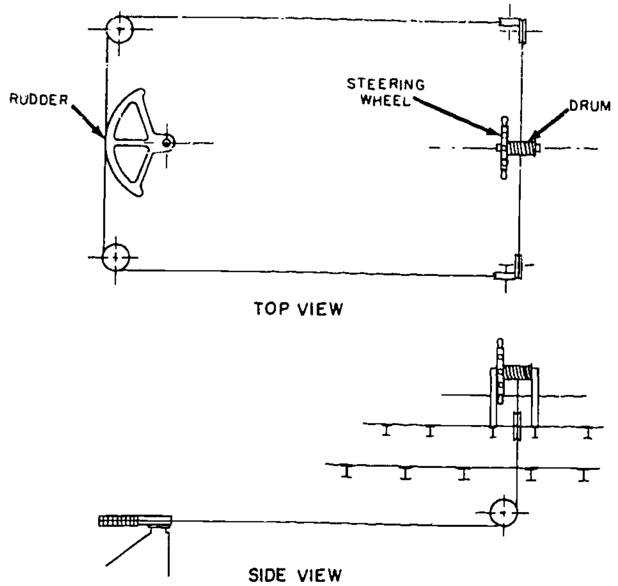


Figure 5-1.–Hand steering. 89.9

STEERING ENGINES

When ships began using steam as a means of propulsion, many problems were created. The first and probably most important problem emphasized the inadequacy of hand-powered steering gear. The rapid increase in the size and speed of steamships resulted in a correspondingly greater turning effort required at rudder stocks. Thus, a natural sequence of events led to the introduction of steam-powered steering gear.

Today, the three types of steering engines are steam, electromechanical, and electrohydraulic. Although some auxiliary ships still depend on steam for operating their steering gear, no active combatant ships are equipped with steam steering engines. Electromechanical steering gear presently is found on some small ships. Most vessels of recent design are equipped with the electrohydraulic mechanism. A brief discussion of the three types of steering gear follows.

Steam steering gear usually is controlled by a system of wires, pulleys, and drums that transmit the wheel's movements to the steam steering engine. When the wheel is set at a certain number of degrees, the steam engine "follows up" by moving the rudder to the corresponding angle.

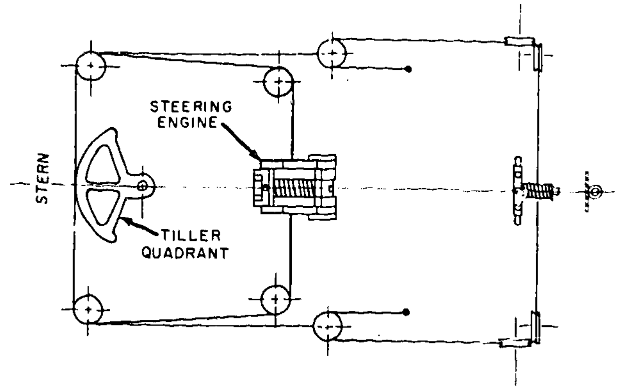


Figure 5-2.–Tiller line with power steering gear. 69.10

Electromechanical steering gear applies power to the rudder by means of electromotive machinery, thus dispensing with the necessity for vulnerable steam pipes, or the installation of steam on board vessels not equipped with it. Electromechanical gear requires large motors and d-c power, however. For this reason it has been superseded to a great extent by electrohydraulic gear.

Modern naval vessels are equipped with electrohydraulic steering gear. Most destroyers use the single-ram steering gear shown in figure 5-3. Carriers and some other large ships use a double-ram system.

For an idea of how the single-ram system works, let's watch what happens during a starboard turn, referring to figure 5-3. From the steering wheel on the bridge, the wheel movement is transferred electrically to the synchro receiver unit, where the electrical signal is converted to a mechanical signal. The synchro receiver unit sends the mechanical signal to the running pump, and the pump proceeds to pump oil to the port cylinder. Oil, at the same time, is taken from the starboard cylinder by the pump's suction. As oil is pumped into the port cylinder, the ram is moved toward the starboard side, turning the rudder as it does so. The ram is forced toward the starboard side until the correct rudder position is obtained. Simultaneously, the followup shaft causes the pumping to cease.

OPERATION OF MACHINERY

Personnel who stand steersman watches must be able to change from the port steering motor and

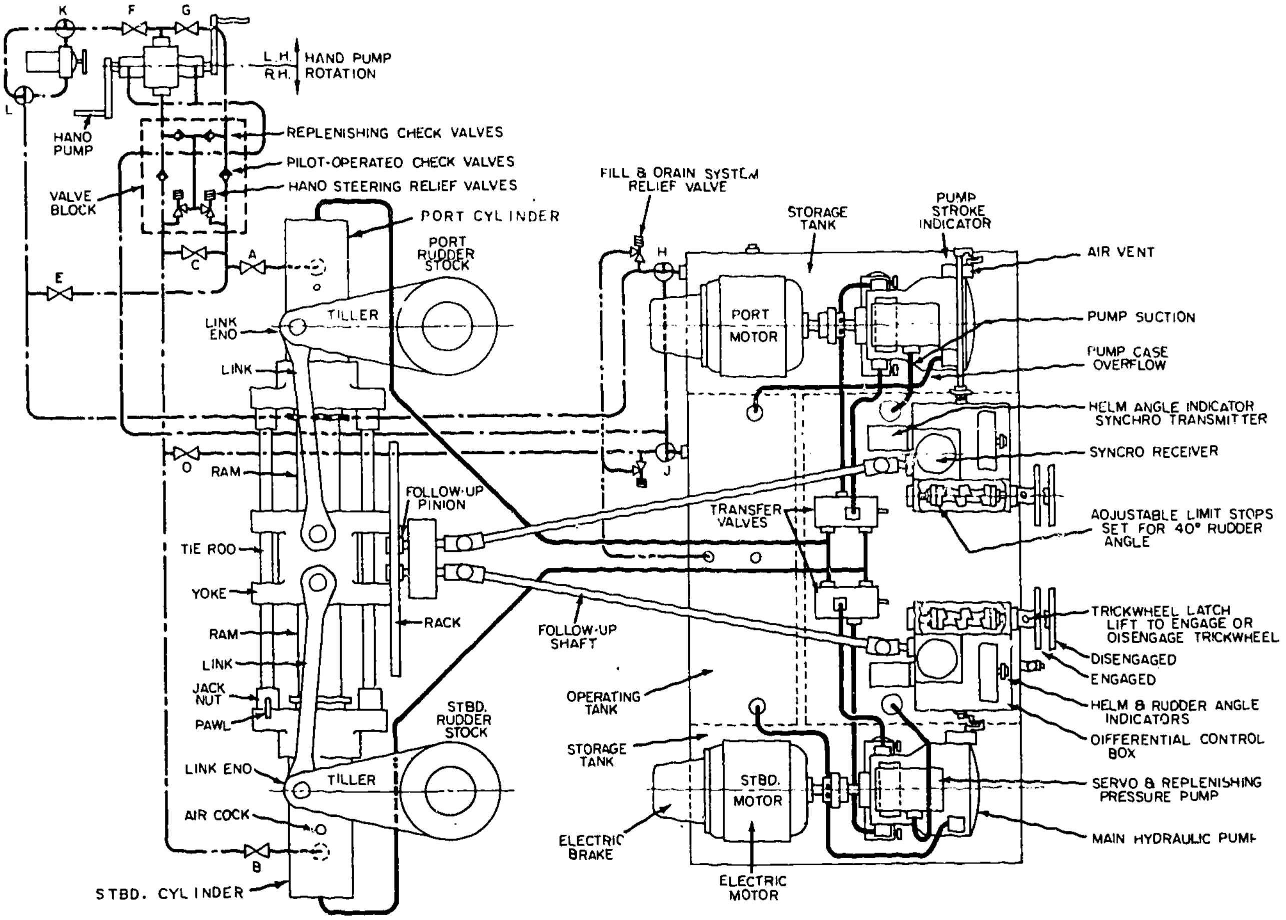


Figure 5-3.–Electrohydraulic steering gear.
27.82

steering cable to the starboard steering motor and steering cable (and vice versa) because the unit in use usually is alternated daily. These personnel must also be able to shift steering control from and to the various steering stations. If a breakdown of the mechanism occurs at one station, control must be shifted with a minimum of lost time and motion. Once a breakdown happens, it is too late to start learning methods for shifting. It behooves all QMs to learn the procedures now–before a possible emergency. This topic acquaints trainees with starting and securing the equipment, changing motors and cables, and shifting to alternate steering stations.

Energizing and/or shifting procedures may differ from ship to ship, but learning your ship's method will be much simpler if you clearly understand this basic information.

Starting the Equipment

In this discussion, assume that we want to use the port motor and the port cable. The steering gear is secured with the rudders amidships and with the transfer valve shift lever in the NEUTRAL (N) position. The valve and plug cocks of the hydraulic system should be set in accordance with the operating diagram for normal power operation for the steering gear.

1. To start the port pump motor, press the start pushbutton.
2. Engage the trick wheel and turn it until the helm indicator (pointer) corresponds to the rudder angle indicator.
3. To connect the port pump unit to the ram, move the transfer valve shift lever to the PORT (P) position.

4. To energize the synchro receiver selector switch in the steering gear room, close the circuit breakers on the steering power panel.
5. Move the synchro receiver selector switch and the cable selector switch (in steering gear room) to their PORT positions.
6. To energize the remote control synchro transmitter to steer from the bridge, notify personnel in the pilothouse to turn the cable selector switch at that station to the PORT position.
7. Disengage the trick wheel on the port unit and engage the trick wheel on the idle (starboard) unit.

The rudder is now ready for operation, using the helm in the pilothouse.

Shifting Motors and Cables

It is routine on most ships to shift steering motors (power units) and cables each day during the midwatch. This way both units get equal wear. Moreover, preventive maintenance can be performed on the idle unit.

Assume that the ship is underway, using the port power unit and port cable. The OOD orders a shift to the starboard power unit and starboard cable. Personnel in the pilothouse notify the watch standers in the steering machinery room to stand by for the shift.

Action by personnel in the steering machinery room and in the pilothouse is as follows:

1. (Steering machinery room) To start the starboard pump motor, press the start pushbutton.
2. Notify steering station to keep wheel motionless during change of units.
3. Allow rudder angle indicator to line up with helm indicator. Then turn the transfer valve shift lever to the STARBOARD (S) position to connect the starboard pump to the ram. Transfer the remote control from the port to the starboard unit by turning the synchro receiver selector switch.
4. Transfer the cable selector switch in the steering machinery room to the STARBOARD position. Notify personnel in the pilothouse to turn their selector switch to the STARBOARD position.
5. (Pilothouse) Turn selector switch to STARBOARD position and notify steering machinery room when the change is made.
6. (Steering machinery room) Disengage the trick wheel and notify pilothouse personnel that they may resume steering.
7. To stop the port motor, press the stop pushbutton. Then engage the trick wheel on this unit.
8. (Pilothouse) Test the helm by moving the wheel a few degrees in each direction, watching to see if the rudder angle indicator follows. If the rudder angle indicator aligns itself with the wheel angle indicator, report to the OOD that the shift has been made, and that the test of the helm is satisfactory.

Emergency Steering Procedures

If a steering failure occurs in the pilothouse, the procedure for shifting steering motors and cables (just described) would, in many instances, be used to regain steering control. If the cause of the steering failure is in the steering machinery itself, however, a shift to another power unit and cable would be useless. A method of hand emergency steering (described later) is therefore incorporated in the steering machinery.

Consider a hypothetical situation. A ship is engaged in close-quarter maneuvering, when the steersman suddenly discovers that he has no control over the rudder. He sings out, "Lost steering control." Simultaneously he sounds the emergency steering alarm, which alerts personnel in the steering machinery room that a loss of steering control has occurred. Immediately upon hearing this report, the 1JV phone talker on the bridge alerts personnel in the steering machinery room to take control. Then the phone talker tells the steering machinery room watch the course to steer, or he tells them to steer by rudder angle-order indicator-transmitter. The rudder angle-order indicator-transmitter and its use are described in some detail in the*Seaman* manual and are reviewed near the end of this chapter. The method of taking control follows.

1. Energize the idle unit, using the procedures described previously for operating the port power unit.
2. Engage both trick wheels and steer from the trick wheel of the previously idle unit.
3. Deenergize the remote control system by turning the synchro receiver selector switch to the OFF position.

The preceding operations (from loss of steering control to deenergizing the remote control system) must be accomplished in the shortest possible time, otherwise the ship may wind up on a reef or plow into the side of some unsuspecting ship. Proficiency and the split-second timing required for emergency shifting can be attained only through practice.

The steering failure, as mentioned earlier, might be in the steering machinery itself (as opposed to the power supply or steering cables). In such an instance, shifting to the trick wheel or another motor and cable would be of no help. It is necessary to resort to hand emergency steering. The following steps are necessary to operate hand emergency steering.

1. Set the valves and plug cocks of the hydraulic system according to the operating diagram for the steering gear for hand steering.
2. Set the transfer valve shift lever in the NEUTRAL (N) position.
3. Crank the hand pump in the proper direction until the desired rudder angle is obtained. (NOTE: This procedure is both tiring and slow, because the rudder turns only a small amount for every revolution of the crank.)

Securing the equipment is the final steering mechanism operation with which Quartermasters must become familiar. Following is the procedure for securing.

1. Put the rudder amidships (0° rudder angle).
2. Turn the transfer valve shift lever to the NEUTRAL (N) position.
3. Deenergize the remote control system by turning the synchro receiver selector switch and the cable selector switch (in the steering gear room) and the cable selector switch (in the pilothouse) to their OFF position. Open the circuit breakers on the steering power panel.
4. Stop the pump motor by pressing the associated STOP pushbutton.

STEERING ENGINE CUTOUT

A safety device is installed on every steering engine. It automatically cuts off the power when the rudder is brought against the stop beyond which it cannot be turned. The extreme limit most rudders can be turned is 35° on either side of center. Full rudder on most ships, however, is 30° right or left; the extra 5° is used only in emergencies. Unless you are ordered to do so, never put the rudder hard over. It is possible for the rudder to jam against the stops, causing you to make circles in the ocean.

ORDERS TO STEERSMAN

The words "port" and "starboard" are never used when giving orders to the steersman. "Right" and "left" are substituted because they are clearer and more distinct.

You must repeat distinctly, word for word, every order you receive, so that the officer of the deck or pilot may know that you understood him. Also tell him when you have carried out an order; in other words, report immediately when the rudder is right full, or the ship is steady on 257, and the like. Additionally, when making a swing, occasionally give the compass heading that the lubber's line is passing, so that the conning officer can tell how far the ship has gone through the swing. Thus, if ordered to take her right from 000° to 045°, don't wait until you are heading 045° to report. As the ship's head goes through the swing, report "Passing zero one zero, Sir," "Passing zero two zero, Sir," and so on. Standard orders and their meanings follow.

Right (left) full rudder: Full rudder usually means 30° on the rudder angle indicator.

Hard right (left) rudder: This order puts the extra 5° on the rudder angle.

Right (left) standard rudder: Standard rudder varies with different ships. It is the designated number of degrees of rudder angle in each ship of a unit that will cause all ships to turn in the same space. You must find out from the man you relieve, or from the officer of the deck, what standard rudder is on your ship.

Right (left)___degrees rudder: Move rudder to a specific rudder angle.

Come right (left) to one four eight: Swing ship's head in the direction stated and steady her on the course given. (In this example it is 148°.) Frequently stated "Bring her right (left) to one four eight." or "Take her right (left) to one four eight."

Steer one nine zero: Usually given for only a minor change of heading to the number of degrees specified. (Here it is 190°.)

Steady on two two five: States the course on which ship's head is to be steadied. Normally given while swinging.

Increase your rudder: Increase rudder angle to right (left) full (standard) number of degrees.

Ease the rudder: Reduce rudder angle. May be stated "Ease to fifteen degrees (ten degrees) rudder."

Rudder amidships: Put the rudder on the centerline; no rudder angle. (As a rule, this order is merely "Midship!")

Meet her: Check, but do not stop, the swing by putting on opposite rudder.

Steady (steady go) (steady as you go) (steady as she goes): An order to steady her on the course she is heading at the time the order is given. If she is swinging at the time, heading must be noted and the lubber's line brought back to and steadied on that heading as soon as possible.

Shift the rudder: Change to the same number of degrees of opposite rudder angle. In other words, if your rudder angle is 15° right, at the command "Shift the rudder!" you change to 15° left rudder.

Mind your rudder: Usually a caution to steer more carefully, but may be a warning to stand by for an order to follow.

Nothing to the right (left): Given when the presence of some danger on one side or the other makes it necessary to avoid a set in that direction. You must keep the ship from swinging past the course in the direction warned against.

Keep her so: Continue to steer the course you are heading. Usually given after you state the course you are steering.

Very well: Reply of conning officer to steersman, meaning "The situation is understood."

The conning officer and the steersman must understand each other at all times. Several orders issued in rapid succession will cause confusion unless the steersman makes the correct reply and takes the proper action on each order. When the conning officer gives contradictory orders without enough time between them for the steersman to react, the steersman should reply to and take action on the last order only. When contradictory orders are separated by a pause, the steersman should answer and comply with the orders in the usual manner.

POINTERS ON STEERING

When steering, the first pointer to remember is that it is the ship that turns under the compass card; the compass card remains steady. When the card appears to be turning to the left of the lubber's line, for example, it actually is the line (and thus the ship's head) that is moving to the right. On all modern ships (as mentioned earlier) the wheel, rudder, and ship's head all move in the same direction. To move the lubber's line and ship's head back to the left, therefore, you turn the wheel to the left.

By now you know that steering a ship is not like steering an automobile. To straighten your car on the road, you bring the wheel to the midships position and keep it there. In trying to straighten a ship that is swinging to the right, you probably will have to put your rudder left, past the midships position, until she begins to straighten out, then turn it back to midships before the ship's head reaches the course on which you want to steady her. When she is at that point, it is probable that you will have to give her a touch of right to steady her, and you must get the rudder off her before she starts to swing again.

A new steersman usually begins by applying too much rudder. You turn your auto steering wheel, and your car responds immediately. The new steersman turns the ship's wheel a few degrees, but nothing happens. A little time is required for the steering engine to operate and for the ship to begin answering her rudder. The steersman becomes anxious after a few seconds and turns the wheel more, and still more. Eventually, the lubber's line starts to move. When it reaches the course desired, the steersman puts the rudder amidships, heaving a sigh of relief. But the good old ship keeps right on swinging. The steersman hastily applies opposite rudder, and finds that he has to put on plenty before the swing stops. It finally does, but starts again, more rapidly, in the other direction. Soon the steersman is turning the wheel frantically from hard over to hard over. Meanwhile, the ship's head is swinging back and forth, leaving a wake that resembles a corkscrew. If somebody doesn't notice this predicament or the racket in the steering engineroom, where the engine is straining itself, the steersman actually will be sculling the ship with her rudder throughout his watch.

The effect of the rudder on a big ship is a delayed action, more or less. You don't notice it right away. Even when you put on too much rudder, the result is not instantaneous. When the swing begins, the influence of opposite rudder, in an attempt to stop it, is equally slow. Always remember: The less rudder you use, the better; and it takes a lot less rudder to start a steady ship turning than you first are inclined to think.

When the man you relieve turns the wheel over to you, the ship should be steady on course. Find out from him how she is acting. Often, because of wind and sea conditions, she may "carry" rudder on one side or the other. In other words, with the rudder amidships, she has a strong tendency to go off in one direction. Watch her for a while and observe what she does. Try to figure out how much rudder it takes to catch her just before she goes off course, and have the rudder off her before she gets back on. By this method she won't go past the course coming up, but barely will come up to it and steady on her own. Then you won't have to use any rudder at all on the other side.

If a sea is running from aft, the ship may be yawing back and forth about the same number of degrees on either side of the course as each swell passes under her. If she's getting the sea on one of the quarters, she will be thrown off as her stern rises, and off again on the opposite side as she drops into the trough.

You are powerless to prevent this kind of yawing, and in trying, it's useless to strain yourself and the steering engine. But you must learn to recognize instantly when she actually starts to go off course, and get rudder on her to prevent it. Much less rudder is needed to head off a swing than to stop one that has started.

When you're steering with a pilot, don't worry. He normally tells you the angle he wants on the rudder so that the ship won't get away from him, or from you, either. But, if it's pilot water, it probably is close quarters, so be sure you keep alert to hear every order correctly and carry it out instantly. When you are at close quarters, a pilot or conning officer frequently dashes from one bridge wing to the other, calling orders from outside the steering station. In these circumstances it is sometimes difficult to hear the orders. Anytime you are uncertain what was said, ask for a repeat immediately.

When coming up to a dock, buoy, or anchorage, you must tell the conning officer when the ship loses headway to the point where she no longer answers the rudder. Report it as soon as you are certain she no longer responds. Any failure of the steering gear must be reported immediately.

Before surrendering the wheel to your relief, have the ship steady on her course. Don't turn over the wheel to him in the middle of a swing. Give him the course, and tell him the compass or repeater you are using. If a gyro repeater, be sure to designate the correct repeater (if more than one). Also pass on to your relief the equivalent course to steer by magnetic compass if the gyro fails. When you are zigzagging, report to him both the immediate course the ship is on and the base course she should follow if she ceases to zigzag.

Besides the course data, tell your relief about any steering peculiarity you may have discovered, such as: "Carrying a little right rudder," "Carrying mostly left," and the like. Relay to him any order you received that still stands; for example, "Nothing to

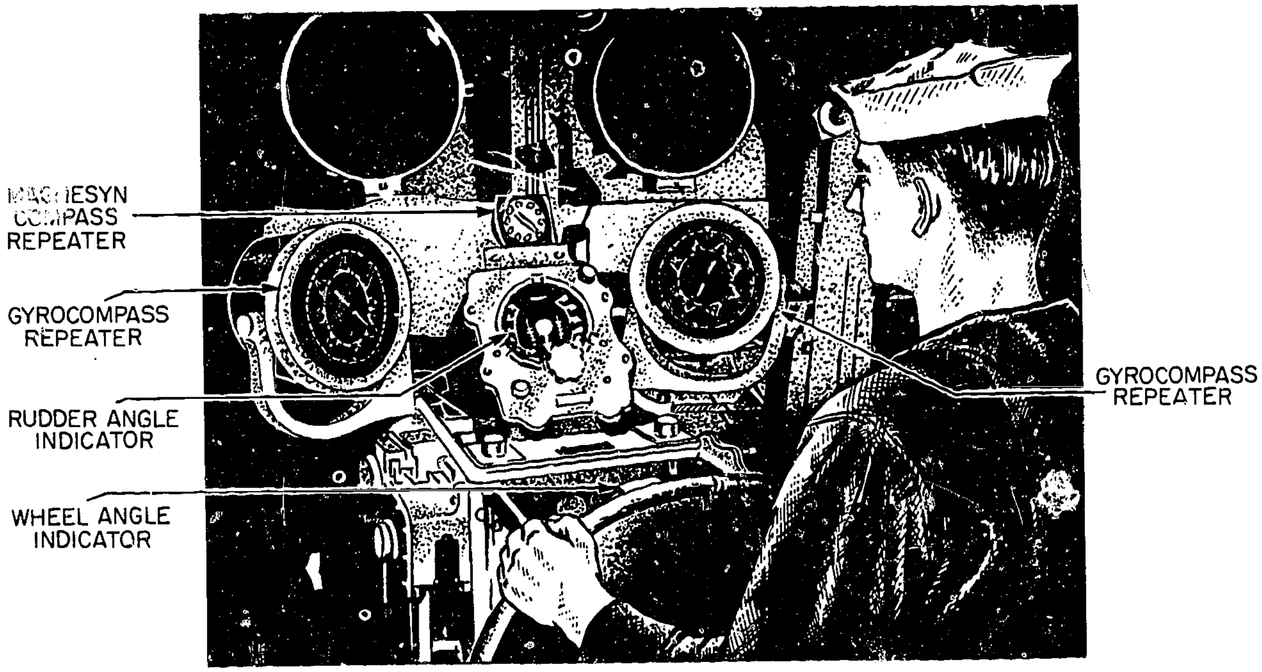


Figure 5-4.–Looking over the steerman's shoulder on a cruiser. 69.11

the left," "Steady as she goes," etc. If you are steering on a sh[illegible]. a range, a landmark, or a light, point out the object to him and make certain that he has the correct one. Before leaving the steering station, report to the officer of the deck the orders given your relief, as "Steering two seven eight by gyro, Sir," "Steady as she goes, Sir," "Steering on the range, Sir" and so on.

EVASIVE STEERING

During wartime, all bridge personnel–especially the OOD and his QM of the watch–must be thoroughly familiar with evasive steering methods employed against submarines and torpedoes. Currently, the evasive methods used are called sinuating, weaving, zigzagging, and making emergency turns. The purpose of antisubmarine evasion is to make more difficult the enemy submarine's effort to contact or shadow a ship, or reach a position for attacking it. Torpedo evasion complicates a submarine's fire control problem and avoids torpedoes.

Details of evasive steering may be found in ATP3, and are not described in this Rate Training Manual. Nevertheless, it is the responsibility of each Quartermaster to familiarize himself with the effective instructions that cover sinuating, weaving, and zigzagging. Study them; know your job.

STEERING STATIONS

When a ship goes into action, no one knows where she might be hit; everybody on board takes the same chance. If a ship had only a single steering station, a hit there would put her out of the fight permanently. For this reason, combat ships have several steering stations, and control can be shifted almost instantaneously to any station.

A view over the shoulder of the steersman on a cruiser is illustrated in figure 5-4. Just beyond the wheel is a brass plate on which is a graduated scale showing 35° to right and left of center. This device is the wheel angle indicator; it reveals the number of degrees the wheel is turned. Usually this angle is the same that the rudder assumes when the steering engine operates. A variance could occur, of course, if the engine operates improperly.

The instrument above and forward of the wheel angle indicator (fig. 5-4) is the rudder angle-order indicator-transmitter. This instrument has a dual purpose. During normal steering situations it shows the actual angle of the rudder, which usually lags the wheel angle indicator by about 2° because of the time required for the steering mechanism to operate. During emergency steering this instrument is useful in transmitting visual orders to the steersman in after steering. By working the control knob (see fig. 5-5) the rudder order is displayed on the instrument by moving the pointer marked "ORD" to the desired rudder angle. The order is displayed in after steering on another rudder angle-order indicator-transmitter, from which the after steersman receives his orders. A push switch, near the face of the rudder angle-order indicator-transmitter on the bridge, operates a bell in after steering to call the steersman's attention to a change in rudder angle.

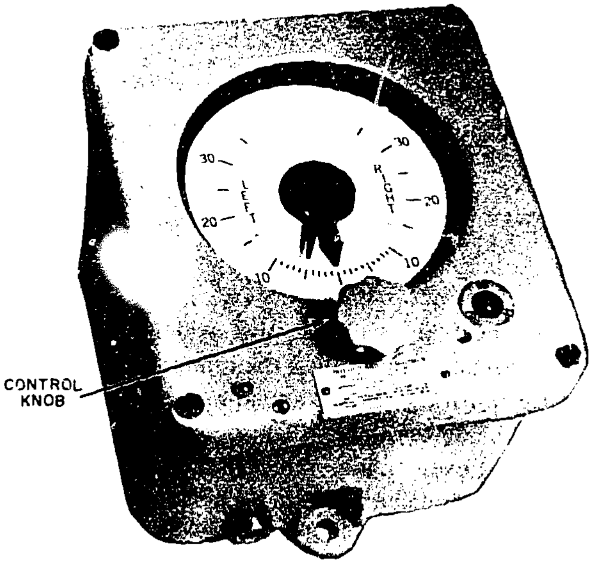


Figure 5-5.–Rudder angle-order indicator-transmitter. 7.126

The dial above the rudder angle-order indicator-transmitter in figure 5-4 is called a magnesyn repeater. It transmits indications from a magnesyn compass, usually located on one of the masts where it is practically free of deviation. The magnesyn repeater is rapidly replacing the binnacle-mounted magnetic steering compass, but the standard magnetic compass on the flying bridge or signal bridge is retained as a check on the magnesyn and gyro.

CHAPTER 6

MAGNETIC COMPASS AND GYROCOMPASS

The best known and most widely used of all navigational instruments is the compass. Without it, precise information on headings and directions would be almost impossible to obtain. Compasses were used even before the days of Columbus, and they remain indispensable in today's Navy.

The Navy uses two main types of compasses: gyroscopic and magnetic. The gyrocompass operates on the principle that a rapidly spinning object is balanced at its center of gravity, much as a spinning top stands on its point. The gyrocompass is designed to point toward true north, though it may have a slight mechanical error (1° or 2°), which may be determined and for which allowance is made. The magnetic compass, on the other hand, is controlled primarily by the magnetic properties of the earth and tends to point toward the magnetic north pole.

MAGNETISM

To fully understand the operation of the magnetic compass, it is necessary to know something about magnets themselves. A magnet is a body that has the property of attracting iron and producing a magnetic field around itself. Such materials as lodestone and magnetic oxide of iron, in their natural state, possess this property. The earth itself has similar properties and may be considered a gigantic magnet.

Every magnet has a north pole and a south pole. If a single magnet is cut in half, each half becomes a magnet with a north pole and a south pole. If two magnets are brought close together, their unlike poles will attract and their like poles repel. That is to say, a north pole attracts a south pole but repels another north pole. This law of magnetism has meaning for you inasmuch as you later will see how the magnets in a ship's magnetic compass observe this law in relation to the earth's magnetic fields or to the ship's own magnetic properties.

EARTH'S MAGNETISM

The earth, like all other magnets, has a north pole, located approximately at 76.2° north latitude, 101.0° west longitude, and a south pole, located approximately at 66.0° south latitude, 139.1° east longitude. (These locations are the 1960 positions of the magnetic poles, as distinguished from the true north and south poles, which, of course, are at 90° north latitude and 90° south latitude, respectively.)

The magnetic lines of force that connect the magnetic poles are called magnetic meridians. These meridians are not great circles. Because of the irregular distribution of magnetic material in the earth, the meridians are irregular, and the planes of the magnetic meridians do not pass through the center of the earth. Approximately midway between the magnetic poles a line called the magnetic equator intersects the meridians and connects all points at which the magnetic dip is zero. The magnetic equator is an irregular arc, varying in latitude from 15° south in South America to 20° north in Africa.

MAGNETIC COMPASS

Although you were introduced to the magnetic compass in the *Seaman* manual, your job as Quartermaster requires a much more thorough knowledge of the intricacies of the magnetic compass. Accordingly, this topic presents detailed information on the magnetic compass, its nomenclature, and its limitations.

COMPASS NOMENCLATURE

The simplest magnetic compasses, as you know, contain magnets whose south ends tend to seek the earth's north magnetic pole, thus giving the compass its directive force.

Magnetic compasses used in the Navy (fig. 6-1) are highly sophisticated instruments. In addition to the magnets, magnetic compasses are made up of a number of parts. Components of a standard 7 1/2-

inch diameter Navy compass are given in the accompanying list.

* Magnets: Four (two in older compasses) cylindrical bundles of steel wire, with magnetic properties, which are attached to the compass card to supply directive force.

* Compass card: An aluminum disk graduated in degrees from 0 to 359. (It also shows cardinal and intercardinal points.) The compass card is attached to the magnets, and provides a means of reading direction.

* Compass bowl: A bowl-shaped container, made of nonmagnetic material (brass), with a reference mark on its rim. The bowl contains the magnetic element and the fluid. Part of the bottom may be transparent (glass) to permit light to shine upward against the compass card.

* Fluid: A liquid surrounding the magnetic element. By reduction of weight, in accordance with the Archimedes principle of buoyancy, friction is reduced. Closer alignment of the compass needle with the magnetic meridian is thus possible. The liquid in older compasses may be a mixture of ethyl alcohol and water in approximately equal parts. Alcohol serves to lower the freezing point of the mixture. Newer compasses contain varsol, an oil that neither freezes nor becomes more viscous at low temperatures.

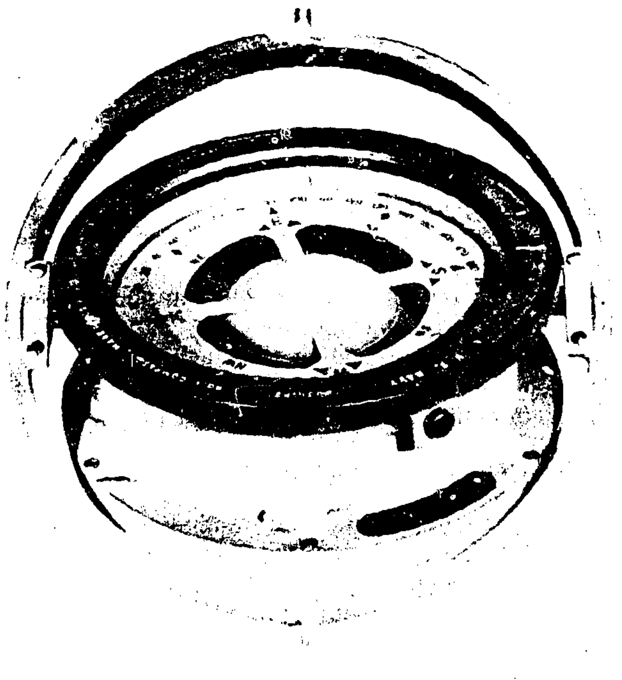


Figure 6-1.–U.S. Navy 7 1/2-inch standard compass. 45.595(69)

* Float: An aluminum air-filled chamber in the center of the compass card to further reduce weight and friction at the pivot point.

* Expansion bellows: A bellows arrangement in the bottom of the compass bowl, which operates to keep the compass bowl completely filled with liquid. A filling screw facilitates addition of liquid that may become necessary, notwithstanding the expansion bellows.

* Lubber's line: A mark on the inside of the compass bowl, which is aligned with the ship's fore-and-aft axis. The lubber's line is a reference for reading direction from the compass card. The compass card reading on the lubber's line represents the ship's heading.

* Gimbals: The compass bowl has two pivots that fit or rest in a metal ring, which also has two pivots resting in the binnacle. This arrangement (gimbals) permits the compass to remain almost horizontal despite the motion of the ship. An important concept is that, regardless of the movement of the ship, the compass remains fixed (unless, of course, some magnetic material is introduced to provide additional deviation from the magnetic meridian). The ship, the compass bowl, and the lubber's line move together around the compass card. To the observer, as he witnesses this relative motion, it appears that the compass card moves.

* Binnacle: A nonmagnetic housing in which the magnetic compass is mounted. It usually provides a means for inserting corrector magnets for compass adjustment.

COMPASS LIMITATIONS

The following characteristics of the magnetic compass limit its direction-finding ability.

1. It is sensitive to any magnetic disturbance.
2. It is useless at the magnetic poles, and is sluggish and unreliable in areas near the poles.
3. Deviation (explained later) changes as a ship's magnetic properties change. Moreover, the magnetic properties change with changes in the ship's structure or magnetic cargo.
4. Deviation changes with heading. The ship as well as the earth may be considered as a magnet. The effect of the ship's magnetism upon the compass changes with the heading.
5. It does not point to true north.
6. It requires frequent adjustment.

PRECAUTIONS IN VICINITY OF MAGNETIC COMPASS

A magnetic compass cannot be expected to give reliable service unless it is properly installed and protected from disturbing magnetic influences. Certain precautions must be observed in the vicinity of the magnetic compass. Some of these precautions follow.

If avoidable, a compass should not be placed near iron or steel equipment that will be moved frequently. Thus, a location near a gun, boat davit, or boat crane is not desirable. The immediate vicinity should be kept free of sources of deviation, particularly those of changing nature. When avoidable, no source of magnetism (except the structure of the vessel) should be permitted within a radius of several feet of the magnetic compass. Some sources that might be overlooked include electric wires carrying direct current; magnetic instruments, searchlights, windshield wipers, electronic equipment, or motors; steel control rods, gears, or supports associated with the steering apparatus; fire extinguishers, gas detectors, etc.; and metal hangers, flashlights, keys, or pocketknives.

MAGNETIC COMPASS RECORD BOOK

According to provisions of *Navy Regulations*, the magnetic compass record must be a complete record of all direct reading and remote indicating magnetic compasses on board. It also must be a record of errors of the gyrocompasses on board. While a vessel is underway, comparison between the magnetic and gyrocompass headings must be made and entered in the record whenever a new course is set. Unless impracticable, under circumstances such as emergencies or when making frequent course changes within a harbor, these comparisons may be omitted. Compass comparisons must also be made at least every 30 minutes for one magnetic compass and the master gyrocompass (or the ship's heading indicator used for steering) and every 4 hours for all other installed compasses. The compass record book must be signed by the navigator and submitted to the commanding officer for his approval on the last day of every quarter. Figure 6-2 shows a sample page from the magnetic compass record book.

MAGNETIC COMPASS ERROR

Compass error, defined as the inclination of the axis of the compass card to the true meridian, may be computed easily. It is simply the algebraic sum of variation and deviation. Compass error (fig. 6-3) must be applied to a compass direction to obtain true direction. It must be applied to true direction, with signs reversed, to arrive at compass direction.

VARIATION

Because the magnetic north pole and the true north pole are not located at the same point, the magnetic compass does not seek true north. The magnetic compass aligns itself with the direction of the horizontal component of the earth's magnetic field at the compass location, and therefore does not always point toward the north magnetic pole. The amount the needle is offset is called variation, because it varies at different points on the earth's surface. Even in the same locality it usually doesn't remain constant, but increases or decreases annually at a certain known rate.

The variation for any given locality is shown on the compass rose of the chart for that particular locality, together with the amount of annual increase or decrease. (In the following discussion, symbols are used for degrees (°) and minutes (′).) The compass rose in figure 6-4 indicates that in 1960 there was a 14°45′ westerly variation in that area, increasing 1′ annually. To find the amount of variation in this specific locality in 1967, determine how many years have elapsed since 1960 (which is 7), multiply that number by the amount of annual increase (which gives you 7 times 1′ or 7′) and add that sum to the variation in 1960. You add it in this example because it is an annual increase. If it were a decrease, you would subtract it.

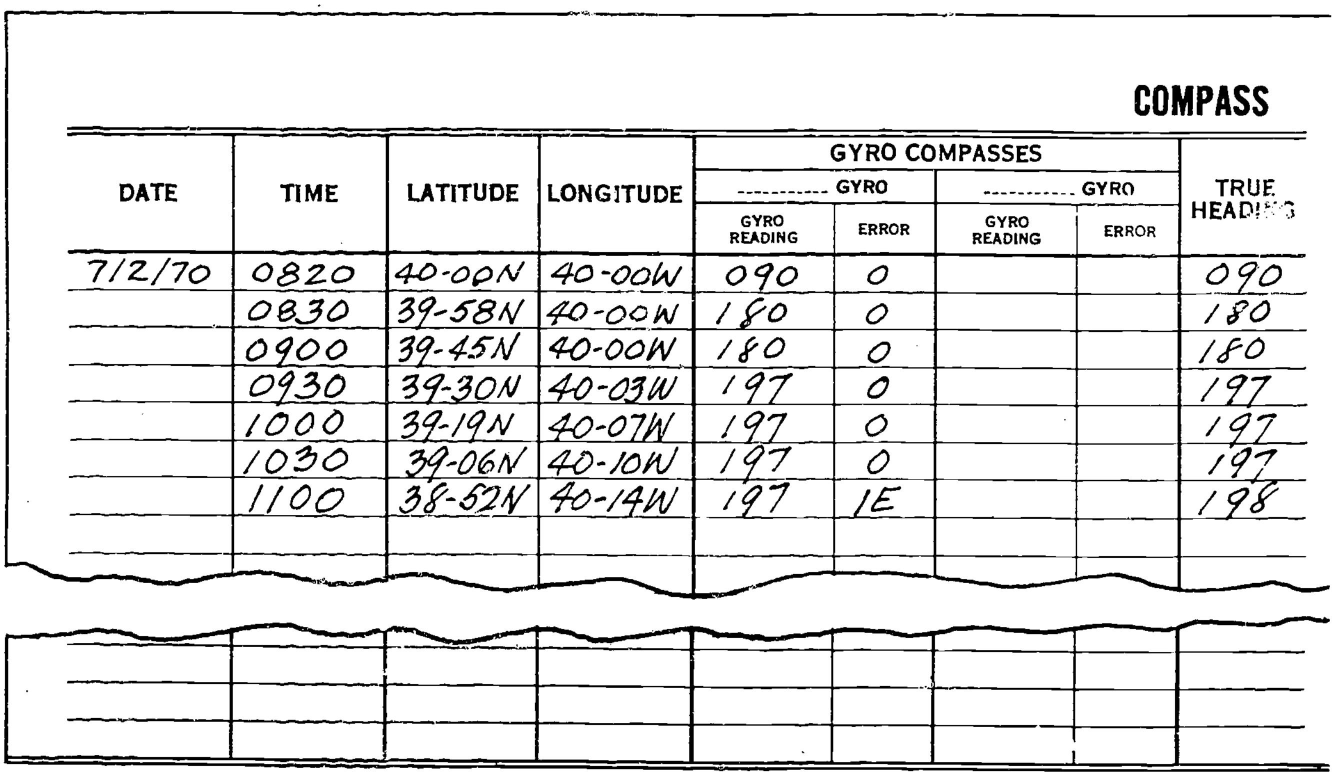
The variation in 1960 was 14°45′ W. Add 7′ to that amount, and you have a 1967 variation of 14°52′ W. Variation normally is rounded off to the nearest 0.5°.

Variation remains the same for any heading of the ship at a given locality. No matter which direction the ship is heading, the magnetic compass, if affected by variation only, points steadily in the general direction of the magnetic north pole.

DEVIATION

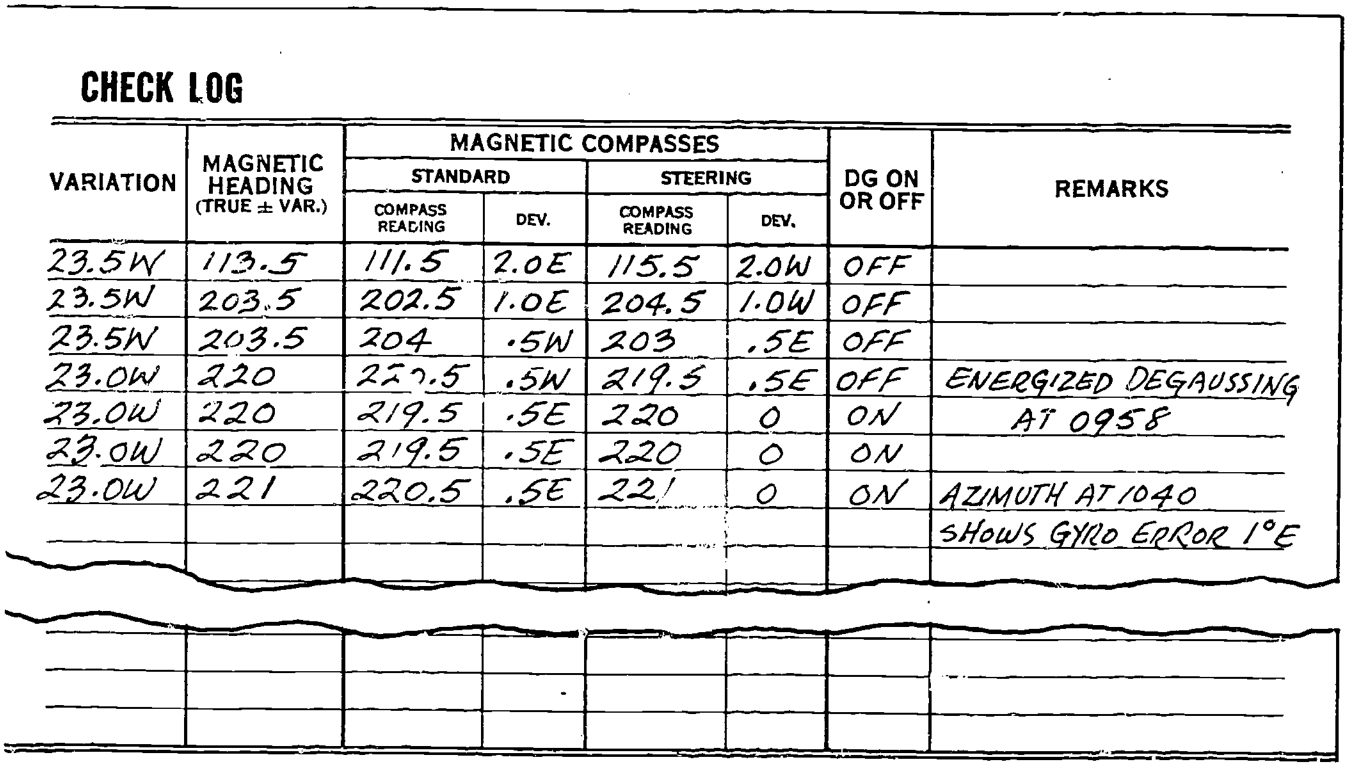
The amount a magnetic compass needle is deflected by magnetic material in the ship around it is called deviation.

The most convenient method of determining deviation, and the one most commonly used, is to check your compass on each 15° heading against a properly functioning gyrocompass. Because your ship must be on a magnetic heading when determin-



COMPASS

DATE	TIME	LATITUDE	LONGITUDE	GYRO COMPASSES				TRUE HEADI
				---------- GYRO		---------- GYRO		
				GYRO READING	ERROR	GYRO READING	ERROR	
7/2/70	0820	40-00N	40-00W	090	0			090
	0830	39-58N	40-00W	180	0			180
	0900	39-45N	40-00W	180	0			180
	0930	39-30N	40-03W	197	0			197
	1000	39-19N	40-07W	197	0			197
	1030	39-06N	40-10W	197	0			197
	1100	38-52N	40-14W	197	1E			198



CHECK LOG

VARIATION	MAGNETIC HEADING (TRUE ± VAR.)	MAGNETIC COMPASSES				DG ON OR OFF	REMARKS
		STANDARD		STEERING			
		COMPASS READING	DEV.	COMPASS READING	DEV.		
23.5W	113.5	111.5	2.0E	115.5	2.0W	OFF	
23.5W	203.5	202.5	1.0E	204.5	1.0W	OFF	
23.5W	203.5	204	.5W	203	.5E	OFF	
23.0W	220	220.5	.5W	219.5	.5E	OFF	ENERGIZED DEGAUSSING
23.0W	220	219.5	.5E	220	0	ON	AT 0958
23.0W	220	219.5	.5E	220	0	ON	
23.0W	221	220.5	.5E	221	0	ON	AZIMUTH AT 1040
							SHOWS GYRO ERROR 1°E

Figure 6-2.–Magnetic compass record book--sample page. 69.137

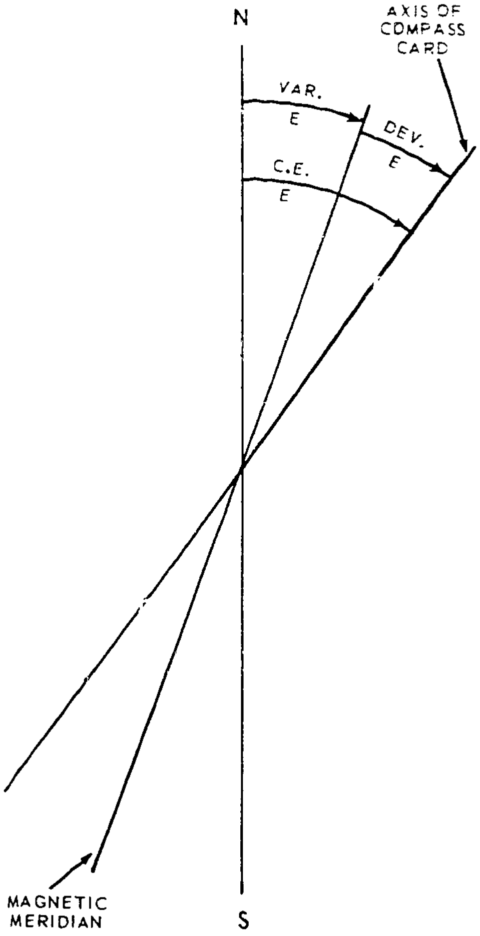


Figure 6-3.–Components of compass error.
69.138

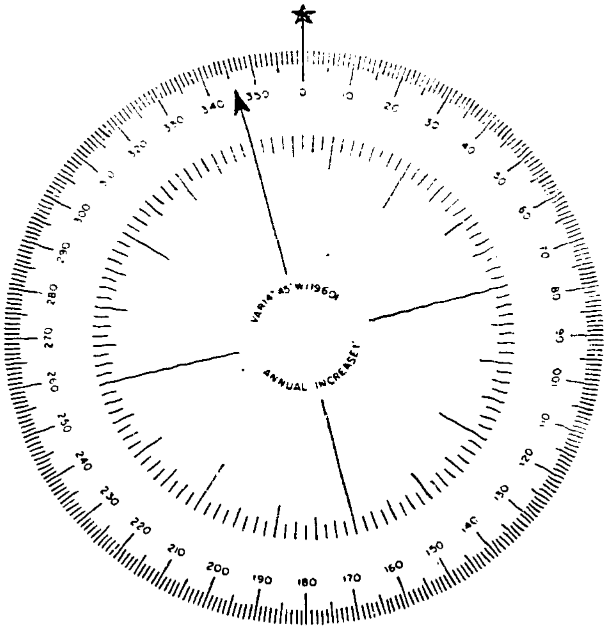


Figure 6-4.–Compass rose. 45.23(69)

ing deviation, gyro error and local variation must be applied to each true heading. When using this procedure it is only necessary to station personnel at each magnetic compass and have them record the amount of deviation for each compass upon signal from an observer at the gyrocompass or repeater.

Some other methods of finding deviation follow.

1. By comparison with a magnetic compass of known deviation: This method is similar to comparison with a gyrocompass except that it is unnecessary to know the local variation ..is method is used frequently by ships not equipped with gyrocompasses.

2. By reciprocal bearings: One observer is stationed ashore with a spare compass, which is placed where it is free from local magnetic influences. An observer aboard the ship stands by the compass to be checked. When the ship is steady on the desired heading, a prearranged signal is made, and each observer notes the bearing of the other. The reverse bearing of the compass ashore, which has no deviation, is the magnetic bearing of the ship. The difference between this bearing and the bearing indicated by the compass on board is the amount of deviation on that particular heading. This method is not very convenient and probably will never be used on your ship until all other methods of determining deviation are exhausted.

3. By ranges: This method uses a range whose magnetic bearing is known. The ship steams on the various headings, and notes the bearing of the range on her compasses for each heading as she crosses the range. The deviation for each compass is the difference between the known magnetic bearing of the range and the bearing indicated on the compass. Further discussion of ranges appear in Chapter 8 of this manual.

4. By azimuths of the sun or other celestial body: In this method the magnetic azimuth of the body is determined by applying local variation to the body's

true azimuth. Computing an azimuth of the sun by using H.O. 214 is described in chapter 15 of this manual. The difference between the body's magnetic azimuth and its compass azimuth is the deviation for that particular heading.

5. By distant objects: In this method the ship must be a considerable distance from a conspicuous object, with a clearly defined point on which to take bearings. If the ship is being swung at anchor, the object should be at least 6 miles away. If she is steaming on different headings, the fact that she does not remain on the same spot requires that the object be at least 10 miles away. The ship is steadied on successive headings, and the compass bearing of the object is taken on each heading. Magnetic bearings may be found from a chart. As before, deviation on each heading is the difference between compass and magnetic bearing of the object. This method has been almost completely discarded in favor of the other methods. It is described here so that it can be used in extreme circumstances.

CORRECTING COMPASS ERROR

Variation and deviation combined constitute magnetic compass error. The course you want the ship to head is the true course, worked out from the chart on which true courses and bearings are given. Knowing the true course, it is necessary for you to find the compass course you must steer to make good the true course. Compass course is found by applying the compass error, in terms of variation and deviation, to the true course.

Your problem could be the other way around. Suppose you have a bearing taken by magnetic compass. Plotting true bearings on the chart is preferable to plotting magnetic bearings. Therefore, you must apply variation and deviation to the compass bearing to obtain the true bearing.

Changing from true course to compass course, or vice versa, may be accomplished more easily by means of this handy key, in the form of the question: CAN DEAD MEN VOTE TWICE? Of course it's a sure bet that dead men can't vote once, let alone twice; hence this question has no actual meaning. As already pointed out, it is merely handy in solving our problem of correcting compass error.

First, write each word of the question in column form, then opposite each word set down what it represents, as follows:

Can	Compass
Dead	Deviation
Men	Magnetic
Vote	Variation
Twice	True

Your problem will always be either (knowing the true course) to work up the line to the compass course, or (knowing the compass course) to work down the line to the true course. Going up the line, or changing from true to compass, is called uncorrecting. Coming down the line, or changing from compass to true, is called correcting. All you actually have to remember is this rule: When correcting, ADD easterly and SUBTRACT westerly error. When uncorrecting, SUBTRACT easterly and ADD westerly error. It is as simple as that. All compass errors, whether due to variation or deviation, are either easterly or westerly. There are no northerly or southerly errors.

Now, let's work a problem. Suppose the true course you want to head is 000° and you want to know the course to steer by magnetic compass. In other words, you are uncorrecting. This time, write the initial letters of each word of the old question in a line.

←— W + E —→

C	D	M	V	T

You already know what T is, so write it down.

←— W + E —→

C	D	M	V	T
				000°

Let's say the chart shows a variation of 11° E. Now you have:

←— W + E —→

C	D	M	V	T
			11°E.	000°

When uncorrecting, remember that you subtract easterly and add westerly errors. This 11° is an easterly variation, so you subtract it from 360°, and get a magnetic course of 349°. Write that down.

←— W + E —→

C	D	M	V	T
		349°	11°E.	000°

Occasionally, you need to know a magnetic heading or bearing. If that is all you are looking for in this example, you could stop right here. This time, however, you want to go on and find the compass course. Let's say the deviation table shows a deviation of 14° W. for a 349° heading. Write that down.

←— W + E —→

C	D	M	V	T
	14°W.	349°	11°E.	000°

When uncorrecting, you add westerly error, so add 14° to 349° and get 003°. Now you have:

← W + E →

C	D	M	V	T
003°	14°W.	349°	11°E.	000°

In order to head 000° true, therefore, you must steer 003° by this particular magnetic compass.

Note in our sample problem that the easterly variation and westerly deviation almost canceled each other, leaving an error of only 3° W. If you don't want to go through the correction process in detail, you can find the algebraic sum of the errors beforehand. This advance preparation is accomplished by subtracting the lesser from the greater if they are unlike, or adding them if they are like. Then you can apply the result directly, to either T or C, depending on whether you are correcting or uncorrecting.

We were uncorrecting this time–changing from true to compass. We could have used the same method to change from compass to true, but we must remember that when correcting, we add easterly and subtract westerly errors.

ADJUSTING VERSUS COMPENSATING

As you know by now, magnetic material around the compass is a cause of deviation. Another cause of compass deviation is electrical circuits. In particular, the ship's degaussing currents have a strong effect on the magnetic compass. (Degaussing, discussed later, is an electrical installation designed to protect ships against magnetic mines and torpedoes.) The deviation resulting from these currents is neutralized by a procedure called compensation. You should distinguish between adjusting the compass, which means correcting for deviations caused by magnetic material, and compensating the compass, which means correcting for deviations produced by degaussing currents.

STANDARD AND STEERING COMPASS

The magnetic steering compass is located in the pilothouse, where it is affected considerably by deviation. Usually the standard compass is topside, where the magnetic forces producing deviation are not so strong. Courses and bearings by these compasses must be carefully differentiated by the abbreviations psc (per standard compass), pstgc (per steering compass), and pgc (per gyrocompass). The standard compass provides a means for checking the steering compass and the gyrocompass.

The steering compass on many ships has been replaced by a repeater, which transmits indications from a magnesyn compass. (The word magnesyn is formed from the term magnetic synchronized.) It is located on a mast or at some other point where deviation is at a minimum.

Some ships may have a third magnetic compass located at the after steering station when that station is topside. This compass is known as the emergency steering compass.

DEGAUSSING

In discussing the magnetic compass, we mentioned that it is affected by degaussing. A Quartermaster will be concerned with how degaussing works and why it is necessary. The subject is explained in the ensuing topics.

SHIP'S MAGNETIC FIELD

A ship is a magnet because of magnetic material (steel) in its hull, machinery, and cargo. Like any other magnet, it is surrounded by a magnetic field that is large near the ship and small at a considerable distance from it. When a ship is close to a magnetic mine or magnetic torpedo, the magnetic field of the ship actuates the firing mechanism and causes th mine or torpedo to explode.

Degaussing equipment is installed aboard ship to neutralize the ship's disturbance of the earth's magnetic field. This neutralizing force affords protection against the magnetic mine or magnetic torpedo.

Two methods are used to decrease a ship's magnetic field. They are the magnetic treatment (called deperming) and the shipboard degaussing installation.

Magnetic Treatment

Magnetic treatment is given by deperming stations, using coils installed temporarily on or around a ship, to provide antimine protection. This treatment reduces the overall magnetic field of the ship so there is less chance of activating a magnetic mine or magnetic torpedo. Magnetic treatment furnishes some protection, but is not so effective as the protection afforded by shipboard degaussing installations. Magnetic treatment is seldom used alone.

Shipboard Degaussing Installation

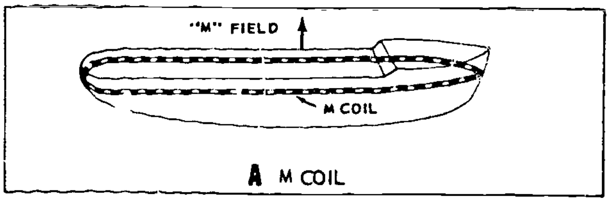
A shipboard degaussing installation consists of permanently installed equipment. The major items are degaussing coils, a power source for the coils, a control unit to control the coil current (which, in turn, controls the strength of the magnetic field caused by the coils), and compass compensating equipment to prevent disturbances of the magnetic compasses by the magnetic field of the degaussing coils.

Since it may become necessary for the Quartermaster to apply corrections to degaussing coils due to changes in course, the following discussion is designed to assist you in understanding the coils and the operations required to make corrections to their applied current.

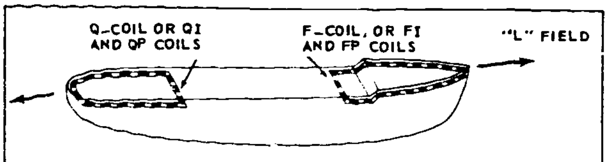
Figure 6-5 illustrates the types of coils that are found on a typical degaussing installation.

The M or main coil (part A, figure 6-5) encircles the ship in a horizontal plane, which is usually at the waterline. The function of the M coil is to produce a magnetic field, which counteracts the magnetic field produced by the vertical permanent and the vertical induced magnetization of the ship.

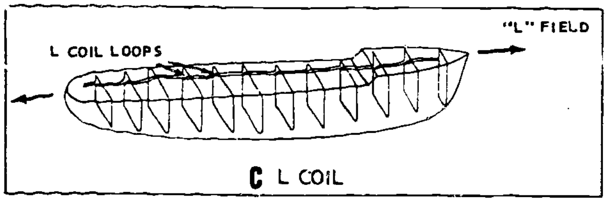
The F or forecastle coil encircles the forword one-fourth to one-third of the ship and is usually just below the forecastle or other uppermost deck; whereas the Q or quarterdeck coil encircles the after one-fourth to one-third of the ship and is usually just below the quarterdeck or other uppermost deck (part B, figure 6-5). The function of the F and Q coils is to counteract the magnetic field produced by the ship's longitudinal permanent and longitudinal induced magnetization.



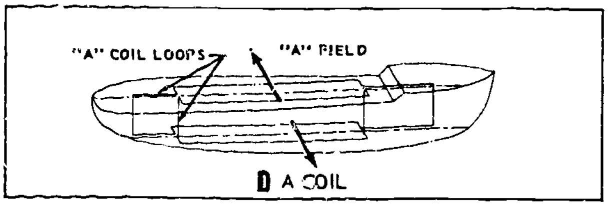
A M COIL



B F AND Q COILS



C L COIL



D A COIL

Figure 6-5.–Types of degaussing coils.
27.107

In many installations the conductors of the F and Q coils are connected to form two separate circuits designated as the FI-QI coil and the FP-QP coil (part B, figure 6-5). The FI-QI coil consists of an FI coil connected in series with a QI coil so that the same current flows in both coils. The FP-QP coil is similar.

The FI-QI coil is used to counteract the magnetic field produced by the ship's longitudinal induced magnetization. The FP-QP coil is used to counteract the magnetic field produced by the ship's longitudinal permanent magnetization.

The L or longitudinal coil (part C, figure 6-5 consists of loops in vertical planes that are parallel to the frames of the ship. The function of the L coil is to counteract the magnetic field produced by the ship's longitudinal permanent and longitudinal induced magnetization. The L coil is more difficult to install than the F and Q coils or the FI-QI and FP-QP coils, but provides better neutralization because it more closely simulates the longitudinal magnetization of the ship. The L coil is often used in minesweeper vessels.

The A or athwartship coil (part D, figure 6-5) consists of loops in vertical fore-and-aft planes. The function of the A coil is to produce a magnetic field that will counteract the magnetic field caused by the athwartship permanent and athwartship induced magnetization.

The magnetic field produced by a degaussing coil (coil strength) is proportional to the ampere turns (NI), which are the product of the number of turns in the coil and the current in amperes through the coil. A specified number of ampere turns can be obtained by using one turn and a current numerically equal to the required and a current numerically equal to the required ampere turns, or by using more turns and a correspondingly smaller current.

DEGAUSSING SETTINGS

Energizing the degaussing equipment consists of setting the coil currents and maintaining them at the values specified in the charts comprising the degaussing folder (NavOrd Form 1547). Quartermasters must be able to read and interpret the degaussing charts contained in this folder. On some ships you may have to make the degaussing settings yourself, but on other ships Electricians Mates make the settings.

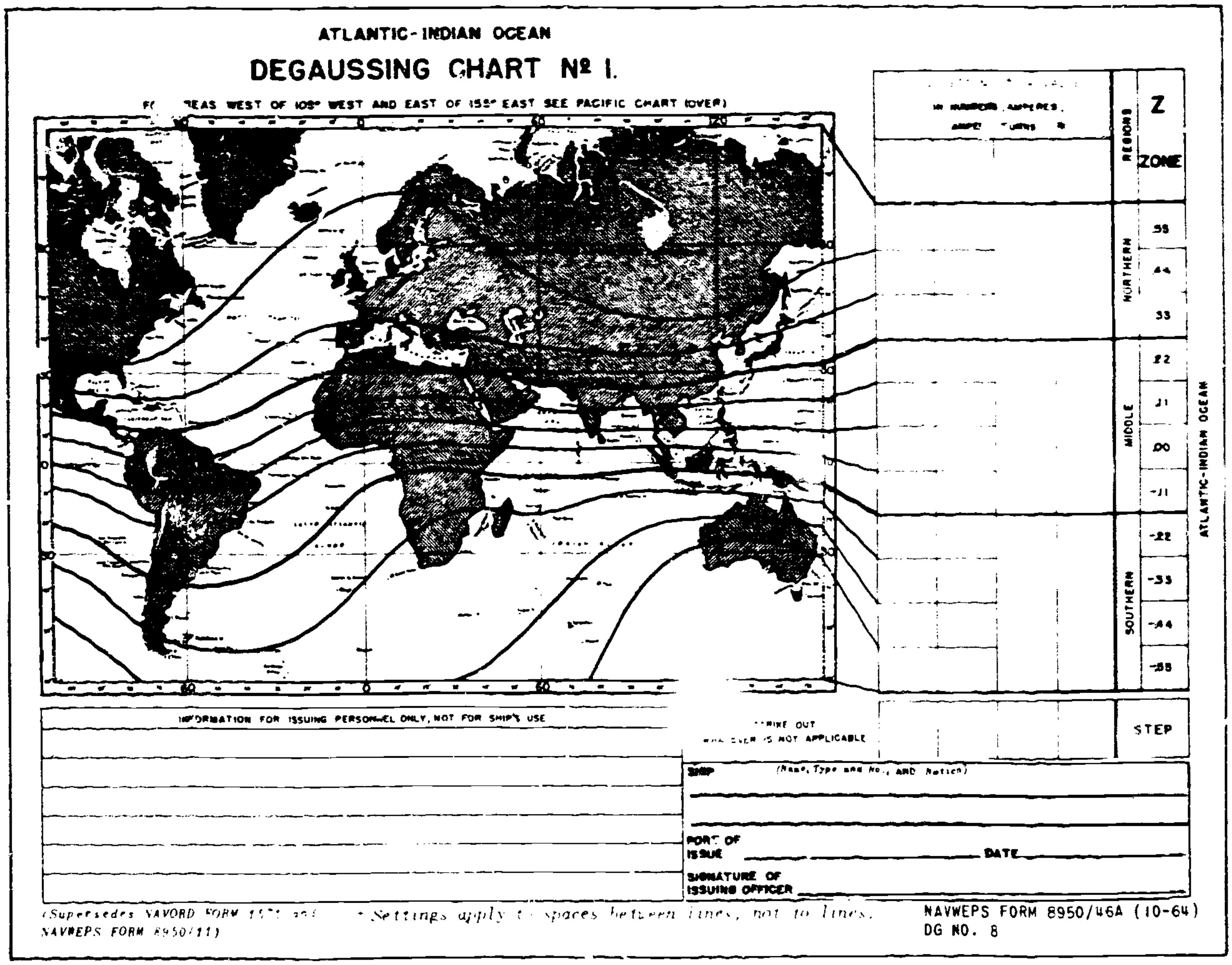


Figure 6-6.--Degaussing chart No. 1 69.14

Degaussing chart No. 1 is shown in figure 6-6. This chart divides the vertical intensity (Z-component) of the earth's magnetic field into Z-zones. When your ship passes from one Z-zone to another, the coil setting is changed to the value given for that coil in the new zone. Make a correction for each coil requiring a change. These changes are made on a rheostatammeter setup located on the bridge. As an alternative, pass the information to the Electricians Mates so that they can make the correction.

Let's say you are traveling from the Caribbean Sea to the Gulf of Mexico. This travel means that you will pass from a zone where the M-coil setting is altered from 52 to 68 amps. At the same time the L coil is changed from 9 to 11 amps.

Degaussing chart No. 2 (fig. 6-7) divides the horizontal intensity (H-component) of the earth's magnetic field into H-zones. When your ship passes from one H-zone to another, you must make correction settings comparable to those described for Z-zones. You may have to make corrections for all the coils when you pass from zone to zone, or you may need to change only one or two.

Figure 6-8 diagrams the course correction setting for the current in coil FI-QI. This diagram means that if you are on a southerly course, the polarity switch must be set so that the current is negative. If your course is northerly, the polarity switch is set at the opposite (positive) position. If you are traveling east or west, the current is shut off. The course cor-

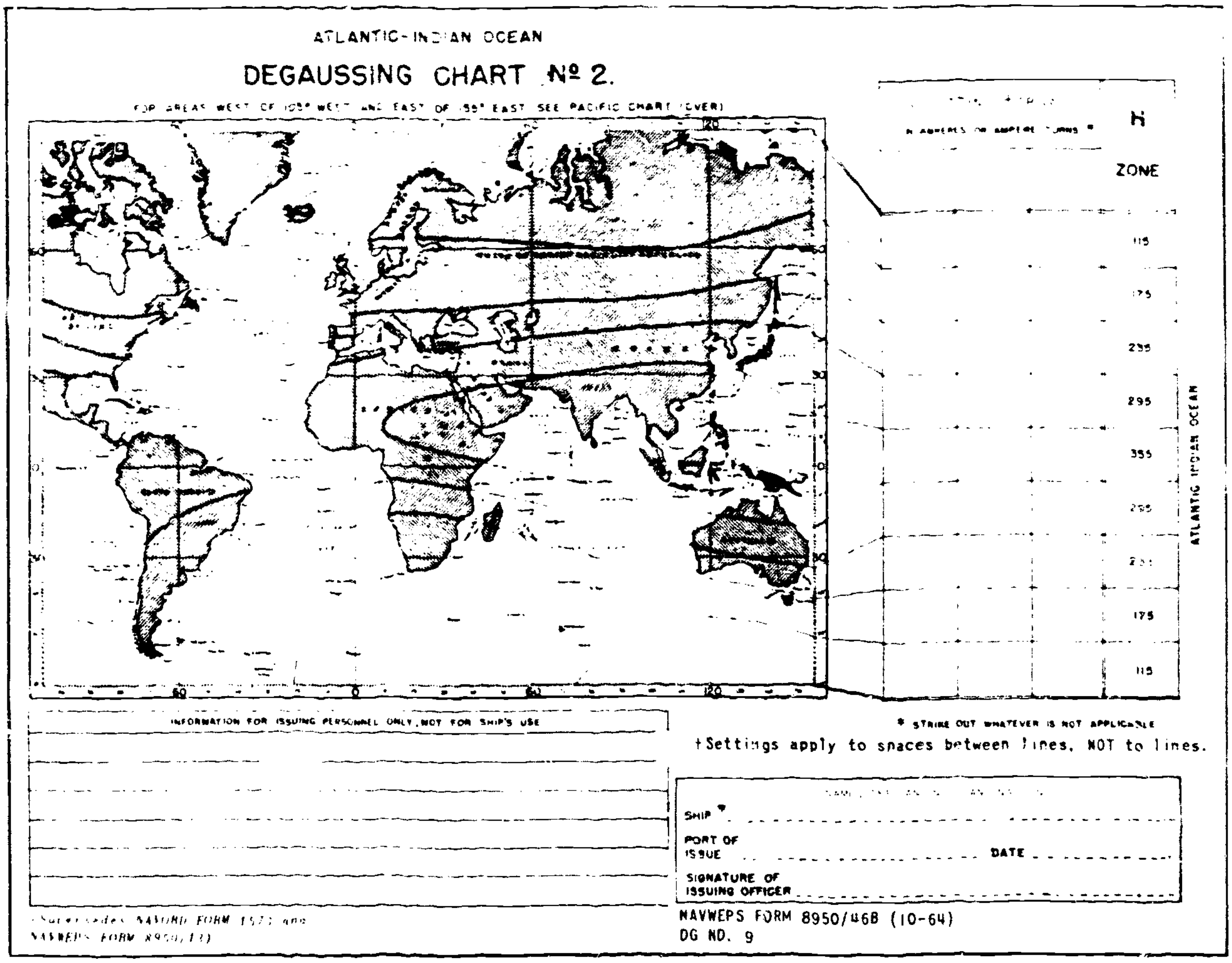
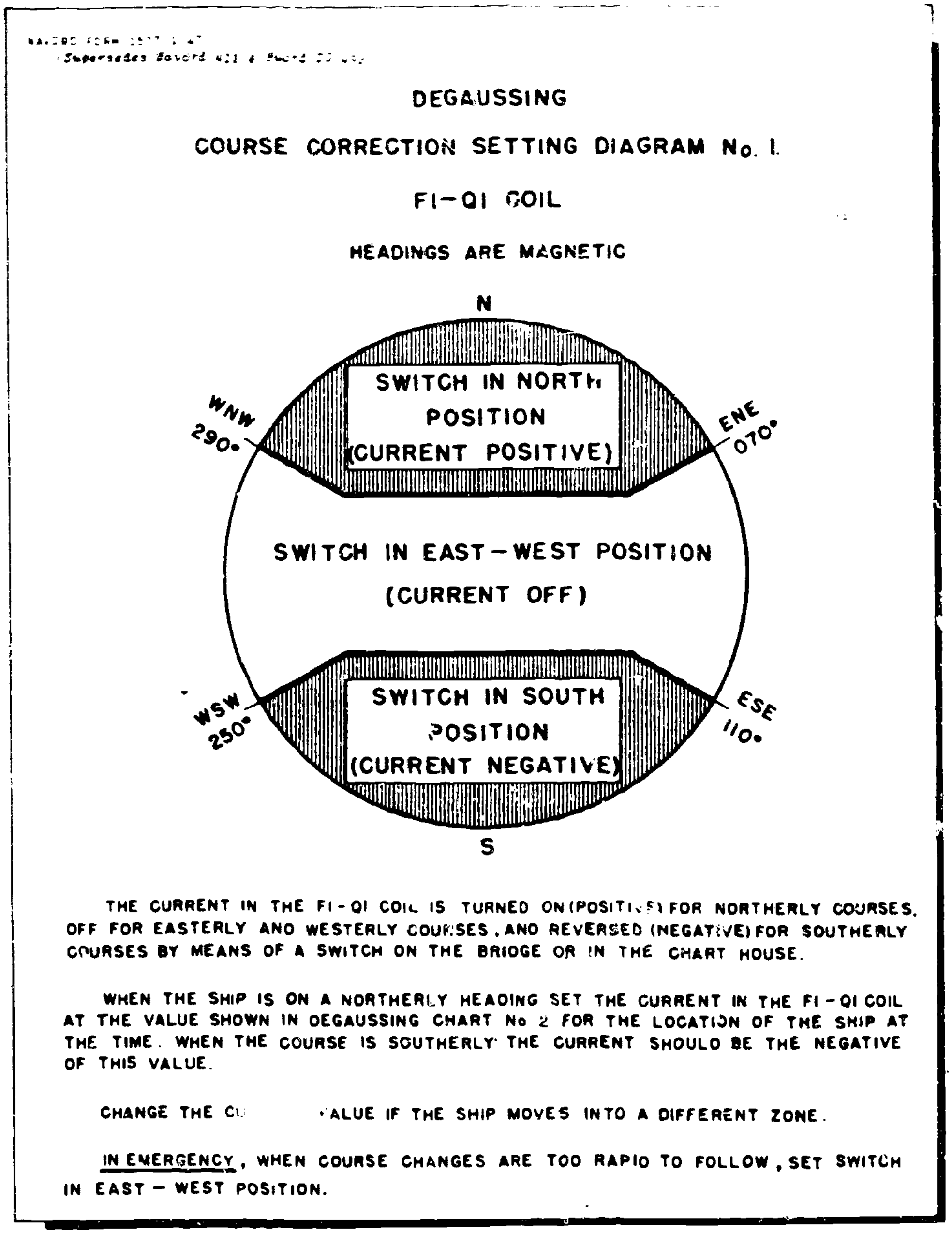


Figure 6-7.–Degaussing chart No. 2. 69.15

rection setting for coils FI-QI and A are shown in figure 6-9. Quartermasters must ensure that the course correction settings are set properly.

In most degaussing installations, the degaussing coil currents are set to the required values and are checked by an Electrician's Mate at least once every hour. They are readjusted to the correct value when necessary. This continual check is necessary because the changes in degaussing coil resistance, created by variations in both the cable temperatures and in the voltage of the power supply for the degaussing coils, alter the degaussing coil currents. The coil currents must have the correct polarity. If the polarity setting of any coil is incorrect, the ship is in much greater danger from magnetic mines than if the ship has no degaussing system installed, because then the total magnetic field of the ship is stronger than before. On the bridge, the Quartermaster checks the polarity of the coils hourly by observing the neon indicator light on the control panel.

Most new vessels are equipped with automatic degaussing control equipment to change coil currents automatically, when required, because of roll and pitch, and because of changes in ship's heading and in ship's position with respect to the earth's magnetic field. Under certain conditions, a manual



NAVORD FORM [illegible]
(Supersedes Navord [illegible])

DEGAUSSING

COURSE CORRECTION SETTING DIAGRAM No. 1.

FI-QI COIL

HEADINGS ARE MAGNETIC

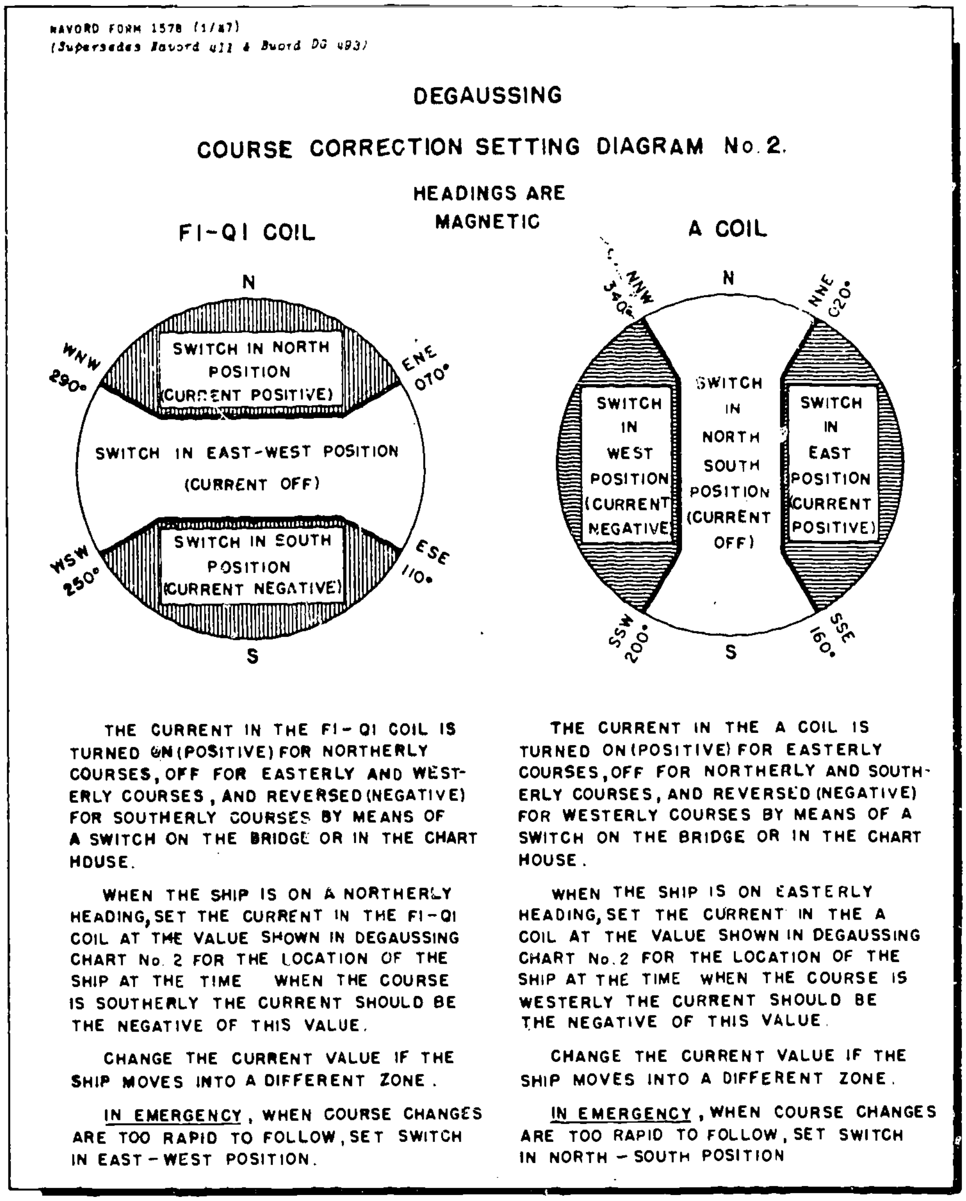
THE CURRENT IN THE FI-QI COIL IS TURNED ON (POSITIVE) FOR NORTHERLY COURSES, OFF FOR EASTERLY AND WESTERLY COURSES, AND REVERSED (NEGATIVE) FOR SOUTHERLY COURSES BY MEANS OF A SWITCH ON THE BRIDGE OR IN THE CHART HOUSE.

WHEN THE SHIP IS ON A NORTHERLY HEADING SET THE CURRENT IN THE FI-QI COIL AT THE VALUE SHOWN IN DEGAUSSING CHART No 2 FOR THE LOCATION OF THE SHIP AT THE TIME. WHEN THE COURSE IS SOUTHERLY THE CURRENT SHOULD BE THE NEGATIVE OF THIS VALUE.

CHANGE THE C[illegible] VALUE IF THE SHIP MOVES INTO A DIFFERENT ZONE.

IN EMERGENCY, WHEN COURSE CHANGES ARE TOO RAPID TO FOLLOW, SET SWITCH IN EAST - WEST POSITION.

Figure 6-8.–Degaussing course correction setting diagram No. 1. 69.16



NAVORD FORM 1578 (1/47)
(Supersedes Navord 411 & Buord DG 493)

DEGAUSSING

COURSE CORRECTION SETTING DIAGRAM No. 2.

HEADINGS ARE MAGNETIC

THE CURRENT IN THE FI-QI COIL IS TURNED ON (POSITIVE) FOR NORTHERLY COURSES, OFF FOR EASTERLY AND WESTERLY COURSES, AND REVERSED (NEGATIVE) FOR SOUTHERLY COURSES BY MEANS OF A SWITCH ON THE BRIDGE OR IN THE CHART HOUSE.

WHEN THE SHIP IS ON A NORTHERLY HEADING, SET THE CURRENT IN THE FI-QI COIL AT THE VALUE SHOWN IN DEGAUSSING CHART No. 2 FOR THE LOCATION OF THE SHIP AT THE TIME WHEN THE COURSE IS SOUTHERLY THE CURRENT SHOULD BE THE NEGATIVE OF THIS VALUE.

CHANGE THE CURRENT VALUE IF THE SHIP MOVES INTO A DIFFERENT ZONE.

IN EMERGENCY, WHEN COURSE CHANGES ARE TOO RAPID TO FOLLOW, SET SWITCH IN EAST-WEST POSITION.

THE CURRENT IN THE A COIL IS TURNED ON (POSITIVE) FOR EASTERLY COURSES, OFF FOR NORTHERLY AND SOUTHERLY COURSES, AND REVERSED (NEGATIVE) FOR WESTERLY COURSES BY MEANS OF A SWITCH ON THE BRIDGE OR IN THE CHART HOUSE.

WHEN THE SHIP IS ON EASTERLY HEADING, SET THE CURRENT IN THE A COIL AT THE VALUE SHOWN IN DEGAUSSING CHART No. 2 FOR THE LOCATION OF THE SHIP AT THE TIME WHEN THE COURSE IS WESTERLY THE CURRENT SHOULD BE THE NEGATIVE OF THIS VALUE.

CHANGE THE CURRENT VALUE IF THE SHIP MOVES INTO A DIFFERENT ZONE.

IN EMERGENCY, WHEN COURSE CHANGES ARE TOO RAPID TO FOLLOW, SET SWITCH IN NORTH-SOUTH POSITION

Figure 6-9.–Degaussing course correction setting diagram No. 2. 69.17

coil current adjustment still is necessary, however, as explained in the degaussing folder. Indicator lights, standard on all automatic control equipment, show when the equipment is functioning incorrectly.

DEGAUSSING RANGES

A degaussing range is a station for measuring and recording the magnetic fields of ships as they pass over measuring equipment located at or near the bottom of the channel in which the ship travels. The measurements recorded are used to compute the coil currents required to give minimum magnetic fields below a ship.

The procedure for making a run on a degaussing range starts with a request to the degaussing station. Usually the Quartermaster is charged with seeing that the authorized procedure is carried out.

After receiving an affirmative reply from the degaussing station that your ship is to be ranged, an immediate check is made of the degaussing chart to get the correct setting for each coil installed, both for the geographic location and for the heading of the ship at the time for crossing the range. These settings are made and checked before the run is started. The commanding officer adjusts the ship's speed in accordance with instructions from the degaussing station. It is customary to run the range on one heading, followed by a run on the opposite heading.

Results of the runs are entered in the ship's degaussing folder by personnel of the degaussing station. Through periodic checks of the equipment in this manner, any shortcomings can be detected easily and corrected immediately so that protection will be available when it is needed.

COMPASS COMPENSATING EQUIPMENT

The Quartermaster needs to know how to protect the ship's magnetic compasses from the magnetic influence of the degaussing system. An unattended degaussing system would be of sufficient magnitude to make the compasses useless for navigation.

The purpose of compass compensating coils is to set up a magnetic field that is equal to and opposite the degaussing coil field in the immediate vicinity of the compasses.

Most standard types of compass compensating coils are composed of an enclosure, a single heeling coil to compensate the vertical component, and two coils, or two pairs of coils, to compensate the cardinal or intercardinal components. Each coil consists of a number of windings, one winding for each degaussing coil producing, at the compass, a magnetic field that must be compensated. Compass compensating coils usually are installed and compensated for degaussing by personnel at a naval shipyard or a degaussing activity.

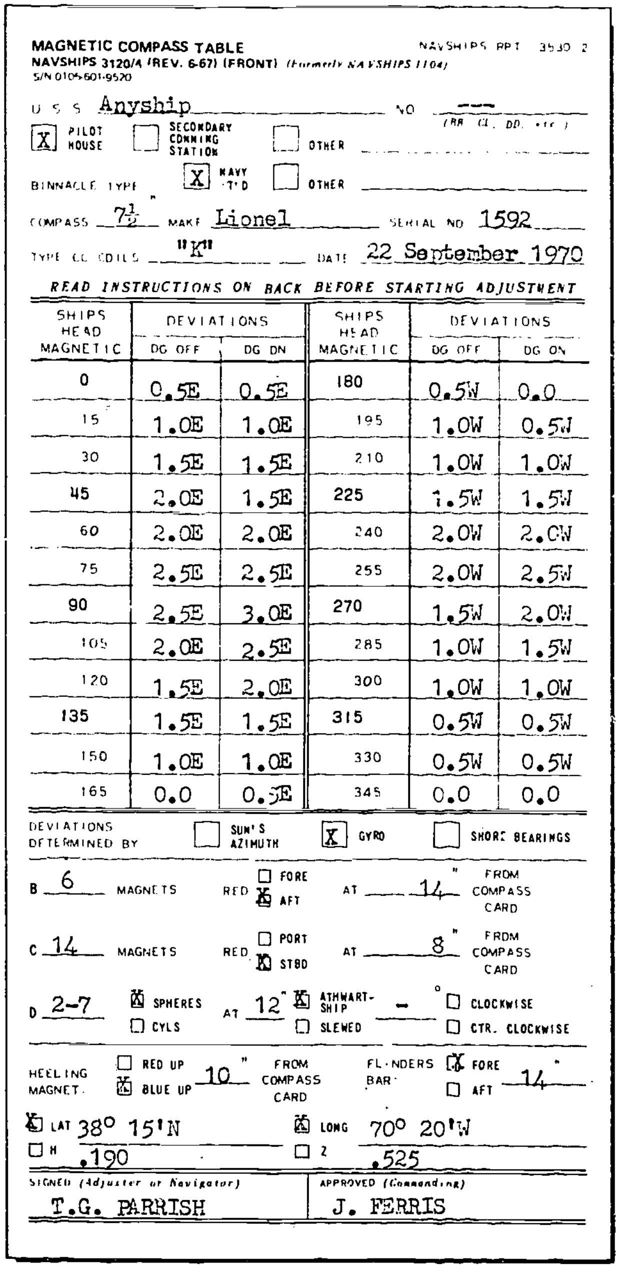
The compass compensating coils operate automatically when the degaussing coils are turned on. This operation is easily understandable when it is known that the power supply used for the compensating coils usually is the voltage drop across a number of turns of the degaussing coil. Thus, a change in the current in a degaussing coil automatically affects the compensating coils, ensuring that the compass compensation is undisturbed. Operation should be checked once a week, preferably at the time the degaussing coils are energized to dry out the cables. It should be noted at that time whether any compass deviations, in excess of allowable limits, are produced when the degaussing coils are turned on or off.

Because one of the foremost responsibilities of a Quartermaster is to know all about his ship's magnetic compasses, it is imperative that he also have a working knowledge of the degaussing equipment installed on his ship. The best single source of this information is the ship's degaussing folder. You should study this folder and understand it thoroughly before you assume your first watch at sea.

MAGNETIC COMPASS TABLE

In figure 6-10 you see the prepared form in general use for recording deviations (Form NavShips 3120/4). On the form the deviations for every 15° around the compass are shown. Note that deviations are recorded in two columns headed DG OFF and DG ON. The deviations in the first column were recorded with the ship's degaussing system secured. For the second column, readings were taken with the ship's degaussing system energized. Whether the degaussing system is on or off may cause a considerable difference in the deviation, hence each condition must have a separate column. In correcting or uncorrecting, it is important that you use the deviation for the proper condition of the ship's degaussing system.

To compute the deviation on any magnetic heading not given in the table, it is necessary to interpolate between the two nearest recorded readings. If the deviations recorded on each 15° heading do not vary by more than 1/2° from the adjacent readings, you may use the deviation for the heading nearest the one you are checking.



MAGNETIC COMPASS TABLE NAVSHIPS RPT 3530 2
NAVSHIPS 3120/4 (REV. 6-67) (FRONT) *(Formerly NAVSHIPS 1104)*
S/N 0105-601-9520

U S S Anyship NO --- *(BB, CL, DD, etc.)*

☒ PILOT HOUSE ☐ SECONDARY CONNING STATION ☐ OTHER

BINNACLE TYPE ☒ NAVY STD ☐ OTHER

COMPASS 7½" MAKE Lionel SERIAL NO 1592

TYPE CC COILS "K" DATE 22 September 1970

READ INSTRUCTIONS ON BACK BEFORE STARTING ADJUSTMENT

SHIPS HEAD MAGNETIC	DEVIATIONS		SHIPS HEAD MAGNETIC	DEVIATIONS	
	DG OFF	DG ON		DG OFF	DG ON
0	0.5E	0.5E	180	0.5W	0.0
15	1.0E	1.0E	195	1.0W	0.5W
30	1.5E	1.5E	210	1.0W	1.0W
45	2.0E	1.5E	225	1.5W	1.5W
60	2.0E	2.0E	240	2.0W	2.0W
75	2.5E	2.5E	255	2.0W	2.5W
90	2.5E	3.0E	270	1.5W	2.0W
105	2.0E	2.5E	285	1.0W	1.5W
120	1.5E	2.0E	300	1.0W	1.0W
135	1.5E	1.5E	315	0.5W	0.5W
150	1.0E	1.0E	330	0.5W	0.5W
165	0.0	0.5E	345	0.0	0.0

DEVIATIONS DETERMINED BY ☐ SUN'S AZIMUTH ☒ GYRO ☐ SHORE BEARINGS

B 6 MAGNETS RED ☐ FORE ☒ AFT AT 14" FROM COMPASS CARD

C 14 MAGNETS RED ☐ PORT ☒ STBD AT 8" FROM COMPASS CARD

D 2-7 ☒ SPHERES ☐ CYLS AT 12" ☒ ATHWARTSHIP ☐ SLEWED -° ☐ CLOCKWISE ☐ CTR. CLOCKWISE

HEELING MAGNET ☐ RED UP ☒ BLUE UP 10" FROM COMPASS CARD FLINDERS BAR ☒ FORE ☐ AFT 14"

☒ LAT 38° 15'N ☒ LONG 70° 20'W
☐ H .190 ☐ Z .525

SIGNED *(Adjuster or Navigator)*	APPROVED *(Commanding)*
T.G. PARRISH	J. FERRIS

Figure 6-10.–Magnetic compass table. 69.13

GYROCOMPASS

The gyrocompass is unaffected by either variation or deviation. When in proper running order, it points constantly to the true rather than the magnetic north pole, it may have a slight mechanical error, but this error is computed easily, and remains constant for any heading, so that it does not interfere in any way with the instrument's practical value.

Considering the gyro's advantages, you may wonder why the Navy doesn't heave all the magnetic compasses over the side, and relieve Quartermasters of the necessity for learning the principles of correcting magnetic compass error. The answer is that, despite the excellence of the gyromechanism, it is the magnetic compass, not the gyrocompass, that is standard aboard ship. The reason is simple: The magnetic compass operates through the attraction exerted by that great natural magnet, the earth. The earth is absolutely certain to continue to function as a magnet, therefore the magnetic compass will never go out of commission because of any failure of its source of power.

The gyrocompass, on the other hand, is powered by electricity. Cut off the supply, and the gyro is absolutely useless. Being an extremely complicated and delicate instrument, it also is subject to mechanical failure. Some gyros, for instance, become erratic after a ship makes a series of sharp turns at high speed. These disadvantages do not mean, however, that great confidence cannot be placed in the gyro. It can be depended upon, when running properly, to point faithfully and steadily to true north. But it is the magnetic compass that always remains the reliable standby, constantly checking the gyro's performance, and ready at all times to take over if the gyro fails.

The principles on which the gyro functions are too complicated for short explanation. Operation of its delicate mechanism is the responsibility of the IC gang. **Adjustments for speed and latitude (every 3 knots of speed and 3° of latitude) must be made in** most gyros, but you don't need to concern yourself with them at this point, except to keep the gyroelectrician informed of the latitude and speed.

MASTER GYROS AND GYRO REPEATERS

A typical shipboard installation consists of one or more master gyros, whose indications are transmitted electrically to repeaters. The gyro repeaters are located in the conning stations, on the bridge wings, and at other points as may be necessary.

A chief advantage of the gyro is that its repeaters may be set up at any angle–nearly on edge for the convenience of steersmen, or flat for taking bearings.

The master gyro must be started at least 4 hours before getting underway to allow time for it to settle before use. The Quartermaster on watch must check to see that the gyro is started, and enter the time in his notebook. He also must check its performance frequently against the standard compass. Additionally, he must check the repeaters occasionally against the master gyro.

CHAPTER 7

NAVIGATIONAL INSTRUMENTS

To determine his ship's position, a navigator needs certain instruments. Correct use of these instruments and proper interpretation of the information from them require both skill and experience.

Navigational instruments must be capable of considerable accuracy. The chronometer, for example, is one of the most exact mechanical timepieces devised by man. A companion navigational instrument, the sextant, measures angular distances (usually altitude) with utmost accuracy. And so it goes with all navigational instruments used in the Navy. This chapter describes a number of the important navigational instruments Quartermasters will use.

SEXTANT

One of the better known navigational instruments is the sextant. It is used to measure angles that ultimately result in determining the ship's position at sea. The sextant is capable only of measuring the angle between two objects. Its principal function in navigation is measuring the angle (called altitude in this usage) between a heavenly body and the visible horizon. When you have the altitude, you still must work out the ship's position (by methods described later).

Figure 7-1 shows the parts of a marine sextant. Part A is the frame on which are mounted the other parts. Part B is the limb, graduated in degrees. (The word "sextant" is derived from the Latin word *sex*, meaning six. In old-fashioned sextants the limb was one-sixth of the arc of a circle. The limb on a modern sextant, however, contains more than one-sixth of the arc of a circle.) Part C is the index arm, which pivots about the exact center of curvature of the limb. The lower end of the arm is provided with an index mark (to indicate the reading) and with a micrometer (D). The index mirror (E) is mounted perpendicular to the plane of the limb, at the upper end of the index arm. Half of the horizon glass (F) is silvered over like a mirror; the other half is clear. At zero reading the horizon glass is supposed to be exactly parallel to the index mirror. The telescope (G) is supported in a collar attached to the frame. It directs the observer's line of sight to the horizon glass in a line parallel to the plane of the frame, and also magnifies the horizon. Filters reduce the glare of light reaching the eye. The colored glass filters shown in figure 7-1 are being replaced by variable density polarizing filters.

MICROMETER

Figure 7-2 shows you the micrometer arrangement on a sextant. The limb on this sextant has teeth that mesh with teeth on the micrometer drum. One complete rotation of the drum moves the index arm 1° along the limb. The limb and micrometer drum can be separated by disengaging the tangent screw (part H of fig. 7-1). This process is accomplished by squeezing the two small levers that project below the arm.

Now look at figure 7-2, and see if you can figure out how to read the altitude. On this type of sextant altitude can be read to the nearest tenth of a minute. It's easy to see that the altitude is somewhere between 58° and 59°–the indicator on the arm shows you that on the main scale. Inboard of the tangent screw is the micrometer drum, graduated from 0 to 60. Each graduation represents 1 minute (1′). A smaller cylinder, inboard of the drum, is graduated from 0 to 10. It is the vernier on this type of sextant. Each graduation on it represents one-tenth of a minute (0.1′). The index mark for the drum is the 0 on the vernier, which, in figure 7-2, is between 16 and 17. Thus, the altitude is a little more than 58°16′. To find out, to the tenth of a minute, how much more the altitude is, start along the vernier scale from 0 and locate the first graduation that lines up with a graduation on the drum. Here, it is readily apparent that the first graduation that so lines up is 3. Therefore, the sextant shows an altitude of 58°16.3′.

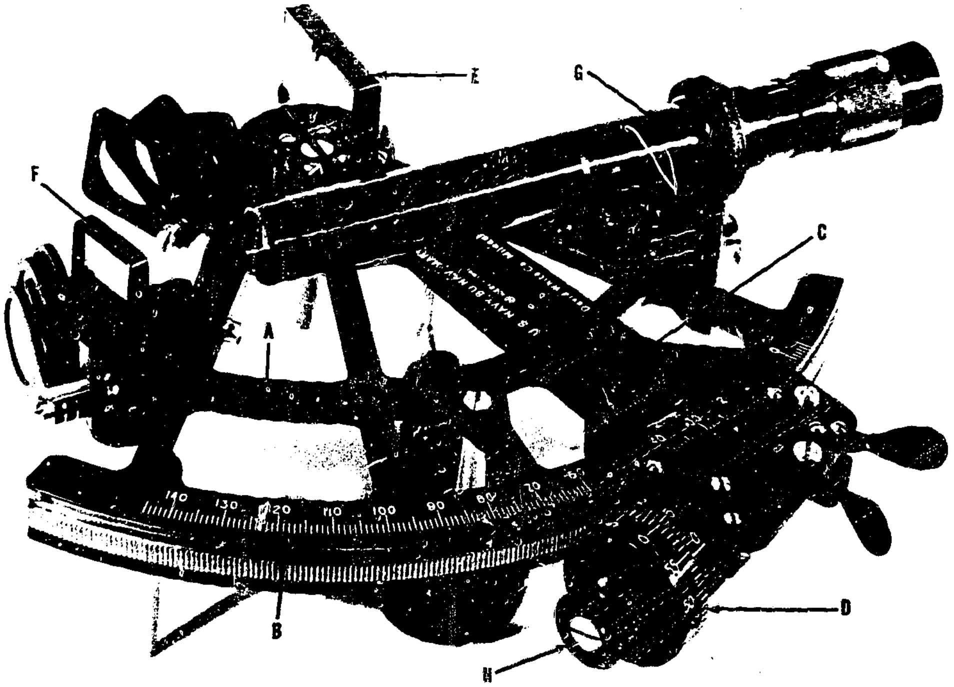


Figure 7-1.–Marine sextant. 29.268

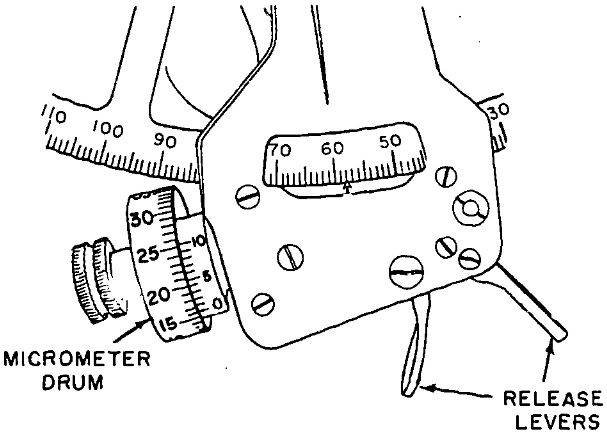


Figure 7-2.–Marine sextant micrometer. 29.268(69)

TAKING A SIGHT

Now that you know the parts for the sextant, let's take a sun sight and obtain an altitude. Face the spot on the horizon just below the sun. Place filters across the horizon glass and the index mirror, and look into the telescope. Move the sextant up or down until the line of the horizon crosses the middle of the clear half of the horizon glass. Move the arm until the index mirror picks up the sun's image and reflects it upon the mirrored half of the horizon glass. Continue moving the arm so as to "pull down" the sun's reflected lower limb (lower edge of the disk) until it appears to just touch the horizon, as seen through the clear half of the horizon glass. Then rock the sextant slightly from side to side so that the sun's image describes a small arc. Adjust the arm so that the lower limb barely touches the horizon when the sun is at the bottom of the arc. This procedure is called "swinging the arc." It ensures that you pull the sun's reflection to a point on the horizon directly below the sun itself. Pulling it down to a point slightly to either side gives you an inaccurate altitude. Use the micrometer to obtain a fine adjustment and for reading the altitude to the nearest tenth of a minute. The view should appear much like figure 7-3 at the time of observation.

TIMING OBSERVATIONS

The sextant in figure 7-2 shows that the altitude of this particular heavenly body was 58°16.3′ at the instant the observation was taken. If you don't know the exact time, to the second, all your subsequent calculations will be inaccurate. Consequently, the exact time of every observation must be recorded the instant the observation is made. Don't wait to read the sextant altitude first.

INDEX CORRECTION

Practically every sextant has a small error, called the index error, which is allowed for by applying the index correction (IC) to every sextant reading. To find the IC, place the index mark at 0° on the limb scale, and level the sextant toward the horizon. If there were no IC, setting for zero altitude would bring the direct and reflected images of the horizon exactly into line. If the two images are not exactly in line when the instrument is set at zero, the IC is the amount shown to the right or left of zero after they are brought into line. A few graduations have been inserted to the right of the 0° mark to allow for an IC that might occur on that side.

After the images are lined up, if the index lies to the right of 0°, then the IC is plus, and must be added to all sextant readings. If the index lies to the left, the IC is minus, and must be subtracted.

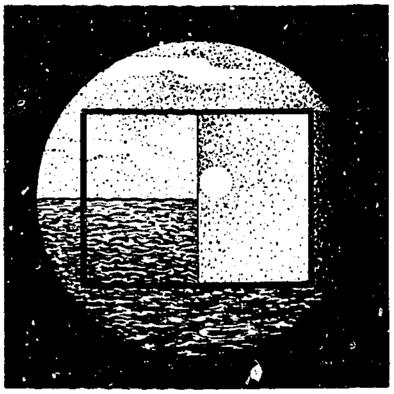


Figure 7-3.–View through the telescope at the instant of observation. 69.19

This little jingle will help you remember how to apply index correction to the sextant reading: "When it's on, it's off; when it's off, it's on." In other words, when the reading is on the drum scale, the correction is subtractive; when the reading is off the drum scale, the correction is additive.

CARE OF SEXTANT

Accuracy of the sextant depends on exact adjustment and alignment of its various parts. A slight shock, for instance, can disturb the adjustment and alignment enough to produce a material error. In handling the sextant, great care must be exercised to avoid striking it accidentally against any object. Accidental dropping will, of course, either temporarily or permanently destroy its value as a navigational instrument. It should be protected against exposure to salt spray while you are waiting to get a sight. If no shelter is available, a towel should be used to protect the sextant.

Moisture must not be permitted to accumulate on the mirror or glass surface. These surfaces should be dried with a good grade of lens paper or a piece of clean, soft linen. Silk or chamois may scratch the mirrors, and cotton cloth or waste may leave particles of lint adhering to the glass. Alcohol is an excellent glass cleaner, and is safe to use on a sextant.

Never use brass polish on the arc or vernier, because it eventually abrades the graduations on the scale. When cleaning becomes necessary, use ammonia. Subsequent rubbing with thin oil and lampblack will restore the distinctness of faded markings. A drop or two of light oil should be applied occasionally to the sextant's working parts.

Adjusting screws on the sextant never should be manipulated unless absolutely necessary, and then only by authorized persons, who must exercise the greatest possible caution. Minor adjustments are described in both Dutton's *Navigation and Piloting* and Bowditch's *American Practical Navigator*. All other adjustments should be made by trained personnel in the optical shop.

AIDS TO VISION

In many ratings, defective vision, if corrected by glasses, is not especially detrimental to the adequate performance of duty. To the Quartermaster, who spends much of his time looking for and observing distant objects and landmarks, however, good vision is a basic requirement. In order to magnify distant objects, the important aids to vision, described in the following four topics, are carried on nearly every man-of-war.

All optical aids are delicate precision instruments. They must be cleaned frequently, and should be protected as much as possible from sharp knocks and from exposure to the weather. When cleaning lenses, always use lens paper; anything else is likely to scratch the highly polished lens surface.

SHIP'S TELESCOPE

The ship's telescope (fig. 7-4) is a variable power instrument. Four separate eyepieces are provided so that the eyepiece magnification power may be 13, 21, 25, or 32; that is, an object may be magnified for the naked eye 13, 21, 25, or 32 times its apparent size. The telescope is mounted in a yoke that permits 360° of horizontal rotation. When actually viewing, both eyes may be kept open if this procedure is more convenient for the viewer. The unoccupied eye should, however, always be closed while the focus is being adjusted. The ship's telescope is useful in spotting flaghoists and other signals.

LONG GLASS

Two types of long glasses are used in the Navy. In the old sailing men-of-war the OOD never "kept the quarterdeck" without the long glass tucked under his arm. Whether he wanted to train on anything or not, it was customary for him to carry it. It is available for observing objects out of range of hand-held binoculars but not distant enough to require manipulation of the ship's telescope or ship's binoculars. The custom of carrying it when underway, however, has been discarded. In port it still is carried by the OOD on the quarterdeck. The strength of the OOD long glass is 10 power.

Besides the OOD long glass there is the Quartermaster's long glass (fig. 7-5). This glass is 16 power. It generally is used by a Signalman or Quartermaster for reading flags and for observing distant objects when the magnifying power of hand-held binoculars is inadequate. Both the OOD long glass and the QM long glass must be supported on a steady object, otherwise it is difficult to focus on a target. As with the ship's telescope, it is necessary to keep one eye closed while focusing, but both may be open while actually viewing.

Be careful not to lean over the side when training any telescope. You might drop it.

HAND-HELD BINOCULARS

The word binoculars consists basically of two Latin words spliced together: *bini* (two at a time),

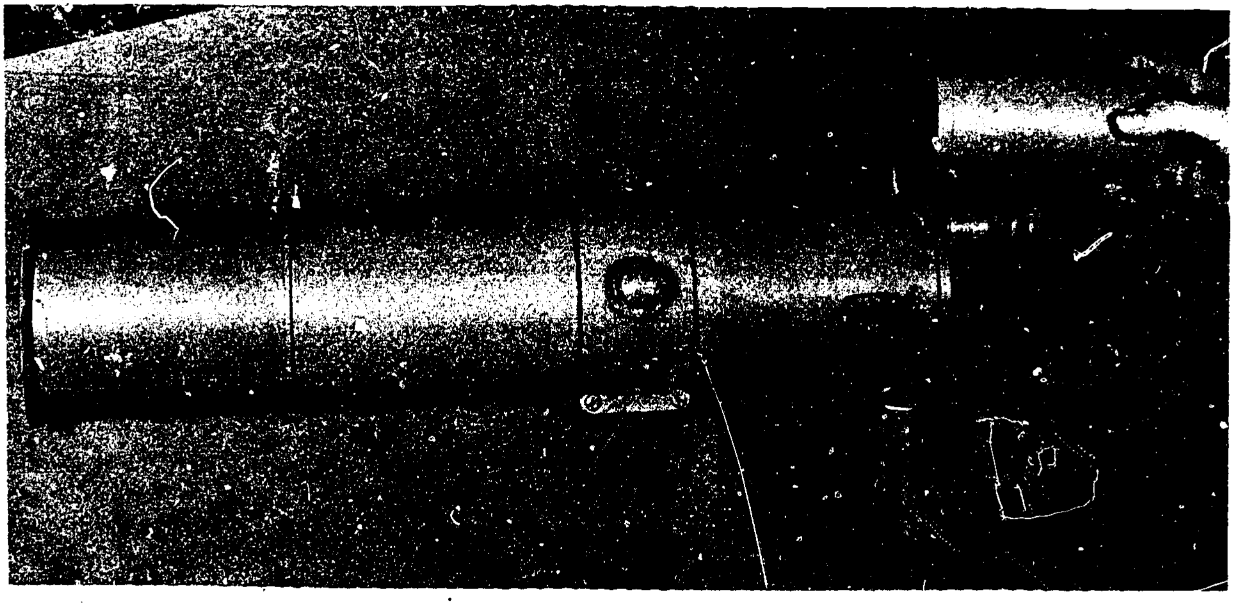


Figure 7-4.–Ship's telescope. 37.2

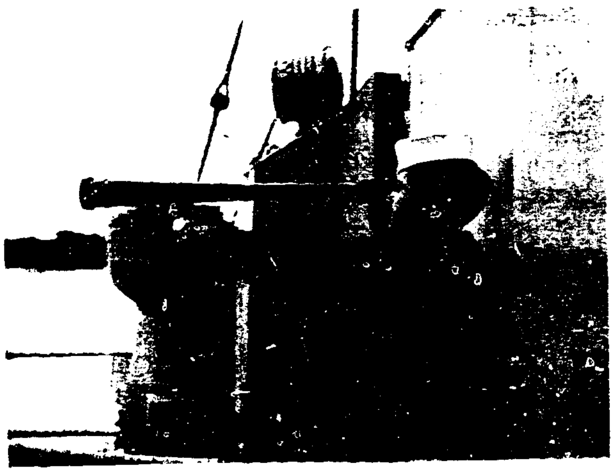


Figure 7-5.–Quartermaster's long glass.
37.3(69)

and *oculus* (eye). Both eyes at a time are used. The chief advantage is a wider field of observation.

Hand-held binoculars (fig. 7-6) usually are only about 7 power. There is a tube for each eye, and because both eyes do not always have the same vision, it is best to adjust the focus individually for each eye. The glass used in most binoculars is treated to reduce glare. Additional colored filters are provided for an especially bright atmosphere. It is well, however, to omit the colored filters unless their use is absolutely necessary, both because they reduce visibility and because the eye becomes accustomed to them. Individual ability in detection can be improved greatly by resting the body, elbow, or even the binoculars on some firm support.

Wearing eyeguards aids the user in shielding his eyes from extraneous light. Placing objective guards on binoculars helps reduce damage to the binoculars.

SHIP'S BINOCULARS

The ship's binoculars (fig. 7-7) are used in conjunction with the telescope on many ships. Eyepiece magnification power of the two models in use is 20 power. Eyepieces on the older model are inclined at a 45° angle for easier viewing. Later model binoculars have variable density polarizing filters and adjustable focusing. Both binoculars are supported in yokes mounted in either bulkhead brackets or deck stands. An adjustable carriage (elevating gear) is used with the deck stand for raising or lowering elevation of the binoculars.

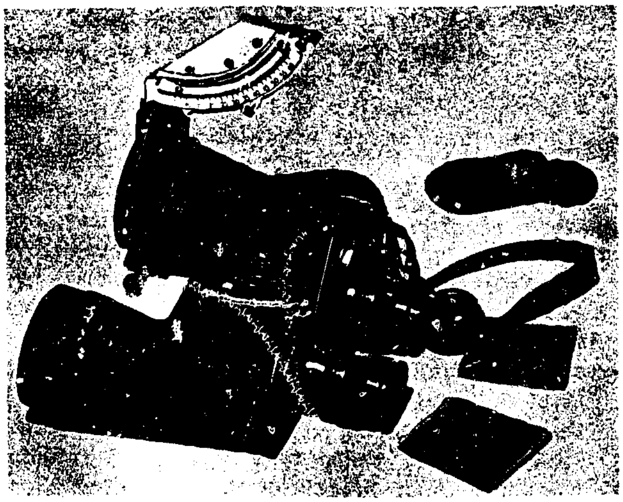


Figure 7-6.–Hand-held 7x50 binoculars.
37.1(69)

Figure 7-7.–Ship binoculars. 69.18

PELORUS

In a ship without a gyro installation, a pelorus or dumb compass (fig. 7-8) is located on either bridge wing, from which bearings may be taken on objects visible from the ship. In pelorus stands similarly located, gyro repeaters have replaced the peloruses on all gyro-equipped ships. If the gyro should fail, however, a bridge wing gyro repeater usually can substitute for a pelorus.

The pelorus consists of a nonmagnetic metal ring mounted in gimbals on a pelorus stand. The inner lip of the ring is graduated through 360°. The 000° mark corresponds to the ship's lubber's line.

Inside the ring is a dumb compass card, which can be rotated so as to bring any heading on the lubber's line. A pair of sighting vanes, mounted on the card, are aimed to the object whose bearing is desired.

If the dumb compass card is set to the ship's true course, the bearing by pelorus will be a true bearing provided the ship is exactly on course at the instant the bearing is taken. This synchronization seldom happens, however, and it is customary for the person taking the bearing to sing out "Mark!" the instant he takes it and simultaneously clamp the sighting vanes. The steersman notes the compass heading when he hears "Mark!" If the ship was on the true course, the bearing obtained was a true bearing. If she was off course, a correction equal to the amount she was off must be applied to the bearing. If the course was by magnetic compass, the bearing by pelorus must still be converted from compass to true.

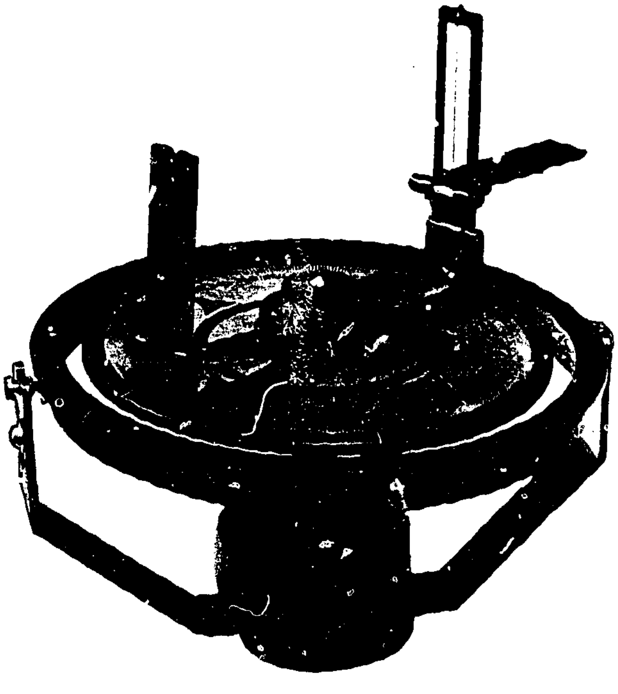


Figure 7-8.–Pelorus or "dumb compass."
69.20

Relative bearings are taken by pelorus merely by setting the dumb compass card's 000° heading to the lubber's line.

Because the gyro repeater gives true bearings without the necessity for any compass correction or allowance for the ship's being off course, it is easy to see why gyros have supplanted peloruses.

AZIMUTH CIRCLE AND BEARING CIRCLE

Strictly speaking, both azimuth and true bearing have the same meaning: the horizontal angle made by drawing a line from the object sighted to you and from you to the true north pole. The word azimuth, however, is applied only to bearings of heavenly bodies. To illustrate, it is not the bearing but the azimuth of the sun; it is not the azimuth but the bearing of the Brenton Reef Lightship (But the meaning is the same.)

A bearing circle is a nonmagnetic metal ring equipped with sighting devices. It is fitted over a gyro repeater or a magnetic compass. Only bearings of objects on the earth's surface normally are taken with the bearing circle.

The azimuth circle is merely a bearing circle equipped with additional attachments for taking azimuths of celestial bodies. Either bearings or azimuths may be taken with the azimuth circle.

A telescopic alidade (fig. 7-9) is an erecting telescope equipped with crosshair, level vial, polarizing light filter, and internal focusing. The telescope is mounted on a ring that fits on a gyro repeater or magnetic compass. The optical system simultaneously projects the image of approximately 25° of the compass card, together with a view of the level vial, onto the optical axis of the telescope. By this means, both the object and its bearing can be viewed at the same time through the alidade eyepiece. Older models of the telescopic alidade have a straight-through eyepiece telescope, whereas the model shown in figure 7-9 has the eyepiece inclined at an angle for ease in viewing.

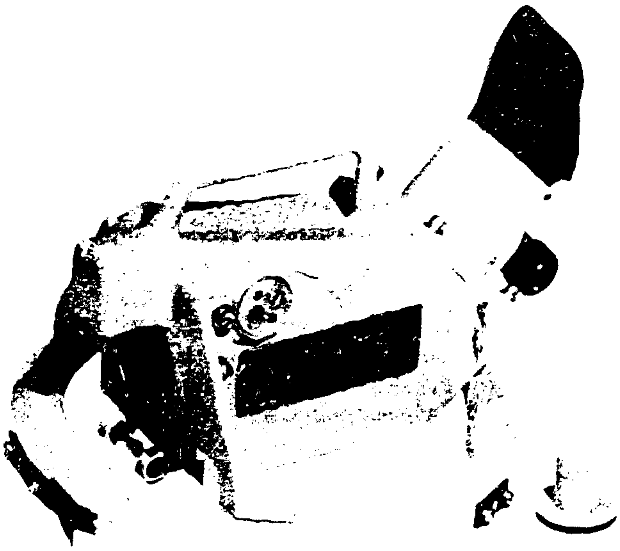


Figure 7-9.–Telescopic alidade. 45.39(69)A

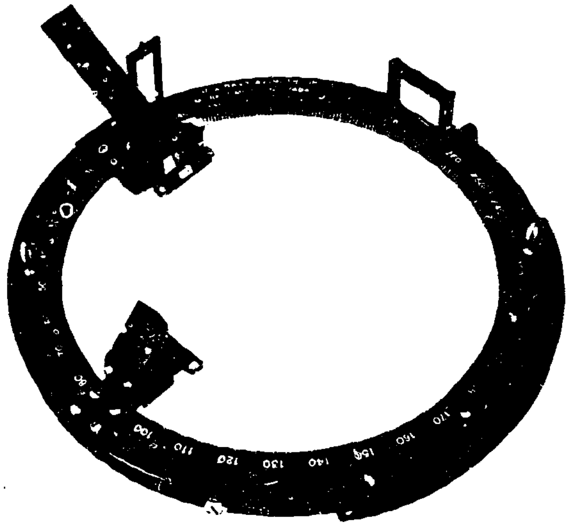


Figure 7-10.–Azimuth circle. 65.122

TAKING A BEARING

Let's say you want to take a bearing on a lighthouse. First, install either the bearing or azimuth circle on the gyro repeater or magnetic compass, and make sure the vanes rotate freely. The lower right vane you see in figure 7-10 is the near vane; the other is the far vane. (Disregard the black mirror behind the vane.) Next, line up the vanes in such a manner that, when you look through the opening in the near vane, you see the lighthouse directly behind the vertical wire in the vane. You then read the lighthouse bearing on the prism at the base of the far vane.

TAKING AN AZIMUTH

In taking an azimuth of a celestial body, the azimuth circle may be used in two ways. The first method is with a brilliant body like the sun. At the upper right of figure 7-10 you see a concave mirror; at the lower left is a prism attachment. You align the mirror and prism so that the sun's rays reflect off the concave mirror to the prism. The beam of light entering the prism from the mirror is directed downward in a narrow beam onto the compass card, enabling you to read the azimuth.

The second method is appropriate for azimuths of bodies whose brightness is insufficient to throw the distinct beam mentioned for the first method. A black mirror behind the far vane on the azimuth circle may be pivoted so as to pick up celestial bodies at various altitudes. When a body is picked up, its reflection appears behind the vertical wire in the far vane, and its azimuth may be read under the hairline in the prism. Each of the far vanes contains a spirit level to indicate when the circle is horizontal. Bearings read when the azimuth or bearing circle is not on an even keel are inaccurate.

Notice that the inner lip of the azimuth circle is graduated counterclockwise in degrees. This graduation makes it possible to obtain relative bearings of objects merely by training the vanes on the object and reading the graduation on the inner circle, which is aligned with the lubber's line on the compass or repeater.

SELF-SYNCHRONOUS ALIDADE

A self-synchronous alidade (fig. 7-11) is a motor-driven instrument utilized for obtaining accurate bearings. A synchro receiver is used to drive the

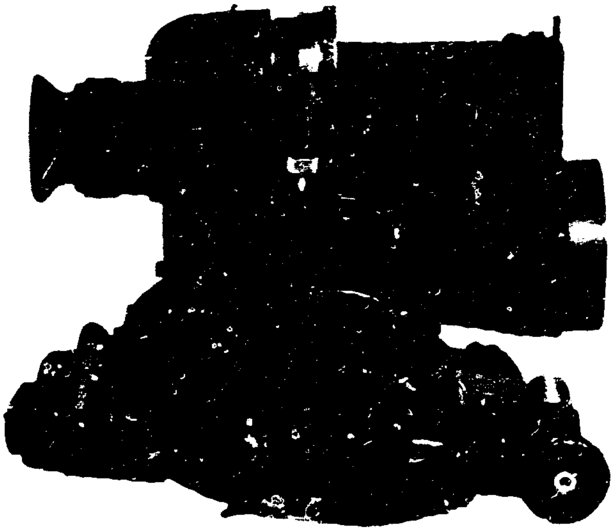


Figure 7-11.–Self-synchronous alidade. 45.39(69)B

telescope after it is set on a target. The synchro receiver is similar to the one that drives the compass card, and is activated by the same master gyro. A self-synchronous alidade can be set to any bearing. The receiver keeps it fixed in this true direction until it is reset. This instrument is gradually becoming obsolete, but it still is used on a few ships.

STADIMETER

The stadimeter is used most frequently to measure distances from your ship to others in a formation. In piloting, it also is used as a navigational instrument to ascertain distance to some navigational aid, as, for example, when a ship's position is being determined by bearing and distance of a single known object.

Stadimeters are of two types: the Fisk type (fig. 7-12) and the Brandon sextant type (fig. 7-13). In using either type, the height of the object whose distance is desired must be known, and that height must be between 50 and 200 feet. (Usually, when measuring distances to ships, the height used is

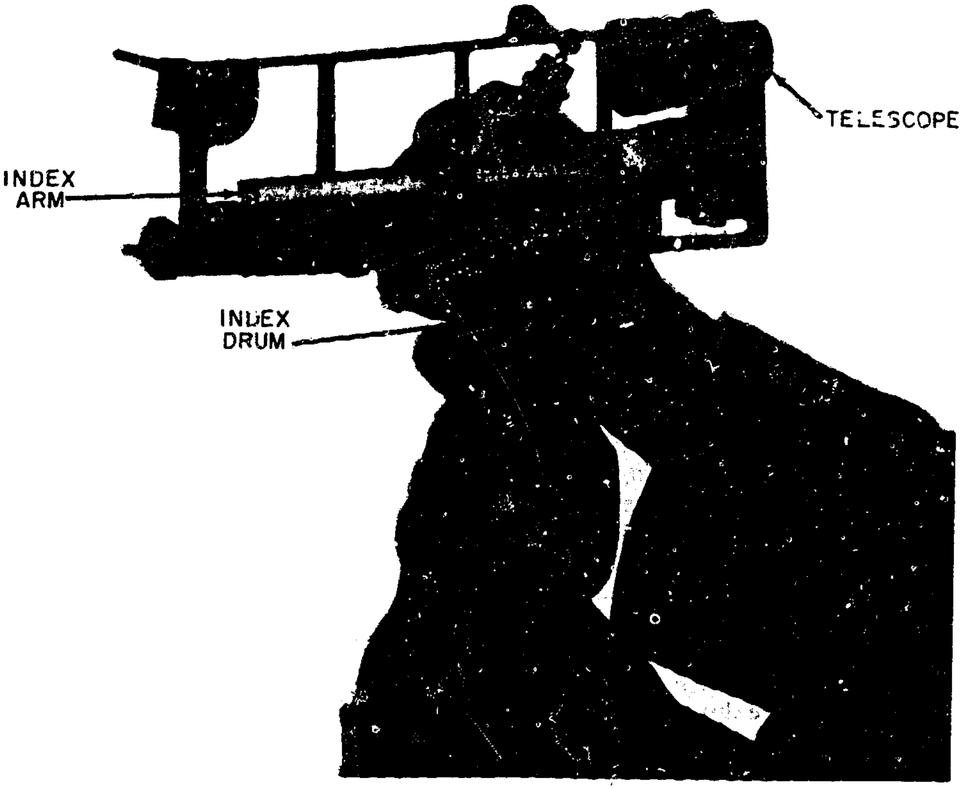


Figure 7-12.–Fisk-type stadimeter. 58.78.2

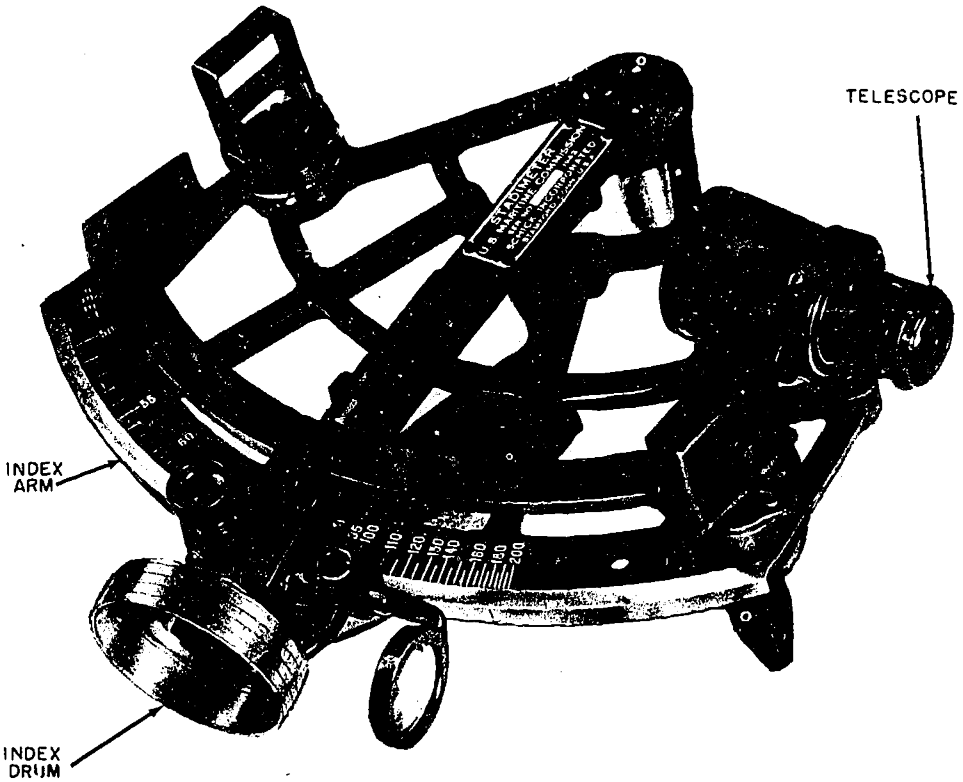


Figure 7-13.–Brandon sextant-type stadimeter.
58.78.1

from the boot topping to the top of the mast or highest radar.) Distances are measured with reasonable accuracy up to 2000 yards. Beyond that range the accuracy of the stadimeter decreases progressively.

Operation of the Fisk-type stadimeter, described here, is typical of the two, inasmuch as operation of the Brandon type varies from the Fisk only in minor details. Say you're trying to get the range to a 120-foot light structure. Move the carriage containing the index drum to the 120-foot mark on the index arm. Sight through the telescope at the light structure. As with the sextant, you will see a direct and a reflected image. Turning the drum causes the reflected image to move up or down relative to the direct image. When the top of the reflected image is in line with the bottom of the direct image, distance in yards may be read directly from the drum.

A stadimeter is a delicate instrument, and requires the same care given a sextant.

PLOTTING INSTRUMENTS

PARALLEL RULERS AND DIVIDERS

The parallel ruler is a plotting instrument consisting merely of two straightedges connected by metal strips. The two straightedges may be closed or opened, but they always remain parallel to each other. By placing the edge of one ruler along a line of bearing and "walking" the rulers carefully across the chart to the compass rose, the true bearing of the line may be determined. Figure 7-14 shows you a set of parallel rulers and also a pair of dividers. In navigation, dividers are used for transferring chart distances to scales of miles.

PROTRACTOR

A protractor performs practically the same function as parallel rulers, but without the necessity for

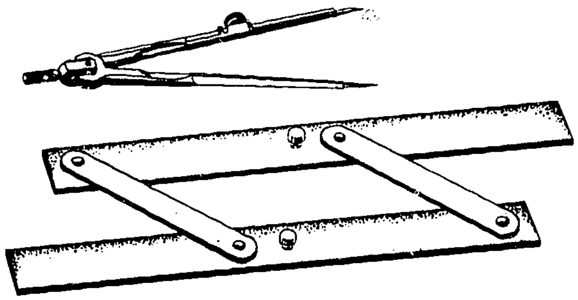


Figure 7-14.–Parallel rulers and dividers.
4.16:.18(65)

any walking across the chart. A simple protractor consists of a graduated arc on a piece of celluloid, with an attached ruler that pivots on the center of curvature of the arc. The Hoey position plotter is a protractor of this type. Its arc is graduated like the upper half of a compass rose, and horizontal and vertical lines are etched on the celluloid. By lining up these lines with meridians or parallels, any course or bearing can be plotted by swinging the ruler to the desired degree mark on the arc.

DRAFTING MACHINE

The drafting machine (also called parallel motion protractor) (fig. 7-15) consists of a protractor that is moved across the chart by a parallel-motion linkage fastened to the chart board. The linkage per-

of the protractor to any part of the y change in orientation of the an- the graduated protractor disk. This instrument is a great convenience in laying off courses and bearings and for transferring lines from one location to another. The graduated protractor rim can be clamped to any desired position to coincide with a direction on the chart.

DEAD RECKONING TRACER

Theoretically, you aren't supposed to know much, yet, about dead reckoning. The subject is discussed later in this course. For now, it is sufficient for you to know that a ship's dead reckoning position is the place she would be if, since her last fix or exactly determined location, she actually made good the courses steered and progressed exactly the distance shown on her log or as indicated by her revolutions per minute. This method of navigation would be fairly accurate if a ship ran on rails like a train. But, because the ocean is an unstable element, the dead reckoning position must be corrected to the ship's actual position each time a fix is obtained.

The dead reckoning tracer (DRT) consists of a glass plotting board under which a moving light (called a "bug") follows the movement of the ship's dead reckoning position. (See fig. 7-16.) The light is mounted on the arm whose motion is controlled by an input from the ship's gyrocompass and speed indicating log. A roll of paper, mounted on the end of the plotting board, is drawn across the glass when a plot is to be made. The light of the bug is sufficiently strong to show through the paper.

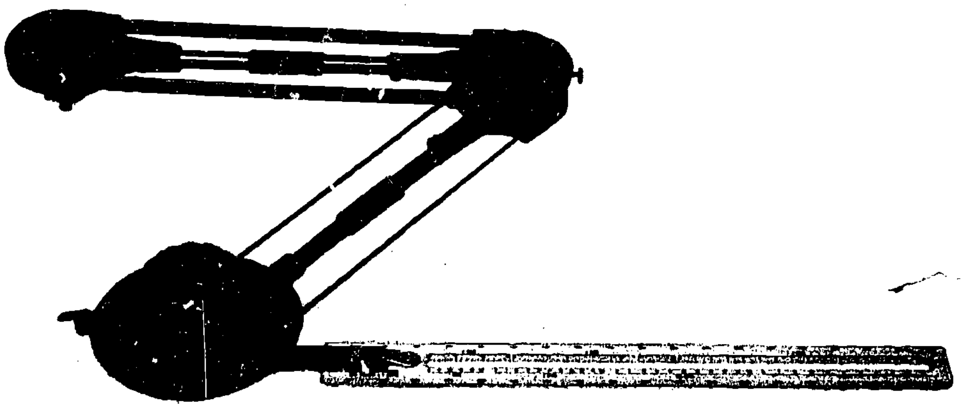


Figure 7-15.–Drafting machine.   59.57A

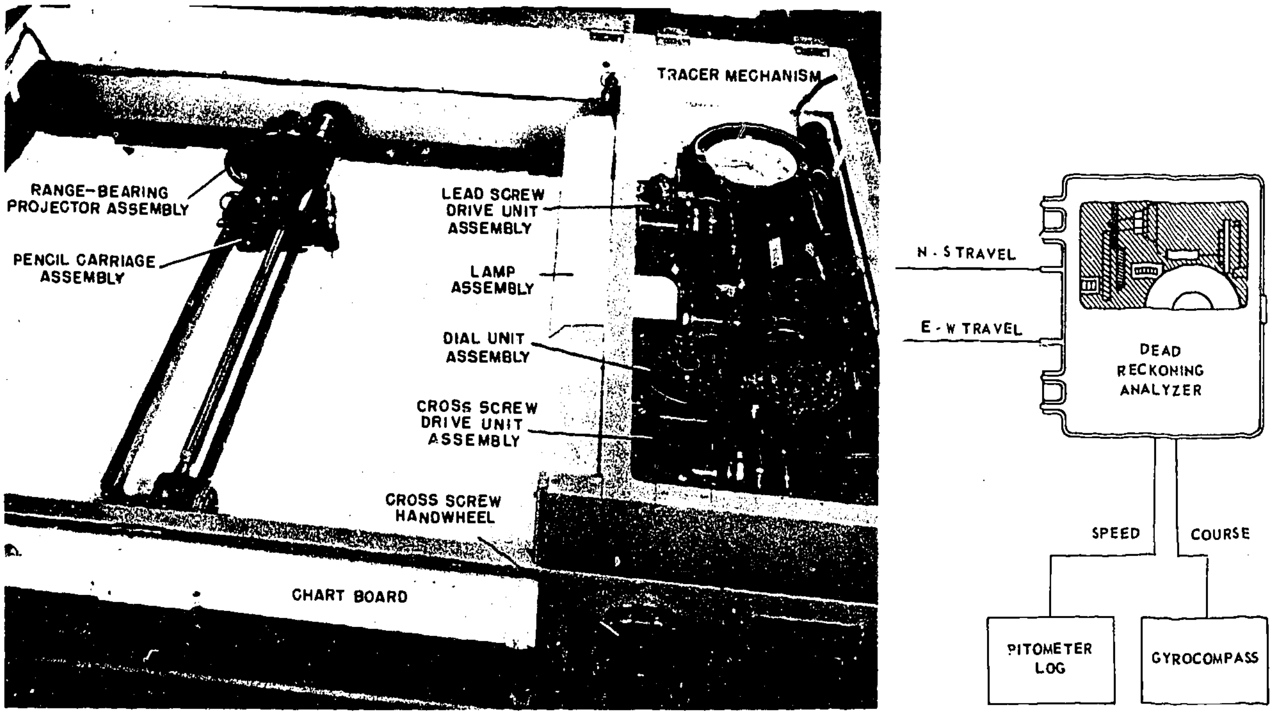


Figure 7-16.–Dead reckoning tracer. 40.61

Besides recording the ship's own dead reckoning track, another purpose of the DRT is to keep an up-to-the-minute plot of all ships within range of your radar. Most DRT systems are equipped with drafting machines. The one shown in figure 7-16 is not so equipped. Instead, it has a compass rose attachment on the bug that can be adjusted to indicate true bearings. Radar contacts on this DRT model are plotted with parallel rulers.

Operating the DRT

The first step in operating the DRT is to position the bug so that its subsequent movements do not take it off the board. Own ship's position in the formation–and also the disposition of the other ships–must be considered when selecting a starting position for the bug.

As the second step, select a suitable scale. If other contacts are surface ships, a scale of 1000 to 2000 yards to the inch is approximately correct.

The third step consists of adjusting the gears so the bug's movement conforms to the selected scale as shown in figure 7-17.

For the fourth step, position a piece of paper over the glass, then start the motors.

In the fifth and final step, set the ship's latitude and longitude on the latitude and longitude (dial) reversing switch to the proper earth's quadrant. (Refer to fig. 7-16.) If the ship is operating in the north latitudes, for example, the latitude dial would be set at N; if operating in the east longitudes, the longitude dial would be set at E.

STOWING AND HANDLING INSTRUMENTS

Now that specific navigational instruments have been described, it might be well to discuss the delicacy of all instruments used in navigation, as well as the care that must be exercised in handling them. Damaged navigational instruments are expensive to repair or replace. The best policy, of course is to prevent their being damaged. Some hints on proper stowing and handling of navigational instruments follow.

Cases are provided for stowage of most instruments you will handle. These cases are manufac-

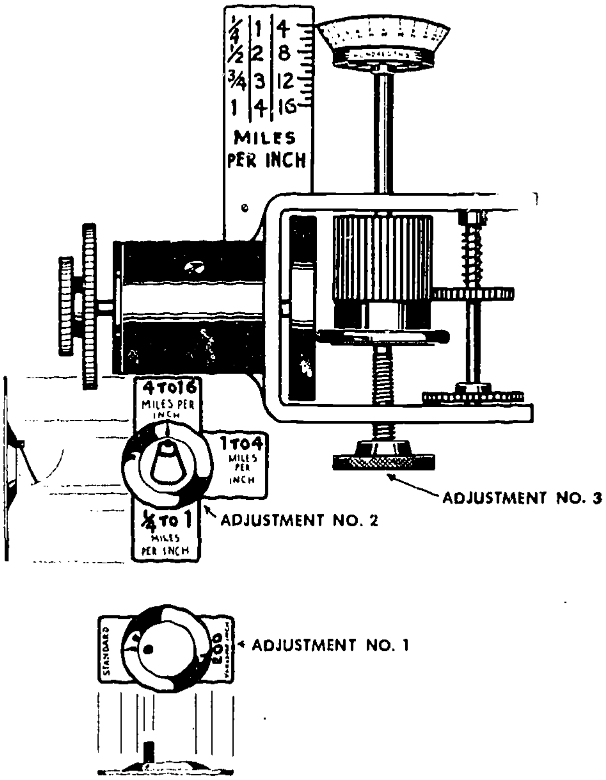


Figure 7-17.–DRT scale adjustment mechanism.
59.56

tured with close tolerances so that instruments fit snugly into them. Thus, equipment is protected from sliding and banging when the ship rolls. Spaces for securely holding the instrument cases usually are available aboard each ship. For a maximum protection, any instrument not in use should be properly stowed in its case, and the case stowed in the space provided.

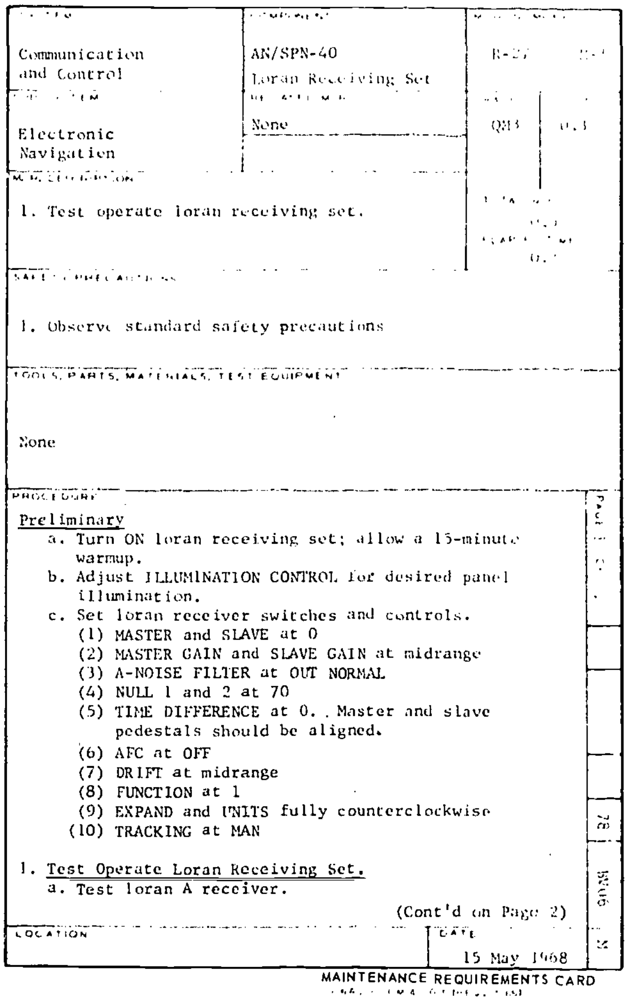
When carrying instruments in their cases, even supposedly locked cases, the proper technique is to grasp the handle with only three fingers and the thumb, and place the index finger over the lid to ensure that the lid remains closed.

Care should be exercised when removing an instrument from its case. The equipment should be grasped firmly to prevent it from slipping out of your hand. If a carrying strap is attached (as for binoculars or a comparing watch), it should be put around your neck as added protection against the instrument hitting the deck should it slip from your grasp.

One further precaution: Never use your navigational instruments for purposes for which they were not designed. Just as you wouldn't try to tell time with a compass, neither should you attempt to punch holes with divider points or use a long glass as a hammer.

MAINTENANCE OF NAVIGATIONAL INSTRUMENTS

Preventive maintenance of shipboard equipment is normally accomplished in accordance with procedures and schedules establised by the Navy Maintenance and Material Management (3-M) System. However, the majority of instruments used by the navigation department have not been incor-



Communication and Control

AN/SPN-40
Loran Receiving Set

Electronic Navigation

None

QM3

1. Test operate loran receiving set.

1. Observe standard safety precautions

TOOLS, PARTS, MATERIALS, TEST EQUIPMENT

None

PROCEDURE

Preliminary

a. Turn ON loran receiving set; allow a 15-minute warmup.
b. Adjust ILLUMINATION CONTROL for desired panel illumination.
c. Set loran receiver switches and controls.
    (1) MASTER and SLAVE at 0
    (2) MASTER GAIN and SLAVE GAIN at midrange
    (3) A-NOISE FILTER at OUT NORMAL
    (4) NULL 1 and 2 at 70
    (5) TIME DIFFERENCE at 0. . Master and slave pedestals should be aligned.
    (6) AFC at OFF
    (7) DRIFT at midrange
    (8) FUNCTION at 1
    (9) EXPAND and UNITS fully counterclockwise
    (10) TRACKING at MAN

1. Test Operate Loran Receiving Set.
    a. Test loran A receiver.

(Cont'd on Page 2)

LOCATION

DATE
15 May 1968

MAINTENANCE REQUIREMENTS CARD

Figure 7-18.–Maintenance Requirements Card.
98.176

porated into this system. As a consequence, your maintenance responsibilities are controlled by two systems. The first consists of cleaning, stowing, and inspecting in accordance with manufacturers' instruction books, *NavShips Technical Manual*, and various locally prepared instructions. This system is concerned with such items as sextants, binoc and alidades–to mention just limited number of operational ch conducted in accordance with the 3-M system. These checks normally are restricted to electronic navigational devices that are operated primarily by the navigation department. Your responsibility under the 3-M system is generally limited to operational checks that determine if the equipment is operating at peak performance. When indications of faulty operation are observed, all you need to do is notify the responsible personnel, who will take the necessary corrective measures. Detailed procedures for conducting a 3-M system check is presented on the appropriate Maintenance Requirements Card (fig. 7-18). All aspects of the 3-M system are presented in *Military Requirements for Petty Officer 3&2*. As a result, coverage in this manual is limited to pointing out that your maintenance requirements, although not as detailed as other department maintenance requirements, are none the less important and do require attention.

CHAPTER 8

NAVIGATIONAL AIDS

One branch of navigation is piloting, in which a ship's position is determined by bearings taken on visible objects whose exact locations are shown on a chart. Some of the objects may be natural, such as hills, rocks, land tangents, or trees. Others may be large buildings, smokestacks, TV towers, etc., which coincidentally happen to be located where they can be of assistance to navigators.

By far the greatest number of aids to navigation, however, are artificial. Included in this category are lighthouses, lightships, minor lights, buoys, and daybeacons. Also considered as aids to navigation are marks placed on hidden dangers and obstructions, although they seldom are used to fix a position. Artificial aids are placed so that, insofar as possible, they provide a continuous and unbroken chain of charted marks for coast and channel piloting. The extent to which the system of artificial aids is complete and accurate depends upon the status of the particular country as a maritime power.

Most harbors and frequented coasts are well marked with manmade aids to navigation, yet no attempt has ever been made to so mark every mile of the world's coastlines. Such marking would be impractical because many regions are so seldom navigated. In some areas the lack of artificial aids (together with knowledge that artificial aids may be inoperative, out of position, or completely destroyed) frequently makes the use of natural aids necessary.

Learning to observe and plot bearings of natural aids may, at first, be more difficult than learning to take and plot bearings of manmade aids. But whenever natural aids must be used, the effort applied to learning pays huge dividends in accuracy of position and safety. Natural aids may be used at any time, provided they are distinguishable by the navigator and identifiable on his chart. Further information on the use of natural aids is given later in this course, in the chapter on piloting.

LIGHTS

A ship cannot suspend piloting operations merely because darkness falls and daytime aids cannot be distinguished. For that reason, aids to navigation are lighted whenever it is both necessary and practicable. For purposes of identification, lights have individual characteristics regarding color, brilliancy, and system of operation. Some of a light's characteristics may be printed near its symbol on the chart. Detailed information, including the height–which, combined with brilliancy and observer's height, determines a light's visibility– is set forth in light lists. Symbols describing lights in light lists are uniform throughout the world.

The U. S. Naval Oceanographic Office publishes *List of Lights*, containing a description of every light in the world not located in the United States or its possessions. This publication is in seven volumes, each pertaining to a definite geographical division. Descriptive symbols in light lists are the same as those used on all charts published by the Oceanographic Office.

Lights located in the United States and its possessions are described in *Light Lists* published by the U.S. Coast Guard.

LIGHT CHARACTERISTICS

White, red, and green are the three standard colors for lights on aids to navigation. Significance of the colors is important chiefly regarding channel buoys. They are discussed in the section devoted to buoys.

Fixed, Flashing, and Occulting

Some navigational lights are fixed, meaning that they burn steadily. Most important lights, however, go through repeated periods of systematic changes of light and darkness. It is this characteristic of a navigational light that is the most valuable for identification purposes. (See fig. 8-1.)

Following are the principal characteristics of

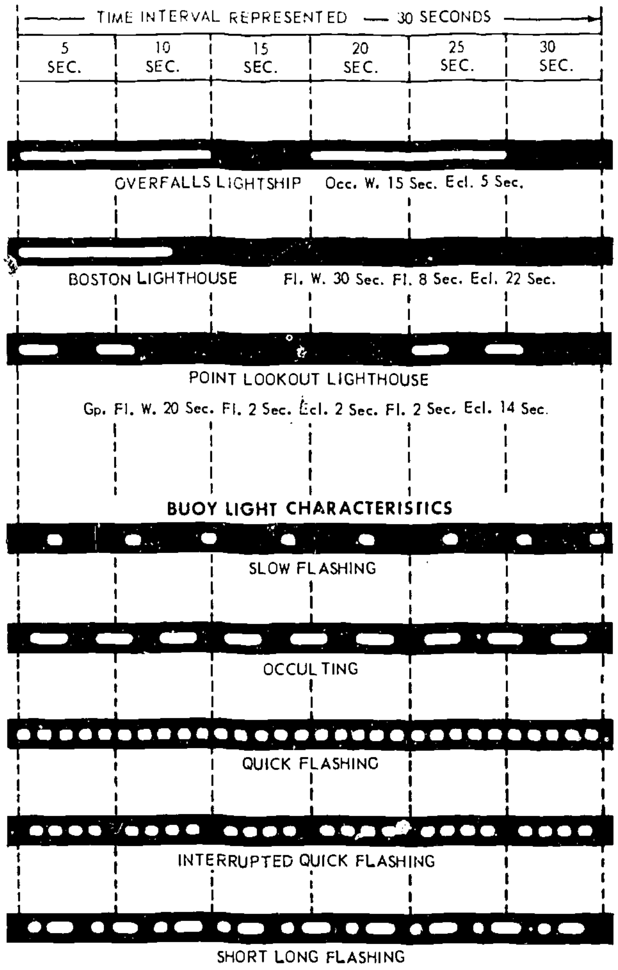


Figure 8-1.–Typical light characteristics.
69.22

lights on lighthouses and lightships. Lighted buoys have a few more special characteristics, which are mentioned later.

1. Flashing: Showing a single flash at regular intervals, the duration of light always being less than the duration of darkness.
2. Occulting: A light totally eclipsed at regular intervals, the duration of light always greater than the duration of darkness.
3. Fixed and flashing: A fixed light varied at regular intervals by groups of two or more flashes of greater brilliance. The group may, or may not, be preceded and followed by an eclipse.
4. Group flashing: Showing at regular intervals groups of two or more flashes.
5. Group occulting: A light with a group of two or more eclipses at regular intervals.
6. Equal interval (isophase): Duration of light equal to that of darkness.
7. Morse Code: Light in which flashes of different durations are grouped to produce a Morse character of characters.
8. Alternating: Rhythmic lights which exhibit different colors during each sequence.

VISIBILITY OF LIGHTS

The visibility of lights is the specific distance, in nautical miles, a navigator can expect to see a navigational aid, such as a lighthouse, lightship, or beacon.

In speaking of the visibility of a light, the following terms are applicable:

1. Geographic range: Maximum distance in nautical miles a light can be seen under clear weather conditions from a height of eye of 15 feet above sea level; it takes no account of candlepower of the light. It is listed in column 5 of the light list. It is not of primary interest to the navigator.

2. Luminous (nominal) range: Maximum distance, in nautical miles, at which a light, when observed in clear weather conditions with an unlimited height of eye or elevation or curvature of the earth, can be seen, as determined by the intensity of the light. Luminous range is listed in column 4 in the light list. A luminous range diagram is shown in figure 8-2.

At some future date, the phrase (nominal range) will be substituted for luminous range in United States and foreign light lists.

3. Computed visibility: Determined for a particular light taking into account its height and luminous (nominal) range and height of eye of the observer. In computing visibility of a light it is assumed that computed visibility never will exceed the light's luminous (nominal) range; although, under certain atmospheric conditions the loom or glare of a powerful light may appear before the light itself is visible.

The following examples illustrate the recommended procedure for determining the visibility of a light. (Bear in mind that computed visibility cannot be greater than the luminous (nominal) range.)

Example 1: Determine the visibility of Light Alfa (Light List NO.__) for an observer with a height of eye of 50 feet.

Solution: From the light list, determine the luminous range (column 4), 20 miles, and the height of the light above water (column 6), 90 feet.

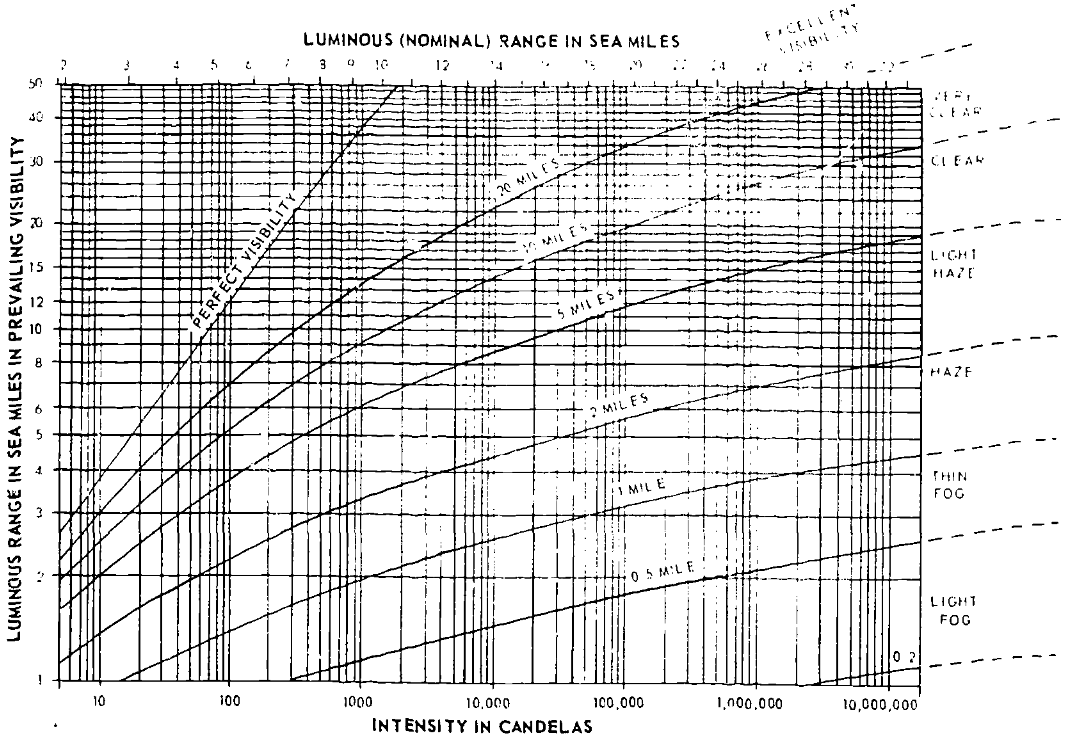


Figure 8-2. —Luminous (nominal) range diagram.
69.23

Determine horizon distance from table of distance of visibility of objects of various elevations above sea level, and place in form shown below.

Height of eye of 50 feet	8.1 miles
Height of light above water, 90 feet	10.9 miles
Computed visibility	19.0 miles
Luminous range	20.0 miles

Answer: 19.0 miles

Example 2: Determine the visibility of Light **Bravo (Light List NO.___) for an observer with height of eye 37 feet.**

Solution: From the light list, determine the luminous range, 10 miles, and the height of light above water, 77 feet. Determine horizon distance from (table 8-1) interpolating for 77 feet.

Height of eye for 37 feet	7.0 miles
Height of light above water, 77 feet	10.0 miles
Computed visibility	17.0 miles
Luminous range	10.0 miles

Answer: 10 miles

Luminous (Nominal) Range Diagram

The luminous (nominal) range diagram enables the mariner to determine the approximate range at which a light may be sighted, at night, in the meteorological (pertaining to weather) visibility prevailing at the time of observation.

The diagram can be entered either from the top border, using the luminous (nominal) range, obtained from Light List (column 4); or from the bot-

Table 8-1.–Distance of Visibility for Objects of Various Elevations Above Sea Level 69.130

HEIGHT IN FEET	DISTANCE IN GEOGRAPHIC OR NAUTICAL MILES	HEIGHT IN FEET	DISTANCE IN GEOGRAPHIC OR NAUTICAL MILES
1	1.1	45	7.7
2	1.6	46	7.8
3	2.1	47	7.8
4	2.3	48	7.9
5	2.6	49	8.0
6	2.8	50	8.1
7	3.0	55	8.5
8	3.2	60	8.9
9	3.4	65	9.2
10	3.6	70	9.6
11	3.8	75	9.9
12	4.0	80	10.2
13	4.1	85	10.5
14	4.3	90	10.9
15	4.4	95	11.2
16	4.6	100	11.4
17	4.7	105	11.7
18	4.9	110	12.0
19	5.0	115	12.3
20	5.1	120	12.5
21	5.2	125	12.8
22	5.4	130	13.0
23	5.5	135	13.3
24	5.6	140	13.5
25	5.7	145	13.8
26	5.8	150	14.0
27	5.9	160	14.5
28	6.1	170	14.9
29	6.2	180	15.3
30	6.3	190	15.8
31	6.4	200	16.2
32	6.5	210	16.6
33	6.6	220	17.0
34	6.7	230	17.3
35	6.8	240	17.7
36	6.9	250	18.1
37	7.0	260	18.4
38	7.1	270	18.8
39	7.1	280	19.1
40	7.2	290	19.5
41	7.3	300	19.8
42	7.4	310	20.1
43	7.5	320	20.5
44	7.6	330	20.8

tom border using the intensity in candelas, also obtained from Light List. The figures along the curves represent the estimated meteorological visibility at the time of observation, and th [illegible] left-hand border the luminous range under those conditions.

Example: A light of an intensity of 10,000 candelas has a luminous (nominal) range of 14 miles. When the meteorological visibility (along the curved line) is 10 miles the light would be sighted at 14 miles; and with a 5-mile visibility line, the light would be sighted at about 9 miles.

CAUTION: When using this diagram it must be remembered that: 1. The ranges obtained are approximate. 2. The transparency of the atmosphere is not necessarily consistent between the observer and the light. 3. Glare from background lighting will reduce considerably the range at which lights are sighted. 4. Luminous ranges, when given in light lists, are based upon a meteorological visibility of 10 sea miles.

LIGHTHOUSES AND LIGHT STRUCTURES

Lighthouses are numerous on all coasts of the United States, on the Great Lakes, and along many interior waterways. They are placed wherever a powerful light may be of assistance to navigators, or wherever a danger requires a warning beacon of long-range visibility. Visibility increases with height on a powerful light, hence the principal purpose of a light structure is to increase the height of a light above sea level.

A lighthouse may contain fog-signaling and radio beacon equipment as well as the light itself. Many lights formerly operated by keepers are now automatic. In lights still staffed by keepers, the lighthouse also may contain their living quarters. In general, operating personnel may be housed in separate buildings grouped around the tower. Such a group of buildings is called a light station.

Secondary, minor, and automatic lights are located in structures ranging from towers (that resemble important seacoast lighthouses) down to a small cluster of piles supporting a battery box and lens.

Solid colors, bands, stripes, and the like, are applied to lighthouses and light structures in various patterns. Thus they are easier to identify. (See fig. 8-3.) Minor structures sometimes are painted red or black, like channel buoys, to indicate the side of the channel on which they are located–red structures to the right, black to the left, coming from seaward.

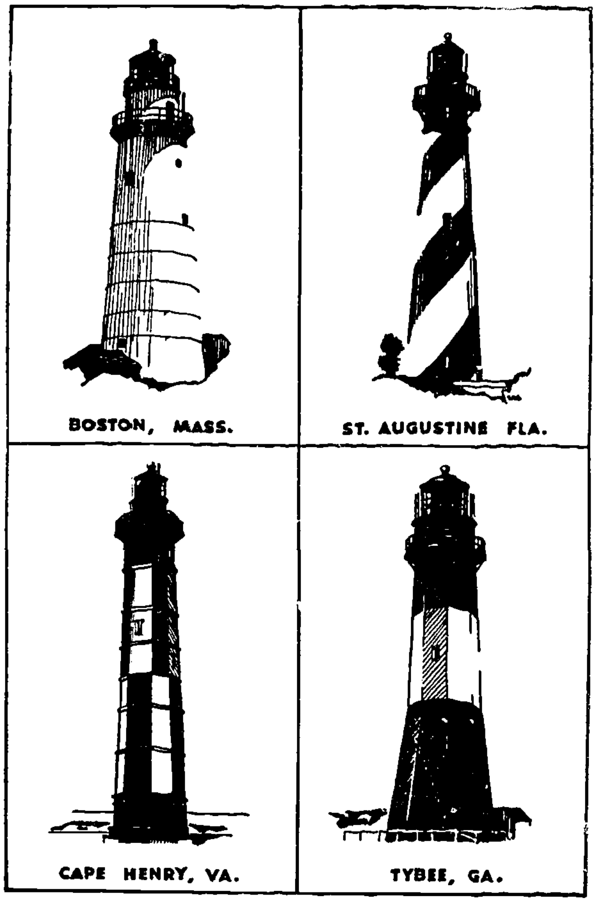


Figure 8-3.—Various patterns of typical lighthouses. 69.24

LIGHTSHIPS

A lightship is a floating lighthouse, located where conditions make it impossible or impracticable to build a permanent structure. Lightships mark the approaches or entrances to many of the principal harbors for both transoceanic and coastwise traffic. In many instances they also warn vessels away from shoals lying near important traffic routes. (The storm-tossed Nantucket Shoal lightship is a good example.)

Most lightships in United States waters are painted red on the hull, with the name of the station in large white letters on either side. Super structures are painted white; masts, lantern galleries, ventilators, and stacks are buff. (The color scheme on Lake Huron lightships varies from this pattern.)

The lights, fog signals, and radio beacon signals on lightships are given various characteristics for purposes of identification. Like lighthouses, lightships are described briefly on the chart and in detail in light lists.

A light vessel underway or offstation hoists the International Code signal "LO," signifying that the light vessel is not in correct position. She must then observe the requirements of the Rules of the Road for a vessel of her class.

When anchored on station, a lightship at night shows only her beacon light(s), and a less brilliant light on the forestay to indicate her heading. By day she hoists the international signal of her station when it appears that an approaching vessel is in doubt concerning her identity, or when any vessel requests that information.

Most United States lightships are self-propelled vessels, able to proceed to and from their stations under their own power. If forced to slip their moorings and get underway in heavy weather, they can ride out the storm and work back to station under their own power.

When a regular lightship goes in for overhaul or repairs, her place is taken by a relief lightship whose lights and signals have, as nearly as possible, the same characteristics as the regular lightship. Relief lightships are distinguished by the word "Relief" painted in white letters on either side.

DANGER SECTORS

Sectors of red glass are placed in the lanterns of certain lighthouses to indicate danger bearings within which a ship will be in danger of running on rocks, shoals, or some other hazard. The arcs over which the red light shows are the danger sectors whose bearings usually appear on the chart. Although the light is red within the danger bearings, its other characteristics remain the same.

Sectors may be only a few degrees in width, marking an isolated obstruction, or they may be so wide that they extend from the direction of deep water to the beach. In most instances, red sectors indicate water to be avoided. A narrow green sector may signify a turning point or the best water across a shoal. Exact significance of each sector may be obtained from the chart.

All sector bearings are true bearings in degrees, running clockwise around the light as a center. The sector bearings are described as they would be observed from a ship crossing them, i.e., from seaward toward the light. In figure 8-4, for instance, the

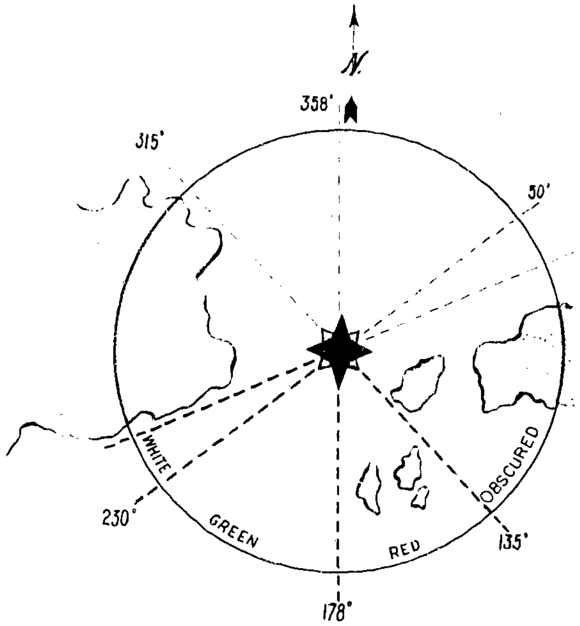


Figure 8-4.–Light sectors. 69.25

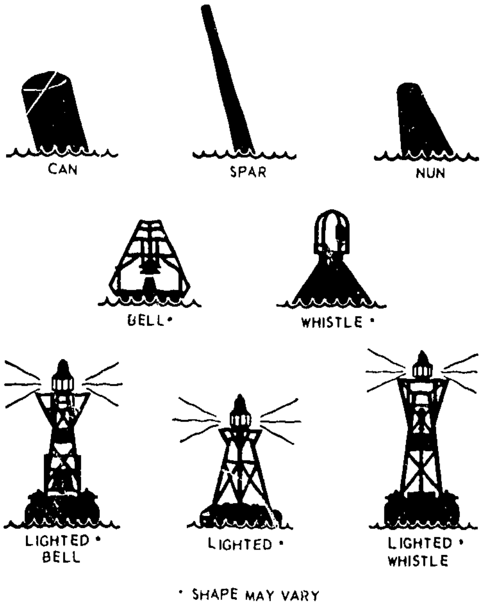


Figure 8-5.–Types of United States buoys. 17.33

bearings of the red sector from the light are 135° to 178°. This sector is defined in the light list in terms of bearings from the ship. These bearings are 315° to 358°, the reciprocals of the preceding bearings. The light shown in the diagram would be defined thus: Obscured from land to 315°, red thence to 358°, green thence to 050°, white thence to land.

On either side of the line of demarcation between colored and white sectors there is always a small sector whose color is doubtful, because the edges of a sector cannot be cut off sharply in color. Under some atmospheric conditions, moreover, a white light itself may have a reddish appearance. Consequently, light sectors must not be relied upon entirely, but position must be verified repeatedly by bearings taken on the light itself or on other fixed objects.

When a light is cut off by adjoining land, the arc of visibility may vary with a ship's distance away from the light. If the intervening land is sloping, for example, the light may be visible over a wider arc from a far-off ship than from one close inshore.

BUOYS

Navigational buoys are moored floating markers, so placed as to guide ships in and out of channels, warn them away from hidden dangers, lead them to anchorage areas, etc. Their location usually is shown on the chart, which makes them invaluable aids for fixing position in piloting. Buoys may be of various sizes and shapes (fig. 8-5). Regardless of their shapes, however, their distinctive coloring is the chief indication of their purpose.

TYPES OF BUOYS

Although a buoy's type has no special navigational significance, it may help toward its identification from the description given on the chart. The following are the principal types of buoys.

1. Spar buoys are large logs, trimmed, shaped, and appropriately painted. They also may be of metal, constructed in the familiar spar shape.
2. Can and nun buoys are cylindrical and conical, respectively.
3. A bell buoy has a flat top, surmounted by a framework supporting a bell. Older bell buoys are sounded by the restless motion of the sea. Newer types are operated automatically by gas or electricity.
4. A gong buoy is similar to a bell buoy, except that it has a series of gongs, each with a different tone.

5. A whistle buoy usually is cone-shaped, and carries a whistle sounded by the sea's motion, or horns that are sounded at regular intervals by mechanical or electrical means.
6. A lighted buoy carries batteries or gas tanks, and is surmounted by a framework supporting a light. (A description of the lights on lighted buoys is given later.)
7. A combination buoy is one in which a light and sound signal are combined, such as a lighted bell, gong, or whistle buoy.

COLORING OF BUOYS

In the United States red buoys mark the right side, and black buoys the left side of the channel, coming from seaward. A great help in remembering this placement of buoys is the jingle "red-right-returning."

Normally, red channel buoys are cone-shaped nun buoys, whereas black channel buoys are cylindrical can buoys. This situation probably is the only one in which a buoy's shape is of any significance, and even here the rule is not controlling. Either can buoys or nun buoys may be replaced with spar buoys of proper color. It is the color that counts. Sometimes red and black buoys are painted white on top, but this color scheme is merely to enable them to be located more easily at night.

Black and red horizontally banded buoys mark obstructions. They may be passed on either side, but, unless you know the dimensions of the obstruction, it is best to give such buoys a wide berth. Although these buoys may be passed on either side, sometimes (for various reasons) the channel on one side is preferable to the other side. If the top band on the buoy is red, the preferred channel is to the left of the buoy, coming from seaward; if the top band is black, the preferred channel is to the right.

Black and white vertically striped buoys mark the middle of a channel or fairway. Yellow buoys mark quarantine anchorages.

The foregoing combinations are practically all the colors on buoys that have a direct connection with navigation. Buoys painted all white have no special significance; they are utilized for purposes not concerned with navigation, such as marking ordinary anchorage areas. Buoys with black and white horizontal stripes are used in some locales to mark fishtrap areas. A white buoy with a green top usually means a dredging area.

NUMBERS ON BUOYS

The red buoys marking the right side of a channel bear even numbers, starting with the first buoy from seaward. This maritime situation is, perhaps, the only one in which anything to starboard has an even number. Black channel buoys, to the left of the channel coming from seaward, have odd numbers. Both the number and a letter or two appear on some channel buoys, such as the Governor's Island West End Shoal Bell Buoy. Because it is the first buoy on the port side of the channel coming from seaward, it is painted black and carries the number 1. The letters GI are painted next to the 1.

Banded or striped buoys are not numbered, but some have letters for identification purposes. For example, the East Rockaway Inlet Bell Buoy (vertical black and white stripes) carries the letters ER.

LIGHTS ON BUOYS

Red lights are used only on red buoys or red and black horizontally banded buoys, with the topmost band red. Green lights are only for black buoys or black and red horizontally banded buoys, with the topmost band black. When a light of considerable brilliance is required, a white light may be (and frequently is) substituted for either the green or the red light. White lights are the only lights used on the black and white vertically striped buoys that mark the middle of a channel or fairway. Characteristics of lights on lighted buoys follow.

1. A fixed (steady) light means either a black or a red channel buoy.
2. A flashing light (at regular intervals, not more than 30 flashes per minute) may also mean either a black or a red buoy.
3. A quick-flashing light (no fewer than 60 flashes per minute) is also on either a black or red buoy, but at a turning point or junction where special caution is required.
4. An interrupted quick-flashing light (repeated series of quick flashes, separated by about 4-second dark intervals) indicates a red and black horizontally banded obstruction buoy.
5. A short-long flashing light (short and a long flash, recurring at the rate of about 8 per minute) is placed on a black and white vertically striped midchannel buoy.

FALLIBILITY OF BUOYS

Although buoys are valuable aids to navigation, they must never be depended upon exclusively. Buoys frequently drag their moorings in heavy weather, or they may be sent adrift when run down by passing vessels. Lights on lighted buoys may go out of commission. Whistles, bells, and gongs usually sounded by the sea's motion, may fail to function in smooth water.

DAYBEACONS

Unlighted aids to navigation (except unlighted buoys) are called daybeacons. A daybeacon may consist of a single pile with a daymark on top of it, a spar supporting a cask, a slated or masonry tower, or any of several structures.

Daybeacons, like lighthouses and light structures, usually are colored to distinguish them from their surroundings and make them easy to identify. Daybeacons marking channels are colored and numbered like channel buoys. Many are fitted with reflectors that show the same colors a lighted buoy would show at night in the same position.

RANGES

Two daybeacons, located some distance apart on a specific true bearing, constitute a daybeacon range. Two lights, similarly located, are a lighted range. When a ship reaches a position where the two lights or beacons are seen exactly in line, she is "on the range." Ranges are especially valuable for guiding ships along the approaches to or through narrow channels. Much steering through the Panama Canal is accomplished on ranges. Other examples of successive straight reaches marked by ranges are the channel entrances to the St. Johns River on the Atlantic coast, and to the Columbia River on the Pacific coast.

Lights on ranges may show any of the three standard colors, and they may be fixed, flashing, or occulting. Frequently the nearer light is fixed, and the more distant one is flashing or occulting. Most range lights appear to lose brillance rapidly as a ship diverges from the range line of bearing.

When steering on a range, it is highly important to ascertain the limit beyond which the range line of bearing cannot be followed safely. This information is available on the chart.

FOG SIGNALS

Most lighthouses and lightships are equipped with installed fog-signaling apparatus, ordinarily sounded automatically by mechanical means. For identification purposes, each station has its own assigned number of blasts, recurring at specified intervals. A definite time is required for each station to sound its entire series of blasts, and this timing provides another means of identification.

The various types of apparatus produce corresponding variance of pitch and tone, thus giving your ear a chance to compare the sound of a station with its description in the light list. Following are listed some of the noisemaking apparatus used to send out fog signals.

1. A two-tone device contains diaphones that produce sound through a slotted reciprocating piston actuated by compressed air. The sound consists of two tones of different pitch, the first part of the blast high-pitched and the remainder low.
2. Diaphragm horns produce sound by a disk diaphragm vibrated by compressed air, steam, or electricity. Duplex or triplex horn units of differing pitch produce a chime signal.
3. Reed horns emit sound by a steel reed vibrated by compressed air.
4. Sirens make sound by either a disk or a cup-shaped rotor actuated by compressed air, steam, or electricity.
5. Whistles produce sound by compressed air or steam admitted through a slot into a cylindrical chamber.
6. Bells are sounded by gas or electricity, or possibly by a hand hammer.

AIDS IN INTRACOASTAL WATERWAY

The Intracoastal Waterway, called the inland waterway, is a channel in which a light-draft vessel can navigate coastwise from the Chesapeake Bay almost to the Mexican border, remaining inside natural or artificial breakwaters for almost the entire length of the trip. Ensuing paragraphs describe special markings for the Intracoastal Waterway proper and for those portions of connecting or intersecting waterways that must be crossed or followed in navigating it.

Every buoy, daybeacon, or light structure along the Intracoastal Waterway has part of its surface painted yellow, the distinctive coloring adopted for this Waterway. (See page 23 of Chart 1 (fig. 10-20).) Buoys have a band of yellow at the top. Daybeacons and other structures have a band or border of yellow somewhere. Dual-purpose markings are illustrated in the inset of figure 10-20.

Red buoys and daybeacons are to the right, black to the left, as you proceed from the Chesapeake Bay toward Mexico. As in other channels, red buoys have even numbers; black buoys, odd numbers. Because the numbers would increase in amount in such a long line of buoys, they are numbered in groups that usually contain no more than 200 buoys.

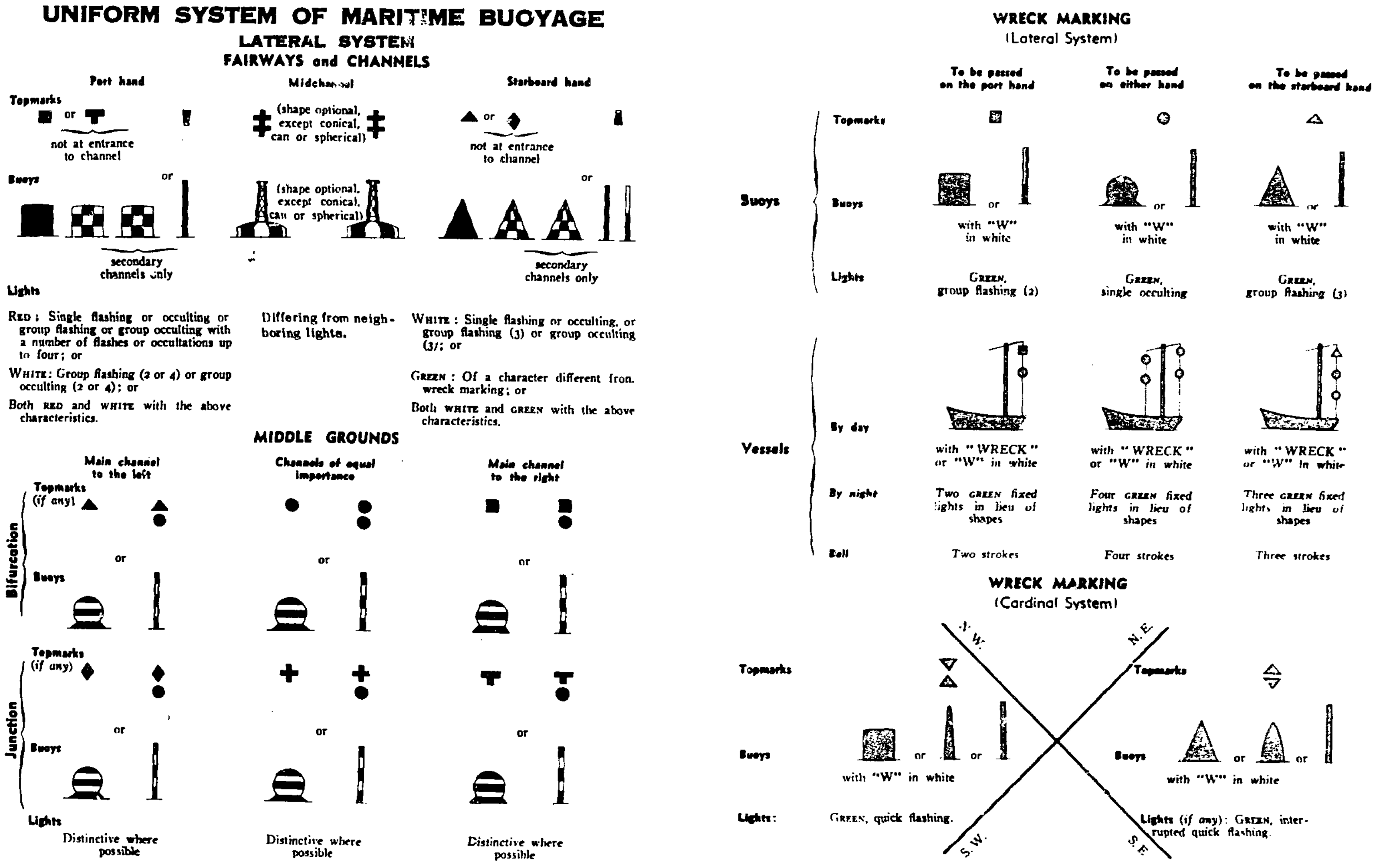
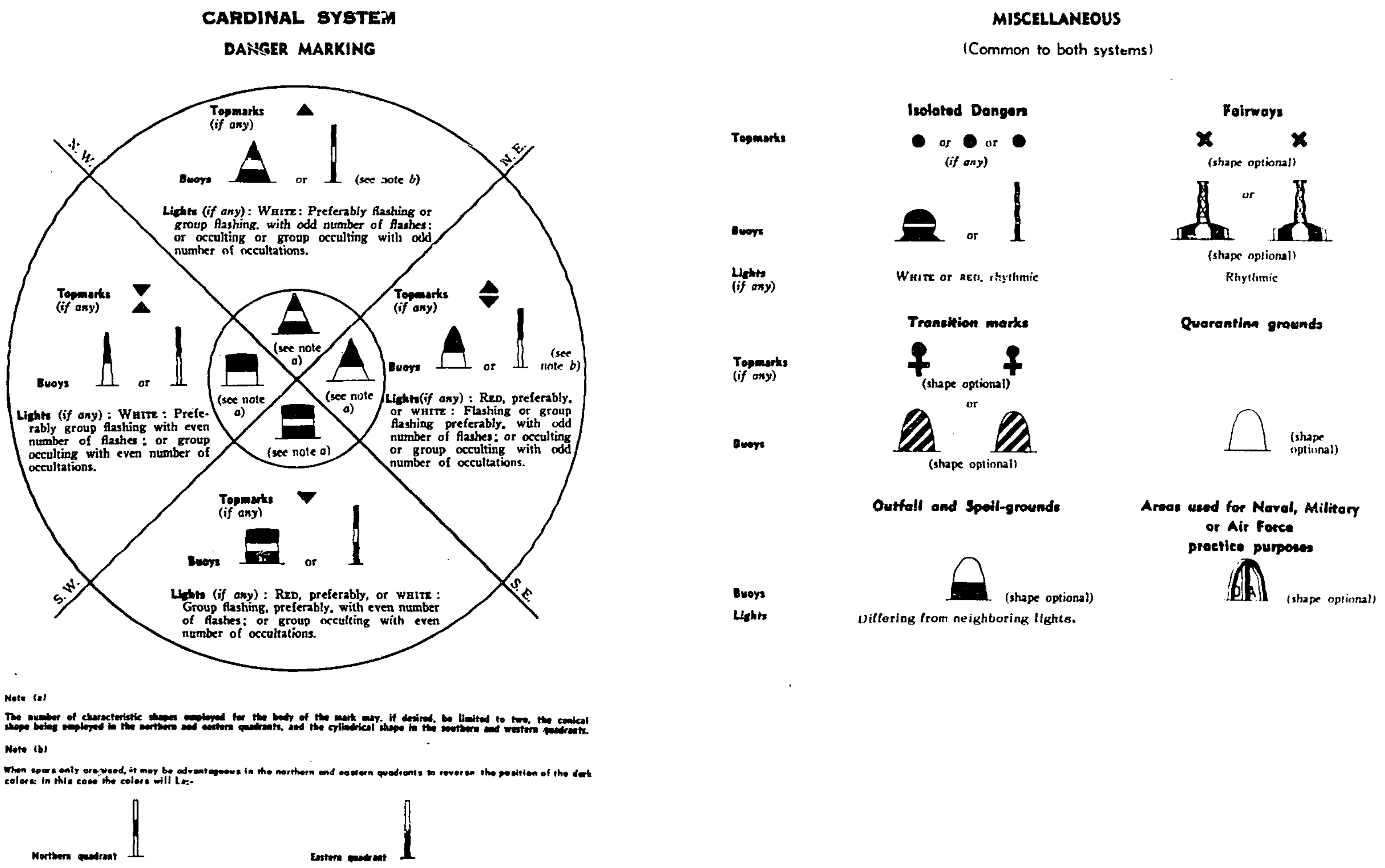


Figure 8-6.–Lateral buoyage system.
C37.23:.24



Note (a)

The number of characteristic shapes employed for the body of the mark may, if desired, be limited to two, the conical shape being employed in the northern and eastern quadrants, and the cylindrical shape in the southern and western quadrants.

Note (b)

When spars only are used, it may be advantageous in the northern and eastern quadrants to reverse the position of the dark colors: in this case the colors will be:-

Figure 8-7.–Cardinal buoyage system.
C37.25:.26

At certain natural dividing points, numbering begins again at 1.

Lights on buoys in the Intracoastal Waterway follow the standard system of red or white lights on red buoys, and green or white lights on black buoys. Lights on lighted aids besides buoys also agree with the standard rules for lights on aids to navigation.

LATERAL AND CARDINAL BUOYAGE SYSTEMS

Most maritime countries use either the lateral or the cardinal system of buoyage; some regions use both. In the lateral system (fig. 8-6), used on all navigable waters of the United States, the coloring, shape, and lighting of buoys indicate the direction to a danger relative to the course that should be followed. In the cardinal buoyage system (fig. 8-7), the coloring, shape, and lighting of buoys show the direction to a danger relative to the buoy itself. The color, shape, lights, and number of buoys in the lateral system, as used by the United States, are determined relative to a direction from seaward. Some countries using the lateral system color their buoys and lights the direct opposite of the United States color scheme. Before going into foreign waters, consult *Sailing Directions* for an exact description of the aids to navigation in the particular locality.

In offshore channels, the lateral buoyage system prescribes the following markings and colorings for United States waters: Proceeding in a southerly direction along the Atlantic coast, in a northerly and westerly direction along the Gulf coast, and in a northerly direction along the Pacific coast, is considered to be proceeding from seaward. Accordingly, coastal buoys on the right when proceeding in those directions are red buoys with even numbers. On the Great Lakes, offshore buoys are colored and numbered from the outlet of each lake toward its upper end. The Intracoastal Waterway is marked from the North Atlantic States to the lower coast of Texas, regardless of the compass bearings of individual sections.

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CHAPTER 9

RULES OF THE ROAD

You already are acquainted with basic Rules of the Road through study of the *Seaman* training manual. A Quartermaster of the watch must have a broader knowledge of the Rules of the Road; he should know them at least to the extent covered in this chapter. All the rules can be covered in this chapter. All the rules can be found in *Rules of The Road*, CG-169. Material on Rules of the Road contained in this course is arranged to make the rules easy to remember. In most instances, instead of the exact wording, only the sense of each rule is given.

APPLICABLE RULES

International Regulations for Preventing Collisions at Sea dated 1960 (commonly called International Rules of the Road) have been adopted by most of the maritime nations of the world. This revision was necessary due to changes, amendments, and new provisions resulting from deficiencies in the previous regulations and the great increase in shipping. The present Rules of the Road were enacted by the Congress in 1963, proclaimed by the President in 1964, and put into effect September 1, 1965.

By act of Congress in 1897, the United States adopted the system of United States Inland Rules of the Road, which apply in "all harbors, rivers, and inland waters of the United States, except the Great Lakes and their connecting and tributary waters as far east as Montreal, Canada, and the Red River of the North and rivers emptying into the Gulf of Mexico."

Certain additional rules, known as Pilot Rules, are drawn up by the Commandant of the Coast Guard, with approval by the Secretary of Transportation.

The Pilot Rules are in three volumes. The first contains rules that apply in the same waters as Inland Rules: "All harbors, rivers, and inland waters of, etc." This set of Pilot Rules contains charts setting forth most of the boundaries between international and United States inland waters. The same information is contained in *Coast Pilot*, a National Ocean Survey publication, which also includes the boundaries between inland waters and the high seas in Hawaii and Alaska.

Following is the general rule for establishing boundaries between international and United States inland waters in localities where no specific boundary line is prescribed:

"At all buoyed entrances from seaward to bays, sounds, rivers, or other estuaries for which specific lines are not prescribed herein, Inland Rules of the Road shall apply inshore of a line approximately parallel with the general trend of the shore, drawn through the outermost buoy or other aid to navigation of any system of aids."

The first volume of Pilot Rules, then, contains rules that actually supplement the Inland Rules, and apply in the same waters. Incidentally, the Pilot Rules cannot contradict the Inland Rules. Where the rules conflict, the Inland Rules take precedence.

The second volume of Pilot Rules contains rules for the Great Lakes and their connecting and tributary waters. The third volume is made up of rules for the Red River of the North and the rivers flowing into the Gulf of Mexico. You probably won't need to consult either of these volumes. Many of the Pilot Rules that apply in inland waters are most important, particularly the one governing a whistle signal for a crossing situation (discussed later).

A Quartermaster must know the boundaries between international and inland waters. When a ship crosses this boundary an entry to this effect is made in the ship's log, and significant changes in the rules occur at that instant.

Some foreign governments have local rules that may be found in *Sailing Directions*. More generally, however, local rules for foreign waters must be obtained from local authorities. In foreign jurisdictions that have no local rules, International Rules usually are observed.

Where differences are significant in the International, Inland, and Pilot Rules covered in this chapter, these differences are pointed out so that you may know which rule applies where and when.

In instances where all three rules are essentially the same, only one definition is given and it is referred to simply as "the Rule."

As defined in the Rules of the Road, a "power-driven" or "steam" vessel means any vessel propelled by machinery, even though she may also be under sail. Any vessel under sail alone is considered a sailing vessel whether machinery is aboard or not. A vessel is "underway" when she is not at anchor, aground, or made fast to the shore. She doesn't have to be actually making headway.

RULES FOR LIGHTS

Rules for lights must be complied with in all weathers, from sunset to sunrise, as specified by both International and Inland Rules of the Road. Ships usually show no outside lights at night during wartime conditions, of course, but even then lights are kept ready for emergency display. The Pilot Rules prohibit flashing the rays of a searchlight or other blinding light onto the bridge or into the pilothouse of a vessel underway. Common sense dictates that this rule must be observed in all waters. The Pilot Rules also forbid showing any lights that may either obstruct or be mistaken for the prescribed lights.

MASTHEAD AND RANGE LIGHTS

International Rules differ somewhat from the Inland Rules governing masthead lights and range lights prescribed for power-driven vessels. The variations are discussed in the next two topics.

* International Rules: A power-driven vessel underway carries at the masthead, or at some other elevated point forward, a bright 20-point white light visible from dead ahead to 2-points abaft the beam. (A "point" is 11 1/4 degrees of the compass.) The light must be displayed between 20 and 40 feet above the deck. The masthead light must be visible for at least 5 miles. When the rules say "visible," they mean "visible on a dark night with a clear atmosphere."

In addition to the masthead light, a power-driven vessel over 150 feet in length must carry another 20-point white light aft, and it must be at least 15 feet higher than the masthead light. The after light is called the range light. Its use is mandatory except for vessels less than 150 feet in length.

* Inland Rules: A power-driven vessel operating only in inland waters carries a 20-point masthead light forward, as under International Rules. Her range light is a 32-point light. If a seagoing vessel carries a range light in accordance with International Rules, she need not alter her 20-point range light when entering inland waters. In both international and inland waters, the horizontal distance between the lights must be more than the vertical distance.

SIDE AND STERN LIGHTS

All ships carry a 10-point green light on the starboard side and a 10-point red light on the port side. Each light must be visible from dead ahead to 2 points abaft the beam on the appropriate side. The side lights must be fitted with screens to prevent their being seen across the bow.

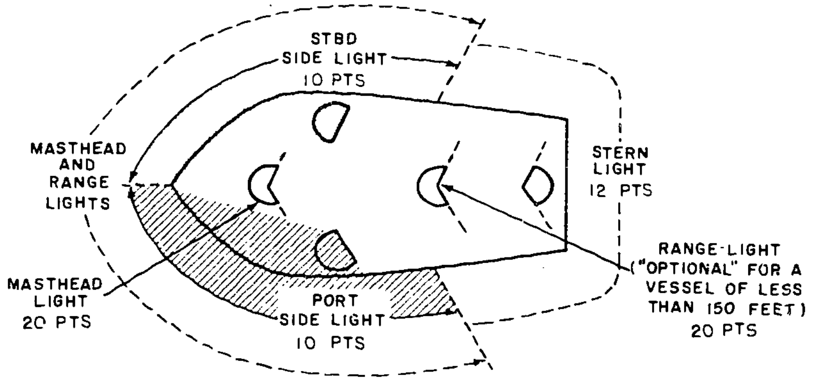
Ships underway also must display a 12-point white stern light (fig. 9-1). It must be visible for 2 miles, and should be carried as nearly as possible on the same level as the side lights. On small ships, when it is impossible to have a fixed stern light, a lantern or flareup light is kept ready and is shown at the approach of an overtaking ship. A stern light is not required in inland waters if the ship displays any other bright light visible from aft. Thus, if an all-around range light is shown, a stern light need not be shown in inland waters.

RUNNING LIGHTS ON POWERBOATS

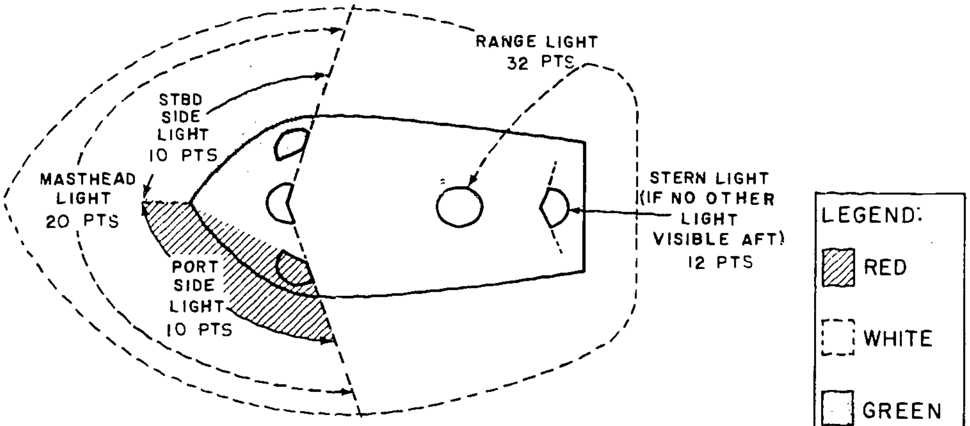
* International Rules: Power-driven boats under 65 feet in length (which includes most of those carried on seagoing ships) carry a 20-point light forward, at least 9 feet above the gunwale and visible for at least 3 miles. They must also carry either green and red side lights, as do larger vessels, or they may carry a combined lantern showing green on the starboard side and red on the port side. The combined lantern must be so fixed as to show from dead ahead to 2 points abaft the beam on the appropriate sides. The side lights or combined lantern must be at least 3 feet below the white light and must be visible at least 1 mile.

* Inland Rules: Running lights for powerboats in United States inland waters are prescribed in the Motorboat Act of 1940. The Motorboat Act expressly provides, however, that boats equipped with lights in accordance with the International Rules may carry and exhibit those lights in lieu of the lights prescribed in the Motorboat Act. The Act divides powerboats into the following classes:

Class A: Less than 16 feet in length.
Class 1: 16 feet or over, but less than 26 feet.
Class 2: 26 feet or over, but less than 40 feet.
Class 3: 40 feet or over, but not more than 65.



INTERNATIONAL RULES—ARCS OF VISIBILITY
(AND U.S. INLAND WATERS—SEAGOING VESSEL)



U.S. INLAND WATERS—ARCS OF VISIBILITY
(NON-SEAGOING VESSEL)

Figure 9-1.–Running lights. 69.27

Class A and class 1 boats carry an all-around white light aft and a combined lantern forward. The combined lantern is fixed to show its red and green lights in the same manner as the combined lantern in international waters, and it must be lower than the after white light. (See fig. 9-2.)

Classes 2 and 3 include most of the powerboats used in the Navy. Distinction between boats of class 2 and class 3 set forth in the Motorboat Act are concerned with matters not related to running lights. Boats of these classes show a 20-point white light forward and an all-around light aft. The after light must be higher than the forward light. (See fig. 9-3.) Normally the after light on motor launches and motor whaleboats are on the flagstaff. Class 2 and 3 powerboats must have separate red and green side lights (instead on the combined lantern) showing from dead ahead to 2 points abaft the beam.

When motorboats are under sail, they carry their normal side lights and a white light at the stern. If, due to bad weather or other sufficient cause, a motorboat under sail cannot display a fixed light at the stern, she must have a lantern or flashlight, showing a white light, ready to exhibit in ample time to avert collision.

The white lights used by motorboats must be visible for at least 2 miles. Colored lights must be visible 1 mile.

LIGHTS ON PILOT VESSELS

An OOD or conning officer is anxious to sight the pilot boat and signal her alongside without being forced to lie to when conditions may be setting the ship toward a lee shore. Quartermasters must be able to recognize a pilot vessel the instant she is sighted. "White over red, pilot ahead" is the

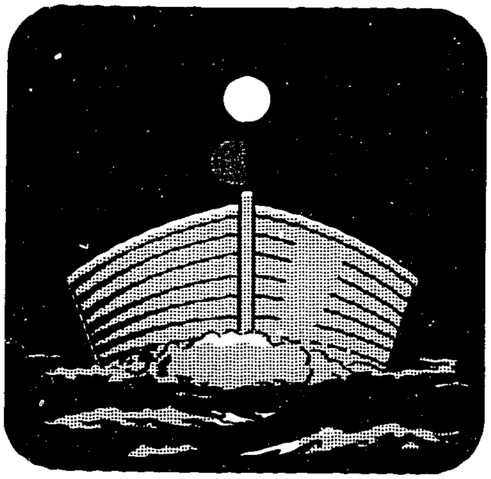


Figure 9-2.–The combination light on powerboats must be lower than the white after light. C17.25.1

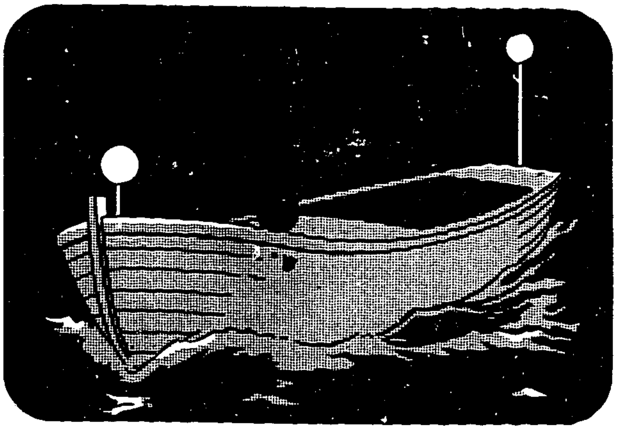


Figure 9-3.–Position of white lights on motorboats. C17.25.2

memory aid for the Quartermaster to recall when sighting a power-driven pilot vessel.

When pilot vessels are not engaged on station, whether under International or Inland Rules, they are required to carry the same lights as other vessels of their class and tonnage.

* International Rules: Sailing pilot vessels, when engaged on their stations and not at anchor, carry an all-around white light from the masthead visible to a distance of at least 3 miles. They also exhibit a flareup light at intervals not exceeding 10 minutes. Additionally, they display colored side lights, which need not be shown continuously, but must be flashed upon the approach of another vessel.

A power-driven pilot vessel, when on station and not at anchor, carries the lights prescribed for sailing pilot vessels. She also carries an all-around red light, visible for 3 miles, 8 feet below her white masthead light. She is required to display colored side lights when underway. In place of the flareup light, she may carry a bright, intermittent white light.

* Inland Rules: The Inland Rules that apply to lights on pilot vessels are much the same as International Rules. The differences are that the red light must be visible at a distance of 2 miles, and the flare interval is not to exceed 15 minutes.

LIGHTS ON VESSELS AT ANCHOR

Under both International and Inland Rules, ships less than 150 feet in length at anchor show an all-around white light forward. This light is called the forward anchor light. It must be visible for at least 2 miles in international waters and 1 mile in inland waters. Usually the forward anchor light is hoisted to a block on the forestay or to the jackstaff.

Under both rules, a vessel 150 feet long or over carries her forward anchor light at least 20 feet above the hull. A similar light is carried aft, not less than 15 feet lower than the forward light. Both lights must be visible all around the horizon for a distance of at least 3 miles according to International Rules but only 1 mile under Inland Rules.

Remember that the range light must be 15 feet higher than the masthead light, but the after anchor light is 15 feet lower than the forward one. When the anchor lights come on, all running lights must be turned off.

International Rules provide that all vessels, when anchored, must display, between sunrise and sunset, a black ball a minimum of 2 feet in diameter. (See fig. 9-4). It is shown on the forward part of the vessel, where it can be seen best.

According to Pilot Rules, all vessels greater than 65 feet in length, moored or anchored in a fairway or channel, must display the black ball prescribed under International Rules.

LIGHTS ON TOWING VESSELS

Both rules state that a towing vessel may carry a small white light abaft the funnel or aftermast for the vessel towed to steer by, but such light must not be visible forward of the beam.

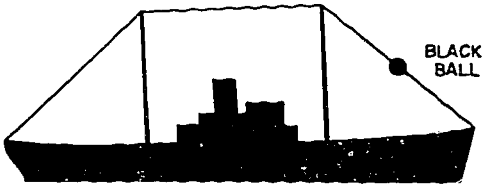


Figure 9-4.-Anchor signal. 17.28.2

* International Rules: A power-driven vessel either towing or pushing another vessel must display two masthead lights in a vertical line not less than 6 feet apart. If she is towing and the length of the tow measured from the stern of the towing vessel to the stern of the last vessel towed exceeds 600 feet, she carries a third light at least 6 feet above or below the other two lights. Consequently, when you see three masthead lights in international waters, you are looking at a ship towing astern, with her tows ranging more than 600 feet.

* Inland Rules: Towing lights on an inland vessel may be either forward or aft. If forward, they are 20-point lights like the masthead light. If aft, they are 32-point lights like the range light. The towing lights are only 3 feet (instead of 6 feet) above or below each other.

Two white towing lights on an inland vessel, either forward or aft, signify that the tow is secured alongside the towing vessel or is being pushed. If the vessel is carrying her towing lights forward and is pushing one or more vessels, she also carries, at or near her stern, two amber lights in a vertical line not less than 3 feet apart. They must be 12-point lights showing from right aft to 6 points on either side and visible for 2 miles. When towing astern, regardless of the length of the tow, an inland towing vessel shows three white lights.

NOT-UNDER-COMMAND LIGHTS

* International Rules: The term "not under command" as used in the Rules of the Road refers to ships and craft which are physically disabled and are therefore unable to maneuver in accordance with the rules. Rule 4 says a ship not under command at night must show two red lights, one over the other and not less than 6 feet apart, where they may be seen best. They must be visible all around the horizon at a distance of at least 2 miles. During daylight she hoists two black balls or shapes at least 6 feet apart. If she is a power-driven vessel, she shows the not-under-command lights in lieu of her masthead light. If she is making no headway, she shows the red lights and stern light only; if making headway, she shows her side lights as well. The reason for this procedure is obvious. If a ship is not under command, it is urgent that nearby ships know whether she is making headway, and if so, the direction she is headed.

* Inland Rules: The Inland Rules contain no provision for not under command lights comparable to rule 4 of International Rules. A ship not under command in inland waters shows only her regular running lights at night, and no prescribed signal by daylight. You already know that a naval vessel breaks the 5 flag when she is not under command in daylight. But, in international waters, she would hoist two black balls as a warning to any merchant vessels in the vicinity.

OTHER LIGHTS AND DISPLAYS

The Rules of the Road go into extensive detail concerning special lights and displays that must be shown by vessels engaged in operations restricting their ability to get out of the way. This section describes these special lights and displays.

Fishing Vessels

In international waters, fishing vessels not engaged in fishing show the same lights or shapes as other vessels of similar length. In inland waters, fishing vessels underway but not engaged in fishing and under 10 tons gross weight are not required to show side lights. Instead, they may have a green and a red lantern ready to show on the appropriate side when in the vicinity of other ships. If the vessels are of 10 gross tons or more, however, they must show the same lights as other vessels.

* International Rules: The lights prescribed for fishing vessels in international waters must be visible at a distance of at least 2 miles, unless otherwise indicated.

Vessels that are engaged in trawling carry two lights in a vertical line, one over the other, 4 to 12 feet apart. The upper light is an all-around green light; the lower light is an all-around white light. (See fig. 9-5.) These vessels may also carry a white 20-point light abaft the aforementioned all-around lights visible at a distance of 5 miles. These vessels carry colored side lights and a stern light only when they are making way.

Vessels engaged in fishing with nets or lines extending not more than 500 feet (except vessels engaged in trawling), show the same all-around lights as for trawling, except that the upper light is red. When making way, these vessels display sidelights and a stern light.

Fishing vessels (except vessels engaged in trawling) with nets or lines extending greater than 500 feet horizontally carry, in addition to the lights mentioned in the previous paragraph, an all-around white light in the direction of the outlying gear. (See fig. 9-6.)

By day fishing vessels indicate their occupation by displaying a black shape consisting of two cones with their points together, one over another (fig. 9-7). If these vessels are less than 65 feet in length, a basket may be substituted for the black shape, pointed upward, in the direction of the outlying gear.

* Inland Rules: All fishing vessels, when fishing with any kind of dragnets or lines, must exhibit two lights, one red and one white. The red light is displayed 6 to 12 feet over the white light. The horizontal distance between the two should be no more than 10 feet. (A memory aid for lights on fishing vessels is: "Red over white, fishing at night.") Both lights are all-around lights. The red light must be visible for a distance not less than 2 miles. The white light must be visible for at least 3 miles. (See fig. 9-8.)

All fishing vessels, during the day, indicate their occupation to approaching vessels by displaying a basket where it can be seen best. If an anchored fishing vessel has its gear out, on the approach of another vessel, it must display the basket in the direction from the anchor ball toward the gear.

Vessels Engaged In Restricted Operations

In this section, the term "restricted operations" refers to vessels engaged in laying or picking up submarine cable or navigation aids, vessels engaged in surveying, vessels replenishing at sea, vessels engaged in launching and recovering aircraft, or any other vessels engaged in operations which, by nature, restricts their ability to get out of the way of other vessels.

* International Rules: When vessels engaged in restricted operations are unable, because of the nature of their work, to get out of the way of approaching vessels, they must display three vertical all-around lights not less than 6 feet apart. All three lights must be visible for at least 2 miles. The top and bottom lights are red and the middle light is white. Figure 9-9 shows these lights and the side lights that also must be displayed.

During daytime, these vessels carry three shapes. The highest and lowest are red global shapes; the middle shape is a white diamond. (See fig. 9-10.) The shapes are not less than 6 feet apart, and are 2 feet in diameter.

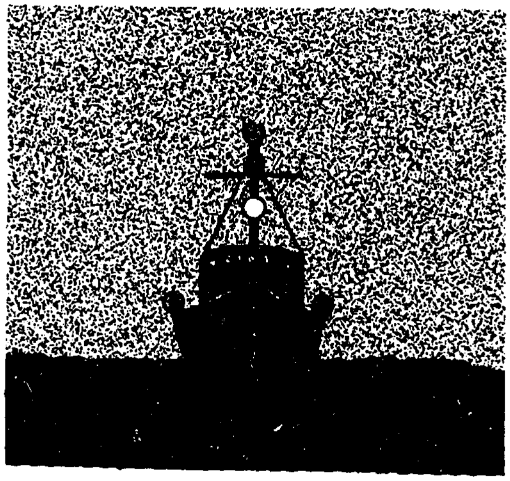


Figure 9-5.–Fishing vessel engaged in trawling–International Rules. C112.50

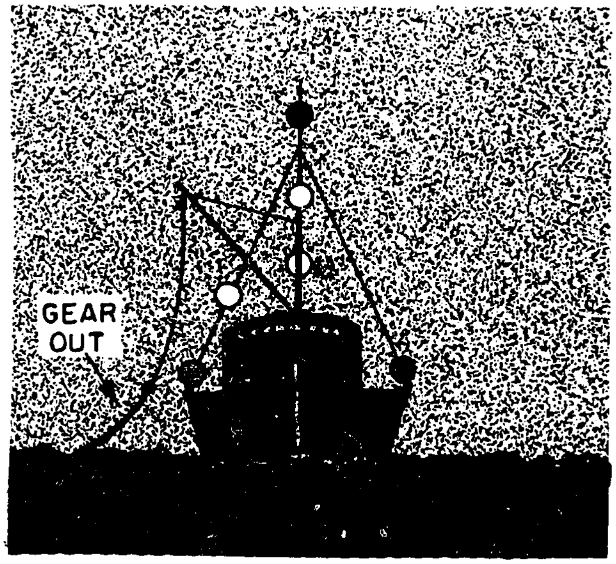


Figure 9-6.–Fishing vessels with nets extended greater than 500 feet–International Rules.
C112.51

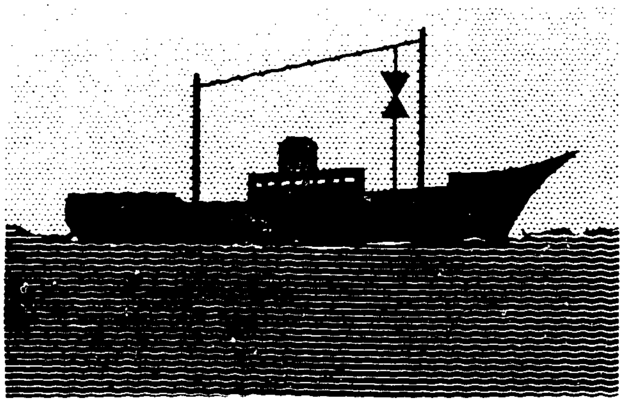


Figure 9-7.–Day shape, fishing vessel–International Rules. C112.52

* Inland Rules: The following descriptions concern lights and shapes for vessels engaged in restricted operations. Unlike International Rules, Inland Pilot Rules require different lights and shapes for various operations included in the general term "restricted operations."

Vessels towing a submerged object: Vessels towing a submerged object at night are required to show four lights, arranged vertically, 3 to 6 feet apart. The upper and lower lights are white; the two middle lights are red. All four lights must be visible for a distance of at least 5 miles. These vessels also carry side lights and an after range light. (See fig. 9-11.)

During the day, vessels towing a submerged object must display two shapes, one above the other, not less than 6 feet apart. The lower shape is at least 10 feet above the deckhouse. The shapes are in the form of a double frustum of a cone, not less than 8 inches at the end. They should be 4 feet in length. The upper shape is painted in alternate horizontal stripes of black and white, and the lower shape is red. (See fig. 9-12.)

Vessels made fast alongside or over a wreck: At night, vessels made fast alongside a wreck, or moored over a wreck that is on the bottom or partly submerged, display white lights from the bow and the stern, not less than 6 feet above the deck. Additionally, these vessels must show two vertically arranged red lights, 3 to 6 feet apart, and not less than 15 feet above the deck (fig. 9-13).

The day shapes are of the same character and dimensions as those for vessels towing submerged objects, except that both shapes are painted red.

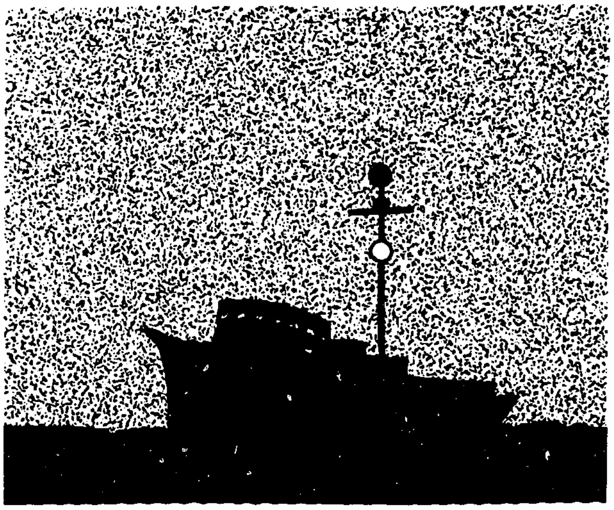


Figure 9-8.–Fishing vessel–Inland Rules. C112.54

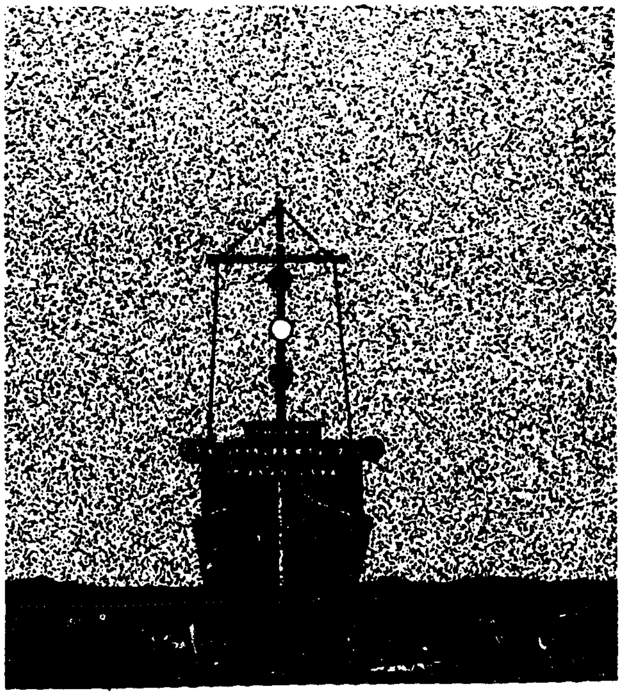


Figure 9-9.–Vessel engaged in underwater operations–International Rules. C112.55

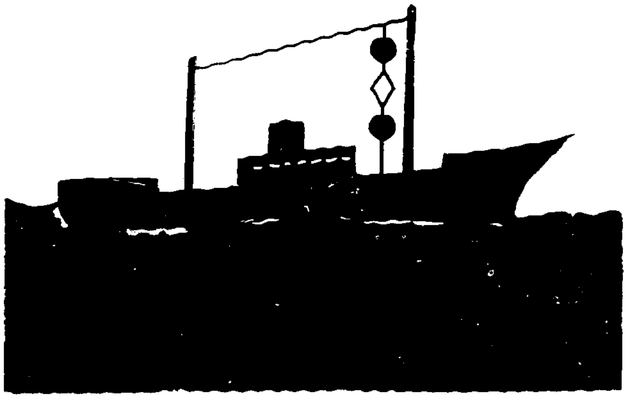


Figure 9-10.–Day shapes, underwater operations–International Rules. C112.56

Dredges in stationary position: At night, dredges held in position by moorings or spuds display a white light at each corner at least 6 feet above the deck. They also show two red lights in a vertical line 3 to 6 feet apart, not less than 15 feet above the deck. (See fig. 9-14).

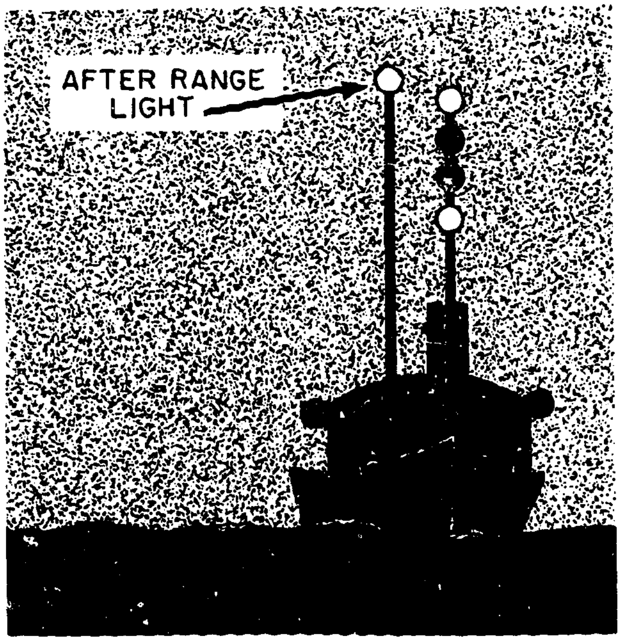


Figure 9-11.–Vessel with submerged tow– Inland Rules. C112.57

During the day, two red balls are displayed in a vertical line 3 to 6 feet apart and at least 15 feet above the deckhouse in a position where they can be seen best from all directions.

At night, vessels moored or anchored and engaged in laying cables or pipe, submarine construction, excavation, mat sinking, bank grading, or other bank protection operations, display three red lights in a vertical line, 3 to 6 feet apart. The lowest light must be at least 15 feet above the deck. (See fig. 9-15).

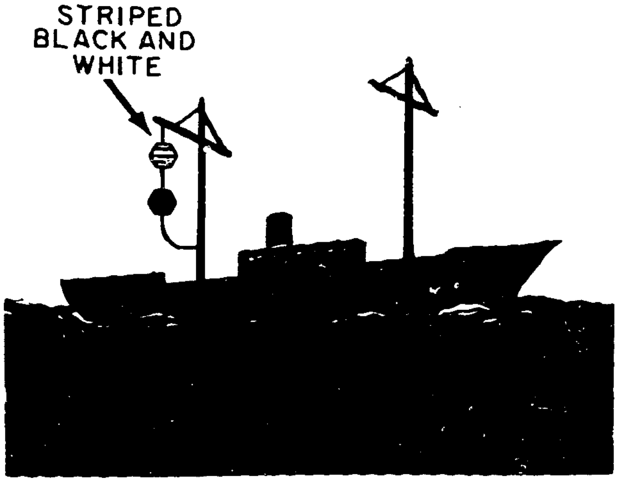


Figure 9-12.–Day shapes, vessel with submerged tow–Inland Rules. C112.58

During the day these vessels show two balls in a vertical line at least 15 feet above the deck. The upper ball is painted in alternate black and white stripes and the lower ball is painted red.

Vessels Aground

At night, under International Rules, vessels under 150 feet in length, when they go aground, must carry on the bow of the ship, where it can be seen best, a white light in a lantern that is visible for at least 2 miles. They must also carry, in a vertical line 3 to 6 feet apart, two all-around red lights, which are visible for at least 2 miles.

At night, vessels 150 feet and over, when they go aground, must display a white light in the forepart of the vessel at least 20 feet above the hull, and a white light near the stern of the vessel at such a height that it is not less than 15 feet lower than the forward light. (This light is optional on vessels less than 150 feet in length.) The two red lights specified for vessels under 150 feet are also required. (See fig. 9-16).

By day, vessels aground show three black balls in a vertical line not less than 6 feet apart.

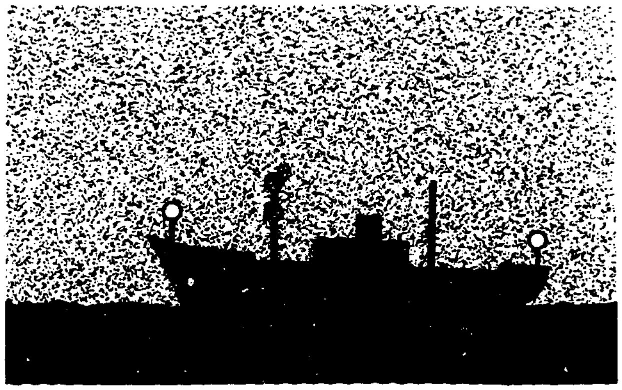


Figure 9-13.–Vessel made fast over a wreck–Inland Rules. C112.59

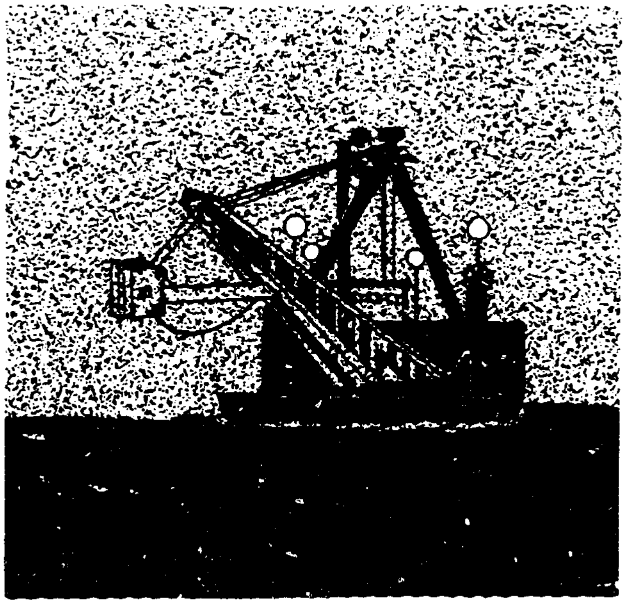


Figure 9-14.–Dredge held stationary–Inland Rules. C112.60

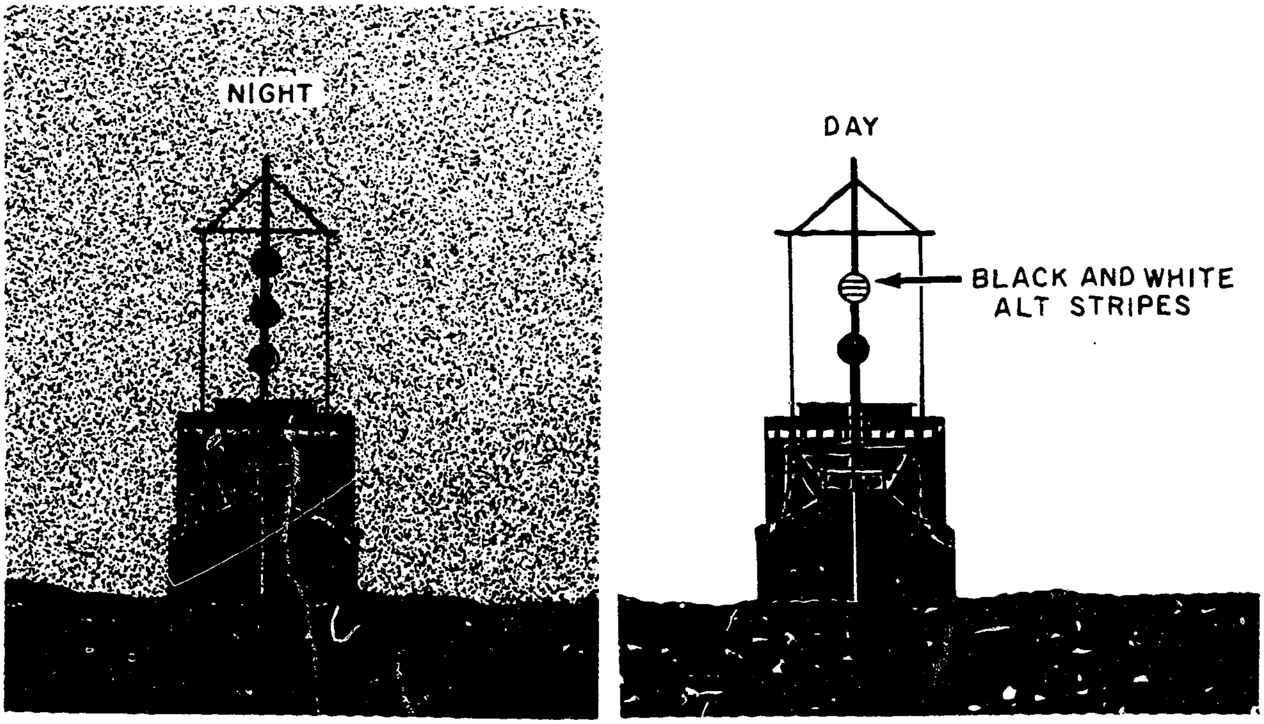


Figure 9-15.–Vessel laying cable–Inland Rules. C112.61

Inland Rules do not provide for vessels that go aground. Courts have ruled, however, that vessels aground in inland waters should display anchor signals. This decision means that during the night such vessels should display the same lights as required by International Rules (with the exception of the red lights). During the day, such vessels display a single black ball where it can be seen best by other vessels.

Sailing Vessels

Both International and Inland Rules provide that sailing vessels underway must carry red and green side lights and must display a white stern light as near the level of the side light as possible.

Vessels In Tow And Ferryboats

This topic describes lights and shapes for barges and canalboats in tow in international and inland waters. Lights and shapes for ferryboats are described for Inland Rules only. International Rules do not provide for ferryboats.

* International Rules: Any vessel being towed carries side lights. They carry in addition a white stern light visible over an arc of 135°. This light is visible 67 1/2° on either side of the stern.

* Inland Rules: The following Inland Rules apply to ferryboats and to barges and canalboats on both the Atlantic and Pacific coasts.

Ferryboats: Power-driven ferryboats navigating in inland waters, except those waters covered in *Pilot Rules for the Western Rivers* and *Pilot Rules for the Great Lakes and Their Connecting and Tributary Waters*, carry the range lights and side lights required by law for steam vessels navigating in those waters. The only exception is the double-end ferryboat, which is required to carry a central range of white lights, showing all around the horizon, placed at equal altitudes, fore and aft. The side lights for double-end ferryboats must be changed each time the ferry changes direction. Figure 9-17 shows a double-end ferryboat.

Barges and canalboats–Atlantic and Pacific Coasts: Barges, canalboats, and other nondescript vessels, when towed astern of steam vessels–as in tandem towing (fig. 9-18)–carry a green light on the starboard side and a red light on the port side. Each vessel also carries a white stern light, except that the last vessel of the tow carries two white lights.

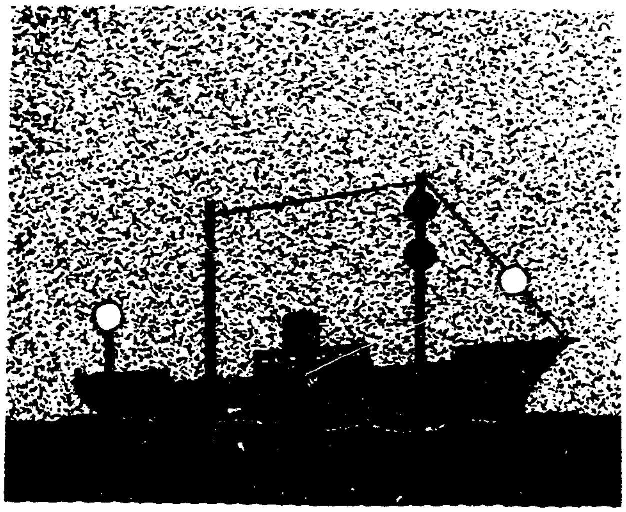


Figure 9-16.–Vessel aground, over 150 feet–International Rules. C112.62

When two or more barges, canalboats, or other nondescript vessels are towed abreast, side lights are carried at the outer sides of the bows of the vessels (fig. 9-19). Each of the outside vessels in the last tier of a hawser tow must carry a white light on the stern.

A barge or a scow that is towed alongside a steam vessel must, if the deck, deckhouse, or cargo of the towed vessel obscures the side lights of the steam vessel, carry the proper side light on the tow to replace the hidden side light of the towing vessel.

When a barge or canalboat is pushed ahead by the steam vessel, side lights are placed on the bow. If more than one vessel is pushed ahead, the side lights are placed on the lead vessel.

The same lights for barges and canalboats are applicable on most inland waters along the Atlantic and Pacific coasts. The lights in some harbors and waterways are subject to changes and variations. To find these changes and variations, as well as the lights for barges and canalboats in other inland waters, refer to CG 169.

SPECIAL RULES FOR NAVAL VESSELS

It should be noted that many naval vessels, because of their special construction, are unable to comply strictly with the rules for running lights. Examples of such noncompliance are:

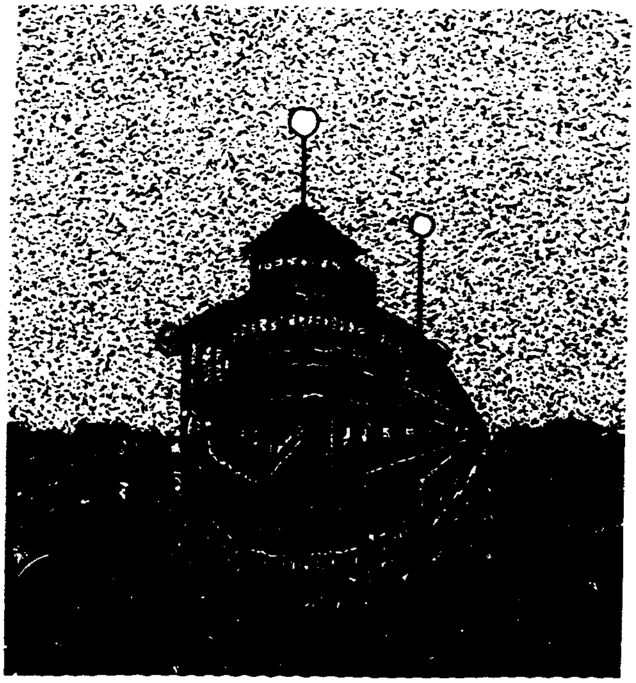


Figure 9-17.–Double-end ferry. C112.63

The horizontal separation of the white lights on destroyers and smaller ships is frequently less than that specified in the rules;

The white lights on aircraft carriers are usually on the superstructure and, thus, considerably off the centerline;

The towing lights on certain command ships (CC2 type) are lower than required by the rules.

The lights on such specially constructed vessels must, nevertheless meet the requirements of the rules as nearly as possible.

Naval vessels may also be expected to show certain other lights not mentioned in the rules (such as speed lights, carrier landing lights, and colored recognition lights) or during darken ship exercises, they may show no lights at all. These departures from the Rules of the Road are provided for by U.S. laws and statutes.

Minesweepers

Minesweepers, when not sweeping, display the same lights and signals as other vessels of equivalent length. In international and inland waters, minesweepers engaged in sweeping (fig. 9-20) display the following lights:

1. A green all-around light is shown from the fore masthead before passing or streaming sweeps.
2. Next, a green all-around light is hoisted at the yardarm on the side (s) on which it is dangerous for other vessels to pass.
3. In addition to these two or three green lights, minesweepers carry the required running lights for ships of their class.

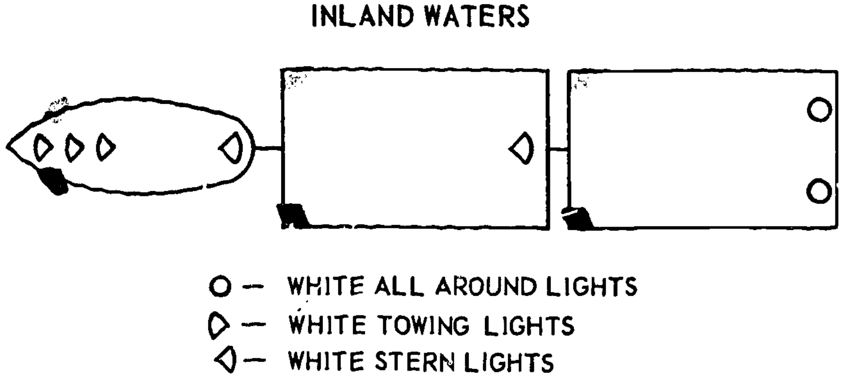


Figure 9-18.–A tow in tandem. C80.121

Additional lights are displayed by minesweepers engaged in particular types of sweeping. These lights are described in ATP 1(A) Volume II.

During the day, minesweepers substitute black balls (fig. 9-21) for the green lights they display at night. Minesweepers may use some special signals during the day. These signals are contained in ATP 1(A), Volume II.

Display of Distinctive Lights by Submarines

In accordance with International Rules and Inland Rules, the Secretary of the Navy has authorized the display of a distinctive light by U.S. Navy submarines in international waters and in the inland waters of the United States. The light must be exhibited in addition to the presently prescribed navigational lights for submarines.

The normal navigational lights of submarines have been found to be easily mistaken for those of small vessels when in fact submarines are large deep-draft vessels with limited maneuvering characteristics while they are on the surface.

The newly authorized light is expected to promote safety at sea by assisting in the identification of submarines. United States submarines may therefore display an amber colored rotating light producing 90 flashes per minute visible all round the horizon at a distance of at least 3 miles, the light to be located approximately 6 feet above the masthead light.

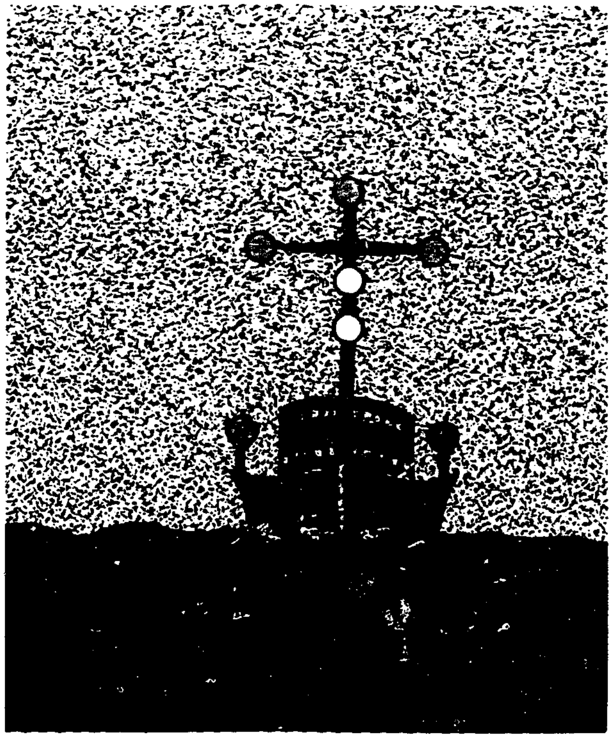


Figure 9-20.–Minesweeper engaged in sweeping; at night; sweeps streamed on both sides. 112.64

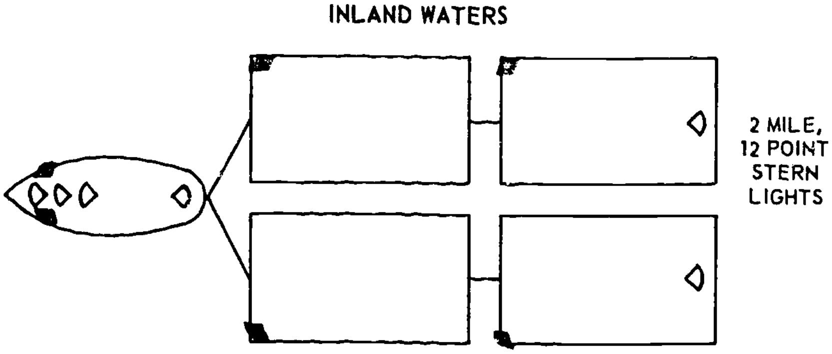


Figure 9-19.–Canalboats and barges abreast in tiers. C80.121

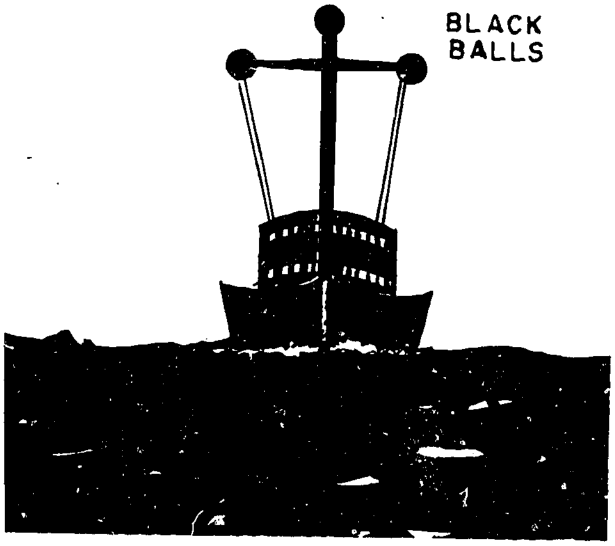


Figure 9-21.–Minesweeper–day shape.
112.65

SOUND SIGNALS FOR FOG

A power-driven vessel sounds her fog signals on the whistle or siren; sailing vessels, on the foghorn; and vessels in tow, on the whistle or foghorn. When a "prolonged blast" is mentioned in the rules, it means a blast of from 4 to 6 seconds' duration. A short blast is for about 1 second.

A power-driven vessel underway in a fog (or thick weather of any kind) is required by International Rules to sound a prolonged blast at 2-minute intervals. Inland Rules require the same signal, but at 1-minute intervals.

In inland waters, a power-driven vessel underway in fog sounds one prolonged blast whether she is making way or is stopped with no way on her. Under International Rules, a power-driven vessel underway in a fog, but stopped and having no way on her, sounds two prolonged blasts, with about 1 second between them, at intervals not exceeding 2 minutes.

Under both International and Inland Rules, a power-driven vessel towing another vessel sounds one prolonged blast, and two short blasts at 1-minute intervals. This same signal is sounded in international waters by a vessel not under command in fog. In inland waters a vessel not under command or unable to maneuver in fog (except a power-driven vessel towing) cannot signal her plight, and can do nothing but sound a prolonged blast at 1-minute intervals.

Under Inland Rules, one prolonged blast, followed by two short ones, is the signal given by a vessel being towed in fog. International Rules specify that the last vessel of the tow must give one prolonged blast followed by three short ones. Under both rules the signals are sounded at 1-minute intervals.

A sailing vessel underway in fog sounds her foghorn at 1-minute intervals as follows:

1. On the starboard tack, one blast.
2. On the port tack, two blasts.
3. Wind abaft the beam, three blasts.

A vessel at anchor in fog (International and Inland) rings her bell rapidly for about 5 seconds at intervals of not more than 1 minute. By provisions of International Rules, a vessel over 350 feet in length rings a bell in the forward part of the vessel. In the after part, a gong, or some other instrument that cannot be confused with the bell, is sounded. The instrument is sounded for about 5 seconds at intervals of not more than 1 minute. If there is a possibility of collision, the vessel at anchor may sound three blasts (one short, one prolonged, and one short) to warn each approaching vessel of her position.

In addition to the signals sounded by a vessel at anchor, a vessel aground in international waters gives three separate and distinct strokes on the bell immediately before and after the anchored signal. Inland Rules for a ship aground are the same as those for an anchored ship.

If at any time a vessel hears a fog signal forward (or apparently forward) of her beam, and cannot ascertain the position from which the signal is coming, she must stop her engines and navigate with caution until she is sure there is no danger of collision.

A stopwatch is best used by the man assigned the duty of sounding the fog signals. He should be directed to vary the interval between signals frequently in case another vessel's signals are synchronized with his own, therefore, each drowning out the other's signals.

Table 9-1 should be helpful in learning fog signals.

STEERING AND SAILING RULES

Distinction must be made between Inland and International Rules in whistle signals in several particulars; but first of all, note this general distinction between the two types of signals:

International whistle signals are signals of execution. Inland whistle signals are signals of intention.

Inasmuch as international waters are not so crowded as inland waters, it was not considered necessary to make International Rules whistle

Table 9-1.–Summary of Fog Signals 69.131

International		Situation	Inland	
Signal	Maximum interval		Signal	Maximum interval
—	2 min.	Power-driven or steam vessel underway, with way on.	—	1 min.
— —	2 min.	Power-driven or steam vessel underway, but stopped, no way on.	—	1 min.
— ..	1 min.	Vessel not under command	—	1 min.
X	1 min.	Vessel at anchor	X	1 min.
3 X 3	1 min.	Vessel aground	X	1 min.
— ..	1 min.	Vessel towing	— . .	1 min.
— ...	1 min.	Vessel towed	— . .	1 min.
— ..	1 min.	Vessel laying submarine cable or navigation mark.	—	1 min.
— ..	1 min.	Vessel fishing	—	1 min.
		Sailing vessel:		
0	1 min.	On starboard tack	0	1 min.
0 0	1 min.	On port tack	0 0	1 min.
0 0 0	1 min.	Wind abaft beam	0 0 0	1 min.

NOTES:

3 represents three strokes of bell.

X represents bell, forward, 5 seconds, vessels over 350 feet, when anchored in international water, sound gong aft also.

— represents a prolonged blast.

. represents a short blast.

0 represents a blast.

signals as informative as Inland Rules signals. International whistle signals which are signals of execution are given below. They are not sounded at all unless and until the ship is already executing the maneuver.

One short blast: I am altering my course to starboard.

Two short blasts: I am altering my course to port.

Three short blasts: My engines are going astern.

The close quarters and heavy traffic in inland waters make it necessary for Inland Rules whistle signals to be a better means of communication than International signals. Meanings of the Inland Signals are developed as this discussion progresses. Remember, however, that an Inland signal is a signal of intention only. The ship that sounds the signal does not put her intention into execution until she receives an OK from the other vessel by the return of the same signal. If the other vessel does not understand the signal, or considers the proposed maneuver of the first vessel dangerous, she replies with the danger signal–not less than four short, rapid blasts. (The doubt signal for international waters consists of at least five such blasts.)

Confusion over whistle signals for meeting, crossing, and passing situations is probably responsible for more collisions than any other phase of the Rules of the Road. Read over this section on Steering and Sailing Rules until you clearly understand the distinction between International and Inland whistle signals, and the application of the steering and sailing rules to various traffic situations. Although all the Rules of the Road are important, the steering and sailing rules are the ones most essential to know to avoid collision. Farwell's *Rules of the Nautical Road* is a valuable aid in interpreting the rules. Figure 9-22 illustrates several situations that might arise when two vessels approach each other. The illustration and the following summary should help you learn steering and sailing rules.

1. When two ships meet end-on, or nearly so, each ship must change course to starboard so as to pass port-to-port. In international waters, a whistle signal is sounded only if and when a course change actually is made. In inland waters, either vessel sounds the whistle signal, and it is to be answered with one by the other. If the meeting ships are already far enough off each other to pass clear on their present courses, no signal is sounded in international waters. In inland waters, either vessel must sound one short blast if intending to pass port-to-port; two short blasts, intending to pass starboard-to-starboard. The signal must be answered by the other vessel.
2. When two steam vessels are crossing in international waters, the one having the other to starboard must keep clear by the best means available, but should cross ahead only when risk of collision does not exist or when in extremis. A whistle signal is sounded only if and when a course change is made or the engines are backed. In inland waters, under the Pilot Rules, the privileged vessel must sound one blast to show her intention to maintain her course and speed. The burdened vessel must stand clear by passing under the stern of the privileged vessel.
3. A sailing vessel always has the right-of-way over a steam vessel, except when the sailing vessel is overtaking, or the steam vessel is a vessel engaged in fishing, or the vessels are navigating in a narrow channel in which the steam vessel must remain.
4. Any vessel overtaking another must keep clear. In international waters, a vessel passing another ship sounds a whistle signal only if and when she changes course. In inland waters, whether a change of course is made or not, an overtaking vessel must sound one short blast if she intends to pass to starboard; two, if she intends to pass to port. She must not pass until she gets an OK from the vessel being overtaken, by return of the same signal.
5. In inland waters the danger signal means either "I don't understand your intentions," or "I don't think what you intend to do is safe, and am about to signal for what I consider to be the safer procedure." In international waters the danger signal means "I am in doubt as to whether you are taking sufficient action to avoid collision."

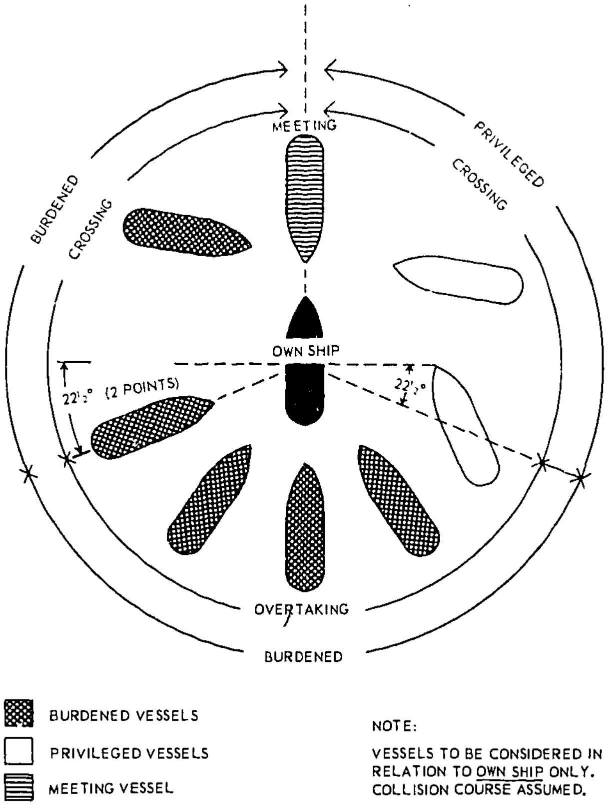


Figure 9-22.–Meeting, crossing, and overtaking situations. 58.86

WHO MUST KEEP CLEAR

The rules for lights are designed so that a ship's display at night will tell you as much as possible about her. Positioning the range light higher than the masthead light, for instance, frequently lets you know the direction a ship is heading before you can recognize her side lights. If the after anchor light is lower than the forward one, you are able to distinguish either end of an anchored ship.

The same rules apply to the sound signals for fog. You can tell from the sound whether the ship making the signal is anchored or underway. You know when she has a tow. In international waters, a certain signal tells you when a ship in fog is not under command.

In short, these sailing and steering rules are designed mainly to help one ship keep clear of another. Now, the question arises: Which of two ships in sight of each other must haul off to let the other pass? The rules that govern in a situation like this are most important, and distinctions between International and Inland Rules are such that they must be very clear in your mind.

RISK OF COLLISION

Both International and Inland Rules usually talk about a situation in which two ships are approaching each other so as to involve risk of collision. Naturally, no maneuvering is required by ships that will pass clear by merely maintaining their present courses and speeds. But when the courses of two ships are converging so as to raise the possibility of a collision, one or the other must take some positive action, either by altering course, or by slowing, stopping, or backing her engines. The rules say: "Risk of collision can, when circumstances permit, be ascertained by carefully watching the compass bearing of an approaching vessel. If the bearing does not appreciably change, such risk should be deemed to exist."

When the bearing of a vessel whose course is converging with yours remains constant, she is on a "Collision course." In such a situation, one vessel or the other is charged by the rules with keeping clear by the best means available.

The vessel keeping clear is referred to as the "burdened vessel." The other vessel must maintain her course and speed until risk of collision no longer exists. She is said to have the right-of-way, or she may be called the privileged vessel. The terms "burdened vessel" and "privileged vessel" must be applied in a strictly limited sense, however, because even the so-called privileged vessel is charged with definite responsibilities from which she may depart only in situations covered by the General Prudential Rule or the Rule of Good Seamanship.

General Prudential Rule: The General Prudential Rule makes it impossible for a privileged vessel to escape responsibility after standing into a recognized danger, simply because her skipper was determined not to haul off when he had the right-of-way. International Rule No. 27 says: "In obeying and construing these Rules due regard shall be had to all dangers of navigation and collision, and to any special circumstances, including the limitations of the craft involved, which may render a departure from the above Rules necessary in order to avoid immediate danger."

The corresponding Inland Rule 27 deletes the words "including the limitations of the craft involved."

Obviously, a vessel may depart from the requirements of the Rules of the Road, by provisions of the General Prudential Rule, only when an immediate danger exists, which requires such a departure. When such a danger exists, it is termed "in extremis." Although we have mentioned the failure of a privileged vessel to heed the General Prudential Rule, in some conceivable situations a burdened vessel could be at fault in the same manner.

Rule of Good Seamanship: The Rule of Good Seamanship (Rule 29, Inland and International) reads as follows: "Nothing in these Rules shall exonerate any vessel, or the owner, master or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper look-out, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case."

The Rule of Good Seamanship is invoked in a situation where the immediate danger is not as pressing or as obvious as one justifying a departure from the letter of the rules under the General Prudential Rule. A good example is a tug, with a couple of tows streamed astern, coming down with a strong current from aft and crossing a single vessel on her starboard bow. The literal interpretation of the rules says that the tug is the burdened vessel and must keep clear. Let's say the circumstances are such that, in order to do so, she must lie to. Any good seaman knows that if the tug does lie to, the tows will pile up on her stern. The Rule of Good Seamanship says she doesn't have to get herself in a situation like that just to let the other vessel have the right-of-way. Consequently, she can request permission to cross ahead, by appropriate whistle signal as described later.

In considering the General Prudential Rule and the Rule of Good Seamanship, it must be borne in mind that a departure from the Rules of the Road is permissible only—positively only—when the immediate danger, or requirement of the ordinary practice of seamen, or special circumstance, exists. Otherwise, the rules must be adhered to strictly. Naturally, only the OOD or conning officer of the vessel involved may decide when to apply the General Prudential Rule or the Rule of Good Seamanship.

MEETING END-ON

When two power-driven vessels meet end-on, or nearly end-on, so as to involve risk of collision, each must alter her course to starboard so they will pass each other port-to-port.

Most of the rules describe a situation wherein one vessel or the other must keep clear, but this meeting end-on situation requires both vessels to keep clear. The rule applies only when the ships are so nearly stem-to-stem as to see each other's masts in line in the daytime, or both of the other's side lights at night. If they are far enough off each other to pass clear without changing course, then each must maintain her present course and speed.

Each of the two ships so meeting, as already stated, must alter course to starboard so as to pass port-to-port. In inland waters, each ship sounds one short blast to indicate her intention to change course to starboard. In international waters, each ship sounds one blast when she changes course to starboard.

If the vessels are already far enough to port or starboard of each other to pass clear on their present courses, they must stay on their courses and pass clear. Here, an important distinction must be pointed out between International and Inland Rules. Because no course change is involved, no signal is made in international waters. Inland Rules require, however, that if the ships are to pass port-to-port, regardless of whether a course change is made, either ship sounds one short blast to signify her intention to pass port-to-port, and the other ship answers with one short blast to show it is OK with her. If they are going to pass starboard-to-starboard, whether a change of course is required, either ship sounds two short blasts, to be answered with two short blasts by the other.

CROSSING

In taking up crossing situations, we should recall the previously mentioned International and Inland Rule, which says, in substance, that when a power-driven vessel and a sailing vessel are proceeding in such a direction as to involve risk of collision, the power-driven vessel must keep out of the way of the sailing vessel; but the sailing vessel does not have the right, in a narrow channel, to hamper the safe passage of a steam vessel that can navigate only inside the channel. Rule 24 (both Rules) modifies this rule somewhat by saying, in part: "Notwithstanding anything contained in these rules, every vessel overtaking any other shall keep out of the way of the overtaken vessel."

Rule 26 says that sailing vessels must keep out of the way of ships fishing with nets, lines, or trawls, but that fishing vessels may not obstruct channels with their gear.

From the foregoing interpretations, it is clear that in any situation involving a power-driven vessel and a sailing vessel, the power-driven vessel must keep out of the way, except when–

1. In a narrow channel and the sailing vessel can operate outside the channel but the power-driven vessel cannot.
2. The sailing vessel is overtaking the power-driven vessel.
3. A sailing vessel comes upon a power-driven fishing vessel.

Rule 19, both Rules, says: "When two power-driven vessels are crossing, so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way of the other."

In other words, the ship that has the other vessel to starboard is the burdened vessel; the ship that has the other one to port is the privileged vessel. A burdened vessel must keep out of the way by the best means available. The privileged vessel must maintain her present course and speed until the danger is past.

In a crossing situation in international waters, a whistle signal is made by either vessel only if and when she changes course or backs her engines. Inland Rules for whistle signals in a crossing situation are complicated by the following Pilot Rule:

"One short blast of the whistle signifies intention to direct course to own starboard, except when two steam vessels are approaching each other at right angles or obliquely, when it signifies intention of steam vessel which is to starboard of the other to hold course and speed."

The privileged vessel in a crossing situation in inland waters, then, must sound a short blast to indicate she intends to avail herself of her privilege to maintain her course and speed. You can see how important it is to recognize such a situation. Suppose the ships are lined up so that one vessel thinks it is a crossing situation, but the other ship considers it a meeting situation. When the first ship (which would be, say, the privileged vessel) sounds one short blast, she intends to hold her present course and pass ahead of the other. The skipper of the other vessel, believing it to be a meeting situation, takes the one short blast to mean an intention to pass port-to-port. A collision is likely to result. Remember: It is not an end-on situation unless you can see the other ship's masts in line, or both her side lights, and you must be sure as well that your keel is directly in line with the other ship's keel.

The Pilot Rules state that two short blasts on the whistle mean an intention to direct own course to port. We already have seen that, under Inland Rules, two short blasts must be sounded in a meeting situation where two vessels will pass clear starboard-to-starboard without a change of course. Pilot Rules cannot contradict Inland Rules, thus the Inland Rule prevails in a meeting situation. Three short blasts, according to Pilot Rules, mean: "My engines are going at full speed astern." This particular whistle signal, sounded in inland waters, is a signal of execution instead of intention.

Assume that one of two vessels crossing is backing down. Which is the burdened vessel? Each vessel has the other one either to port or to starboard. In a situation like this, the courts have held that, for the purpose of locating the burden of keeping clear, the vessel going astern is considered to have her bow where her stern actually is. Then, if the other ship is on her starboard side, facing aft, she herself must keep clear.

Under the Rule of Good Seamanship, you read about a situation in inland waters where a burdened vessel may signal to the privileged vessel in order to share the burden of keeping clear. The instance cited was a tug towing a string of barges in a following current on the port side of another vessel. In this illustrative case the single vessel sounds one short blast, indicating under the Pilot Rules an intention to maintain her right-of-way. The tug answers with the danger signal, followed by two short blasts, signifying an intention to pass starboard-to-starboard. To let the tug cross, the single vessel must lie to or alter her course. Before the final maneuver, the single vessel must answer with two short blasts after she hears the tug's two short blasts.

As a matter of fact, the courts have held, in a similar situation, that a vessel may sound the signal that, in effect, calls for a shift of the burden of keeping clear, before the privileged vessel sounds her original signal.

OVERTAKING

Any vessel, including a sailing vessel, overtaking another must keep clear of the overtaken vessel. An overtaking vessel is one that is approaching another vessel from any direction more than 2 points abaft her beam. When in doubt whether you are forward or abaft this bearing, you must assume that you are overtaking, and keep clear.

In an overtaking situation, you recall, the Inland and International Rules have significant differences in whistle signals. In international waters a vessel that can pass another without a change of course sounds no signal. If she must change course, she sounds the appropriate signal as she does so. She is not required to wait for an answer.

In inland waters, however, an overtaking vessel cannot pass another ship until she signals on which side she intends to pass–one short blast if passing to starboard, two if passing to port. She sounds a signal regardless of whether she must change course, and she may not pass until she hears an OK, by a repeat of the same signal, from the vessel being overtaken.

If the ship being overtaken considers the proposed maneuver risky, she sounds the danger signal, followed by the signal for what she considers the safer procedure. Assume that the overtaking vessel sounds one short blast, signifying an intention to pass to starboard. The ship being overtaken vetoes this by sounding the danger signal. She follows with two short blasts, meaning: "You had better pass me to port, instead." The overtaking vessel replies with two blasts, and may then pass the other to port.

RADAR INFORMATION

When using radar information as an aid in navigation, the following recommendations should be applied.

1. Assumptions made on scanty information may be dangerous and should be avoided.
2. A vessel navigating with the aid of radar in restricted visibility must go at a moderate speed. Information obtained from radar is one circumstance to consider when determining moderate speed. In this regard, it must be pointed out that small vessels, icebergs, and similar floating objects may not be detected by radar. Radar indications of one or more vessels in the vicinity may mean that "moderate speed" should be slower than a mariner navigating without radar might consider moderate in the circumstances.
3. When navigating in restricted visibility, and a fog signal is heard forward of the beam, a ship's radar range and bearing alone do not constitute ascertainment of the position of the other vessel sufficiently to relieve a ship of her duty to stop her engines and navigate with caution.
4. When action has been taken to avoid a close quarters situation, it is essential to make sure that such action is having the desired effect. Alterations of course or speed or both are circumstances in which the mariner must be guided by the individual situation.

5. Alteration of course alone may be the most effective action to avoid close quarters if there is sufficient sea room, if it is made in good time, if it is substantial, and if it does not result in a close quarters situation with other vessels.

6. The direction of an alteration of course is a matter in which the mariner must be guided by the applicable circumstances. An alteration to starboard, particularly when vessels are approaching nearly on opposite courses, usually is preferable to an alteration to port.

7. An alteration of speed, either alone or in conjunction with an alteration of course, should be substantial, so that other vessels may realize that you have taken some action. A number of small alterations of speed should be avoided.

8. If a close quarters situation is imminent, the most prudent action may be to take all way off the vessel.

CHANNELS, BENDS, AND LEAVING A BERTH

Both Inland Rules and International Rules say that in a narrow channel every steam vessel must, when it is safe and practicable, keep to the side of the fairway or midchannel lying to her own starboard. Inland Rules provide that a steam vessel approaching a bend in a channel, if she is unable to see for at least 1/2 mile ahead, must sound a long blast on her whistle, which must be answered by any approaching vessel that hears it. International Rules are the same, except that a prolonged blast is sounded. If the first vessel receives no answer, she is to consider the channel clear ahead. A long blast, by custom, is of at least 8 to 12 seconds' duration—longer than a prolonged blast.

A vessel leaving her dock or berth also sounds a long blast in inland waters. Suppose a ship backing out into a fairway encounters a crossing situation with another coming down the fairway. Does the court's doctrine of changing ends to fix the burden of keeping clear apply? Answer: Apparently not. The courts have ruled that when a ship is leaving her berth, the ordinary sailing rules do not apply until she is fully in sight. If she becomes involved with another ship, both ships must keep clear.

DISTRESS SIGNALS

Both Inland and International Rules stipulate that distress signals may be made either separately or together. There is no basis in the rules for the popular notion that the national ensign, hoisted upside down, is a recognized signal of distress. No man-of-war would ever subject the colors to this indignity. But if you should see a private craft with her ensign hoisted upside down, she probably is in distress, and you should go to her assistance without delay.

Distress signals, Inland Rules, are as follows:

1. In the daytime, a continuous sounding with any fog-signal apparatus, or firing a gun.
2. At night– a. Flames on the vessel, as from a burning tar barrel or oil barrel. b. A continuous sounding with any fog-signal apparatus, or firing a gun.

Distress signals, International Rules, are as follows:

1. A gun or other explosive signal fired at intervals of about 1 minute.

2. A continuous sounding with any fog-signal apparatus.

3. Rockets or shells, throwing red stars, fired one at a time at short intervals.

4. The signal group ... — — — ... (SOS) in Morse code.

5. Radiotelephone signal "Mayday."

6. The international signal of distress indicated by the letters NC.

7. The distress signal, a square flag having above or below it a ball or anything resembling a ball.

8. Flames on the vessel, as from a burning tar barrel or oil barrel.

9. A rocket parachute flare or a hand flare showing a red light.

10. A smoke signal giving off a volume of orange-colored smoke.

11. Slowly and repeatedly raising and lowering arms outstretched to each side.

SPECIAL SUBMARINE SIGNALS

The following signals, although not part of the Rules of the Road, are prescribed for submerged submarines in emergency situations involving rising to periscope depth or surfacing.

1. A yellow smoke bomb fired into the air from a submarine indicates the submarine is coming to periscope depth from below periscope depth. Ships should clear the immediate vicinity, but should not stop propellers.
2. A red smoke bomb fired into the air from a submarine is a signal that the submarine is in serious trouble and will surface immediately if possible. Smoke bombs of any color, fired into the air at short intervals, mean that the submarine requires assistance. All ships in the vicinity should stand by to give aid.

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CHAPTER 10

CHARTS AND PUBLICATIONS

CHARTS

A chart is a pictorial representation of all or part of the navigable waters of the earth. Before going into detail concerning information on charts, you should know the methods of projection by which the curved surface of the earth's sphere is transferred to a flat plane. Best known is the Mercator system, devised several hundred years ago by a Flemish geographer whose real name was Gerhard Kremer. Most of the charts you will use are Mercator projections.

MERCATOR PROJECTION

If you cut a hollow rubber ball in half and try to flatten out one of the halves, you will find you cannot do so without tearing or stretching the rubber. In fact, no section of the hemisphere will lie flat without some distortion. Projection of the curved surface of the earth onto a flat plane presents the same difficulty. No system has been devised for such a projection that preserves the true proportions of components of the original sphere. The surface of a cylinder, however, readily opens out and lies flat without distortion, and the Mercator system of projection is based upon this phenomenon.

The discussion that follows is general. Consult Dutton's *Navigation and Piloting* or the *American Practical Navigator*, H.O. Pub. No. 9 if you desire more detailed information.

In drawing a Mercator projection, the first detail is to project the meridians. Assume that the earth is a hollow, transparent glass ball with a powerful light shining in its center. A paper cylinder is placed around it, tangent to it at the equator, as shown in figure 10-1. Suppose the meridians painted on the glass ball are projected onto the cylinder as vertical lines, parallel to and equidistant from one another. (See fig. 10-2.) The cylinder now has the meridians on its surface, and half of the Mercator projection is complete.

The next step in the projection process is to draw the parallels. Spacing of the parallels is derived mathematically to agree with the expansion of the longitude scale. Spacing between parallels increases progressively toward the poles at the same ratio as the expansion of the space between meridians. The meridians and parallels are at right angles to one another resulting in a projection of conformity. Remember, because of the sphere-cylinder relationship, the north and south poles cannot appear at all on the Mercator projection.

Now, unroll the cylinder and look at the projection that has been made (fig. 10-3). The meridians are parallel to and equidistant from one another. The latitude lines are parallel to one another, but they gradually draw apart as they become farther north and south of the equator. Above or below 80° north or south latitude they become so far apart that Mercator projection of the polar regions seldom is used.

Although the space between parallels on a Mercator chart increases with latitude, the distance represented by 1° of latitude is always the same. One

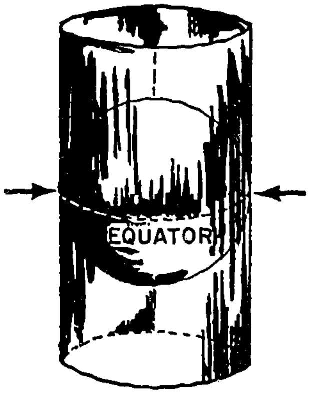

Figure 10-1.–Cylinder tangent to the earth at the equator. 45.422(69).1

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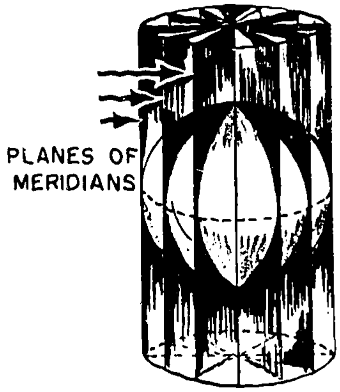


Figure 10-2.–Projection of meridians on the cylinder. 45.422(69).2

minute of latitude is considered to be approximately 1 nautical mile.

On a Mercator projection, however, 1° of latitude near one of the poles appears considerably longer than 1° of latitude near the equator. It follows, then, that if both measurements represent the same actual distance, that distance as shown in high latitude on a Mercator chart may appear distorted, but actually it conforms to scale.

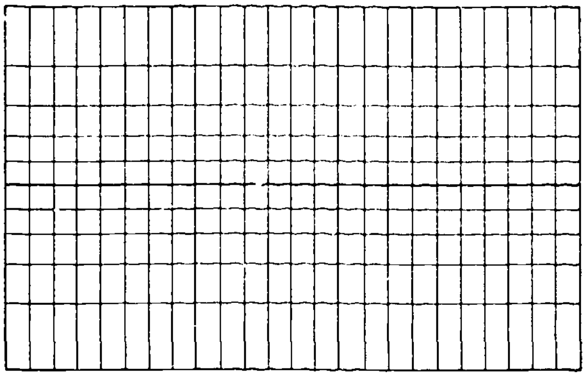


Figure 10-3.–Meridians and parallels on a Mercator projection. 45.422(65).2

Figure 10-4 shows the globe with actual comparative size of Greenland to the United States. But on the Mercator chart, in the background, Greenland appears to be larger than the United States. The reason is, at high latitudes the Mercator chart shows greater exaggeration of area, but the exaggeration of area does conform to the latitude and longitude scale. Actually the United States is a good deal larger than Greenland.

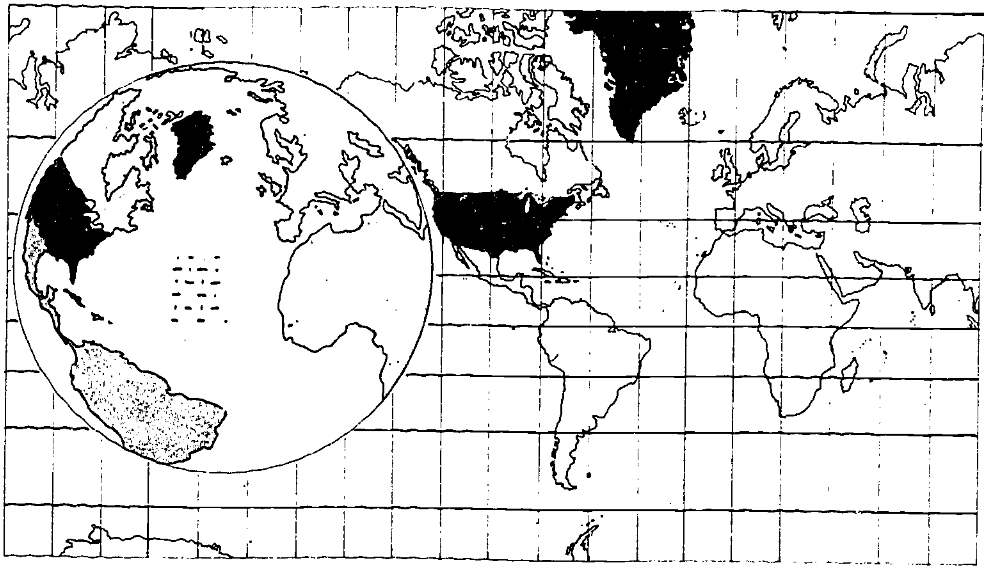


Figure 10-4.–Globe/Mercator chart comparison.
65.117

Direction on a Mercator Projection

As mentioned before, the meridians on a Mercator chart appear as straight lines, parallel to and equidistant from one another. You know, however, that they represent imaginary curved lines, not parallel to one another at all, but converging on the poles.

Appearance of meridians on a Mercator projection as parallel straight lines is one of the most valuable features of this type of projection, making it possible to plot a course as a straight line (called a rhumb line). You may already know that the shortest distance between two points on a sphere actually is along the great circle connecting them. Such a line intersects every meridian at a different angle. A great circle, with the exception of a meridian or the equator, is a line of continuously changing direction, along which it would be generally impracticable to steer a ship. The ship's course would have to be changed progressively and continuously to follow it.

On a Mercator projection, though, a straight rhumb line cuts every meridian at the same angle. In other words, it is a line of the same bearing throughout. Although it does not represent the shortest distance between the points it connects, this fact is not important unless very large distances are involved. That brings up the subject of great circle sailing, which is done from charts made by gnomonic projection.

GNOMONIC PROJECTION

Details of gnomonic projection are not especially useful to surface navigators, and therefore are of little use to a Quartermaster 3 or 2. You simply need to know that the gnomonic projection preserves the natural curvature of the meridians and parallels, so you see them as though you were looking directly at a point on the surface of a globe of the earth. If the point happens to be one of the poles, then the parallels appear as a series of concentric circles, and the meridians are straight lines radiating away from the pole.

Polar charts frequently are gnomonic projections because, as you already learned, Mercator projection of the polar regions seldom is used. Chief advantage of the gnomonic projection is in determining the great circle track (or shortest distance) between two widely separated points. Gnomonic projections utilized for this purpose are called great circle charts. Gnomonic projections cannot be used directly for navigation because they are not conformal projections, i.e., they do not show correct angular and spatial relationships.

GREAT CIRCLE SAILING

Suppose you are sailing from Valparaiso, Chile, to Sydney, Australia–a considerable distance. Time and expense can be saved if you sail by the shortest route. The shortest distance between any two points on the earth is along the great circle passing through the points.

On a gnomonic projection, a great circle appears as a straight line (fig. 10-5). Take out the great circle chart of the South Pacific, and connect Valparaiso and Sydney by a straight line. This line is the great circle track between those points. You can't steer along this track, however, because it is a line of continuously changing direction. Instead, you transfer the great circle course from the small-scale great circle chart to a series of large-scale Mercator charts. Latitude and longitude of points along the great circle course are located on the Mercator charts, and are connected by a series of straight rhumb lines. The rhumb lines indicate the courses the ship actually will steer.

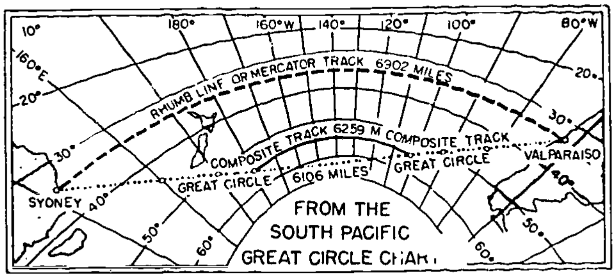


Figure 10-5.–Rhumb line and great circle course on a great circle chart. 65.118(69)B

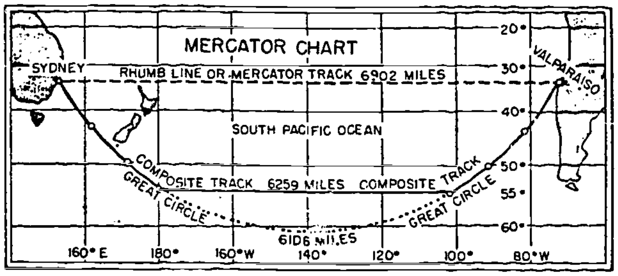


Figure 10-6.–Rhumb line and great circle course on a Mercator chart. 65.118(69)A

Great circle sailing usually is performed only over a large area For short distances, a rhumb line and great circle course very nearly coincide. Even for long distances, the course actually steered is, in general, a composite of both tracks (fig. 10-6), selected to avoid high latitudes and dangers to navigation.

MILITARY GRID REFERENCE SYSTEM

The ability to read and interpret grid coordinates on charts is becoming increasingly important to Quartermasters. Presently a number of grid overlays and grid overprints are in use. The system with which Quartermasters are most concerned is called the military grid reference system. The primary purpose of this system is to simplify and increase the accuracy of reporting in military operations (shore bombardment, target designation, etc.). It may be used for other purposes when designating small areas of the earth's surface.

The coordinates used in the military grid reference system are derived by two separate methods. They are the universal transverse Mercator (UTM) grid, which covers all the earth's surface between latitudes 80° S and 80° N, and the universal polar stereographic (UPS) grid, which covers the areas from 80° N to the north pole and from 80° S to the south pole. From the foregoing data, it is readily apparent that the vast majority of the earth's surface falls within the UTM system; consequently, only that system is taken up in this course.

Universal Transverse Mercator (UTM)

In the transverse Mercator projection, vertical and horizontal lines are projected from the earth's surface onto a cylinder in a manner similar to the method described earlier for use in the Mercator projection. The principal difference is that the transverse Mercator projection is not tangent to the earth at the equator. Instead, it is tangent to the earth along the great circle of a meridian, at right angles to the equator. In this system, both meridians and parallels appear as slightly curved lines. The rectangular UTM grid is then superimposed upon the projection.

The UTM is based on five separate spheroids that are corrected mathematically to allow for the slightly flattened shape of the earth. When pieced together, the spheroids join each other on exact degrees of latitude and exact even degrees of longitude.

The earth is divided by the UTM system into areas 6° east-west and 8° north-south. East-west divisions are called columns; north-south divisions are called rows. Columns are numbered consecutively 1 through 60°, starting at the 180° meridian and proceeding eastward. Rows are lettered C through X, starting at latitude 80° S and proceeding in a northerly direction to 80° N. Letters I and O are omitted to avoid confusion with numerals 1 and 0. This letter-number combination is called grid zone designation.

The grid zone designation for any area may be determined by reading right, then up on the chart. Column designation 2 and row designation P, for example, produce grid zone designation 2P. (See fig. 10-7.)

Each grid zone designation is divided into 100,000-meter squares. Squares are further subdivided into 10,000-, 1000-, and finally 100-meter squares. The 100,000-meter squares are identified by letters only, as may be seen in figure 10-7. Columns are lettered A through Z (omitting I and O), beginning with the 180° meridian and proceeding along the equator. Rows are lettered A through V (again omitting I and O) from south to north.

Divisions smaller than the 100,000-meter square are indicated by numbers only and are always located by reading right, then up on the chart. Thus, 10,000-meter square 65, shown as a shaded area in part A of figure 10-8, would be located by starting in the lower left corner, reading right to column 6 and up to row 5.

For further subdivisions, additional numbers indicate 1000- and 100-meter lines. For example, 1000-meter square area 6957 would be located by reading right (within area 65) to 69 and up to 57. The 100-meter square area 693578 would be located by reading right to 693 and up to 578.

To summarize, the numerical reference of a point may be expressed to the desired accuracy as in the following examples.

52SCU . . . . locating a point within a 100,000-meter square.
52SCU65. . . . . locating a point within a 10,000-meter square.
52SCU6957 . . . . . . locating a point within 1000 meters.
52SCU693578. . . . . locating a point within 100 meters.

As a matter of practical referencing, both the grid zone designation and the 100,000-meter square may be omitted because the position to which reference is made is almost always known within 100,000 meters.

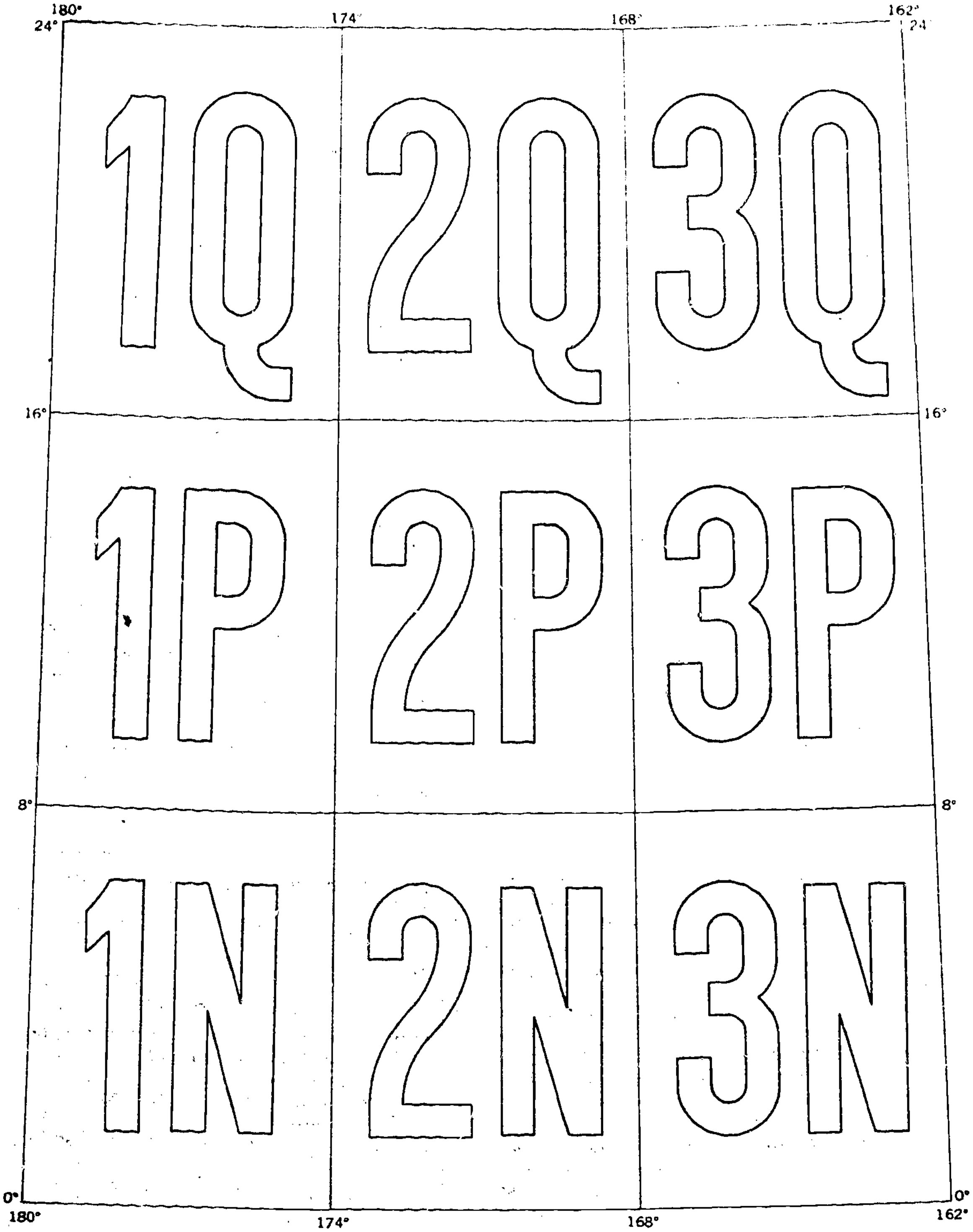


Figure 10-7.–Basic plan of the 100,000-meter square identification of the military grid reference system. 82.52

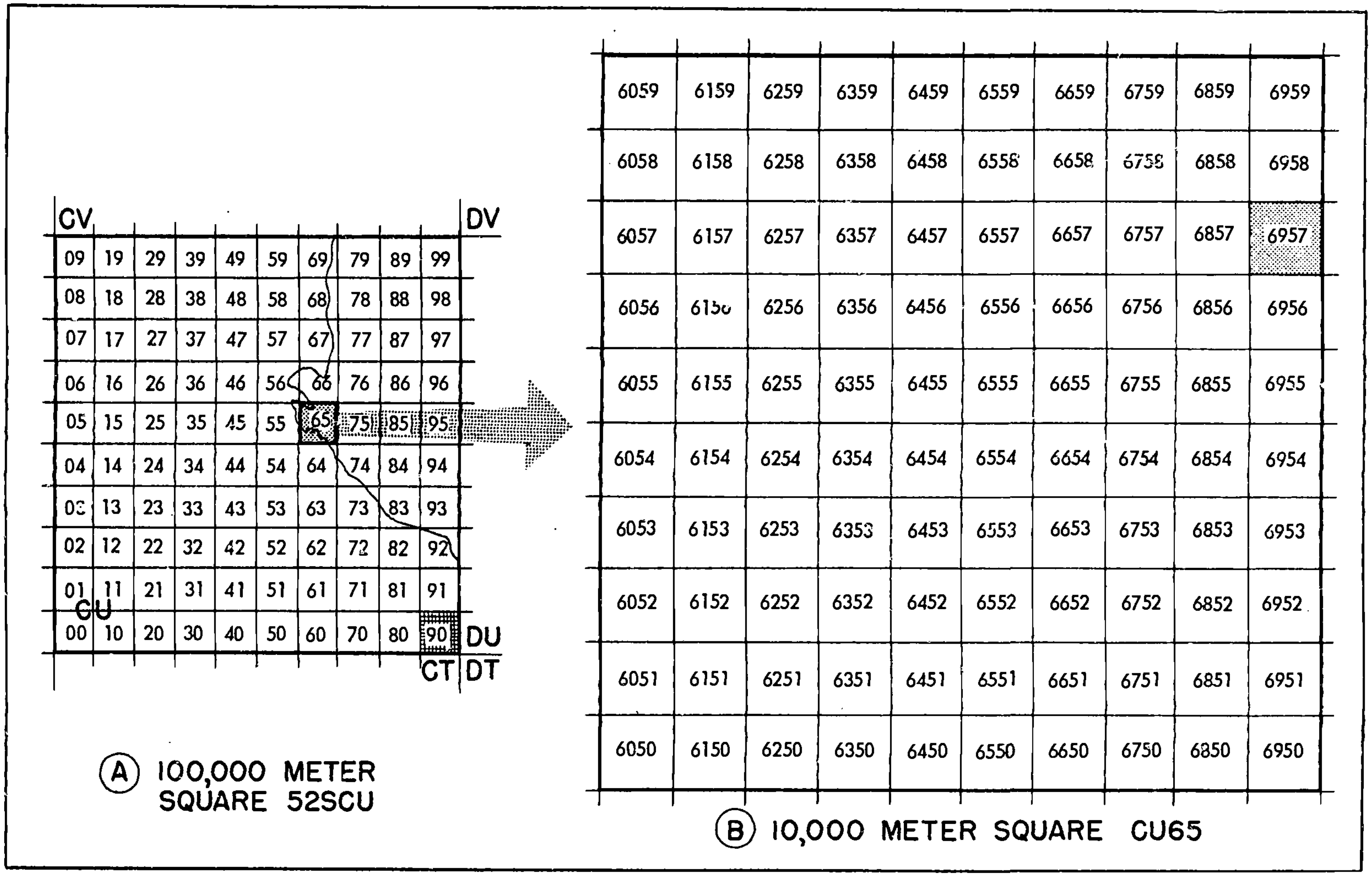


Figure 10-8.–Area 6957 within square 65.
74.102

SCALE OF CHARTS

The scale of a chart refers to a measurement of distance, not area. A chart covering a relatively large area is called a small-scale chart and one covering a relatively small area is called a large-scale chart. Scales may vary from 1:2,500 for plans to 1:14,000,000 for world charts. Normally, the major types of charts fall within the following scales:

1. Harbor Charts–1:2,400 to 1:50,000
2. Coast and Approach Charts–1:50,000 to 1:100,000
3. Offshore Coasting Charts–1:100,000 to 1:600,000
4. Ocean Sailing Charts–1:600,000 or smaller

The size of the area portrayed by a chart varies extensively, according to the scale of the chart. (See fig. 10-9.) The larger the scale, the smaller the area represented. From this truism it follows that large-scale charts show areas in greater detail. Many features that appear on a large-scale chart do not, in fact, show up at all on a small-scale chart of the same area.

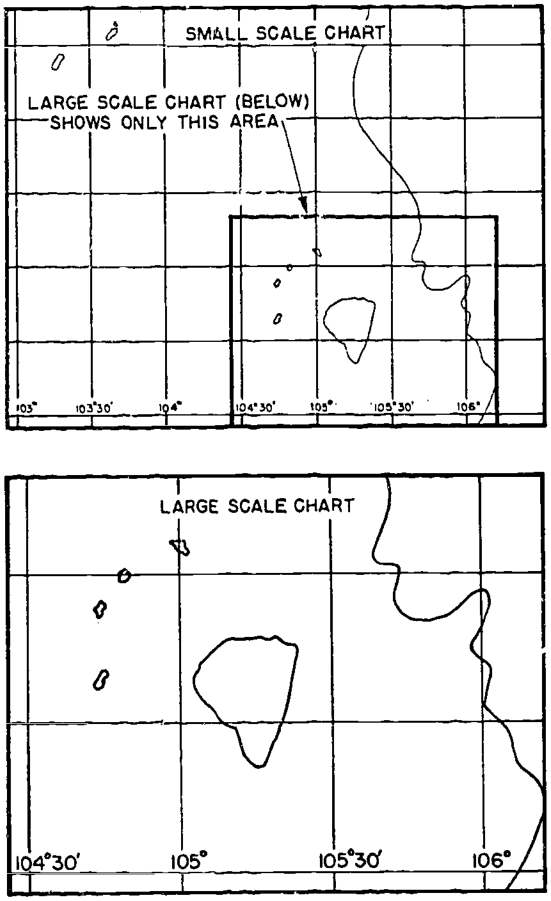


Figure 10-9.–Small-scale and large-scale charts.
65.123

The scale to which a chart is drawn usually appears under its title in one of three ways: 1 to 5,000, 1:5,000 or 1/5,000. These figures mean, in effect, that an actual feature is 5,000 times as large as its representation on the chart. Expressed another way, an inch, foot, yard, or the like, on the chart means 5,000 identical units on the earth's surface. Thus, the larger the figure indicating the proportion of the scale, the smaller the scale of the chart. A chart with a scale of 1:5,000 is on a much larger scale, for instance, than one whose scale is 1:4,500,000. Another way of expressing scale, called the numerical scale, is in inches to the nautical mile.

You must exercise greater caution when working with small-scale charts than with charts on a larger scale. A small error, which may be only a matter of yards on a large-scale chart, could amount to miles on a chart depicting a much more extensive area. When navigating the approaches to land, use only charts of the largest scale.

TYPES OF CHARTS

Charts used in the Navy may be prepared by the Naval Oceanographic Office, the National Ocean Survey (formerly Coast and Geodetic Survey), the British Admiralty, or by other agencies. Whatever the source, however, all charts used by the Navy are issued by the Oceanographic Office.

Navigational Charts

A navigational chart is one on which standard symbols, figures, and abbreviations give information on depth of water, character of bottom and shore, location of navigational aids, and other information used in actual navigation.

General sailing charts are small-scale charts showing the approaches to large areas of the coast. These charts show offshore soundings, principal lights and outer buoys, and any natural landmarks visible at a considerable distance. The scale of general sailing charts usually is from 1:600,000 and smaller.

Coastal charts are on a larger scale. They are used to navigate a vessel that is well offshore but whose position may be determined by prominent landmarks and lights, outer buoys, or soundings.

When navigating inside outlying reefs or shoals, or well offshore in large bays or sizable inland waterways, a coastal or harbor chart may be used.

Harbor charts are on scales larger than 1:50,000. They show harbors and their approaches in considerable detail.

SOUNDINGS.–Scattered all over the watery area of any navigational chart are many tiny figures, each number representing the depth of water (usually the depth of mean low water) in that particular locality. Depths on some charts are given in feet; on others, in fathoms. A notation under the title of the chart is the key; for example, "Soundings in feet at mean low water," or "Soundings in fathoms at . . . ." Most charts also contain dotted lines called fathom curves, marking the limits of areas of certain depths. On the chart in figure 10-10 you can see a 10-fathom (60 feet) curve and a 15-fathom (90 feet) curve.

Aids to Navigation

Aids to navigation are indicated on a chart by appropriate symbols, as shown in the numerous graphics comprising figure 10-20 at the end of this chapter. As much information as possible is printed in standard abbreviations near the symbol. For instance, look at the light on Castle Hill, on the west point of Newport Neck (fig. 10-10). Printed near the light symbol is this information: Occ R 4 sec 40 ft 12M. This notation means the light is red, that it is occulting (the period of light is equal to or greater than the period of darkness), the period required for the light to go through a complete cycle is 4 seconds, the light is 40 feet above mean high water, and is visible for 12 miles. By "visible" is meant visible on a clear, dark night.

The chart symbol for a buoy is a diamond shape. Notice that there is a small dot near every buoy sym-

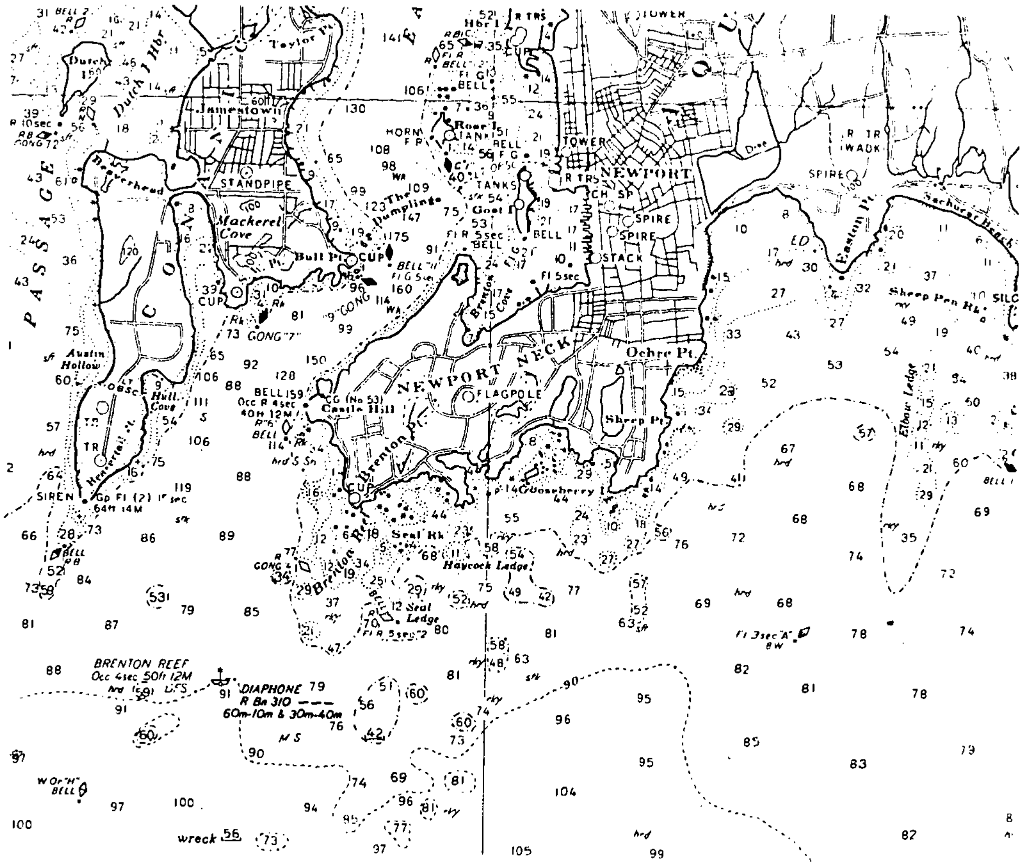


Figure 10-10.–Part of N.O. Chart 13058.
69.29

bol. This dot represents the buoy's exact location. The diamond shape itself is not drawn to scale, and may be set down considerably off the buoy's actual position.

CHART NUMBERS

The Naval Oceanographic Office introduced a new chart numbering system which became effective 1 March 1971. The system provides a simple method of identifying each chart by number which indicates, in general, the geographical region and scale range in which the chart falls. Charts are numbered with one to five digits, as shown in the following lists.

Number of Digits	*Natural Scale*
ONE (1–9)	No scale involved
TWO (10–99)	1:9,000,001 and smaller
THREE (100–999)	1:2,000,001 to 1:9,000,000
FOUR (5000–9999)	Nonnavigational type
FIVE (11000–99999)	1:2,000,000 and larger

Under the new system a new prefix (N.O.) representing the Naval Oceanographic Office is used with one-, two-, three-, four-, or five-digit numbers. From the list indicating number of digits and associated scale, four categories of charts exist. Each category contains clues to the location and scale range of the chart.

The first category contains charts with one-digit number, have no scale, such as Nautical Chart Symbols and Abbreviations (N.O. 1), National Flags and Ensigns (N.O. 5), International Flags and Pennants with Morse Symbols (N.O. 6).

The second category has charts with two- and three-digit numbers that are general charts based on the nine "ocean basin" concept. (See fig. 10-11.) The ocean basins of the world are as follows:

Basin	*Area*
1	North Atlantic
2	South Atlantic
3	Mediterranean
4	Carribbean
5	North Pacific Ocean
6	South Pacific Ocean
7	Indian Ocean
8	Artic Ocean
9	Antarctica

The first digit in the category denotes the ocean basin which the chart covers, for example, chart N.O. 15 covers the North Atlantic Ocean with a scale 1:9,000,001 and smaller. Chart N.O. 121 covers the North Atlantic Ocean (northern sheet) with a scale between 1:2,000,001 and 1:9,000,000. An exception to the scale concept is the series of position plotting sheets, which have a scale larger than 1:2,000,000. These plotting sheets have been included in the three-digit number category because they cover ocean basins of 360° of longitude. Since the Mediterranean (basin 3), the Caribbean (basin 4), and the Indian Ocean (basin 7), for example, are small in size an exception to the ocean basin concept exists. There is no chart smaller in scale than 1:9,000,000 in these areas. The two-digit numbers 30 to 49 and 70 to 79 are used for special world charts that cannot have the first digit indicating an ocean basin, such as The Magnetic Inclination or Dip for the Year 1965 (N.O. 30), Magnetic Variation Chart of the World for the Year 1965 (N.O. 42), and the Standard Time Zone Chart of the World (N.O. 76).

The third category consists of charts with four-digit numbers, that are nonnavigational. They are a special-purpose chart series such as chart N.O. 5006, Chart of the World, Longitude 172" W to 15° E; and chart N.O. 5090, Maneuvering Board, (Small, in pads of 50).

The fourth category contains charts with five-digit numbers. Since the charts in this category have a scale range of 1:2,000,000 and larger, the "ocean basin" concept loses significance. So another system was adopted based on the world now divided into nine regions, listed as follows:

Region	*General Area*
1	United States and Canada
2	Central and South America and Antarctica
3	Western Europe, Iceland, Greenland and the Arctic
4	Scandinavia, Baltic and U.S.S.R.
5	West Africa and the Mediterranean
6	Indian Ocean
7	Australia, Indonesia and New Zealand
8	Oceania
9	East Asia

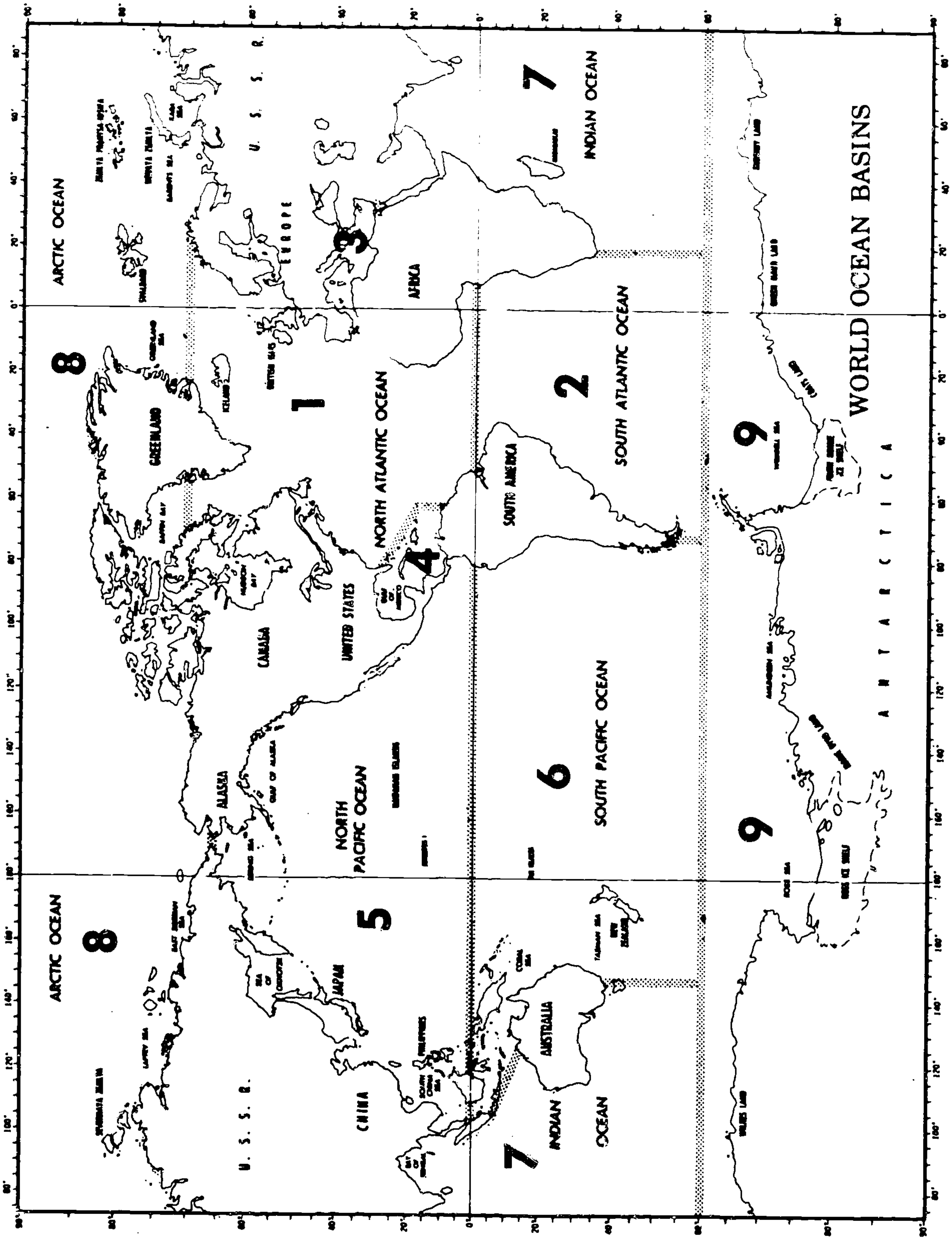


Figure 10-11.–World ocean basins. 74.263

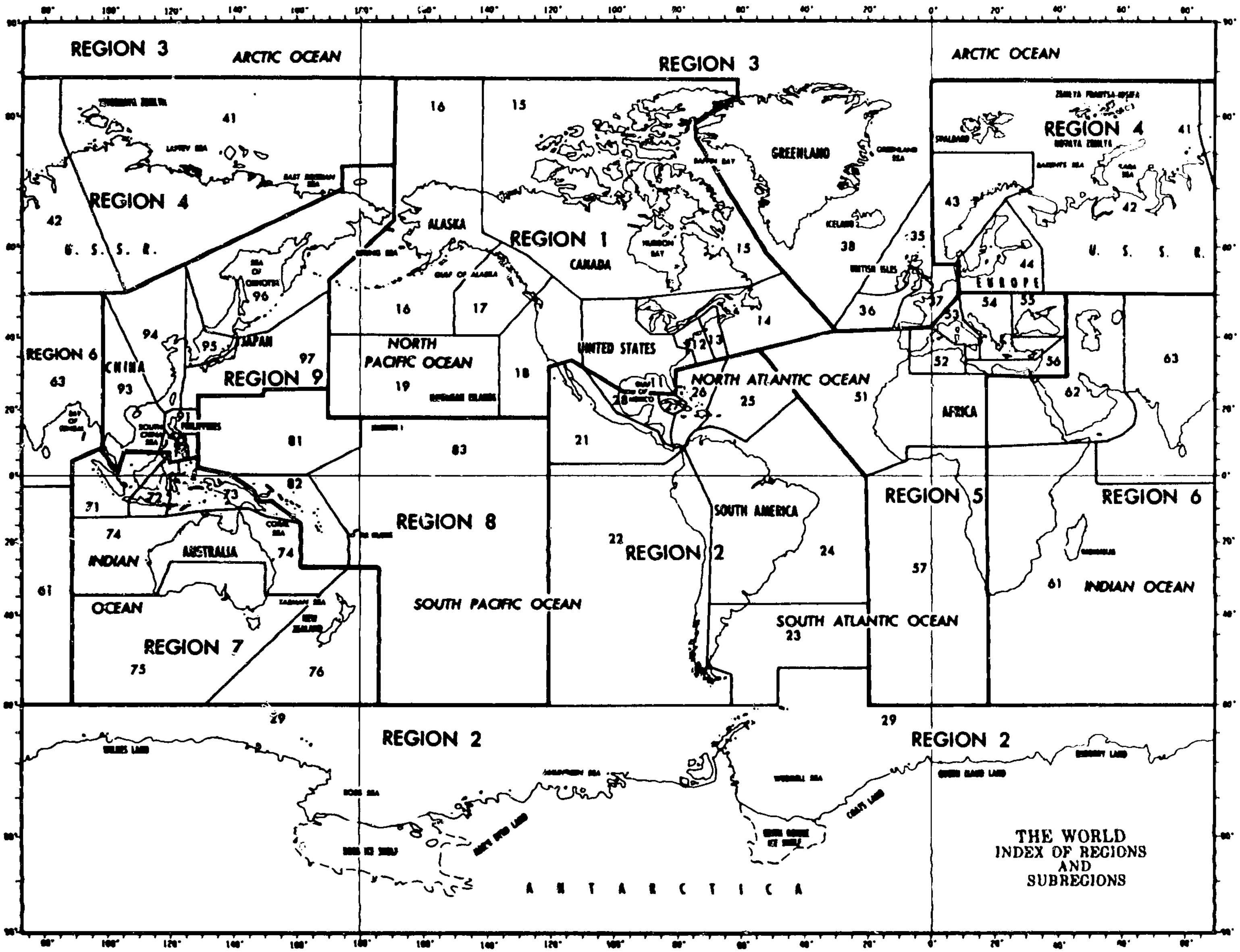


Figure 10-12.–World Regions and Subregions.
74.264

Each region is further subdivided into numbered subregions. The subregions divide the world into 52 geographical areas which are assigned a two-digit designator. (See figure 10-12.)

The five-digit category contains all of the large-scale charts of the world. These are the primary nautical charts. The first of the five digits indicates the region in which the chart is depicted, the second digit indicates a geographical subregion within the region, and the last three digits identify the geographical order of the chart within the subregion.

There are exceptions to the N.O. numbering system just described, such as, Bathymetric (Bottom Contour) and Non-Submarine Contact Charts. These charts, at a scale larger than 1:2,000,000 do not portray portions of a coastline, but chart parts of the ocean basins. In view of the characteristics of these charts, they are identified with an alphabetical character plus four digits: The letter "B" denoting bottom contour (BC) charts with or without Loran-A; the letter "C" for bottom contour charts with Loran-C information; the letter "N", non-submarine contact (NSC) charts; the letter "M", NSC charts containing Loran-C; and the letter "D", BC charts with Omega information. The first two digits of these charts describe a longitude band, and the last two digits describe the latitude band.

Combat charts also fall within the five-character identifier. However, because of their special military use some deviation was made to distinguish them from regular navigational charts. Their five-character identifier consists of the two digits indicating the region and subregion in which the chart falls, the third character is a letter, and the final two characters are digits identifying the geographical sequence of the chart.

This numbering system is also applicable to nautical charts produced by the National Ocean Survey (formerly Coast and Geodetic Survey) and charts of foreign governments which the Naval Oceanographic Office maintains within its distribution system. N.O. numbers are assigned to these charts so that they may be filed in a logical sequence with charts produced by the Naval Oceanographic Office.

CHARTS ON BOARD

The charts your ship has on board depend on your ship type (CVA, DD, LST, etc.). The allowance of charts for each type of ship is prepared by taking into consideration its probable operating range and its facilities for chart storage. For each type of ship assigned to units of the Atlantic or Pacific Fleets, you will find the minimum chart allowance listed in the front of N.O. Pub. No. 1-PCL.

Quantities designated are basic minimum allowances. Your ship may carry additional charts, depending on your particular area of operation or the type or fleet commander's instructions.

NAUTICAL CHART AND PUBLICATION CATALOGS

Nautical chart and publications may be found indexed in one of the below listed catalogs. These catalogs can provide additional information of interest to the navigator that may not be found in N.O. Pub 1-PCL.

Catalog No.	
N.O. Pub 1-N INTRODUCTION PART I	Consists of general information on Charts, text and/or graphics on limits of regions and subregions, small-scale charts of the world, bottom contour, great circle sailing and polar charts, air/surface electronic navigational and miscellaneous charts.
N.O. Pub 1-N INTRODUCTION PART II	Index of sheets and diagrams, plotting and display charts, tracking, great circle and miscellaneous charts.
N.O. Pub 1-N INTRODUCTION PART III	Numerical listing of unclassified charts contained in all sections of the catalog.
N.O. Pub 1-N, REGION 1	United States and Canada
N.O. Pub 1-N, REGION 2	Central and South America and Antarctica
N.O. Pub 1-N, REGION 3	Western Europe, Iceland, Greenland and the Arctic
N.O. Pub 1-N, REGION 4	Scandinavia, Baltic and U.S.S.R.
N.O. Pub 1-N, REGION 5	West Africa and the Mediterranean

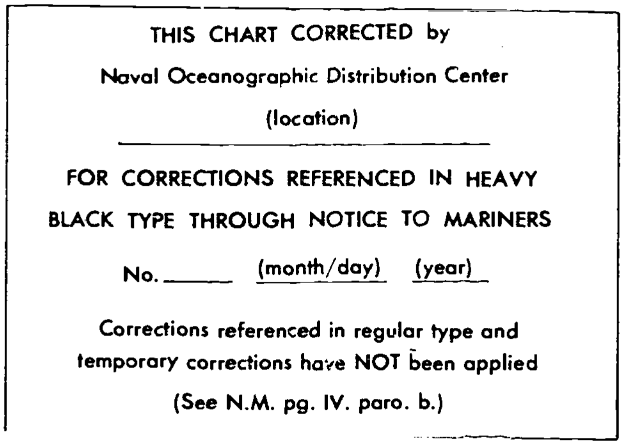
N.O. Pub 1-N, REGION 6	Indian Ocean
N.O. Pub 1-N, REGION 7	Australia, Indonesia and New Zealand
N.O. Pub 1-N, REGION 8	Oceania
N.O. Pub 1-N REGION 9	East Asia
N.O. Pub 1-P	Catalog of Publications

Suppose you are to sail from Norfolk, Va., to Sao Luis in South America. For general planning and for sailing the open sea between the two ports, you would refer to Introduction, Part I to locate the appropriate small-scale charts, *Sailing Directions* and *Light Lists*. From Introduction, Part II you would find any charts you might need for loran navigation, and your position plotting sheets. For the large-scale charts needed when you navigate in port, channels, etc., you would refer to region 2.

Additions and changes to the catalogs may be obtained from the *Monthly Information Bulletins*. These bulletins contain a listing of new nautical publications and charts and their limits, new editions, dates, prices, cancellations, and withdrawals. All Navy ships receive a copy of these bulletins.

The *Catalog of U.S. Navy Aeronautical Charts* and *Related Publications*, *Coast and Geodetic Survey Catalog* of *Aeronautical Charts and Related Publications*, and *DOD Catalog of Aeronautical Charts and Flight Information Publications* contain index plates and listings of aeronautical charts and publications and indicate the latest editions. The charts are used principally for aeronautical navigation.

Only the latest editions of charts are issued. Corrections are made on all nautical charts embodying the necessary changes in lighting, buoyage, and other data received in the Oceanographic Office before the charts are issued. The *Notice to Mariners* number and the date through which a chart is corrected are stamped in a convenient place at the bottom of the chart at the time of issue. (See fig. 10-13.) Corrections affecting charts (after the stamped date) are published in the weekly *Notice to Mariners*, copies of which may be obtained from the Naval Oceanographic Office, Washington, D.C. 20390.



THIS CHART CORRECTED by

Naval Oceanographic Distribution Center

(location)

FOR CORRECTIONS REFERENCED IN HEAVY BLACK TYPE THROUGH NOTICE TO MARINERS

No._____ (month/day) (year)

Corrections referenced in regular type and temporary corrections have NOT been applied

(See N.M. pg. IV. para. b.)

Figure 10-13.–The Notice to Mariners stamp.
69.31

PORTFOLIO CHART LIST

The Portfolio Chart List (N.O. Pub. No. 1-PCL) is a publication furnished by the Naval Oceanographic Office to United States ships. It is issued in two volumes; one for the Atlantic and one for the Pacific. The ocean of operation determines which volume is issued to a particular ship. This publication contains a complete list of charts, by portfolio, arranged according to their N.O. numbers. The basic minimum N.O. charts and publication allowance listed for active vessels assigned to the Pacific or Atlantic Fleets are listed in Section 6 labeled For Official Use Only. Each ship may carry additional charts, depending on the particular area of operation, or according to instructions from type or fleet commanders.

The Portfolio Chart List is intended as a guide in selection and stowage of nautical charts aboard ship, and provides a ready reference to the grouping by geographic sequence of the charts in the various portfolios. Most of the necessary information concerning charts, such as chart number, edition number and date, and title required by a mariner in establishing a chart correction card system, is included within this publication.

OTHER U.S. AGENCY CHARTS

For nautical charts produced and sold by National Ocean Survey and loran charts produced by U.S. Air Force, reference must be made to their catalogs. The catalogs may be issued by Naval Oceanographic Office to U.S. Navy and other authorized users. All other users may obtain these catalogs from the Director, National Ocean Survey (N.O.A.A.). Washington Science Center, Rockville, Md. 20852.

For nautical charts of the Great Lakes, reference should be made to the U.S. Lake Survey Catalog. This catalog may be issued by the Naval Oceanographic Office to the U.S. Navy and other authorized users. All other users may obtain this catalog from the National Ocean Survey (N.O.A.A.), Lake Survey Center, 630 Federal Building and Courthouse, Detroit, Michigan 48226.

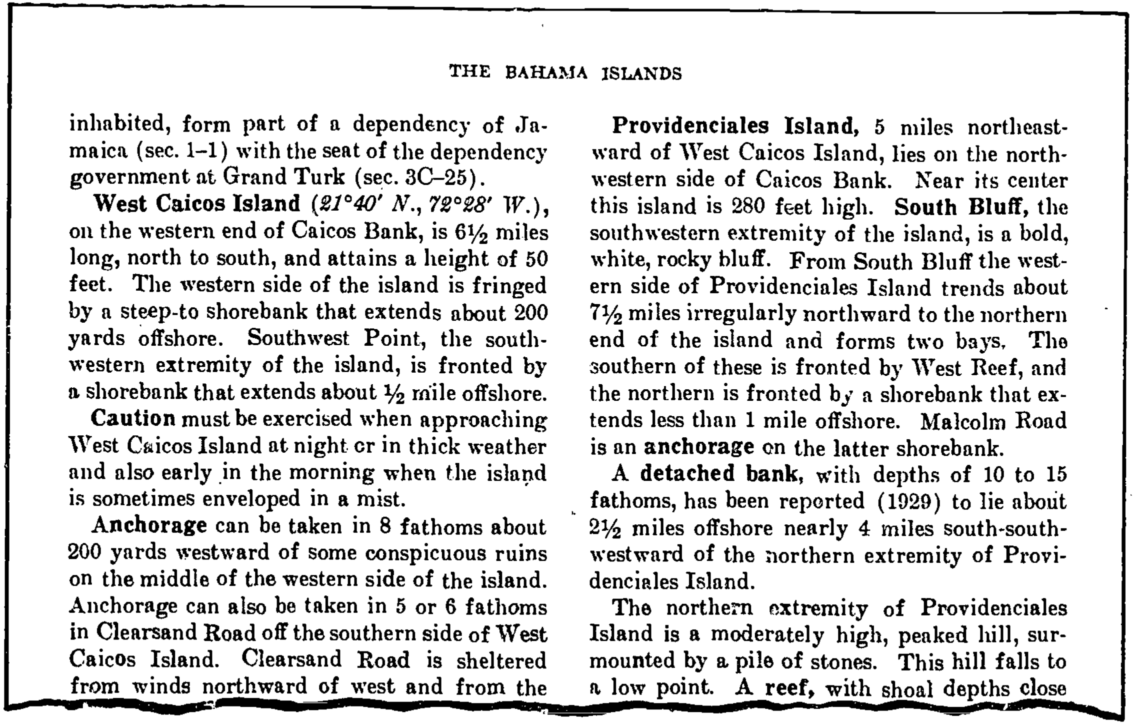
COAST PILOT AND SAILING DIRECTIONS

Similar information is given in the *United States Coast Pilot* (C. & G.S.) and *Sailing Directions* (Oceanographic Office). Whereas *Coast Pilot* applies to the United States and its possessions, *Sailing Directions* pertains to the rest of the world. New volumes are issued from time to time. Examples from these publications are shown in figures 10-14 and 10-15. Typical information in both publications includes appearance of coastline (mountains, landmarks, visible foliage, etc.); navigational aids in general; local weather conditions; tides and currents; local rules of the road, if any; bridges–type and clearance; anchorage facilities; repair facilities; availability of fuel and provisions; transportation service ashore; and local industries.

In addition to the preceding information, *Sailing Directions* offers instructions for using charts, descriptions of aids to navigation, and, in appendices, tables like the following: list of principal ports, with particulars (such as depth), list of ports with facilities for underwater repairs, and meteorological tables.

Note: Under a new concept the 70 volume existing Sailing Directions are being replaced by 43 publications, namely, 35 new graphic Sailing Directions (Enroute) and eight new Sailing Directions (Planning Guide).

Each of the 35 volumes of Sailing Directions (Enroute) will be divided into numbered sectors. For example, each volume of the Mediterranean Sailing Directions (Enroute) will be divided into 20



THE BAHAMA ISLANDS

inhabited, form part of a dependency of Jamaica (sec. 1–1) with the seat of the dependency government at Grand Turk (sec. 3C–25).

West Caicos Island (*21°40′ N., 72°28′ W.*), on the western end of Caicos Bank, is 6½ miles long, north to south, and attains a height of 50 feet. The western side of the island is fringed by a steep-to shorebank that extends about 200 yards offshore. Southwest Point, the southwestern extremity of the island, is fronted by a shorebank that extends about ½ mile offshore.

Caution must be exercised when approaching West Caicos Island at night or in thick weather and also early in the morning when the island is sometimes enveloped in a mist.

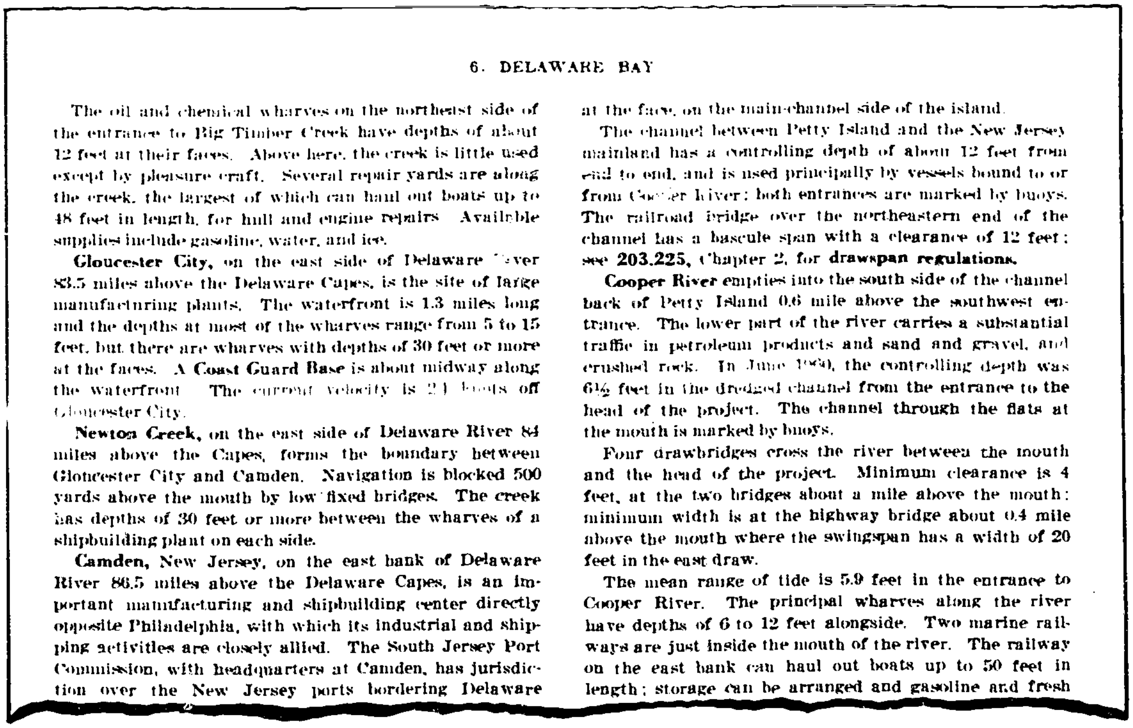
Anchorage can be taken in 8 fathoms about 200 yards westward of some conspicuous ruins on the middle of the western side of the island. Anchorage can also be taken in 5 or 6 fathoms in Clearsand Road off the southern side of West Caicos Island. Clearsand Road is sheltered from winds northward of west and from the

Providenciales Island, 5 miles northeastward of West Caicos Island, lies on the northwestern side of Caicos Bank. Near its center this island is 280 feet high. **South Bluff,** the southwestern extremity of the island, is a bold, white, rocky bluff. From South Bluff the western side of Providenciales Island trends about 7½ miles irregularly northward to the northern end of the island and forms two bays. The southern of these is fronted by West Reef, and the northern is fronted by a shorebank that extends less than 1 mile offshore. Malcolm Road is an **anchorage** on the latter shorebank.

A **detached bank,** with depths of 10 to 15 fathoms, has been reported (1929) to lie about 2½ miles offshore nearly 4 miles south-southwestward of the northern extremity of Providenciales Island.

The northern extremity of Providenciales Island is a moderately high, peaked hill, surmounted by a pile of stones. This hill falls to a low point. A **reef,** with shoal depths close

Figure 10-14.—Sample taken from *Sailing Directions*. 69.32



6. DELAWARE BAY

The oil and chemical wharves on the northeast side of the entrance to Big Timber Creek have depths of about 12 feet at their faces. Above here, the creek is little used except by pleasure craft. Several repair yards are along the creek, the largest of which can haul out boats up to 48 feet in length, for hull and engine repairs Available supplies include gasoline, water, and ice.

Gloucester City, on the east side of Delaware River 83.5 miles above the Delaware Capes, is the site of large manufacturing plants. The waterfront is 1.3 miles long and the depths at most of the wharves range from 5 to 15 feet, but there are wharves with depths of 30 feet or more at the faces. A **Coast Guard Base** is about midway along the waterfront The current velocity is 2.1 knots off Gloucester City.

Newton Creek, on the east side of Delaware River 84 miles above the Capes, forms the boundary between Gloucester City and Camden. Navigation is blocked 500 yards above the mouth by low fixed bridges. The creek has depths of 30 feet or more between the wharves of a shipbuilding plant on each side.

Camden, New Jersey, on the east bank of Delaware River 86.5 miles above the Delaware Capes, is an important manufacturing and shipbuilding center directly opposite Philadelphia, with which its industrial and shipping activities are closely allied. The South Jersey Port Commission, with headquarters at Camden, has jurisdiction over the New Jersey ports bordering Delaware

at the face, on the main-channel side of the island.

The channel between Petty Island and the New Jersey mainland has a controlling depth of about 12 feet from end to end, and is used principally by vessels bound to or from Cooper River; both entrances are marked by buoys. The railroad bridge over the northeastern end of the channel has a bascule span with a clearance of 12 feet; see **203.225,** Chapter 2, for **drawspan regulations.**

Cooper River empties into the south side of the channel back of Petty Island 0.6 mile above the southwest entrance. The lower part of the river carries a substantial traffic in petroleum products and sand and gravel, and crushed rock. In June 1960, the controlling depth was 6½ feet in the dredged channel from the entrance to the head of the project. The channel through the flats at the mouth is marked by buoys.

Four drawbridges cross the river between the mouth and the head of the project. Minimum clearance is 4 feet, at the two bridges about a mile above the mouth; minimum width is at the highway bridge about 0.4 mile above the mouth where the swingspan has a width of 20 feet in the east draw.

The mean range of tide is 5.9 feet in the entrance to Cooper River. The principal wharves along the river have depths of 6 to 12 feet alongside. Two marine railways are just inside the mouth of the river. The railway on the east bank can haul out boats up to 50 feet in length; storage can be arranged and gasoline and fresh

Figure 10-15. —Sample taken from *Coast Pilot, Atlantic Coast.* 69.33

sectors. A portion of a typical table of contents indicating only the subdivisions for Sector 1 is illustrated below:

Sailing Directions (Enroute)

Table of Contents

SECTOR 1—West Point to East Point
- Chart Information—Index: Gazetteer
- Coastal Winds & Currents
- Outer Dangers
- Coastal Features
- Anchorages (Coastal)
- Major Ports
  - Directions; Landmarks; Navaids; Depths; Limitations; Restrictions; Pilotage; Regulations; Winds; Tides; Currents; Anchorages

Each of the eight Sailing Directions (Planning Guide) will contain five chapters, the titles of which are shown in the following list.

Sailing Directions (Planning Guide)

Chapter	*Info. Covered*
1. Countries	Governments, Regulations, Search & Rescue, Communications
2. Ocean Basin Environment	Oceanography, Climatology Magnetic Disturbances
3. Danger Areas	Operating Areas, Firing Areas, Reference Guide to Warnings – NM No. 1 – NEMEDRI, DAPAC – Charts

Chapter	*Info. Covered*
4. Ocean Routes	Route Chart & Text. Traffic Separation Schemes
5. Navaid Systems	Electronic Navigation Systems, Systems of Lights & Buoyage

It is planned that both the planning guide and the enroute publications of the sailing directions for the Mediterranean Sea area will be issued to the fleet during June 1971. Publication of all of the remaining planning guides and enroute sailing directions should be completed prior to 1 January 1977.

Coast Pilot, besides its standard information on United States ports and waterways, contains descriptions of ports and harbors; pilot information; quarantine and marine hospital information; Coast Guard stations; radio services; distances and bearings; time signals; atmospheric pressure, temperature, and wind tables; rules of the road; instructions in case of shipwreck; and general harbor regulations.

LIGHT LISTS

Use of light lists as a navigational aid is described in chapter 8 of this book.

The Oceanographic Office publication *List of Lights* contains detailed information on the location and characteristics of every light in the world not located in the United States or possessions. Brief descriptions of lighthouses and fog signals are included. *List of Lights* is published in seven volumes, and they are corrected by change pages as necessary. A sample page from a current issue is reproduced in figure 10-16.

Information on lights located on the continental coasts of the United States or its possessions, or in any of the United States inland waterways, is promulgated in *Light Lists* published by the United States Coast Guard.

AVIATION CHARTS

All naval air stations, facilities, and aircraft tenders keep a permanent file of one set of aviation charts and publications for the areas in which their aircraft may be called upon to operate. A complete file of *DOD Aeronautical Chart Updating Manual* (CHUM), *DOD Aeronautical Chart Bulletin*, and *DOD Aeronautical Chart Bulletin Digest* must be maintained by each of the aforementioned activities.

The CHUM is published monthly and the latest edition always supersedes that of the previous month. The *Aeronautical Chart Bulletin* is published monthly and should be accumulated for 6 months until they are superseded by the *DOD Aeronautical Chart Bulletin Digest*.

The permanent file of aviation charts and publications must be corrected and kept up to date at all times, reflecting all pertinent changes as published in the CHUM. The same general principles of correction apply as are employed in nautical charts.

PILOT CHARTS

Pilot charts, prepared by the Oceanographic Office, are rather curiously named. They are small-scale charts of large areas, thus they are of little use in actual piloting. Nevertheless, they are invaluable to navigators. They present, in graphic form, a complete review of the hydrographic, navigational, and meteorological situation in a given area. Included is information concerning average winds, tides, currents, and barometer readings; frequency of storms, calms, or fog; possibility of the presence of ice, wrecks, or other dangers; and location of ocean station vessels. Lines of equal magnetic variation are given for each full degree of variation. Indicated also are the shortest and safest routes between principal ports.

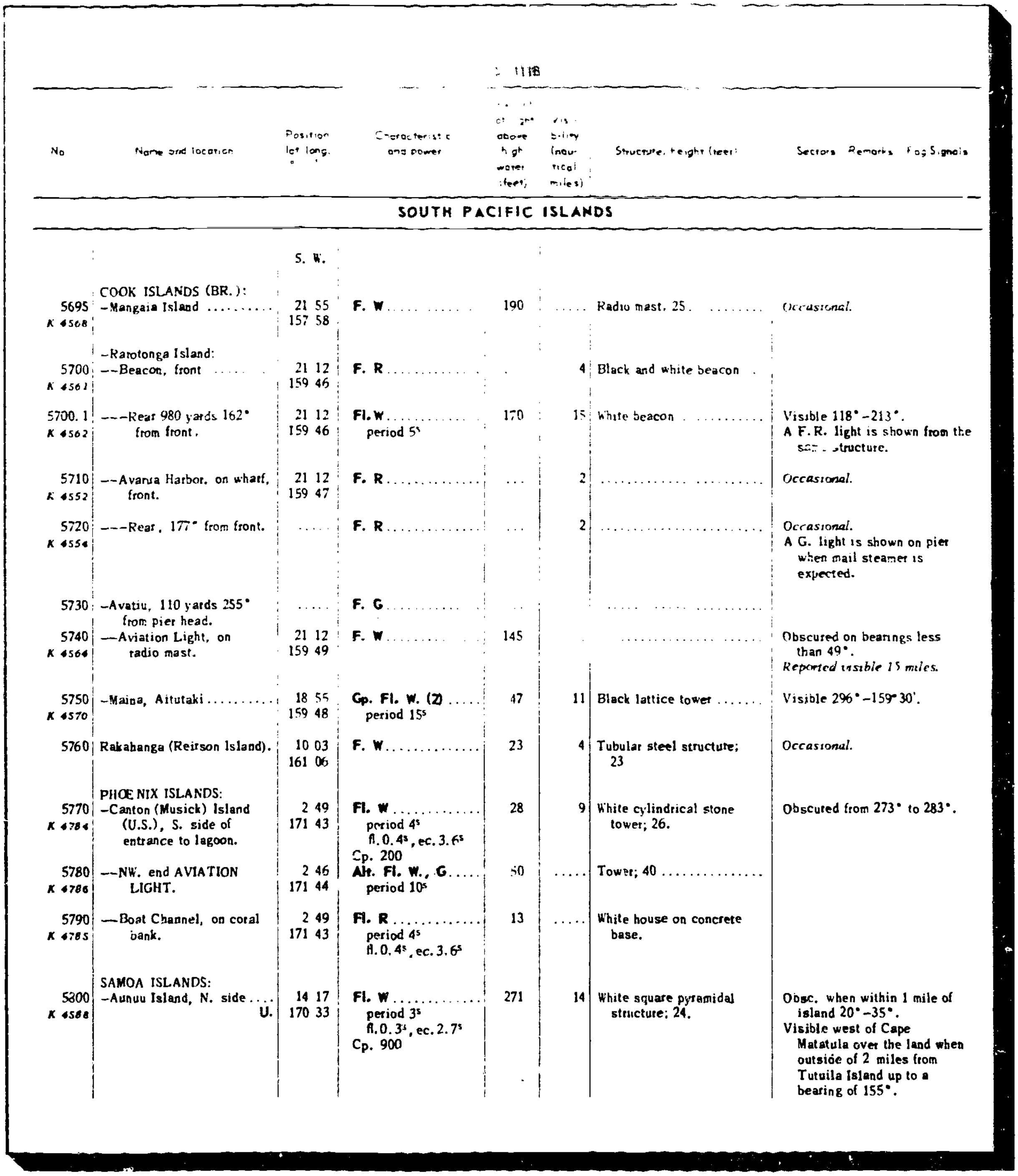
Pilot Chart of the North Atlantic Ocean and Pilot Chart of the North Pacific Ocean are issued monthly by the Oceanographic Office. Other pilot charts are published in atlas form for the Northern North Atlantic Ocean, the South Atlantic Ocean and Central American Waters, and for the South Pacific and Indian Oceans.

MONTHLY INFORMATION BULLETIN

The *Monthly Information Bulletin*, issued by the Oceanographic Office, is aimed chiefly at corrections to the index catalogs and the *Portfolio Chart List*. Its main object is to advise naval ships, branch Oceanographic Offices, and other activities on such matters as the issue of new charts, new plotting sheets, and other publications, cancellations of old issues, and new editions of *Sailing Directions*. Special notices also appear in the *Bulletin*.

HANDLING CHARTS

Correcting, stowing, and keeping an accurate file on charts account for much of a Quartermaster's



1118

No	Name and location	Position lat. long. ° ′	Characteristic and power	Height of light above high water (feet)	Visibility (nautical miles)	Structure, height (feet)	Sectors Remarks Fog Signals
	SOUTH PACIFIC ISLANDS						
		S. W.					
	COOK ISLANDS (BR.):						
5695 *K 4568*	–Mangaia Island	21 55 157 58	**F. W**	190	.....	Radio mast, 25.	*Occasional.*
	–Rarotonga Island:						
5700 *K 4561*	––Beacon, front	21 12 159 46	**F. R**	.	4	Black and white beacon .	
5700.1 *K 4562*	–––Rear 980 yards 162° from front.	21 12 159 46	**Fl. W** .... period 5ˢ	170	15	White beacon	Visible 118°–213°. A F.R. light is shown from the same structure.
5710 *K 4552*	––Avarua Harbor, on wharf, front.	21 12 159 47	**F. R**	...	2	....	*Occasional.*
5720 *K 4554*	–––Rear, 177° from front.	.....	**F. R**	...	2	....	*Occasional.* A G. light is shown on pier when mail steamer is expected.
5730	–Avatiu, 110 yards 255° from pier head.	.....	**F. G**	..		....	
5740 *K 4564*	––Aviation Light, on radio mast.	21 12 159 49	**F. W**	145	.	....	Obscured on bearings less than 49°. *Reported visible 15 miles.*
5750 *K 4570*	–Maina, Aitutaki	18 55 159 48	**Gp. Fl. W. (2)** ..... period 15ˢ	47	11	Black lattice tower	Visible 296°–159°30′.
5760	Rakahanga (Reirson Island).	10 03 161 06	**F. W**	23	4	Tubular steel structure; 23	*Occasional.*
	PHOENIX ISLANDS:						
5770 *K 4784*	–Canton (Musick) Island (U.S.), S. side of entrance to lagoon.	2 49 171 43	**Fl. W** .... period 4ˢ fl. 0.4ˢ, ec. 3.6ˢ Cp. 200	28	9	White cylindrical stone tower; 26.	Obscured from 273° to 283°.
5780 *K 4786*	––NW. end AVIATION LIGHT.	2 46 171 44	**Alt. Fl. W., G** ..... period 10ˢ	50	.....	Tower; 40	
5790 *K 4785*	––Boat Channel, on coral bank.	2 49 171 43	**Fl. R** .... period 4ˢ fl. 0.4ˢ, ec. 3.6ˢ	13	.....	White house on concrete base.	
	SAMOA ISLANDS:						
5800 *K 4588*	–Aunuu Island, N. side .... U.	14 17 170 33	**Fl. W** .... period 3ˢ fl. 0.3ˢ, ec. 2.7ˢ Cp. 900	271	14	White square pyramidal structure; 24.	Obsc. when within 1 mile of island 20°–35°. Visible west of Cape Matatula over the land when outside of 2 miles from Tutuila Island up to a bearing of 155°.

Figure 10-16.—Sample from *Light Lists*. 69.34

duty. It could be a full-time job on a ship using many charts.

STOWING CHARTS

Within the portfolio system, charts are arranged and numbered in a geographical sequence which provides for systematic stowage of charts aboard ship. With the exception of Portfolios WA and WP, the remaining 52 portfolios are composed of charts at a scale of 1:2,000,000 and larger. To establish a logical numbering system within the geographical subregions (portfolios) a worldwide skelton grid framework of coastal charts was laid out at a scale of 1:250,000. This skelton series is used as basic coverage for the numbering except in areas where a coordinated series at about this scale currently exists. An example of an exception is the coast of Norway where a coordinated series of 1:200,000 coastal charts are in existence. Within each region, the geographical subregions (portfolios) are numbered counterclockwise around the continents, and within each subregion the basic (1:250,000 skelton) series is also numbered counterclockwise around the continents. The skelton coverage is assigned generally every twentieth digit, except that the first 40 numbers in each subregion are reserved for smaller-scale coverage. Charts with scales larger than the skelton 1:250,000 coverage are assigned one of the 19 numbers following the number assigned to the skelton sheet within which it falls. Thus, the last three digits of a five-digit numbered chart identify the chart in geographical order within the subregion or portfolio, with many numbers left unused so that charts produced in the future may be placed within this same geographical order.

Arrangment of charts within a portfolio begins with the smaller-scale coverage of charts; that is all charts at a scale smaller than 1:250,000 covering the portfolio are assigned initially. Therefore, these will be the first chart numbers within a portfolio. (The first 40 numbers, 000-039 are used for this purpose.) The skelton series (1:250,000) then comes into prominence beginning with the last three digits of a chart numbered 040 and continuing with 060, 100, etc. until all coverage within a portfolio area is included. Charts at scales larger than 1:250,000 are then numbered within the skelton series such as 041, 042, 061, 062, 081, 082, 101, 102, etc. Within this scheme it is readily apparent that chart numbers will not be listed in a strict numerical sense of using all digits as provision is made to include future charts into the scheme without having to establish a suffix to a chart number. In addition to charts produced or reproduced by Naval Oceanographic Office, the National Ocean Survey (formerly USC & GS), and foreign charts stocked within the Naval Oceanographic Distribution System are also identified with an N.O. number so that all charts fall within the portfolio format.

Charts must be stowed in an orderly manner in the compartments or drawers specially designed for the purpose. They should always be laid flat. It may be necessary to fold some charts, but they must never be rolled. When folding is necessary, try to follow the original folds. Special precautions must be taken to prevent curling at the edges.

It is a good idea to have a list of the charts contained in your portfolios. To make sure you still have all the charts on the list, occasionally check the charts in the portfolios against this list.

CORRECTING CHARTS

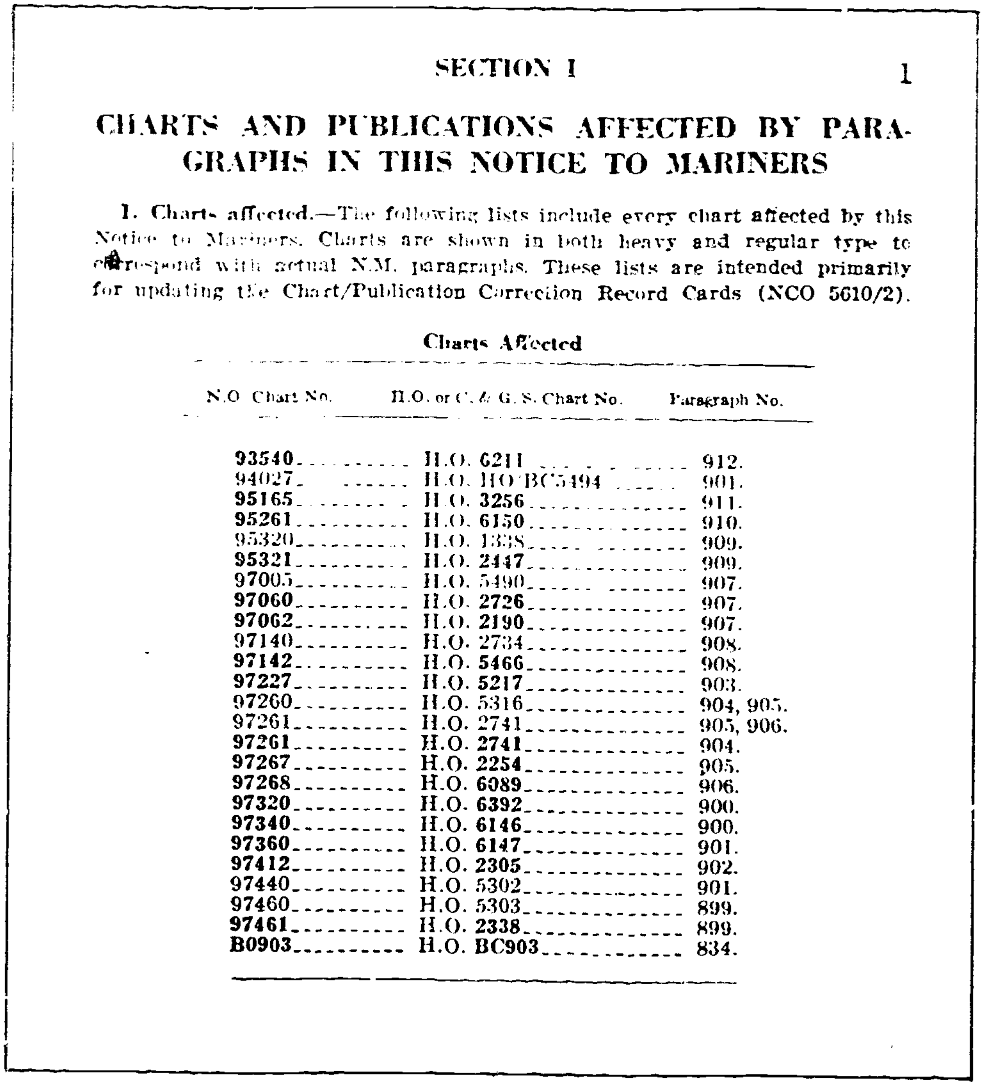
Oceanographic Office publications mentioned thus far are published at more or less widely separated intervals. As a result, provisions must be made for keeping mariners apprised of changes in hydrographic conditions as soon as possible after they occur.

The principal medium for distributing corrections to charts, light lists, and other Oceanographic publications is *Notice to Mariners*. One or more copies are distributed to each naval vessel. Each notice is divided into four sections. Duplicate pages in two separate sets are provided in section IV. Pages in the first set, which are printed on both sides, should remain intact to form a permanent record of *Notice to Mariners* for future reference. Pages in the second set are printed on only one side. These pages are intended to be detached and appended to the pages of the affected publications.

Supplements to *Coast Pilots* and looseleaf changes to Sailing Directions, issued periodically, contain all the corrections from *Notice to Mariners* and other sources received since the issue date of either the publication itself or the previous supplement or change.

PROCEDURE FOR CHART CORRECTION

The chart/publication correction record card system was established for the purposes of fulfilling the requirements of the U.S Navy Regulations Articles 0751-2(b) and 0930.1(f); for conserving the use of nautical charts and publications, and for reducing the amount of the chart correction work aboard ship.



SECTION I 1

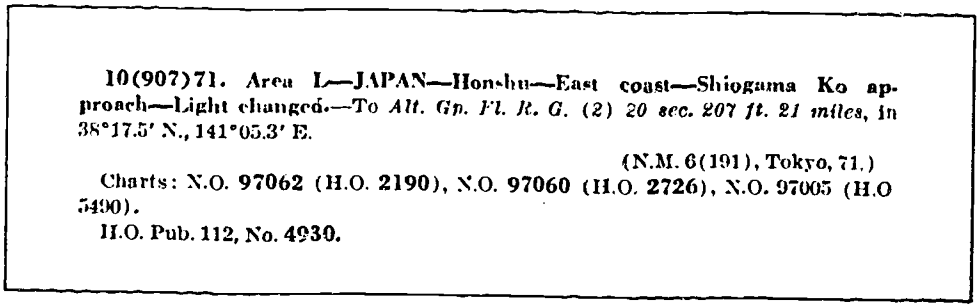
CHARTS AND PUBLICATIONS AFFECTED BY PARAGRAPHS IN THIS NOTICE TO MARINERS

1. Charts affected.—The following lists include every chart affected by this Notice to Mariners. Charts are shown in both heavy and regular type to correspond with actual N.M. paragraphs. These lists are intended primarily for updating the Chart/Publication Correction Record Cards (NCO 5610/2).

Charts Affected

N.O Chart No.	H.O. or C. & G. S. Chart No.	Paragraph No.
93540	H.O. **6211**	912.
94027	H.O. HO BC5494	901.
95165	H.O. **3256**	911.
95261	H.O. **6150**	910.
95320	H.O. 1338	909.
95321	H.O. **2447**	909.
97005	H.O. 5490	907.
97060	H.O. **2726**	907.
97062	H.O. **2190**	907.
97140	H.O. 2734	908.
97142	H.O. **5466**	908.
97227	H.O. **5217**	903.
97260	H.O. 5316	904, 905.
97261	H.O. 2741	905, 906.
97261	H.O. **2741**	904.
97267	H.O. **2254**	905.
97268	H.O. **6089**	906.
97320	H.O. **6392**	900.
97340	H.O. **6146**	900.
97360	H.O. **6147**	901.
97412	H.O. **2305**	902.
97440	H.O. 5302	901.
97460	H.O. 5303	899.
97461	H.O. **2338**	899.
B0903	H.O. **BC903**	834.

A



10(907)71. Area L—JAPAN—Honshu—East coast—Shiogama Ko approach—Light changed.—To *Alt. Gp. Fl. R. G. (2) 20 sec. 207 ft. 21 miles*, in 38°17.5′ N., 141°05.3′ E.

(N.M. 6(191), Tokyo, 71.)

Charts: N.O. **97062** (H.O. **2190**), N.O. **97060** (H.O. **2726**), N.O. 97005 (H.O 5490).

H.O. Pub. 112, No. 4930.

B

Figure 10-17. —Excerpts from *Notice to Mariners* 10-71. 69.35

Each chart onboard will have a chart correction card on file. With the chart correction card system. only the charts in current use in the operating area of your ship must be kept up to date at all times. Corrections are not made to other charts until the charts are needed. If a chart is uncorrected, a notation is made on the card. The entry gives the notice to mariner's number, paragraph number, and page number. When a chart is corrected, the date and the initials of the person who corrected the chart are entered in the prescribed space on the card.

Chart Correction List

Near the front of every *Notice to Mariners* is a chart correction list. (See fig. 10-17A). Some charts and publications are referenced in heavy black type and some are not. The charts referenced by heavy black type are those charts normally required to navigate the area in which the information pertains. Corrections to these charts are of primary concern because they are important to safe navigation. On the other hand, those charts and publications not referenced in heavy black type require a suitable annotation indicating that corrections have not been entered, and that such charts and publications are not to be used for navigational purposes until corrections are made.

Annotations are not a substitute for the actual correction of charts and publications when they are to be used for navigational purposes. Figure 10-17B shows a correction paragraph from a *Notice to Mariners*.

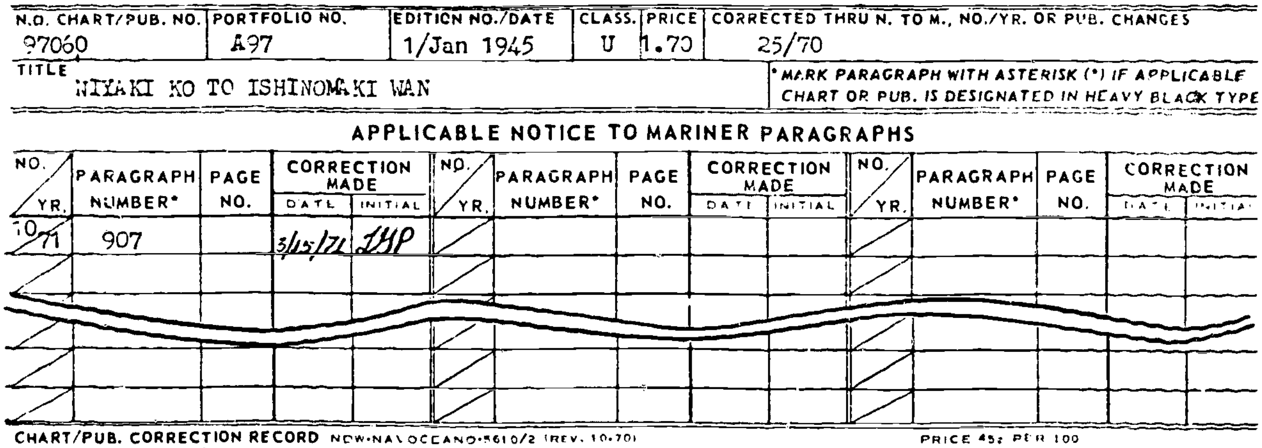
Note.–The heavy black type designation on charts to be corrected before using is an advisory service only and in no way relieves users of the responsibility for correcting all referenced charts before they are used for navigation.

Application of information in the *Notice to Mariners* is the responsibility of the user.

Before changing any chart you should go through the chart/pub correction record (NAVOCEANO 5610/2) cards (fig. 10-18) and remove those affected by that particular notice. After withdrawing the cards corresponding to the number entered on the chart correction list, you are ready to enter the necessary data on the cards. Prepare a card for each chart/publication, inserting the following information:

N.O. Chart/Pub Number (e.g., N.O. 97060)
Portfolio (e.g., A97)
Edition No/Date (e.g., 1/Jan 1945)
Classification (e.g., "U" for Unclassified)
Price ($1.70)
Latest *Notice to Mariners* through which the chart is corrected (e.g., 25-1970 or 25/70)
Title of Chart/Publication. If title is too long, use a short, abbreviated descriptive title.
NOTE: In correcting charts which have accumulated numerous corrections, it is more practical to make the latest correction first and work backwards, as late corrections may cancel or alter earlier corrections.

Upon receipt of a new chart and/or a new edition, a new card should be made, so that the card will show only those corrections (including tempora-



N.O. CHART/PUB. NO.	PORTFOLIO NO.	EDITION NO./DATE	CLASS.	PRICE	CORRECTED THRU N. TO M., NO./YR. OR PUB. CHANGES
97060	A97	1/Jan 1945	U	1.70	25/70

TITLE NIYAKI KO TO ISHINOMAKI WAN

* MARK PARAGRAPH WITH ASTERISK (*) IF APPLICABLE CHART OR PUB. IS DESIGNATED IN HEAVY BLACK TYPE

APPLICABLE NOTICE TO MARINER PARAGRAPHS

NO./YR.	PARAGRAPH NUMBER*	PAGE NO.	CORRECTION MADE		NO./YR.	PARAGRAPH NUMBER*	PAGE NO.	CORRECTION MADE		NO./YR.	PARAGRAPH NUMBER*	PAGE NO.	CORRECTION MADE	
			DATE	INITIAL				DATE	INITIAL				DATE	INITIAL
10/71	907		3/15/71	JHP										

CHART/PUB. CORRECTION RECORD NDW-NAVOCEANO-5610/2 (REV. 10-70) PRICE 45¢ PER 100

Figure 10-18.–Chart/Pub. Correction record (NAVOCEANO 5610/2). 69.36

ry changes) which have been published since the date to which the chart was corrected by the Naval Oceanographic Office. Temporary changes are not incorporated in new editions of charts and must be carried forward from old editions. Consult the first issue of the month in the *Notice to Mariners* for outstanding temporary corrections. At the end of each quarter for that quarterly period, the Naval Oceanographic Office will include in the *Notice to Mariners* a "Chart Correction List" containing all effective *Notice to Mariners* corrections to charts. The list for *Navy Notice to Mariners* corrections will be published annually. These lists should be checked against the cards to assure that all corrections have been entered.

Chart/Publication Correction Record Card

The card is designed for use in recording all Notice to Mariners corrections affecting charts and publications held onboard. With this record, only the charts and publications of the operating area need to be corrected. Charts and publications not immediately required may be updated as areas of operations change. Holders of nautical material must ensure that a card record is maintained for *Notice to Mariners* corrections to all charts and publications carried aboard, with actual corrections being made on those charts and publications prior to being used for navigational purposes. When the correction record cards are established for the charts and publications. The following procedures should be followed in maintaining the system.

Where corrections have been made aboard ship since the chart was received, the *Notice to Mariners* number, year and paragraph number should be entered on the card. If more than one paragraph number is listed, use a separate line for each paragraph number.

Included in each *Notice to Mariners* is a listing of charts temporarily affected by information in the specific *Notice to Mariners*. These temporary changes show chart and paragraph numbers which will be made to the correction record card in pencil. A summary of all outstanding temporary changes is published quarterly in the *Notice to Mariners*. After all entries have been made on the cards, the applicable corrections from *Notice to Mariners* should be plotted on those charts which are in active use. Entries are to be made on the corresponding correction cards to show the date of the person who made the correction. The commanding officer of the ship will determine which charts are to be kept corrected to date.

Chart Correction Techniques

After a little practice on obsolete charts, corrections to printed information on nautical charts can be made neatly and quickly. These corrections become a permanent part of the chart and may involve the safety of the ship, therefore, they must be made in ink so they will not be accidently erased when cleaning the chart after use. The only instruments necessary to correct charts are several high quality ballpoint pens or central feed technical fountain pens, a variety of stick or pencil-type erasers, and an erasing shield.

Frequently, the first step in correcting a chart is to erase that part of the charted information that will be changed. To erase an inked line, rest the chart on a smooth surface. The top of a chart table is well suited for this, but if an improvised surface is needed, place the areas to be erased over a large smooth hard surface. Erase in a back and forth motion with an abrasive eraser. This will remove most of the ink. To preserve the quality of the paper's surface, remove the remainder of the ink with a nonabrasive eraser. Most typewriter erasers are very abrasive and general erasers are mildly abrasive. A sharp penknife or razor blade used to erase can be a valuable tool in the hands of an experienced draftsman, but poor handling of a knife can quickly ruin a chart. Rubbing of an erased surface with an ivory or bone burnishing tool, or even the thumb nail, may improve its inking qualities. The ink from a conventional lettering or drafting pen tends to feather to a degree depending on the condition of the erased surface. Normally, a ballpoint pen with a fine point feathers less and eliminates the possibility of ink smears. Another advantage of the ballpoint is the variety of colored inks available. Although black is the principle color used in chart correction work, other colors such as green, purple, magenta, or blue may be occasionally needed.

All heavy type referenced on charts are to be corrected in ink. Temporary corrections affecting aids to navigation are to be made in pencil. For those referenced charts that are not shown in heavy type, it is suggested that suitable annotations be made to the charts and publications affected. This is especially applicable to those mariners engaged in specialized operations.

The amount and character of information to be inserted on a chart is to be in accordance with that already printed on such charts. For example:

* On the coast charts, full particulars of lights and fog signals are to be inserted where possible, omitting minor details of lights and fog signals of harbors. However, inner harbor buoys and beacons are not to be inserted.

* On charts of smaller scale than coast charts, insert only the outer buoys. Lights and fog signals of harbors are not to be inserted, and particulars of other lights and fog signals are to be lessened as the scale of the chart decreases, omitting details in the following order.

(1) For lights:
Height, Period, Number in Group, Abbreviations for Visibility and Miles
a. Gp Fl R (3) 10 sec 85 Ft 10M
b. Gp Fl R (3) 10 sec 10M
c. Gp Fl R (3) 10M
d. Gp Fl R 10M
e. Gp Fl R 10M

(2) Fog signals, thus:
a. Fog Siren
b. (F.S.)

* On ocean charts, only lights visible 15 miles or more are to be inserted, unless otherwise stated on the chart, and then only their characteristics, color, and visibility, thus:

Alt Gp 16 Occ R 18 F 15

No period is to be inserted against a light buoy, thus:

FL, FL R, FL G, etc.

Corrections in writing should be kept as much as possible clear of the water, unless the objects referred to are on the water.

When inserting written corrections, care must be taken not to obliterate any of the other information already on the chart.

When "notes" are to be inserted (such as cautionary, tidal, etc.) they should be written in a convenient but conspicuous place, where they will not interfere with any other details.

The year and number of every *Notice to Marines* from which corrections have been made are to be entered in ink at the lower left-hand corner of the charts, thus: "1968-6, 9, 18." Temporary changes should be made in pencil.

Charts Under Red Lights

Red has been selected as the preferred color for night lighting. This red color effect may be attained by the use of red bulbs, red shields or filters, or by the use of red goggles. The use of red lights seriously affects the legibility of charts as the buff, orange and red colors are all invisible under red lighting. The Naval Oceanographic Office has met this situation through the use on charts of gray, magenta, purple, and blue. These colors appear as different shades, not as different colors, under the red light. Caution should be exercised in using the old charts under red light. If there are any vital features shown on the charts in red, orange, and yellow colors, it will be necessary to redraw them in some color that will show such as blue, green, brown, or purple. The use of red ink or red pencil should be avoided.

DEFINITIONS

In your work with charts, and entering corrections, you will need to be familiar with the following definitions.

Cancel: A chart or publication removed from publication permanently. Existing plates are destroyed and *Notice to Mariners* corrections no longer are published.

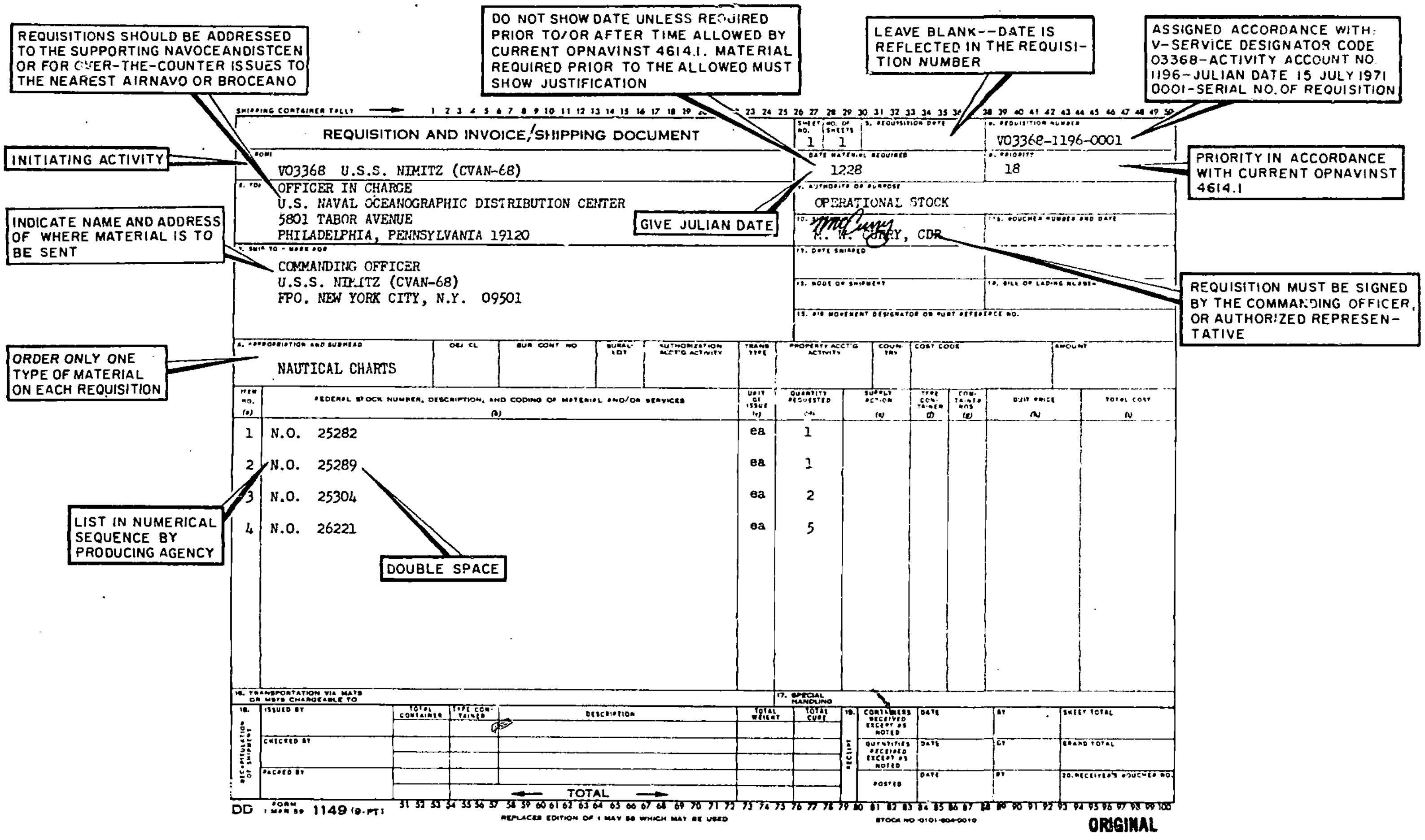
Withdrawn: A chart or publication removed from issue temporarily or indefinitely with the intention of replacing it at a future date.

Discontinued: A foreign chart, emergency-reproduced, or any other chart or publication not published by the Oceanographic Office, which is removed from issue permanently. Existing plates are destroyed and *Notice to Mariners* corrections no longer are published.

Make sure that canceled and withdrawn charts are destroyed, but check with your navigator before destroying them.

ORDERING CHARTS

Ships of the Pacific Fleet are requested to address their requisitions for charts to the Naval Oceanographic Distribution Center, Clearfield, Utah 84016. Ships of the Atlantic Fleet send their requisitions to the Naval Oceanographic Distribution Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120. If an emergency arises, as when



REQUISITION AND INVOICE/SHIPPING DOCUMENT

V03368 U.S.S. NIMITZ (CVAN-68)

OFFICER IN CHARGE
U.S. NAVAL OCEANOGRAPHIC DISTRIBUTION CENTER
5801 TABOR AVENUE
PHILADELPHIA, PENNSYLVANIA 19120

COMMANDING OFFICER
U.S.S. NIMITZ (CVAN-68)
FPO. NEW YORK CITY, N.Y. 09501

V03368-1196-0001

1228

18

OPERATIONAL STOCK

CDR

NAUTICAL CHARTS

1	N.O. 25282	ea	1
2	N.O. 25289	ea	1
3	N.O. 25304	ea	2
4	N.O. 26221	ea	5

DD FORM 1149

ORIGINAL

REQUISITIONS SHOULD BE ADDRESSED TO THE SUPPORTING NAVOCEANDISTCEN OR FOR OVER-THE-COUNTER ISSUES TO THE NEAREST AIRNAVO OR BROCEANO

INITIATING ACTIVITY

INDICATE NAME AND ADDRESS OF WHERE MATERIAL IS TO BE SENT

ORDER ONLY ONE TYPE OF MATERIAL ON EACH REQUISITION

LIST IN NUMERICAL SEQUENCE BY PRODUCING AGENCY

DOUBLE SPACE

DO NOT SHOW DATE UNLESS REQUIRED PRIOR TO/OR AFTER TIME ALLOWED BY CURRENT OPNAVINST 4614.1. MATERIAL REQUIRED PRIOR TO THE ALLOWED MUST SHOW JUSTIFICATION

GIVE JULIAN DATE

LEAVE BLANK--DATE IS REFLECTED IN THE REQUISITION NUMBER

ASSIGNED ACCORDANCE WITH:
V-SERVICE DESIGNATOR CODE
03368-ACTIVITY ACCOUNT NO.
1196-JULIAN DATE 15 JULY 1971
0001-SERIAL NO. OF REQUISITION

PRIORITY IN ACCORDANCE WITH CURRENT OPNAVINST 4614.1

REQUISITION MUST BE SIGNED BY THE COMMANDING OFFICER, OR AUTHORIZED REPRESENTATIVE

Figure 10-19.-Form DD-1149. 43.3

a ship receives orders on short notice, address the requisitions to the nearest Branch Oceanographic Office.

All requests for complete portfolios and individual charts should be submitted by the Navigator, in accordance with the current OCEANAVINST 5604.1, on DD Form 1149 (fig. 10-19) to the supporting Naval Oceanographic Distribution Center. All requests must bear an appropriate issue priority designator assigned in accordance with the current OPNAVINST 4614.1, and must be signed by the commanding officer or an authorized representative.

Assignment of Priorities to Requisitions

Naval activities and units submitting requests for charts, maps, and publications must assign priorities in accordance with OPNAVINST 4614.1. Requests for charts and publications which contain unrealistic priorities interfere with the service capabilities of the Naval Oceanographic Distribution System. Basically, the assignment of a priority to a requisition is dependent upon the status of the unit which within the instruction is referred to as "force activity designator" (FAD), and the urgency (or degree) of need at the time a requisition is prepared. These terms are illustrated and described as follows:

Force Activity Designator	*Urgency of Need*			
	A	*B*	*C*	*D*
I —Combat	1	4	11	16
II —Positioned	2	5	12	17
III —Ready	3	6	13	18
IV —Reserve/Support	7	9	14	19
V —Other	8	10	15	20

The "urgency of need" is defined as follows:

A–An emergency requirement for weapons, equipment, or material without which the ship cannot perform to mission or work stoppages are immediate.

B–Items required for immediate end use, the lack of which will impair the operational capability of the ship, or the ship can operate only temporarily or with lessened efficiency and effectiveness.

C–Material required immediately to repair or replace collateral or administrative system equipment not essential to the effectiveness of the ship, or required to meet a scheduled deployment, or required on a more urgent basis than routine stock replenishment, or required to replenish stocks during deployment.

D–Material required for initial outfitting and filling of allowances, and other routine replenishment and filling of allowance list requirements.

It is simple to obtain your force activity designator and to determine your urgency (degree) of need. By definition of purpose as defined, most requirements fit FAD IV or V and Category D for degree of need.

A priority 19 or 20 should cover most requirements for navigational charts or publication. There should seldom be a need for a priority higher than 16. Priorities higher than 11 should be used only in true emergencies. The table below indicates the maximum delivery time associated with the range of priorities:

Priority	*Conus (Days)*	*Overseas (Days)*
01-03	5	7
04-08	8	15
09-15	20	45
16-20	30	60

Note: These are maximum delivery times established for supply support. Routine map/chart requests are normally filled (delivered to the consumer) in about 10-15 days even for priority 20 requests, since most requisitions do not involve bulk shipments and are filled via the U.S. Postal System. Bulk shipments may take somewhat longer to deliver, subject to transportation limitations.

Do not order any publications from an Oceanographic Office not issued by that office. Copies of the *Nautical Almanac*, *Air Almanac*, and the *American Ephermeris* and *Nautical Almanac*, for instance, are ordered from the Naval Observatory. The *Watch Officer's Guide*, Knight's *Modern Seamanship*, Dutton's *Navigation* and *Piloting*, and Mixter's *Primer of Navigation* are ordered from the Library Division of the Bureau of Naval Personnel instead of from the Oceanographic Office.

CLASSIFIED CHARTS AND PUBLICATIONS

Classified charts and publications must be handled and stowed in accordance with provisions of the *Department of the Navy Security Manual for Classified Information*, OpNavInst 5510.1C. The following pertinent points should be adhered to in connection with handling and stowing classified charts and publications.

* Only persons with the necessary security clearance and a definite need to know should be granted access to the information.
* When classified material is not under the direct observation of an authorized person, it must be locked up or given equivalent protection.
* Charts must be stowed in locked drawers. Publications must be stowed in locked safes or cabinets.
* Money, jewels, or other valuables must never be stowed in containers used for stowing classified material.
* Combinations (or keys) to safes or locks must be accessible only to persons whose official duties require access to the material in the containers.

Nautical Chart Symbols

The following printed insert, figure 10-20, is a reprint of Nautical Chart Symbols and Abbreviations, published by the U. S. Department of Commerce, Coast and Geodetic Survey.

GENERAL REMARKS

Chart No. 1 contains the standard symbols and abbreviations which have been approved for use on nautical charts published by the United States of America.

Symbols and abbreviations shown on Chart No. 1 apply to the regular nautical charts and may differ from those shown on certain reproductions and special charts. Symbols and abbreviations on certain reproductions and on foreign charts may be interpreted by reference to the Symbol Sheet or Chart No. 1 of the originating country.

Terms, symbols and abbreviations are numbered in accordance with a standard form approved by a Resolution of the Sixth International Hydrographic Conference, 1952.

Vertical figures indicate those items where the symbol and abbreviation are in accordance with the Resolutions of the International Hydrographic Conferences.

Slanting figures indicate no International Hydrographic Bureau symbol adopted.

Slanting figures underscored indicate U.S.A. and I.H.B. symbols do not agree.

Slanting figures asterisked indicate no U.S.A. symbol adopted.

An up-to-date compilation of symbols and abbreviations approved by resolutions of the International Hydrographic Conference is not currently available. Use of I.H.B. approved symbols and abbreviations by member nations is not mandatory.

Slanting letters in parentheses indicate that the items are in addition to those shown on the approved standard form.

Colors are optional for characterizing various features and areas on the charts.

Lettering styles and capitalization as used on Chart No. 1 are not always rigidly adhered to on the charts.

Longitudes are referred to the Meridian of Greenwich.

Scales are computed on the middle latitude of each chart, or on the middle latitude of a series of charts.

Buildings - A conspicuous feature on a building may be shown by a landmark symbol with descriptive note (See I-n & L-63). Prominent buildings that are of assistance to the mariner are crosshatched (See I-3a,5,47 & 66).

Shoreline is the line of Mean High Water, except in marsh or mangrove areas, where the outer edge of vegetation (berm line) is used. A heavy line (A-9) is used to represent a firm shoreline. A light line (A-7) represents a berm line.

Heights of land and conspicuous objects are given in feet above Mean High Water, unless otherwise stated in the title of the chart.

Depth Contours and Soundings may be shown in meters on charts of foreign waters.

Visibility of a light is in nautical miles for an observer's eye 15 feet above water level.

Buoys and Beacons - On entering a channel from seaward, buoys on starboard side are red with even numbers, on port side black with odd numbers. Lights on buoys on starboard side of channel are red or white, on port side white or green. Mid-channel buoys have black-and-white vertical stripes. Junction or obstruction buoys, which may be passed on either side, have red-and-black horizontal bands. This system does not always apply to foreign waters. The dot of the buoy symbol, the small circle of the light vessel and mooring buoy symbols, and the center of the beacon symbol indicate their positions.

Improved channels are shown by limiting dashed lines, the depth, month, and the year of latest examination being placed adjacent to the channel, except when tabulated.

U. S. Coast Pilots, Sailing Directions, Light Lists, Radio Aids, and related publications furnish information required by the navigator that cannot be shown conveniently on the nautical chart.

U. S. Nautical Chart Catalogs and Indexes list nautical charts, auxiliary maps, and related publications, and include general information (marginal notes, etc.) relative to the charts.

A glossary of foreign terms and abbreviations is generally given on the charts on which they are used, as well as in the Sailing Directions.

Charts already on issue will be brought into conformity as soon as opportunity affords.

All changes since the September 1963 edition of this publication are indicated by the symbol † in the margin immediately adjacent to the item affected.

Published at Washington, D.C.
U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
COAST AND GEODETIC SURVEY

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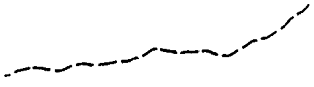
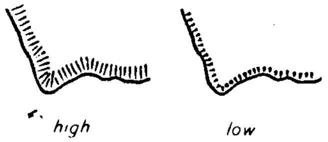
A. The Coastline (Nature of the Coast) (see General Remarks)


1 *Shoreline unsurveyed*

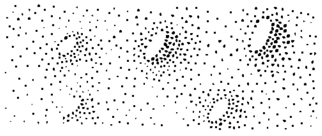


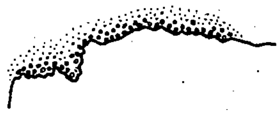
2 *Steep coast (Bluff)*


2a *Flat coast*


3 *Cliffy coast*


3a *Rocky coast*

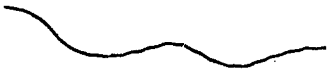

4 *Sandhills; Dunes*


5 *Stony or Shingly shore*


6 *Sandy shore*

7 *Mangrove*


8 *Surveyed coastline*


9 *High water line*

10 *Low water line*

11 **Foreshore** *(Strand in general)*


†(Aa) *Approximate low water line*

11a *Mud*

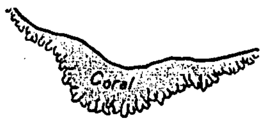
11b *Sand*

11c *Stones; Shingle; or Gravel*

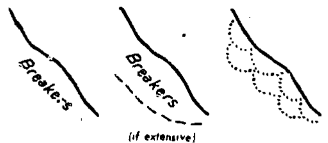
11d *Rock, uncovers at sounding datum (See A-11g)*

11e *Sand and mud*

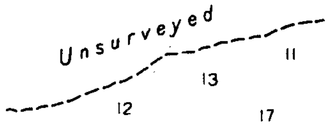
11f *Sand and gravel*



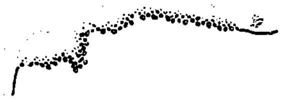
11g *Coral, uncovers at sounding datum (See O-10)*



12 *Breakers along a shore (See O-25)*



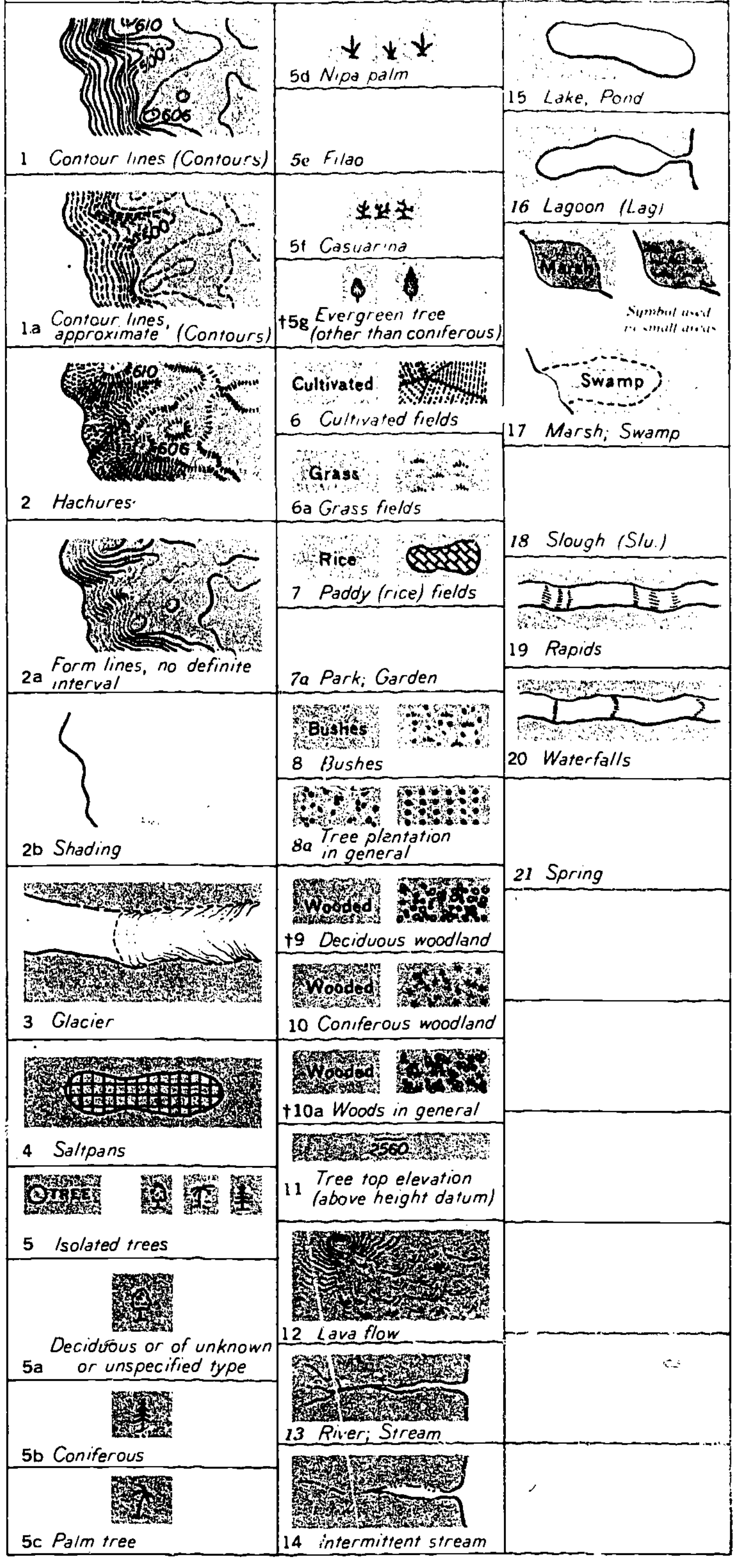
14 *Limit of unsurveyed areas*


(Ab) *Rubble*

B. Coast Features

1	G	Gulf
2	B	Bay
(Ba)	B	Bayou
3	Fd	Fjord
4	L	Loch; Lough; Lake
5	Cr	Creek
5a	C	Cove
6	In	Inlet
7	Str	Strait
8	Sd	Sound
9	Pass Thoro	Passage; Pass Thorofare
10	Chan	Channel
10a		Narrows
11	Entr	Entrance
12	Est	Estuary
12a		Delta
13	Mth	Mouth
14	Rd	Road; Roadstead
15	Anch	Anchorage
16	Hbr	Harbor
16a	Hn	Haven
17	P	Port
(Bb)	P	Pond
18	I	Island
19	It	Islet
20	Arch	Archipelago
21	Pen	Peninsula
22	C	Cape
23	Prom	Promontory
24	Hd	Head; Headland
25	Pt	Point
26	Mt	Mountain; Mount
27	Rge	Range
27a		Valley
28		Summit
29	Pk	Peak
30	Vol	Volcano
31		Hill
32	Bld	Boulder
33	Ldg	Landing
34		Table-land (Plateau)
35	Rk	Rock
36		Isolated rock
(Bc)	Str	Stream
(Bd)	R	River
(Be)	Slu	Slough
(Bf)	Lag	Lagoon
(Bg)	Apprs	Approaches
(Bh)	Rky	Rocky

C. The Land (Natural Features)



D. Control Points

1	△		*Triangulation point (station)*
†*1a*			*Astronomic Station*
2	☉		*Fixed point (landmark) (See L-63)*
†*(Da)*	∘		*Fixed point (landmark, position approx.)*
3	• 256		*Summit of height (Peak)* *(when not a landmark)*
(Db)	◎256		*Peak, accentuated by contours*
(Dc)	✹256		*Peak, accentuated by hachures*
(Dd)	✹		*Peak, elevation not determined*
(De)	☉256		*Peak, when a landmark*
4	⊕	Obs Spot	*Observation spot*
*5		BM	*Bench mark*
†6	**View X**		*View point*
7			*Datum point for grid of a plan*
8			*Graphical triangulation point*
9		Astro	*Astronomical*
10		Tri	*Triangulation*
(Df)		C of E	*Corps of Engineers*
12			*Great trigonometrical survey station*
13			*Traverse station*
14		Bdy Mon	*Boundary monument*
(Dg)	◇		*International boundary monument*

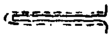
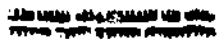
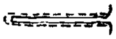
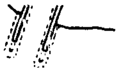
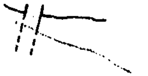
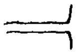
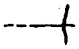
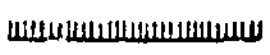
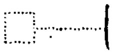
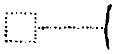
E. Units

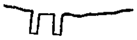
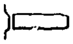
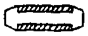
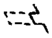
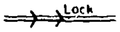
1	hr	*Hour*	†*14a*		*Greenwich*
2	m; min	*Minute (of time)*	*15*	pub	*Publication*
3	sec	*Second (of time)*	*16*	Ed	*Edition*
4	m	*Meter*	*17*	corr	*Correction*
4a	dm	*Decimeter*	*18*	alt	*Altitude*
4b	cm	*Centimeter*	*19*	ht; elev	*Height; Elevation*
4c	mm	*Millimeter*	20	°	*Degree*
4d	m^2	*Square meter*	21	′	*Minute (of arc)*
4e	m^3	*Cubic meter*	22	″	*Second (of arc)*
5	km	*Kilometer*	23	No	*Number*
6	in	*Inch*	*(Ea)*	St M	*Statute mile*
7	ft	*Foot*	*(Eb)*	msec	*Microsecond*
8	yd	*Yard*	†*(Ec)*	Hz	*Hertz (cps)*
9	fm	*Fathom*	†*(Ed)*	kHz	*Kilohertz (kc)*
10	cbl	*Cable length*	†*(Ee)*	MHz	*Megahertz (Mc)*
11	M	*Nautical mile*	†*(Ef)*	cps	*Cycles/second(Hz)*
12	kn	*Knot*	†*(Eg)*	kc	*Kilocycle (kHz)*
12a	t	*Ton*	†*(Eh)*	Mc	*Megacycle (MHz)*
12b	cd	*Candela (new candle)*			
13	lat	*Latitude*			
14	long	*Longitude*			

† F. Adjectives, Adverbs
and other abbreviations

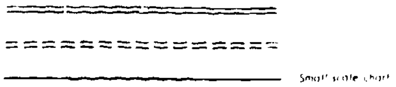
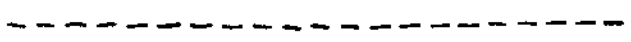
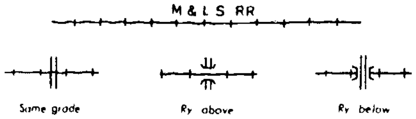
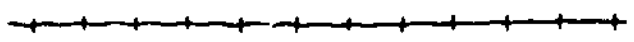
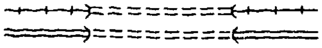
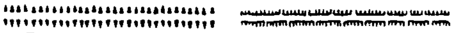
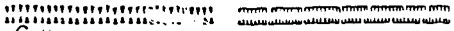
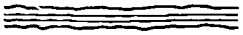
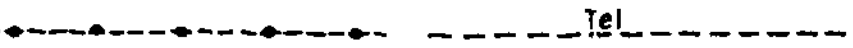
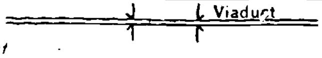
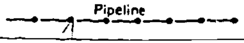
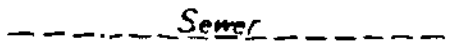
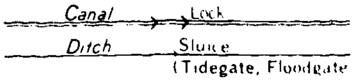
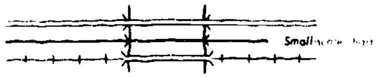
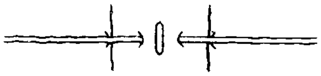
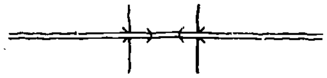
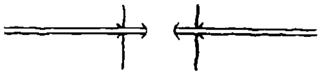
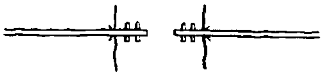
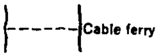
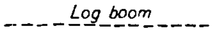
1	gt	*Great*
2	lit	*Little*
3	lrg	*Large*
4	sml	*Small*
5		*Outer*
6		*Inner*
7	mid	*Middle*
8		*Old*
9	anc	*Ancient*
10		*New*
11	St	*Saint*
12	conspic	*Conspicuous*
13		*Remarkable*
14	D Destr	*Destroyed*
15		*Projected*
16	dist	*Distant*
17	abt	*About*
18		*See chart*
18a		*See plan*
19		*Lighted; Luminous*
20	sub	*Submarine*
21		*Eventual*
22	AERO	*Aeronautical*
23		*Higher*
†*23a*		*Lower*
24	exper	*Experimental*
25	discontd	*Discontinued*
26	prohib	*Prohibited*
27	explos	*Explosive*
28	estab	*Established*
29	elec	*Electric*
30	priv	*Private, Privately*
31	prom	*Prominent*
32	std	*Standard*
33	subm	*Submerged*
34	approx	*Approximate*
†*35*		*Maritime*
†*36*	maintd	*Maintained*
†*37*	aband	*Abandoned*
†*38*	temp	*Temporary*
†*39*	occas	*Occasional*
†*40*	extr	*Extreme*
†*41*		*Navigable*
†*42*	N M	*Notice to Mariners*
†*(Fa)*	L N M	*Local Notice to Mariners*
†*43*		*Sailing Directions*
†*44*		*List of Lights*
(Fb)	unverd	*Unverified*
(Fc)	AUTH	*Authorized*
(Fd)	CL	*Clearance*
(Fe)	cor	*Corner*
(Ff)	concr	*Concrete*
(Fg)	fl	*Flood*
(Fh)	mod	*Moderate*
(Fi)	bet	*Between*
(Fj)	1st	*First*
(Fk)	2nd	*Second*
(Fl)	3rd	*Third*
(Fm)	4th	*Fourth*

G. Ports and Harbors

1		Anch	Anchorage (large vessels)
†2		Anch	Anchorage (small vessels)
3		Hbr	Harbor
4		Hn	Haven
5		P	Port
6		Bkw	Breakwater
6a			Dike
7			Mole
8			Jetty (partly below MHW)
8a			Submerged jetty
(Ga)			Jetty (small scale)
9		Pier	Pier
10			Spit
11			Groin (partly below MHW)
12	ANCHORAGE PROHIBITED	ANCH PROHIB	Anchorage prohibited (See P-25)
†12a			Anchorage reserved
†12b	QUARANTINE ANCHORAGE	QUAR ANCH	Quarantine anchorage
13	Spoil Area		Spoil ground
(Gb)	Dumping Ground		Dumping ground
(Gc)	80 83 Disposal Area 85 Depths from survey of JUNE 1968 90 98		Disposal area
14		Fsh stks	Fisheries; Fishing stakes
14a			Fish trap; Fish weirs (actual shape charted)
14b			Duck blind
15			Tunny nets (See G-14a)
15a	Oys	Oys	Oyster bed
16		Ldg	Landing place
17			Watering place
18		Whf	Wharf
19			Quay

20			Berth
20a	⑭		Anchoring berth
20b	3		Berth number
21	•	Dol	Dolphin
22			Bollard
23			Mooring ring
24			Crane
25			Landing stage
25a			Landing stairs
26	⊕	Quar	Quarantine
27			Lazaret
*28		Harbor Master	Harbor master's office
29		Cus Ho	Customhouse
30			Fishing harbor
31			Winter harbor
32			Refuge harbor
33		B Hbr	Boat harbor
34			Stranding harbor (uncovers at LW)
35			Dock
36			Dry dock (actual shape on large-scale charts)
37			Floating dock (actual shape on large-scale charts)
38			Gridiron; Careening grid
39			Patent slip; Slipway, Marine railway
39a		Ramp	Ramp
†40			Lock (point upstream) (See H-13)
41			Wet dock
42			Shipyard
43			Lumber yard
44	⊕	Health Office	Health officer's office
45		Hk	Hulk (actual shape on lrg scale charts) (See O-11)
46	PROHIBITED AREA	PROHIB AREA	Prohibited area
†46a			Calling-in point for vessel traffic control
47			Anchorage for seaplanes
48			Seaplane landing area
49	Under construction		Work in progress
50			Under construction
†51			Work projected
(Gd)	Subm ruins		Submerged ruins

H. Topography (Artificial Features)

1	Road (Rd) or Highway (Hy)	
†(11a)	Highway markers	
2	Track, Footpath, or Trail	
3	Railway (Ry) (single or double track), Railroad (RR)	
3a	Tramway	
3b	Railway station	
3c	Tunnel (railroad or road)	
3d	Embankment, Levee	
3e	Cutting	
†3f	Causeway	
4	Overhead power cable (OVHD PWR CAB)	
5	Power transmission line	
5a	Power transmission mast	
6	Prominent telegraph or telephone line	
7	Aqueduct; Water pipe	
8	Viaduct	
†8a	Oil pipeline	
†9	Pile; Piling; Post (above MHW) (See L-59, O-30)	°Pile •Pile ∴°Piling ∴•Piling °Post
9a	Mast	⊙MAST °Mast
10	Highway (See H-1)	
11	Sewer	
12	Culvert	
†13	Canal, Ditch, Lock, Sluice (point upstream)	
†14	Bridge (BR) in general	
14a	Stone, concrete bridge (Same as H-14)	
14b	Wooden bridge (Same as H-14)	
14c	Iron bridge (Same as H-14)	
14d	Suspension bridge (Same as H-14)	
15	Drawbridge (in general)	
16	Swing bridge (Same as H-15)	
16a	Lift bridge	
16b	Weighbridge or Bascule bridge	
17	Pontoon bridge	
17a	Footbridge	
18	Transporter bridge (Same as H-14)	
18a	Bridge clearance, vertical	VERT CL 6 FT
18b	Bridge clearance, horizontal	HOR CL 28 FT
19	Ferry (Fy)	
†(Hb)	Cable ferry	
20	Ford	
21	Dam	
22	Fence	
23	Training wall	
24	Log boom	

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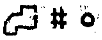
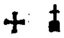
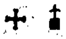
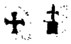
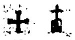
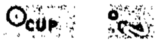
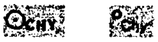
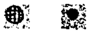
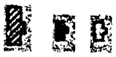
I. Buildings and Structures (see General Remarks)

1	 		*City or Town (large scale)*
(1a)			*City or Town (small scale)*
2			*Suburb*
3		Vil	*Village*
3a			*Buildings in general*
4		Cas	*Castle*
5			*House*
6			*Villa*
7			*Farm*
8		Ch	*Church*
8a		Cath	*Cathedral*
8b		Spire	*Spire; Steeple*
9			*Roman Catholic Church*
†10			*Temple*
11			*Chapel*
†12			*Mosque*
†12a			*Minaret*
(1b)			*Moslem Shrine*
†13			*Marabout*
†14		Pag	*Pagoda*
†15			*Buddhist Temple; Joss-House*
†15a			*Shinto Shrine*
16			*Monastery; Convent*
17			*Calvary; Cross*
17a			*Cemetery, Non-Christian*
18			*Cemetery, Christian*
18a			*Tomb*
19			*Fort (actual shape charted)*
†20			*Battery*
21			*Barracks*
22			*Powder magazine*
23			*Airplane landing field*
24			*Airport, large scale (See P-13)*
(1c)			*Airport, military (small scale)*
†(1d)			*Airport, civil (small scale)*
25			*Mooring mast*
26		St	*Street*

26a		Ave	*Avenue*
†26b		Blvd	*Boulevard*
27		Tel	*Telegraph*
28		Tel Off	*Telegraph office*
29		P O	*Post office*
30		Govt Ho	*Government house*
31			*Town hall*
32		Hosp	*Hospital*
33			*Slaughterhouse*
34		Magz	*Magazine*
34a			*Warehouse, Storehouse*
35			*Monument*
36			*Cupola*
37			*Elevator, Lift*
(1e)		Elev	*Elevation; Elevated*
38			*Shed*
39			*Zinc roof*
40			*Ruins*
41			*Tower*
†(1f)			*Abandoned lighthouse*
42			*Windmill*
†43			*Watermill*
43a			*Windmotor*
44			*Chimney; Stack*
45			*Water tower; Standpipe*
46			*Oil tank*
47		Facty	*Factory*
48			*Saw mill*
49			*Brick kiln*
50			*Mine; Quarry*
51			*Well*
52			*Cistern*
53			*Tank*
54			*Noria*
55			*Fountain*

I. Buildings and Structures (continued)

61		Inst	*Institute*
62			*Establishment*
63			*Bathing establishment*
64		Ct Ho	*Courthouse*
65	⚑	Sch	*School*
(Ig)	⚑	H S	*High school*
(Ih)	⚑	Univ	*University*
66	■ ▨ □	Bldg	*Building*
67		Pav.	*Pavilion*
68			*Hut*
69			*Stadium*
70		T	*Telephone*
71	⊕ ●		*Gas tank; Gasometer*

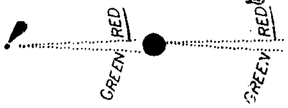
72	⊙GAB	°Gab	*Gable*
73			*Wall*
†74			*Pyramid*
†75			*Pillar*
†76			*Oil derrick*
(Ii)		Ltd	*Limited*
(Ij)		Apt	*Apartment*
(Ik)		Cap	*Capitol*
(Il)		Co	*Company*
(Im)		Corp	*Corporation*
(In)	⊙		*Landmark (conspicuous object)*
(Io)	o		*Landmark (position approx.)*

J. Miscellaneous Stations

1		Sta	*Any kind of station*
2		Sta	*Station*
3			*Coast Guard station* *(Similar to Lifesaving Sta.)*
(Ja)			*Coast Guard station* *(when landmark)*
†4	⊙ LOOK TR		*Lookout station; Watch tower*
5			*Lifeboat station*
6			*Lifesaving station* *(See J-3)*
7		Rkt Sta	*Rocket station*
8	◉ ⊙ PIL STA		*Pilot station*
9		Sig Sta	*Signal station*
10		Sem	*Semaphore*
11		S Sig Sta	*Storm signal station*
12			*Weather signal station*
(Jb)	⊙ W.B. SIG STA		*Weather Bureau signal station*

13			*Tide signal station*
14			*Stream signal station*
15			*Ice signal station*
16			*Time signal station*
†16a			*Manned oceanographic station*
†16b			*Unmanned oceanographic station*
17			*Time ball*
18			*Signal mast*
19	P ⊙FS °FS ⊙FP °FP		*Flagstaff; Flagpole*
†19a	⊙F TR °F Tr		*Flag tower*
20			*Signal*
21		Obsy	*Observatory*
22		Off	*Office*
(Jc)	BELL		*Bell (on land)*
(Jd)	° HECP		*Harbor entrance control post*

K. (! new optional symbol) Lights

†1	! ● ☆	Position of light
2	Lt	Light
†(Ka)	●	Riprap surrounding light
3	Lt Ho	Lighthouse
4	! AERO ● AERO	Aeronautical light (See F-22)
4a		Marine and air navigation light
5	! Bn ● ● Bn	Light beacon
6	● !	Light vessel; Lightship
8		Lantern
9		Street lamp
10	REF	Reflector
11	! ······ Ldg Lt ●······ Ldg Lt	Leading light
12	 RED RED	Sector light
13	 RED GREEN RED GREEN	Directional light
14		Harbor light
15		Fishing light
16		Tidal light
17	! Priv maintd ●	Private light (maintained by private interests; to be used with caution)
21	F	Fixed light
22	Occ	Occulting light
23	Fl	Flashing light
†23a	E Int	Isophase light (equal interval)
24	Qk Fl	Quick flashing (scintillating) light
25	Int Qk Fl I Qk Fl	Interrupted quick flashing light
25a	S Fl	Short flashing light
26	Alt	Alternating light
27	Gp Occ	Group occulting light
28	Gp Fl	Group flashing light
28a	S-L Fl	Short-long flashing light
28b		Group short flashing light
29	F Fl	Fixed and flashing light
30	F Gp Fl	Fixed and group flashing light
†30a	Mo	Morse code light
31	Rot	Revolving or Rotating light
		Period
42		Every
43		With
44		Visible (range)
(Kb)	M	Nautical mile (See E-11)
(Kc)	m. min	Minute (See E-2)
(Kd)	sec	Second (See E-3)
45	Fl	Flash
46	Occ	Occultation
46a		Eclipse
47	Gp	Group
48	Occ	Intermittent light
49	SEC	Sector
50		Color of sector
51	Aux	Auxiliary light
52		Varied
61	Vi	Violet
62		Purple
63	Bu	Blue
64	G	Green
65	Or	Orange
66	R	Red
67	W	White
67a	Am	Amber
68	OBSC	Obscured light
†68a	Fog Det Lt	Fog detector light (See N-Nb)

K. Lights (continued)

69		[illegible] light
70	Occas	Occasional light
71	Irreg	Irregular light
72	Prov	Provisional light
73	Temp	Temporary light
(Ke)	D Destr	Destroyed
74	Exting	Extinguished light
75		Faint light
76		Upper light
77		Lower light
78		Rear light

79		Front light
80	Vert	Vertical lights
81	Hor	Horizontal lights
(Kf)	VB	Vertical beam
(Kg)	RGE	Range
(Kh)	Exper	Experimental light
(Ki)	TRLB	Temporarily replaced by lighted buoy showing the same characteristics
(Kj)	TRUB	Temporarily replaced by unlighted buoy
(Kk)	TLB	Temporary lighted buoy
(Kl)	TUB	Temporary unlighted buoy

L. Buoys and Beacons (see General Remarks)

1	•	*Position of buoy*
2		*Light buoy*
3	BELL	*Bell buoy*
3a	GONG	*Gong buoy*
4	WHIS	*Whistle buoy*
5	C	*Can or Cylindrical buoy*
6	N	*Nun or Conical buoy*
7	SP	*Spherical buoy*
8	S	*Spar buoy*
†8a	P	*Pillar or Spindle buoy*
9		*Buoy with topmark (ball) (see L-70)*
10		*Barrel or Tun buoy*
(La)		*Color unknown*
(Lb)	FLOAT	*Float*
12	FLOAT	*Lightfloat*
13		*Outer or Landfall buoy*
14	BW	*Fairway buoy (BWVS)*
14a	BW	*Mid-channel buoy (BWVS)*
†15	R "2" R "2"	*Starboard-hand buoy (entering from seaward)*
16	"1"	*Port-hand buoy (entering from seaward)*

17	RB RB	*Bifurcation buoy (RBHB)*
18	RB RB	*Junction buoy (RBHB)*
19	RB RB	*Isolated danger buoy (RBHB)*
20	RB G	*Wreck buoy (RBHB or G)*
20a	RB C	*Obstruction buoy (RBHB or G)*
21	Tel	*Telegraph-cable buoy*
22		*Mooring buoys (colors of mooring buoys never carried)*
22a		*Mooring*
22b	Tel	*Mooring buoy with telegraphic communications*
22c	T	*Mooring buoy with telephonic communications*
23		*Warping buoy*
24	Y	*Quarantine buoy*
†24a		*Practice area buoy*
25	Explos Anch	*Explosive anchorage buoy*
25a	AERO	*Aeronautical anchorage buoy*
26	Deviation	*Compass adjustment buoy*
27	BW	*Fish trap (area) buoy (BWHB)*
27a		*Spoil ground buoy*
†28	W	*Anchorage buoy (marks limits)*
†29	Priv maintd	*Private aid to navigation (buoy) (maintained by private interests, use with caution)*

L. Buoys and Beacons (continued)

30			*Temporary buoy (See K-1j,k,l)*
30a			*Winter buoy*
31		*HB*	*Horizontal stripes or bands*
32		*VS*	*Vertical stripes*
33		*Chec*	*Checkered*
†33a		*Diag*	*Diagonal bands*
41	□	*W*	*White*
42	■	*B*	*Black*
43	▨	*R*	*Red*
44	□	*Y*	*Yellow*
45	▧	*G*	*Green*
46		*Br*	*Brown*
47		*Gy*	*Gray*
48	▤	*Bu*	*Blue*
†48a		*Am*	*Amber*
†48b		*Or*	*Orange*
51			*Floating beacon*
52	△RW Bn △W Bn ▲R Bn		*Fixed beacon (unlighted or daybeacon)*
	▲Bn		*Black beacon*
	△ Bn		*Color unknown*
†(Lc)	⊙MARKER °Marker		*Private aid to navigation*
53		Bn	*Beacon, in general (See L-52)*
54			*Tower beacon*

55			*Cardinal marking system*
56	△ Deviation Bn		*Compass adjustment beacon*
57			*Topmarks (See L-9, 70)*
58			*Telegraph-cable (landing) beacon*
†59	°° Piles •• Piles		*Piles (See O-30, H-9)*
	⊥⊥		*Stakes*
	•°Stumps		*Stumps (See O-30)*
	⊥⊥		*Perches*
61	⊙CAIRN °Cairn		*Cairn*
62			*Painted patches*
63	⊙		*Landmark (conspicuous object) (See D-2)*
(Ld)	°		*Landmark (position approximate)*
64		*REF*	*Reflector*
65	⊙MARKER		*Range targets, markers*
(Le)	 *W Or*  *W Or*		*Special-purpose buoys*
†66			*Oil installation buoy*
†67			*Drilling platform (See O-0b, O-0c)*
70	*Note:*		*TOPMARKS on buoys and beacons may be shown on charts of foreign waters. The abbreviation for black is not shown adjacent to buoys or beacons.*
(Lf)		*Ra Ref*	*Radar reflector (See M-13)*

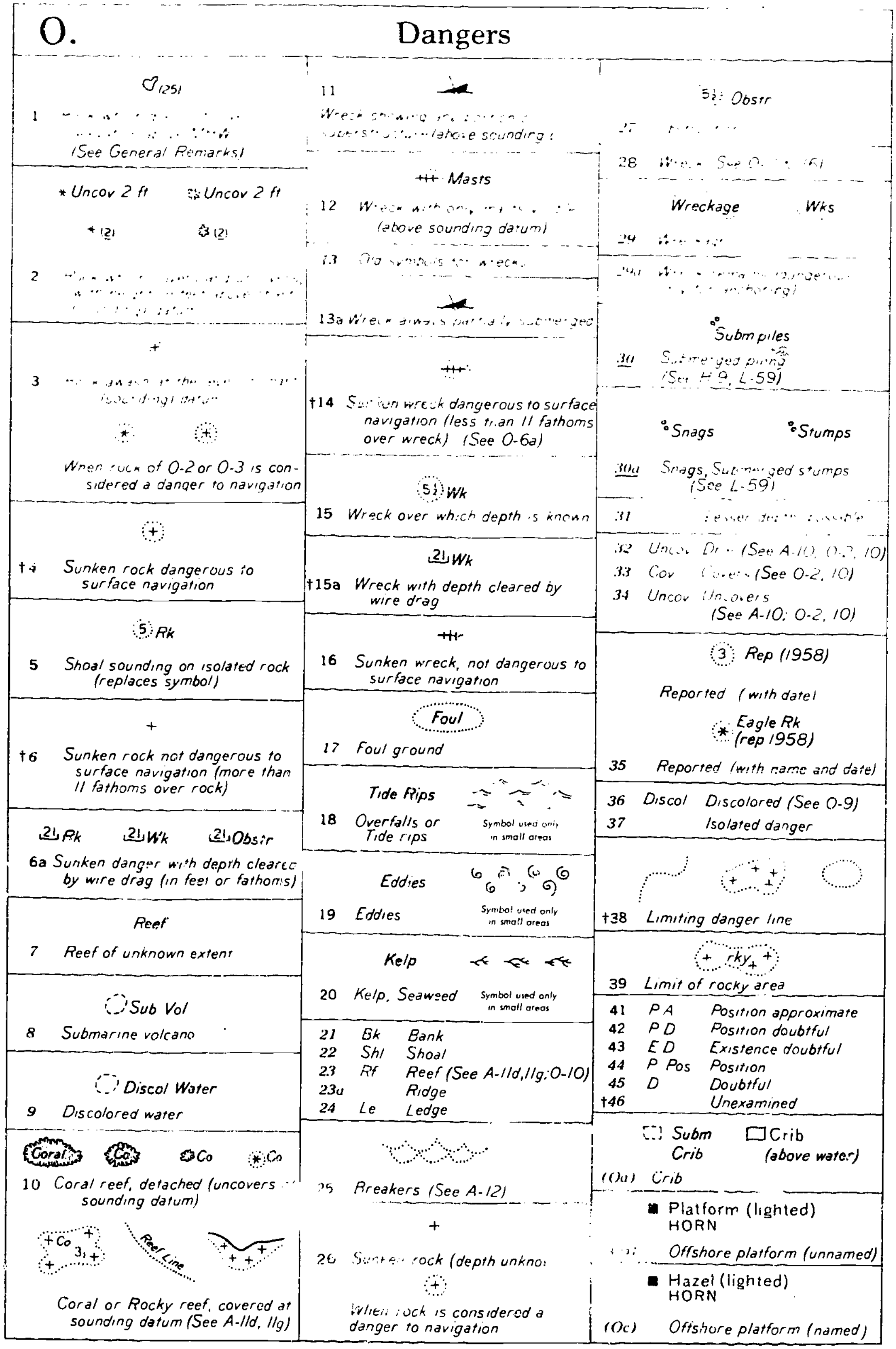
M. Radio and Radar Stations

1	° **R Sta**	*Radio telegraph station*
2	° **R T**	*Radio telephone station*
3	◎ **R Bn**	*Radiobeacon*
4	◎ **R Bn**	*Circular radiobeacon*
5	◎ **R D**	*Directional radiobeacon; Radio range*
6		*Rotating loop radiobeacon*
7	◎ **R D F**	*Radio direction finding station*
(Ma)	⊙ **TELEM ANT**	*Telemetry antenna*
†*(Mb)*	⊙ **R RELAY MAST**	*Radio relay mast*
†*(Mc)*	⊙ **MICRO TR**	*Microwave tower*
9	⊙ **R MAST**	*Radio mast*
	⊙ **R TR**	*Radio tower*
†*9a*	⊙ **TV TR**	*Television mast; Television tower*
10	⊙ **R TR (WBAL) 1090 Kc**	*Radio broadcasting station (commercial)*
10a	° **R Sta**	*Q.T.G. Radio station*
11	◎ **Ra**	*Radar station*
12	◎ **Racon**	*Radar responder beacon*
13	**Ra Ref**	*Radar reflector* [illegible]
14	Ra (conspic)	*Radar conspicuous object*
14a		*Ramark*
15	D F S	*Distance finding station (synchronized signals)*
†16	◎ **AERO R Bn 302**	*Aeronautical radiobeacon*
†17	° **Decca Sta**	*Decca station*
†18	**Loran Sta Venice**	*Loran station (name)*
†*19*	◎ **CONSOL Bn 190 Kc MMF**	*Consol (Consolan) station*
(Md)	◎ **AERO R Rge 342**	*Aeronautical radio range*
(Me)	◎ **Ra Ref Calibration Bn**	*Radar calibration beacon*
(Mf)	⊙ **LORAN TR SPRING ISLAND**	*Loran tower (name)*
†*(Mg)*	⊙ **R TR F R Lt**	*Obstruction light*

N. Fog Signals

1	Fog Sig	*Fog-signal station*
2		*Radio fog-signal station*
3	*GUN*	*Explosive fog signal*
4		*Submarine fog signal*
5	*SUB-BELL*	*Submarine fog bell (action of waves)*
6	*SUB-BELL*	*Submarine fog bell (mechanical)*
7	*SUB-OSC*	*Submarine oscillator*
8	*NAUTO*	*Nautophone*
9	*DIA*	*Diaphone*
10	*GUN*	*Fog gun*
11	*SIREN*	*Fog siren*
12	*HORN*	*Fog trumpet*
13	*HORN*	*Fog horn*
†*13a*	*HORN*	*Electric fog horn*
14	*BELL*	*Fog bell*
15	*WHIS*	*Fog whistle*
16	*HORN*	*Reed horn*
17	*GONG*	*Fog gong*
†18	©	*Submarine sound signal not connected to the shore (See N-5, 6, 7)*
†18a	◎∿∿	*Submarine sound signal connected to the shore (See N-5, 6, 7)*
(Na)	*HORN*	*Typhon*
(Nb)	*Fog Det Lt*	*Fog detector light (See K 68a)*

O. Dangers



(25)
1 [illegible] MHW
(See General Remarks)

Uncov 2 ft   Uncov 2 ft
(2)   (2)
2 [illegible]

3 [illegible] sounding datum

When rock of O-2 or O-3 is considered a danger to navigation

†4 Sunken rock dangerous to surface navigation

5 Rk
5 Shoal sounding on isolated rock (replaces symbol)

†6 Sunken rock not dangerous to surface navigation (more than 11 fathoms over rock)

21 Rk   21 Wk   21 Obstr
6a Sunken danger with depth cleared by wire drag (in feet or fathoms)

Reef
7 Reef of unknown extent

Sub Vol
8 Submarine volcano

Discol Water
9 Discolored water

Coral   Co   Co   Co
10 Coral reef, detached (uncovers at sounding datum)

Co 3₁   Reef Line
Coral or Rocky reef, covered at sounding datum (See A-11d, 11g)

11 Wreck showing any portion of hull or superstructure (above sounding datum)

Masts
12 Wreck with only masts visible (above sounding datum)

13 Old symbols for wrecks

13a Wreck always partially submerged

†14 Sunken wreck dangerous to surface navigation (less than 11 fathoms over wreck) (See O-6a)

5₁ Wk
15 Wreck over which depth is known

21 Wk
†15a Wreck with depth cleared by wire drag

16 Sunken wreck, not dangerous to surface navigation

Foul
17 Foul ground

Tide Rips
18 Overfalls or Tide rips   Symbol used only in small areas

Eddies
19 Eddies   Symbol used only in small areas

Kelp
20 Kelp, Seaweed   Symbol used only in small areas

21 Bk Bank
22 Shl Shoal
23 Rf Reef (See A-11d, 11g; O-10)
23a Ridge
24 Le Ledge

25 Breakers (See A-12)

26 Sunken rock (depth unknown)
When rock is considered a danger to navigation

5₁ Obstr
27 [illegible]

28 Wreck (See O-11 to 16)

Wreckage   Wks
29 Wreckage

29a Wreck remains (dangerous only for anchoring)

Subm piles
30 Submerged piling (See H-9, L-59)

Snags   Stumps
30a Snags, Submerged stumps (See L-59)

31 Lesser depth possible

32 Uncov Dries (See A-10, O-2, 10)
33 Cov Covers (See O-2, 10)
34 Uncov Uncovers (See A-10; O-2, 10)

(3) Rep (1958)
Reported (with date)
Eagle Rk (rep 1958)
35 Reported (with name and date)

36 Discol Discolored (See O-9)
37 Isolated danger

†38 Limiting danger line

rky
39 Limit of rocky area

41 PA Position approximate
42 PD Position doubtful
43 ED Existence doubtful
44 P Pos Position
45 D Doubtful
†46 Unexamined

Subm Crib   Crib (above water)
(Oa) Crib

Platform (lighted)
HORN
[illegible] Offshore platform (unnamed)

Hazel (lighted)
HORN
(Oc) Offshore platform (named)

P. Various Limits, etc.

1		Leading line, Range line
2		Transit
3		In line with
4		Limit of sector
5		Channel, Course, Track recommended (marked by buoys or beacons) (See P-21)
(Pa)		Alternate course
†6	—Ra——Ra—	Radar guided track
7		Submarine cable (power, telegraph, telephone, etc.)
7a	Cable Area	Submarine cable area
†7b		Abandoned submarine cable (includes disused cable)
†8	Pipeline	Submarine pipeline
8a	Pipeline Area	Submarine pipeline area
9		Maritime limit in general
†(Pb)	RESTRICTED AREA	Limit of restricted area
10		Limit of fishing zone (fish trap areas)
†(Pc)		U S Harbor Line
11		Limit of dumping ground, spoil ground (See P-9, G-13)
12		Anchorage limit
13		Limit of airport (See I-23, 24)
†13a		Limit of military practice areas
14		Limit of sovereignty (Territorial waters)
15		Customs boundary
16		International boundary (also State boundary)
17		Stream limit
18		Ice limit
19		Limit of tide
20		Limit of navigation
†21		Course recommended (not marked by buoys or beacons) (See P-5)
22		District or province limit
23		Reservation line
24	COURSE 053°00' TRUE MARKERS MARKERS	Measured distance
25	PROHIBITED AREA	Prohibited area (See G-12, 46)
†(Pd)	SAFETY FAIRWAY	Shipping safety fairway
†(Pe)		Directed traffic lanes
†(Pf)	Obstruction (fish haven)	Fish haven (fishing reef)

Q. Soundings

1	SD	Doubtful sounding
2	65	No bottom found
3		Out of position
4		Least depth in narrow channels
5	30 FEET APR 1968	Dredged channel (with controlling depth indicated)
6	24 FEET MAY 1968	Dredged area
7		Swept channel (See Q-9)
8	6	Drying (or uncovering) heights, in feet above chart (sounding) datum
9	17 119	Swept area, not adequately sounded (shown by green tint)
9a	29 23 3 30 8 21 7	Swept area adequately sounded (swept by wire drag to depth indicated)
†10		Hair-line depth figures
10a	8_2 19	Figures for ordinary soundings
11	8_2 19	Soundings taken from foreign charts
12	8_2 19	Soundings taken from older surveys (or smaller scale chts)
13	8_2 19	Echo soundings
14	8_2 19	Sloping figures (See Q-12)
15	8_2 19	Upright figures (See Q-10a)
†16	(25) (2)	Bracketed figures (See O-1, 2)
17	6	Underlined sounding figures (See Q-8)
18	3_2 6_1	Soundings expressed in fathoms and feet
†22		Unsounded area
(Qa)	6 5 2ft	Stream

2188

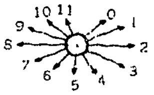
R. Depth Contours and Tints (see General Remarks)

Feet	Fathoms		Feet	Fathoms	
0	0	··········	300	50	— — — —
6	1	···········	600	100	- - - - - -
12	2	·· ·· ·· ··	1,200	200	- - - -
18	3	··· ··· ···	1,800	300	- - - - - - - -
24	4	· · · · ·	2,400	400	--- --- --- ---
30	5	·	3,000	500	- - - - - -
36	6	--- - - --- --- --- - -	6,000	1,000	-
60	10	- - - - - - - - - - - - -	12,000	2,000	- - - -
120	20	— — — — — — — — — — — —	18,000	3,000	- - -
180	30	- - - - - - - - - - - -	Or continuous lines, with values		——·5 ·· (blue or black) ——100——
240	40	— — — — — —			

S. Quality of the Bottom

†1	*Grd*	*Ground*	24	*Oys*	*Oysters*	50	*spk*	*Speckled*
2	*S*	*Sand*	25	*Ms*	*Mussels*	51	*gty*	*Gritty*
3	*M*	*Mud; Muddy*	26	*Spg*	*Sponge*	†52	*dec*	*Decayed*
4	*Oz*	*Ooze*	†27	*K*	*Kelp*	53	*fly*	*Flinty*
5	*Ml*	*Marl*	28	*Wd*	*Sea-weed*	54	*glac*	*Glacial*
6	*Cl*	*Clay*		*Grs*	*Grass*	†55	*ten*	*Tenacious*
7	*G*	*Gravel*	†29	*Stg*	*Sea-tangle*	56	*wh*	*White*
8	*Sn*	*Shingle*	†31	*Spi*	*Spicules*	57	*bk*	*Black*
9	*P*	*Pebbles*	32	*Fr*	*Foraminifera*	58	*vi*	*Violet*
10	*St*	*Stones*	33	*Gl*	*Globigerina*	59	*bu*	*Blue*
11	*Rk; rky*	*Rock; Rocky*	34	*Di*	*Diatoms*	60	*gn*	*Green*
11a	*Blds*	*Boulders*	35	*Rd*	*Radiolaria*	61	*yl*	*Yellow*
12	*Ck*	*Chalk*	36	*Pt*	*Pteropods*	62	*or*	*Orange*
12a	*Ca*	*Calcareous*	37	*Po*	*Polyzoa*	63	*rd*	*Red*
13	*Qz*	*Quartz*	†38	*Cir*	*Cirripeda*	64	*br*	*Brown*
†13a	*Sch*	*Schist*	†38a	*Fu*	*Fucus*	65	*ch*	*Chocolate*
14	*Co*	*Coral*	†38b	*Ma*	*Mattes*	66	*gy*	*Gray*
(Sa)	*Co Hd*	*Coral head*	39	*fne*	*Fine*	67	*lt*	*Light*
15	*Mds*	*Madrepores*	40	*crs*	*Coarse*	68	*dk*	*Dark*
16	*Vol*	*Volcanic*	41	*sft*	*Soft*			
(Sb)	*Vol Ash*	*Volcanic ash*	42	*hrd*	*Hard*	†70	*vard*	*Varied*
17	*La*	*Lava*	43	*stf*	*Stiff*	†71	*unev*	*Uneven*
18	*Pm*	*Pumice*	44	*sml*	*Small*	†*(Sc)*	*S/M*	*Surface layer and Under layer*
19	*T*	*Tufa*	45	*lrg*	*Large*			
20	*Sc*	*Scoriae*	46	*stk*	*Sticky*			
21	*Cn*	*Cinders*	47	*brk*	*Broken*			
†*21a*		*Ash*	47a	*grd*	*Ground (Shells)*	76		*Fresh water springs in sea-bed*
22	*Mn*	*Manganese*	†48	*rt*	*Rotten*			
23	*Sh*	*Shells*	†49	*str*	*Streaky*			

T. Tides and Currents

1	HW	High water
1a	HHW	Higher high water
2	LW	Low water
(Ta)	LWD	Low water datum
2a	LLW	Lower low water
3	MTL	Mean tide level
4	MSL	Mean sea level
4a		Elevation of mean sea level above chart (sounding) datum
5		Chart datum (datum for sounding reduction)
6	Sp	Spring tide
7	Np	Neap tide
†7a	MHW	Mean high water
8	MHWS	Mean high water springs
8a	MHWN	Mean high water neaps
8b	MHHW	Mean higher high water
†8c	MLW	Mean low water
9	MLWS	Mean low water springs
9a	MLWN	Mean low water neaps
9b	MLLW	Mean lower low water
10	ISLW	Indian spring low water
11		High water full and change (vulgar establishment of the port)
12		Low water full and change
13		Mean establishment of the port
13a		Establishment of the port
14		Unit of height
15		Equinoctial
16		Quarter; Quadrature
17	Str	Stream
18	2 kn →	Current, general, with rate
19	2 kn →	Flood stream (current) with rate
20	2 kn →	Ebb stream (current) with rate
21	○ Tide gauge	Tide gauge, Tidepole, Automatic tide gauge
23	vel	Velocity; Rate
24	kn	Knots
25	ht	Height
26		Tide
27		New moon
28		Full moon
29		Ordinary
30		Syzygy
31	fl	Flood
32		Ebb
33		Tidal stream diagram
34	◇A ◇B	Place for which tabulated tidal stream data are given
35		Range (of tide)
36		Phase lag
(Th)		Current diagram, with explanatory note

U. Compass

Compass Rose

The outer circle is in degrees with zero at true north. The inner circles are in points and degrees with the arrow indicating magnetic north.

1	N	North
2	E	East
3	S	South
4	W	West
5	NE	Northeast
6	SE	Southeast
7	SW	Southwest
8	NW	Northwest
9	N	Northern
10	E	Eastern
11	S	Southern
12	W	Western
21	brg	Bearing
†22	T	True
23	mag	Magnetic
24	var	Variation
25		Annual change
25a		Annual change nil
26		Abnormal variation; Magnetic attraction
27	deg	Degrees (See E-20)
28	dev	Deviation

Index of Abbreviations

A

abandt	Abandoned	F 37
ABAND LT HO	Abandoned lighthouse	If
abt.	About	F 17
AERO	Aeronautical	F 22; K 4
AERO R. Bn.	Aeronautical radiobeacon	M 16
AERO R. Rge	Aeronautical radio range	Md
alt.	Altitude	E 18
Alt	Alternating (light)	K 26
Am	Amber	K 67a; L 48a
anc.	Ancient	F 9
Anch	Anchorage	B 15, G 1,2
Anch prohib	Anchorage prohibited	G 12
approx.	Approximate	F 34
Apprs.	Approaches	Bg
Apt.	Apartment	Ij
Arch.	Archipelago	B 20
Astro.	Astronomical	D 9
AUTH.	Authorized	Fc
Aux	Auxiliary (light)	K 51
Ave.	Avenue	I 26a

B

B	Bay	B 2
B	Bayou	Ba
B	Black	L 42
Bdy. Mon.	Boundary monument	D 14
BELL	Fog Bell	N 14
bet.	Between	Fi
B Hbr	Boat harbor	G 55
Bk	Bank	O 21
bk	Black	S 57
Bkw.	Breakwater	G 6
Bld	Boulder	B 32
Bldg.	Building	I 66
Blds	Boulders	S 11a
Blvd.	Boulevard	I 26b
B.M.	Bench mark	D 5
Bn	Beacon (in general)	L 52,53
BR.	Bridge	H 14
Br	Brown	L 46
br	Brown	S 64
brg.	Bearing	U 21
brk	Broken	S 47
Bu	Blue	K 63; L 48
bu	Blue	S 59
BWHB	Black and white horizontal bands	L 27
BWVS	Black and white vertical stripes	L 14,14a

C

C	Can; Cylindrical (buoy)	L 5
C	Cape	B 22
C	Cove	B 5a
Ca	Calcareous	S 12a
Cap.	Capitol	Ik
Cas.	Castle	I 4
Cath.	Cathedral	I 8a
cbl.	Cable length	E 10
C. G.	Coast Guard	J 3, Ja
Ch	Chocolate	S 65
Ch	Church	I 8
Chan	Channel	B 10
Chec	Checkered (buoy)	L 33
CHY	Chimney	I 44
Cir	Cirripeda	S 38
Ck	Chalk	S 12
Cl	Clay	S 6
CL.	Clearance	Fd
cm	Centimeter	E 4b
Cn	Cinders	S 21
Co.	Company	Ii
Co	Coral	S 14
Co Hd	Coral head	Sa
concr.	Concrete	Ff
conspic.	Conspicuous	F 12
C. of E.	Corps of Engineers	Df
cor.	Corner	Fe
Corp.	Corporation	Im
Cov	Covers	O 33
corr.	Correction	E 17
cps	Cycles/second	Ef
Cr.	Creek	B 5
crs	Coarse	S 40
Cswy.	Causeway	H 3f
Ct. Ho.	Courthouse	I 64
CUP.	Cupola	I 36
Cus. Ho.	Customhouse	G 29

D

D	Doubtful	O 45
D.; Destr.	Destroyed	F 14; Ke
dec.	Decayed	S 52
deg.	Degrees	U 27
dev.	Deviation	U 28
Diag	Diagonal bands	L 33a
D.F.S.	Distance finding station	M 15
Di	Diatoms	S 34
DIA	Diaphone	I 9
Discol	Discolored	O 36
discontd.	Discontinued	F 25
dist.	Distant	F 16
dk	Dark	S 68
dm.	Decimeter	E 4a
Dol	Dolphin	G 21

E

E.	East, Eastern	U 2,10
Ed.	Edition	E 16
E.D.	Existence doubtful	O 43
elec.	Electric	F 29
elev.	Elevation	E 19
ELEV.	Elevator, Lift	I 37
Elev.	Elevation, Elevated	Ia
Entr	Entrance	B 11
E Int	Isophase lt.(equal interval)	K 23a
Est	Estuary	B 12
estab.	Established	F 28
Exper	Experimental (light)	Kh
exper.	Experimental	F 24
explos.	Explosive	F 27

Explos. Anch.	Explosive Anchorage (buoy)	L 25
Exting	Extinguished (light)	K 74
extr.	Extreme	F 40

F

F	Fixed (light)	K 21
Facty	Factory	I 47
Fd	Fjord	B 3
F Fl	Fixed and flashing (light)	K 29
F Gp Fl	Fixed and group flashing (light)	K 30
Fl	Flash, Flashing (light)	K 23.45
fl.	Flood	Fg; T 31
fly	Flinty	S 53
fm	Fathom	E 9
fne	Fine	S 39
Fog Det Lt	Fog detector light	K 68a; Nb
Fog Sig.	Fog signal station	N 1
FP.	Flagpole	J 19
Fr	Foraminifera	S 32
FS.	Flagstaff	J 19
Fsh stks	Fishing stakes	G 14
ft.	Foot	E 7
Ft.	Fort	I 19
F. TR.	Flag tower	J 19a
Fu	Fucus	S 38a
Fy.	Ferry	H 19

G

G	Gulf	B 1
G	Gravel	S 7
G	Green	K 64
G	Green	L 20.20a.45
GAB.	Gable	I 72
Gl	Globigerina	S 33
glac	Glacial	S 54
gn	Green	S 60
GONG	Fog gong	N 17
Govt. Ho.	Government House	I 30
Gp	Group	K 47
Gp Fl	Group flashing	K 28
Gp Occ	Group occulting	K 27
Grd, grd	Ground	S 1,47a
Grs	Grass	S 28
gt.	Great	F 1
gty	Gritty	S 51
GUN	Explosive fog signal	N 3
GUN	Fog gun	N 10
Gy	Gray	L 47
gy	Gray	S 66

H

HB	Horizontal bands or stripes	L 31
Hbr	Harbor	B 16; G 3
Hd.	Head, Headland	B 24
HECP	Harbor entrance control post	Jd
Hk	Hulk	G 45
HHW	Higher high water	T 1a
Hn	Haven	B 16a; G 4
Hor	Horizontal lights	K 81
HOR. CL.	Horizontal clearance	H 18b
HORN	Fog trumpet, Fog horn, Reed horn, Typhon	N 12,13,13a,16,Na
Hosp	Hospital	I 32
hr	Hour	E 1
hrd	Hard	S 42
H S	High School	Ig
ht.	Height	E 19; T 25
HW	High water	T 1
Hy	Highway	H 1
Hz	Hertz	Ec

I

I.	Island	B 18
I Qk; Int Qk	Interrupted quick	K 25
in.	Inch	E 6
In	Inlet	B 6
Inst	Institute	I 61
irreg	Irregular	K 71
ISLW	Indian spring low water	T 10
It.	Islet	B 19

K

K	Kelp	S 27
kc	Kilocycle	Eg
kHz	Kilohertz	Ed
km.	Kilometer	E 5
kn	Knots	E 12; T 24

L

L.	Loch, Lough, Lake	B 4
La	Lava	S 17
Lag	Lagoon	Bf; C 16
lat.	Latitude	E 13
Ldg.	Landing; Landing place	B 33; G 16
Ldg. Lt.	Leading light	K 11
Le	Ledge	O 24
LLW	Lower low water	T 2a
L.N.M.	Local Notice to Mariners	Fa
long.	Longitude	E 14
LOOK. TR.	Lookout station; Watch tower	J 4
lrg	Large	F 3; S 45
LS. S.	Lifesaving station	J 6
Lt.	Light	K 2
lt	Light	S 67
Ltd.	Limited	Ii
Lt. Ho.	Lighthouse	K 3
LW	Low water	T 2
LWD	Low water datum	Ta

M

M	Nautical mile	E11; Kb
M	Mud, Muddy	S 3
m.	Meter	E 4,d,e
m. ; min.	Minute (of time)	E2; Kc
Ma	Mattes	S 38b
mag.	Magnetic	U 23
Magz.	Magazine	I 34
maintd.	Maintained	F 36

Mc	**Megacycle**	**Eh**
Mds	Madrepores	S 15
MHHW	Mean higher high water	T 8b
MHW	Mean high water	T 7a
MHWN	Mean high water neaps	T 8a
MHWS	Mean high water springs	T 8
MHz	**Megahertz**	**Ee**
MICRO. TR.	**Microwave tower**	**Mc**
mid.	Middle	F 7
Mkr	Marker	Lc
Ml	Marl	S 5
MLLW	Mean lower low water	T 9b
MLW	Mean low water	T 8c
MLWN	Mean low water neaps	T 9a
MLWS	Mean low water springs	T 9
mm.	Millimeter	E 4c
Mn	Manganese	S 22
Mo.	**Morse code light**	**K 30a**
mod.	**Moderate**	**Fh**
MON.	Monument	I 35
Ms	Mussels	S 25
M. Sec.	Microsecond	**Eb**
MSL	Mean sea level	T 4
Mt.	Mountain, Mount	B 26
Mth	Mouth	B 13
MTL	Mean tide level	T 3

N

N.	North; Northern	U 1, 9
N	Nun; Conical (buoy)	L 6
NAUTO	Nautophone	N 8
NE.	Northeast	U 5
N.M.	**Notice to Mariners**	**F 42**
No.	Number	E 23
Np	Neap tide	T 7
NW.	Northwest	U 8

O

OBSC	Obscured (light)	K 68
Obs. Spot	Observation spot	D 4
Obstr.	Obstruction	O 27
Obsy.	Observatory	J 21
Occ	Occulting (light); Occultation	K 22, 46
Occ	Intermittent (light)	K 46
Occas	Occasional (light)	F 39; K 70
Off.	Office	J 22
or	Orange	S 62
Or	Orange	K 65; L48b
OVHD. PWR. CAB.	Overhead power cable	H 4
Oys	Oysters; Oyster bed	S 24; G 15a
Oz	Ooze	S 4

P

P	Pebbles	S 9
P	Pillar (buoy)	L8a
P	Pond	Bb
P.	Port	B 17; G 5
P. A.	Position approximate	O 41
Pag.	Pagoda	I 14
Pass	Passage, Pass	B 9
Pav.	Pavilion	I 67
P. D.	Position doubtful	O 42
Pen.	Peninsula	B 21
PIL. STA.	Pilot station	J 8
Pk.	Peak	B 29
Pm	Pumice	S 18
Po	Polyzoa	S 37
P. O.	Post Office	I 29
P., Pos	Position	O 44
priv	Private, Privately	F 30
Priv. maintd.	Privately maintained	K 17, L 29
Prohib.	Prohibited	F 29
prom.	Prominent	F 31
Prom.	Promontory	B 23
Prov	Provisional (light)	K 72
Pt.	Point	B 25
Pt	Pteropods	S 36
pub.	Publication	F 15
PWI	Potable water intake	

Q

Quar.	Quarantine	G 26
Qk Fl	Quick flashing (light)	K 24
Qz	Quartz	S 13

R

	Red	K 66; L 15,43
	River	Bd
Ra	Radar station	M 11
Racon	Radar responder beacon	M 12
Ra (conspic)	Radar conspicuous object	M 14
Ra Ref	Radar reflector	Lf; M 13
RBHB	Red and black horizontal bands	L 17, 18, 19, 20, 20a
R Bn	Red beacon	L 52
R. Bn.	Radiobeacon	M 3, 4, 6
Rd	Radiolaria	S 35
rd	Red	S 63
Rd.	Road	H 1
Rd	Road, Roadstead	B 14
R.D.	Directional Radiobeacon; Radio range	M 5
R. D. F.	Radio direction finding station	M 7
REF	Reflector	K 10; L 64
Rep.	Reported	O 35
Rf	Reef	O 23
Rge.	Range	B 27
RGE	Range	Kg
Rk	Rock	B 35
Rk, rky	Rock, Rocky	S 11
Rky.	Rocky	Bh
R MAST	Radio mast	M 9
Rot	Revolving; Rotating (light)	K 31
RR.	Railroad	H 3
R.RELAY MAST	**Radio relay mast**	**Mb**
R. Sta.	Radio telegraph station; Q.T.G. Radio station	M 1, 10a
R. T.	Radio telephone station	M 2
rt	Rotten	S 48

R TR	Radio tower	M 3
Ru	Ruins	I 40
RW Bn	Red and white beacon	L 52
Ry.	Railway	H 3

S

S	Sand	S 2
S	South; Southern	U 3, 11
S	Spar (buoy)	L 8
Sc	Scoriae	S 20
Sch.	Schist	S 13a
Sch.	School	I 65
Sd.	Sound	B 8
SD	Sounding doubtful	Q 1
SE	Southeast	U 6
sec.	Second (of time)	E 3
sec	Seconds	Kd
SEC	Sector	K 49
Sem.	Semaphore	J 10
S Fl	Short flashing (light)	K 25a
sft	Soft	S 41
Sh	Shells	S 23
Shl	Shoal	O 22
Sig. Sta.	Signal station	J 9
SIREN	Fog siren	N 11
S-L Fl	Short-long flashing (light)	K 28a
Slu	Slough	Bc; C 18
sml	Small	F 1; S 44
Sn	Shingle	S 8
Sp	Spring tide	T 6
SP	Spherical (buoy)	L 7
Spg	Sponge	S 26
Spi	Spicules	S 31
S'PIP	Standpipe	I 45
spk	Speckled	S 50
S. Sig. Sta.	Storm signal station	J 11
St.	Saint	F 11
St.	Street	I 26
St	Stones	S 10
Sta.	Station	J 1, 2
std.	Standard	F 32
stf	Stiff	S 43
Stg	Sea-tangle	S 29
stk	Sticky	S 46
St. M.	Statute mile	Ea
Str	Strait	B 7
Str	Stream	Bc; T 17
str	Streaky	S 49
sub	Submarine	F 20
SUB-BELL	Submarine fog bell	N 5,6
subm	Submerged	F 33
Subm	Submerged	Oa.30
Subm Ruins	Submerged ruins	Gd
SUB-OSC	Submarine oscillator	N 7
Sub Vol	Submarine volcano	O 8
SW.	Southwest	U 7

T

T.	Telephone	I 70; L 22c
T	True	U 22
T	Tufa	S 19
Tb	Temporary buoy	L 30
Tel.	Telegraph	I 27; [illegible]
Telem Ant	Telemetry antenna	[illegible]
Tel. Off.	Telegraph office	I 28
Temp	Temporary (lights)	F 38; K 73
ten	Tenacious	S 55
Thoro.	Thorofare	B 9
Tk.	Tank	I 53
TR	Tower	I 41
TRLB. TRUB.	TLB. TUB	Ki, j, k, l
Tri.	Triangulation	D 10
TV TR.	Television tower (mast)	M 9a

U

Uncov.	Uncovers	O 2
Uncov.	Uncovers, Dries	O 32, 34
Univ.	University	Ih
unverd.	Unverified	Fb
unev	Uneven	S 71

V

var	Variation	U 24
vard	Varied	S 70
VB	Vertical beam	Kf
vel.	Velocity	T 23
Vert	Vertical (lights)	K 80
VERT. CL.	Vertical clearance	H 18a
Vi	Violet	K 61
vi	Violet	S 58
View X	View point	D 6
Vil.	Village	I 3
Vol.	Volcano	B 30
Vol	Volcanic	S 16
Vol Ash	Volcanic ash	Sb
VS	Vertical stripes	L 32

W

W.	West; Western	U 4, 12
W	White	K 67; L 41
wh	White	S 56
W Bn	White beacon	L 52
W.B. SIG. STA.	Weather Bureau signal station	Jb
Wd	Sea-weed	S 28
Whf.	Wharf	G 18
WHIS	Fog whistle	N 15
Wk	Wreck	O 15, 28
Wks	Wreckage	O 29
W Or	White and orange	Le

Y

Y	Yellow	L 24, 44
yl	Yellow	S 61
yd.	Yard	E 8

1st	First	Fj
2nd	Second	Fk
3rd	Third	Fl
4th	Fourth	Fm

°	Degree	E 20
′	Minute (of arc)	E 21
″	Second (of arc)	E 22

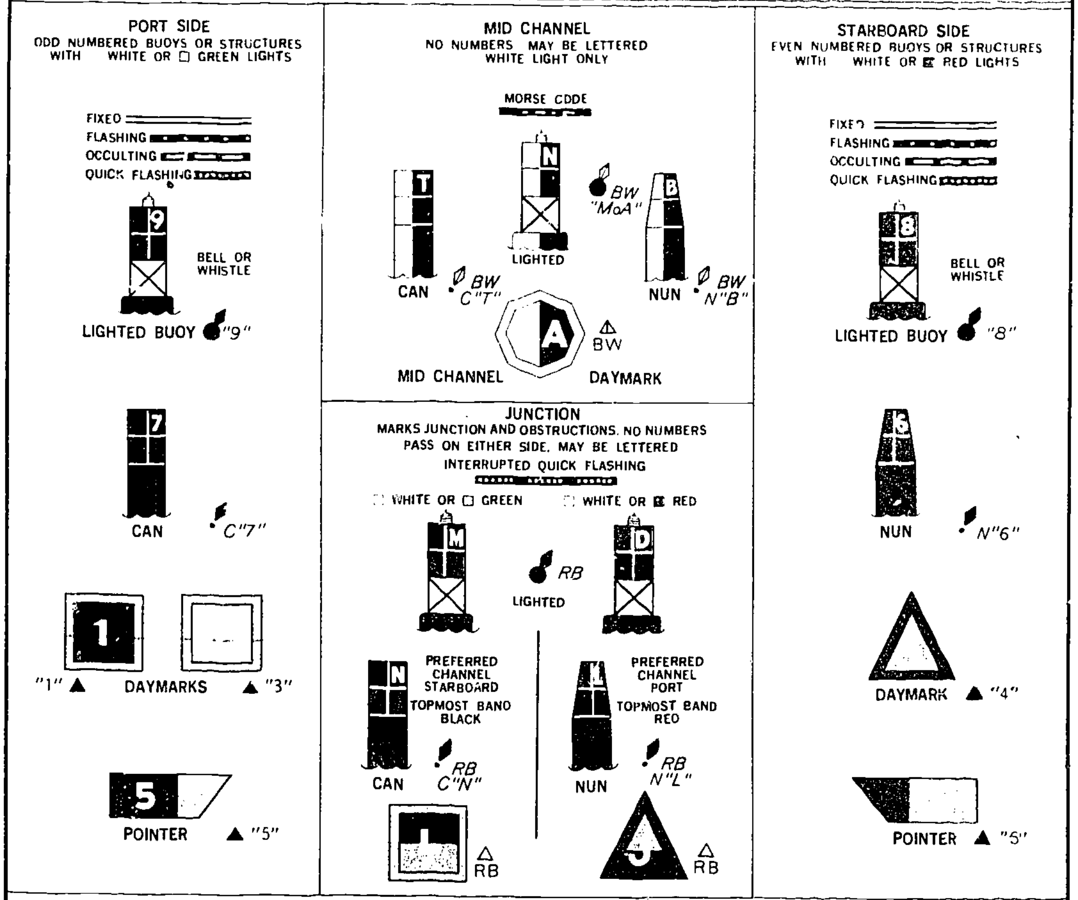
NAVIGATIONAL AIDS

IN

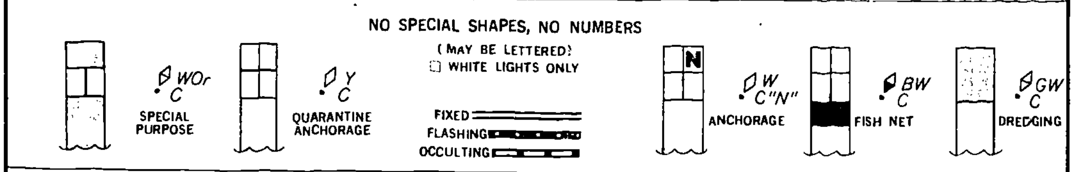
UNITED STATES WATERS

AIDS TO NAVIGATION ON NAVIGABLE WATERWAYS
except Western Rivers and Intracoastal Waterway

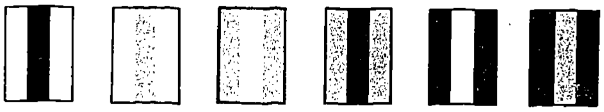
LATERAL SYSTEM AS SEEN ENTERING FROM SEAWARD

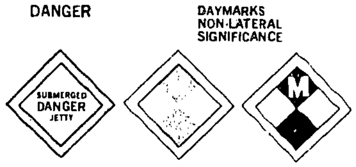


BUOYS HAVING NO LATERAL SIGNIFICANCE—ALL WATERS



RANGE DAYMARKS





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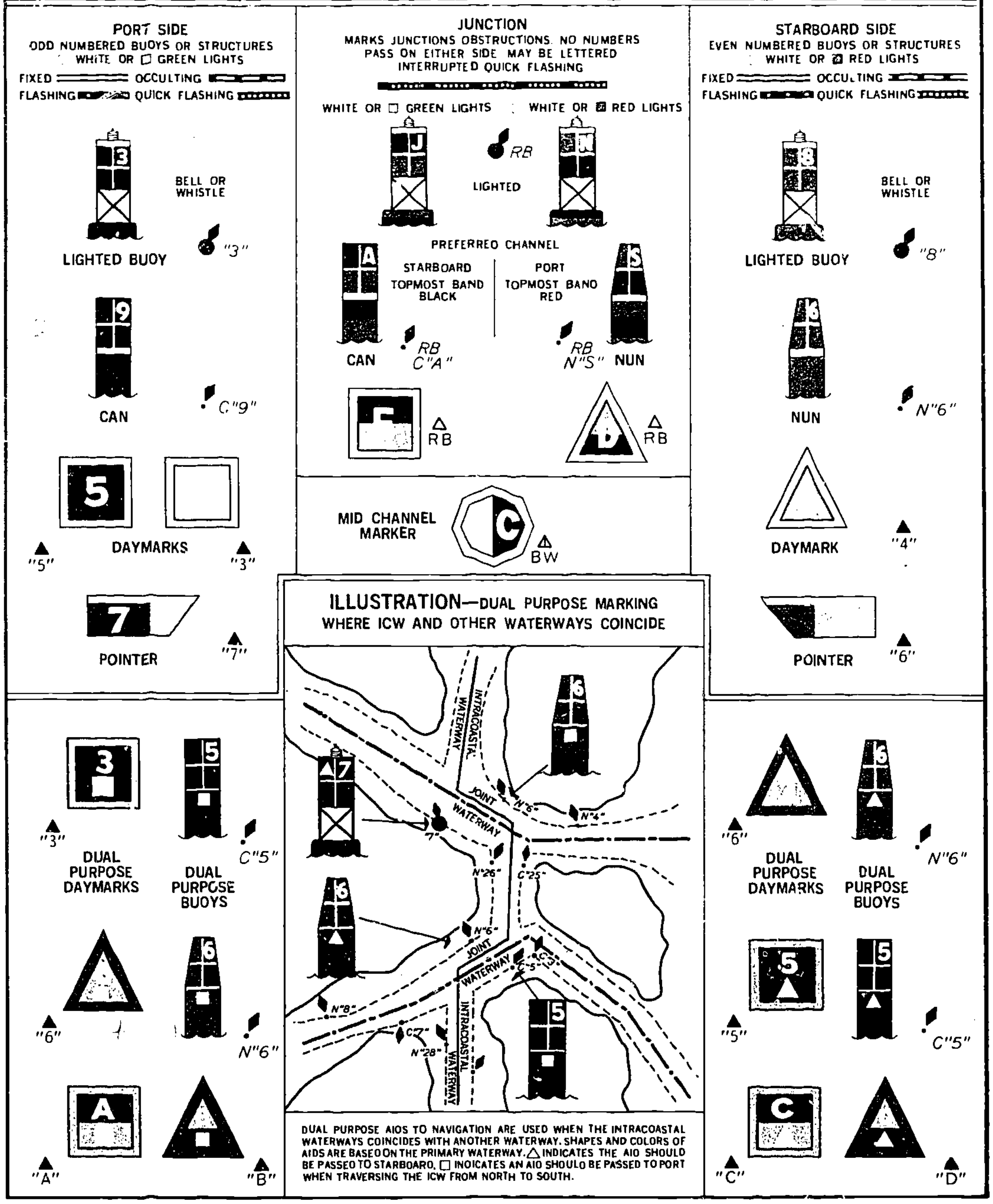
AIDS TO NAVIGATION ON THE INTRACOASTAL WATERWAY

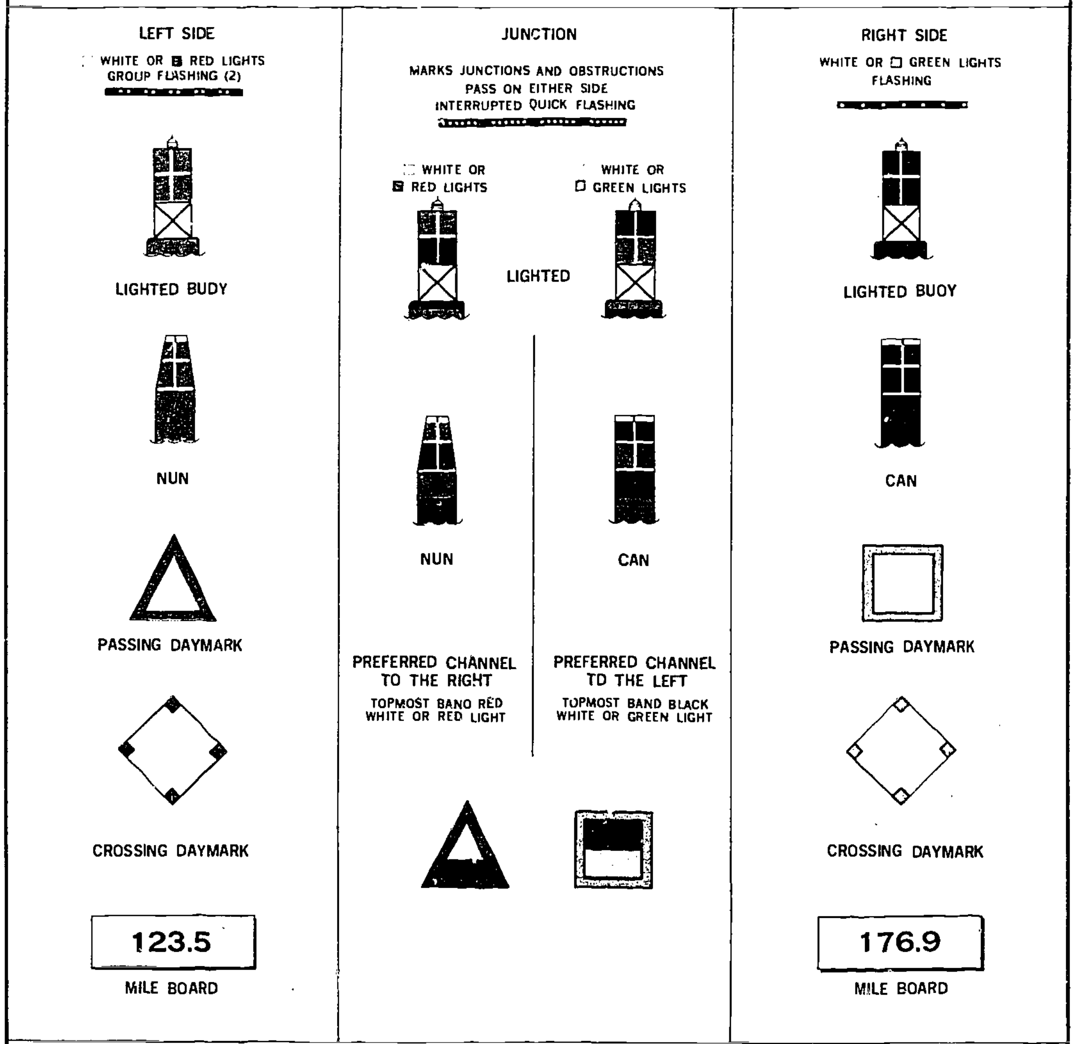
AS SEEN ENTERING FROM NORTH AND EAST—PROCEEDING TO SOUTH AND WEST



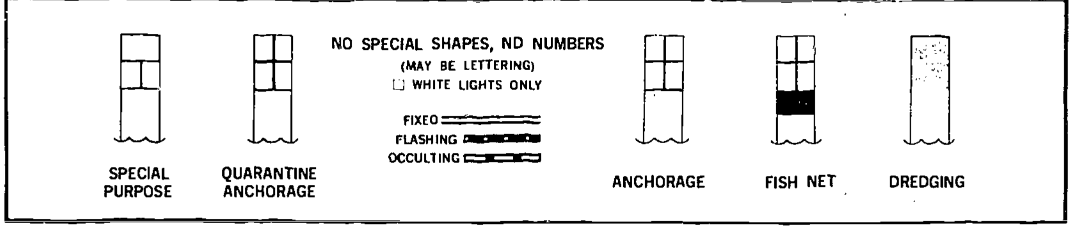
DUAL PURPOSE AIDS TO NAVIGATION ARE USED WHEN THE INTRACOASTAL WATERWAYS COINCIDES WITH ANOTHER WATERWAY. SHAPES AND COLORS OF AIDS ARE BASED ON THE PRIMARY WATERWAY. △ INDICATES THE AID SHOULD BE PASSED TO STARBOARD, □ INDICATES AN AID SHOULD BE PASSED TO PORT WHEN TRAVERSING THE ICW FROM NORTH TO SOUTH.

AIDS TO NAVIGATION ON WESTERN RIVERS

AS SEEN PROCEEDING IN THE DIRECTION (DESCENDING) OF RIVER FLOW



BUOYS HAVING NO LATERAL SIGNIFICANCE—ALL WATERS



UNIFORM STATE WATERWAY MARKING SYSTEM

USED BY STATES IN STATE WATERS AND SOME NAVIGABLE WATERS

REGULATORY MARKERS (Information)

SWIM AREA

BOATS KEEP OUT

EXPLANATION MAY BE PLACED OUTSIDE THE CROSSED DIAMOND SHAPE, SUCH AS DAM, RAPIDS, SWIM AREA, ETC.

ROCK

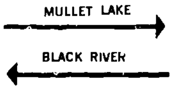
DANGER

THE NATURE OF DANGER MAY BE INDICATED INSIDE THE DIAMOND SHAPE, SUCH AS ROCK, WRECK, SHOAL, DAM, ETC.

5
MPH

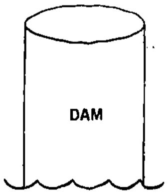
CONTROLLED AREA

TYPE OF CONTROL IS INDICATED IN THE CIRCLE, SUCH AS 5 MPH, NO ANCHORING, ETC.



INFORMATION

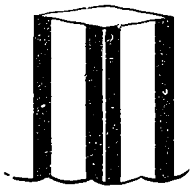
FOR DISPLAYING INFORMATION SUCH AS DIRECTIONS, DISTANCES, LOCATIONS, ETC.



BUOY USED TO DISPLAY REGULATORY MARKERS

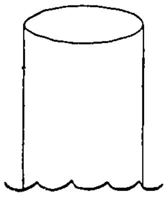
AIDS TO NAVIGATION

(ALL MAY SHOW WHITE REFLECTOR OR LIGHT)



RED-STRIPED WHITE BUOY

INDICATES THAT BOAT SHOULD NOT PASS BETWEEN BUOY AND NEAREST SHORE



MOORING BUOY

WHITE WITH BLUE BAND

BLACK-TOPPED WHITE BUOY

BOAT SHOULD PASS TO NORTH OR EAST OF BUOY

RED-TOPPED WHITE BUOY

BOAT SHOULD PASS TO SOUTH OR WEST OF BUOY

CARDINAL SYSTEM

(MAY SHOW GREEN REFLECTOR OR LIGHT)

RED AND BLACK CAN BUOYS

ARE USUALLY FOUND IN PAIRS VESSELS SHOULD PASS BETWEEN THESE BUOYS

(MAY SHOW RED REFLECTOR OR LIGHT)

LEFT SIDE ——— (LOOKING UPSTREAM) ——— RIGHT SIDE

CHAPTER 11

TIME AND TIMEPIECES

The navigator steps out on the bridge wing and takes a sight on the star Vega. After applying various corrections to the sextant altitude, he finds the altitude of Vega from his position at the instant of observation. From tables he extracts the altitude of Vega from a previously selected assumed position (AP) at the instant he took his sight. He then finds (again, from tables) the azimuth of Vega from the AP. The difference between the altitude from his actual position and the altitude from the assumed position enables him to calculate how far away he was from the AP at the instant of observation. He measures this distance along the azimuth line, and thus establishes a line of position.

The foregoing general outline tells how a line of position is determined by celestial navigation. The reason it is inserted here prematurely is to impress upon you the importance of the time element in navigation. Suppose the navigator's observation is inaccurate by 1 minute. Although 1 minute isn't very long, it can make considerable difference in navigation. Instead of the observation time, suppose the altitude is worked out for 1 minute earlier or later, which could produce an error of as much as 15 miles in the resulting line of position. Regardless of your latitude, a 1-minute time error produces a 15-minute error in longitude. On the equator, 1 minute of longitude equals 1 nautical mile.

You know, of course, that the motion of the sun and the stars around the earth is only apparent–an illusion created by the rotation of the earth itself. Nevertheless, in the discussion of time, which follows, it is simpler to consider the heavenly bodies as moving around the earth.

TIME AND ARC

Ordinarily, we use solar time, which is measured by the motion of the sun around the earth. If you are standing on the main deck aft of a ship headed due north and the sun passes your given meridian (your longitude) it is noon where you are at that time, but if the ship were headed due east, noon would occur on the forecastle before it would occur at your after location.

Every celestial observation is timed according to the time at the Greenwich meridian. Usually timing is determined by means of the chronometer, which is set to Greenwich time. In order to clarify the relationship between time and arc, let's say that it is exactly noon where you are, that you know your longitude, and you want to find what time it is in Greenwich.

The sun makes a complete 360° revolution around the earth every 24 hours (h). When the sun is on a particular meridian, it is noon along that meridian. In other words, when the sun is on the Greenwich meridian (0°), it is noon by Greenwich time. To make the explanation simpler, let's say you're in 90° W. longitude. It's noon where you are, so the sun also is in 90° W. That is, since leaving Greenwich, the sun traveled through 90° of arc. Because it was 1200 Greenwich time when the sun was at 0°, the time at Greenwich now must be 1200 plus the time required for the sun to travel through 90° of arc.

The foregoing explanation provides all the elements of a problem for converting arc to time. If you know that it takes 24h for the sun to travel 360°, it should be a cinch to find how long is required for it to go 90°. Thus, if it travels 360° in 24h, it must go 15° in 1h. If it transits 15° in 1h, it must go 1° in 4 minutes (m). Then, to go 90° requires 90 multiplied by 4m, or 360m, which is 6h. Six hours ago it was 1200 Greenwich time. Therefore, the time at Greenwich now must be 1800. You actually have converted 90° of arc to 6h of time. In doing so, you discovered the basic relationship between arc and time. This relationship is stated as 15° of longitude (arc) equals 1 hour of time.

You can also convert time to arc–the reverse of the example just worked. Tables for converting either way are in the *Nautical Almanac* and in Bowditch. But if you acquire the following easy methods of converting, you won't have to refer to other sources. First, you must memorize the values for arc and time in the accompanying table. The only reason you need to memorize these values is to make it easier to remember the methods for converting arc and time.

Arc and Time Equivalents

Time to Arc	
24h	360°
1h	15°
1m	15'
1s	15"

Arc to Time	
360°	24h
1°	4m
1'	4s

METHODS FOR CONVERTING TIME AND ARC

*Time to arc: Suppose you want to change the time 10h 15m 10s to its equivalent in arc. First, arrange the figures in a column, with the degree, minute, and second symbols of arc measurement in a row alongside, as follows:

	°	'	"
10h	--	--	--
15m	--	--	--
10s	--	--	--

The next part is easy. There are 15 in 1 hour, so multiply the hours by 15.

	°	'	"
10h	150	--	--
15m	--	--	--
10s	--	--	--

Next, divide the minutes by 4. In this example, 4 into 15 is 3, with a remainder of 3. Write the first 3 under degrees.

	°	'	"
10h	150	--	--
15m	3	--	--
10s	--	--	--

Now, multiply the remainder, 3, by 15, which gives you 45. This number goes under minutes.

	°	'	"
10h	150	--	--
15m	3	45	--
10s	---	--	--

To convert seconds, follow the same procedure; divide them by 4. Here you divide 4 into 10, which gives 2 and a remainder of 2. Write the first 2 under minutes and multiply the remainder, 2, by 15. This procedure gives you 30 seconds. You now have these totals:

	°	'	"
10h	150	--	--
15m	3	45	--
10s	--	2	30
	153	47	30

Thus, in 10h 15m 10s of time, there are 153° 47' 30" of arc.

* Arc to time: Now, let's see how to convert the other way—from arc to time. Set up the degrees, minutes, and seconds of arc just as you did the hours, minutes, and seconds of time.

	h	m	s
153°	--	--	--
47'	--	--	--
30"	--	--	--

An hour contains 15, so divide the degrees by 15. This result is 10, with a remainder of 3. Write 10 under the hours column.

	h	m	s
153°	10	--	--
47'	--	--	--
30"	--	--	--

Multiply the remainder, 3, by 4, and put the resulting 12 in the minutes column.

	h	m	s
153°	10	12	--
47'	--	--	--
30"	--	--	--

Next, divide the minutes by 15, which gives you 3 and a remainder of 2. Place 3 under minutes, multiply 2 by 4, and write the product, 8, under seconds.

	h	m	s
153°	10	12	--
47'	--	3	8
30"	--	--	--

Divide the seconds also by 15. This step gives you exactly 2, with no remainder. Write the 2 under seconds. This entry completes the conversion of arc to its equivalent in time, thus:

	h	m	s
153°	10	12	--
47'	--	3	8
30"	--	--	2
	10	15	10

KINDS OF TIME

Astronomy provides the basis for measuring time which is of paramount importance to the navigator. A day is measured as one rotation of the earth about its axis. The external reference point determines the type of time considered; solar, sidereal, or lunar. Apparent time and mean time are applied in certain problems of navigation. The difference between apparent and mean time is called equation of time.

APPARENT TIME

The sun, as mentioned earlier, is our most convenient reference point for reckoning time. Time measured by the sun is solar time. Rotation of the earth on its axis produces apparent motion of the sun around it. When we measure time by the apparent motion of the sun itself, we call it apparent time. If the sun is directly over the meridian we are on, we say that it is noon, local apparent time. When it is directly over the meridian 180° away from ours, it is midnight, local apparent time.

If the earth remained stationary in space, all the days reckoned by apparent time would be the same length. But the earth travels in an elliptical orbit around the sun, and its speed relative to the sun varies with its position in its orbit. Consequently, the time required for a complete rotation of the earth on its axis, although constant as applied to points on the earth, varies regarding the earth relative to the sun. The length of a day, therefore, reckoned by a complete rotation of the earth with regard to the sun, also varies.

MEAN TIME

Instead of each day having exactly 24 hours, it would be rather confusing if some days had more and some fewer hours to conform to the irregularities of the earth's rotation. To preserve the obvious advantages of solar time, yet eliminate these irregularities, solar time used in navigation is mean time. It is calculated from the motion around the earth of an imaginary mean sun, which always makes the 360° trip around in exactly 24 hours. When it is noon by local mean time (LMT) the mean sun, in lieu of the true sun, is exactly over your meridian.

Four times a year the positions of the mean and the true sun coincide. In other words, on those four occasions there is no difference between apparent and mean time. Otherwise, there always is a difference, called the equation of time, which is listed in the *Nautical Almanac* for every 12 hours of Greenwich mean time (GMT) of the sun on any date. The equation of time reaches a maximum of nearly 16 1/2 minutes.

SOLAR, SIDEREAL, AND LUNAR TIME

Solar time, we learned, is calculated from the motion of the sun around the earth. Solar time is the principal time used in navigation.

Sidereal time, calculated from the motion of the stars around the earth, is used in the procedure for identifying heavenly bodies (described later). For the present, all you need to know about sidereal time is that it is measured by the motion around the earth of the first point of Aries. A sidereal day is about 4 minutes shorter than a mean solar day, and there are 366 1/4 sidereal days in a calendar year.

A lunar day is measured by the motion of the moon as it orbits the earth; it is about 50 minutes longer than a mean solar day. Moon data is used in some navigation problems and in tide analysis.

ZONE (STANDARD) TIME

We have seen that local mean time on the forecastle can be different from local mean time on the main deck aft. In other words, local mean time always differs in different longitudes. In New York City, for example, a difference of about 9s LMT occurs between one end of Forty-second Street and the other end.

You can understand, now, how a general foulup would result if everyone set his watch on his own LMT. He would have to change it every time he went a few blocks on a street running east and west. To eliminate this difficulty, standard time zones have been established, within which all clocks are set to the same time. A difference of 1 hour takes place between one time zone and the next. Because 1h is 15°, you can see that each time zone comprises 15° of longitude.

The standard time zones begin at the Greenwich meridian (0°). Every meridian east and west of Greenwich that is a multiple of 15° (15°, 30°, 45°, 60°, 75°, and so on) is a standard time meridian.

Each standard time meridian is at the center of its time zone, and the zone extends 7°30 ′ (half of 15°) on either side of the meridian. Certain standard time zones ashore vary somewhat from this procedure in order to give adjacent populated areas the same time, and for other reasons of convenience.

Local mean time along each standard time meridian is zone (standard) time for the entire time zone. Zone time in navigation is abbreviated ZT.

Daylight saving time is simple zone time set ahead 1 hour (sometimes 2 hours) to extend the time of daylight. Daylight saving time is ignored in navigation.

ZONE TIME AND GMT

If GMT is the time at the Greenwich meridian, measured by the mean sun, and the Greenwich meridian is the standard time meridian for the 0 time zone, it follows that zone time anywhere in the 0 zone is the same as GMT. Most of the information in navigational tables relates to GMT, hence you must know how to convert the time in any zone to GMT.

The solar day contains 24h, and each time zone represents 1h, so there must be 24 zones. Beginning with the 0 (Greenwich) zone, time zones run east and west from zone 1 to zone 12. (See fig. 11-1.) Zones east of Greenwich are minus; those west of Greenwich are plus zones. (Note that +12 and -12 time zones each include only 7 1/2° of longitude.) In other words, in zones east of Greenwich, you must subtract the zone number from the zone time to find Greenwich time. In zones west of Greenwich, you must add the two. The zone time at Greenwich is GMT, consequently the zone number tells you the difference in hours between your zone time and GMT.

Standard time zones are also designated by letters. You can find the equivalent letter designation from the numbered zone by referring to figure 11-1.

Because there is a standard time meridian for every 15° of longitude, you divide your longitude by

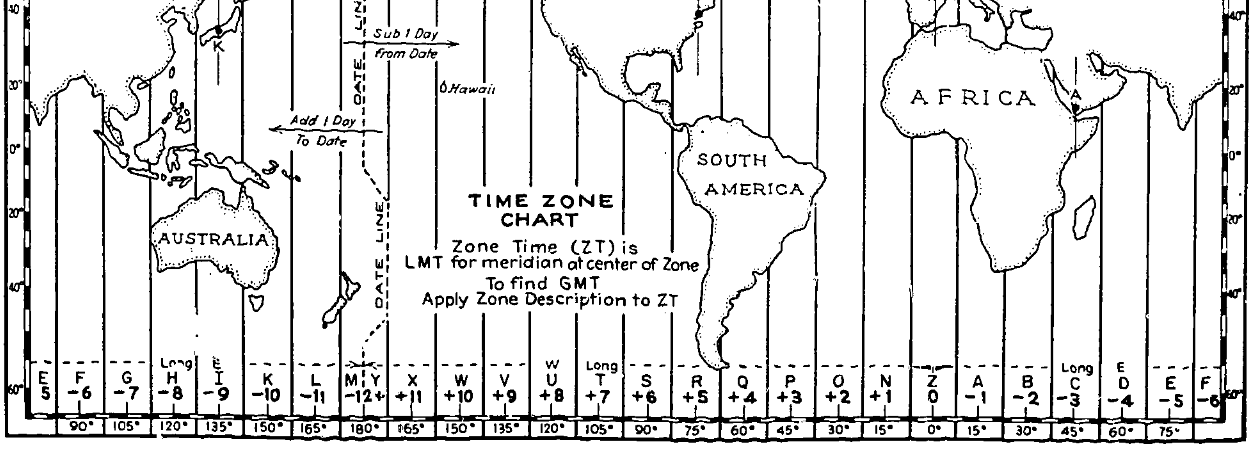


Figure 11-1.–Standard time zones.
13.76(69)

15° to find which zone you are in. Then, to find GMT, you merely apply the zone description (ZD) according to its sign.

To illustrate, assume that you are in longitude 105°E., ZT is 16h 23m 14s, and you want to find GMT. Dividing 105 by 15 yields 7, which means you are in time zone 7. You are in east longitude, so the sign is minus. Therefore, your ZD is -7. The minus sign means that you subtract ZD from ZT to find GMT. Thus:

ZT	16h	23m	14s
ZD	-7		
GMT	9h	23m	14s

Or, say you're in longitude 75°W., ZT is 7h 13m 57s, and you want to find GMT. Divide 75 by 15 and your answer is 5. Therefore, you are in zone 5, and it must be plus 5, because your longitude is west. Consequently:

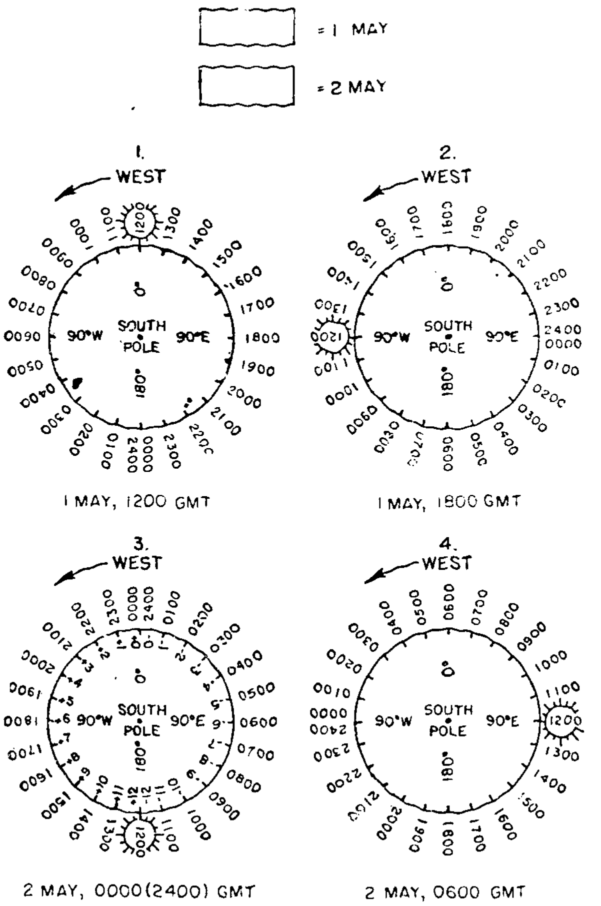
ZT	7h	13m	57s
ZD	+5		
GMT	12h	13m	57s

In both examples, your longitude coincided with a standard time meridian which simplified the solution somewhat. If you are not located on one of these meridians, you can figure out which zone you're in by dividing your longitude by 15, and observing the size of the remainder. You must bear in mind that each standard time meridian is at the center of its time zone, and the zone extends 7°30′ on either side of the meridian. For example, say your longitude is 142°41′ W., and you want to know ZD. Dividing 142°41′ by 15, you have 9, with 7°41′ left over. But 7°41′ is more than 7°30′, so you must be in the zone next beyond zone 9, meaning zone 10.

TIME AND DATE

In the first diagram in figure 11-2, the mean sun is over the Greenwich meridian, meaning that it is noon, 1 May, GMT. Because it is noon, GMT, it must be 12 hours later (midnight) at the 180th meridian on the other side of the earth. In other words, the sun is just starting its 24-hour cruise, it is the same day all the way around the earth, but a new day is about to begin at the 180th meridian.

As the sun moves westward, it takes noon along with it, so to speak, and midnight moves along concurrently into east longitude. In the second diagram the sun has brought noon to 90°W. longitude. For the sun to travel 90° requires 6 hours, so it is 6 hours past noon, or 18h 0m 0s GMT. Midnight has moved to 90°E. longitude.



1 MAY, 1200 GMT

1 MAY, 1800 GMT

2 MAY, 0000(2400) GMT

2 MAY, 0600 GMT

Figure 11-2.–Date change over the earth.
69.37

A new day starts as midnight leaves 180°. Thus, between 180° and 90°E., it is the next day, 2 May, while it still is 1 May from 90°E. westward to 180°.

Looking at the third diagram, you see that the sun has brought noon to the 180th meridian, and it is midnight in Greenwich. It now is 2 May from 180° to 0° longitude in the eastern half of the earth, but still 1 May from 0° to 180° in the western half.

In the last diagram, noon has reached 90°E., and midnight has traveled 6h past Greenwich to 90°W. It is 2 May over three-quarters of the earth, from 180° around to 90°W., but still 1 May over the quarter between 90°W. and 180°. On 2 May, GMT is 6h 0m 0s.

The date changes at the 180th meridian in all of the diagrams except the first one. Going west, it becomes the next day at 180°; going east, it becomes the day before.

When you refer to GMT in the *Nautical Almanac*, you must know what the date is at Greenwich. Frequently the date there differs from what it is in your longitude. Assume that on 1 May you are in longitude 176°41′ W., and ZT is 16h 0m 0s. Divide 176° by 15. The nearest whole number is 12, the ZD. Longitude is west, therefore ZD is +12. Adding ZD to ZT, we obtain the following data:

ZT	16h	0m	0s	(1 May)
ZD	+12			
GMT	28h	0m	0s	(1 May)

What have we here, 28 o'clock? Time 2800 on 1 May is the same as 0400 on 2 May. Therefore, GMT is 4h 0m 0s on 2 May.

Suppose that at the same ZT you were in longitude 176°41′ E., on the other side of 180, where it is 2 May. In this example, ZD is -12 but GMT comes out the same; the date where you are is the same as the date at Greenwich. In the former problem, it already has become a day later at Greenwich.

ZT	16h	0m	0s	(2 May)
ZD	-12			
GMT	4h	0m	0s	(2 May)

Here is a problem with a new twist: Suppose you're in longitude 47°53′ E., ZT is 2h 0m 0s, and the date is 2 May. The ZD is -3. (You should know why by now.) How can you subtract 3 from 2h 0m 0s? Time 0200 on 2 May is the same as 2600 on 1 May. The figuring goes like this:

ZT	26h	(1 May)
ZD	-3	
GMT	23h	(1 May)

ZONE AND LOCAL MEAN TIME

Zone time is a matter of convenience only. It was established to keep all clocks in a specific area on the same time. The actual time where you are is the local mean time, which changes continually as the sun moves. Local mean time also changes as you change your longitude.

If you are located on one of the standard time meridians, then zone time and local mean time are the same. Otherwise, you must calculate local mean time according to the difference in longitude between your meridian and the closest standard time meridian. You subtract your longitude from the longitude of the time meridian. This result is in degrees, minutes, and seconds of arc, which you convert to time, and apply to the zone time.

Suppose you are in longitude 142°41′ W., and ZT is 06h 21m 09s. Divide 142°41′ by 15, and you find that you are in zone +10. Your standard time meridian must be 150°W. Write that down as 149°60′ W., so it will be easier to subtract your longitude.

Longitude time meridian	149°60′W.
Longitude your meridian	142°41′W.
Longitude difference	7°19′

Change 7°19′ to time, and you get 0h 29m 16s. This change means that LMT at your meridian differs from ZT by 0h 29m 16s. Whether your time is later or earlier than the time at 150°W. depends on whether you are east or west of that meridian. You are in west longitude, which is measured west from 0° to 180°, so 150°W. must be farther west than 142°41′ W. Therefore, you must be east of the standard time meridian. It is always later to the east, consequently your LMT must be 0h 29m 16s later than ZT. This representation is as follows:

ZT	06h	21m	09s
	00h	29m	16s
LMT	06h	50m	25s

TIMEPIECES

Time-measuring devices have evolved, with civilization, from the simplest sundials to complicated electronic equipment. Aboard Navy ships, time is kept by watches, clocks, and chronometers.

CLOCKS AND WATCHES

A ship's routine activities are timed by the various ship's clocks or deck clocks, mounted on the bulkheads and usually set to ZT. When the ship enters a new time zone, a Quartermaster makes the rounds of all clocks, resetting them 1 hour one way or the other, contingent upon whether the ship is moving east or west. The commanding authority may, however, direct that the clocks be changed at some time except the instant of entry into a new zone. Some arbitrary time, like daylight saving, may be selected for reasons of convenience. In some localities the ship's clocks are set to fractional zone time.

Ships are equipped with a number of clocks depending upon the ship's size and mission. The pilothouse, engineering spaces, offices, messing spaces, and staterooms are areas that normally have clocks. Ship's clocks are of various types: 12- and 24-hour dials, direct reading, 8-day (winding period), electric, etc. Whatever their location or type, however, keeping them set to correct time, adjusting their rates, and having them repaired when necessary is the Quartermaster's responsibility.

One person usually is assigned the job of winding and setting the clocks at intervals prescribed by the navigator. Ship's clocks are accurate enough to time meals, watch relief, taps, liberty call, etc. The person assigned the duty of setting the clocks sets a comparing watch to the correct time (either from a chronometer or radio time signal) and checks the accuracy of each clock by comparing it with the comparing watch. He then notes (in a clock log) the error of each clock, winds each clock, and adjusts it to run faster or slower, depending on whether it was gaining or losing time. No adjustment for rate is made to clocks that have only a small error, because frequent adjustments may cause erraticisms.

Comparing watches and stopwatches may also be used for timing celestial observations, as described in the final topic in this chapter.

CHRONOMETER

Chief among navigational timepieces is the chronometer (fig. 11-3). It is considered one of the most accurate mechanical time machines devised by man. If a ship does not have a chronometer, and must navigate at any time by celestial observations, she is provided with a timepiece that reasonably approximates the chronometer's accuracy.

The chronometer is a clock of unusually fine construction. It is designed for extreme accuracy and dependability, and is built to withstand shock, vibration, and variations of temperature. Like the magnetic compass, it is mounted in gimbals to offset ship's motion. It must be handled with the greatest care, because its accuracy and regularity are essential in determining GMT, the basic time used in fixing position by celestial navigation.

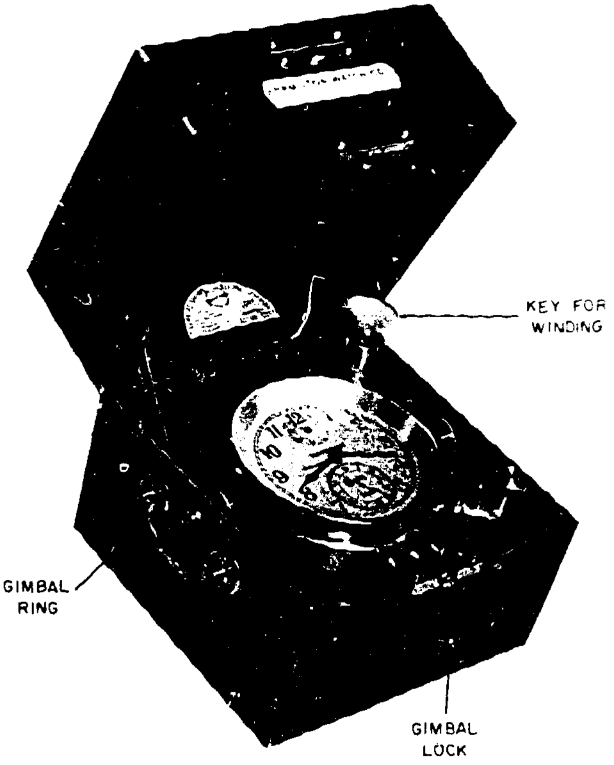


Figure 11-3.–Ship's chronometer in its case.
69.38

Types of Chronometers

Two types of chronometers presently are in use: size 85 and size 35.

The size 85 chronometer (formerly called ship chronometer) is the principal navigation timepiece aboard ship. It can easily be identified by its 4-inch dial and the jerky motion of its second hand, which jumps 1/2 second every other tick. A modified size 85 chronometer is furnished to missile carrying ships, if those ships have shipboard time/frequency standards. This modification features an electrical contact assembly (make-break circuit) capable of producing an electrical impulse every second except the 59th second of each minute. The make-break circuit keeps the DRT and other equipment on missile ships set to the correct time.

2506

Formerly, size 35 chronometers were called chronometer watches. They are identified by their 2 1/2-inch dial and external winding stem, making them resemble large pocket watches. Although size 35 chronometers still are found on many ships, they are being phased out of the Navy.

Care of Chronometer

The *NavShips Technical Manual*, current NavShips directives, and *Navy Regulations* contain complete instructions concerning the care, winding, and transportation of chronometers. You must familiarize yourself with these instructions. A brief summary of their content follows.

Before the chronometer is received on board, complete preparations should be made for its immediate installation. The chronometer locker (fig. 11-4) should be located as near as possible to the ship's centerline, where the effect of rolling is minimized. Chronometers should not be installed near masses of vertical iron or charged electrical machinery. They should be placed where they are least subjected to drafts, temperature changes, the jar or vibration of machinery, and the shock of gunfire.

Chronometers should always remain in their gimbal boxes. The glass cover of the chronometer gimbal box should be kept closed at all times. This cover protects the chronometer from moisture and prevents sudden, rapid changes of temperature. The gimbal boxes should be removed from the chronometer locker only under the following circumstances: for safekeeping during extended periods of ship repair; during deperming or flashing operations; or when the chronometers are scheduled for overhaul.

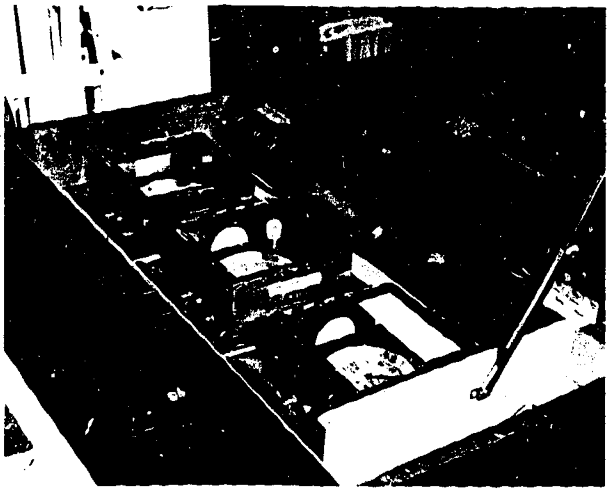


Figure 11-4.–Stowage of ship's chronometers.
69.39

When chronometers are received on board, they have a small piece of gummed paper attached to their bezels. On this paper is written or stamped the overhaul due date. Chronometers should be turned in for overhaul within 6 months of the date indicated because, beyond that time, their rates tend to become erratic and their accuracy deteriorates.

If chronometers are moved for any reason, their gimbal rings must be locked. For transportation from ship to pool, or vice versa, the instruments should be hand-carried by a responsible person. He must guard them particularly against shocks, jars, or quick rotary motions. The *NavShips Technical Manual* gives instructions for transporting chronometers over a considerable distance (as by express).

Winding Chronometers

Chronometers are started and set to GMT at the chronometer pool and are never reset thereafter. Although they usually are designed to run for 56 hours without rewinding, each one must be wound regularly at approximately the same time each day to ensure uniform performance. If a chronometer should run down, the consequences would be serious; hence, a better means than memory alone must be used as a reminder of the time for daily winding. The number of hours elapsed since the last winding is shown by an indicator dial on the face of each chronometer.

To wind the size 85 chronometer, turn the instrument gently on its face and steady it with your hand. Uncover the keyhole by turning the dustplate on the bottom, and insert the key. Wind counterclockwise. Seven half-turns will suffice if no more than 24 hours have elapsed since the last winding. Take the last turn slowly, to avoid bringing the winding mechanism up hard against the stops. After winding, cover the keyhole and return the instrument to its normal position. (Except when being wound, chronometers should always rest face up in their gimbals.) Check the indicator dial at the top of the face to ascertain that the indicator is back to 0.

To wind the size 35 chronometer, grasp it in your left hand. Turn it in its gimbal until it is vertical, stem up. With the thumb and index finger of the right hand, wind the instrument as you would a fine watch, again being careful not to bring the winding mechanism up hard against the stops. Twenty-one half-turns normally wind 24 hours.

Most ships have more than one chronometer. They should be wound in the same sequence each day to prevent omissions. The Quartermaster customarily winds the chronometers at 1130. A report of this action must be made to the commanding officer by the OOD at 1200.

Error and Rate

Even a chronometer cannot keep exact time indefinitely. Sooner or later the chronometer time gradually begins to draw away from GMT. Chronometers are set to GMT, as nearly as possible, before delivery aboard ship. The difference between chronometer time and GMT, at any instant, is called chronometer error. Error directions are identified with a sign or letter, such as (+ or F = Fast) or (- or S = Slow), to indicate that the chronometer is either fast or slow in relation to the correct GMT.

Chronometer rate, on the other hand, is the amount the instrument gains or loses in a specified time. For example, a chronometer whose rate is + 1.5 seconds will gain 1.5 seconds every 24 hours. Chronometer rate is usually expressed as seconds and tenths of seconds per day, and is labeled "gaining" or "losing." Chronometer rate is determined by comparing errors obtained several days apart and dividing the difference by the number of days between readings. See example below.

No attempt should be made to determine chronometer error closer than 1/2(0.5) second. Average daily rates, therefore, are a somewhat more accurate measurement of the chronometer's performance than are the daily checks because, in the former method, any daily observational errors are averaged out.

Determining Chronometer Error

Inasmuch as chronometers are never reset aboard ship, an accumulated error may become quite large. Such an error is unimportant, though, if an accurate record is kept of the error.

The most accurate check on the chronometer and other timepieces is the radio time signal, broadcast by radio station NSS and other stations listed in *Radio Navigational Aids* (H.O. 117). Naval radio stations transmit time signals (on six different frequencies) for the 5 minutes immediately preceding certain hours GMT. These signals may be relied upon because they are accurate to within 0.01 second. You must familiarize yourself with their pattern, a description of which follows.

Each second in the time signal is marked by the beginning of a dash; the end of the dash has no significance. Beginning at 5 minutes before the hour, every second is transmitted except the 51st second of the 1st minute, 52nd second of the 2nd minute, 53rd second of the 3rd minute, 54th second of the 4th minute, 29th second of each minute, the last 4 seconds of each of the first 4 minutes, and the last 9 seconds of the last minute. The hour signal after the 9-second break (59m 60s) consists of a longer

Date	Correct GMT	Chron. time	Error	Chron. rate
17 July	11h 30m 00s	11h 32m 00s	02m 00s	
18 July	11h 30m 00s	11h 32m 01s	02m 01s	+1s

Average daily rate (ADR) is found by using the formula--

$$\text{ADR} = \frac{(\text{error on last day observed}) - (\text{error on first day observed})}{(\text{date of last observation}) - (\text{date of first observation})}$$

The example worked from applying the ADR formula is for a 31-day month. A navigator, desiring to determine the chronometer rate, compares the chronometer directly with the Washington, D. C., 1200 radio time signal on different days. On the first day the chronometer reads fast by 09 minutes 3.0 seconds and on the last day it reads fast by 9 minutes 53.5 seconds. Average daily rate (ADR) is found as follows—

$$\text{ADR} = \frac{\text{(F) 09m 53.5s} - \text{(F) 09m 3.0s}}{(31) - (1)} = \frac{\text{50.5s diff.}}{\text{30 days}} = \text{1.68s/day gaining}$$

dash than the others. For clarity, the system of dashes is shown graphically in the accompanying table.

Minute	Second										
	50	51	52	53	54	55	56	57	58	59	60
55	-		-	-	-	-					-
56	-	-		-	-	-					-
57	-	-	-		-	-					-
58	-	-	-	-		-					-
59	-										—

Radio stations WWV (Washington) and WWVH (Honolulu) give the correct time signal every 5 minutes, 24 hours per day. These time signals consist of an audiofrequency, which is interrupted precisely 1 minute before each hour and at 5-minute intervals thereafter. The signals are broadcast on 2.5, 5, 10, 15, 20, and 25 megahertz. One of these signals usually can be received in any part of the world.

The upcoming time is announced during the interruption of the audiofrequency. The exact time is taken the instant the audiofrequency is resumed. An example of the voice announcement might be: "This is radio station WWV. When the tone returns, the time will be 8:50 a.m. eastern standard time; 8:50 a.m."

Information concerning each chronometer (error, successive daily rate, average daily rate) must be recorded in the Navigational Timepiece Rate Book, NavShips 9846/2. (See fig. 11-5.) Each page of NavShips 9846/2 can accommodate the records of a maximum of three chronometers for 1 month.

The most accurate timepiece on board is checked against the time signal, and its error is recorded in NavShips 9846/2. Errors of the other chronometers can be calculated by referring to the chronometer just checked.

Chronometer Minus Watch Computation

The importance of obtaining the exact GMT of every celestial observation was mentioned earlier. Obviously it would be impractical if, every time you took a sight on the bridge wing, you had to dash into the charthouse and look at the chronometer. Every observation, consequently, is timed the instant it is made, either by a stopwatch or by a comparing watch.

The stopwatch can be started exactly on some convenient minute or hour of the chronometer. If its rate is known to be small, there is no necessity for working out any chronome [illegible] V) computation, provided the i [illegible] observations are taken is short. [illegible] observation, the stopwatch can be stopped (or reversing the procedure, the watch may be started) when the sight is taken, but seldom is only one observation made. For this reason, the stopwatch usually must be read like any other watch.

A comparing watch can be set to the chronometer time and can be used to keep time, if its rate also is small. Some navigators, though, prefer to keep their watches on zone time, hence observation time must be computed. It doesn't matter whether computation is made before or after the observation. It is essential, though, to have the interval as short as possible between time of sight and time of computation. Otherwise, enough time may elapse for the watch to gain or lose a sufficient amount to cause an error. For better accuracy and to avoid careless errors, it's a good idea to make C-W computations both before and after a round of sights.

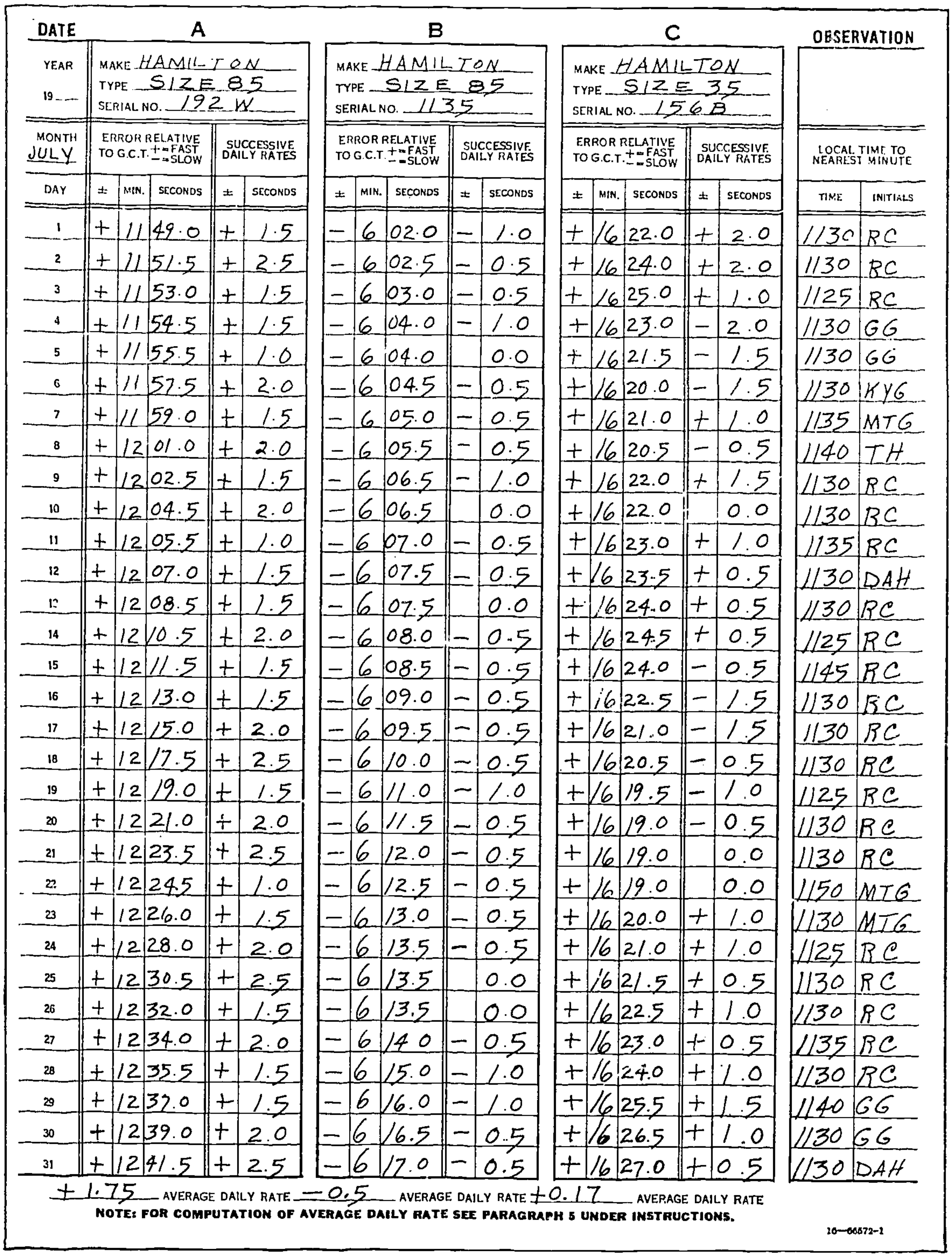
The C-W computation is watch time (WT) to the half-second subtracted from chronometer time (CT). If WT is greater, 12 hours must be added to CT. The C-W is never greater than 12 hours, because both watch and chronometer are graduated only to 12. Now that you know the value of C-W, it is necessary only to add this value to the WT of any observation to find the correct CT, then apply CE, and you have the GMT of the observation.

To work an example, assume that you have a chronometer whose error (CE) is -7m 4s; in other words, it is 7m 4s behind GMT. Your watch is set to ZT and reads 5h 26m 42s when the chronometer reads 10h 19m 00s. First, find the C-W. It's WT subtracted from CT.

CT	10h	19m	00s
WT	5h	26m	42s
C-W	4h	52m	18s

You step out on the bridge with your sextant and watch, and sight on Sirius at WT 5h 34m 21s, date 15 October, longitude 101°34.2′ E. What is the GMT of this sight? Applying the formula CT=WT+C-W, we find:

WT	5h	34m	21s
C-W	4h	52m	18s
CT	10h	26m	39s



DATE

YEAR 19__

A

MAKE HAMILTON

TYPE SIZE 85

SERIAL NO. 192 W

B

MAKE HAMILTON

TYPE SIZE 85

SERIAL NO. 1135

C

MAKE HAMILTON

TYPE SIZE 35

SERIAL NO. 156 B

OBSERVATION

MONTH JULY	A: ERROR RELATIVE TO G.C.T. + = FAST − = SLOW			A: SUCCESSIVE DAILY RATES		B: ERROR RELATIVE TO G.C.T. + = FAST − = SLOW			B: SUCCESSIVE DAILY RATES		C: ERROR RELATIVE TO G.C.T. + = FAST − = SLOW			C: SUCCESSIVE DAILY RATES		LOCAL TIME TO NEAREST MINUTE	
DAY	±	MIN.	SECONDS	±	SECONDS	±	MIN.	SECONDS	±	SECONDS	±	MIN.	SECONDS	±	SECONDS	TIME	INITIALS
1	+	11	49.0	+	1.5	−	6	02.0	−	1.0	+	16	22.0	+	2.0	1130	RC
2	+	11	51.5	+	2.5	−	6	02.5	−	0.5	+	16	24.0	+	2.0	1130	RC
3	+	11	53.0	+	1.5	−	6	03.0	−	0.5	+	16	25.0	+	1.0	1125	RC
4	+	11	54.5	+	1.5	−	6	04.0	−	1.0	+	16	23.0	−	2.0	1130	GG
5	+	11	55.5	+	1.0	−	6	04.0		0.0	+	16	21.5	−	1.5	1130	GG
6	+	11	57.5	+	2.0	−	6	04.5	−	0.5	+	16	20.0	−	1.5	1130	KYG
7	+	11	59.0	+	1.5	−	6	05.0	−	0.5	+	16	21.0	+	1.0	1135	MTG
8	+	12	01.0	+	2.0	−	6	05.5	−	0.5	+	16	20.5	−	0.5	1140	TH
9	+	12	02.5	+	1.5	−	6	06.5	−	1.0	+	16	22.0	+	1.5	1130	RC
10	+	12	04.5	+	2.0	−	6	06.5		0.0	+	16	22.0		0.0	1130	RC
11	+	12	05.5	+	1.0	−	6	07.0	−	0.5	+	16	23.0	+	1.0	1135	RC
12	+	12	07.0	+	1.5	−	6	07.5	−	0.5	+	16	23.5	+	0.5	1130	DAH
13	+	12	08.5	+	1.5	−	6	07.5		0.0	+	16	24.0	+	0.5	1130	RC
14	+	12	10.5	+	2.0	−	6	08.0	−	0.5	+	16	24.5	+	0.5	1125	RC
15	+	12	11.5	+	1.5	−	6	08.5	−	0.5	+	16	24.0	−	0.5	1145	RC
16	+	12	13.0	+	1.5	−	6	09.0	−	0.5	+	16	22.5	−	1.5	1130	RC
17	+	12	15.0	+	2.0	−	6	09.5	−	0.5	+	16	21.0	−	1.5	1130	RC
18	+	12	17.5	+	2.5	−	6	10.0	−	0.5	+	16	20.5	−	0.5	1130	RC
19	+	12	19.0	+	1.5	−	6	11.0	−	1.0	+	16	19.5	−	1.0	1125	RC
20	+	12	21.0	+	2.0	−	6	11.5	−	0.5	+	16	19.0	−	0.5	1130	RC
21	+	12	23.5	+	2.5	−	6	12.0	−	0.5	+	16	19.0		0.0	1130	RC
22	+	12	24.5	+	1.0	−	6	12.5	−	0.5	+	16	19.0		0.0	1150	MTG
23	+	12	26.0	+	1.5	−	6	13.0	−	0.5	+	16	20.0	+	1.0	1130	MTG
24	+	12	28.0	+	2.0	−	6	13.5	−	0.5	+	16	21.0	+	1.0	1125	RC
25	+	12	30.5	+	2.5	−	6	13.5		0.0	+	16	21.5	+	0.5	1130	RC
26	+	12	32.0	+	1.5	−	6	13.5		0.0	+	16	22.5	+	1.0	1130	RC
27	+	12	34.0	+	2.0	−	6	14.0	−	0.5	+	16	23.0	+	0.5	1135	RC
28	+	12	35.5	+	1.5	−	6	15.0	−	1.0	+	16	24.0	+	1.0	1130	RC
29	+	12	37.0	+	1.5	−	6	16.0	−	1.0	+	16	25.5	+	1.5	1140	GG
30	+	12	39.0	+	2.0	−	6	16.5	−	0.5	+	16	26.5	+	1.0	1130	GG
31	+	12	41.5	+	2.5	−	6	17.0	−	0.5	+	16	27.0	+	0.5	1130	DAH

+1.75 AVERAGE DAILY RATE −0.5 AVERAGE DAILY RATE +0.17 AVERAGE DAILY RATE

NOTE: FOR COMPUTATION OF AVERAGE DAILY RATE SEE PARAGRAPH 5 UNDER INSTRUCTIONS.

10—66572-1

Figure 11-5.–Ship's chronometer record.
69.140

The CT is the chronometer time of the observation. Apply CE to CT to find GMT. The CE is minus, meaning that the chronometer is behind GMT, therefore CE must be added to CT. Thus:

CT	10h	26m	39s
CE		7m	04s
GMT	10h	33m	43s

Now, let's consider the date 15 October at 101°32.2′ E. Is it the same day at Greenwich? Let's see. The zone time is 5h 34m 21s. The ZD is -7. Subtract ZD from ZT to get GMT. You can't subtract 7 from 5, but 5h on 15 October is the same as 29h on 14 October, and 7 f[illegible] 29 is 22. Therefore, 10h 33m 43s is not a.[illegible] October, but p.m. on 14 October. From this [illegible]ation, it follows that GMT is 22h 33[illegible] October.

In problems like these you must check the date carefully every time to avoid a 12-hour error such as the one we encountered just now.

CHAPTER 12

INTRODUCTION TO N[illegible]

NAVIGATION DEFINED

Navigation is simply the art and science that enables the mariner (or aviator) to (1) determine his ship's position, and (2) guide her safely from one point to another. You already have a good idea of how a ship's compass is used in guiding her from one point to another, but how does her navigator figure out where he is in the first place?

The only way to locate any object is to describe its position with relation to some other object(s) whose location is already known. If you don't believe this, try and dream up another way to locate something. Try to tell yourself where your white hat is, right now, without bringing some other object into the picture. Either your white hat is on your head, in your locker, in your sea bag, or in, on, or near some other object you can locate. If it isn't, then you don't know where it is.

We have four ways of determining position in navigation, every one of which locates a ships position with relation to some locality, or object(s) whose location is already known. These four methods of finding position are–

1. Piloting, in which position is determined by means of bearings on or distances from visible objects on the earth's surface, and by soundings.
2. Dead reckoning, in which position is ascertained through the direction and distance a ship has traveled from a known point of departure.
3. Celestial navigation, in which position is found by locating a ship with relation to the celestial bodies.
4. Electronic navigation, in which position is determined much as it is in piloting, except that the bearings and/or distances are obtained by electronic means.

By utilizing the methods of calculating ship's position, her course can be kept on charts in the pilothouse. (See fig. 12-1.)

The four ways of determining position will receive individual treatment as this course progresses. Right now we want to discuss some of the fundamentals you must know about objects located on the terrestrial sphere.

TERRESTRIAL SPHERE

Let's say you're looking at a white cue ball with an absolutely blank surface. Take a pencil and make a mark on it. Now, how would you tell anybody where on the cue ball the mark is located? The answer is: You couldn't. There are no points or objects on the cue ball with reference to which you can locate the mark.

The earth is a sphere, just as this cue ball is. It is called the terrestrial sphere. Although it is a little flattened instead of being perfectly spherical, this irregularity is disregarded here for simplicity. Reference points for location of objects on the earth, with two exceptions, have been established by general agreement among maritime nations. These two exceptions are the north and south poles, located at the ends of the axis on which the earth rotates. Imaginary lines (an infinite number of them) running through the poles and around the earth are called meridians. They divide the earth into sections, the way an orange is divided into segments.

Now, suppose you start at the north pole and travel along a meridian exactly half way to the south pole. You'll then be on the equator, an imaginary line running clear around the earth, which bisects every meridian and divides the earth in half. The half the north pole is on is called the northern hemisphere; the other half, the southern hemisphere.

CIRCULAR MEASUREMENT

Before going any further, you'll have to know something about how distances are measured along the circumference of a circle. Measurement along a meridian, for instance, which is a perfect circle, is expressed in terms of degrees of arc. These degrees of arc may be transformed into linear measurement in nautical miles (described later). The best example

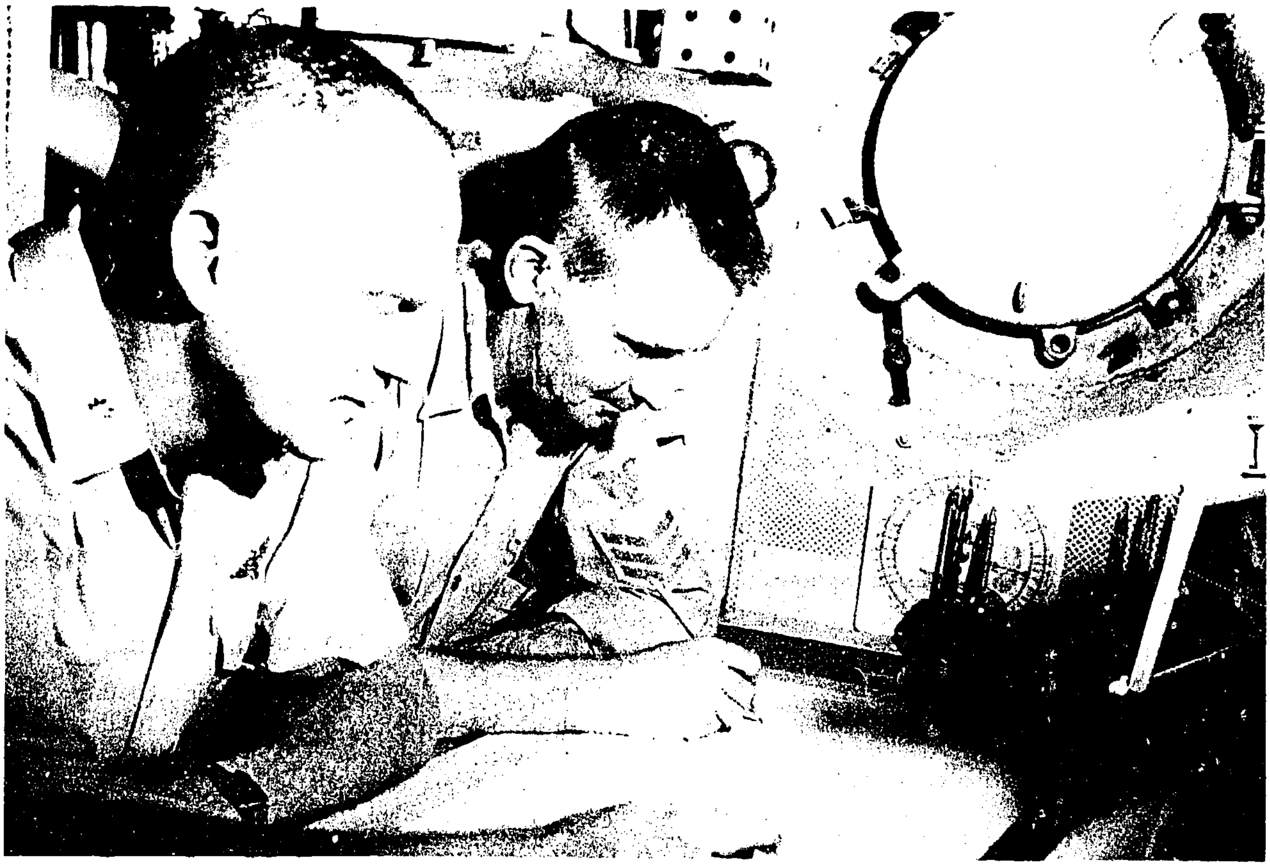


Figure 12-1.–Plotting a course. 134.69

of circular measurement in degrees of arc is the compass card. Whatever the size of the card, its circumference always contains 360°. Each degree contains 60 minutes ('); each minute, in turn contains 60 seconds ("). The nautical mile, by arbitrary international agreement, is now taken as 6076.11549 feet or exactly 1852 meters. The nautical mile is about one-seventh again as long as the statute mile.

MERIDIANS AND PARALLELS

So far, in developing a system for locating points on the terrestrial sphere, we have a series of meridians running through the poles around the earth, and a single line, called the equator, running around the earth at right angles to its axis. These reference lines can be seen in figure 12-2. The equator divides each meridian and the earth itself into two exact halves.

For every degree around the earth's rim there is a meridian–360 of them 60' or 3600" apart. A starting point for numbering these specific meridians was required, and most of the maritime countries decided that the starting point should be the meridian on which was located the Royal Observatory at Greenwich, England. The Greenwich meridian is therefore number 0, and meridians run from that one east and west to the 180th, on the opposite side of the earth from Greenwich. The complete circle formed by the 0 and 180th meridians, like the equator, divides the earth into two exact halves, one of which is the eastern and the other the western hemisphere. Every meridian runs true north and south.

Let's leave the meridians, now, and go back to the equator. Let's cut a globe of the world in half exactly along the equator, and set the northern half on the chart table, flat edge down. Get your eye lined up so that the flat edge appears as a straight line, and you will see the upper edge in the shape of a semicircle, containing 180° of arc, 90° from equator to pole on either side.

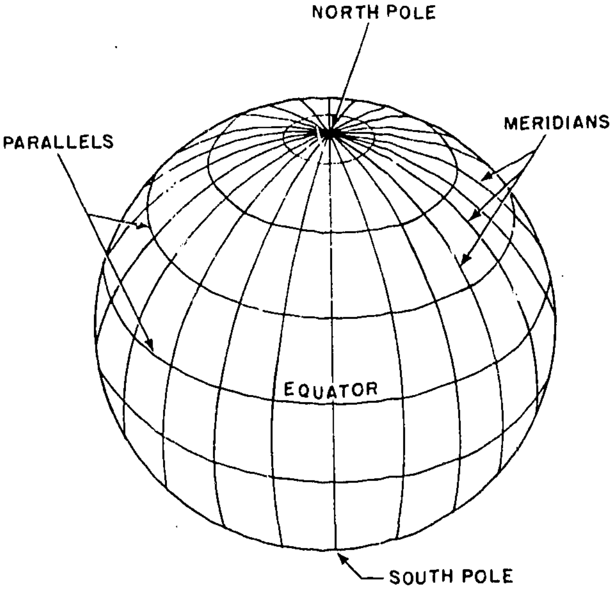


Figure 12-2.–The terrestrial sphere.
65.116(69)

Beginning with the equator, you see lines that appear to be parallel to it, one for each of the 90° of arc from the equator to the north pole. The planes forming these lines on the earth's surface are actually parallel to each other, and for this reason they are called parallels. (See fig. 12-2.) As a matter of fact, if you shift your eye to a point just above the pole, you can see that they are actually circles, growing increasingly smaller as they get farther from the equator and nearer the poles. Don't forget though, that no matter how small a circle is, it still contains 360°. The distance represented by each degree becomes less, however, as the parallel circles get smaller.

Starting point for numbering the parallels is the equator, the 0 parallel. Parallels are numbered from 0° to 90°N. and S. of the equator, and every parallel runs true east and west.

Don't get the idea that there are only 360 meridians and 180 parallels. There is a meridian or parallel for every one of the 21,600 minutes around the complete circle of the earth's sphere. There is one for each of the 1,296,000 seconds all the way around and one for each of the 12,960,000 tenths of seconds. The parallels and meridians are imaginary. Because there is no limit on the imagination, there is no limit to the number of meridians or parallels that could be imagined on the earth. You could imagine a couple of trillion of them crowded between your two feet. But there is a limit to the capacity of our instruments, and we seldom break down measurement along a meridian or parallel to a value smaller than that of a second.

LATITUDE AND LONGITUDE

Now we have a network of meridians and parallels all the way around the globe. Every spot on the earth is located at the point of intersection between a meridian and a parallel. Every point's location is described in terms of its latitude (distance in degrees, minutes, and seconds of arc N. or S. of the equator, measured along the point's meridian) and longitude (distance in degrees, minutes, and seconds of arc E. or W. of 0 meridian, measured along the point's parallel). Longitude is always from 0° to 180°. Latitude never is greater than 90°. Zero latitude is the equator. If you are in latitude 90° N., you are at the north pole, and whichever way you look is south.

GREAT CIRCLE

The concept of the great circle is sometimes difficult for a beginner to grasp, but it is a fundamental that must be clearly understood. A great circle is any circle whose plane passes through the center of the earth or any other sphere.

What does this statement mean, exactly? Suppose you have a perfect sphere of soft rubber through which you can pass a flat sheet of thin metal. If you shove the metal sheet through the sphere so as to cut it exactly in half, you have passed it through the center. The circumference of the flat side of each half becomes a great circle whose circumference is the same size as the circumference of the sphere itself.

On the other hand, if you shove the flat metal through the sphere so that it doesn't pass through its center, the circumference of the flat side of each part is smaller than the outside circumference of the sphere.

In both examples cited, the flat sheet represents the plane of the circle the sheet makes when it cuts the sphere. Now, imagine we cut the earth with a similar plane. No matter how we slice it, if the plane passes through the earth's center, the cutoff circle is a great circle. If the plane passes through, away from the center, however, the circle it cuts is a small circle.

The equator is a circle whose plane passes through the earth's center, consequently the equator is a great circle. The other parallels N. and S. of the equator, however, are all small circles whose planes do not pass through the earth's center. The equator is the only parallel that is a great circle. All meridians, on the other hand, pass through the poles, and all their planes must therefore pass through the earth's center. Consequently, every meridian is a great circle.

Don't get the idea that a great circle must be either a meridian or a parallel. A great circle is any circle around the earth whose plane passes through the earth's center, no matter in what direction the plane passes.

What is the practical significance of the great circle in navigation? Just this: The shortest distance between two points on the earth (or on any other sphere, for that matter) is along the great circle passing through the points.

You'll understand this subject better after you study the different methods of chart projection. Right now it is necessary only that you understand the fundamental concept of the great circle.

NAUTICAL DISTANCE

We've already mentioned the nautical mile. It is equal approximately to 1' of arc along the equator, the equivalent in length of about 1-1/7 statute or land miles. The equator is a great circle, as we have seen. Therefore, if 1' of arc along the equator is 1 nautical mile, 1' of arc along any great circle must also be 1 nautical mile. All great circles on the earth are the same length.

How does this relationship work out, then? It means that on any chart the meridians may be used as a distance scale. All meridians are great circles therefore 1' of latitude along any meridian equals 1 nautical mile. Latitude is measured along the meridians. On the other hand, when it comes to parallels, 1 minute equals 1 mile only along the equator, the only parallel that is a great circle. Or, to put it another way, 1 minute of longitude equals 1 mile only along the equator.

NAUTICAL SPEED

The word knots is a seagoing speed term meaning nautical miles per hour. It is incorrect to say "knots per hour" except when referring to acceleration. In the old days a ship gaged her speed by heaving over a chip log, consisting of a flat piece of wood, which offered a maximum resistance to passage through the water. There was a light "log line" attached to the chip. It was impracticable to stream out 1 mile of log line, so the line was knotted marking suitable fractions of 1 nautical mile. A man held aloft a reel containing the log line. The instant the log was heaved from the taffrail by the Quartermaster, one of the ship's hands turned over a small 2- or 3-minute sandglass. As soon as the sand in the glass ran out, the reel was stopped, and from the amount of line run out in 2 or 3 minutes the number of knots that would have run out in 1 hour was calculated.

For obvious reasons, the chip log gave but a rough approximation of a ship's actual speed. It is entirely obsolete now, and is mentioned here only to give you the historical background of the expression "knots."

NAUTICAL DIRECTION

Nautical magnetic direction usually is measured from true north on from the observer's meridian. The meridians run true north and south, the parallels true east and west.

On the old-fashioned compass card, direction was indicated by points. There were 32 points around the card, each of which had a name: N, N by E, NNE, NE by N, NE, and so on. Each point was subdivided into quarter points, and the system of naming these divisions toward or away from the points themselves was quite complicated and difficult to remember.

Modern navigators long since adopted the system of circular measurement (360° of arc) as a much more convenient means of indicating direction than the ancient system of points. (See fig. 12-3.) Only the Rules of the Road and a few diehard

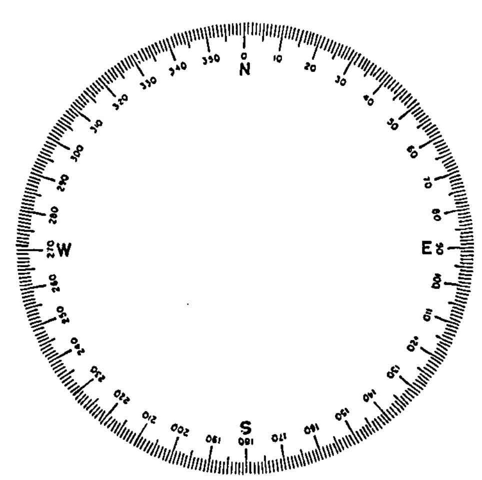


Figure 12-3.–The compass card. 45.29.1

pilots and coastwise merchant mariners still express direction in terms of points. In the Navy even relative bearings, formerly expressed as "4 points on the bow," "abeam," "2 points abaft the beam," etc., are now given in terms of their corresponding degrees. There are 11 1/4° in each of the old style compass points.

Direction in modern navigation, then, is always given in degrees, measured clockwise from true north, or 000°T. A course or bearing, incidentally, is always expressed in three figures, regardless of whether three digits are necessary. In other words, it is not 45° but 045°. Seldom is it possible to consider compass direction to a value smaller than the 10th of a degree, even though each degree of direction contains 60 minutes of 60 seconds each. As a matter of fact, it is almost impossible to read a compass bearing or heading to closer than a quarter of a degree.

BEARINGS

A true bearing is the direction of an object from the observer, measured clockwise from true north.

A compass bearing is the direction of an object as indicated by magnetic compass. It must be converted into a true bearing by applying the corrections for variation and deviation (illustrated in chapter 6).

A relative bearing is the direction of an object from the observer measured clockwise from the ship's head, as indicated by the lubber's line in the binnacle, pelorus, or gyro repeater. Figure 12-4 shows true and relative bearings of a lighthouse from a ship.

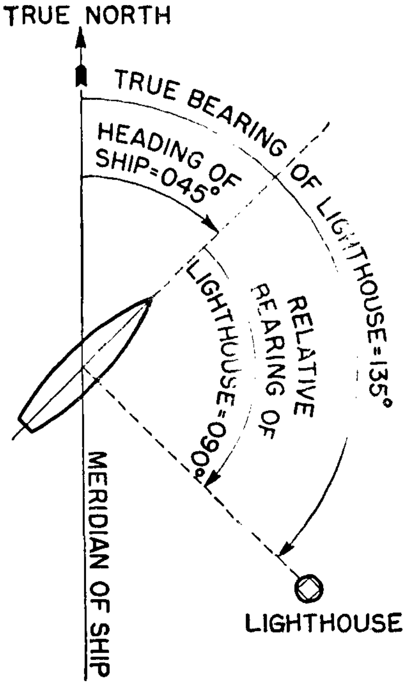


Figure 12-4.–True and relative bearings.
45.29(65)B

Objects seen by lookouts are reported in terms of relative bearings by degrees. Relative bearings by points still are used to describe lights and the like, Rules of the Road, and sometimes in certain problems connected with fixing position in piloting. There are 32 relative bearings by points around the ship. As a consequence, each point is equal to 11 1/4°.

There will be times when the Quartermaster will find it necessary to convert from true to relative bearings and vice versa. This relationship is shown in figure 12-4. Note that dead ahead is 000°, dead astern is 180°, and the starboard and port midpoints are 090° and 270° respectively.

The reciprocal of any bearing is its opposite, that is, the point or degree on the opposite side of the compass card from the bearing. For example, the reciprocal of 180° is 000°, and vice versa. When you obtain a bearing on some object, the bearing from the object to you is the reciprocal of the bearing from you to it. To find the reciprocal of any bearing expressed in degrees, simply add 180° to the bearing. If the bearing is 050°, for instance, its reciprocal is 050° plus 180° or 230°. If your bearing is greater than 180°, subtract 180°.

CHAPTER 13

DEAD RECKONING AND PILOTING

PLOTTING

At last we're getting around to some actual navigation. By the time you finish this chapter, you will know how a ship's position is determined by dead reckoning and by piloting. But, before going into that, you must know something about how courses, bearings, and lines of position are plotted on a chart. More properly, you must know, first, that they frequently are not plotted on the chart itself. Repeatedly drawing lines, then rubbing them out, soon uses up a chart. Besides, it is desirable many times to keep a permanent file of a ship's movements. Consequently, actual plotting often is done on either an overlay position plotting sheet, or a small area plotting sheet. Each sheet is also referred to as a track chart.

OVERLAY

An overlay consists simply of a piece of tracing paper large enough to cover the navigational chart being used. The chart is laid on the chart table and the overlay is fastened over it with tape. Meridians and parallels are traced lightly in pencil in the area to be plotted. Each meridian and parallel is marked carefully with its degrees and minutes of latitude or longitude. The general contour of any shoreline in the area, although not always essential, may be traced in also. Any navigational hazards in the area usually are marked. From here on, the overlay is treated as if it were the chart itself. When a plotting problem is completed and the overlay is to be filed, it is a good idea to trace over its essential features in ink to preserve the record better.

SMALL AREA PLOTTING SHEET

A small area plotting sheet is a form that is the beginning of a chart you, in effect, will finish drawing yourself. When completed, it represents the area on the chart to be plotted, but it is on a larger and more convenient scale. Figure 13-1 shows a small area plotting sheet. The sheet originally contained only the compass rose, equidistant vertical lines representing the meridians, and a single horizontal line called the middle latitude line. This line cuts through the compass rose on the 90° and 270° graduations, and must therefore indicate true east and west.

A vertcal line on the sheet indicates each minute of longitude, but the middle latitude line is the only parallel printed; the others must be inserted by you. Parallels cannot be included in the printed form because of Mercator distortion. On the Mercator projection, parallels are farther apart as distance north or south of the equator increases. In other words, as latitude increases, the ratio between a degree of latitude and a degree of longitude also increases. This ratio must be worked out for the latitude in which you are plotting before you can figure out how far apart your parallels should be on the small area plotting sheet.

Suppose the area in which you are plotting lies between longitude 44°50′ W. and 46°30′ W., and between latitude 31°20′ N. and 32°20′ N. Inasmuch as the printed horizontal line represents the middle latitude, it must represent 31°20′ N. plus 30′ (half of the 60′ between 31°20′ N. and 32°20′ N.), or 31°50′ N.

Next, you are going to work out a latitude scale. Why the method described gives you such a scale is a matter of geometry unnecessary for you to know. Here is what you actually do:

Starting at the 90° graduation on the compass rose, count up the outer ring (toward 0°) the number of degrees and minutes in the middle latitude; in this instance, 31°50′. You'll have to estimate where 50′ will land you between 59° and 58° on the compass rose. With an edge of the parallel rulers, draw a line through the center of the compass rose to the 58°10′ graduation and its reciprocal, 238°10′. The reciprocal is used merely to check on the accuracy of the location of this line.

You can see that the line just drawn is intersected at intervals by the vertical lines representing minutes of longitude. Each intersection along the line represents a minute of latitude (to accurate

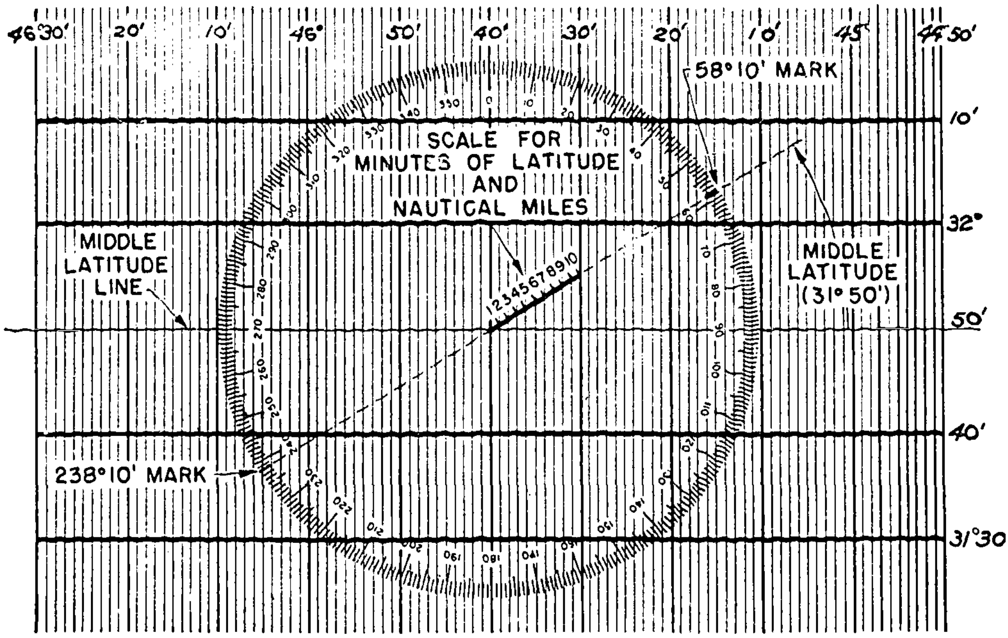


Figure 13-1.–Small area plotting sheet.
65.130

scale) for latitude 31°50′ N. Lay off the length of 10′ of latitude with the dividers, then lay off a parallel up and down the margin for every 10′ north and south of the middle latitude line. A minute of latitude is a nautical mile, hence the latitude scale you laid out serves also as a distance scale for measuring distances on the plotting sheet.

DEAD RECKONING

Dead reckoning, as stated previously, is the method of navigation by which position is determined by means of the direction and distance traveled from a known point of departure.

A ship underway is moving through water, which is a very unstable element. She might leave point A, steer an exact course according to the true bearing between point A and point B, and still wind up a long distance from B, depending on how much leeway she makes. Likewise, her means of estimating the distance traveled seldom produces an exact result.

The dead reckoning (DR) position is only an estimated position, calculated from values that rarely are exact. A fix, on the other hand, is a relatively exact location derived from the intersection of two or more lines of position. A DR position is not a fix, but it is calculated from the last fix obtained. In piloting, a fix is obtained by bearings taken on objects whose locations are known. In celestial navigation, position (fix) is determined by observations of the heavenly bodies. When a ship out of sight of land is prevented by bad weather from taking celestial observations, she must navigate by other means. Normally, electronic navigation is used when the ship is located in an area where it is available. If nothing else can be used, the ship must navigate by dead reckoning.

PLOTTING DR TRACK

In early sailing days, a "dead log" was employed to measure ship's speed. This means of measuring speed consisted merely of timing the interval between which a piece of wood tossed overboard at the bow was off the stern. The length of the ship being known, it was a matter of simple calculation to estimate her speed.

The dead log is considered by some authorities as one source of the word "dead" in dead reckoning. Another theory holds that dead reckoning originally was "deduced" reckoning. Shortened in the logbooks to "ded," an "A" somehow crept in, making it "dead." Whatever the source, however, nothing is really dead about dead reckoning.

Following a ship's DR track from one fix to the next is a continuous process while underway. A constant check on her approximate position is valuable to the navigator in many respects. It enables him, for instance, to locate his assumed position for celestial observations reasonably close to the ship's actual position.

How is the DR track plotted? Suppose that a fix, determined at 0900 by celestial observation, piloting, or electronic navigation, located your ship in latitude 32°42′ N., longitude 46°15′ W. It is your last fix, and your DR track begins at this point. Which way does it run? The answer is, naturally, along the line of the true course steered. Assume that your course is 055°T. You simply set the parallel rulers or protractor on 055° and shift them to the fix, then draw a line from the fix bearing 055°T. As long as you stay on that course, your DR track will advance along this line. Suppose you're steaming at 20 knots. In 1 hour, or at 1000, your DR position will be 20 nautical miles (to scale, of course) from the 0900 fix, along the 055° course line.

The line bearing 055° from the fix is the course line or rhumb line. Label it "C 055" above the line, and "S 20" (for a 20-knot speed) below the line. Label the fix "0900 fix," and the DR position at 1000 "1000 DR."

The 1000 DR represents where you would be if you traveled exactly 20 nautical miles; that is, if you are not set to either side of the DR track. If you had a strong headwind or a big sea against the bow, chances are that you didn't quite make 20 nautical miles. Although the steersman may have kept her on exactly 055°T for every second of the hour, it is probable that a wind, current, or a combination of the two elements was working to set her to one side of the course. For this reason, it is most unlikely for the DR position to coincide with the actual position, even after steaming only 1 hour.

In the *Quartermaster 1 & C* training course, you will see how the navigator tries to calculate direction and strength of forces tending to set a ship off the DR track. He computes set (direction in which the forces are acting) and drift (distance they will send the ship off in a given time), then allows for them in setting his course and speed.

MEASURING SHIP'S SPEED

In the preceding section we mentioned that you can locate a ship's DR position on the course line by figuring the nautical miles traveled in the time underway since the last fix. In simpler terms, this explanation means that distance traveled by a ship, in nautical miles, equals her speed in knots multiplied by her time underway.

One method of measuring the approximate speed of a ship is by counting the revolutions per minute made by her engines. The speed produced by various revolutions per minute has been calculated already, normally by repeated running of a measured distance at various revolutions per minute. Speed by revolutions per minute is necessarily approximate. A ship forcing her way against a swift current, with her engines turning flank speed, would actually make less headway than if she were running with the stream, her engines making the same revolutions per minute.

Another way of measuring speed is by a seagoing speedometer called a log. Three general types of logs are installed in Navy ships: the Pitot-static (hydraulic) type, the propeller (electromechanical) type, and the electromagnetic type.

In all three types of logs, a rodmeter (called a sword) protrudes through the hull of the ship beneath the keel and furnishes the speed signal to a mechanism within the ship that converts the signal into speed and distance traveled. In shallow or foul water, the sword must be retracted and housed in its shaft, because the slighest scraping can damage the sword and render it inoperable.

The electromagnetic log is the most accurate of the three types, and is rapidly replacing the other two throughout the fleet.

ELECTROMAGNETIC LOG

The electromagnetic log consists essentially of a rodmeter, an oscillator amplifier, an indicator-transmitter, and associated repeaters. The rodmeter contains an electromagnetic sensing element, which produces a voltage directly proportional to the ship's speed through the water. This voltage is amplified in the oscillator amplifier, and is converted to pointer indications of speed on the dial of the indicator-transmitter. Distance traveled (in forward motion) also is shown on the counter of the indicator-transmitter. The speed and distance signals are transmitted to repeaters (fig. 13-2) located in the pilothouse, charthouse, CIC, and other ship control stations.

ACTUAL SPEED

Generally speaking, both the engine revolutions and the log are indicators only of speed through the

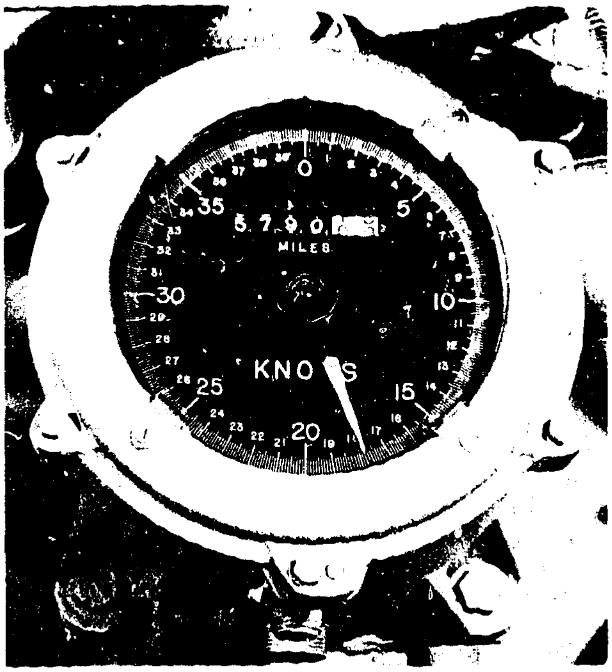


Figure 13-2.–Underwater log indicator.
69.42

water. Actual speed over the ground that a ship makes cannot be determined unless wind and current are taken into consideration.

PILOTING

Piloting, you learned earlier, is a method of determining position and directing the movements of a vessel by reference to landmarks, navigational aids, or soundings. Ordinarily, piloting is used as a primary means of navigation when entering or leaving port and in coastal navigation. It may be utilized at sea when the bottom contour makes it possible to establish a fix in piloting, the navigator (1) obtains warnings of danger, (2) fixes the position frequently and accurately, and (3) determines the proper course of immediate action.

LINES OF POSITION

Piloting entails the use of lines of position, which are the loci of a ship's position. A line of position is determined with reference to a landmark. To be useful for this purpose, a landmark must be identified easily, and its position must be shown on the chart in use. Lines of position (fig. 13-3) are of three general types: ranges, bearings, and distance arcs.

A ship is said to be on the range when two landmarks are observed in line. This range is represented on a chart by means of a straight line through two appropriate chart symbols. The line, labeled with the time expressed in four digits (above the line), is a locus of the ship's position. It should be noted that range in this context differs significantly from its homonym meaning distance.

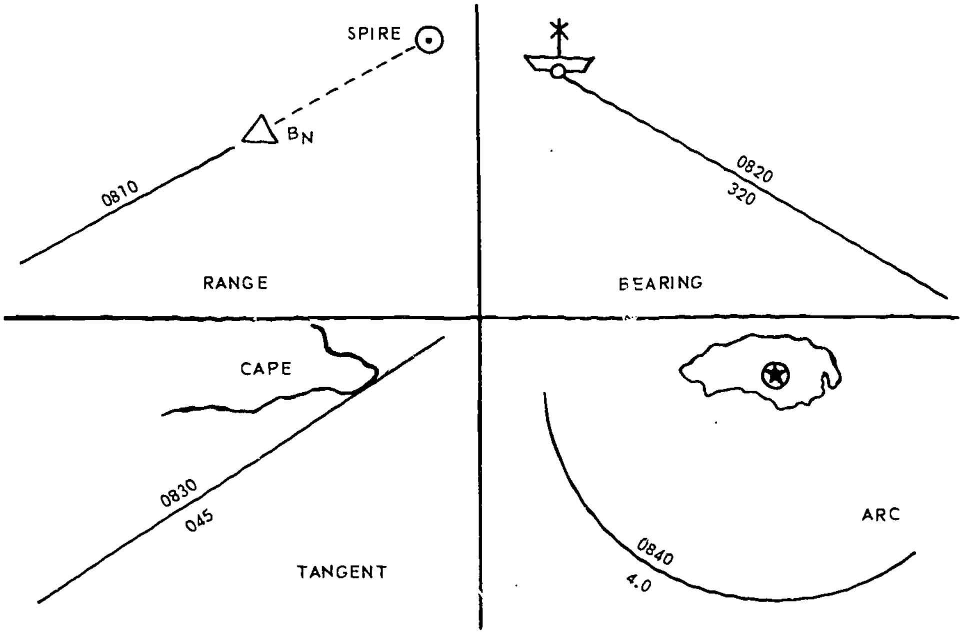


Figure 13-3.–Lines of position. 69.141

It is preferable to plot true bearings, although either true or magnetic bearings may be plotted. Thus, when the relative bearing of a landmark is observed, it should be converted to true bearing of direction by adding ship's true heading. In plotting, therefore, because bearing indicates the direction of a terrestrial object from the observer, a line of position is drawn from the landmark in a reciprocal direction. If a lighthouse bears 040°, for example, then the ship bears 220° from the lighthouse. A bearing line of position is labeled with the time expressed in four digits above the line and the bearing in three digits below the line.

A special type of bearing is the tangent. When a bearing is observed of the right edge of a projection of land, the bearing is a right tangent. Similarly, a bearing on the left edge of a projection of land, as viewed by the observer, is a left tangent. A tangent provides an accurate line of position if the point of land is sufficiently abrupt to provide a definite point for measurement. It is inaccurate when the slope is so gradual that the point for measurement moves horizontally with the tide.

A distance arc is a circular line of position. When the distance from an observer to a landmark is known, the locus of the observer's position is a circle with the landmark as center having a radius equal to the measured distance. The entire circle need not be drawn, because in practice the navigator normally knows his position nearly enough that drawing an arc of a circle suffices. The arc is labeled with the time above expressed in four digits and the distance below in nautical miles (and tenths). The distance to a landmark may be measured by using radar, stadimeter, or sextant, in conjunction with tables 9 and 10 of the *American Practical Navigator*.

PILOTING RECORD

All bearings, ranges, and soundings used in piloting must be recorded in a bearing record log. To facilitate this recording, the Oceanographic Office publishes a Standard Bearing Book (S.P. 87) for use by all ships. This record is maintained so that a ship's piloting track can be reconstructed after overlays are destroyed or charts are erased. The bearing record must be kept up to date and accurate and must contain all the information used to obtain each fix, including time, name of navigational aid on which bearing or range was taken, bearing or range, and depth of water.

In the appropriate spaces on each page of the Standard Bearing Book (fig. 13-4) is entered the ship's location and the gyro error. Column 1 contains the date as the first entry. Times are entered chronologically under the date. When the date changes, the new date may be entered on a separate line of the same column.

Columns 2 through 6 are headed by the name(s) or other clear identification of the object(s) used to obtain the line of position. Bearings are recorded under the name of each of these navigational aids. Bearings or ranges are placed alongside the appropriate times. All bearings are visual (by gyrocompass) unless otherwise indicated. Radar bearings and ranges must be identified by suitable notation.

In the final column, depth under the keel (as indicated by the echo sounder) is recorded alongside each time.

As with other logs and records, no erasures are permitted in the Standard Bearing Book. A single line must be drawn through errors (so that the entry is still legible); the correct entry is made alongside it. Upon being relieved or secured, the bearing recorder must sign his name across the line immediately below the last piloting entry.

FIXES

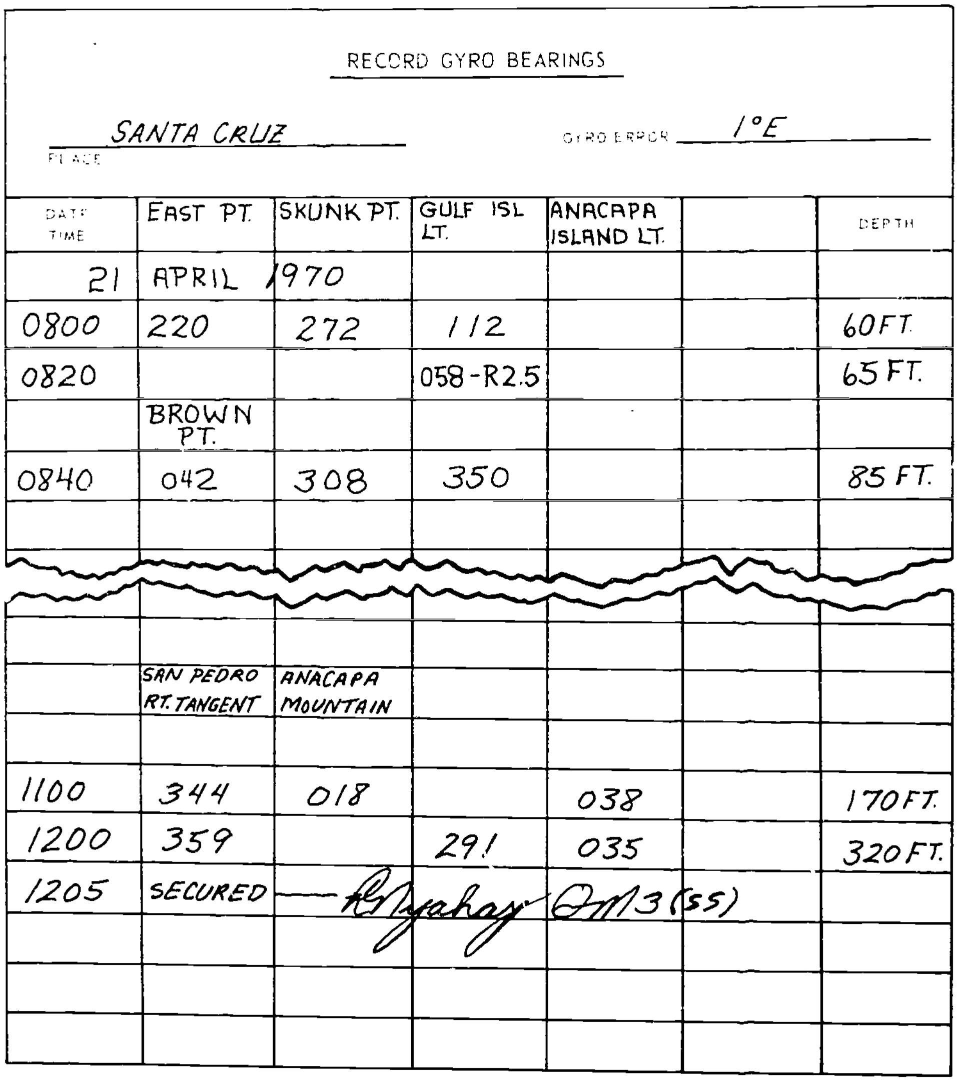
A fix, previously thought of as a well-determined position, is defined as the point of intersection of two or more simultaneously obtained lines of position. The symbol for a fix is a small circle around the point of intersection. For better identification, it is labeled with time expressed in four digits followed by the word "fix." Fixes may be obtained by means of the following combinations of lines of position, of which many types are seen in figure 13-5.

* A line of bearing and a distance arc.
* Two or more lines of bearing.
* Two or more distance arcs.
* Two or more ranges.
* A range and a line of bearing.
* A range and a distance arc.

Because two circles may intersect at two points, two distance arcs used to obtain a fix are somewhat undesirable. In making his choice between two points of intersection, however, a navigator may consider an approximate bearing, a sounding, or his DR position.

When a distance arc of one landmark is used with a bearing of a different landmark, the navigator may again be faced with the problem of choosing between two points of intersection of loci.

Navigation plotting symbols and their meanings are shown in figure 13-6. When these symbols are used, it is not necessary to label the position (except for time), since a glance tells what type of position is



RECORD GYRO BEARINGS

SANTA CRUZ
PLACE

GYRO ERROR 1°E

DATE TIME	EAST PT.	SKUNK PT.	GULF ISL LT.	ANACAPA ISLAND LT.		DEPTH
21	APRIL	1970				
0800	220	272	112			60FT.
0820			058-R2.5			65 FT.
	BROWN PT.					
0840	042	308	350			85 FT.

	SAN PEDRO RT. TANGENT	ANACAPA MOUNTAIN				
1100	344	018		038		170FT.
1200	359		291	035		320FT.
1205	SECURED	— R Nyahay		QM3 (SS)		

Figure 13-4.-Standard bearing book. 69.142

indicated. Any simple, clear, logical, unambiguous system of labels is suitable. Due to various labeling systems in the Navy, your navigator will be the authority on which symbols to use.

SELECTING LANDMARKS

In selecting landmarks for use in obtaining lines of position (LOP), two considerations enter the problem: angle of intersection and number of objects.

Two lines of position crossing at nearly right angles will result in a fix with a small amount of error as compared to two lines of position separated by less than 30° spread. If a small unknown compass error exists in both examples, or if a slight error is made in reading the bearings, the resulting discrepancy will be less in a fix produced by widely separated lines of position than when a fix is obtained from lines of position separated by a few degrees.

If only two landmarks are used, an error in observation or identification may not be apparent. By obtaining three or more lines of position, each LOP acts as a check. If all LOPs cross in a pinpoint or from a small triangle, the fix may be considered reliable. Where three lines of position are used, a spread of 120° would result in optimum accuracy.

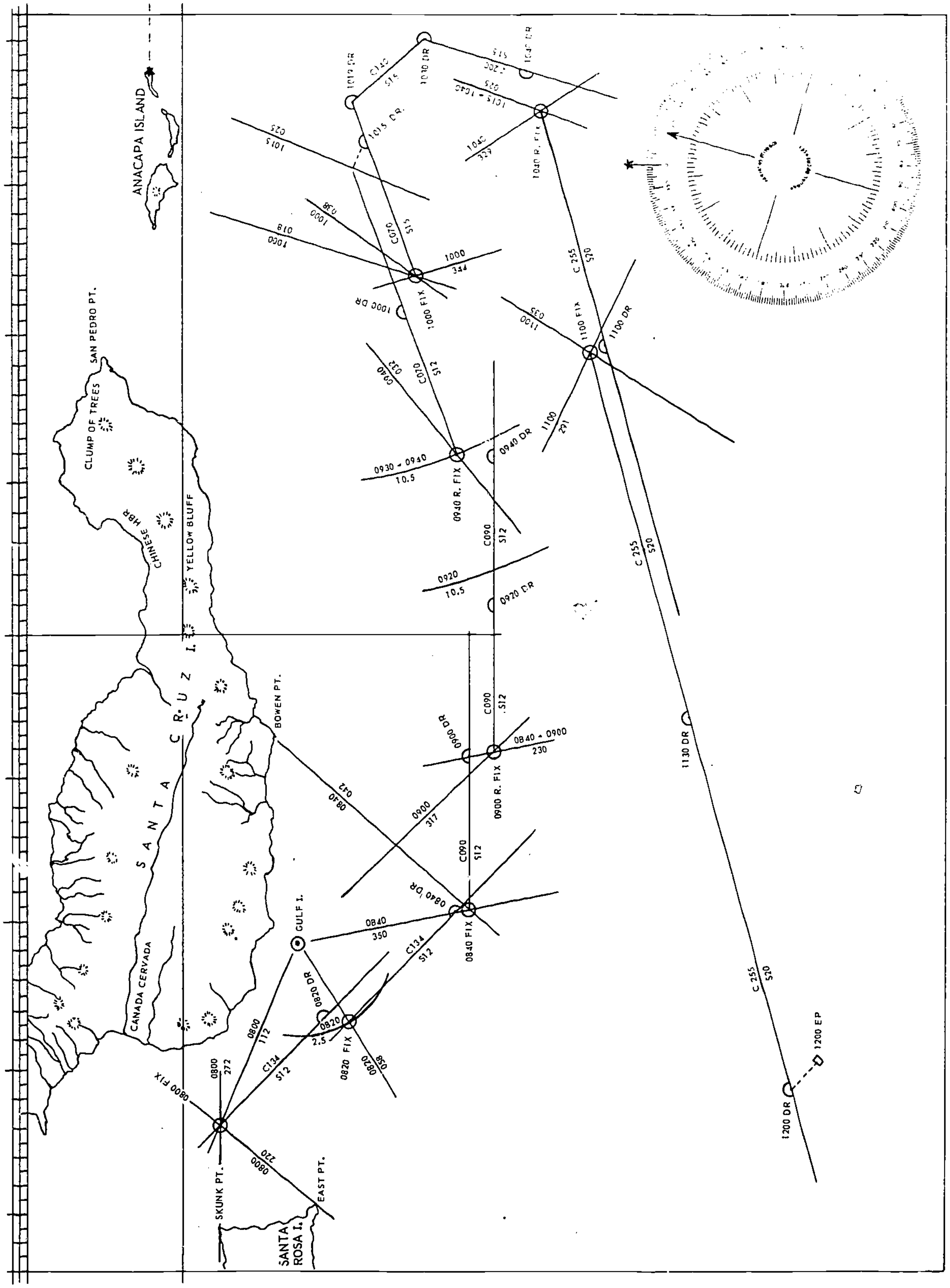


Figure 13-5.—Piloting plot.   69.143

SYMBOL	DESCRIPTIVE LABEL	MEANING
⊙	FIX	AN ACCURATE POSITION DETERMINED WITHOUT REFERENCE TO ANY PREVIOUS POSITION. ESTABLISHED BY VISUAL OR CELESTIAL OBSERVATIONS.
△	FIX	A RELATIVELY ACCURATE POSITION, DETERMINED BY ELECTRONIC MEANS, WITHOUT REFERENCE TO ANY FORMER POSITION.
⌓	DR	DEAD RECKON POSITION. ADVANCED FROM A PREVIOUS KNOWN POSITION OR FIX. COURSE AND SPEED ARE RECKONED WITHOUT ALLOWANCE FOR WIND OR CURRENT.
⊡	EP	ESTIMATED POSITION. IS THE MOST PROBABLE POSITION OF A VESSEL, DETERMINED FROM DATA OF QUESTIONABLE ACCURACY, SUCH AS APPLYING ESTIMATED CURRENT AND WIND CORRECTIONS TO A DR POSITION.

Figure 13-6.–Navigation plotting symbols.
69.149

Sometimes a navigator has no choice in landmarks, their number, or spread. He then must use whatever reference marks are available, no matter how undesirable. In evaluating his fix, the number of landmarks and their spread should receive consideration. When three lines of position cross, forming a triangle, it is difficult to determine whether the triangle is the result of a compass error or an erroneous LOP. Intersection of four lines of position usually indicates which LOP is in error.

COMPASS ERROR IN PLOTTED FIX

When lines of position cross to form a small triangle, the fix is considered to be the center of the triangle, at a point determined visually. If the size of the triangle appears significant, then it is possible that the compass has an error, and the ship's actual location may be outside the triangle.

To eliminate the compass error from the fixes, assume an error; then, by successive trials and assumptions, determine the actual error. If the assumed error is labeled improperly (east or west), the triangle will plot larger. If the error proves to be labeled properly but the triangle still exists, although reduced in size, the navigator on the second trial should assume a larger error in the same direction.

HORIZONTAL SEXTANT ANGLES

In piloting, the most accurate fixes may be obtained by measuring the horizontal angles between three fixed objects whose exact locations are known.

By use of a sextant, horizontal angles are measured between the object in the middle and the one on either side.

A point to bear in mind is that this method should not be used when the three objects are on a circle whose arc passes through the observer. (See fig. 13-7.) Such situations are known as "swingers" or "revolvers." To avoid swingers or revolvers, objects selected should lie in a straight line. When this

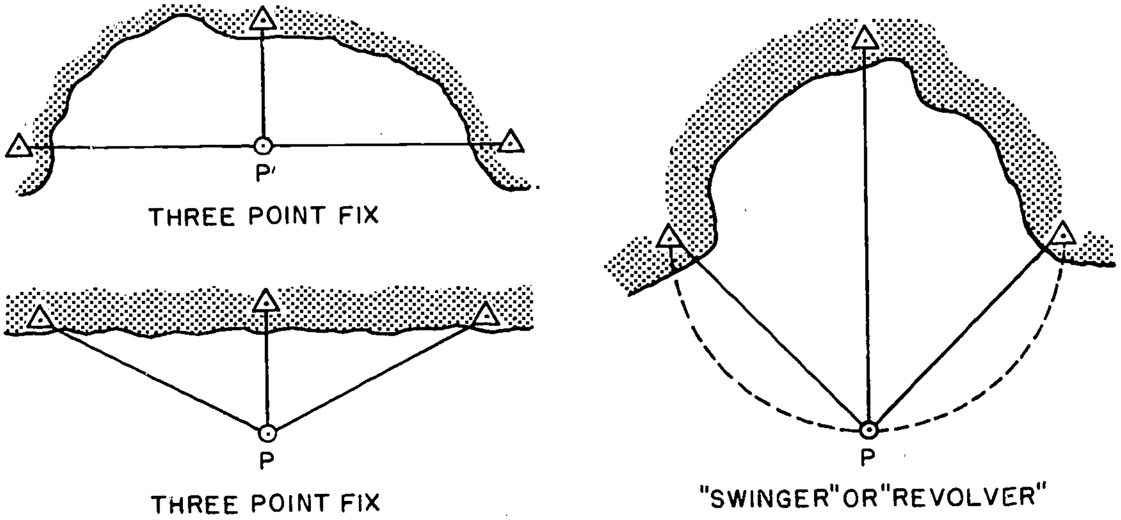


Figure 13-7.–Horizontal sextant angles.
69.144

selection is impracticable, the object in the middle should be nearer the observer than the other two, or the angle between the middle object and the two end ones should approach or exceed 180°.

Horizontal sextant angles should be taken as nearly simultaneously as possible, preferably by two people on a predetermined signal. The angles are then set on a three-arm protractor. The protractor arms are then aligned to the objects on the chart, and the observer's location is the focal point of the three arms.

Three-arm Protractor

The three-arm protractor is a device of metal or rigid plastic, and has one fixed and two movable arms. (See fig. 13-8.) The fixed (center) arm is secured to (or is part of) a graduated circle. The other two arms, fitted with clamping devices, pivot around this circle. The left and right arms may be set to form any angle with the middle arm. All arms have a common vertex. To determine an observer's exact location, the three-arm protractor may be aligned to the beacons on the chart, as seen in the illustration.

RUNNING FIX

So far we've talked about methods for obtaining a definite fix by piloting. Whether obtained by bearing and distance of a single object or by cross bearings of two or more objects, the lines of position are located exactly. Their intersection, consequently, is the ship's location at the time bearings were taken.

A running fix, on the other hand, is what you might call a dead reckoning fix, because the location of one of the lines of position is determined by dead reckoning calculation of the ship's direction and distance traveled during an interval. The most common example of a running fix is a situation where, for some reason, a line of position obtained at a certain time is advanced. Figure 13-9 shows how a line of position is advanced. At 1500 the ship took a bearing of 245° on light E. Since then she has run for 20 minutes at 12 knots on course 012°. Twenty minutes at 12 knots means that she has run 4 nautical miles. This distance is measured to scale along the course line in the direction traveled, and the new line of position is drawn at this point parallel to the old one. The new line of position is labeled

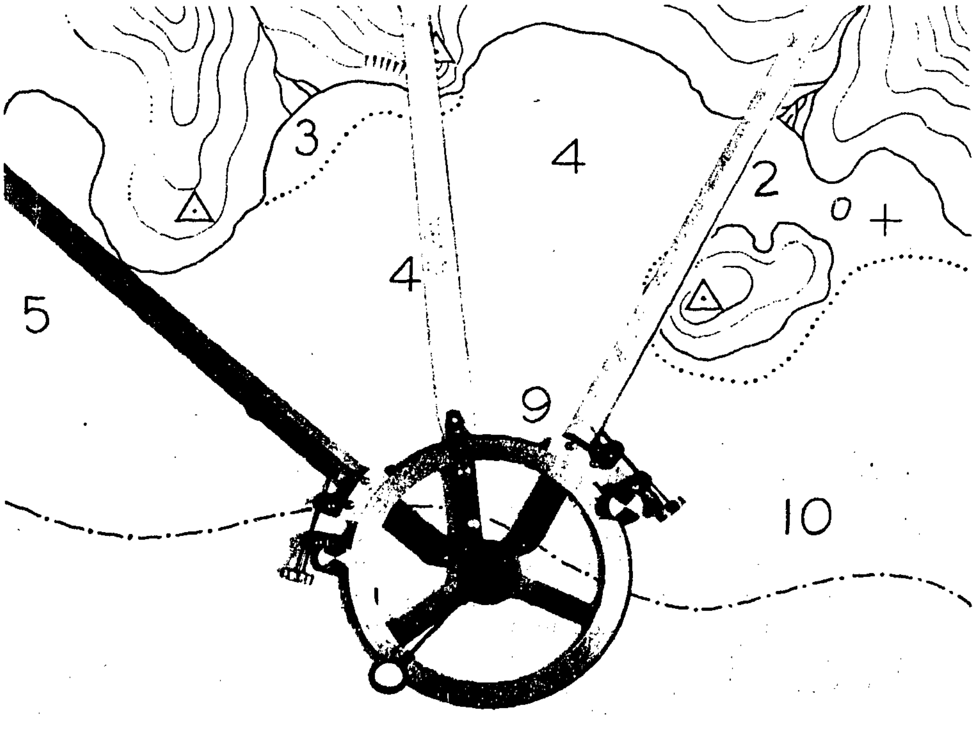


Figure 13-8.–Three-arm protractor. 29.269

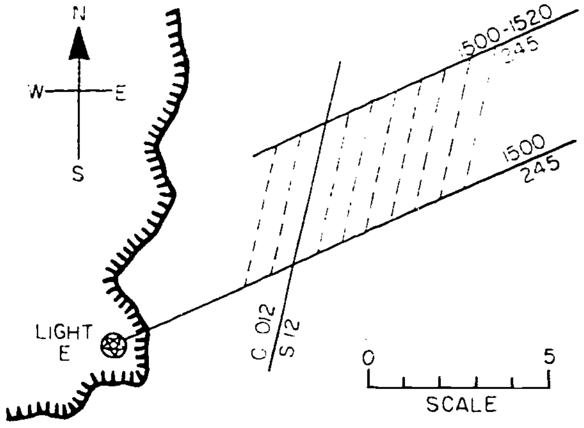


Figure 13-9.–Advancing line of position.
58.74(69)C

1500–1520 to show that it is a line of position advanced the amount of the run in that interval. At 1500 the ship was somewhere along the 1500 line of position. At 1520 she is somewhere near a point on the 1500–1520 line. The exact spot depends on how accurately the direction and distance traveled are represented by the measured distance along the course line.

You may wonder why a ship would advance a line of position in the manner described here and illustrated in figure 13-9. By way of explanation, suppose that another object is farther up the coast from light E. The object is shown on the chart but cannot be seen from the ship until she arrives at a point somewhere on the 1500 1520 line of position. Intersection of a line of position obtained from a bearing on this object with the 1500-1520 line locates a running fix (a running fix, remember–not a fix). The running fix is labeled "1520 R. fix."

In chapter 15 you will see how a line of position, obtained by observing a single heavenly body, may be advanced to form a running fix by intersection with another line obtained by later observation of the same celestial body. A similar running fix can be obtained in piloting by taking two bearings on the same object, with an interval between them. The *Quartermaster 1 & C* training course tells how to solve this type of running fix by referring to tables. For the QM 3 or 2 this course is confined to a description of the simplest and most common method of getting a running fix by two bearings on the same object. The method is called doubling the angle, or bow and beam bearings.

Bow and Beam Bearings

In all applications of the two-bearing principle, the basic doctrine can be stated as follows; The distance a ship runs on the same course to double the angle of bearing of an object on her bow equals her distance away from the object at the time of the second bearing.

You don't really need to know why the basic doctrine is true, but a knowledge of trigonometry will give you the answer readily. The most common and convenient application of this principle is with bow and beam bearings. Figure 13-10 illustrates how it works. A ship starts to determine her run from the time the fixed object shown bears 315° relative, which is 45° on her port bow. By the time the object is 270° relative (90° from the bow, or abeam), she has run 1.0 nautical mile. At the time of the second bearing the object is also 1.0 nautical mile distant on the beam. The navigator now is able to locate a running fix by bearing and distance of a single object. Why is it called a running fix? It is a running fix because the navigator must calculate by DR methods the direction and distance run between bearings.

Other special situations of the two-bearing principle include combinations of angles. They are taken up in *Quartermaster 1 & C*, which also describes the use of tables that make it unnecessary to steam all the distance required to double the angle.

PILOTING BY SOUNDINGS

A position obtained by soundings usually is approximate. Accuracy of this type of position de-

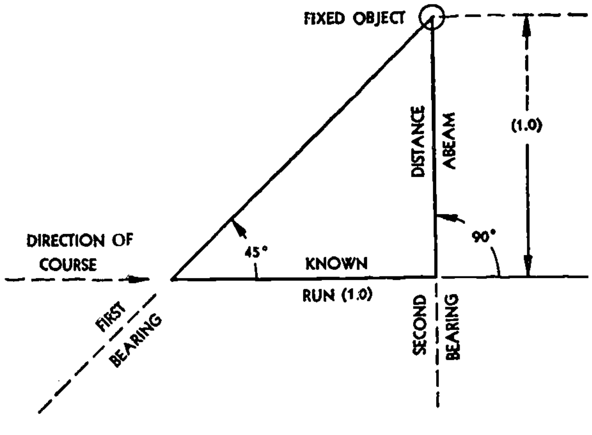


Figure 13-10.–Bow and beam bearings.
58.79

pends on (1) how completely and accurately depths are indicated on the chart and (2) the irregularity of the depths. It is impossible to obtain a position by soundings if the ship is located in an area where depth is uniform throughout. In practice, position by soundings ordinarily serves as a check on a fix taken by some other means.

Before going into the soundings method, let's talk about the ship's depth-finding gear. You learned about the hand lead from the *Seaman* training manual. The hand lead is the most accurate means for obtaining soundings. It usually is used when water is sufficiently shallow and the ship's speed is slow enough, to make it practicable.

Before the invention of the depth finder (described later), offshore soundings in water too deep for a hand lead were taken by sounding machine. The machine consisted of a hand-operated reel on which was wound a long length of fine wire. A heavy lead was fastened at the end of the wire. Just above the lead was a metal tube into which was inserted a colored glass sounding tube. The interior of the glass tube changed color to an extent governed by the depth reached by the lead. Sounding machines are now obsolete (much to the satisfaction of any man who ever had to assist at winding in a half mile or so of wire).

DEPTH-SOUNDING SONAR

Modern ships are equipped with sonic depth finders whose principle of operation is based on the scientific fact that sound travels through water at about 4800 feet per second. A depth finder sends out a signal, which bounces off the ocean floor and returns to the ship much like an echo. Obviously, half the time in seconds required for the sound to make the round trip, multiplied by 4800, is the distance (in feet) to the bottom.

AN/UQN-1 Depth Finder

The type of sounding equipment discussed in this chapter is the AN/UQN-1. (See fig. 13-11.) In using this equipment, the depth finder operator must make certain choices in each of the following conditions.

1. Equipment mode: Standby (ready to operate) or operating.
2. Recorder range: 600 feet, 600 fathoms, or 6000 fathoms.
3. Indicator range: 100 feet or 100 fathoms.
4. Pinging mode: Automatic (periodic) or single ping (hand-triggering).

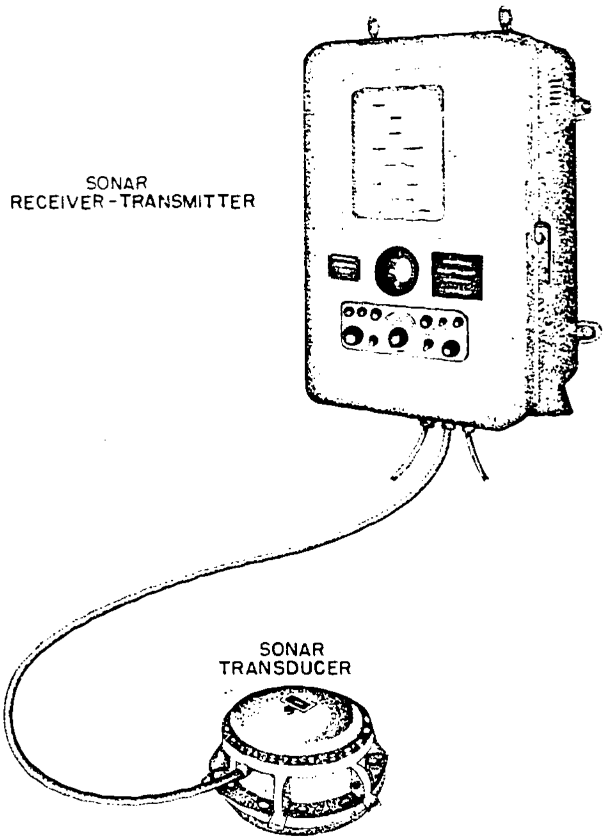


Figure 13-11.–Depth-sounding Sonar AN/UQN-1(). 62.9

In making his choices, the depth finder operator must bear in mind the following limitations of the equipment:

1. For best results, the operator should change scales when the depth warrants, although one scale could be used for most depths. A depth of 300 feet, for example, can be recorded on the 6000-fathom scale; it also can be measured on the 600-fathom scale; but the most accurate reading is obtained on the 600-foot scale. On the other hand, when the echo mark approaches the lower edge of the echogram, a depth has been reached where the next higher scale should be selected.
2. The operator must observe the visual paper warning given through the echogram paper roll. A warning light is visible through slots

in the paper within 5 feet of the end of the roll.

3. The depth finder, when used in extremely shallow water, cannot always be adjudged accurate but must be checked constantly by use of the hand lead.
4. As with some other electronic equipment, inaccuracies or malfunctioning of the depth finder may not readily be discernible. Because completely reliable and accurate soundings are essential, two simple checks of the accuracy of the depth finder have been devised. Following is a description of these checks. a. Flash count: When the power supply frequency that operates the depth finder is not constant, the readings obtained on the recorder are inaccurate. To check for this error, set the recorder on the 6000-fathom range and, with an accurate stopwatch, measure the time for the stylus to travel from 0 to 6000 fathoms. Over a period of five readings, average time should be 10 seconds. If this average time is not obtained, the ship's power supply frequency to the depth finder should be adjusted to 60 cycles per second to remedy the inaccuracy. b. Bar check: At a predetermined distance, a metal bar or plate is suspended directly beneath the transducer of the depth finder. Readings obtained on the recorder should equal the depth to which the bar or plate was suspended. If inaccuracies occur, the percentage of error can be determined and applied to future soundings.

* Operating AN/UQN-1: Following is a summary for operating the AN/UQN-1 depth-sounding Sonar.

1. Turn on power switch.
2. Set depth range and choose either INDICATOR or RECORDER operation on range switch.
3. Select AUTOMATIC (periodic) or SINGLE PING on ping switch.
4. Adjust GAIN control for suitable marking.

* Replacing chart paper: The following steps should be observed when replacing chart paper on the AN/UQN-1 sounding equipment.

1. Secure power at source; open cabinet door.
2. Release roller-release thumbscrews at the top and bottom of takeup spool on left side of recorder (containing used echogram), and swing out the roller.
3. Remove empty spool from right side.
4. Trim paper end of new roll to a V-shape.
5. Install new roll of chart paper on right side of recorder and the used spool (or new spindle) on the left side.
6. Pull paper from right-hand roll across the face of recorder, ruled side facing out. Slip the chart up and under range styluses.
7. Tuck cut edge of paper from right spool into slot of the left spool and roll up a few turns, by hand, with the chart side facing out.
8. Reset drive roller (takeup roller) and tighten securing screws.
9. Close cabinet door and turn on power. You now are ready to record soundings.

* Marking echogram: The echogram (fig. 13-12) is a specially treated paper on which depth recordings are made. When a new roll of recorder paper is installed in the echo sounder, specific data must be written on it. Time must be recorded on the echogram every hour when the recorder is operating at slow paper speed and every 30 minutes when operating at fast paper speed. The date must be written at 0000, 0400, 0800, 1200, 1600, and 2000 hours. All course and speed changes are recorded on the echogram and marked with the time of occurrence. Upon removing the echogram roll from the machine, the date must be written at the end of the echogram. All notations on the echogram must be made with a dark red pencil; an ordinary graphite pencil blends too well with the finish on the paper.

SOUNDING LOGBOOKS

Sounding logbooks, furnished by the Oceanographic Office, are maintained by individual ships for recording soundings. Two sounding logs are kept, one for odd-numbered days and the other for even-numbered days. When taking soundings, values are recorded every 5 minutes, unless specified otherwise. Soundings are read from the echogram whenever possible, because recordings of soundings by audible or visual (dial light) means are subject to many personal errors.

Whenever a change of depth scale is made, or the recording is shifted to another machine, entries of changes are made in the log. All changes of course and speed also are entered in the log. When

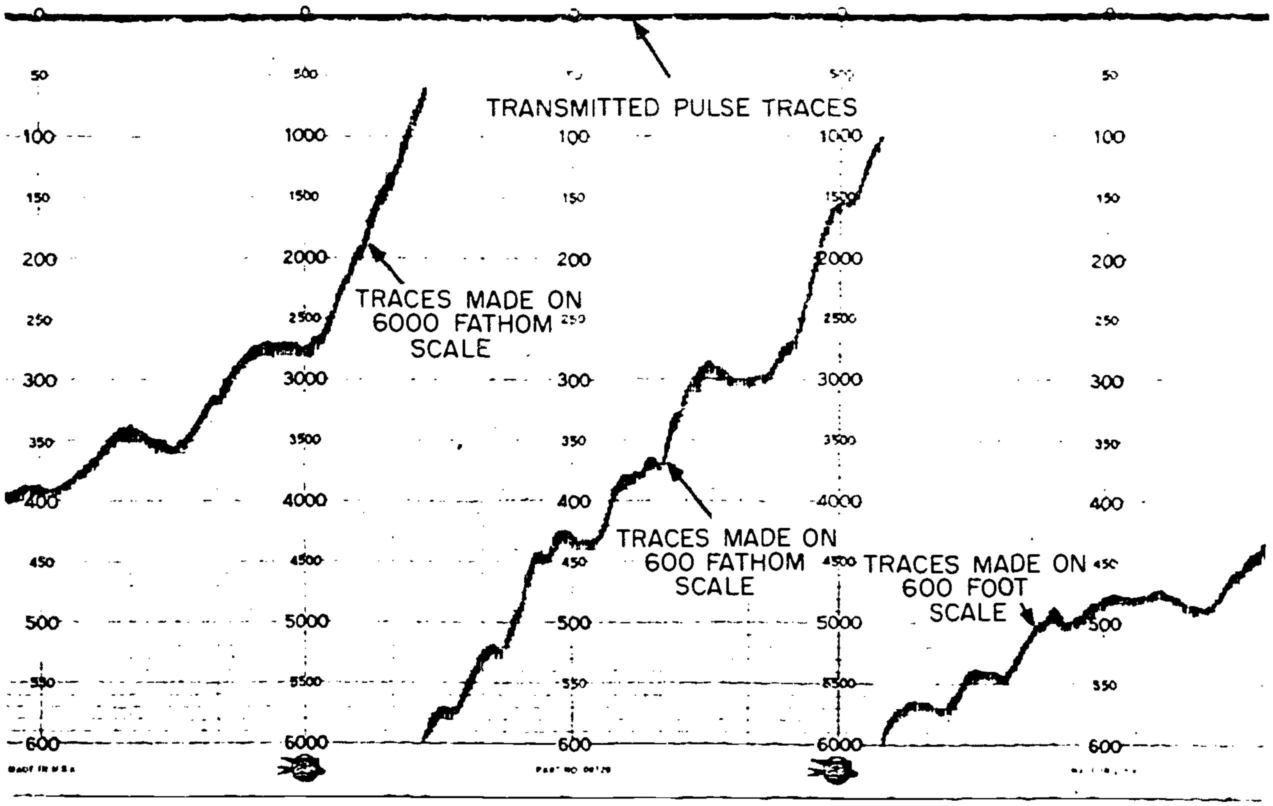


Figure 13-12.–Depth recording showing steady decrease in depth. 62.10

two or more ships are operating together, hourly bearings and ranges of other ships are recorded.

Proper time notations must accompany all entries in the sounding log. Local zone times are used, and time zone changes are noted.

When completed, sounding logbooks are forwarded by each ship to the Oceanographic Office.

POSITION BY SOUNDINGS

Suppose you have only one spot on or near your DR track where water depth is 6 fathoms, and the depth over the rest of the area for miles around is 20 fathoms. If you heave the lead and record 6 fathoms, you can be certain you are located at the one point where a 6-fathom depth was shown on the chart.

Piloting by soundings is not as simple as that of course, but the supposition gives you an idea of the principle involved. What you really do is get a contour (by repeated soundings) of the bottom you are passing over, and try to match it up with a similar contour shown by depth figures on the chart. One of the best methods is to proceed as follows:

Draw a straight line on a piece of transparent paper or plastic. Calculate how far apart your soundings will be (in other words, the length of the ship's run between soundings), and mark off distances on the line to the scale of the chart. Alongside the mark representing each sounding, record the depth obtained at that sounding. The line so obtained represents ship's course. The line of soundings recorded on the overlay should fit the depth marks on the chart somewhere near your DR track. If it makes an accurate fit, it probably is a close approximation of the course the ship actually is making good.

OCEANOGRAPHIC OBSERVATIONS

The continuing need for naval and maritime operations throughout the world makes it increasingly important that every effort be made to collect accurate oceanographic and related data regarding various oceanic areas. Oceanographic survey ships of the Navy are engaged continually in collecting this information, which includes, in part, the determination of water depths of the oceans, seas, and straits of the world. When oceanographic survey operations are undertaken, use of the sonic depth finder is more intensified than during normal operations. Consequently, more exacting observations must be obtained and recorded.

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CHAPTER 14

ELECTRONIC NAVIGATION

PILOTING BY RADIO

Basically, electronic navigation is a form of piloting. Piloting, you recall, is that branch of navigation in which a ship's position is obtained by referring to visible objects on the earth whose locations are known. This reference usually consists of bearing and distance of a single object, cross bearings on two or more objects, or two bearings on the same object with an interval between them, as you saw in the last chapter.

Position is determined in electronic navigation in practically the same way that it is in piloting. But there is this important difference: The objects by which a ship's position is determined need not be visible from the ship. Instead, bearings (and sometimes ranges) of the objects are obtained by electronic means, usually in the form of radio waves.

The advantages of piloting by radio are obvious. A ship's position may be fixed electronically in fog or thick weather that otherwise would make it impossible to obtain visual bearings. It may be determined electronically from stations located far beyond the range of even clear-weather visibility. Electronic navigation, invaluable though it may be as an aid to the navigator, depends on the performance of manmade apparatus, which is always subject to failure or casualty. Electronics, consequently, supplements but does not supplant the tried and true methods of navigation.

LORAN

Loran (derived from the underlined letters of the term *long range navigation*) enables a navigator to determine his ship's position by means of radio signals broadcast by stations of known position. A fix is determined by loran through the intersection of lines of position obtained by reference to shore stations whose locations are known. In loran a line of position is located by obtaining the difference in time of arrival of signals sent out by each of a pair of transmitters (broadcasting stations). This time interval is constant when the ship is located anywhere along a previously established loran line of position. To put it another way: when the time interval is a specific amount, the ship must be somewhere on a predetermined loran line of position, which is a locus of all points where the interval between arrival of signals is the same. Unlike lines of position obtained from bearings, loran lines of position gradually become curved as they draw away from the center of the baseline between two transmitting stations. (See fig. 14-1.)

HOW LORAN WORKS

Two transmitting stations are required to give you a single line of position by loran. The master station starts the cycle of transmission by sending out a pulse of radio energy that is radiated in all directions, including that of the ship and that of the other station of the pair, called the slave station. After traveling over the distance between the two transmitting stations, which is known as the baseline, the pulse transmitted by the master arrives at the slave. The time of its arrival there is used by the slave as a reference for the transmission of its own signal. After the signal is transmitted, the entire cycle is repeated constantly at the same definite time interval. The loran operating sequence is shown diagrammatically in figure 14-2.

Because the value of the loran system depends on the accuracy of the timing of the signals transmitted, every precaution is taken to safeguard the functioning of the system. Following are three continuous checks that are applied to ensure a high level of reliability.

1. Continuous guarding of the slave signal by observations made at the master station.
2. Continuous guarding of the master signal by observations made at the slave station.
3. Continuous guarding of the complete transmission by monitor stations strategically located with respect to the transmitters.

Loran transmissions can be momentarily at fault owing to many possible causes, such as electrical failure of a part of the equipment, or operating error

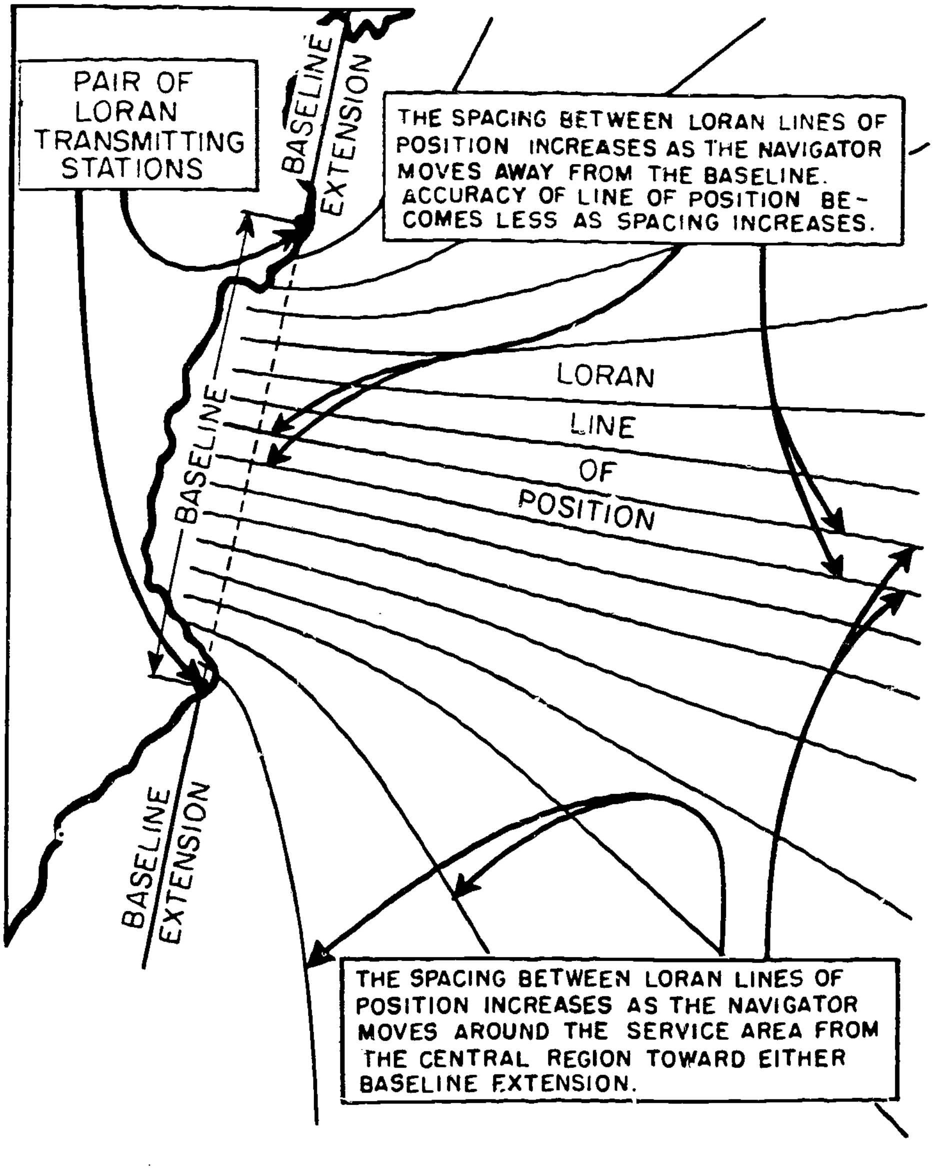


Figure 14-1.–Loran lines of position are curved.
69.45

in manipulation of transmitting controls. Even though these troubles may be minor and of relatively short duration the navigator should be instantly cognizant of any failure. The transmitting equipment is designed to produce a characteristics and easily recognizable shift of signals to the right, about 1000 microseconds (μsec) and back an intervals of about 1 second; or, in rare instances, a signal may be turned off and on at short intervals, at which time the navigator is warned that the signals must not be used.

Whenever failure is sufficiently serious to interrupt transmission entirely, there is no danger of misinterpretation on the part of the navigator, because reception of an impulse from only one of a pair of stations makes the system inoperable.

RANGE AND RELIABILITY OF LORAN-A

Making the three continuous checks referred to earlier assures the surface or air navigator that any loran transmissions he receives (except shifting signals) are accurate and reliable. Under almost any kind of weather conditions, lines of position by loran-A are fully as accurate as those obtained from good celestial observations. Determination of posi-

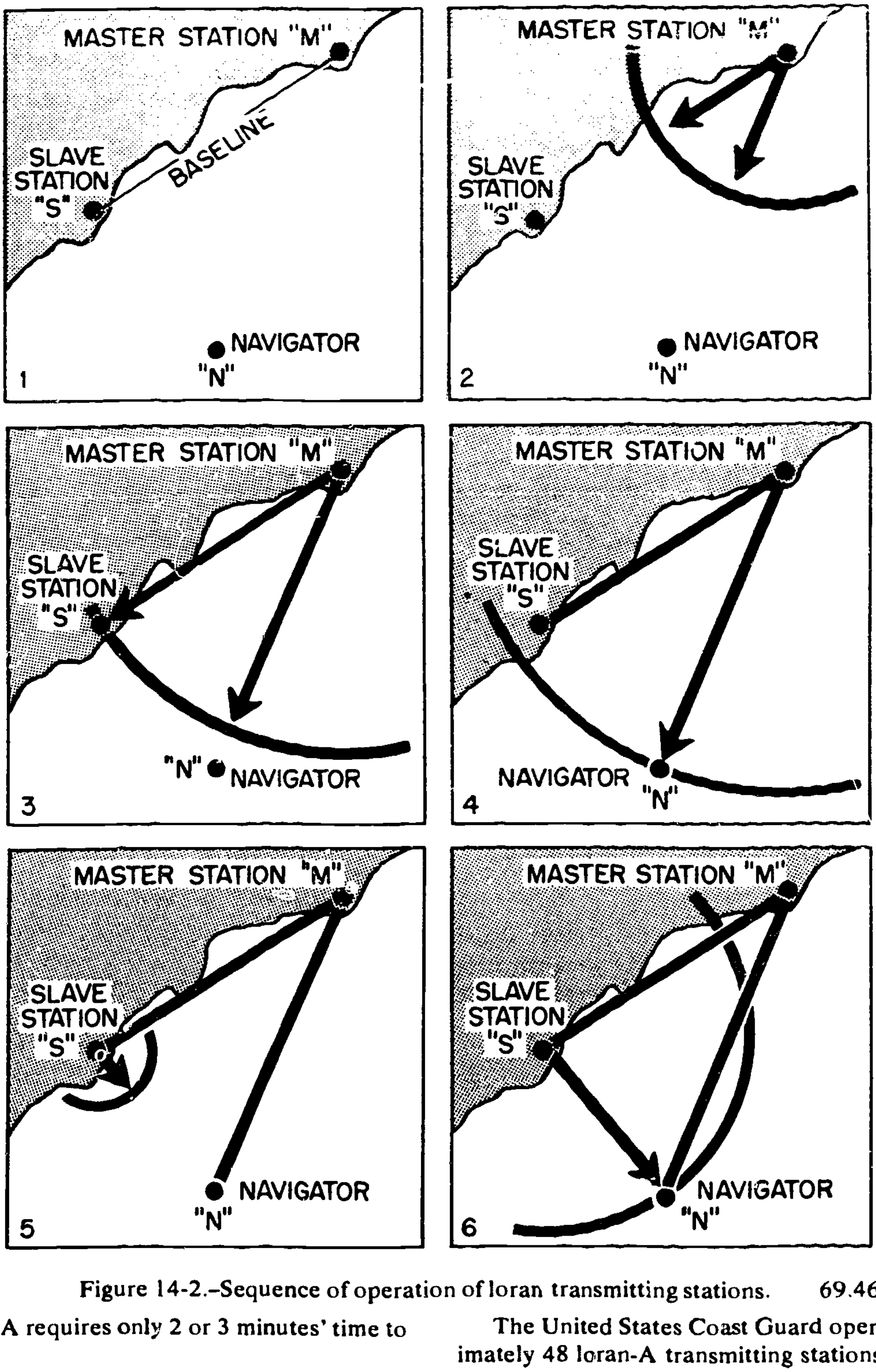


Figure 14-2.–Sequence of operation of loran transmitting stations. 69.46

tion by loran-A requires only 2 or 3 minutes' time to effect.

Reception of signals is made possible at distances from the transmitting stations out to 1400 nautical miles at night, and 700 to 800 nautical miles in the daytime. The reason for the day-night difference in effective range is discussed in the next topic.

The United States Coast Guard operates approximately 48 loran-A transmitting stations throughout the world. Other nations operate approximately 35 more stations. They provide loran service along both coasts of North America, along the great circle courses of the North Atlantic and North Pacific, and in the Central and Southwest Pacific. A considerab

2533

KEY TO FIGURE 14-2

Step 1: Navigator at point N, within range of stations M and S, about to receive loran signals.
Step 2: Loran transmission cycle is begun by master station M. Pulse radiates in all directions, travels toward both slave station and point N.
Step 3: Pulse from master arrives at slave station but has not yet reached N.
Step 4: Pulse from master arrives at N. Slave already has received master pulse and is waiting for proper amount of time to elapse before transmitting to assure correct synchronization with master.
Step 5: After assuring correct synchronization, slave transmits pulse. Navigator has received pulse from master already.
Step 6: Slave pulse arrives at N. Because navigator already has received a signal from master, loran reading is taken by measuring elapsed time between arrival of master and slave pulses. After both signals travel throughout their effective range, cycle is repeated.

larger number of transmitting stations is required for coverage of all the major air and sea traffic routes of the world.

WAVE CHARACTERISTICS AND SIGNAL IDENTIFICATION

The range of loran stations, the type of signal received, and the accuracy of the resulting time difference measurement are affected by the path over which the radio waves travel. The portion of the radio energy which travels from the transmitters parallel to the surface of the earth is known as groundwaves. Another portion of the radio energy travels upward and outward, encounters electrified layers of the atmosphere, and, if conditions are favorable, reflects back to the receiver. These reflections are known as skywaves.

Groundwaves

During the daytime groundwaves can be expected to reach a range of about 600 to 700 miles. At night, because of atmospheric disturbances, the groundwave is reduced to 400 or 500 miles. The actual range at which a loran signal may be received depends on many factors, but generally speaking ranges decrease in the tropic zones and increase in the polar zones. Intervening land reduces the range by approximately one third; however, the accuracy of the loran system is affected. Ranges vary with the position of the receiver in relation to the transmitters and with the time of day.

Groundwaves are always steady in shape and size; however, they may vibrate at maximum ranges and their amplitude may vary when the ship rolls or pitches greatly. This condition can readily be identified as the signals vary in time to the rolling and pitching of the ship.

Time differences obtained using groundwaves require no corrections before plotting on a chart or when using the loran publications.

Skywaves

Skywaves are primarily a nighttime signal, but may occasionally appear during the daytime. Ranges of skywaves vary but can usually be expected out to about 1200 to 1400 miles. You will find that many skywave signals will form on the scope, but only the first skywave received is usable for navigation (1 Hop E). All other skywaves are not reliable for navigation because they are too erratic and no skywave corrections are computed for them. As skywaves are reflected from the ionosphere the actual amount of miles that these signals must travel is considerably greater than the equivalent groundwave. Therefore, all skywaves require a correction. Because all charts and publications are computed on the assumption that all signals received will be groundwaves, the skywave corrections convert skywave time difference readings to equivalent groundwave readings.

The minimum usable skywave range is 250 miles from the transmitters. When closer than that the skywave corrections cannot be accurately computed. When in the area between 250 and 350 miles of the transmitters, caution should be used as only a slight difference between your actual position and your DR position will cause large errors in your skywave corrections.

All skywaves may be identified by their inherent characteristics. All skywaves will, if given time, split and/or fade. This condition makes it easy to determine what kind of signals you are receiving. Remember, when and if possible, always match a groundwave to a groundwave or a skywave to a skywave. Keep in mind the ship's position and the time of day. Patience and experience go a long way toward making you a more proficient operator.

SHIPBOARD LORAN EQUIPMENT

Loran equipment used by the navigator aboard a ship or aircraft is known as a receiver-indicator. (See fig. 14-3.) The unit consists of a receiver for picking up and amplifying the signals and an indicator that makes the electrical impulses visible. Actually, this unit is also a timer by which the navigator can measure the interval in microseconds (millionths of seconds) between times of arrival of the first and second signals from the pair of transmitters.

Figure 14-4 is a presentation of loran timing sequences. A loran time difference is measured by cycling the time base with respect to the transmitted

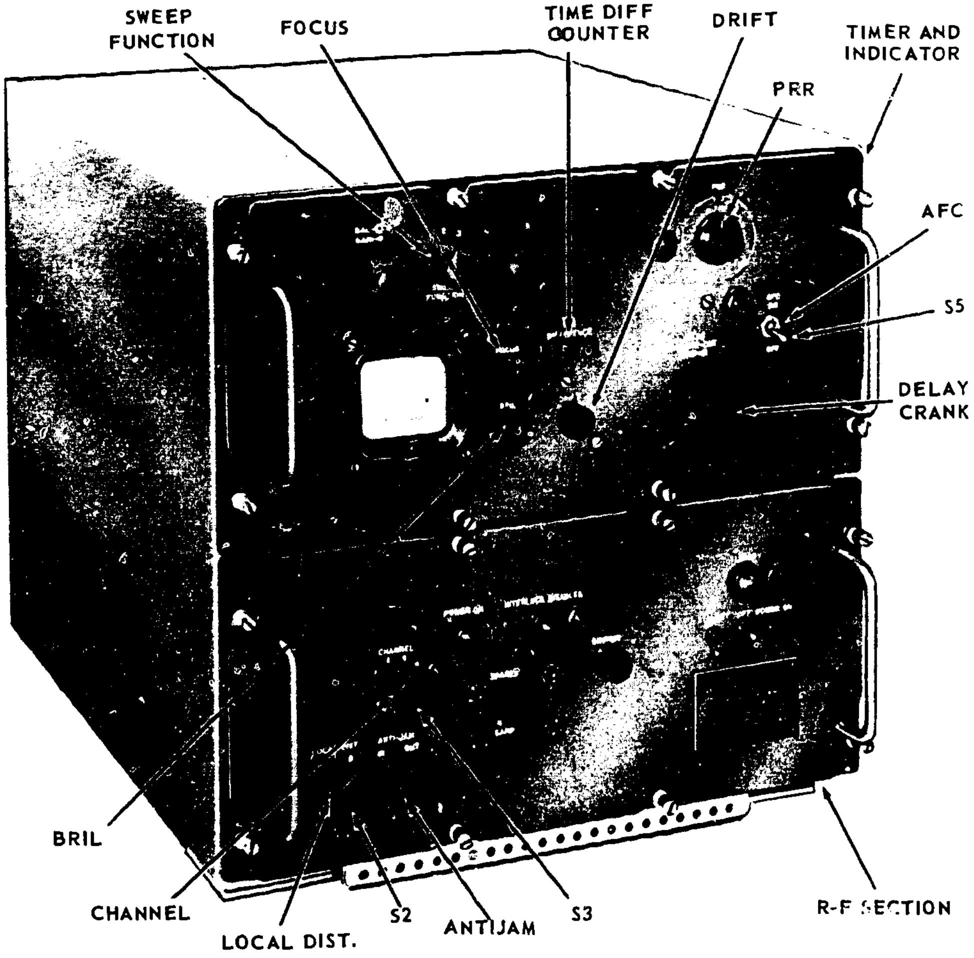


Figure 14-3.–Loran receiving set. 69.47

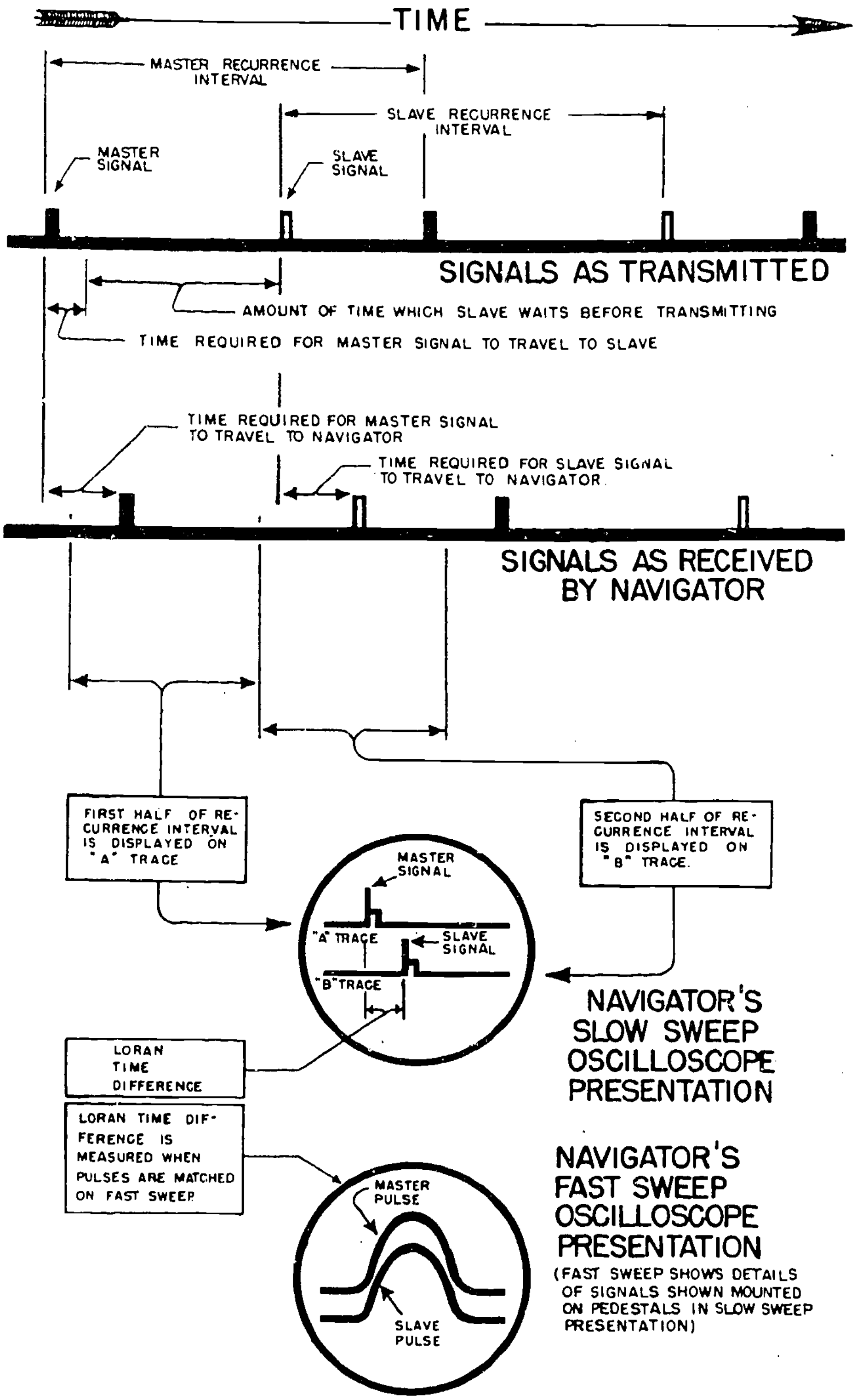


Figure 14-4.–Loran timing sequences. 69.48

signals until the master and slave signals appear on the upper (A) and the lower (B) traces of the scope, respectively. Examine the signals on the scope operating on fast sweep and make a fine adjustment until the pulses are matched with respect to time. Time differences are then read directly from a mechanical counter.

The technique for reading the indicator can be learned in less than 1 hour from a qualified operator demonstrating on the scope of an actual receiver-indicator. The result is expressed in microseconds. The time of observations, plus the rate and type of wave used, is always included when the reading is recorded. The rate consists of two figures separated by a letter. The first figure indicates frequency; the second, the basic pulse repetition rate (PRR); and the last figure, the specific pulse repetition rate of the signals broadcast by that particular pair of stations. A typical rate is 2L6, which means that this pair of stations operates on frequency channel 2, at low basic recurrence rate, and at the specific pulse repetition rate assigned to stations designated by the number 6. You couldn't care less about such involved data, but you do need to know that the rate is essential when plotting a line of position by loran. A proper recording of a reading by loran would be 1130:2L6 Tg 2040. This loran reading means that at 1130 a reading of 2040 μsec was obtained by groundwaves (Tg) from the pair of stations whose rate is 2L6.

PLOTTING LORAN LINES OF POSITION

Loran lines of position (LOP) may be plotted by using either charts or tables. A description of each method follows.

Plotting Charts

Figure 14-5 shows part of one of the special charts designed for plotting loran lines of position. You can see how lines of position from the pair of transmitting stations (rates 2L0 and 2L1) are drawn

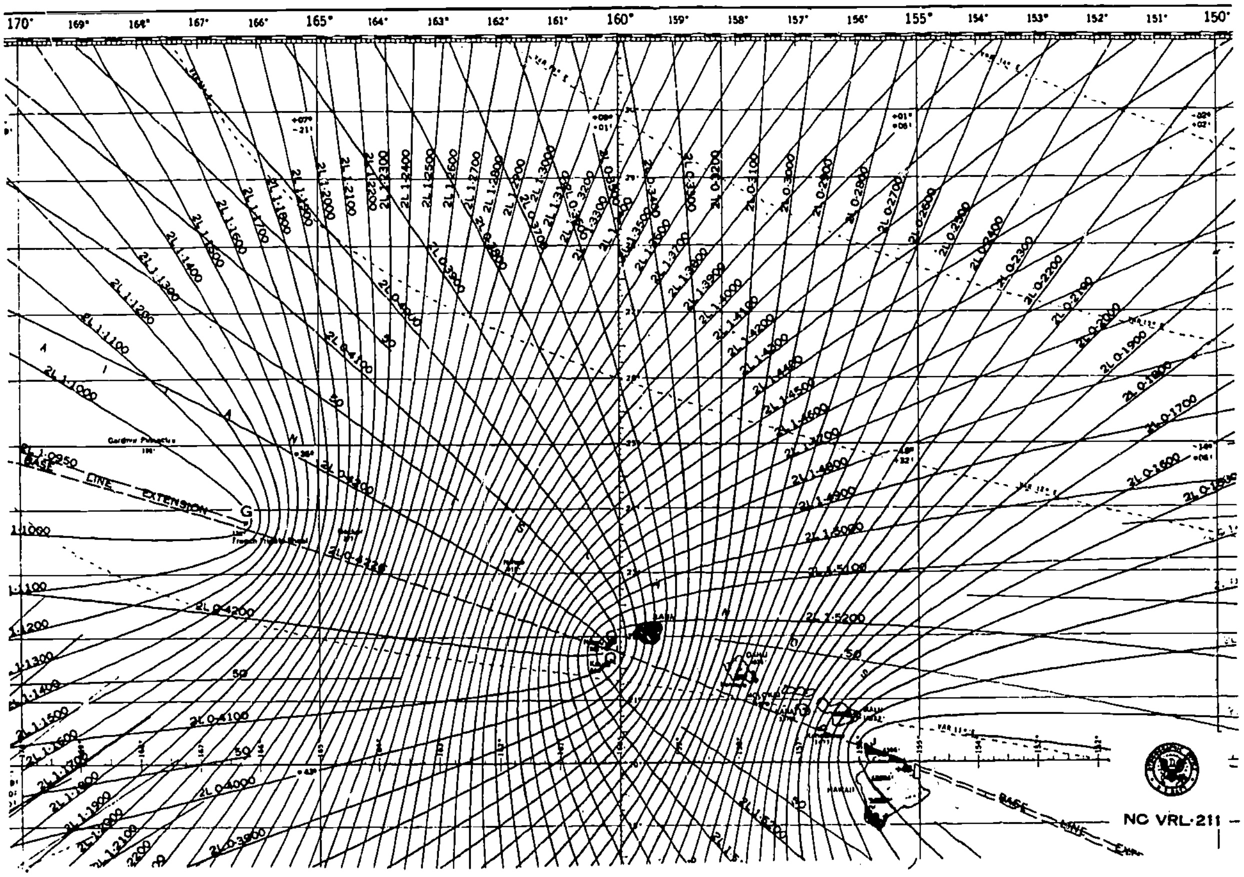


Figure 14-5.–Part of a loran chart. 69.49

in at intervals of 50 to 100 μsec. To plot a line, it is necessary to draw in only the portion of it near the DR, interpolating between printed lines as necessary.

Incidentally, lines shown on the charts are for groundwaves (Tg). If skywaves (Ts) are matched, a different reading is obtained, and the skywave corrections appearing at intersections of latitude and longitude lines on the chart are used to compute corrections for DR positions. These computed corrections must be applied to readings before lines are plotted. Air navigators frequently prefer loran plotting by chart, because the method is fast and easy to use.

Plotting Tables

Tables (H.O. 221 series) are available for plotting loran lines directly on ordinary navigational charts or plotting sheets. The loran tables contain (in tabular form) essentially the same information as plotted on loran charts. Where both tables and charts are available, the choice of which to use lies with the navigator. When loran tables are used, the loran lines can be plotted directly on the chart used for regular navigation. In some regions the tables may contain lines from rates that are omitted from the charts in order to reduce clutter. Therefore, if readings are obtained for rates but the corresponding lines-of-position are not shown on a particular chart, the tables should be consulted to see if those lines are tabulated there. If so, the lines can be placed on the chart, or the tables can be used for that fix.

Entries are given in the tables for every 15′, 30′, or 1° of latitude or longitude, depending on the amount of curvature of the line. Whether the latitude or the longitude is tabulated depends on the angle the line of position makes with the meridian.

You enter the tables with the loran reading (corrected for skywave, if necessary, from information given at the front of the tables), and either the latitude or the longitude on each side of the DR. From the tables you obtain corresponding values of longitude and latitude, and thus can locate two points. A line drawn between the two points is a segment of your loran LOP.

DISADVANTAGES OF LORAN

The advantages of loran, already mentioned, are sufficient to make the system one of the most valuable electronic aids to navigation yet developed. Nothing made by man is perfect, however, and even loran is subject to certain disadvantages. Although it has proved to be highly reliable, there is always a possibility of failure of either transmitting or receiving equipment. Jamming by an enemy is possible. Capture or destruction by an enemy can put stations out of commission.

Loran coverage still is restricted; that is, many large areas of the world even yet are without any loran coverage at all, particularly the southern hemisphere. Within the areas of coverage, readings close to the baseline extension and in the extreme range limit areas must be used with extreme caution because a small error in time difference can cause a "fix" error in terms of miles.

According to the foregoing reasons, loran is only an aid to the navigator. It does not replace the older methods of navigation.

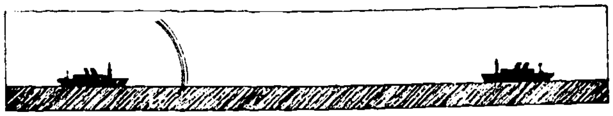
BEACHING BY RADIO BEACON

A fixed and charted transmitter whose signals are used to determine position is known as a radio beacon. For that matter, any radio transmitter whose signals can be received can be used as a radio beacon. Another type of radio beacon is devised to guide small craft from a base to a predetermined objective. Usually, the base is a large attack transport. The objective is the invasion point on the beach.

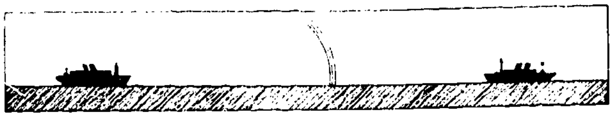
The beacon aboard the ship beams a radio signal toward the shoreside landing point. By listening to the characteristics of the radio signal, the boat coxswain keeps on his course. If he hears a continuous long dash, he knows he is on the course. When he goes off to the right, he picks up the Morse code character A (dit-dah). When he goes off to the left, he receives N (dah-dit). By keeping her headed so that he receives the continuous long dash, he can remain on his course to the beach.

RADAR

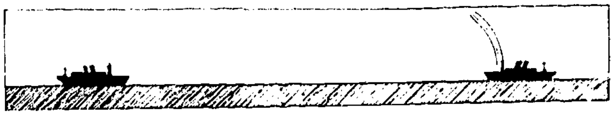
Radar (derived from the underlined letters of the term *ra*dio *d*etection *a*nd *r*anging) was developed originally as a means for detecting and ranging targets in warfare, but it has been developed to the point where it is a valuable electronic navigational aid. Its principle of operation (fig. 14-6) is based upon radio waves that are reflected from solid objects. It has the great advantage over loran of not requiring any shore transmitting stations. Radar's chief disadvantage is that its maximum range, for a surface vessel, is limited to slightly more than the line-of-sight of the horizon. Despite its limitations, radar remains a most important navigational aid. A



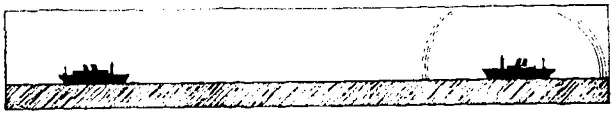
PULSE LEAVES RADAR ANTENNA AT THE SPEED OF LIGHT



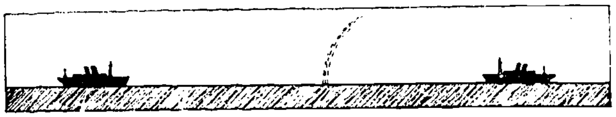
PULSE CONTINUES THROUGH SPACE



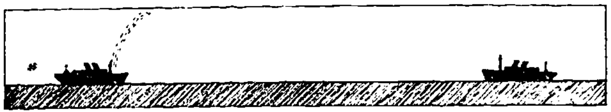
PULSE STRIKES TARGET



ECHO IS RETURNED AS ORIGINAL PULSE CONTINUES



ECHO RETURNING AT SPEED OF LIGHT



ECHO RECEIVED BY ANTENNA GIVING INDICATION ON SCOPE OF PRESENCE OF OTHER SHIP

Figure 14-6.–Principle of radar operation.
69.50

summary of the advantages of radar as a navigational aid follows.

1. Radar can be used at night and during periods of low visibility when visual means of navigation cannot be employed.
2. A fix can be obtained from a single object, because range and bearing are available.
3. Radar navigation is often more accurate than other means of navigation, especially during periods of reduced visibility.
4. Radar is available for use at greater distances from land than are most other navigational methods.
5. Radar fixes may be obtained rapidly.
6. Radar can be used to locate and track storms.

HOW RADAR WORKS

Basically, radar employs very short electromagnetic waves, and utilizes the principle that these waves can be beamed, that they travel in a straight line, and that they will be reflected by any abrupt discontinuity in the medium through which they are transmitted. Because you are interested chiefly in the navigational aspects of radar, only a general description of how radar works is given here.

The typical surface radar is made up of five components. They are the transmitter, modulator, antenna, receiver, and indicator. The transmitter consists of a radiofrequency oscillator, which sends out electromagnetic waves of energy. The modulator is a device that makes it possible for the waves to be emitted as pulses during the intervals when the echo is received. The antenna assembly is so designed that it beams the energy at the target, much as a searchlight is beamed. It also can be rotated so as to scan the entire area around it. In the receiver, the reflected radio energy returned from the target is converted into a form that may be presented visually on an indicator or scope.

PLAN POSITION INDICATOR

Although there are many ways of presenting radar information visually, the plan position indicator (PPI) is considered the most practical from a navigator's point of view. Figure 14-7 shows a view of objects in the area around the ship as they are presented on a PPI scope. The ship's own position is usually in the center of the scope. In many newer models, however, the ship's position may be offcentered as desired.

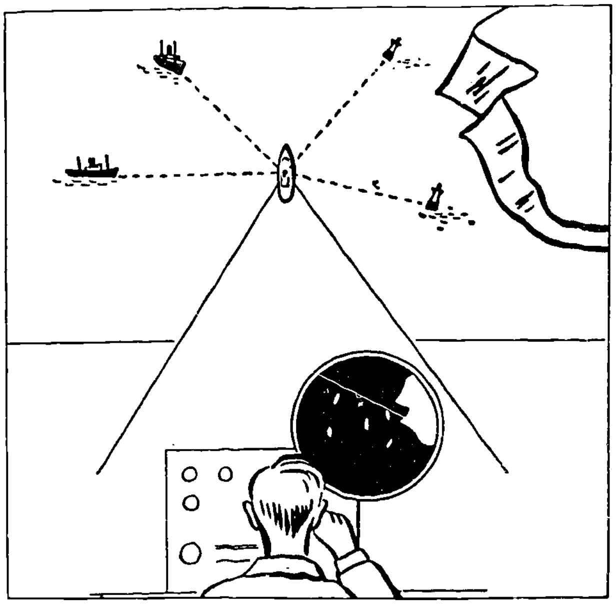


Figure 14-7.–A PPI presentation. 69.51

RANGE AND BEARING BY RADAR

The PPI is designed to enable the navigator to determine the range and bearing of an object, which is one of its chief navigational advantages. The scope can be adjusted to several different range scales to provide greater target detail. Range is measured to scale (in yards or nautical miles) from the center of the scope to the target indication.

Figure 14-8 shows a target and three range markers on the face of a PPI scope. Bearing is indicated by numbers around the edge of the screen. Bearings may also be shown on a direct-reading indicator when the bearing cursor is used.

The bright rings seen in the illustration are the range makers or range rings. Range markers can be switched on or off, and their brightness can be controlled as needed. The range indicated by each ring depends, of course, upon the scale used. For instance, if each ring represents 5000 yards, the outer edge in this illustration is 20,000 yards. The target shown halfway between the third ring and the edge of the scope is at a range of about 17,500 yards, and a bearing of 300°.

Range Strobe

Range markers do not provide an exact means for finding the range of objects shown on the PPI scope. Because of this lack of precision, interpolation must be made by eye when the indications of such objects lie between markers. To remedy this situation the range strobe is used on most types of PPIs. The range strobe is a small, bright spot that can

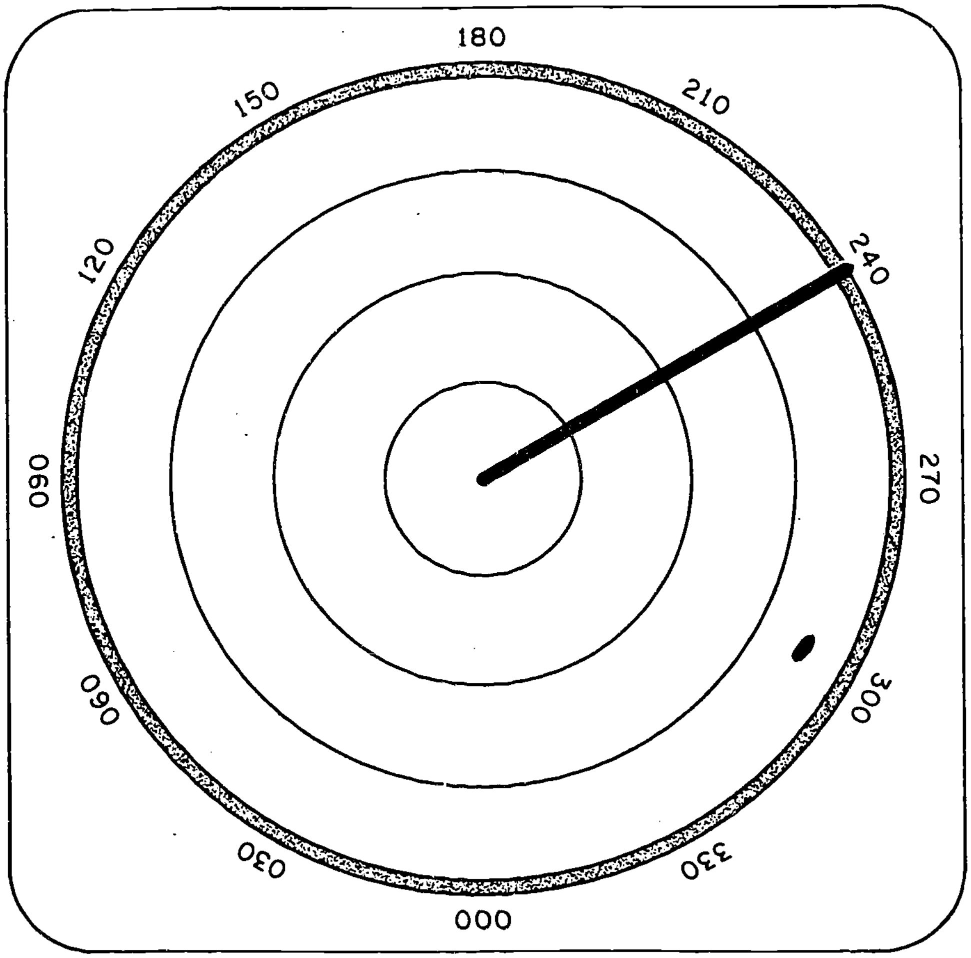


Figure 14-8.–A target and range markers on PPI scope. 69.52(69D)

be positioned on the PPI scope by turning a handcrank. The strobe is cranked to the target indication, and the range is read directly from a mechanical counter connected to the handcrank. The range strobe adapts itself to any range scale.

Bearing Determination

As mentioned earlier, bearing is indicated on the PPI scope by the figures around the edge of the screen. On gyro-equipped ships (and most ships having radars are so equipped), this bearing circle has a gyro input, and bearings obtained from it are true. If gyro failure occurs, the radar presentation automatically reorients to a relative picture and relative bearings may be taken from the PPI.

Bearing Cursor

To facilitate accurate reading of bearings on the scope, a transparent plastic surface, on which a hairline cursor is inscribed, is mounted over the face of the PPI. The plastic is rotated by means of a handcrank until the cursor bisects the target. Its extension then indicates the target's exact bearing.

PILOTING BY RADAR

Subject to the judgment of the navigator, after experience with his equipment, well-determined positions by radar are labeled fixes. Less reliable positions are labeled estimated positions (EP). Because of beam width, radar bearings usually are less accurate than are radar ranges. A fix obtained where one or more lines of position are determined by ranges is more accurate than one obtained by bearings alone. Methods of obtaining radar fixes are by (1) ranges and bearing of a single object; (2) cross bearings; and (3) two or more ranges.

Range and Bearing of a Single Object

Obtaining position by taking range and bearing on a single object is practically the same as the bearing and distance circle method described in piloting. If the target is an island or some other object of appreciable width, a more accurate fix can be obtained by plotting tangent bearings and the range. Figure 14-9 shows how beam width distortion causes the tangent bearing lines to intersect at a range less than the measured range. Note that the fix is considered to be on the measured range, midway between the bearing lines.

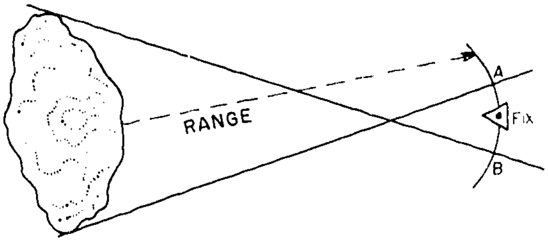


Figure 14-9.–Tangent bearings and range.
69.53

Cross Bearings

Cross bearings by radar are plotted just as they are in visual piloting. If no well-defined objects are available, bearings can be taken on tangents, as described in the preceding topic. These bearings are less accurate, however, than bearings on well-defined small objects, because a target's width is exaggerated in the PPI scope. Right tangent bearings should be decreased by half the beam width; left tangent bearings should be increased by the same amount. All bearings should be corrected for any known gyro error.

Two or More Ranges

Two or more ranges provide the most accurate radar fix that can be determined by plotting on a navigational chart, because radar ranges are reasonably accurate for any range within the maximum limit of the equipment. Figure 14-10 shows how distance circles are intersected to form the fix. Additional ranges afford good checks against improper interpretation of the original points on which the ranges were taken.

Figure 14-11 shows how a device can be constructed easily aboard ship for speeding up the plotting of two ranges. Pivot two transparent plastic

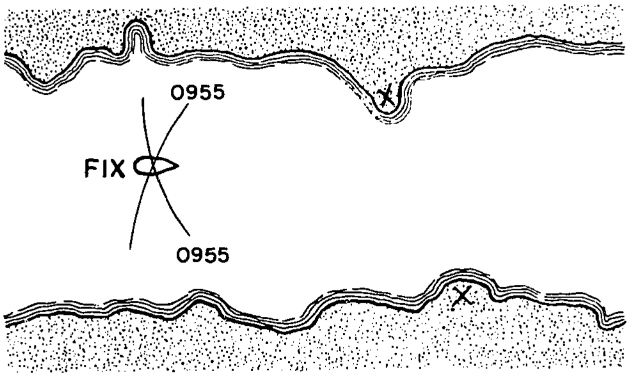


Figure 14-10.–Radar fix by two ranges.
59.61

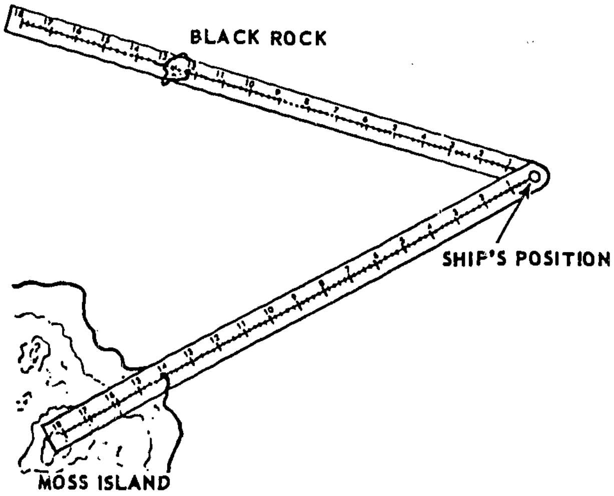


Figure 14-11.–Plastic plotter for determining position from ranges. 59.62

arms at a common point, and drill a small hole at the pivot, just large enough for inserting a pencil point. Calibrate the arms to the scale of the chart, with zero range at the Pivot. To plot a fix, simply place the plotter on the chart so that the observed range from each target is exactly over that target's indication on the chart. The hole in the pivot then will be located at the fix.

NAVIGATIONAL RADAR TARGETS

Small isolated rocks are excellent targets for center bearings and ranges. Because they are well-defined, they can be plotted accurately from the exact point of echo. Small islands are also good, but large ones, as you have seen, require tangent bearings instead of center bearings.

Sharp points of land often are used for ranges and for either tangent or center bearings. In ranging on land, you must be certain to plot your range arc from the point that actually produced the radar echo. Sometimes what appears to be a waterline on a radarscope is, in fact, being reflected from some point inland, or possibly from a surfline offshore.

Buoys are good for ranges and bearings because, like small rocks, they are well-defined and produce sharp echoes. For several reasons, however, buoys may go off their stations. Buoys should not be used for fixing position unless no better quality targets are available.

Offshore lighthouses on rocks or pilings are reliable radar targets. They are easy to identify. Large charted buildings, tanks, towers, and the like often can be picked up by an experienced operator, even though they may be located some distance inland.

When distant mountains are the only objects available, you must bear in mind that it is difficult to get an accurate range from such a large mass. The bearing inaccuracy may also be considerable under such circumstances.

INTERPRETING RADAR INFORMATION

Interpreting radar information requires considerable experience. Even then an operator may not always be able to interpret correctly. Bearing resolution, range resolution, and radar shadows are but three of the problems that hinder radar interpretation.

BEARING RESOLUTION

The minimum difference in bearing between two objects at the same range that can be discerned on the scope is called bearing resolution. The radar beam width causes a target to appear larger than it actually is. If two targets are close together and at about the same range, their pips may merge and form a single pip, giving evidence of a larger target. A number of rockpiles and small boats near shore may appear as a straight line, giving a false impression of the shoreline. Bearing resolution can sometimes be improved by reducing the radar receiver gain.

RANGE RESOLUTION

The minimum difference in range between two objects on the same bearing that can be discerned by radar is called range resolution. Two or more objects on the same bearing and at only a slight difference in range may appear on the scope as a single long object.

SHADOWS

Echos are not returned from an object that lies behind another object obstructing the radar beam. Radar shadows occur behind prominent objects. Small boats or rocks that lie a considerable distance beyond the horizon cannot be picked up by radar. Figure 14-12 shows a boat that cannot be located by radar because of shadow. In the distance, the radar picks up the top of an island, but the bottom is in the shadow created by the earth's curvature.

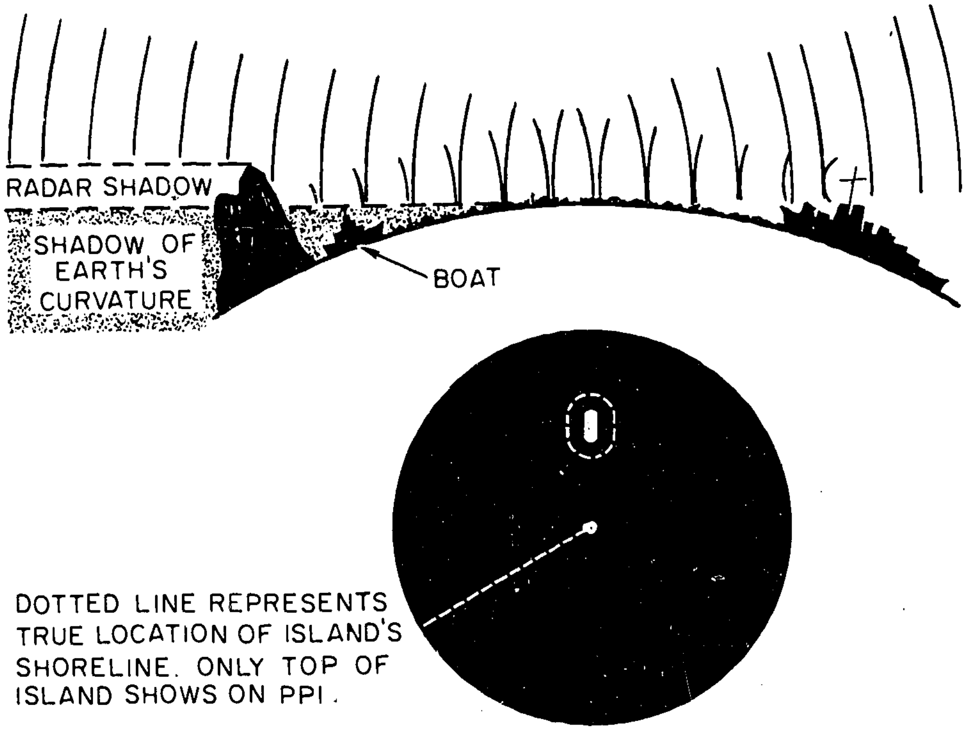


Figure 14-12.–Radar shadow. 69.54

NAVIGATION BY SATELLITES

The navigational satellite system is a global all-weather system. With its use, navigators in ships on or below the ocean surface can obtain a fix to within a fraction of a mile, night or day, in all parts of the world. Although it is usable worldwide, fix information is available only during a satellite pass, which may occur every 45 to 150 minutes, more often at high latitudes than on the equator. On some occasions satellites may interfere with one another due to the close proximity of their orbits. This is especially true at high latitudes as the satellites are all in polar orbits.

The system operates on the doppler principle. Doppler can best be described by example. Suppose, as you stand at a railroad crossing a train approaches with its whistle sounding. As the train comes nearer, the pitch of the whistle becomes higher until the train passes you. At this time the pitch drops, and as the train goes off into the distance, the pitch of the whistle gradually grows lower. The changes in pitch is called doppler shift. A satellite approaching and passing over a ship likewise has a change in pitch, or doppler shift. Analysis of the doppler shift enables the navigator to calculate his position relative to the satellite. The position of the satellite is radioed from the satellite so that the navigator can take the doppler information, along with the satellite position information, and determine his ship's position.

The navigational satellite system requires five groups of equipment: several satellites, tracking stations, a computing center, an injection station, and shipboard navigational equipment. Following is a brief explanation of how the system works. (Referring to fig. 14-13 may help you understand the system.)

As each of the navigational satellites orbits the earth, the tracking stations receive and record the doppler shifts radiated by each satellite as it passes within receiving range.

Doppler information is transmitted to the computing center, and there the information is used to calculate the satellite's position as a function of time. From the computing station the satellite's position (as a function of time) is transmitted to the injection station.

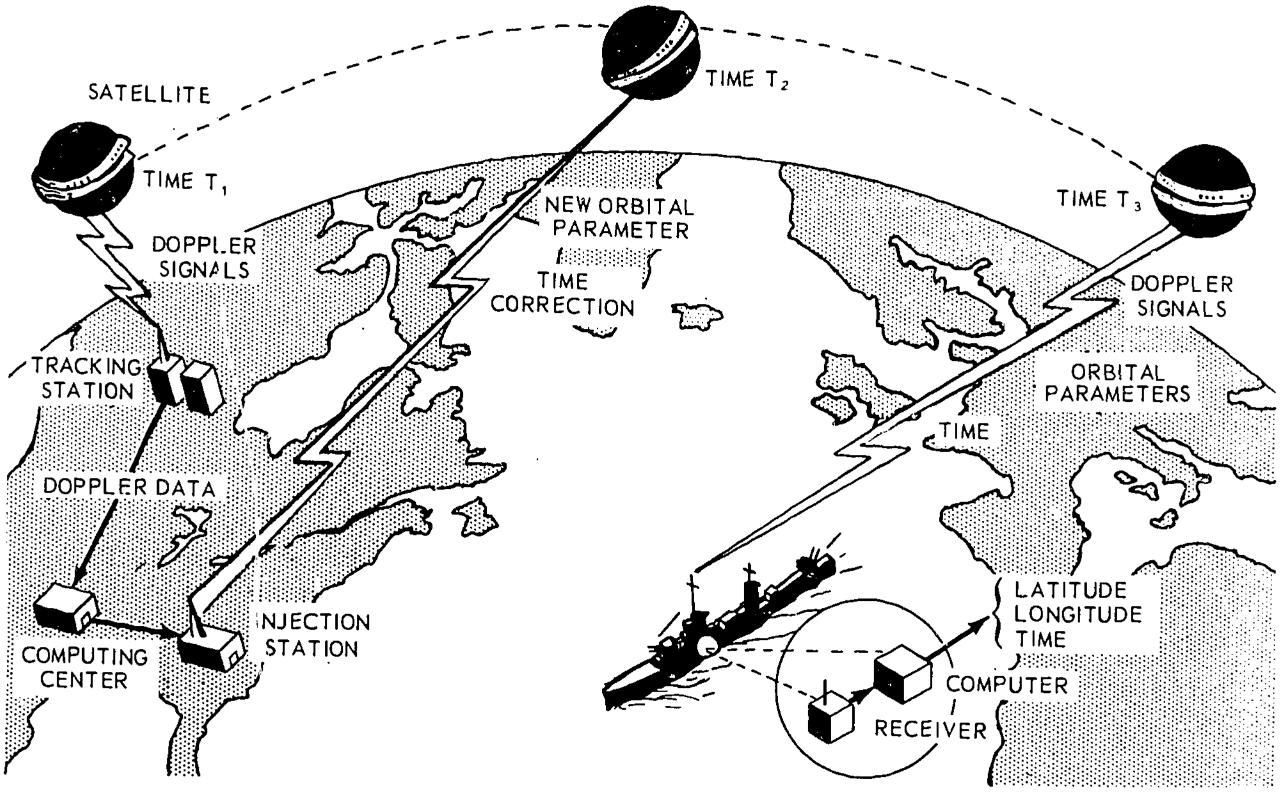


Figure 14-13.–Navigational satellite system.
69.55

The injection station transmits orbital data to the satellite as it passes into range. The information sent from the injection station erases former data and allows the correct data to be transmitted by the satellite. The injection station sends corrective data to each satellite twice a day.

Meanwhile, the satellite continues to radio information every 2 minutes. Any ship within receiving range of the satellite can record the doppler shift, orbital position, and time as they are radioed from the satellite. By means of this information, the navigator of the ship can compute the latitude and longitude of his ship.

LORAN-C

Loran-C is an advanced long-range navigational system using low frequency transmissions. It operates in much the same manner as standard loran (loran-A), but has a greater range and accuracy. Standard loran receivers can be modified to permit reception of loran-C signals. (After modification they are known as loran A/C reserves.) The modified receivers, however, are not as accurate as the standard loran-C receivers. More sophisticated receivers exist today which can automatically track two loran-C pairs, discriminate skywaves, and provide digital outputs for integration with a shipboard computer.

The usual groundwave range of loran-C is 1200 nautical miles. First hop skywaves during daylight and darkness have a normal range of 2300 nautical miles. Second hop skywaves have a range of approximately 3400 nautical miles.

Figure 14-14 shows the day and night coverage of some loran-C stations. The chart may show some stations that no longer are operative, or stations not yet operative, hence you should consult the weekly *Notice to Mariners* for any changes.

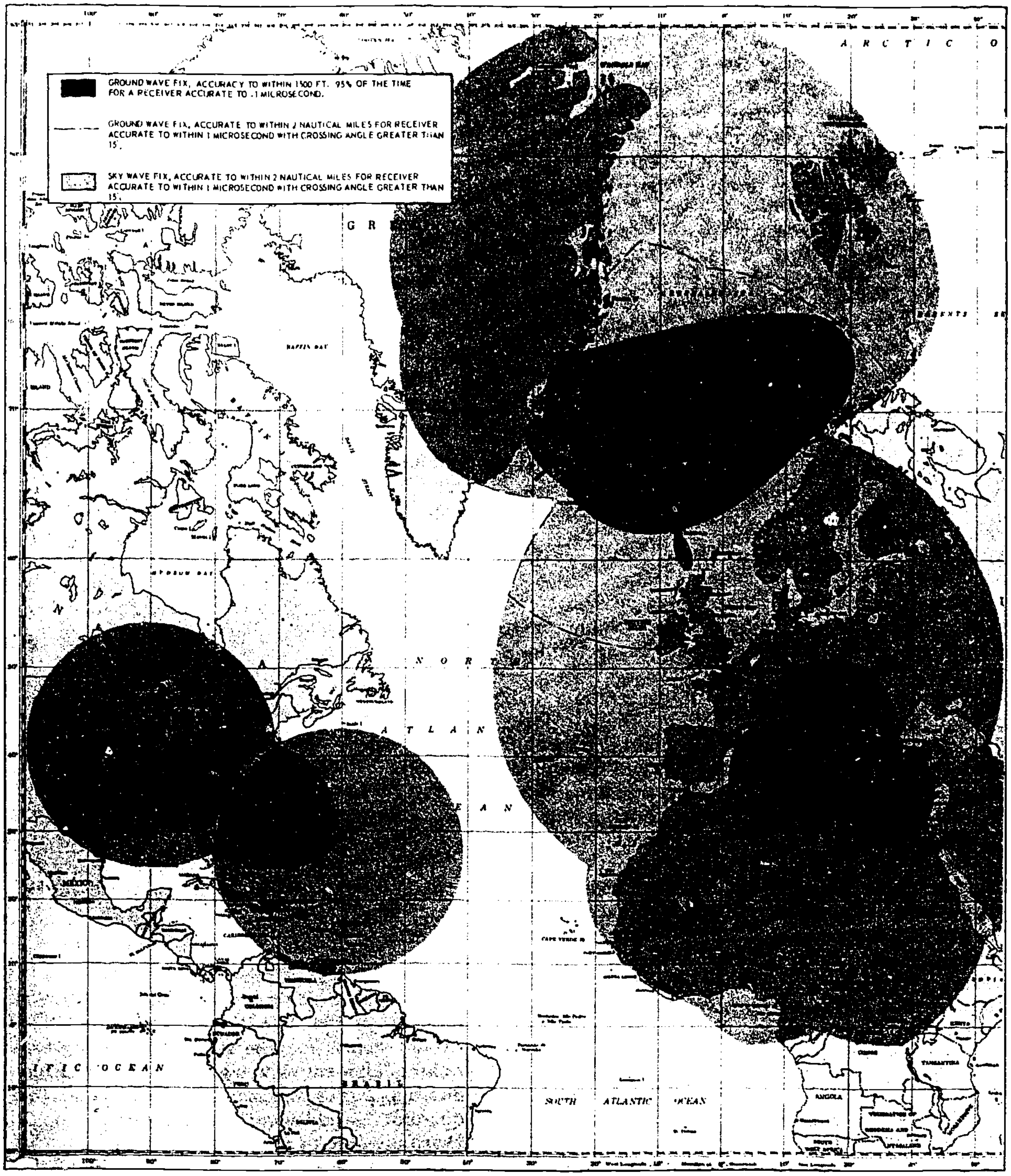


Figure 14-14.–Some loran-C stations. 112.37

SHORAN

Shoran (from the underlined letters of the term *sho*rt-*ran*ge *n*avigation), employed principally in surveying, uses ranges rather than bearings. Signals from own ship's radar automatically trigger two fixed transmitter ashore. The signals emitted by these transmitters are in the form of pips and are received simultaneously. You measure the ranges to these pips in the same manner as you would any contact, and then plot the ranges on your chart. The point where these two ranges intersect is your position. Although shoran is relatively short-ranged, it is extremely accurate, so that your fix can be relied on to about 50 feet.

STAR TRACKER

Star tracker is an extremely sensitive optical telescope with radio or infrared components that calculate elevation (altitude) and azimuth data from celestial bodies, including the sun. The star tracker may be used even during periods of poor visibility. With the sun it may be used effectively in heavy overcasts with a high degree of accuracy. The radio sextant is similar to the radio telescope and is included in the same category as the star tracker.

SHIP'S INERTIAL NAVIGATION SYSTEM

At present, the ship's inertial navigation system (SINS) is chiefly a navigational aid for submarines and aircraft carriers. It soon should be operational on most surface vessels.

This SINS provides ships with an accurate and continuous dead reckoning position. The DR position is displayed continuously on a chart, along with the desired track. Because SINS is a self-contained system, it is a valuable wartime navigational aid. When the loran systems and other similar systems are knocked out, SINS remains operable.

The SINS operates on an arrangement of gyros and accelerometers. This arrangement is called the sensitive element. Three gyros and two accelerometers make up this sensitive element. Two of the gyros give absolute values, one gyro for latitude and the other for the vertical. The third gyro is for longitude, but it cannot give an absolute value. A requirement for the third gyro is the initial ship's longitude, with which ship's position can be computed at any time thereafter.

The accuracy usually obtained by SINS is on the order of about 1 mile per day. The degree of accuracy can be greater, however, because more accurate position data can be obtained by other navigational methods and inserted into the SINS.

NAVDAC

Among the advanced components to navigational systems that assist the navigator in solving navigational problems is navdac (*nav*igation *d*ata *as*similation *c*omputer). The navdac combines, evaluates, and stores data received from navigational systems, i.e., SINS, Loran-C and star tracker. In effect, it is a memory bank of highly accurate navigational data, capable of rejecting solutions of poor quality and accepting only those of a high degree of probable accuracy.

OTHER SYSTEMS

Several other electronic navigation systems, which are available but are less widely used in the Navy, are Omega, Decca, and Consol.

Omega is a long-range, all-weather VLF navigation system, which will have worldwide coverage when completely implemented. The completed system will have eight transmitting stations strategically located throughout the world. Therefore, a ship located in any ocean will be able to receive signals from five stations at all times. Utilizing signals from the three best stations, the navigator will be able to determine the ship's position to within 1 nautical mile in the daytime and 2 nautical miles at night.

Two other electronic navigation systems, which are available but are less widely used in the Navy, are Decca and consol.

Decca is a British system, which, like loran, requires special receiving equipment. The receiving unit measures phase differences between a master and a group of three slave stations, all of which are transmitting at different frequencies. Fixes are obtained by plotting the phase differences directly onto a chart printed with Decca hyperbolic lines.

Consol is a long-range, short-baseline system that operates in the 250- to 350-kc frequency range. Consol signals may be received by using ordinary radio equipment. The signals consist of a series of dots and dashes, which are counted by the receiving operator. Dotted and dashed lines printed on Consol charts are used to plot fixes.

Complete information on Decca and Consol may be found in *American Practical Navigator*, H.O.9.

CONCLUSION

In closing this chapter, it must be pointed out that no single method of navigation should be used to the exclusion of all others. Even the newer electronic navigational systems cannot be considered cure-alls. These systems are made up of highly complex pieces of equipment and are subject to various types of casualties. Unusual atmospheric conditions will affect some of them, and severe sea conditions will influence others. Complete reliance upon one system alone, to the extent of excluding all other methods or systems of navigation, cannot and must not be practiced. There is no perfect system or method of navigation under all conditions.

CHAPTER 15

CELESTIAL NAVIGATION

Piloting (including its electronic phases) and dead reckoning comprise that branch of navigation that determines position by reference to objects or localities on the earth. Another branch, in which position is determined by the aid of heavenly bodies, such as the sun, moon, stars, and planets, is called celestial navigation. An accurately timed altitude on any navigational body gives an accurate line of position. Navigation by such lines of position is the crux of modern seafaring.

NAUTICAL ASTRONOMY

Astronomy is the scientific study of the celestial bodies, as well as their magnitudes, motions, and constitutions. Nautical astronomy is that part of astronomy on which celestial navigation is based. You must know something about nautical astronomy before you can acquire a knowledge of celestial navigation.

CELESTIAL SPHERE

Although we know that the earth is not a perfect sphere, we consider it to be so for navigational purposes. All problems in celestial navigation involve the use of two spheres. One such body is the earth itself, and the other is an imaginary celestial sphere.

Let's go back again and use the lighted transparent sphere with which we illustrated a chart projection. Assume the sphere is the size of a tennis ball, with the earth's meridians and parallels laid out on it in black. Assume further that it is suspended in the exact center of another sphere, made of glass, about the size of a basketball.

The basketball-sized sphere, on which the meridians and parallels are projected from the smaller one, represents the imaginary celestial sphere on which all the heavenly bodies are presumed to be located. The entire system of navigation by the stars is founded upon the fact that angular distances on the celestial sphere can be reduced to fit the earth (terrestrial sphere). This system makes it possible for a navigator to locate objects on the earth with reference to the locations of heavenly bodies on the celestial sphere.

As you know, objects are located on the terrestrial sphere by a system of coordinates called latitude and longitude. Latitude lines (parallels) are horizontal, and are used to indicate distance north or south of the equator. Longitude lines (meridians) are vertical, and are used to indicate distance east or west of the Greenwich meridian. Objects on the celestial sphere are located in a similar manner, but the horizontal lines are called declination, and the vertical lines are called Greenwich hour angle (GHA).

Longitude is measured on the terrestrial sphere east and west from the Greenwich meridian (G) along the equator, as you already know. The Greenwich hour angle of a body on the celestial sphere is measured westward from the projected Greenwich meridian to the body's hour circle.

What is an hour circle? The earth's poles are conceived as being projected onto the celestial sphere, as is the Greenwich meridian. So is the equator, for that matter. In fact, if you look at figure 15-1, you can see that the celestial sphere is just about the same kind of a setup as the terrestrial sphere, except that it is blown up to infinite size. The names of objects differ somewhat, however. The projected equator becomes the celestial equator, and the projected poles become the celestial poles. The projected meridians are then called celestial meridians.

An hour circle, then, is actually the celestial meridian a heavenly body is on at a particular instant. Because the earth's rotation and the resulting apparent motion of heavenly bodies to the westward never stop, it follows that the hour circle of a body changes continuously—moving westward with the body.

The GHA of any body is the degrees, minutes, and seconds of arc of the celestial equator intercepted at a given instant between that body's hour circle and the celestial meridian of Greenwich, measured westward from Greenwich through 360°. Whether measured on the celestial or the terrestrial sphere, the amount of arc is the same. Figure 15-1

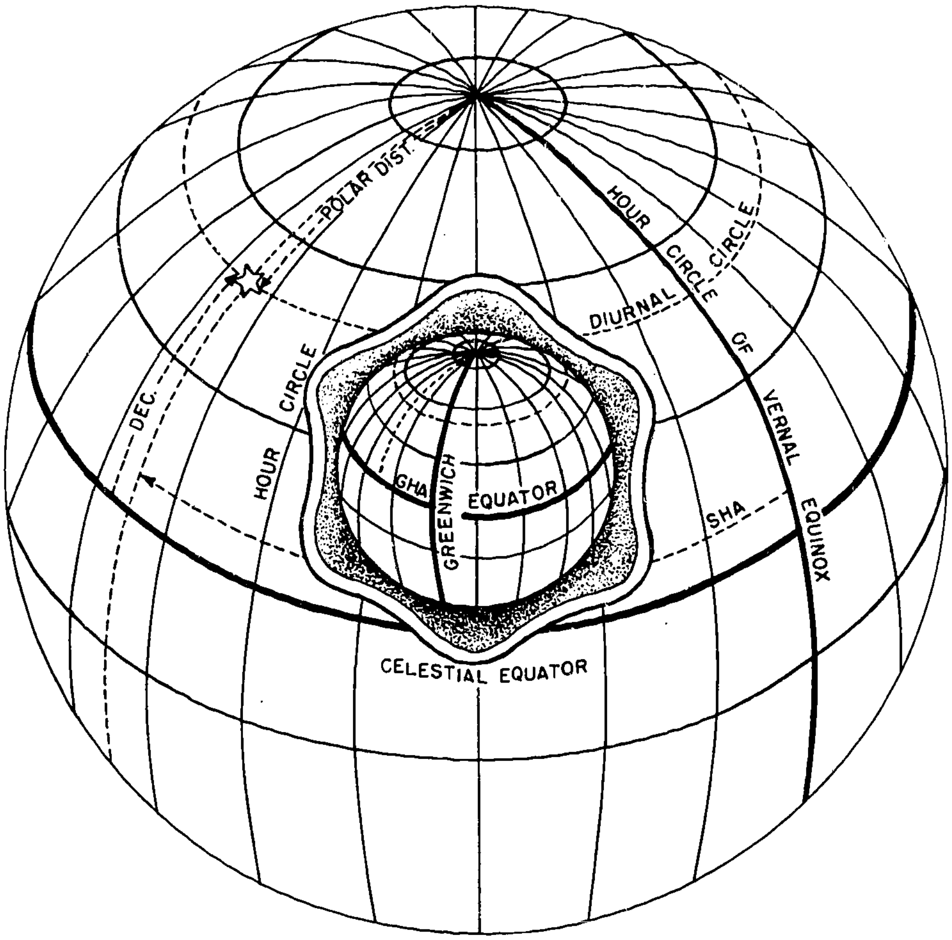


Figure 15-1.–The celestial sphere. 69.56

shows you GHA of a star measured on the terrestrial sphere.

Notice that the star's position on the terrestrial sphere is indicated by GP. The letters GP stand for geographic position, and represent the point where a line drawn from the center of the earth to the body would intersect the earth's surface. Depending on whether the body in question is the sun, the moon, or a star, a GP may be variously a subsolar, sublunar, or subastral point.

You can see from figure 15-1 how closely GHA corresponds to longitude. Remember, however, that GHA of any body increases continuously as the body moves westward, whereas longitude remains the same for any point on the earth. The GHA is always measured westward from Greenwich (0°) through 360°. Longitude is measured east or west from Greenwich to 180°.

The GHA of any navigational body of the solar system (sun, moon, and planets) and of the vernal equinox (first point of Aries) is listed in the *Nautical Almanac* for every hour of GMT, for any date. The GHA of any navigational star may be determined from the *Nautical Almanac* by adding GHA of the vernal equinox to the tabulated sidereal hour angle (SHA) of the star. Let's see, now, what all these explanations mean.

SIDEREAL HOUR ANGLE

Refer to figure 15-1 again. The marking "hour circle of vernal equinox" is the line from which sidereal hour angle is measured. The SHA of any star is measured westward through 360°, like GHA, but measurement is from the vernal equinox or first point of Aries, instead of from Greenwich.

At the present time you must bear in mind two points. One is that GHA of the vernal equinox, like GHA of any other body, is increasing continuously to the westward. But the sidereal hour angle of any star (measured westward from the vernal equinox to the body's hour circle) remains relatively constant. Why? Simply because all the stars move to the westward, along with the vernal equinox. The SHA of any body changes slightly, and its tabulated value in the *Nautical Almanac* varies throughout the year. The reasons for the change are beyond the scope of this course.

You will see later that the SHA and GHA of the vernal equinox are factors used in star observations. However, both are not applicable in observations of navigational planets.

DECLINATION

You know that the GP you see on the small sphere in figure 15-1 corresponds to the star's location on the celestial sphere. You know that latitude of a point on the terrestrial sphere is measured from the equator northward or southward along the point's meridian, to a maximum of 90°. Declination of a body on the celestial sphere is measured in exactly the same way—from the equinoctial (celestial equator) northward or southward along the body's hour circle. The polar distance is the number of degrees, minutes, and seconds of arc between the heavenly body and the elevated pole. The elevated pole is the one above the horizon; in other words, the one with the same name as your latitude.

From the foregoing description, it follows that the polar distance of a body whose declination has the same name (north or south) as the elevated pole is always 90° minus its declination (d). Polar distance of a body whose declination has a different name from that of the elevated pole is always 90° plus d. Remember this rule because it is the basis of the system for determining latitude by observations taken at local apparent noon (LAN), which is covered later in this chapter.

Declination of any navigational star is listed in the *Nautical Almanac* for each date. Declination of bodies of the solar system is listed for every hour GMT.

TIME DIAGRAM

So far you have learned that a heavenly body is located on the celestial sphere by its Greenwich hour angle (corresponding to longitude) and its declination (corresponding to latitude). You have seen how both of these coordinates are measured and how, from them, the GP of a heavenly body can be located on the terrestrial sphere.

Before going further into nautical astronomy, you should acquire a knowledge of the use of the diagram on the plane of the celestial equator (time diagram), which not only will make it easier for you to understand the ensuing discussion, but also will simplify the solution of your celestial navigation problems.

In the time diagram, the observer is theoretically located outside the celestial sphere, over its south pole. The diagram consists merely of a circle representing the celestial equator. The center of the circle is the south celestial pole. Counterclockwise direction is westerly. The local meridian is drawn in as a vertical line, thus placing the upper branch (M) at the top of the diagram and the lower branch (m) at the bottom. To avoid confusion, the lower meridian is shown by a dashed line.

You locate the Greenwich meridian by means of your longitude (symbol λ). If you were in 90° W. longitude, G would appear on your diagram 90° clockwise from M (because you're counterclockwise or west of G). A glance at figure 15-2 will confirm this location. What you really do, then, is count from M toward Greenwich, the direction depending upon whether you are in east or west longitude.

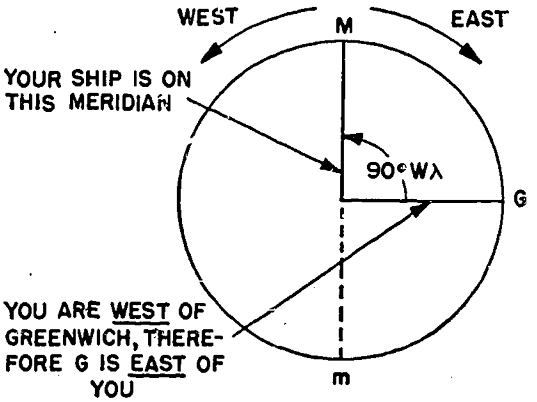


Figure 15-2.–Locating G on the time diagram. Ship in 90° W λ. 69.57.

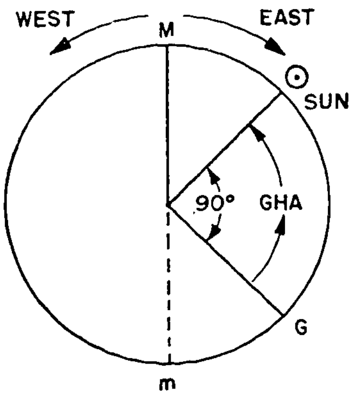


Figure 15-3.–GHA of the sun on a time diagram.
69.58

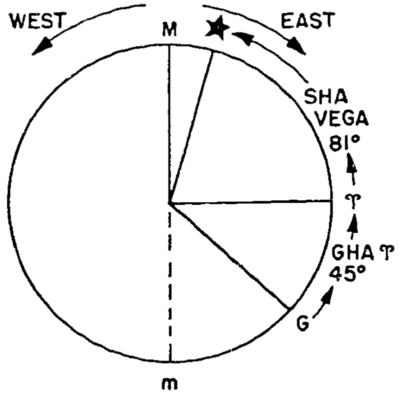


Figure 15-4.–Locating vernal equinox and star on time diagram. 69.59

Figure 15-3 shows another time diagram on which GHA of the sun is indicated. The upper branch of the sun's hour circle is shown as a solid line. The angle, or arc of the celestial equator, between the Greenwich meridian and the sun's hour circle is 90°. Therefore, GHA of the sun at this instant is 90°. Remember, GHA is always measured westward from G.

The GHA of a star is measured in the same direction from Greenwich to the star. Because the SHA enters the picture here, however, your method of locating a star on the time diagram is somewhat different. First, you must locate the vernal equinox by its tabulated GHA. Let's say GHA of the vernal equinox for the time of your observation is 45°. You locate the vernal equinox 45° W. from Greenwich, as shown in figure 15-4. The symbol that resembles a pair of ram's horns represents the vernal equinox.

From the *Nautical Almanac* you find SHA of the star in question. You already know that SHA is measured to the west from the vernal equinox. All you have to do here is find the SHA of this star, measure SHA westward from the vernal equinox, and you have the star located on the time diagram. Let's say it's the star Vega, whose SHA is approximately 81°. Figure 15-4 shows you Vega located on the time diagram.

It's easy to see here that GHA of Vega must be equal to GHA of the vernal equinox plus SHA of Vega. GHA (Vega) = GHA (♈) + SHA (Vega). In this example GHA of Vega is 81° plus 45°, or 126°.

Now let's use the time diagram to explain some more facts about nautical astronomy.

LOCAL HOUR ANGLE (LHA)

Local hour angle is the name given to the angle of arc (expressed in degrees, minutes, and tenths of minutes) of the celestial equator between the celestial meridian of a place and the hour circle of a heavenly body. It is always measured westward from the local meridian through 360°.

Let's work this problem of LHA on a time diagram. Say you're in 135°W. longitude. You know your own meridian is represented by M. Measure approximately 135° from M toward Greenwich, which means, of course, that Greenwich will be shown eastward of M. Think it over for a moment–you're to the west of Greenwich, therefore Greenwich is to the east of you.

Now that we know where Greenwich is and where you are, let's take the sun as we had it in figure 15-3 and try to figure out its LHA. Figure 15-5 shows us that the sun is 90° west of Greenwich. We know that LHA is always measured westward from your local meridian (M) to the hour circle of the body (in this example the sun). Therefore, LHA here is the whole 360° around, minus the 45° between the sun's hour circle and M. This 45° may be found by inspecting figure 15-5, or by subtracting 90° from 135°. Let's think this over–we're 135° W. of Greenwich, therefore G is 135° clockwise of us.

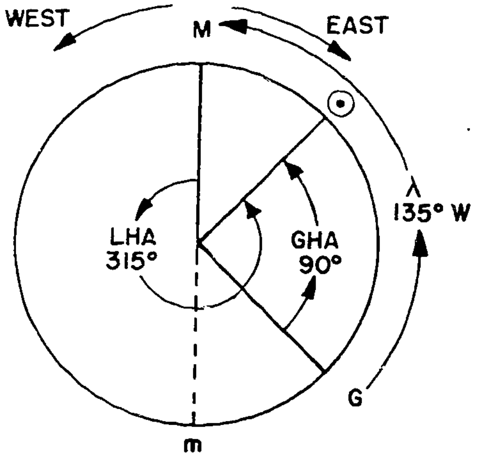


Figure 15-5.–LHA on the time diagram.
69.60

The sun is 90° W. or counterclockwise of G. The difference is the 45° we mentioned. Subtract this 45° from 360° and we get 315°, the LHA.

Look again at figure 15-5. As you can see, the sun was east (clockwise on the diagram) of your local meridian M. Now let's suppose that you're in the same longitude (135° W.) but GHA of the sun is 225° instead of 90°. The time diagram will appear as in figure 15-6. The sun is now west of your meridian (M). The LHA is always measured westward from the local celestial meridian to the hour circle of the body. Therefore, LHA is the 90° from M to the sun's hour circle.

Here are two general rules that will help you in finding LHA when GHA and longitude are known:

$$\text{LHA} = \text{GHA} - \lambda\,\text{W}$$
$$\text{LHA} = \text{GHA} + \lambda\,\text{E}$$

In west longitude it may be necessary to add 360° to GHA before the subtraction can be made. In east longitude 360° is dropped from LHA if it exceeds this amount. Be sure, however, to check the accuracy of your work by referring to a time diagram. It offers a graphic means of obtaining the data you need.

MERIDIAN ANGLE (t)

Meridian angle (symbol t) is another value used in solving problems of celestial navigation. It is defined as the arc of the celestial equator between the local meridian of a place and the hour circle of a heavenly body, measured east or west through 180°. Notice the difference between LHA and t. The LHA is measured west through 360°. The t is measured east or west through 180° and must be labeled E. or W.

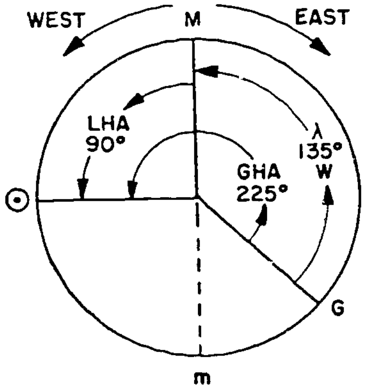


Figure 15-6.–LHA, with sun west of your celestial meridian. 69.61

Let's try a sample on a time diagram (fig. 15-7). We'll keep the same longitude (135° W.) and assume the sun's GHA is 90°. You can see by a glance at the diagram that the sun is east of M. Inasmuch as t is measured east or west from M through 180° it follows that here t is equal to GHA subtracted from longitude, or 45° E.

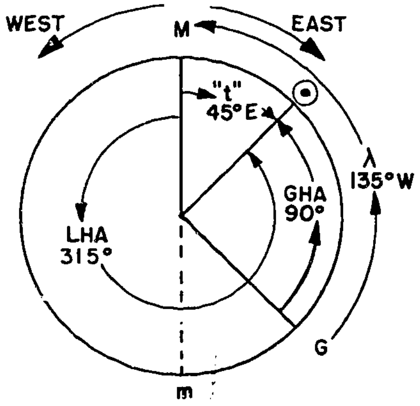


Figure 15-7.–Meridian angle (t), with sun E. of M. 69.62

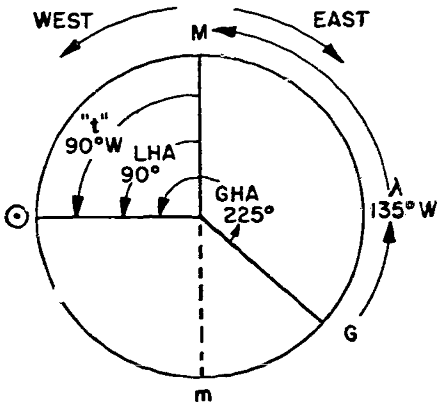


Figure 15-8.–Meridian angle (t), with sun W. of M. 69.63

Again, with the same longitude, assume the sun's GHA is 225° (fig. 15-8). The time diagram shows you that the sun is west of M. Then t is measured to the west and amounts to the longitude subtracted from GHA, or 90° W.

Another look at the diagram will show you that when the body is west of M, t is the same as LHA. (An obvious point here is that meridian angle of the sun is always east before local apparent noon and west afterwards.) It is an absolute necessity for you to know whether t is east or west. The time diagram is the best means of finding out this information.

ELEMENTARY NAVIGATION

The rest of this chapter approaches actual navigation only in the most general way. To begin with, we know that a fix by celestial observation is the point at which two or more lines of position intersect. What is a celestial line of position? To understand what a celestial LOP is, we first must grasp the concept of circles of equal altitude.

Imagine a straight line drawn from a celestial body perpendicular to the surface of the earth. Where this line intersects the earth is the geographical position (GP) of the star. If you were standing at this point (the GP of the star) and took a sight, you'd get an altitude of 90°. The star, in other words, is in your zenith (directly overhead).

Suppose you have a buddy who is standing exactly 1 nautical mile (1′ of arc) from you. You can see that he also is 1 nautical mile (1′ of arc) from the star's GP. Furthermore, his zenith is 1′ of arc from the star's position on the celestial sphere. (The difference between the zenith of the GP of a body and the zenith of an observer is called the zenith distance.) If he takes a sight of this star just as you do, the altitude he gets will differ by 1′ from yours. Because altitude always equals 90° minus zenith distance, the sight he takes will read 89° 59′.

Let's stop right here and look at a significant fact. As long as your buddy stays exactly 1 mile away, he can be in any direction from you. In other words, your position is the center of a circle. Your buddy could be anywhere on that circle and get the same 89° 59′ sextant altitude. He is on a circle of equal altitude. This circle of equal altitude is a celestial line of position. Your buddy is on it somewhere. On every point of the circumference of this circle the altitude of the star is the same.

From the star's GP, any number of circles of equal altitude spread out as altitude decreases with distance of the observer from the GP. The maximum limit, of course, would be about 5400 nautical miles (5400′ of arc) from the GP, at which point the star would be seen on the horizon at zero altitude. Altitude at this limit would have decreased the entire 90° (5400′).

Now let's go back to fixes. It would seem that we could use the intersection of a circle of equal altitude of one body with a circle of equal altitude of another to obtain a fix by celestial navigation. After all, we can locate the latitude and longitude of the GP by the declination and GHA of the star. By subtracting the altitude from 90° and changing the result to nautical miles, we should be able to draw a circle of equal altitude around the GP. Unless the observed body is at a very high altitude, however, the circle of equal altitude is so far from the GP that both of them cannot appear on the same chart. What we actually do is locate a segment of the circle of equal altitude we are on. This segment, plotted as a straight line, is the line of position you see the navigator use.

The remainder of this section discusses means of determining this LOP, although we'll cover only the elements of sight work. You should have a general understanding of what goes on, and that is the aim of the following topic.

COMPUTED ALTITUDE AND AZIMUTH

In H.O. Pub. No. 214 the altitude and azimuth of navigational heavenly bodies have been computed in advance for whole degrees of latitude and meridian angle as well as declination. Actual declination and sidereal hour angle of certain stars is given in H.O. 249. These two publications offer sight reduction tables (described later) that are the most popular ones used by present-day navigators.

The azimuth line from any point to the GP of a heavenly body is actually the radius of the circle of equal altitude passing through that point. This fact is obvious in figure 15-9 where C is a point and the line CGP represents the azimuth line from C to the GP.

Assume that you're aboard ship preparing to plot a line of position from a celestial observation. You've just taken an accurately timed altitude of a particular body. You don't know exactly where you are, but you have a general idea from your DR. You take an assumed position (AP) at or near your DR. Here's where the tables of computed altitude and azimuth come in.

From the tables you can determine the computed altitude (Hc) and computed azimuth (Zn) of the body from the AP at the instant of observation only. (You can't use an observed azimuth because you're not located at the AP.)

If you drew a line through the AP along the azimuth line, your celestial line of position (that is, the circle of equal altitude you are on) would intersect this azimuth line toward or away from the body's GP. The distance toward or away is a number of nautical miles equal to the number of minutes of arc by which the computed altitude (Hc) differs from the altitude you got from observation (Ho). This difference is known as the altitude intercept (a).

Let's try out these findings by referring to figure 15-9. Point C in this illustration represents the AP. Line CGP is the computed azimuth from AP to GP of the star. The circle through C is the circle of equal altitude of the AP. The inner circle is the circle of equal altitude you are on. The segment of the azimuth line between C and the inner circle is the altitude intercept (a). This intercept is as many nautical miles long as the observed altitude differs in minutes from the computed altitude.

Notice that the line of position in figure 15-10 has been plotted as a straight line perpendicular to the azimuth line. You know that a segment of a circle of equal altitude is really curved. We can plot a straight line because circles of equal altitude usually are so large that their curvature is imperceptible in the small segment used for plotting purposes.

How do we know whether the altitude intercept is to be applied for the AP toward or away from the GP? This memory aid will help you figure it: "Coast Guard Academy–Computed Greater, Away." The letters CGA, because of their order, provide a helpful code to stimulate your memory. This code means that if the computed altitude (Hc) is greater than the observed altitude (Ho), the altitude intercept (difference between them) is laid off from the AP away from the GP. If the computed altitude is less than the observed altitude, the altitude intercept (a) is laid off from the AP toward the GP.

Altitude Corrections

A few general pointers regarding altitude corrections should be mentioned here. Besides index

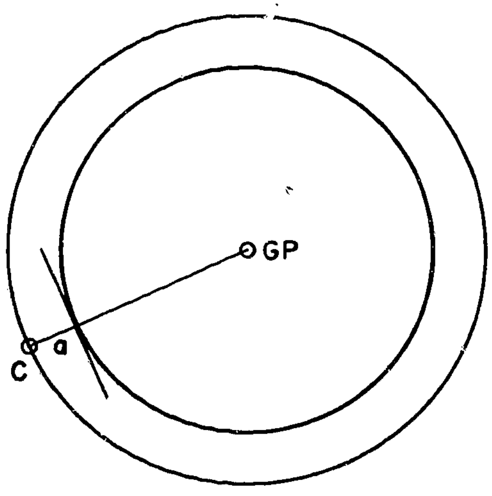


Figure 15-9.–Celestial line of position. 69.64

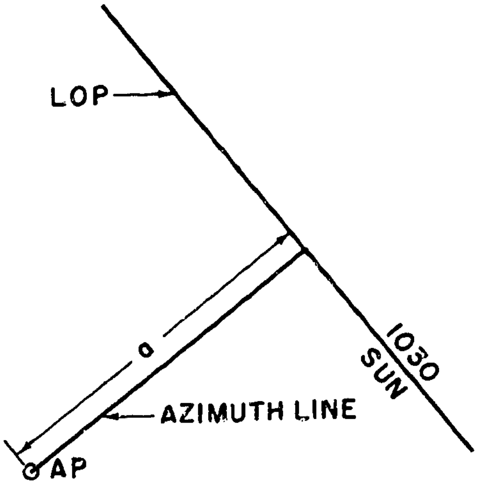


Figure 15-10.–Plotting celestial line of position. 69.65

correction (IC), which was explained in chapter 7, there are four other altitude corrections. These corrections are for refraction, dip, parallax, and semidiameter.

Refraction is the deflection of light rays from a straight line, caused by the oblique passage of the rays through different mediums of density. For simplicity, in navigation, refraction may be thought of as the bending of light rays as they pass at an angle through the layers of atmosphere. The refraction correction is always subtracted from sextant altitude.

Dip is the difference between the visible horizon at the surface and the visible horizon at the observer's height of eye, or height above the surface. The dip correction is always subtracted from the sextant altitude. Dip is also called height of eye.

Parallax is the difference in direction of a heavenly body as seen from some point on the earth's surface, and as seen from some other point, as from the center of the earth.

Semidiameter is the correct altitude of the center of a body. When an observer pulls down the sun's or moon's lower limb to the horizon, he must add a semidiameter correction from the sextant altitude. If the upper limb is observed, the semidiameter correction must be subtracted.

Correction for observed altitude (refraction) and correction for height of eye (dip) are printed on the inside front cover of the *Nautical Almanac*.

Semidiameter corrections to be applied to the sun and moon appear in the daily pages throughout the *Almanac*. Index error, of course, is determined in advance for the individual sextant.

IDENTIFICATION OF CELESTIAL BODIES

In order to work a sight on a celestial body, you first must know which celestial body you have observed. Usually, before twilight, a number of bodies are selected so that the lines of position obtained will give a good fix. Identification of celestial bodies and their approximate positions at desired times can be found by using a star finder.

STAR FINDER AND IDENTIFIER METHOD

The Star Finder and Identifier (No. 2102D) consists of a star base (fig. 15-11) and nine latitude templates. The star base is a plastic disk on which the north celestial pole is at the center on one side and the south celestial pole at the center on the other side. The latitude templates are constructed for 10° latitude intervals (5°, 15°, 25°, etc.). Each template contains altitude and azimuth curves for determining the approximate altitude and azimuths of celestial bodies.

Using Star Finder

The use of the star finder is best explained by an example. Suppose you want to determine the approximate altitude and azimuth of Sirius and Rigel so that you can shoot them. Assume that you have a DR position of latitude 37°14.8′ N., longitude 144°25.6′E. The GHA♈ is found to be 312°46.8′ at that time.

To use the star finder, all you need to know is the LHA of Aries. Applying the method described earlier in this chapter, you find the LHA♈ to be 97°12.4′. Select the template closest to your DR latitude and place it over the star base. In this example you select the template for latitude 35°N. and the star base, which contains N at its center. Place the template over the star base (a hole in the template fits over a peg at the center of the star base) and then orient the template so the arrow points to 97.2°. (See fig. 15-12.) From the template you determine the approximate positions of Sirius and Rigel to be as follows:

	h	Zn
Sirius	39°	176°
Rigel	43°	207°

H.O. Pub. 249 Method

Another method of identifying stars is by consulting Vol. I of the *Sight Reduction Tables for Air Navigation* (H.O. Pub. 249). In this system only selected stars are tabulated. These stars are favorably situated in azimuth and altitude for obtaining fixes.

To use the tables, the quartermaster determines, first, the LHA♈ for the approximate midtime of the period during which he expects to make observations. He then enters the tables with his approximate latitude and LHA♈. Listed in the tables are altitudes and azimuths of seven stars. One disadvantage of this method is that the small listing of stars may make it necessary to observe other celestial bodies when the sky is partially obscured by clouds.

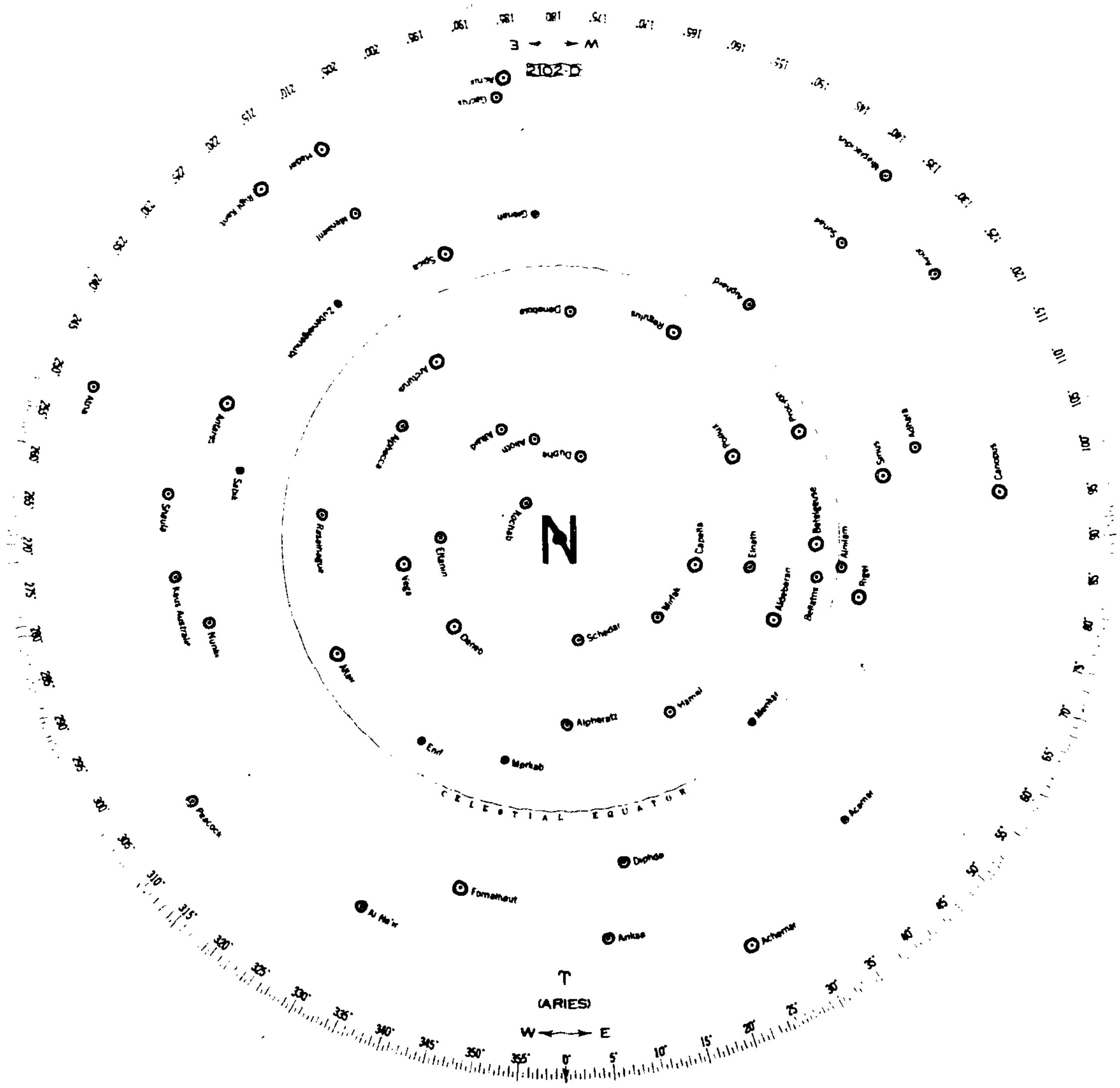


Figure 15-11.–Star base for star finder. 69.66

WORKING A SIGHT

Now let us work a sight problem using H.O. 214 and the *Nautical Almanac* for 1966. Through use of the star finder you determine the approximate position of the celestial body you want to use (Capella, for instance). Then you take a sight on Capella and record the following data:

Hs	66°56.2'
GMT	13h 27m30s, 1 September 1966
DR Lat	34° 24.0'N.
DR	130° 00.0' W.
Height of eye .	55 feet
IC	2.0' (–)

Our first step is to find the observed altitude (Ho). From the table inside the front cover of the *Nautical Almanac* we learn that the correction for a 55-foot height of eye is minus 7.2 ′. Correction for refraction on the same page is minus 0.4 ′. These corrections and the IC are all minus corrections, and they total minus 09.6 ′. Subtracting that figure from the sextant altitude (Hs), we get the observed altitude (Ho). Thus:

Hs.	66°56.2'
Corrections	— 09.6'
Ho	66°46.6'

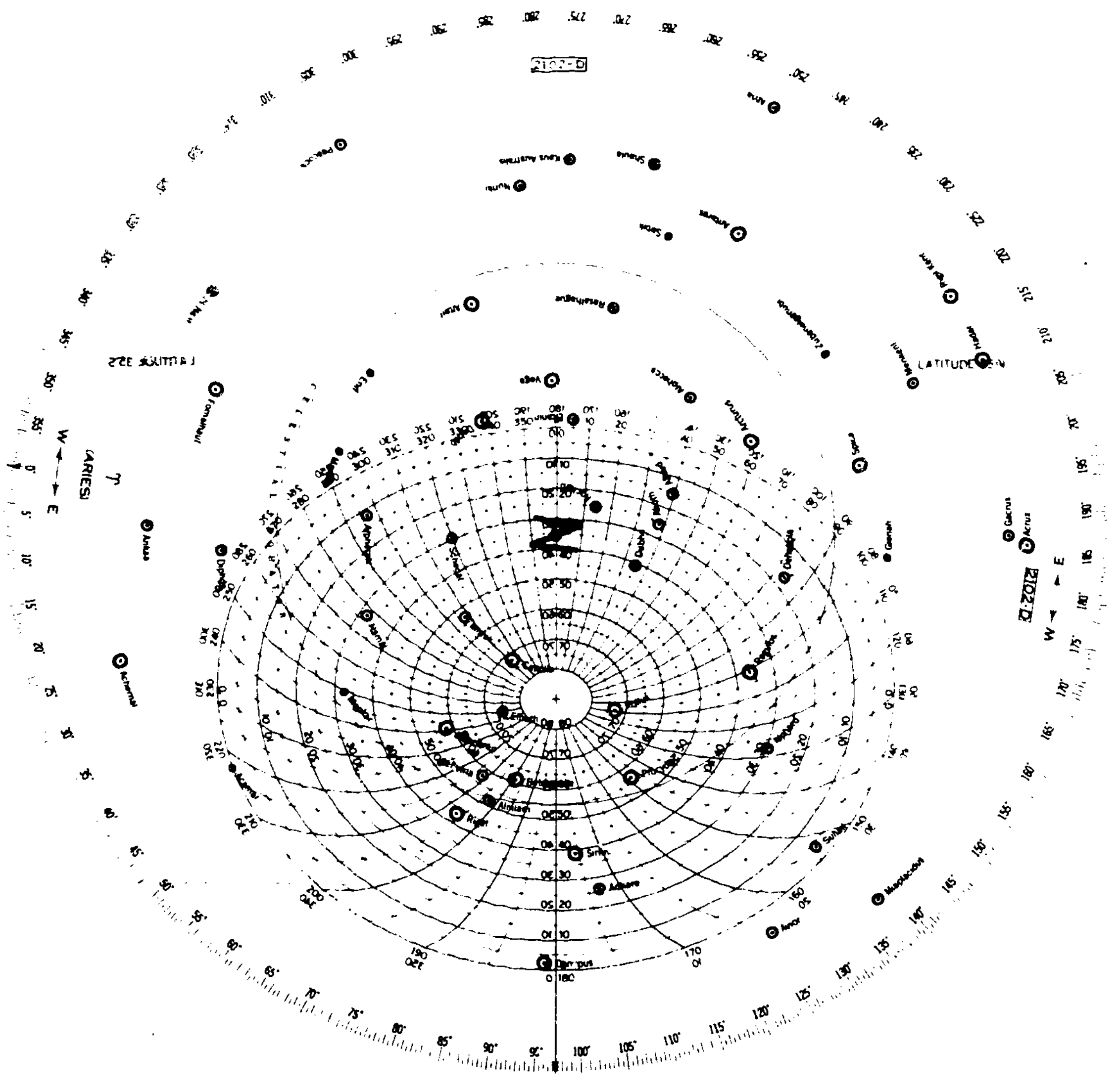


Figure 15-12.–Star base and template. 69.67

Next, we need an assumed position (AP). To simplify matters, the latitude of the AP (DR position) is rounded off to the nearest whole degree of latitude. The DR latitude in this instance is 34°24.0′ N., so we take 34° N. for the latitude of the AP. For the time being we will let the longitude of the AP be the same as the DR longitude, or 130°00.0′ W. Later we will see how certain requirements of convenience might cause us to alter the minutes value of the DR longitude.

To find the computed altitude and azimuth in H.O. 214, we need the following three values: latitude (L), declination (d), and meridian angle (t). We already have the latitude. It is assumed latitude (34°N.), which is the nearest whole degree of latitude to the DR. Now let's find the declination and meridian angle.

DECLINATION

To find declination, turn to the pages headed 1966, for 1, 2, and 3 September. In the column headed Stars you can find the declination for Capella. It is N (for north) 45°57.5′.

MERIDIAN ANGLE (t)

Next we'll work out t. We'll start a time diagram by locating our meridian and the Greenwich meridian (fig. 15-13). Then we have to locate the star on the time diagram by means of its GHA (fig. 15-14). With stars we must determine GHA from the *Nautical Almanac* by adding SHA of the particular body to the tabulated GHA of the first point of aries.

We'll still use the pages for 1, 2, and 3 September. Every hour of GMT for 1 September is listed in the far left column. Remember, GMT of our sight was 13h 27m 30s. We can see, then, that GHA of the first point of Aries for 13h GMT is 175°14.5'. Now we must determine how much arc to add to that to take care of the 27m 30s.

Turn to the yellow pages at the rear of the *Almanac*, and find the column headed 27m. Running down the left column to 30s and then across to the first point of Aries column, we select the value 6°53.6'. Adding this value to 175°14.5' we get 182°08.1', which is the GHA of Aries at the time of observation.

The sum of the SHA of Capella and GHA of Aries equals the GHA of Capella at the time of the sight. Capella's SHA is found in the white pages under the proper date. Choosing the value 281°27.0' from the side column opposite Capella, we add:

GHA	182°08.1'
SHA Capella	281°27.0'
GHA Capella	463°35.1'

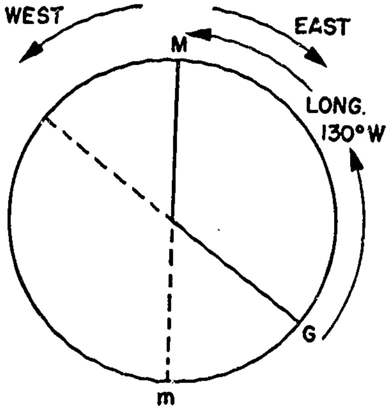


Figure 15-13.–Start of time diagram for sight of Capella. 69.68

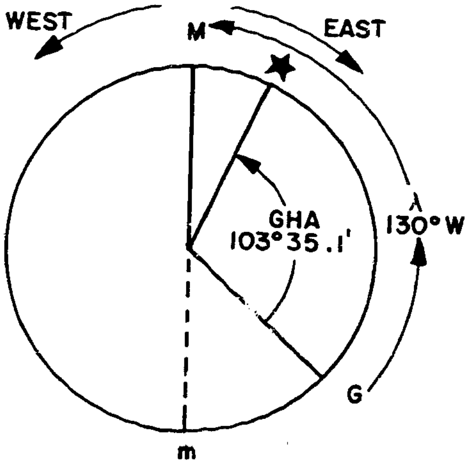


Figure 15-14.–Locating Capella on the time diagram. 69.69

Because this total is more than 360°, we must subtract 360° from it. The result is 103°35.1', the GHA of Capella. Now we can locate Capella on the time diagram (fig. 15-14) by measuring roughly 103°35.1' westward from Greenwich.

It's obvious, now, how to solve for the meridian angle t. Meridian angle is measured east or west from point M to the star's hour circle. In this example, it's measured east. What is its value? We can see that, here, GHA is subtracted from longitude. (If the star were west of M, however, the longitude would be subtracted from GHA.)

The longitude here is 130° W., and we must subtract 103°35.1' from that value to find t. But it is more convenient to enter H.O. 214 with a whole number for t. Hence we use an assumed longitude that (1) will make t a whole number of degrees and (2) is near the DR longitude. Therefore, we use assumed longitude 129°35.1' W.

λ of AP	129°35.1'
GHA	103°35.1'
t..............	26°00.0'

It is essential that we assign t its correct east or west value. The time diagram (fig. 15-14) shows us that t in this example would be 26° E.

We now have the three values needed for H.O. 214:

Latitude (1)	34°00.0'N
Declination (d)	45°57.5'N
Meridian angle (t) ...	26°00.0'E

COMPUTED ALTITUDE

Now we're going to find the computed altitude (Hc) of Capella from the AP at the time of observation. Upon examining H.O. 214, we discover that it consists of nine separate volumes, one for each 10° of latitude up to 89° N. or S. Here we'll use volume IV, for latitude 30° to 39° inclusive. A look inside this volume shows pages for each whole degree of latitude, with declinations across the top for nearly every 30′ of declination. Find the page for latitude 34°, declination 46°, same name as latitude (Use the declination column nearest declination of Capella.) Use the page headed Declination Same Name as Latitude, because both declination and latitude have the same name in this instance (both are north).

In narrow columns at the left and right sides we notice the letters H.A., which is the H.O. 214 name for t. As far as we're concerned here, H.A. means t. We go down this column until we come to 26. We follow across to the listing under declination 46°. Notice that there is an altitude of 66°54.3′ listed there and beside it, in small figures, a delta d correction of 38. (The delta is indicated by a small triangle.) This correction is the amount in hundredths to be multiplied by the minutes of declination less than 46°. There are 2.5 minutes in this example: 2.5′ x38 = 1.0′. Note that as the declination decreases from 46° to 45° the altitude increases: so we will add 1.0′ to 66°54.3′ and obtain a final altitude (Hc) for declination 45°57.5′ of 66°55.3′. This total is the computed altitude from the AP. (NOTE: A multiplication table at the back of each volume of H.O. 214 is to be used when correcting for Δd computations. The table is self-explanatory.)

The other delta correction listed (delta t) is not used in this method of working sights.

COMPUTED AZIMUTH

Next to the altitude we see an azimuth angle for declination 46°. The computed azimuth angle (Z) is 50.9° in this example. The azimuth angle does not always represent the actual indication on the compass rose that you will use to lay out the azimuth line on the chart. To convert the azimuth angle (Z) to the true azimuth (Zn), it is a good idea to draw a diagram (fig. 15-15) representing a compass card. First, we express the computed azimuth in terms of the latitude and the east or west value of t: Z = N. 050.9°E. This expression means that the actual indication on the compass rose, or the true azimuth (Zn) is 050.9° east of north. From the 0° heading on the diagram, we count 050.9° to the east (clockwise), and see that in this example Zn has the same values as Z (fig. 15-15). We plot the azimuth line bearing 050.9° from the AP.

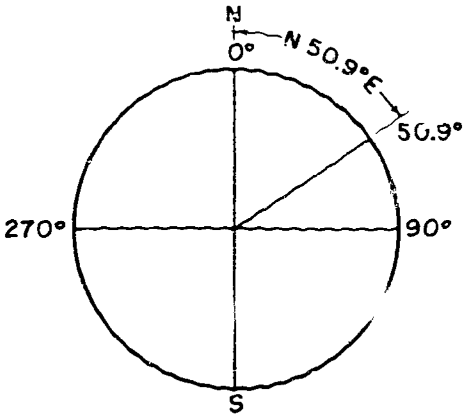


Figure 15-15.–Value of Z equals N. 50.9°E
69.70

Instead of N. 050.9° E., suppose that Z had been N. 050.9°W., which would occur if the body were to the west of your meridian as it was in figure 15-8. This assumption means 050.9° west of north on the compass card. You can see in figure 15-16 that this changed direction would make the actual bearing of the azimuth line 360° minus 050.9° or 309.1°. Figure 15-17 illustrates Zn when Z is S.50.9°E. Figure 15-18 shows Zn when Z is S.50.9° W. You should realize now why it's essential to determine the east or west value of t.

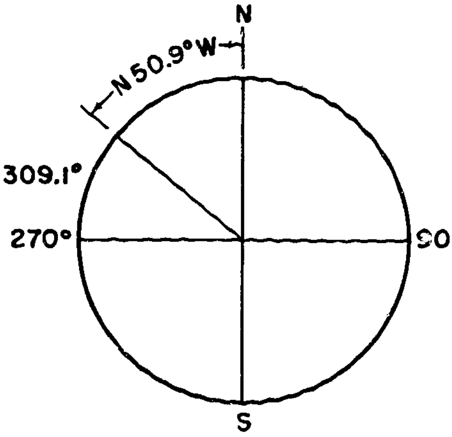


Figure 15-16.–Finding Zn when Z is N. 50.9°W.
69.71

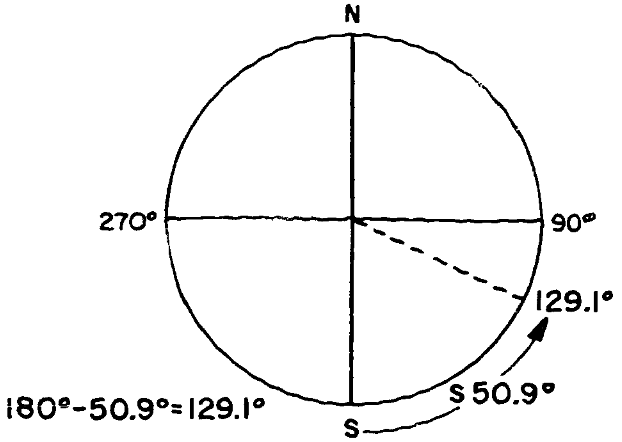


Figure 15-17.–Finding Zn when Z is S. 50.9°E.
69.72

We now have the values for observed altitude (66°46.4′), computed altitude (66°55.3′), and true azimuth (050.9°). The AP is located in latitude 34°00.0′ N, longitude 129°35.1′ W. Simple plotting remains to be done.

Subtracting the smaller altitude from the larger, we obtain the altitude intercept (a):

Hc .... 66°55.3'
Ho .... 66°46.6'
a .... 8.7'

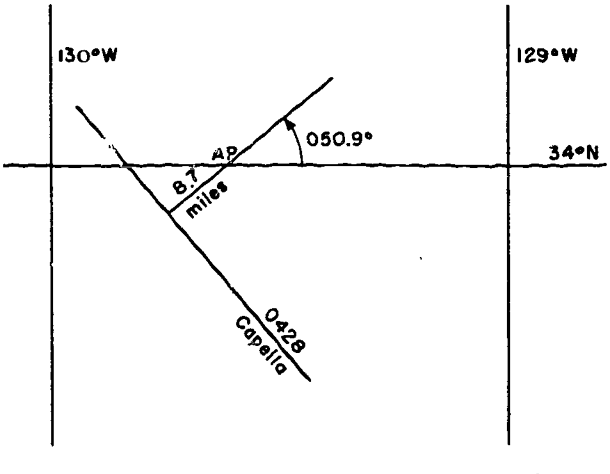


Figure 15-18.–Finding Zn when Z is S. 50.9°W.
69.71

Draw the azimuth line bearing 050.9° through the AP. The line of position is perpendicular to this line, 8.7 nautical miles (to scale) from the AP toward or away from Capella's GP.

Which is it—toward or away? Remember COA: computed greater, away. In this example the computed altitude is greater than observed altitude. Consequently, the altitude intercept is measured from the AP along the azimuth line 8.7 nautical miles away from Capella's GP.

Figure 15-19 shows the celestial line of position as it might be plotted in actual practice. The altitude intercept (a) is measured along the azimuth line from the AP, and the line of position is drawn perpendicular to the azimuth line. No other plotting is required. In actual practice it seldom is necessary to draw the azimuth line itself. Note that the LOP is labeled with the time of observation and the name of the observed body.

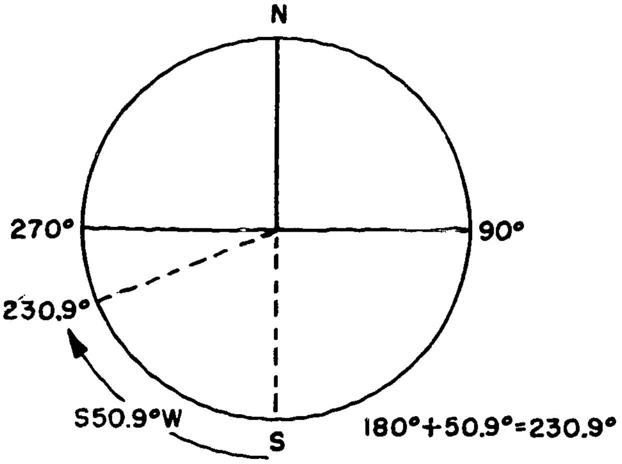


Figure 15-19.–Line of position for Capella.
69.74

Remember, you have determined only one line of position by this altitude intercept method. To obtain a fix, this LOP must be intersected by another line of position.

A CELESTIAL FIX

So that you may see how a celestial fix is obtained, assume that a sight was taken on Altair at the same instant the sight was taken on Capella. After working the sight for Altair, the following information is obtained.

Z = 109.8°
a = 13.2° toward
aλ = 129°51.7' W.

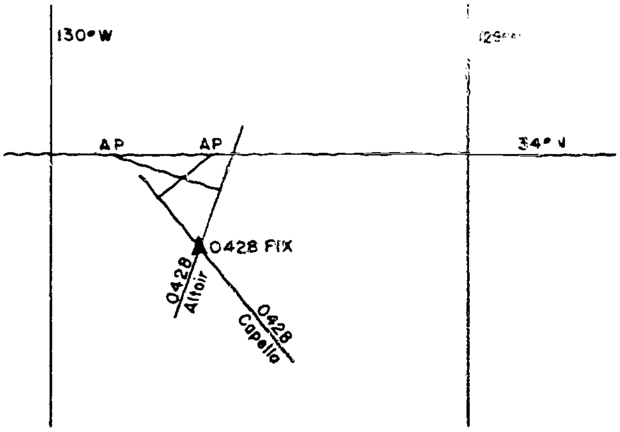


Figure 15-20.--A celestial fix. 69.75

Figure 15-20 reveals the celestial fix obtained by plotting the lines of position for Capella and Altair.

AIR NAVIGATION TABLES

Sight Reduction Tables for Air Navigation (H.O. 249) contains another system for solving sights and obtaining lines of position--a system that is becoming increasingly popular in the fleet. The tables come in three volumes and are arranged for use with the Air *Almanac*.

Volume I contains data for selected stars. This volume is usable through all degrees of latitude from 89° N. to 89° S. As explained previously, this volume also serves as a star finder and identifier for a number of stars.

In general, volume I of H.O. 249 is used in the same manner as H.O. 214. After observing a body, sextant altitude corrections are applied in the usual manner to obtain Ho. An assumed longitude (aλ) is selected so that LHA of the body will be a whole degree (or an even degree above 69° latitude). The tables are entered using the nearest whole degree of latitude, LHAΥ and the name of the body. The computed altitude and azimuth are extracted. In this method a common assumed position may be used. For complete details of this method, you are advised to consult the instructions in volume I. Volumes II and III seldom are used in surface navigation.

LOCAL APPARENT NOON

Local apparent noon (LAN) is a sight taken on the sun the instant it transits an observer's meridian. At that time the sun is at its highest altitude. The LAN lines of position coincide with the ship's latitude.

A number of methods for determining the time of LAN have been devised, but the one given here probably is the simplest. It consists of considering the GHA of the sun to be equal to the ship's longitude when in west longitude, or 360° minus the ship's longitude when in east longitude.

The largest tabulated value for GHA of the sun that does not exceed the longitude is extracted from the daily page of the *Nautical Almanac*. The difference between this tabulated GHA and the assumed longitude is then used to enter the Increments and Corrections table in the yellow pages at the back of the almanac. The time interval corresponding to this value is added to the time of GHA taken from the daily page, and the sum of these two values represents the time of LAN. (The Increments and Corrections table is used here to convert arc to time.) A problem of LAN involving a ship in west longitude would be worked as follows:

Required	Source	Solution
Date	Always known.	31 May 1965
aλ	Taken from DR position	156°44.3'W.
GHA of sun	Daily page of almanac.	150°36.3'
Time	Opposite time of GHA.	22h
Increment	Different between λ and GHA of sun	6°08.0'
Correction	Increments and correcton table.	24m 32s
GMT of LAN	Time plus correcion.	22h 24m 32s
Zone differece	Local time correction.	10h
LMT of LAN	GMT minus zone difference	12h 24m 32s

In the preceding problem, LAN would occur at approximately 1225. A closer estimate can be obtained by taking the difference between the 1200 and the 1225 DR longitudes, converting that difference to time, and applying the resulting correction to the previously determined time of LAN.

Now that LAN is known to the closest minute, the usual procedure is to start taking sights of the sun a few minutes early to ensure that a sight actually is taken at the exact instant of transit.

AZIMUTH OF SUN BY H.O.214

Any of the tabulated solutions of the astronomical triangle (as well as various azimuth tables) may be used to obtain the exact azimuth. The method referenced in this training course is H.O. 214, which has become the most popular source.

Suppose that we obtained an observed azimuth of the sun of 298.0° pgc. We want to learn the true azimuth, which will give us the gyro error. The values needed to enter H.O. 214 are t, d, and L. The delta values are not used, because they apply only to the altitude. Assume a value for t of 25°46.6′ W., d 17° 09.5′ S., and L 33°17.45′ S. These values indicate that volume IV of H.O. 214 (latitude 30° to 39° inclusive) must be used. Entering the "Same Name" part of H.O. 214 with the nearest values of t, d, and L, we select the tabulated value of Z (118.0°). The nearest values of t, d, and L were 26°, 17°, and 33°, respectively. You should stop right here and review this section until you see what has been done so far.

Now, we must interpolate. We start this process by finding the difference between the tabulated value of Z (previously found) and the value of t 25°, d 17°30′, and L 34°. Why do we interpolate? Here's the point: the value of t in our problem is 25°46.6′ W., which falls between 25° and 26°. As soon as we learn the values for 25° and 26° we can find the value at any point between. Similarly, the value for d of 17°09.5′ S. falls between 17° and 17°30′; and the value for L of 33°17.4′S. falls between 33° and 34°. The objective, then, is to find the value of Z at two extremes in order to find the value at a point in between. We interpolate by converting the minutes of difference to tenths of degrees. If we think carefully, we can see that (in this example) the correction for t will be two-tenths of the difference between the values at 25° and at 26°. (The value 46.6′ is eight-tenths of a degree, almost. We use the two-tenths left over.) The correction for d will be approximately three-tenths (9.5/30) of the difference between the values at 17° and at 17°30′. Finally, the correction for L will be three-tenths of the difference between the values at 33° and at 34°. The total correction is the algebraic sum of the three individual corrections rounded off to nearest tenths). Solution:

t	25-46.6 W.	t diff	(+) 1.3	
d	17-09.5 S.	d diff	(-) 0.8	
L	33-17.4 S.	L diff	(+) 1.6	
tab	118.0	t corr	(+) 0.3	
corr	(+) 0.6	d corr		(-)0.2
Z	S 118.6 W.	L corr	(+) 0.5	
Zn	298.6	Sum	0.8	0.2
		Corr	(+) 0.6	

Let's examine each correction in detail. The tabulation for t 26° is 118°; for t 25° it is 119.3°. The difference is 1.3 plus; that is, as you go from 26° (118° our base figure) to 25° (119.3°), the value of Z increased. Hence, the value of Z at 25°46.6′ would be approximately 0.2° (12′) larger than at 26°. Two-tenths of 1.3 is 0.3. (This method works equally well going the other direction, but we should always correct from the base, or originally selected tabulation.)

Next, examine d. Going from 17° to 17°30′ we see that the tabulated Z changes from 118° to 117.2°–or 0.8° minus, because it's decreasing. Three-tenths (9.5/30) of this figure equals approximately 0.2° (-) our next correction.

Last, consider L. The tabulation for 33° was 118° and for 34° it was 119.6°. The difference is plus 1.6° because it is increasing. Three-tenths of this figure equals approximately 0.5° (+), which is our last correction.

By combining these values algebraically, we obtain the final correction of 0.6° (+), for a final Z of the sun of S. (for latitude) 118.6° W. (for t).

Notice that Z is given in terms of azimuth angle instead of true azimuth. (This expression means that the angles are measured from the elevated pole east and west instead of from the north pole eastward.) Accordingly, we must pay close attention to the latitude and t signs. In this example, Z is measured southward and westward, which means that Z must be added to 180° (the elevated pole) to obtain Zn–in this instance 298.6°.

Now, determine the gyro error based on our azimuth. The sun's bearing pgc was 298°. We found its true azimuth by computation to be 298.6°. It's easy to see that the difference is 0.6°, but is the error east or west? This little jingle will help you:

"Compass best–error west. Compass least–error east." In other words, if the compass reading is greater than the true reading, the error is westerly; if the compass reading is less than the true reading, the error is easterly. The error here, then, is 0.6° E., because the compass bearing was less than the true bearing.

CHAPTER 16

TIDES AND CURRENTS

Several problems posed by tides and currents can be solved by means of tide and current tables. By using *Tide Tables* the height of tides can be found at any time. *Tidal Current Tables* permit a similar type of calculation in determining set and drift of the current at any time. Other calculations pertaining to sunrise, sunset, moonrise, and moonset can also be made from data in these tables. Additional publications also contain sunrise/sunset and moonrise/moonset calculations. *The Nautical Almanac* and *Air Almanac* are two such publications. This chapter discusses problems dealt with in the aforementioned four publications and explains the methods utilized in solving the problems.

TIDES

The vertical rise and fall of the ocean level, caused by the gravitational force between the earth and the moon (and, to a lesser extent, between the earth and the sun), are called tides. The highest level reached by an ascending tide is called high water; the lowest level of a descending tide, low water. At high and low water there is a brief period during which no change occurs in the water level. This period is called stand.

The total rise or fall from low water to high, or vice versa, is called the range of the tide. The actual height of the water level at high and low water differs with phases of the moon, variations of wind force and direction, and other phenomena. The average height of high water, measured over a 19-year period, is called mean high water. The average height of low water, measured over the same period, is mean low water. The plane midway between mean high and mean low water is mean tide level.

Spring tides occur near the time of full moon and new moon, at which times the sun and moon act together to produce tides higher and lower than average. When the moon is in its first or last quarter, the moon and the sun are opposed to each other, resulting in neap tides of less than average range.

TIME OF TIDE AND DEPTH OF WATER

You already are familiar with the tiny figures that indicate depth of water on a chart. Let's look at one of them–a 6, for instance. On the chart, check under the title "Soundings in Fathoms at Mean Low Water." Does this figure 6 mean that there always are exactly 6 fathoms at low water at this particular spot? No. Mean low water is only an average of the various depths actually sounded here at low water during survey. Consequently, the actual water level at low water may be above or below mean low water at different times. Height of tide, then, does not refer to actual depth of water. Nor does the charted depth, shown by one of the small figures on the chart, indicate the lowest depth to be found at all times at that particular point.

Figure 16-1 shows you the relationship of certain tidal terms to water depth. The charted depth is the vertical distance from the reference plane to the ocean bottom. (Usually soundings are based on mean low water.) As you have seen, the actual depth of water can be less than the charted depth, or below the reference plane. This depth is indicated by a minus sign placed before the height of tide shown in the tide tables. The depth of water is equal to the algebraic sum of the charted depth and the height of tide.

Usually two high tides and two low tides occur each lunar day. Because of the changing relative positions of the sun and moon with respect to the earth and to each other, an infinite variety of tidal situations is possible. Thus, the height of the water level varies from tide to tide and from day to day. The lower of the two low tides in any one tidal day is called lower low water.

TIDE TABLES

When a ship is making port, the navigator must know the minimum depth of water through which the ship will pass. Depth varies, of course, with phases of the tide. Some ports must be entered over

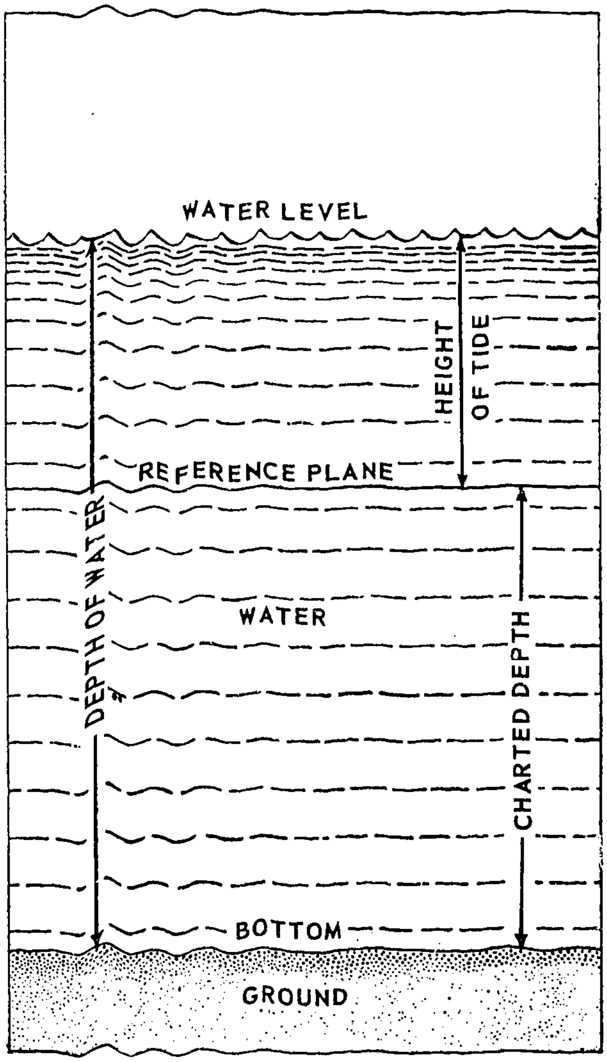


Figure 16-1.–Relationship of terms to water depth. 65.131

bars or shoals, which seagoing vessels cannot transit except during high water.

Depth of water at anchorages must also be known in order to determine proper scope of chain. Information to this effect is obtained from *Tide Tables*, published annually by the Coast and Geodetic Survey. There are four volumes of *Tide Tables*, covering the following areas: East Coast, North and South America; West Coast, North and South America; Europe and West Coast of Africa; Central and Western Pacific and Indian Oceans.

The time and height of tide at each high and low water are listed in the *Tide Tables* for a number of principal locations, called reference stations. Table 1 of the *Tide Tables* (table 16-1) illustrates the listing for one such reference station, New York City at the Battery. Because the lunar or tidal day is a little more than 24 hours in length (it averages about 24h 50m), the time between successive high or low tides is a little more than 12 hours. When a high or low tide occurs just before midnight, the next high or low tide occurs approximately at noon on the following day; the next, just after the ensuing midnight. Only under these conditions do three consecutive high or low tides occur on three different dates. The total interval is no longer than the period of a lunar day. This interval means that on the middle day of the three, there is but one high or low water.

Table 2 of the *Tide Tables* (table 16-2) contains a list of secondary or subordinate stations. Location (latitude and longitude) of each station is given, together with certain information which, when applied to predictions for the stated reference station, gives tidal data for the subordinate station. Usually a time difference is included, and it is added to or subtracted from the time of the reference station. Quartermasters must be alert for changes in date when applying the time difference.

Depending on local conditions, the height of tide at a subordinate station may be found in several ways. If a height difference is given for height of high water, it is necessary only to apply this difference in accordance with its sign. If a ratio of ranges is given, height of the tide at the subordinate station can be obtained by multiplying this ratio by the heights of both high and low tides at the reference station.

Although the ratio of ranges method usually is slightly more accurate, it seldom is used when height differences are listed. Where results of height differences would not be satisfactory, they are not given. One or two ratios of ranges are given instead. In a few places the two systems are combined into a ratio, plus or minus a correction.

Height of the tide at a specific time can be found by using table 3 of the *Tide Tables* (table 16-3). Explicit instructions on how to use the table are included with it.

PREDICTING HEIGHT OF TIDE

Now, let's see how *Tide Tables* are used to predict the height of tide at a specific spot for a particular time. Let's select a subordinate station to make a real problem. Suppose you're proceeding up the Hudson River, with orders to anchor near the George Washington Bridge. You expect to make the anchorage at 1100 on 5 September, and you want to

Table 16-1.–Height of Tide at Reference Station
69.76

NEW YORK (THE BATTERY), N.Y., 1967

TIMES AND HEIGHTS OF HIGH AND LOW WATERS

JULY						AUGUST						SEPTEMBER					
DAY	TIME H.M.	HT. FT.	DAY	TIME H.M.	HT. FT.	DAY	TIME H.M.	HT. FT.	DAY	TIME H.M.	HT. FT.	DAY	TIME H.M.	HT. FT.	DAY	TIME H.M.	HT. FT.
1	0300	3.7	16	0306	4.2	1	0406	3.4	16	0512	4.0	1	0542	3.9	16	0030	0.0
SA	0936	0.7	SU	0930	0.2	TU	1024	1.0	W	1112	0.4	F	1142	0.7	SA	0642	4.5
	1548	4.3		1548	5.2		1642	4.6		1736	5.2		1800	5.1		1242	0.3
	2218	1.0		2224	0.3		2324	0.8								1900	5.1
2	0354	3.6	17	0412	4.1	2	0512	3.5	17	0006	0.1	2	0030	0.2	17	0118	-0.1
SU	1018	0.7	M	1030	0.1	W	1118	0.9	TH	0612	4.2	SA	0630	4.3	SU	0730	4.8
	1636	4.5		1648	5.3		1736	4.8		1206	0.3		1236	0.3		1330	0.2
	2306	[illegible]		2324	0.1					1830	5.4		1842	5.4		1936	5.1
3	[illegible]	[illegible]	18	0518	4.1	3	0012	0.5	18	0054	0.0	3	0118	-0.1	18	0154	-0.2
M	1106	[illegible]	TU	1124	0.1	TH	0612	3.7	F	0700	4.4	SU	0712	4.7	M	0806	4.9
	1724	[illegible]		1748	5.5		1206	0.7		1300	0.2		1324	0.0		1412	0.1
	2354	[illegible]					1824	5.1		1918	5.4		1930	5.6		2018	5.0
4	0548	3.6	19	0018	0.0	4	0100	0.2	19	0142	-0.1	4	0200	-0.4	19	0230	-0.2
TU	1148	0.6	W	0618	4.2	F	0700	4.0	SA	0748	4.5	M	0800	5.1	TU	0842	4.9
	1812	4.9		1218	0.1		1254	0.5		1348	0.2		1412	-0.3		1454	0.1
				1842	5.6		1912	5.3		2000	5.4		2012	5.7		2054	4.8
5	0042	0.4	20	0112	-0.2	5	0148	-0.1	20	0224	-0.2	5	0242	-0.6	20	0306	-0.1
W	0636	3.7	TH	0712	4.3	SA	0742	4.3	SU	0830	4.7	TU	0842	5.4	W	0918	4.9
	1236	0.5		1312	0.1		1342	0.2		1436	0.2		1500	-0.5		1530	0.2
	1848	5.1		1930	5.6		1954	5.5		2042	5.2		2100	5.6		2124	4.6
6	0130	0.1	21	0200	-0.3	6	0230	-0.3	21	0306	-0.2	6	0324	-0.7	21	0336	0.1
TH	0724	3.8	F	0806	4.4	SU	0824	4.5	M	0912	4.7	W	0930	5.5	TH	0954	4.8
	1318	0.5		1406	0.1		1430	0.0		1512	0.2		1542	-0.5		1600	0.4
	1930	5.2		2018	5.5		2036	5.6		2124	5.0		2148	5.4		2200	4.3
9	0336	-0.3	24	0412	-0.2	9	0430	-0.5	24	0442	0.3	9	0536	0.0	24	0442	0.8
SU	0936	4.2	M	1030	4.4	W	1048	5.1	TH	1112	4.5	SA	1212	5.4	SU	1130	4.5
	1530	0.3		1618	0.5		1648	-0.1		1706	0.8		1824	0.3		1736	1.0
	2142	5.3		2236	4.9		2306	5.2		2318	4.2					2342	3.6
10	0418	-0.3	25	0448	0.0	10	0512	-0.3	25	0512	0.5	10	0036	4.4	25	0512	1.0
M	1024	4.3	TU	1118	4.4	TH	1142	5.2	F	1148	4.5	SU	0630	0.3	M	1212	4.4
	1612	0.2		1700	0.7		1742	0.1		1742	1.0		1306	5.2		1836	1.2
	2230	5.2		2318	4.6					2348	4.0		1936	0.5			
11	0454	-0.2	26	0524	0.2	11	0000	4.9	26	0536	0.8	11	0136	4.1	26	0030	3.4
TU	1118	4.5	W	1200	4.4	F	0600	-0.1	SA	1224	4.4	M	0748	0.7	TU	0548	1.2
	1700	0.3		1742	0.9		1236	5.2		1824	1.3		1406	5.0		1300	4.3
	2324	5.0					1842	0.4					2054	0.6		2018	1.3
12	0536	-0.1	27	0000	4.3	12	0054	4.6	27	0024	3.7	12	0242	3.9	27	0136	3.3
W	1206	4.6	TH	0606	0.5	SA	0700	0.2	SU	0600	1.0	TU	0900	0.8	W	0654	1.4
	1754	0.4		1242	4.3		1330	5.2		1306	4.3		1512	4.9		1400	4.3
				1830	1.2		1954	0.5		1942	1.4		2200	0.5		2124	1.1
13	0018	4.8	28	0036	4.1	13	0148	4.3	28	0106	3.5	13	0354	3.9	28	0248	3.4
TH	0630	0.0	F	0648	0.7	SU	0806	0.4	M	0648	1.2	W	1006	0.7	TH	0918	1.3
	1300	4.8		1324	4.3		1424	5.1		1348	4.3		1624	4.9		1518	4.4
	1900	0.5		1936	1.3		2106	0.6		2100	1.4		2254	0.4		2224	0.8
14	0106	4.6	29	0118	3.8	14	0254	4.0	29	0206	3.4	14	0500	4.0	29	0406	3.7
F	0730	0.1	SA	0736	0.9	M	0912	0.5	TU	0830	1.3	TH	1106	0.6	F	1024	1.0
	1348	4.9		1400	4.3		1530	5.1		1448	4.4		1724	5.0		1630	4.6
	2018	0.5		2042	1.3		2212	0.5		2200	1.2		2348	0.2		2312	0.4
15	0206	4.4	30	0200	3.6	15	0400	3.9	30	0324	3.4	15	0600	4.3	30	0506	4.1
SA	0830	0.2	SU	0836	1.0	TU	1018	0.5	W	0948	1.2	F	1154	0.4	SA	1118	0.5
	1448	5.1		1448	4.3		1636	5.1		1554	4.5		1812	5.1		1724	4.9
	2124	0.4		2142	1.2		2312	0.3		2254	0.9						
			31	0300	3.5				31	0442	3.5						
			M	0936	1.0				TH	1048	1.0						
				1542	4.4					1700	4.7						
				2236	1.0					2342	0.5						

TIME MERIDIAN 75° W. 0000 IS MIDNIGHT. 1200 IS NOON.
HEIGHTS ARE RECKONED FROM THE DATUM OF SOUNDINGS ON CHARTS OF THE LOCALITY WHICH IS MEAN LOW WATER.

Table 16-2.–Tidal Differences and Constants
69.77

No.	PLACE	POSITION		DIFFERENCES				RANGES		Mean Tide Level
		Lat.	Long.	Time		Height		Mean	Spring	
				High water	Low water	High water	Low water			
		° ′	° ′	*h. m.*	*h. m.*	*feet*	*feet*	*feet*	*feet*	*feet*
	NEW YORK—Continued	**N.**	**W.**	**on SANDY HOOK, p.70**						
	Long Island, South Side—Continued									
				Time meridian, 75°W.						
	Hempstead Bay									
1451	Deep Creek Meadow	40 36	73 32	+1 02	+1 09	*0.52	*0.52	2.4	2.9	1.2
1453	Green Island	40 37	73 30	+1 22	+1 29	*0.41	*0.41	1.9	2.3	0.9
1455	Cuba Island	40 37	73 31	+1 08	+1 20	*0.50	*0.50	2.3	2.8	1.1
1457	Bellmore, Bellmore Creek	40 40	73 31	+1 29	+1 56	*0.43	*0.43	2.0	2.4	1.0
1459	Neds Creek	40 37	73 33	+0 50	+0 52	-1.9	0.0	2.7	3.3	1.3
1461	Freeport Creek	40 38	73 34	+0 34	+0 27	-1.5	0.0	3.1	3.8	1.5
1463	Freeport, Baldwin Bay	40 38	73 35	+0 38	+0 53	-1.6	0.0	3.0	3.6	1.5
1465	Long Beach	40 36	73 39	+0 19	0 00	-0.7	0.0	3.9	4.7	1.9
1467	Long Beach, outer coast	40 35	73 39	-0 29	-0 35	-0.1	0.0	4.5	5.4	2.2
	Hempstead Bay—Continued									
1469	East Rockaway	40 38	73 40	+0 42	+0 45	-0.7	0.0	3.9	4.7	1.9
1471	Woodmere, Brosewere Bay	40 37	73 42	+0 35	+0 48	-0.7	0.0	3.9	4.7	1.9
1473	East Rockaway Inlet	40 36	73 44	-0 06	-0 16	-0.5	0.0	4.1	5.0	2.0
	Jamaica Bay									
1475	Plumb Beach Channel	40 35	73 55	+0 03	-0 05	+0.3	0.0	4.9	5.9	2.4
1477	Barren Island, Rockaway Inlet	40 35	73 53	0 00	-0 06	+0.4	0.0	5.0	6.0	2.5
1479	Beach Channel (bridge)	40 35	73 49	+0 38	+0 22	+0.5	0.0	5.1	6.2	2.5
1481	Motts Basin	40 37	73 46	+0 40	+0 46	+0.8	0.0	5.4	6.5	2.7
1483	Norton Point, Head of Bay	40 38	73 45	+0 39	+0 43	+0.8	0.0	5.4	6.5	2.7
1485	New York International Airport	40 37	73 47	+0 26	+0 43	+0.7	0.0	5.3	6.4	2.6
1487	Grassy Bay (bridge)	40 39	73 50	+0 44	+0 45	+0.6	0.0	5.2	6.3	2.6
1489	Canarsie	40 38	73 53	+0 28	+0 06	+0.6	0.0	5.2	6.3	2.6
1491	Mill Basin	40 37	73 55	+0 29	+0 02	+0.6	0.0	5.2	6.3	2.6
	NEW YORK and NEW JERSEY **New York Harbor**									
1493	Coney Island	40 34	73 59	-0 03	-0 19	+0.1	0.0	4.7	5.7	2.3
1495	Norton Point, Gravesend Bay	40 35	74 00	-0 03	+0 01	+0.1	0.0	4.7	5.7	2.3
1497	Fort Wadsworth, The Narrows	40 36	74 03	+0 02	+0 12	-0.3	0.0	4.3	5.2	2.1
1499	Fort Hamilton, The Narrows	40 37	74 02	+0 03	+0 05	+0.1	0.0	4.7	5.7	2.3
				on NEW YORK, p.62						
1501	Bay Ridge	40 38	74 02	-0 24	-0 24	+0.1	0.0	4.6	5.5	2.3
1503	St. George, Staten Island	40 39	74 04	-0 21	-0 18	0.0	0.0	4.5	5.4	2.2
1505	Bayonne, New Jersey	40 41	74 06	-0 19	-0 08	0.0	0.0	4.5	5.4	2.2
1507	Gowanus Bay	40 40	74 01	-0 19	-0 15	-0.1	0.0	4.4	5.3	2.2
1509	Governors Island	40 42	74 01	-0 11	-0 06	-0.1	0.0	4.4	5.3	2.2
1511	NEW YORK (The Battery)	40 42	74 01	Daily predictions				4.5	5.4	2.2
	Hudson River‡									
1513	Jersey City, Pa. RR. Ferry, N. J	40 43	74 02	+0 07	+0 07	-0.1	0.0	4.4	5.3	2.2
1515	New York, Desbrosses Street	40 43	74 01	+0 10	+0 10	-0.1	0.0	4.4	5.3	2.2
1517	New York, Chelsea Docks	40 45	74 01	+0 17	+0 16	-0.2	0.0	4.3	5.2	2.1
1519	Hoboken, Castle Point, N. J	40 45	74 01	+0 17	+0 16	-0.2	0.0	4.3	5.2	2.1
1521	Weehawken, Days Point, N. J	40 46	74 01	+0 24	+0 23	-0.3	0.0	4.2	5.0	2.1
1523	New York, Union Stock Yards	40 47	74 00	+0 27	+0 26	-0.3	0.0	4.2	5.0	2.1
1525	New York, 130th Street	40 49	73 58	+0 37	+0 35	-0.5	0.0	4.0	4.8	2.0
1527	George Washington Bridge	40 51	73 57	+0 46	+0 43	-0.6	0.0	3.9	4.6	1.9
1529	Spuyten Duyvil, West of RR. bridge	40 53	73 56	+0 58	+0 53	-0.7	0.0	3.8	4.5	1.9
1531	Yonkers	40 56	73 54	+1 09	+1 10	-0.8	0.0	3.7	4.4	1.8
1533	Dobbs Ferry	41 01	73 53	+1 29	+1 40	-1.1	0.0	3.4	4.0	1.7
1535	Tarrytown	41 05	73 52	+1 45	+1 54	-1.3	0.0	3.2	3.7	1.6

*Ratio.

‡Values for the Hudson River above George Washington Bridge are based upon averages for the six months May to October, when the fresh water discharge is a minimum.

Table 16-3.–Height of Tide at Any Time

69.78

Duration of rise or fall, see footnote	Time from the nearest high water or low water														
h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
4 00	0 08	0 16	0 24	0 32	0 40	0 48	0 56	1 04	1 12	1 20	1 28	1 36	1 44	1 52	2 00
4 20	0 09	0 17	0 26	0 35	0 43	0 52	1 01	1 09	1 18	1 27	1 35	1 44	1 53	2 01	2 10
4 40	0 09	0 19	0 28	0 37	0 47	0 56	1 05	1 15	1 24	1 33	1 43	1 52	2 01	2 11	2 20
5 00	0 10	0 20	0 30	0 40	0 50	1 00	1 10	1 20	1 30	1 40	1 50	2 00	2 10	2 20	2 30
5 20	0 11	0 21	0 32	0 43	0 53	1 04	1 15	1 25	1 36	1 47	1 57	2 08	2 19	2 29	2 40
5 40	0 11	0 23	0 34	0 45	0 57	1 08	1 19	1 31	1 42	1 53	2 05	2 16	2 27	2 39	2 50
6 00	0 12	0 24	0 36	0 48	1 00	1 12	1 24	1 36	1 48	2 00	2 12	2 24	2 36	2 48	3 00
6 20	0 13	0 25	0 38	0 51	1 03	1 16	1 29	1 41	1 54	2 07	2 19	2 32	2 45	2 57	3 10
6 40	0 13	0 27	0 40	0 53	1 07	1 20	1 33	1 47	2 00	2 13	2 27	2 40	2 53	3 07	3 20
7 00	0 14	0 28	0 42	0 56	1 10	1 24	1 38	1 52	2 06	2 20	2 34	2 48	3 02	3 16	3 30
7 20	0 15	0 29	0 44	0 59	1 13	1 28	1 43	1 57	2 12	2 27	2 41	2 56	3 11	3 25	3 40
7 40	0 15	0 31	0 46	1 01	1 17	1 32	1 47	2 03	2 18	2 33	2 49	3 04	3 19	3 35	3 50
8 00	0 16	0 32	0 48	1 04	1 20	1 36	1 52	2 08	2 24	2 40	2 56	3 12	3 28	3 44	4 00
8 20	0 17	0 33	0 50	1 07	1 23	1 40	1 57	2 13	2 30	2 47	3 03	3 20	3 37	3 53	4 10
8 40	0 17	0 35	0 52	1 09	1 27	1 44	2 01	2 19	2 36	2 53	3 11	3 28	3 45	4 03	4 20
9 00	0 18	0 36	0 54	1 12	1 30	1 48	2 06	2 24	2 42	3 00	3 18	3 36	3 54	4 12	4 30
9 20	0 19	0 37	0 56	1 15	1 33	1 52	2 11	2 29	2 48	3 07	3 25	3 44	4 03	4 21	4 40
9 40	0 19	0 39	0 58	1 17	1 37	1 56	2 15	2 35	2 54	3 13	3 33	3 52	4 11	4 31	4 50
10 00	0 20	0 40	1 00	1 20	1 40	2 00	2 20	2 40	3 00	3 20	3 40	4 00	4 20	4 40	5 00
10 20	0 21	0 41	1 02	1 23	1 43	2 04	2 25	2 45	3 06	3 27	3 47	4 08	4 29	4 49	5 10
10 40	0 21	0 43	1 04	1 25	1 47	2 08	2 29	2 51	3 12	3 33	3 55	4 16	4 37	4 59	5 20

Range of tide, see footnote	Correction to height														
Ft.	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*
0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
1.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5
1.5	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8
2.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
2.5	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2
3.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.8	0.9	1.0	1.2	1.3	1.5
3.5	0.0	0.0	0.1	0.2	0.2	0.3	0.4	0.6	0.7	0.9	1.0	1.2	1.4	1.6	1.8
4.0	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.7	0.8	1.0	1.2	1.4	1.6	1.8	2.0
4.5	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.7	0.9	1.1	1.3	1.6	1.8	2.0	2.2
5.0	0.0	0.1	0.1	0.2	0.3	0.5	0.6	0.8	1.0	1.2	1.5	1.7	2.0	2.2	2.5
5.5	0.0	0.1	0.1	0.2	0.4	0.5	0.7	0.9	1.1	1.4	1.6	1.9	2.2	2.5	2.8
6.0	0.0	0.1	0.1	0.3	0.4	0.6	0.8	1.0	1.2	1.5	1.8	2.1	2.4	2.7	3.0
6.5	0.0	0.1	0.2	0.3	0.4	0.6	0.8	1.1	1.3	1.6	1.9	2.2	2.6	2.9	3.2
7.0	0.0	0.1	0.2	0.3	0.5	0.7	0.9	1.2	1.4	1.8	2.1	2.4	2.8	3.1	3.5
7.5	0.0	0.1	0.2	0.3	0.5	0.7	1.0	1.2	1.5	1.9	2.2	2.6	3.0	3.4	3.8
8.0	0.0	0.1	0.2	0.3	0.5	0.8	1.0	1.3	1.6	2.0	2.4	2.8	3.2	3.6	4.0
8.5	0.0	0.1	0.2	0.4	0.6	0.8	1.1	1.4	1.8	2.1	2.5	2.9	3.4	3.8	4.2
9.0	0.0	0.1	0.2	0.4	0.6	0.9	1.2	1.5	1.9	2.2	2.7	3.1	3.6	4.0	4.5
9.5	0.0	0.1	0.2	0.4	0.6	0.9	1.2	1.6	2.0	2.4	2.8	3.3	3.8	4.3	4.8
10.0	0.0	0.1	0.2	0.4	0.7	1.0	1.3	1.7	2.1	2.5	3.0	3.5	4.0	4.5	5.0
10.5	0.0	0.1	0.3	0.5	0.7	1.0	1.3	1.7	2.2	2.6	3.1	3.6	4.2	4.7	5.2
11.0	0.0	0.1	0.3	0.5	0.7	1.1	1.4	1.8	2.3	2.8	3.3	3.8	4.4	4.9	5.5
11.5	0.0	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.4	2.9	3.4	4.0	4.6	5.1	5.8
12.0	0.0	0.1	0.3	0.5	0.8	1.1	1.5	2.0	2.5	3.0	3.6	4.1	4.8	5.4	6.0
12.5	0.0	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.6	3.1	3.7	4.3	5.0	5.6	6.2
13.0	0.0	0.1	0.3	0.6	0.9	1.2	1.7	2.2	2.7	3.2	3.9	4.5	5.1	5.8	6.5
13.5	0.0	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.4	4.0	4.7	5.3	6.0	6.8
14.0	0.0	0.2	0.3	0.6	0.9	1.3	1.8	2.3	2.9	3.5	4.2	4.8	5.5	6.3	7.0
14.5	0.0	0.2	0.4	0.6	1.0	1.4	1.9	2.4	3.0	3.6	4.3	5.0	5.7	6.5	7.2
15.0	0.0	0.2	0.4	0.6	1.0	1.4	1.9	2.5	3.1	3.8	4.4	5.2	5.9	6.7	7.5
15.5	0.0	0.2	0.4	0.7	1.0	1.5	2.0	2.6	3.2	3.9	4.6	5.4	6.1	6.9	7.8
16.0	0.0	0.2	0.4	0.7	1.1	1.5	2.1	2.6	3.3	4.0	4.7	5.5	6.3	7.2	8.0
16.5	0.0	0.2	0.4	0.7	1.1	1.6	2.1	2.7	3.4	4.1	4.9	5.7	6.5	7.4	8.2
17.0	0.0	0.2	0.4	0.7	1.1	1.6	2.2	2.8	3.5	4.2	5.0	5.9	6.7	7.6	8.5
17.5	0.0	0.2	0.4	0.8	1.2	1.7	2.2	2.9	3.6	4.4	5.2	6.0	6.9	7.8	8.8
18.0	0.0	0.2	0.4	0.8	1.2	1.7	2.3	3.0	3.7	4.5	5.3	6.2	7.1	8.1	9.0
18.5	0.1	0.2	0.5	0.8	1.2	1.8	2.4	3.1	3.8	4.6	5.5	6.4	7.3	8.3	9.2
19.0	0.1	0.2	0.5	0.8	1.3	1.8	2.4	3.1	3.9	4.8	5.6	6.6	7.5	8.5	9.5
19.5	0.1	0.2	0.5	0.8	1.3	1.9	2.5	3.2	4.0	4.9	5.8	6.7	7.7	8.7	9.8
20.0	0.1	0.2	0.5	0.9	1.3	1.9	2.6	3.3	4.1	5.0	5.9	6.9	7.9	9.0	10.0

Obtain from the predictions the high water and low water, one of which is before and the other after the time for which the height is required. The difference between the times of occurrence of these tides is the duration of rise or fall, and the difference between their heights is the range of tide for the above table. Find the difference between the nearest high or low water and the time for which the height is required.

Enter the table with the duration of rise or fall, printed in heavy-faced type, which most nearly agrees with the actual value, and on that horizontal line find the time from the nearest high or low water which agrees most nearly with the corresponding actual difference. The correction sought is in the column directly below, on the line with the range of tide.

When the nearest tide is high water, subtract the correction.

When the nearest tide is low water, add the correction.

know the height of the tide there at that time and date.

The George Washington Bridge is listed in table 2, Atlantic tide tables, as a subordinate station whose reference station is New York. Number 1527 in the extreme left column is the station number found by looking up George Washington Bridge in the index to table 2. Table 16-2 shows a specimen page. It lists constants, good on any date. You note that your time meridian is 75° W.; therefore, the times listed are zone time of zone plus 5. (All times used in the tables are standard times and must be adjusted if daylight saving or summer time is used.)

Four columns of differences are shown in the table: high water time difference, low water time difference, high water height difference, and low water height difference. Note that the time of high water for the George Washington Bridge is plus 0h 46m. This explanation means that high tides occur 46 minutes later at the bridge than they do at New York, the reference station. Similarly, low water occurs 43 minutes later at the bridge than tides at New York.

Under high water height difference you see the figure minus 0.6, meaning that the height of high water at the George Washington Bridge is 0.6 foot less than the height of high water at New York. In like manner, the low water height is found to be the same as the height at the reference station.

You now have all the data needed to apply to the information given in table 1 (table 16-1). In that table, run down the column to the date concerned (5 September). You note the following times and heights of high and low waters:

SEPTEMBER

DAY	TIME H.M.	HT. FT.
5	0242	-0.6
TU	0842	5.4
	1500	-0.5
	2100	5.6

Applying the tidal difference for the George Washington Bridge (+ 46m), you find that high tide occurs at 0928 (0842 + 46). Low tide occurs at 1543 (1500 + 43), 43 minutes later than at the Battery.

You want to know the height of the tide at 1100, a time somewhere between the times of high and low water. Inasmuch as 1100 is later than time of high water, you know that the tide is falling (ebbing) at that time. By subtracting 0928 from 1543, you find that it takes 6h 15m for the tide to go all the way out at the bridge. Subtracting 0928 (time of high water) from 1100, you learn that the time you are concerned with is 1h 32m past high water. Note that the time you are interested in (1100) occurs 4h 43m before low water. Always select the high or low tide that gives you the smallest time difference. In this problem, you would choose the high tide, so that the time difference is 1h 32m.

Table 16-1 tells you that the height of high water at the reference station is 5.4. From table 16-2 you learned that the height of high water at the George Washington Bridge is 0.6 foot less than it is at the reference station. Therefore, the height of water at the bridge is 4.8 feet.

The height of low water at the bridge is the same as the low water at the reference station, which is minus 0.5 foot. Subtract -0.5 from 4.8 feet (height of high water at the bridge), and you find the range of the tide at the bridge is 5.3 feet.

Turning to table 3 (table 16-3), you can find the height of the tide at any time. You know that the duration of fall in this instance is 6h 15m and that the time you are concerned with is 1h 32m past high water. Table 3 should then he entererd with 6h 20m (closest listed time to 6h 15m). Run across to 1h 29m in the seventh column. (Time 1h 29m is the closest time to 1h 32m.)

Proceed down this column to the Correction to Height part of the table. You know that the range at the bridge is 5.3 feet, and the closest value to this figure listed in the Range of Tide column (at the left of the table) is 5.5 feet. Where the 5.5 range of tide line intersects the time from nearest high water column, you read the correction to height, which is 0.7 foot. The tide will have fallen this amount below high tide by 1100. By subtracting 0.7 foot from the height of high water at the bridge (4.8 feet), you learn that the height of the tide at 1100 will be 4.1 feet. (Remember that all times listed are standard times and New York is on daylight saving time during September.)

TIDAL CURRENTS

You already have seen that tide is the vertical rise and fall of the ocean water level caused by the attraction of the sun and moon. A tidal current is the periodic alternating horizontal response of the water to the tidal forces which causes the rise and fall of the tide. Tidal currents are so called to distinguish them from ocean or river currents.

Table 16-4.–Predictions for Reference Station

69.79

THE NARROWS, NEW YORK HARBOR, N.Y., 1967

F-FLOOD, DIR. 340° TRUE E-EBB, DIR. 160° TRUE

SEPTEMBER								OCTOBER							
DAY	SLACK WATER TIME H.M.	MAXIMUM CURRENT TIME H.M.	VEL. KNOTS	DAY	SLACK WATER TIME H.M.	MAXIMUM CURRENT TIME H.M.	VEL. KNOTS	DAY	SLACK WATER TIME H.M.	MAXIMUM CURRENT TIME H.M.	VEL. KNOTS	DAY	SLACK WATER TIME H.M.	MAXIMUM CURRENT TIME H.M.	VEL. KNOTS
1	0154	0412	1.2F	16	0230	0524	1.6F	1	0154	0430	1.6F	16	0236	0536	1.7F
F	0654	1006	1.7E	SA	0754	1106	1.9E	SU	0718	1036	2.1E	M	0812	1124	1.9E
	1342	1630	1.8F		1436	1742	1.8F		1412	1648	1.9F		1506	1754	1.6F
	1936	2248	2.0E		2018	2336	2.0E		1948	2300	2.2E		2030	2342	1.9E
2	0236	0500	1.4F	17	0312	0606	1.7F	2	0236	0512	1.9F	17	0318	0606	1.8F
SA	0742	1100	1.9E	SU	0836	1154	1.9E	M	0812	1124	2.3E	TU	0854	1212	2.0E
	1430	1712	2.0F		1524	1818	1.8F		1500	1736	2.1F		1548	1824	1.6F
	2018	2336	2.2E		2100				2036	2348	2.3F		2106		
3	0318	0542	1.7F	18		0018	2.0E	3	0318	0554	2.2F	18		0024	1.9E
SU	0830	1148	2.1E	M	0354	0636	1.7F	TU	0900	1218	2.5E	W	0354	0636	1.8F
	1518	1800	2.1F		0918	1236	2.0E		1548	1818	2.2F		0930	1254	2.0E
	2106				1606	1848	1.8F		2124				1630	1848	1.5F
					2136								2142		
4		0024	2.3E	19		0100	2.0E	4		0036	2.4E	19		0100	1.9E
M	0354	0624	1.9F	TU	0430	0706	1.7F	W	0400	0642	2.4F	TH	0430	0700	1.8F
	0918	1242	2.3F		1000	1318	2.0E		0948	1306	2.6E		1012	1336	2.0F
	1606	1842	2.2F		1648	1918	1.7F		1636	1906	2.1F		1712	1924	1.4F
	2148				2218				2206				2224		
5		0106	2.4E	20		0136	2.0E	5		0124	2.5E	20		0142	1.8E
TU	0436	0706	2.1F	W	0506	0736	1.7F	TH	0442	0724	2.4F	F	0506	0736	1.8F
	1006	1330	2.4E		1042	1400	2.0E		1036	1354	2.7E		1054	1412	2.0E
	1654	1924	2.2F		1730	1948	1.6F		1724	1954	2.0F		1754	2000	1.3F
	2236				2254				2254				2300		
6		0154	2.5E	21		0212	2.0E	6		0212	2.4E	21		0218	1.7E
W	0512	0746	2.2F	TH	0542	0812	1.7F	F	0530	0812	2.4F	SA	0536	0818	1.7F
	1100	1412	2.5E		1124	1436	2.0E		1130	1442	2.6E		1136	1454	1.9E
	1742	2012	2.1F		1812	2030	1.4F		1818	2042	1.9F		1836	2042	1.2F
	2324				2330				2342				2342		
7		0236	2.5E	22		0248	1.9E	7		0254	2.3E	22		0254	1.6E
TH	0600	0836	2.2F	F	0618	0848	1.6F	SA	0618	0906	2.3F	SU	0612	0900	1.6F
	1148	1500	2.5E		1200	1518	1.9E		1224	1536	2.5E		1218	1530	1.8E
	1836	2106	1.9F		1900	2112	1.3F		1918	2142	1.7F		1924	2136	1.1F
8	0006	0318	2.4E	23	0012	0324	1.7E	8	0036	0348	2.1E	23	0024	0330	1.5E
F	0642	0930	2.2F	SA	0654	0936	1.6F	SU	0712	1000	2.1F	M	0654	0954	1.5F
	1242	1554	2.4E		1248	1554	1.8E		1318	1630	2.2E		1300	1612	1.7F
	1930	2200	1.8F		1948	2200	1.1F		2018	2242	1.5F		2018	2224	1.0F
9	0100	0406	2.2E	24	0054	0400	1.6E	9	0130	0442	1.9E	24	0112	0412	1.4E
SA	0736	1024	2.1F	SU	0736	1024	1.5F	M	0818	1100	1.9F	TU	0748	1042	1.5F
	1336	1648	2.2E		1330	1642	1.6E		1412	1730	2.0E		1348	1706	1.6E
	2036	2254	1.6F		2048	2254	1.0F		2124	2342	1.3F		2118	2318	1.0F
10	0148	0500	2.0E	25	0136	0442	1.4E	10	0230	0548	1.7E	25	0206	0512	1.3E
SU	0836	1124	2.0F	M	0830	1112	1.5F	TU	0924	1206	1.8F	W	0854	1136	1.4F
	1436	1748	2.0E		1418	1736	1.5E		1512	1836	1.9E		1442	1806	1.6E
	2142	2354	1.4F		2148	2342	1.0F		2224				2206		
11	0248	0606	1.8E	26	0230	0542	1.3E	11		0048	1.2F	26		0012	1.0F
M	0942	1224	1.8F	TU	0924	1206	1.4F	W	0330	0654	1.6E	TH	0300	0624	1.3F
	1536	1900	1.9E		1512	1842	1.5E		1030	1312	1.6F		0954	1230	1.4F
	2242				2242				1618	1942	1.8E		1536	1912	1.6E
									2324				2300		
12		0100	1.2F	27		0036	0.9F	12		0206	1.2F	27		0100	1.1F
TU	0348	0718	1.7E	W	0324	0654	1.3E	TH	0442	0806	1.6E	F	0406	0730	1.5E
	1042	1330	1.7F		1024	1254	1.4F		1130	1430	1.5F		1054	1324	1.4F
	1642	2006	1.9E		1612	1942	1.6E		1718	2042	1.9E		1636	2006	1.8E
	2348				2336								2348		
13		0224	1.2F	28		0130	1.0F	13	0018	0312	1.3F	28		0200	1.3F
W	0500	0818	1.7E	TH	0430	0800	1.4E	F	0548	0900	1.7E	SA	0506	0824	1.7E
	1148	1448	1.7F		1124	1354	1.4F		1230	1536	1.5F		1154	1424	1.5F
	1748	2106	1.9E		1712	2036	1.7E		1818	2136	1.9F		1736	2054	1.9E
14	0048	0336	1.2F	29	0024	0236	1.1F	14	0112	0412	1.5F	29	0030	0300	1.5F
TH	0606	0918	1.7E	F	0536	0854	1.6E	SA	0642	0954	1.8E	SU	0606	0918	2.0E
	1248	1600	1.7F		1224	1500	1.5F		1324	1630	1.6F		1254	1524	1.6F
	1848	2200	2.0E		1812	2130	1.9E		1906	2218	1.9E		1830	2142	2.1E
15	0142	0436	1.4F	30	0112	0336	1.3F	15	0154	0500	1.6F	30	0118	0354	1.8F
F	0700	1012	1.8E	SA	0630	0942	1.8E	SU	0730	1042	1.9E	M	0700	1012	2.2E
	1348	1654	1.8F		1318	1600	1.7F		1418	1718	1.6F		1348	1624	1.8F
	1936	2248	2.0E		1900	2218	2.1E		1948	2300	1.9E		1918	2230	2.2E
												31	0200	0448	2.1F
												TU	0748	1100	2.4E
													1442	1712	1.9F
													2006	2318	2.3E

TIME MERIDIAN 75° W. 0000 IS MIDNIGHT. 1200 IS NOON.

The horizontal motions of water, which reverses its direction of flow during a tidal cycle, are called flood current and ebb current. The flood current sets toward and the ebb current away from the coast, or the flood and ebb currents set parallel to the coast in opposite directions. At each reversal of the current direction, there is an instant or short period of no horizontal motion called slack water.

At first glance, you might be inclined to presume that the time of a tidal current's change of direction should coincide with the time of the changing tide. To the contrary, the change of direction of the current always lags the turning of the tide by an interval that varies according to the physical characteristics of the land around the body of tidewater. For instance, along a relatively straight coast with only shallow indentations, usually there is little difference between the time of high or low tide and the time of slack water. But where a large bay connects with the ocean through a narrow channel, the tide and the current may be out of phase by as much as 3 hours. In such a situation, the current in the channel may be running at its greatest velocity when it is high or low water outside.

The navigator of a ship operating in tidewater must know the direction (called set) and velocity (called drift) of any tidal current his ship may encounter. This information is obtained from tidal current tables.

CURRENT TABLES

Tidal Current Tables is published annually by the Coast and Geodetic Survey. This publication is divided into predictions for reference stations (table 16-4) and current differences and other constants for subordinate stations (table 16-5). Table 16-4 lists predicted times of slack water and predicted times and velocities of maximum flood and ebb at the reference stations for each day of the year.

Table 16-5 includes the latitude and longitude of each subordinate station, time differences for slack water and maximum current, velocity ratios for maximum flood and ebb, and direction and average velocity for maximum flood and ebb currents.

Time differences are applied to the times of slack and maximum current at the reference station in the same manner that time differences are applied when figuring tides. Application of the time difference to the tabulated time of flood or ebb current produces the time of the corresponding current at the subordinate station. Maximum velocity at the subordinate station is found by multiplying the maximum velocity at the reference station by the appropriate flood or ebb ratio.

Flood direction is the approximate true direction toward which the flood current flows. Ebb direction is usually close to the reciprocal of the flood direction. Average flood and ebb velocities are averages of all the flood and ebb currents.

Table 3 in the *Tidal Current Tables* (table 16-6) is similar to table 3 in the tide tables. It is used for finding the velocity of the current at any time.

PREDICTING SET AND DRIFT OF CURRENT

Now let's see if we can determine the set and drift of the current at the George Washington Bridge for the same time (1100) on the same day for which we predicted the height of the tide. First, notice near the top of the page in table 16-5 that the current reference station for the George Washington Bridge is The Narrows, instead of the Battery as it was for the tide. You see the time differences for slack water and the maximum current are plus 1h 45m and plus 2h 00m. These time differences mean that when slack water or maximum current exists at The Narrows, the same conditions will exist 1h 45m and 2h 00m later, respectively, at the George Washington Bridge.

The flood velocity ratio is 0.9 and the ebb velocity ratio is 1.1. Before selecting the correct ratio, you must determine whether the current is flooding or ebbing at 1100.

Under the Maximum Currents columns, you find that the flood direction is 020° and that the ebb direction is the reciprocal, or 200°. The average flood velocity is 1.6 knots, and the average ebb velocity is 2.2 knots.

You now have all the values needed to find the conditions at the George Washington Bridge. These values are:

Time differences: +1h 45m—slack water
+2h 00m—max. current
Velocity ratios: 0.9—flood
1.1—ebb
Direction of current: 020°—flood
200°—ebb

2570

Table 16-5.–Current Differences and Constants

69.80

No.	PLACE	POSITION		TIME DIFFERENCES		VELOCITY RATIOS		MAXIMUM CURRENTS			
								Flood		Ebb	
		Lat.	Long	Slack water	Maximum current	Maximum flood	Maximum ebb	Direction (true)	Average velocity	Direction (true)	Average velocity
		° ′	° ′	h. m.	h. m.			deg.	knots	deg.	knots
	JAMAICA BAY	N.	W.	on THE NARROWS, p.52 *Time meridian, 75°W.*							
797	Rockaway Inlet	40 34	73 56	-1 45	-2 15	1.1	1.3	85	1.8	245	2.7
799	Barren Island, east of	40 35	73 53	-2 00	-2 25	0.7	0.9	5	1.2	190	1.7
801	Canarsie (midchannel, off Pier)	40 38	73 53	-1 35	-1 50	0.3	0.3	45	0.5	220	0.7
803	Beach Channel (bridge)	40 35	73 49	-1 20	-1 20	1.1	1.0	60	1.9	225	2.0
805	Grass Hassock Channel	40 37	73 47	-1 10	-1 00	0.6	0.5	50	1.0	230	1.0
	NEW YORK HARBOR ENTRANCE										
807	Ambrose Channel entrance	40 30	73 58	-1 10	-1 05	1.0	1.2	310	1.7	110	2.3
809	Ambrose Channel, SE. of West Bank Lt	40 32	74 01	(1)	-0 25	0.8	0.9	310	1.3	170	1.8
810	Coney Island Lt., 1.6 miles SSW. of	40 33	74 01	-0 10	(2)	0.5	0.8	330	0.8	145	1.5
811	Ambrose Channel, north end	40 34	74 02	+0 05	+0 15	0.8	0.9	330	1.3	175	1.9
813	Coney Island, 0.2 mile west of	40 35	74 01	-0 55	-0 55	0.9	1.0	330	1.5	170	2.0
815	Ft. Lafayette, channel east of	40 36	74 02	(3)	(3)	0.6	0.5	345	1.1	195	0.9
817	THE NARROWS, midchannel	40 37	74 03	Daily predictions				340	1.7	160	2.0
	NEW YORK HARBOR, Upper Bay										
819	Tompkinsville	40 38	74 04	-0 10	+0 20	0.9	1.0	5	1.6	170	2.0
821	Bay Ridge Channel	40 39	74 02	-0 35	-0 45	0.6	0.6	40	1.0	220	1.1
823	Red Hook Channel	40 40	74 01	-0 35	-0 35	0.6	0.4	355	1.0	170	0.7
825	Robbins Reef Light, east of	40 39	74 03	+0 10	+0 20	0.8	0.8	15	1.3	205	1.6
827	Red Hook, 1 mile west of	40 41	74 02	+0 45	+1 00	0.8	1.2	25	1.3	205	2.3
829	Statue of Liberty, east of	40 42	74 02	+0 55	+1 00	0.8	1.0	30	1.4	205	1.9
	HUDSON RIVER, Midchannel[4]										
831	The Battery, northwest of	40 43	74 02	+1 30	+1 35	0.9	1.2	15	1.5	195	2.3
833	Desbrosses Street	40 43	74 01	+1 35	+1 40	0.9	1.2	10	1.5	----	2.3
835	Chelsea Docks	40 45	74 01	+1 30	+1 40	1.0	1.0	20	1.7	185	2.0
837	Forty-second Street	40 46	74 00	+1 35	+1 45	1.0	1.2	30	1.7	----	2.3
839	Ninety-sixth Street	40 48	73 59	+1 40	+1 50	1.0	1.2	30	1.7	----	2.3
841	Grants Tomb, 123d Street	40 49	73 58	+1 45	+1 55	0.9	1.2	25	1.6	----	2.3
843	George Washington Bridge	40 51	73 57	+1 45	+2 00	0.9	1.1	20	1.6	200	2.2
845	Spuyten Duyvil	40 53	73 56	+2 00	+2 10	0.9	1.1	20	1.6	----	2.1
847	Riverdale	40 54	73 55	+2 05	+2 20	0.8	1.0	15	1.4	200	2.0
849	Dobbs Ferry	41 01	73 53	+2 25	+2 40	0.8	0.9	10	1.3	----	1.7
851	Tarrytown	41 05	73 53	+2 40	+2 55	0.6	0.8	0	1.1	----	1.5
853	Ossining	41 10	73 54	+2 55	+3 10	0.5	0.7	320	0.9	----	1.3
855	Haverstraw	41 12	73 57	+3 05	+3 15	0.5	0.7	335	0.8	----	1.3
857	Peekskill	41 17	73 57	+3 20	+3 35	0.5	0.6	0	0.8	----	1.2
859	Bear Mountain Bridge	41 19	73 59	+3 25	+3 40	0.5	0.6	0	0.9	----	1.1
861	Highland Falls	41 22	73 58	+3 35	+3 50	0.6	0.6	5	1.0	185	1.2
863	West Point, off Duck Island	41 24	73 57	+3 40	+3 55	[illegible]	0.6	10	1.0	----	1.1
865	Newburgh	41 30	74 00	+3 55	+4 15	[illegible]	0.6	5	0.9	----	1.1
867	New Hamburg	41 35	73 57	+4 10	+4 25	0.5	0.6	5	1.0	----	1.1
869	Poughkeepsie	41 42	73 57	+4 25	+4 45	0.6	0.6	5	1.1	----	1.2
871	Hyde Park	41 47	73 57	+4 35	+4 55	0.7	0.7	5	1.2	----	1.3

[1] Current is rotary, turning clockwise. Minimum current of 0.9 knot sets SW. about time of "Slack, flood begins" at The Narrows. Minimum current of 0.5 knot sets NE. about 1 hour before "Slack, ebb begins" at The Narrows.

[2] Maximum flood, $-0^h\ 50^m$; maximum ebb, $+0^h\ 55^m$.

[3] Flood begins, $-2^h\ 15^m$; maximum flood, $-0^h\ 05^m$; ebb begins, $+0^h\ 05^m$; maximum ebb, $-1^h\ 50^m$.

[4] The values for the Hudson River are for the summer months, when the fresh-water discharge is a minimum.

Table 16-6.–Velocity of Current at Any Time

69.81

TABLE A

Interval between slack and desired time	Interval between slack and maximum current													
	h. m. 1 20	h. m. 1 40	h. m. 2 00	h. m. 2 20	h. m. 2 40	h. m. 3 00	h. m. 3 20	h. m. 3 40	h. m. 4 00	h. m. 4 20	h. m. 4 40	h. m. 5 00	h. m. 5 20	h. m. 5 40
h. m.	f.	f.	f.	f.	f.	f.	f.	f.	f.	f.	f.	f.	f.	f.
0 20	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0 40	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
1 00	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3
1 20	1.0	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4
1 40	---	1.0	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4
2 00	---	---	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5
2 20	---	---	---	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6
2 40	---	---	---	---	1.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.7
3 00	---	---	---	---	---	1.0	1.0	1.0	0.9	0.9	0.8	0.8	0.8	0.7
3 20	---	---	---	---	---	---	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8
3 40	---	---	---	---	---	---	---	1.0	1.0	1.0	0.9	0.9	0.9	0.9
4 00	---	---	---	---	---	---	---	---	1.0	1.0	1.0	1.0	0.9	0.9
4 20	---	---	---	---	---	---	---	---	---	1.0	1.0	1.0	1.0	0.9
4 40	---	---	---	---	---	---	---	---	---	---	1.0	1.0	1.0	1.0
5 00	---	---	---	---	---	---	---	---	---	---	---	1.0	1.0	1.0
5 20	---	---	---	---	---	---	---	---	---	---	---	---	1.0	1.0
5 40	---	---	---	---	---	---	---	---	---	---	---	---	---	1.0

TABLE B

Interval between slack and desired time	Interval between slack and maximum current													
	h. m. 1 20	h. m. 1 40	h. m. 2 00	h. m. 2 20	h. m. 2 40	h. m. 3 00	h. m. 3 20	h. m. 3 40	h. m. 4 00	h. m. 4 20	h. m. 4 40	h. m. 5 00	h. m. 5 20	h. m. 5 40
h. m.	f.	f.	f.	f.	f.	f.	f.	f.	f.	f.	f.	f.	f.	f.
0 20	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2
0 40	0.8	0.7	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3
1 00	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4
1 20	1.0	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5
1 40	---	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6
2 00	---	---	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.6
2 20	---	---	---	1.0	1.0	1.0	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7
2 40	---	---	---	---	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.7
3 00	---	---	---	---	---	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8
3 20	---	---	---	---	---	---	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.8
3 40	---	---	---	---	---	---	---	1.0	1.0	1.0	1.0	0.9	0.9	0.9
4 00	---	---	---	---	---	---	---	---	1.0	1.0	1.0	1.0	0.9	0.9
4 20	---	---	---	---	---	---	---	---	---	1.0	1.0	1.0	1.0	0.9
4 40	---	---	---	---	---	---	---	---	---	---	1.0	1.0	1.0	1.0
5 00	---	---	---	---	---	---	---	---	---	---	---	1.0	1.0	1.0
5 20	---	---	---	---	---	---	---	---	---	---	---	---	1.0	1.0
5 40	---	---	---	---	---	---	---	---	---	---	---	---	---	1.0

Use Table A for all places except those listed below for Table B.

Use Table B for Cape Cod Canal, Hell Gate, Chesapeake and Delaware Canal and all stations in Table 2 which are referred to them.

1. From predictions find the time of slack water and the time and velocity of maximum current (flood or ebb), one of which is immediately before and the other after the time for which the velocity is desired.
2. Find the interval of time between the above slack and maximum current, and enter the top of Table A or B with the interval which most nearly agrees with this value.
3. Find the interval of time between the above slack and the time desired, and enter the side of Table A or B with the interval which most nearly agrees with this value.
4. Find, in the table, the factor corresponding to the above two intervals, and multiply the maximum velocity by this factor. The result will be the approximate velocity at the time desired.

Turning to table 16-4, The Narrows, you find the following data:

DAY	SLACK WATER TIME	TIME	MAXIMUM CURRENT VELOCITY
	H.M.	H.M.	KNOTS
5		0106	2.4E
TU	0436	0706	2.1F
	1006	1330	2.4E
	1654	1924	2.2F
	2236		

It is seen that the time of maximum current is 0706 and that the slack water occurs at 1006. You choose these values because you can see that 1006 plus the time correction gives you a slack water time at the bridge greater than 1100. If you chose instead a maximum current at time 1330, you would find that both times are greater than 1100 and you would not straddle the desired time.

You want to know the set and drift of the current at the bridge at 1100. At the bridge the maximum current velocity occurs 2h 00m after the maximum velocity at The Narrows. Therefore, the maximum current velocity–and in this example it is a flood velocity– occurs at 0906. By the same method, the slack water occurs at the bridge at 1151. Because the current is flooding from 0906 to 1151, you have established a flood current at 1100; hence, you will use the flood ratio.

Multiplying the maximum flood velocity at The Narrows (2.1 knots) by the flood ratio for the bridge (0.9), you arrive at a value of 1.9 knots for the maximum flood velocity at the bridge.

Now turn to table 3 of the *Tidal Current Tables* (table 16-6) and figure the velocity of the current at the bridge at 1100. You enter the table with the interval between slack and maximum current (1151 - 0906 or 2h 45m) and the interval between slack and desired time (1151 - 1100 or 0h 51m). The value in the table closest to the former time is 2h 40m. The value closest to the latter time is 1h 00m. Where these two lines intersect in the table you find the correction value of 0.6. Multiply the velocity of the maximum flood current (1.9 knots) by this factor and you get the velocity at 1100, which is 1.1 knots.

What is the direction, or set? You know that the current still is flooding at this time, and the flood direction is 020°, which is the set.

VARIANCE OF PREDICTED FROM ACTUAL CONDITIONS

In using both the tide and the current tables, you must bear in mind that frequently actual conditions vary considerably from predicted conditions in the tables. Changes in wind force and direction, or variations in atmospheric pressure, produce variations in the ocean water level, especially the high water height. For instance, a hurricane struck the New England coast in September 1938, piling up a tremendous wall of water in Narragansett Bay and increasing it to the point where, when it struck the city of Providence, it assumed the proportions of a huge storm wave. Generally speaking, the actual heights of both high- and low-water level are higher than the predicted heights with an onshore wind or a low barometer. With an offshore wind or a high barometer, those heights usually are lower than predicted.

When working with the tidal current tables, remember that the actual times of slack or strength of current may sometimes differ from the predicted times by as much as 1/2 hour. On rare occasions the difference may be as much as 1 hour. A record of comparison between predicted and observed times of slack water, however, shows that more than 90 percent of slack water predictions are accurate to within 1/2 hour. Consequently, in order to make certain of getting the full advantage of a favorable current or slack water, the navigator may plan to reach an entrance or strait 1/2 hour before the predicted time of the desired condition of the current.

Winds, variations in stream discharges produced by heavy rain, and other weather factors frequently have an effect upon direction and velocity of current. When any of these phenomena occur, actual current conditions vary from those predicted. The ability to estimate the amount by which they vary can be acquired only through experience.

SUNRISE AND SUNSET

You probably know that practically the only time for obtaining observations of the heavenly bodies (with the exception of the sun and moon) is during morning and evening twilight, when both the stars and the horizon are visible. Morning twilight in middle latitudes normally begins nearly 30 minutes before sunrise. By approximately 15 minutes before sunrise, the stars usually fade to the point where observations no longer are possible. Observations in the evening usually are possible from between 15 and 30 minutes after sunset.

The foregoing times are only approximate, and they vary with change of latitude. Unusual conditions of visibility also cause them to vary somewhat. In any event, you can see that it is essential for the navigator to know the time when sunrise or sunset will occur. In port, when no observations are taken, the time of sunrise or sunset still is important in connection with making evening colors, lights, and the like.

SUNRISE AND SUNSET BY TIDE TABLES

Tide Tables contain tables for determining times of sunrise and sunset. These tables differ from those given in the *Nautical Almanac* in that times are given for every fifth day instead of every third day in the year.

You can see at once that, inasmuch as the times are given only for every fifth day, some interpolation is required for the days between. The same requirement is applicable to routine interpolation for latitude.

From the tide tables, let's try to find the time of sunrise and sunset at Hampton Roads on 23 June 1967. Latitude is 36°57′N., longitude 76°20′W.

Table 16-7 shows you the appropriate page from the 1967 Tide Tables. Note that 23 June falls between tabulations for 20 June and 25 June, and that latitude 37°N. falls between 36°N. and 38°N. Consequently you make a two-way interpolation as follows:

1. Interpolate time of sunrise between 36°N. and 38°N. for 20 June. . . . 0440
2. Interpolate time of sunrise between 36°N. and 38°N. for 25 June. . . . 0441
3. Interpolate between 0440 and 0441 to get sunrise for 37°N. on 23 June. 0441 (Actual interpolated value is 0440.5 but the usual practice is to round off fractions to the nearest whole number.)

Time of sunrise	36°N.	37°N.	38° N.
20 June -------	0443	0440	0437
25 June -------	0444	0441	0438
23 June -------	----	0441	----

A correction for longitude can be found in table 5 of the *Tide Tables*. The difference of longitude between local and standard meridian is listed in one column, and the correction to local mean time is given alongside the Difference of Longitude column. For a longitude of 76° 20′ W., the correction is plus 5m. Therefore, the time of sunrise at Hampton Roads is 0446 zone time.

Compute the time of sunset at Hampton Roads in exactly the same way.

	36°N.	37°N.	38°N.
20 June -------	1920	1923	1926
25 June -------	1921	1924	1926
23 June -------	----	1924	----

Correction for longitude is plus 5m, so zone time of sunset for Hampton Roads on this day was 1929.

Time of sunrise and sunset for south latitude is figured from the south latitude tables in the same manner.

SUNRISE AND SUNSET BY NAUTICAL ALMANAC

Because the subjects sunrise and sunset are brought up here, it is appropriate to include a discussion of these times by the *Nautical Almanac*.

Data for finding times of sunrise, sunset, and twilight are given for latitudes between 60°S. and 72°N. on the daily pages of the *Nautical Almanac*. Sunrise, sunset, and the beginning and ending of twilight are given for the middle day of 3 days, and are sufficiently accurate to apply to the other 2 days. The times are applicable along any standard time meridian.

Now let's find the time of sunrise and sunset for Hampton Roads on 25 June 1967. Table 16-8 shows the right-hand page of the *Nautical Almanac* for the dates 24, 25, and 26 June 1967. A column headed Sunrise is shown on the upper right portion of the page. You see a time of sunrise tabulated for latitude 35°N. (0447), and another for latitude 40°N. (0432). You must interpolate between the two times for latitude 37°N. For a 5° difference in latitude (40 - 35°), you have a 15m difference in time (0447 - 0432). The latitude you want is 37°N.; hence, the interpolation is two-fifths of 15m, or 6m. Sunrise is earlier as the latitude becomes higher, so sunrise at 37°N is 6m earlier than it is at 35°N. Consequently, sunrise at 37°N. is 0441 (0447 - 6m). As already mentioned, time is local mean time (LMT) of sunrise. Sunrise occurs in 37°N. at this LMT all the way around the world. To convert this LMT to standard time, apply the difference in longitude between your local meridian and your standard time meridian. In this example, it is the 75th.

Table 16-7.–Sunrise and Sunset from Tide Tables 69.82

Date	30° N.		32° N.		34° N.		36° N.		38° N.		40° N.	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h m.	h. m.	h. m.	h. m.	h. m.	h. m.
Jan. 1	6 56	17 11	7 01	17 07	7 06	17 02	7 11	16 57	7 16	16 51	7 22	16 44
6	6 57	17 15	7 02	17 11	7 06	17 06	7 11	17 01	7 17	16 56	7 22	16 49
11	6 57	17 19	7 02	17 15	7 06	17 10	7 11	17 05	7 16	17 00	7 22	16 54
16	6 57	17 23	7 01	17 19	7 05	17 15	7 10	17 10	7 15	17 05	7 20	17 00
21	6 56	17 27	6 59	17 24	7 04	17 20	7 08	17 15	7 12	17 11	7 18	17 05
26	6 54	17 32	6 57	17 28	7 01	17 25	7 05	17 21	7 09	17 16	7 14	17 11
31	6 51	17 36	6 55	17 33	6 58	17 29	7 02	17 26	7 06	17 22	7 10	17 17
Feb. 5	6 48	17 40	6 51	17 37	6 54	17 34	6 58	17 31	7 01	17 27	7 05	17 23
10	6 45	17 44	6 47	17 42	6 50	17 39	6 53	17 36	6 56	17 33	7 00	17 29
15	6 41	17 48	6 43	17 46	6 45	17 44	6 48	17 41	6 50	17 39	6 54	17 35
20	6 36	17 52	6 38	17 50	6 40	17 48	6 42	17 46	6 44	17 44	6 47	17 41
25	6 31	17 56	6 32	17 55	6 34	17 53	6 36	17 51	6 39	17 49	6 41	17 47
Mar. 2	6 26	17 59	6 27	17 58	6 28	17 57	6 29	17 56	6 31	17 54	6 33	17 52
7	6 20	18 03	6 21	18 02	6 22	18 01	6 23	18 00	6 25	17 59	6 26	17 58
12	6 14	18 06	6 14	18 06	6 15	18 05	6 16	18 05	6 17	18 04	6 18	18 03
17	6 09	18 09	6 09	18 09	6 09	18 09	6 09	18 09	6 10	18 09	6 10	18 08
22	6 02	18 12	6 02	18 12	6 02	18 13	6 02	18 13	6 02	18 13	6 02	18 13
27	5 56	18 15	5 56	18 16	5 55	18 17	5 54	18 17	5 53	18 18	5 53	18 18
Apr. 1	5 50	18 18	5 49	18 20	5 48	18 21	5 47	18 22	5 46	18 23	5 45	18 24
6	5 44	18 21	5 43	18 23	5 41	18 24	5 40	18 26	5 38	18 27	5 37	18 29
11	5 39	18 24	5 36	18 26	5 35	18 28	5 33	18 30	5 32	18 32	5 30	18 34
16	5 33	18 27	5 31	18 30	5 29	18 32	5 26	18 34	5 24	18 37	5 22	18 39
21	5 28	18 31	5 26	18 33	5 23	18 36	5 20	18 39	5 17	18 41	5 15	18 44
26	5 23	18 34	5 19	18 37	5 17	18 40	5 13	18 43	5 10	18 46	5 08	18 49
May 1	5 18	18 37	5 14	18 40	5 11	18 43	5 08	18 47	5 04	18 51	5 01	18 54
6	5 14	18 40	5 10	18 44	5 06	18 47	5 03	18 51	4 59	18 55	4 55	18 59
11	5 10	18 43	5 06	18 47	5 02	18 51	4 58	18 55	4 54	19 00	4 49	19 04
16	5 06	18 47	5 02	18 51	4 58	18 55	4 54	18 59	4 49	19 04	4 45	19 09
21	5 04	18 50	4 59	18 54	4 55	18 59	4 50	19 03	4 45	19 08	4 40	19 13
26	5 01	18 53	4 57	18 57	4 52	19 02	4 47	19 07	4 42	19 12	4 37	19 18
31	5 00	18 56	4 55	19 00	4 50	19 05	4 45	19 11	4 40	19 16	4 34	19 21
June 5	4 59	18 58	4 54	19 03	4 49	19 08	4 43	19 14	4 38	19 19	4 32	19 25
10	4 58	19 00	4 53	19 05	4 48	19 11	4 43	19 17	4 37	19 22	4 31	19 28
15	4 58	19 02	4 53	19 07	4 48	19 13	4 43	19 18	4 37	19 24	4 30	19 30
20	4 59	19 04	4 54	19 09	4 49	19 14	4 43	19 20	4 37	19 26	4 31	19 32
25	5 00	19 05	4 55	19 10	4 50	19 15	4 44	19 21	4 38	19 26	4 32	19 33
30	5 02	19 05	4 57	19 10	4 52	19 15	4 46	19 21	4 40	19 27	4 34	19 33
July 5	5 04	19 05	4 59	19 10	4 54	19 15	4 49	19 20	4 43	19 26	4 36	19 32
10	5 06	19 04	5 02	19 09	4 57	19 14	4 51	19 19	4 46	19 25	4 39	19 31
15	5 09	19 03	5 04	19 07	5 00	19 12	4 54	19 17	4 49	19 22	4 43	19 28
20	5 11	19 01	5 07	19 05	5 03	19 10	4 58	19 14	4 53	19 19	4 47	19 25
25	5 14	18 58	5 10	19 02	5 06	19 06	5 02	19 11	4 57	19 16	4 51	19 21
30	5 17	18 55	5 14	18 59	5 10	19 03	5 05	19 07	5 01	19 11	4 56	19 17
Aug. 4	5 20	18 52	5 17	18 55	5 13	18 58	5 09	19 02	5 05	19 06	5 00	19 11
9	5 23	18 47	5 20	18 50	5 17	18 54	5 13	18 57	5 09	19 01	5 05	19 05
14	5 26	18 43	5 24	18 45	5 21	18 48	5 17	18 52	5 14	18 55	5 10	18 59
19	5 29	18 38	5 27	18 40	5 24	18 43	5 21	18 45	5 18	18 48	5 14	18 52
24	5 32	18 33	5 30	18 34	5 28	18 37	5 25	18 39	5 23	18 42	5 19	18 45
29	5 35	18 27	5 33	18 28	5 31	18 30	5 29	18 32	5 27	18 34	5 24	18 37
Sept. 3	5 38	18 21	5 36	18 22	5 35	18 24	5 33	18 25	5 31	18 28	5 29	18 30
8	5 40	18 15	5 39	18 16	5 38	18 17	5 37	18 18	5 35	18 19	5 34	18 22
13	5 43	18 09	5 42	18 10	5 42	18 11	5 41	18 11	5 40	18 12	5 38	18 13
18	5 46	18 03	5 46	18 03	5 45	18 04	5 44	18 04	5 43	18 05	5 43	18 05
23	5 48	17 56	5 48	17 56	5 48	17 57	5 48	17 57	5 48	17 57	5 48	17 57
28	5 51	17 50	5 51	17 50	5 52	17 49	5 52	17 49	5 53	17 49	5 53	17 49
Oct. 3	5 54	17 44	5 55	17 43	5 56	17 42	5 56	17 41	5 57	17 41	5 57	17 40
8	5 57	17 38	5 58	17 36	5 59	17 35	6 00	17 34	6 01	17 33	6 02	17 32
13	6 00	17 32	6 02	17 31	6 03	17 29	6 05	17 27	6 06	17 26	6 08	17 25
18	6 03	17 27	6 05	17 25	6 07	17 23	6 09	17 21	6 11	17 19	6 13	17 17
23	6 07	17 22	6 09	17 19	6 11	17 17	6 14	17 15	6 16	17 12	6 18	17 10
28	6 10	17 17	6 13	17 14	6 16	17 12	6 18	17 09	6 21	17 06	6 24	17 04
Nov. 2	6 14	17 13	6 17	17 10	6 20	17 07	6 23	17 04	6 26	17 00	6 29	16 57
7	6 18	17 09	6 22	17 06	6 25	17 02	6 28	16 59	6 32	16 55	6 35	16 52
12	6 22	17 06	6 26	17 02	6 29	16 59	6 33	16 55	6 37	16 51	6 41	16 47
17	6 26	17 03	6 30	16 59	6 34	16 56	6 38	16 51	6 43	16 47	6 47	16 43
22	6 30	17 01	6 35	16 57	6 39	16 53	6 43	16 49	6 48	16 44	6 52	16 39
27	6 34	17 00	6 39	16 56	6 44	16 52	6 48	16 47	6 53	16 42	6 58	16 37
Dec. 2	6 38	17 00	6 43	16 55	6 48	16 51	6 53	16 46	6 58	16 41	7 03	16 35
7	6 42	17 00	6 47	16 56	6 52	16 51	6 57	16 46	7 02	16 40	7 08	16 35
12	6 46	17 01	6 51	16 56	6 56	16 52	7 01	16 46	7 07	16 41	7 12	16 35
17	6 49	17 03	6 54	16 58	6 59	16 53	7 04	16 48	7 10	16 42	7 16	16 36
22	6 52	17 05	6 56	17 00	7 01	16 55	7 07	16 49	7 12	16 44	7 18	16 38
27	6 54	17 08	6 59	17 03	7 04	16 58	7 09	16 53	7 15	16 47	7 20	16 41
Jan. 1	6 56	17 11	7 01	17 07	7 06	17 01	7 11	16 56	7 16	16 50	7 22	16 44

Local mean time. To obtain standard time of rise or set, see Table 5.

Table 16-8.–Sunrise and Sunset from Nautical Almanac 69.146

G.M.T.	SUN G.H.A.	SUN Dec.	MOON G.H.A.	MOON v	MOON Dec.	MOON d	MOON H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
24 00	179 29·0	N23 26·0	333 39·9	6·6	S26 04·9	5·8	57·6
01	194 28·9	25·9	348 05·5	6·8	25 59·1	5·9	57·6
02	209 28·7	25·9	2 31·3	6·8	25 53·2	6·1	57·5
03	224 28·6	.. 25·9	16 57·1	6·9	25 47·1	6·3	57·5
04	239 28·5	25·8	31 23·0	7·0	25 40·8	6·4	57·5
05	254 28·3	25·8	45 49·0	7·2	25 34·4	6·5	57·5
06	269 28·2	N23 25·8	60 15·2	7·2	S25 27·9	6·7	57·4
07	284 28·1	25·7	74 41·4	7·4	25 21·2	6·8	57·4
S 08	299 27·9	25·7	89 07·8	7·4	25 14·4	7·0	57·4
A 09	314 27·8	.. 25·7	103 34·2	7·6	25 07·4	7·1	57·3
T 10	329 27·7	25·6	118 00·8	7·7	25 00·3	7·2	57·3
U 11	344 27·5	25·6	132 27·5	7·8	24 53·1	7·3	57·3
R 12	359 27·4	N23 25·5	146 54·3	7·9	S24 45·8	7·5	57·2
D 13	14 27·3	25·5	161 21·2	8·0	24 38·3	7·7	57·2
A 14	29 27·1	25·5	175 48·2	8·2	24 30·6	7·7	57·2
Y 15	44 27·0	25·4	190 15·4	8·2	24 22·9	7·9	57·1
16	59 26·9	.. 25·4	204 42·6	8·4	24 15·0	8·0	57·1
17	74 26·7	25·3	219 10·0	8·5	24 07·0	8·1	57·1
18	89 26·6	N23 25·3	233 37·5	8·6	S23 58·9	8·3	57·0
19	104 26·5	25·2	248 05·1	8·7	23 50·6	8·3	57·0
20	119 26·3	25·2	262 32·8	8·8	23 42·3	8·5	57·0
21	134 26·2	.. 25·1	277 00·6	9·0	23 33·8	8·6	56·9
22	149 26·1	25·1	291 28·6	9·0	23 25·2	8·7	56·9
23	164 25·9	25·0	305 56·6	9·2	23 16·5	8·9	56·9
25 00	179 25·8	N23 25·0	320 24·8	9·3	S23 07·6	8·9	56·8
01	194 25·7	24·9	334 53·1	9·4	22 58·7	9·1	56·8
02	209 25·5	24·9	349 21·5	9·5	22 49·6	9·2	56·8
03	224 25·4	.. 24·8	3 50·0	9·7	22 40·4	9·3	56·8
04	239 25·3	24·8	18 18·7	9·7	22 31·1	9·3	56·7
05	254 25·1	24·7	32 47·4	9·9	22 21·8	9·5	56·7
06	269 25·0	N23 24·7	47 16·3	10·0	S22 12·3	9·6	56·7
07	284 24·9	24·6	61 45·3	10·1	22 02·7	9·7	56·6
08	299 24·7	24·6	76 14·4	10·2	21 53·0	9·8	56·6
S 09	314 24·6	.. 24·5	90 43·6	10·3	21 43·2	9·9	56·6
U 10	329 24·5	24·5	105 12·9	10·5	21 33·3	10·0	56·5
N 11	344 24·3	24·4	119 42·4	10·5	21 23·3	10·1	56·5
D 12	359 24·2	N23 24·3	134 11·9	10·7	S21 13·2	10·2	56·5
A 13	14 24·1	24·3	148 41·6	10·8	21 03·0	10·3	56·4
Y 14	29 23·9	24·2	163 11·4	10·9	20 52·7	10·3	56·4
15	44 23·8	.. 24·2	177 41·3	11·0	20 42·4	10·5	56·4
16	59 23·7	24·1	192 11·3	11·1	20 31·9	10·5	56·4
17	74 23·5	. 24·0	206 41·4	11·3	20 21·4	10·7	56·3
18	89 23·4	N23 24·0	221 11·7	11·3	S20 10·7	10·7	56·3
19	104 23·3	23·9	235 42·0	11·4	20 00·0	10·8	56·3
20	119 23·1	23·8	250 12·4	11·6	19 49·2	10·9	56·2
21	134 23·0	.. 23·8	264 43·0	11·7	19 38·3	11·0	56·2
22	149 22·9	23·7	279 13·7	11·8	19 27·3	11·0	56·2
23	164 22·7	23·7	293 44·5	11·8	19 16·3	11·1	56·1
26 00	179 22·6	N23 23·6	308 15·3	12·0	S19 05·2	11·2	56·1
01	194 22·5	23·5	322 46·3	12·1	18 54·0	11·3	56·1
02	209 22·3	23·4	337 17·4	12·2	18 42·7	11·4	56·1
03	224 22·2	.. 23·4	351 48·6	12·3	18 31·3	11·4	56·0
04	239 22·1	23·3	6 19·9	12·4	18 19·9	11·5	56·0
05	254 21·9	23·2	20 51·3	12·5	18 08·4	11·6	56·0
06	269 21·8	N23 23·2	35 22·8	12·7	S17 56·8	11·6	55·9
07	284 21·7	23·1	49 54·5	12·7	17 45·2	11·7	55·9
08	299 21·6	23·0	64 26·2	12·8	17 33·5	11·8	55·9
M 09	314 21·4	.. 23·0	78 58·0	12·9	17 21·7	11·8	55·9
O 10	329 21·3	22·9	93 29·9	13·0	17 09·9	11·9	55·8
N 11	344 21·2	22·8	108 01·9	13·1	16 58·0	12·0	55·8
D 12	359 21·0	N23 22·7	122 34·0	13·2	S16 46·0	12·0	55·8
A 13	14 20·9	22·7	137 06·2	13·3	16 34·0	12·1	55·8
Y 14	29 20·8	22·6	151 38·5	13·4	16 21·9	12·1	55·7
15	44 20·6	.. 22·5	166 10·9	13·5	16 09·8	12·2	55·7
16	59 20·5	22·4	180 43·4	13·5	15 57·6	12·3	55·7
17	74 20·4	22·3	195 15·9	13·7	15 45·3	12·3	55·6
18	89 20·2	N23 22·3	209 48·6	13·8	S15 33·0	12·4	55·6
19	104 20·1	22·2	224 21·4	13·8	15 20·6	12·4	55·6
20	119 20·0	22·1	238 54·2	13·9	15 08·2	12·5	55·6
21	134 19·8	.. 22·0	253 27·1	14·1	14 55·7	12·5	55·5
22	149 19·7	21·9	268 00·2	14·1	14 43·2	12·6	55·5
23	164 19·6	21·9	282 33·3	14·2	14 30·6	12·6	55·5
	S.D. 15·8	*d* 0·1	S.D. 15·6		15·4		15·2

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Moonrise 24	Moonrise 25	Moonrise 26	Moonrise 27
°	h m	h m	h m	h m	h m	h m	h m
N 72	□	□	□	■	■	■	01 36
N 70	□	□	□	■	■	02 08	01 09
68	□	□	□	■	■	01 22	00 49
66	□	□	□	■	01 32	00 52	00 32
64	////	////	01 32	■	00 45	00 29	00 18
62	////	////	02 10	00 20	00 14	00 11	00 07
60	////	00 51	02 37	23 51	23 55	23 57	23 58
N 58	////	01 41	02 57	23 32	23 42	23 49	23 53
56	////	02 11	03 14	23 16	23 31	23 41	23 48
54	00 47	02 34	03 28	23 03	23 21	23 34	23 44
52	01 33	02 52	03 41	22 51	23 12	23 28	23 40
50	02 01	03 07	03 51	22 40	23 04	23 22	23 37
45	02 47	03 37	04 14	22 18	22 47	23 10	23 30
N 40	03 17	03 59	04 32	22 00	22 33	23 01	23 24
35	03 41	04 17	04 47	21 45	22 21	22 52	23 18
30	03 59	04 33	05 00	21 32	22 11	22 45	23 14
20	04 28	04 58	05 22	21 10	21 53	22 31	23 06
N 10	04 51	05 18	05 41	20 50	21 37	22 20	22 58
0	05 10	05 36	05 59	20 31	21 22	22 09	22 51
S 10	05 27	05 53	06 16	20 13	21 07	21 58	22 45
20	05 43	06 11	06 35	19 53	20 51	21 46	22 37
30	06 00	06 30	06 56	19 30	20 33	21 32	22 29
35	06 08	06 40	07 08	19 17	20 22	21 25	22 24
40	06 18	06 52	07 22	19 01	20 10	21 16	22 19
45	06 28	07 05	07 39	18 43	19 55	21 05	22 12
S 50	06 40	07 21	08 00	18 19	19 37	20 52	22 04
52	06 45	07 29	08 10	18 08	19 28	20 46	22 01
54	06 51	07 37	08 21	17 55	19 19	20 40	21 57
56	06 57	07 46	08 34	17 40	19 08	20 32	21 52
58	07 04	07 57	08 48	17 23	18 56	20 24	21 47
S 60	07 11	08 08	09 06	17 02	18 41	20 14	21 42

Lat.	Sunset	Twilight Civil	Twilight Naut.	Moonset 24	Moonset 25	Moonset 26	Moonset 27
°	h m	h m	h m	h m	h m	h m	h m
N 72	□	□	□	■	■	■	07 27
N 70	□	□	□	■	■	05 19	07 52
68	□	□	□	■	■	06 03	08 11
66	□	□	□	■	04 10	06 33	08 26
64	22 32	////	////	■	04 56	06 54	08 38
62	21 54	////	////	03 30	05 26	07 12	08 48
60	21 28	23 13	////	04 07	05 49	07 26	08 57
N 58	21 07	22 23	////	04 33	06 07	07 38	09 05
56	20 51	21 53	////	04 54	06 22	07 49	09 11
54	20 36	21 31	23 17	05 11	06 35	07 58	09 17
52	20 24	21 13	22 31	05 26	06 46	08 06	09 22
50	20 13	20 58	22 03	05 38	06 57	08 13	09 27
45	19 51	20 28	21 18	06 04	07 17	08 29	09 38
N 40	19 33	20 06	20 47	06 25	07 34	08 42	09 46
35	19 18	19 47	20 24	06 42	07 49	08 53	09 54
30	19 05	19 32	20 05	06 57	08 01	09 02	10 00
20	18 43	19 07	19 36	07 21	08 21	09 18	10 11
N 10	18 24	18 47	19 14	07 43	08 40	09 32	10 21
0	18 06	18 29	18 55	08 03	08 56	09 45	10 30
S 10	17 49	18 11	18 38	08 23	09 13	09 58	10 39
20	17 30	17 54	18 22	08 44	09 31	10 12	10 48
30	17 09	17 35	18 05	09 08	09 51	10 27	10 58
35	16 57	17 25	17 56	09 22	10 03	10 36	11 04
40	16 42	17 13	17 47	09 39	10 16	10 46	11 11
45	16 26	16 59	17 37	09 58	10 32	10 58	11 19
S 50	16 05	16 43	17 25	10 22	10 51	11 12	11 29
52	15 55	16 36	17 20	10 34	11 01	11 19	11 33
54	15 44	16 28	17 14	10 47	11 11	11 26	11 38
56	15 31	16 19	17 08	11 03	11 [illegible]	11 35	11 43
58	15 17	16 08	17 01	11 20	11 [illegible]	11 44	11 49
S 60	14 59	15 57	16 53	11 42	11 [illegible]	11 54	11 56

Day	SUN Eqn. of Time 00ʰ	SUN Eqn. of Time 12ʰ	SUN Mer. Pass.	MOON Mer. Pass. Upper	MOON Mer. Pass. Lower	MOON Age	MOON Phase
	m s	m s	h m	h m	h m	d	
24	02 04	02 10	12 02	01 50	14 17	16	○
25	02 17	02 23	12 02	02 44	15 10	17	
26	02 29	02 36	12 03	03 34	15 57	18	

Longitude is 76°20′ W., which means you are 1°20′ west of 75°W. This arc amounts to 5m 20s of time. Because you are west of the standard meridian, sunrise occurs later. Hence, zone time of sunrise where you are is 0446 (0441 + 5m).

Sunset is figured in the same manner as sunrise Look at the sunset tables near the middle of the page in table 16-8, and you see that sunset in 35°N. latitude is at 1918; in 40°N. it is 1933. Your interpolation here for 37°N. is two-fifths of 15m, or 6m. Here you see that sunset is later in 40°N. than it is in 35°N. latitude, so you add 6m to 1918, the tabulated time of sunset for 35°N. Therefore, LMT of sunset for 37°N. is 1924.

In order to find ZT, you have the same 5m correction to add. Where you are, ZT of sunset is 1929 (1924 + 5m).

MOONRISE AND MOONSET

Frequently, the time of the rising and setting of the moon is of importance. Their timing is of especial significance in wartime, when the increase in visibility may make it necessary for a ship to start a zigzag, cease blowing tubes, and so on. Times of moonrise and moonset are listed in a section at the back of the *Tide Tables* for every day in the year for a few selected points. These times can be computed from the *Nautical Almanac* for any point on the earth. The listed times in the *Almanac*, however, are LMT of moonrise and moonset at the Greenwich meridian. Because the moon takes approximately 50 minutes longer than does the sun to go all the way around the earth, your longitude becomes a factor in calculating time of moonrise and moonset for any meridian besides Greenwich. These times may be calculated for any longitude by the steps described in the next paragraph.

Moonrise and moonset are given in the *Almanac* for each day for the Greenwich meridian. Precise time of either moonrise or moonset, for other longitudes, may be obtained as follows: When in east longitude, interpolate for latitude on the desired day, and also on the preceding day. In west longitude, interpolate for latitude on the desired day and the following day. Take the difference between the two results, multiply it by the longitude divided by 360°, and apply the product to the tabulated time for the specified day.

As an example, let's find the time of moonrise in latitude 38°S., longitude 145°E., on 27 June 1967. You're in east longitude, so take the times for 27 June and the preceding day (26 June) thus:

	35°S.	40°S.
Moonrise 27 June	2224	2219
Moonrise 26 June	2125	2116

Interpolation for latitude 38°S. works out as follows:

Moonrise 27 June---------2221
Moonrise 26 June---------2120

The difference between 2221 and 2120 is 61m. This result is multiplied by the longitude (145° E.), divided by 360, or 8845/360, which gives approximately 24m. Then, 24m is the correction to be applied to the tabulated time of moonrise in 38°S. for 27 June. You're in east longitude, so the correction is minus. Therefore, LMT is 2157 (2221 - 24m). To find the zone time of moonrise, apply a plus 20m longitude correction, and get 2217 (2157 + 20m).

The time of moonset is found similarly.

	35°S.	38°S.	40 S.
Moonset 27 June	1104	1108	1111
Moonset 26 June	1036	1042	1046

From the foregoing data the time correction is found to be 10m. Subtracting this result from 1108 and adding the 20m longitude correction, the zone time of moonset is found to be 1118.

AIR ALMANAC

Information in the *Air Almanac* is similar to that in the *Nautical Almanac*. Sunrise/sunset and moonrise/moonset may be computed from the Air Almanac in the same manner as from the Nautical Almanac. The principal difference between the two publications is the arrangement of the tabular data given in each.

CHAPTER 17

WEATHER

IMPORTANCE TO SEAFARERS

The men who "go down to the sea in ships" fight a continuous close action with the elements that make up the weather. To seafarers the state of the weather is a matter of much greater importance than it is to most people ashore. Accurate weather forecasting may not be as vital now as it was in the days of the wind ships, but situations still arise in which the safety of a ship and the lives of her crew depend on the evasive action taken to avoid the full fury of a storm. Even when actual safety is not considered, possible damage to the ship, her boats, gear, and the like, must be minimized by extra security measures taken well in advance of an approaching storm.

The action taken by ships may be based on the latest weather information compiled and broadcast by United States Fleet Weather Centrals. The Weather Central bases its predictions largely upon the reports of weather conditions received from ships at sea. An intelligent weather report from a ship can be made only by a person capable of accurately observing and (to some extent) interpreting weather conditions around him. You already know that rated Aerographer's Mates in the Navy are charged with this duty; but not all ships carry them. On a ship that doesn't have Aerographer's Mates aboard, the weather duties devolve upon the Quartermasters.

This chapter, then, is concerned with the weather and the way it is observed and reported.

THE ATMOSPHERE

The atmosphere is a mixture of independent gases. Near the surface of the earth the percentages by volume of the various constituents are approximately 78 percent nitrogen, 21 percent oxygen, 1 percent argon, with traces of other gases such as carbon dioxide, hydrogen, neon, and helium. Water vapor, which has been omitted from the foregoing list, is found in relatively small but widely varying amounts; 1 percent of the total atmosphere may be taken as an average figure. The quantity of water vapor present is much greater in equatorial regions than in polar regions, and greater over the ocean than over land. This belt of atmosphere wrapped around the earth is called air. It has definite weight, called atmospheric pressure, and it is measured by an instrument called a barometer.

Large-scale changes in temperature, pressure, and water vapor content of the air cause the changes in weather. Warm air is lighter in weight and can hold more water vapor than cold air. Moist air with a temperature of 50° F. is lighter than drier air of the same temperature because water vapor is lighter than air. Cold or heavy air has a tendency to flow toward and supplant warm or lighter air, and as the air begins to move, other forces come into play, making the movement of air masses and weather rather complex. You can readily see, however, that temperature, humidity, and atmospheric pressure are all factors in considering the weather.

MEASURING TEMPERATURE

You probably don't need to be told that a thermometer is an instrument for measuring temperature. Generally speaking, it is a glass tube of small bore in which either alcohol or mercury expands and contracts with the rise and fall of the temperature of the surrounding medium.

Most Navy thermometers are mercury-filled and practically all of them use the Fahrenheit (F) scale, in which the freezing point of water is 32° and its boiling point is 212°. Temperature in aerology, however, sometimes is expressed according to the Celsius (C) (formerly Centigrade) scale, in which the freezing point of water is 0° and its boiling point is 100° (fig. 17-1).

You might be required sometime to convert a Fahrenheit reading to Celsius, or vice versa. Figure 17-1 shows that on the two scales there are 5° of Celsius temperature to every 9° of Fahrenheit.

Inasmuch as 32°F is equivalent to 0°C, to change a Fahrenheit reading to Celsius you first subtract 32°

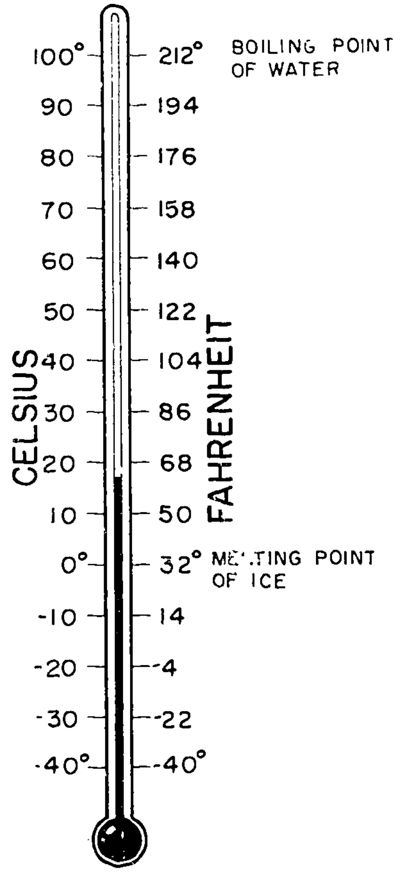


Figure 17-1.–Celsius and Fahrenheit scales.
33.11(69)

and then multiply the remainder by 5/9. Say you want to change 41°F to Celsius. Subtracting 32° from 41° gives 9°. Multiply 9° by 5/9, and you get 45/9, or 5°C.

To change from Celsius to Fahrenheit, simply reverse the procedure. First multiply the Celsius temperature by 9/5, then add 32°. In the previous example, to change 5°C back to Fahrenheit, first multiply it by 9/5 which gives you or 9°. Adding 32° gives you 41° F.

READING A THERMOMETER

A thermometer must be read properly in order to obtain an accurate result. First, if you must handle it, be sure that you do not touch the lower part of the glass containing the alcohol or mercury, because the heat from your body can affect the height of the mercury or alcohol column. Make certain that the top of the column is level with your eyes; otherwise you will be reading a higher or lower graduation than the one actually indicated. The top of the column is in the shape of a curve called a Meniscus. It is the bottom of this curve that indicates the reading for an alcohol thermometer; the top, for a mercury thermometer.

MAXIMUM AND MINIMUM THERMOMETERS

Special thermometers, called maximum and minimum thermometers, are used to measure the highest and lowest temperatures reached during a given period. The maximum thermometer is the mercury type (fig. 17-2), with a constriction in the bore designed to permit the column to rise but prevent it from dropping back again.

The minimum thermometer (fig. 17-3) contains alcohol instead of mercury, because alcohol freezes at a considerably lower temperature than mercury.

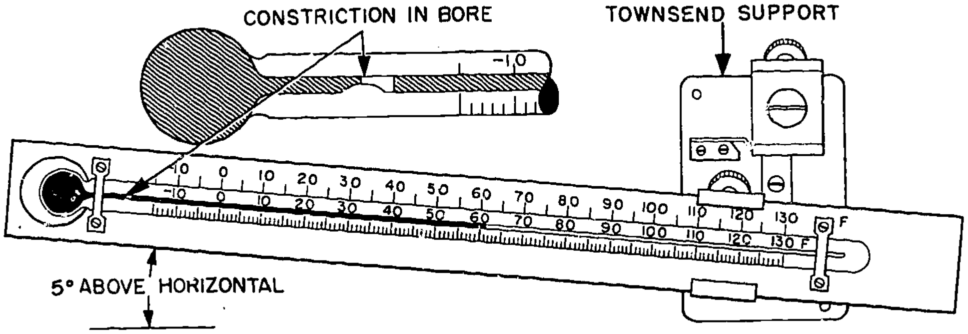


Figure 17-2.–Maximum thermometer.
5.65(69)A

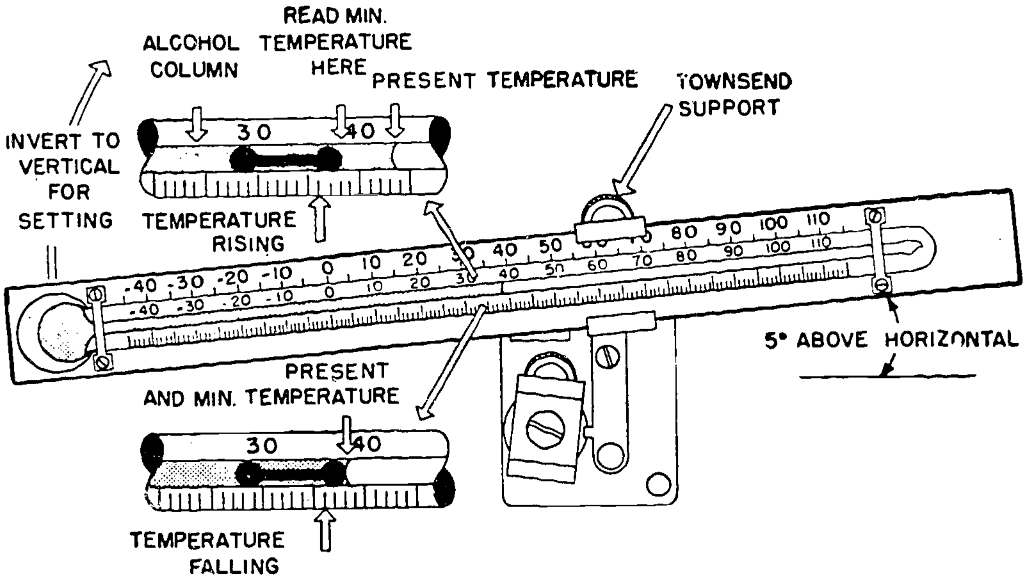


Figure 17-3.–Minimum thermometer.
5.65(69)B

A small glass indicator follows the meniscus down the bore. The indicator moves in only one direction and cannot go the other way if the temperature should rise. The minimum temperature reached is indicated by the upper end of the indicator.

MEASURING RELATIVE HUMIDITY

As already mentioned, the amount of water vapor the atmosphere can hold varies with the temperature. When the atmosphere contains all the water it can hold for a given temperature, humidity is at the saturation point, or 100 percent. If it contains 50 percent of what it could hold at that particular temperature, relative humidity is 50 percent (fig. 17-4).

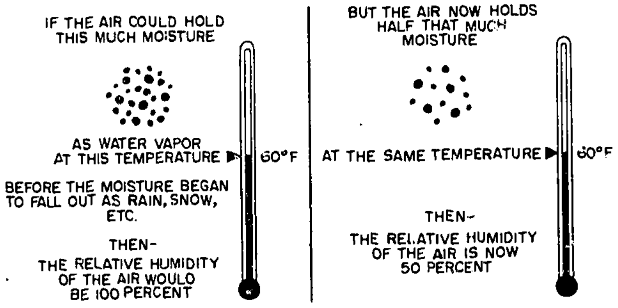


Figure 17-4.–Relative humidity. 69.83

PSYCHROMETER

A psychrometer is simply two ordinary thermometers combined (see figs. 17-5 and and fig. 17-7). The bulb of one thermometer is covered by a water-soaked wick from which the water evaporates rapidly or slowly, depending on the amount of water vapor already in the surrounding atmosphere. Evaporation of water around the wet thermometer cools it. The amount of cooling depends on the rate of evaporation. The reading on the wet bulb is lower than the reading on the dry bulb except when the humidity is 100 percent, at which time both readings coincide. The difference between the wet-bulb and dry-bulb readings, when applied to tables developed for that purpose, results in relative humidity and dewpoint temperature. The dewpoint is the temperature to which air must be cooled at constant pressure and constant water vapor content to reach saturation (100 percent relative humidity). When air is cooled to its dewpoint temperature, small water droplets condense on objects, i.e., dew forms. (See fig. 17-6.)

The dewpoint is computed by using the wet-and dry-bulb readings and entering the psychrometer table shown in table 17-1. (More complete tables may be found in OpNav Instruction P3140.37, *Manual For Ship's Surface Weather Observations.*) Take, for example, a dry-bulb temperature of 60°F and a wet-bulb temperature of 50.5°F. The dif-

Wet-bulb temperature (°F.)	Depression of the wet-bulb thermometer (dry-bulb minus wet-bulb)																				
	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5
50.0	50	49	49	48	48	47	47	47	46	46	45	45	44	44	43	43	42	41	41	40	40
50.5	50	50	49	49	48	48	48	47	47	46	46	45	45	44	44	43	43	42	42	41	40
51.0	51	50	50	49	49	49	48	48	47	47	46	46	45	45	44	44	43	43	42	42	41
51.5	51	51	50	50	49	49	49	48	48	47	47	46	46	45	45	44	44	43	43	42	42
52.0	52	51	51	50	50	50	49	49	48	48	47	47	46	46	46	45	45	44	44	43	43
52.5	52	52	51	51	51	50	50	49	49	48	48	48	47	47	46	46	45	45	44	44	43
53.0	53	52	52	51	51	51	50	50	49	49	49	48	48	47	47	46	46	45	45	44	44
53.5	53	53	52	52	52	51	51	50	50	50	49	49	48	48	47	47	46	46	46	45	45
54.0	54	53	53	53	52	52	51	51	51	50	50	49	49	48	48	48	47	47	46	46	45
54.5	54	54	53	53	53	52	52	51	51	51	50	50	49	49	49	48	48	47	47	46	46
55.0	55	54	54	54	53	53	52	52	52	51	51	50	50	50	49	49	48	48	47	47	47
55.5	55	55	54	54	54	53	53	53	52	52	51	51	51	50	50	49	49	49	48	48	47
56.0	56	55	55	55	54	54	54	53	53	52	52	52	51	51	50	50	50	49	49	48	48
56.5	56	56	55	55	55	54	54	54	53	53	53	52	52	51	51	51	50	50	49	49	48
57.0	57	56	56	56	55	55	55	54	54	54	53	53	52	52	52	51	51	50	50	50	49
57.5	57	57	57	56	56	55	55	55	54	54	54	53	53	53	52	52	51	51	51	50	50
58.0	58	57	57	57	56	56	56	55	55	55	54	54	54	53	53	52	52	52	51	51	50
58.5	58	58	58	57	57	57	56	56	56	55	55	54	54	54	53	53	53	52	52	51	51
59.0	59	58	58	58	57	57	57	56	56	56	55	55	55	54	54	54	53	53	52	52	52
59.5	59	59	59	58	58	58	57	57	57	56	56	56	55	55	55	54	54	53	53	53	52

Table 17-1.–Psychrometric Table (Temperature of the Dewpoint in Degrees Fahrenheit) 69.132

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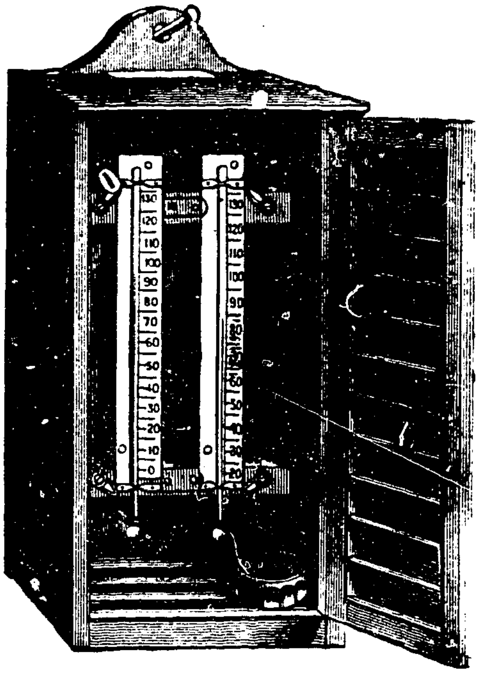

Figure 17-5.–Psychrometer. 69.84

ference between the two readings is 9.5°F. This difference is called the depression of the wet bulb.

To compute the dewpoint, enter the table with the wet-bulb reading (50.5°F). Read across the top of the table to the proper depression column (9.5°F). Read the dewpoint temperature (42°F) directly from the intersection of the temperature row and the depression column.

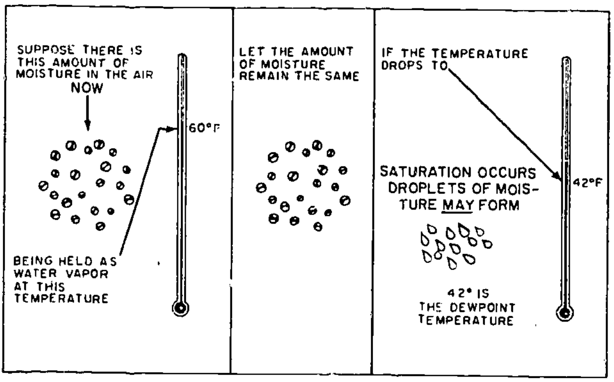

Figure 17-6.–Dewpoint. 69.85

Sling Psychrometer

A sling psychrometer (fig. 17-7) sometimes is used to speed up the process of getting accurate wet- and dry-bulb readings. The sling psychrometer can be whirled around so as to rapidly bring the wet bulb into contact with a great volume of air. This contact with air accelerates the evaporation rate. The person using the sling psychrometer should face the wind, and should shield the instrument as much as possible from the direct rays of the sun. Whirling should not be too rapid, because centrifugal force might displace the mercury columns in the thermometers. The whirling should be repeated until no further change can be detected in the wet-bulb reading.

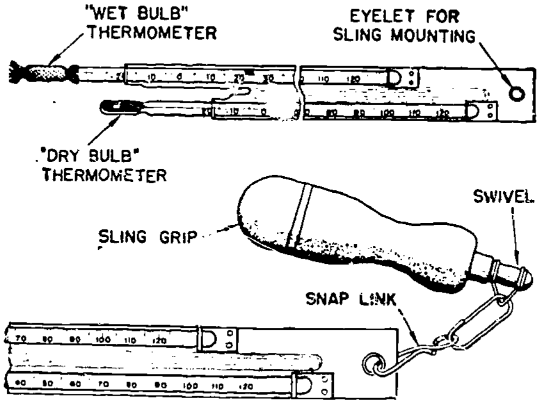

Figure 17-7.–Sling psychrometer. 5.65(69)C

ATMOSPHERIC PRESSURE

The layer of atmosphere that surrounds us exerts a pressure of approximately 15 pounds per square inch at the earth's surface. As mentioned earlier, the weight of the atmosphere varies with the presence of water vapor as well as with temperature and height above the earth's surface. Variations in atmospheric pressure are measured by an instrument called a barometer. The Navy uses two types of barometers: mercurial and aneroid.

MERCURIAL BAROMETER

In the mercurial barometer, a glass tube more than 30 inches long and open at one end, is filled with mercury and set with its open end down in a cistern containing the same element. The mercury in the tube drops until it balances the pressure exerted by the atmosphere on the mercury in the cistern. (See. fig. 17-8.)

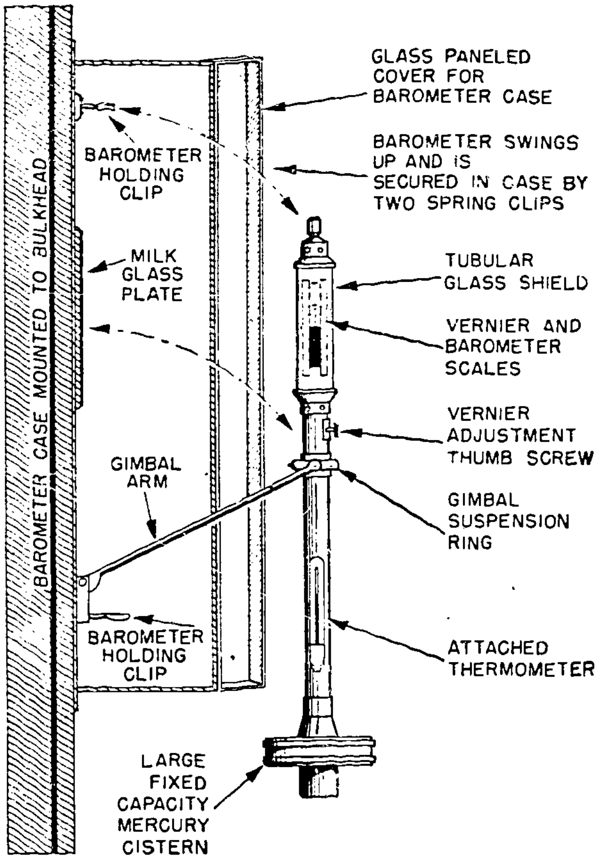

Figure 17-8.–Mercurial barometer. 69.86

To measure atmospheric pressure accurately, using a mercurial barometer, three corrections must be applied to the readings obtained. The corrections (for height above sea level, gravity, and temperature) are found in tables 11, 12, and 13, respectively, of *American Practical Navigator*.

ANEROID BAROMETER

The aneroid ("dry" or "no fluid") barometer (fig. 17-9) needs no correction except for altitude. It contains a small metallic cell, called a sylphon cell, which encloses a partial vacuum. As atmospheric pressure increases, the sylphon contracts; as pressure decreases, it expands. As the sylphon expands and contracts, it communicates motion to an indicating pointer on a graduated scale.

A stationary needle on the aneroid barometer may be fixed at any point so as to show the tendency (rise, fall, or steadiness) of the barometer since the last reading.

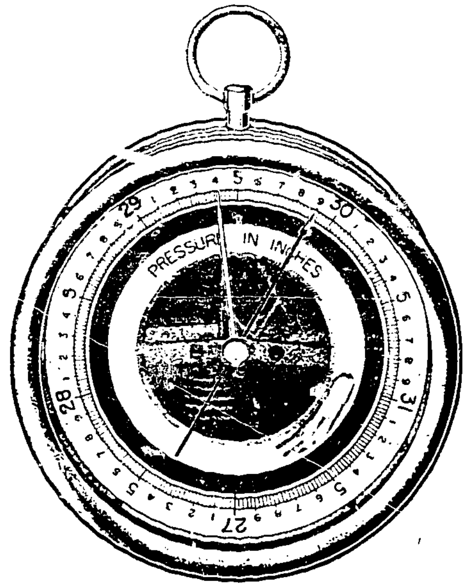

Figure 17-9.–Aneroid barometer. 69.87

Mercurial-Aneroid Comparison

Barometers may be graduated in either inches of mercury or millibars (mb). Both inches and millibars are linear measurements of the height of the mercury column supported by the atmosphere at a given time. The average atmospheric pressure at the earth's surface is 29.92 inches or 1013.2 millibars. Figure 17-10 shows comparative readings on the inch and millibar scales.

Although mercurial barometers may, by using a vernier, be read to the nearest 0.002 inch, and aneroid barometers normally can be read no closer than 0.01 inch, aneroid barometers are the standard pressure-indicating instrument aboard ship and the type of barometer that Quartermasters will encounter most frequently

The accuracy of a properly adjusted aneroid barometer may be as close as 0.67 mb and is comparable to that of a mercurial barometer. Moreover, the aneroid barometer is free of the numerous corrections that must be applied to the mercurial barometer.

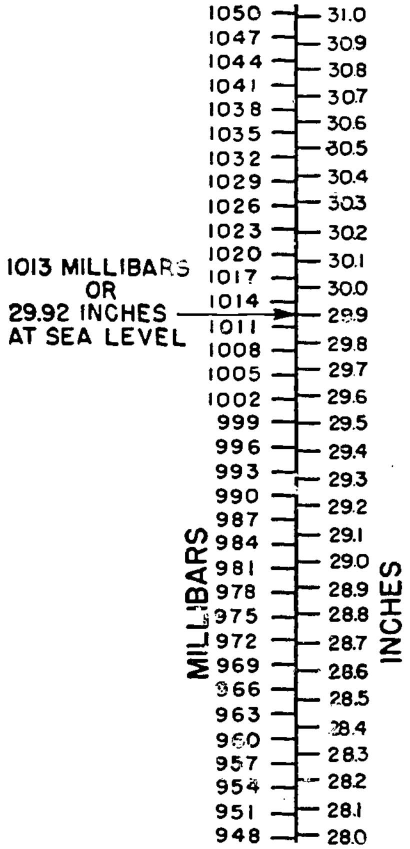

Figure 17-10.–Inches and millibars. 69.88

SIGNIFICANCE OF ATMOSPHERIC PRESSURE

A chart of the atmospheric pressure over a large area of the earth's surface at any given time tells you which way different air masses are moving. Some air masses originate in the cold polar regions; some, in the tropics. By the time they reach you, some air masses have moved over vast bodies of water (called maritime air masses). Others (called continental air masses) have grown up over more or less dry land. Figure 17-11 pictures this distribution of air masses.

Air masses carry along with them the characteristics of the areas they crossed. When distinctly different air masses collide, or just rub elbows, atmospheric disturbances mark the boundary between them. This boundary is known as a front.

PRESSURE AREAS

The atmosphere can be disturbed in other ways, of course, but frontal storms, which usually are quite violent, can be predicted from a chart of the pressure systems. Figure 17-12 shows the three types of frontal systems on a weather map.

Atmospheric pressure is reported in pounds per square inch (psi), atmospheres, bars, or millibars. One atmosphere equals 14.696 psi, a bar equals slightly more than 0.98 atmosphere, and a millibar (mb) equals 1/1000 of a bar. On weather charts pressure usually is indicated in millibars (fig. 17-12).

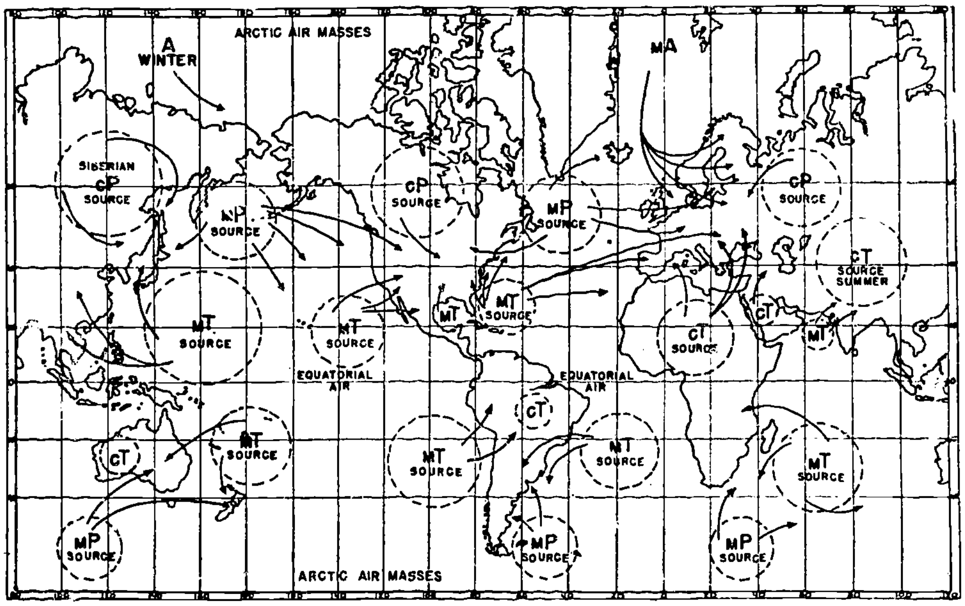

Figure 17-11.–Distribution of air masses.
58.97(69)A

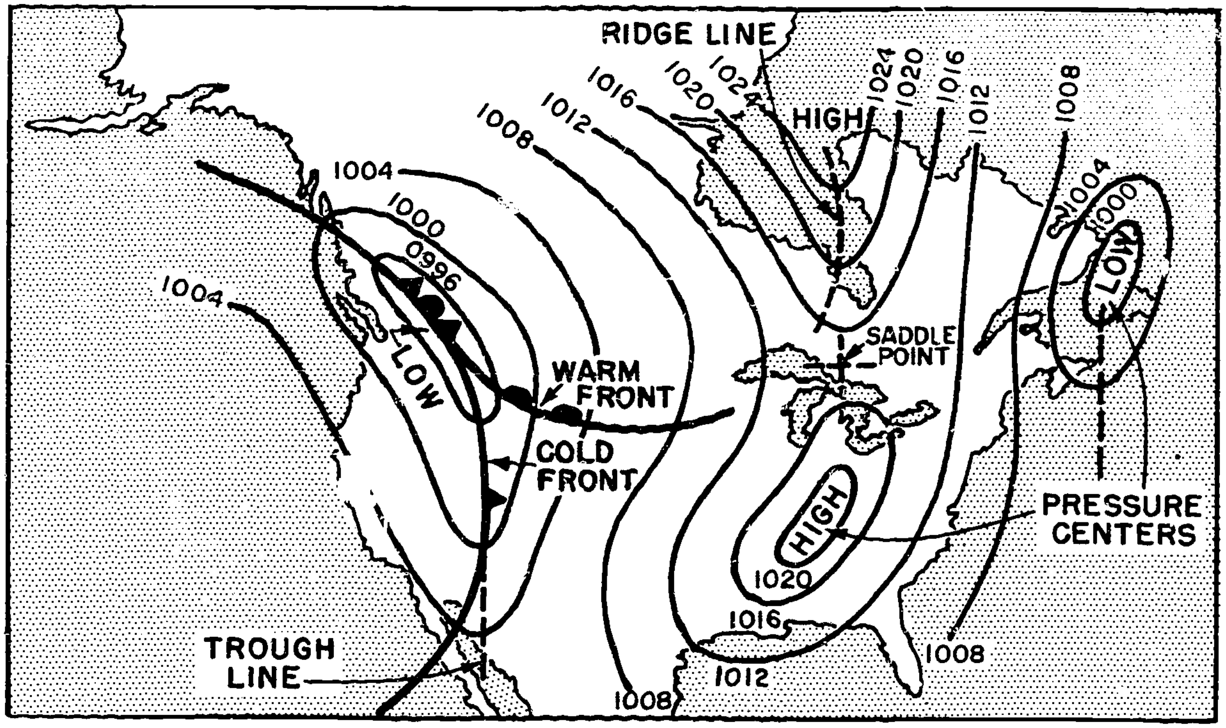

Figure 17-12.–Sample weather map showing frontal systems. 58.97(69)B

The lines shown in the figure are drawn through points of equal pressure and are called isobars.

Assume, for example, that barometric pressure is the same in Chicago, Milwaukee, and St. Paul. An isobar is drawn through these and other points of equal pressure (fig. 17-13). Usually, isobars show equal differences in pressure, four millibars for example, and frequently isobars do not pass through reporting stations (fig. 17-14).

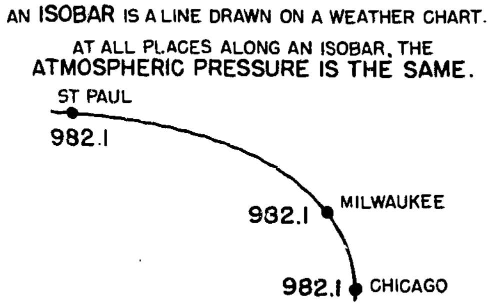

Figure 17-13.–Reports of pressure at three adjacent points, showing an isobar. 69.89

Isobars never join or cross. Some may run off the chart, but others may close, forming irregular ovals that define the areas of highest and lowest pressure (fig. 17-15). Air (wind) flows from high-pressure areas to low-pressure areas.

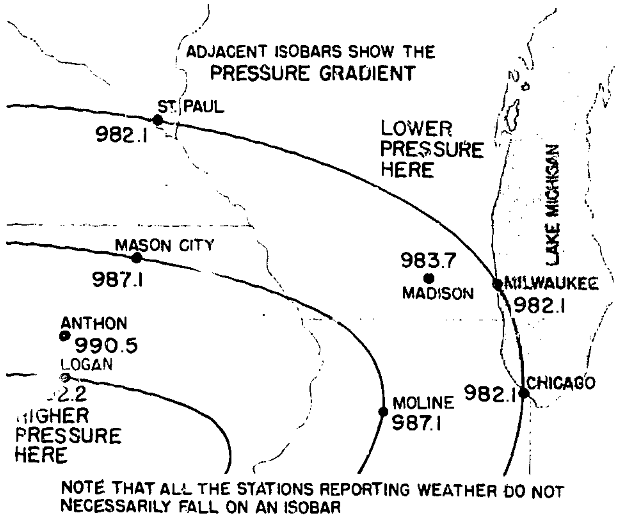

Figure 17-14.–Plotting isobars. 69.90

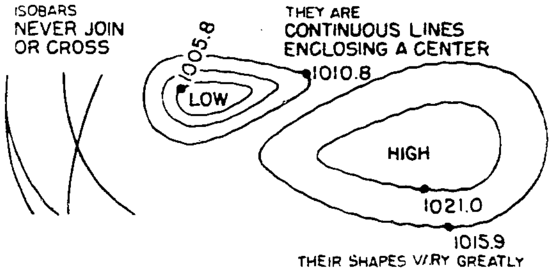

Figure 17-15.–Shapes of isobars. 69.91

The strength of the wind depends upon two factors: the amount of difference in pressure (gradient) and the distance of high-pressure area (high) from the low-pressure area (low). The greater the gradient and the nearer the high to the low, the stronger the wind. Thus, isobars can give a rough indication of the amount of wind. The closer an isobar is to another, the stronger the wind in that area.

In figure 17-14, the isobars represent pressures of 992.2 mb, 987.1 mb, and 982.1 mb. The difference in pressure is called a pressure gradient, and air moves from higher to lower pressure. To state it another way, variation in pressure from place to place (due to uneven distribution of temperature or other causes) gives rise to a horizontal pressure gradient, producing the horizontal movement of air called wind.

Widely separated isobars indicate light winds: isobars closer together mean greater wind velocity. The spacing and shape of isobars are seen in figure 17-15, which also shows how complete isobars are formed. They're always drawn as smoothed-out curves, usually making irregular ovals about the high- or low-pressure center.

Referring again to figure 17-14 you can see that only part of each isobar (the upper right portion of the oval) appears in the diagram. In this pressure system the area of greatest pressure is at the system center. This high-pressure area is also called a high or an anticyclone. If the pressure should be 992.2 mb at Chicago, 987.1 mb at Moline, and 982.1 mb at Logan, the area of lowest pressure would be in the vicinity of Logan. This area would be a low, or a cyclone.

AIR IN MOTION

In a high-pressure area, the air at the center flows outward. In a low, the air flows inward. This flow is not, however, strictly outward or inward. The earth's rotation deflects the air, so that in reality it flows more or less tangent to the isobars, as in figure 17-16.

In the northern hemisphere this almost circular movement of the air is clockwise and away from the center of a high, but counterclockwise and toward the center of a low. In the southern hemisphere, the reverse movement occurs.

The little symbols that cross the isobars in figure 17-16 indicate wind direction and velocity. They're like arrows except that they have no head and only half a tail. The long arm of each symbol points, like an arrow, in the direction of the wind flow. Some of the symbols have one tail feather, some two, and some three. Each long feather represents 10 knots of wind; each short feather, 5 knots. Thus, an arrow with one long and one short feather would indicate wind velocity of 15 knots; an arrow with four long feathers would indicate 40 knots of wind.

The flow of air is influenced not only by the pressure and the earth's rotation but also by friction against the earth's surface. This friction, which slows down air motion, is greatest over land areas, especially where there is either abrupt mountainous terrain or gradual land slope.

Whereas the air within the low or the high rotates as just described, the whole body of air also moves. Consider the weather charts for several days in a row. On the first day a low may appear over the

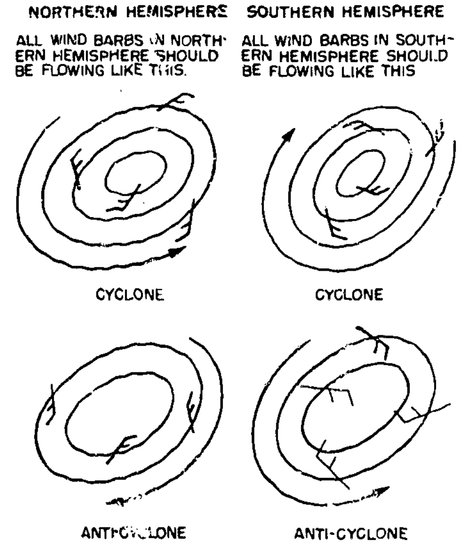

Figure 17-16.–Wind flow around high- and low-pressure areas. 69.92

Pacific Coast region. The chart for the next day probably shows it somewhere in the Rocky Mountain region. A day or two later it may be over Arkansas. If it has not broken up by this time, it moves on eastward and northward, and eventually dissipates over the North Atlantic. All lows in the United States do not follow this same track, however. Some lows come up from the West Indies, as you will see presently.

TROPICAL CYCLONE

You may have thought of a cyclone as being always a violent windstorm. Meteorologists use this term for any low-pressure area. The furious, destructive disturbance (called a typhoon in the Orient, and a hurricane in the West Indies) is referred to sometimes by weather experts as a tropical cyclone.

Fully developed, the tropical cyclone consists of a well-defined area, more or less circular in shape, throughout which the atmospheric pressure diminishes rapidly on all sides toward the center. The rate of decrease in pressure is, in the most severe storms, 0.01 or even 0.02 inch for each mile of approach to the center.

Within this area the winds blow with great force. Rainfall is very heavy, especially toward the center. The motion of the air suggests on a gigantic scale the path followed by water escaping from a circular basin through a central opening in the bottom. Winds circulate counterclockwise around the center in the northern hemisphere, clockwise in the southern hemisphere. At the center itself (the so-called eye of the storm) the dense canopy of cloud that overhangs the rest of the storm area is pierced. and calm or light air prevails, but the sea here is usually very heavy. This eye ranges from 7 to 20 miles in diameter.

Tropical cyclones occur in the North Atlantic, the North and South Pacific, and the Indian Ocean. Due to the proximity of the African and South American land masses, the South Atlantic is free of such disturbances. The track of a tropical cyclone in the northern hemisphere is a line running first westward from the point of origin, then curving toward the north, and finally recurving to the northeast. By this time it probably has reached the middle latitude, but beyond this point it usually loses its force and is spent. Such a track is diagrammed in figure 17-17.

The clockwise movement of air around a low in the southern hemisphere produces a corresponding reversal of the storm track in that region. The diagram in figure 17-18 illustrates this point.

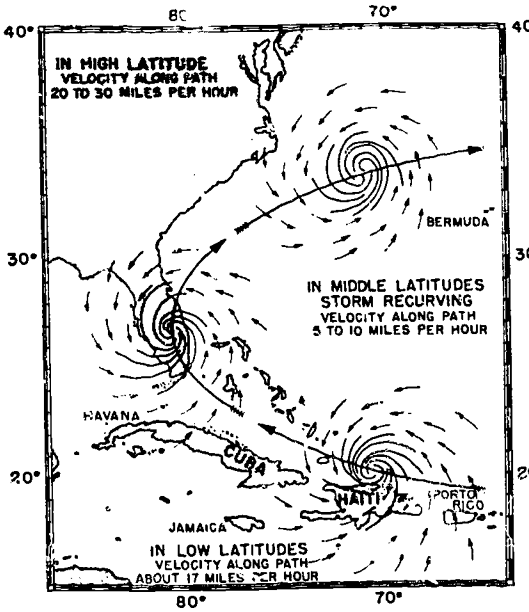

Figure 17-17.–Track of a tropical cyclone originating in the West Indies. 58.94

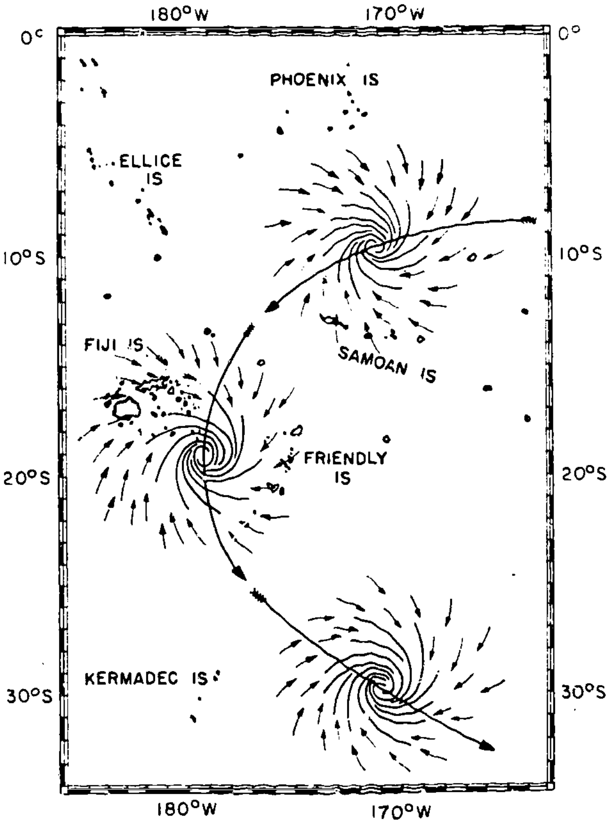

Figure 17-18.–Track of a tropical cyclone in the South Pacific. 58.95

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KEEPING TRACK OF THE WEATHER

The weather observation sheet of the deck log contains weather data necessary for making log entries. Detailed instructions for making entries in the weather observation sheet are contained in the *Manual for Surface Weather Observations*, OpNavInst P3140.37( ). Use this instruction–don't make up your own rules.

When the synoptic observations have been taken and recorded in the weather observation sheet, they must be radioed to Fleet Weather Centrals. Before the synoptic observations are sent, however, they must be put in proper message format. The coding system employed also can be found in the *Manual For Surface Weather Observations*. The message consists of five-digit groups, preceded by the message classification and the word "ship." When ice is observed, the plain language word "ice" must be inserted before the ice group. The coded groups may be taken directly from the synoptic observations table of the weather observation sheet. (A sample weather observation sheet is shown as figure 4-2 in this book.) The text of a sample weather message is as follows:

> BT UNCLAS SHIP 99185 70654 19094 20812 98011 16224 25500 62710 82625 0//20 12605 3//// BT

On larger ships an Aerographer's Mate usually has elaborate equipment for weather observations. He draws up complete weather charts, which require special technical knowledge and familiarity with weather codes. You cannot be expected to make up one of these complete charts, but you must be able to assist the OOD and the navigator in intelligent observations of the weather.

The shortest route to a reliable prediction of bad weather is to keep a close and accurate record of atmospheric pressure and wind. You won't hit it on the nose every time, but frequently you won't be far off. The low-pressure area (cyclone) carries bad weather around with it, from a light storm–with only mild precipitation and wind–to the furious tropical cyclone. Usually it is good practice to keep away from the center of a low. To do so, you must know (1) whether you are moving from higher pressures to lower pressures, and (2) which way the center of the low is moving.

When regular radio weather reports are received, you can plot the pressure picture on a chart. Even if you must depend on your own observations, however, you can get a fairly reliable indication of what lies ahead.

During the day the pressure-indicating needle of your barometer rises and falls twice. This variation is called diurnal (daily) change, and is a normal condition of the atmosphere due to heating and cooling of the earth's surface. Because of the changing pressure, quite a mass of figures on pressure accumulates in your deck log. It's difficult to base a prediction on these long lists of numbers. But with a simple graph, such as that in figure 17-14, you have a pictorial view of the daily pressure change.

If you take the graphs for successive days, you can tell, by comparing the pressure for the same hours on different days, whether the trend is toward higher or lower pressure. Another indication of the approach of a low-pressure area is a continuous lowering of pressure at the time of day when you know it should be rising.

But, assuming that you continually have observed lower readings on your barometer, do you know whether you are (1) within a high-pressure area, moving away from its center, or (2) within a low-pressure area, moving toward its center? The fact is, it doesn't matter too much. So long as you know that the pressure is going down, you are forewarned. Should you advise the OOD? Yes. Most OODs desire to be notified of changes in the barometer even if the change is not an indication of anything serious. Note in figure 17-15 that the isobars are farther apart in a high than in a low. This spacing means that the rate of change (the gradient) is gradual in the anticyclone but more abrupt in the cyclone, which may be a hint of what is happening. When the barometer needle dives sharply, you know you're in the immediate vicinity of a low, and you should notify the OOD to that effect at once. The faster the pressure drops, the more certain it is that you are headed for the center of a low.

WIND

As you approach the center of a low-pressure area, the winds become stronger. Both wind velocity and wind direction are significant factors. Quartermasters must be able to compute the direction and velocity of the true wind from the information at hand.

FINDING TRUE WIND

When there is no wind-measuring equipment aboard, the wind direction and speed must be obtained by various means. When the sea condition can be observed, the Beaufort scale of wind should be used to estimate the windspeed. The speed is determined by the size and character of the waves that are running with the wind. The Beaufort scale of wind appears in table 17-2. Wind direction can be

Table 17-2.—Beaufort Wind Scale and Correlative Sea Disturbance Scale 69.133

Beaufort No.	Knots	Descriptive terms	Sea criterion 1939 (provisional)	Approx. equivalent sea disturbance scale in open sea		
				Code Fig.	Description	Mean ht. of waves in feet
0	Less than 1.	Calm .	Sea like a mirror .	0	Calm (glassy).	. . . .
1	1-3.	Light air .	Ripples with the appearance of scales are formed but without foam crests .	1	Calm (rippled)	1/2
2	4-6.	Light breeze .	Small wavelets, still short but more pronounced, crests have a glassy appearance and do not break .	1	. . . . . .	1
3	7-10	Gentle breeze .	Large wavelets. Crests begin to break. Foam of glassy appearance. Perhaps scattered whitecaps.	2	Smooth (wavelets)	2-1/2
4	11-16	Moderate breeze .	Small waves, becoming longer; fairly frequent whitecaps .	3	Slight .	5
5	17-21	Fresh breeze .	Moderate waves, taking a more pronounced long form; many whitecaps are formed (chance of some spray).	4	Moderate.	9
6	22-27	Strong breeze .	Large waves begin to form; the white foam crests are more extensive everywhere (probably some spray) .	5	Rough .	14
7	28-33	Moderate gale .	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind. (Spray begins to be seen) .	6	Very rough .	19
8	34-40	Fresh gale [1] .	Moderately high waves of greater length; edges of crests break into spray. The foam is blown in well-marked streaks along the direction of the wind.	7	High .	25
9	41-47	Strong gale .	High waves. Dense streaks of foam along the direction of the wind. Sea begins to roll. Spray may affect visibility .	7	. . . .	31

Table 17-2.–Beaufort Wind Scale and Correlative Sea Disturbance Scale–Continued.
69.133

Beaufort No.	Knots	Descriptive terms	Sea criterion 1938 (provisional)	Approx. equivalent Sea Disturbance scale in open sea		
				Code Fig.	Description	Mean ht. of waves in feet
10	48-55	Whole gale .	Very high waves with long overhanging crests. The resulting foam in great patches is blown in dense white streaks along the direction of the wind. On the whole the surface of the sea takes a white appearance. The rolling of the sea becomes heavy and shocklike. Visibility is affected.	8	Very high .	37
11	56-63	Storm .	Exceptionally high waves. (Small- and medium-sized ships might be for a long time lost to view behind the waves.) The sea is completely covered with long white patches of foam lying along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility affected.	9	Phenomenal	45 or more
12	Above 64 . .	Hurricane .	The air is filled with foam and spray. Sea completely white with driving spray; visibility very seriously affected.	9	. . . .	. . . .

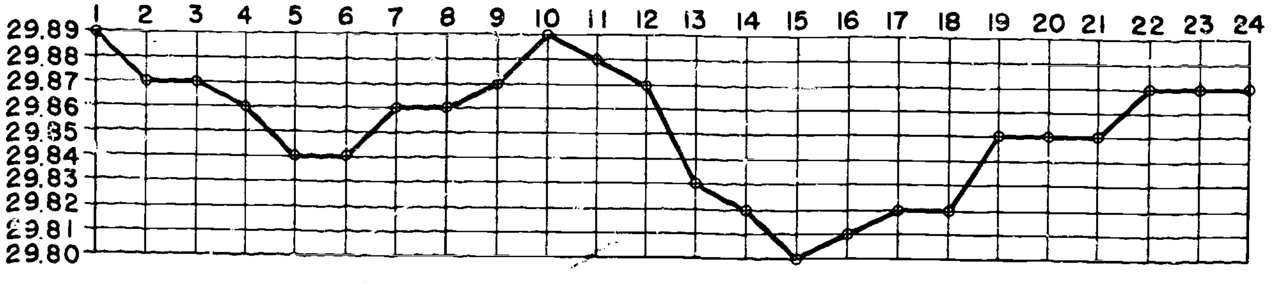


Figure 17-19.–Hourly pressure readings showing diurnal change. 69.93

obtained by observing the direction from which ripples and small wavelets are coming, because they run with the wind. The direction of the wind may also be determined by taking a bearing on wind "streaks" if the wind is strong enough to produce these streaks. This procedure either gives the direction of the true wind or its reciprocal. Wind streaks are readily observed for windspeeds in excess of 20 knots, and experienced observers can distinguish wind streaks with windspeeds as low as 12 knots. When the true wind direction cannot be obtained in this manner, you should use the procedure described next.

When the surface of the sea cannot be observed, the true wind can be determined from the apparent wind as follows:

1. By observing the effects of the wind on the ship's flag, smoke, or rigging, estimate the apparent wind direction to the nearest 10° off the bow of the ship, and apparent windspeed to the nearest 5 knots. (See table 17-3.) If the ship has an anemometer, the speed of the apparent wind may be determined from it.

2. Using the ship's course and speed and apparent wind direction and speed, construct a vector diagram, or use the maneuvering board method to find the true wind.

On vessels equipped with an anemometer (fig. 17-20), the instrument itself is fixed somewhere aloft–usually at the masthead. The wind blows into metal cups attached to the ends of arms. The whirling cups revolve a spindle, communicating with a synchro repeater on a pilothouse or charthouse bulkhead. Figure 17-21 shows one type of synchro repeater.

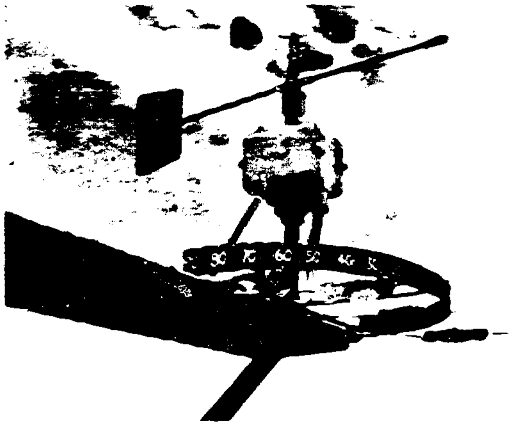


Figure 17-20.–Anemometer. 69.94

The upper dial of the repeater is graduated in 10° intervals and shows the apparent relative direction

Table 17-3.–Apparent Windspeed 69.134

Speed (knots)	Indication
Less than 1	Calm; smoke rises vertically.
1-3	Smoke drifts from funnel.
4-6	Wind felt on face.
7-10	Wind extends light flag.
11-16	Wind raises dust, cinders, loose paper, and the like.
17-21	Wind waves and snaps flags briskly.
22-27	Whistling in rigging.
28-33	Inconvenience felt walking against wind.
34-40	Generally impedes progress.

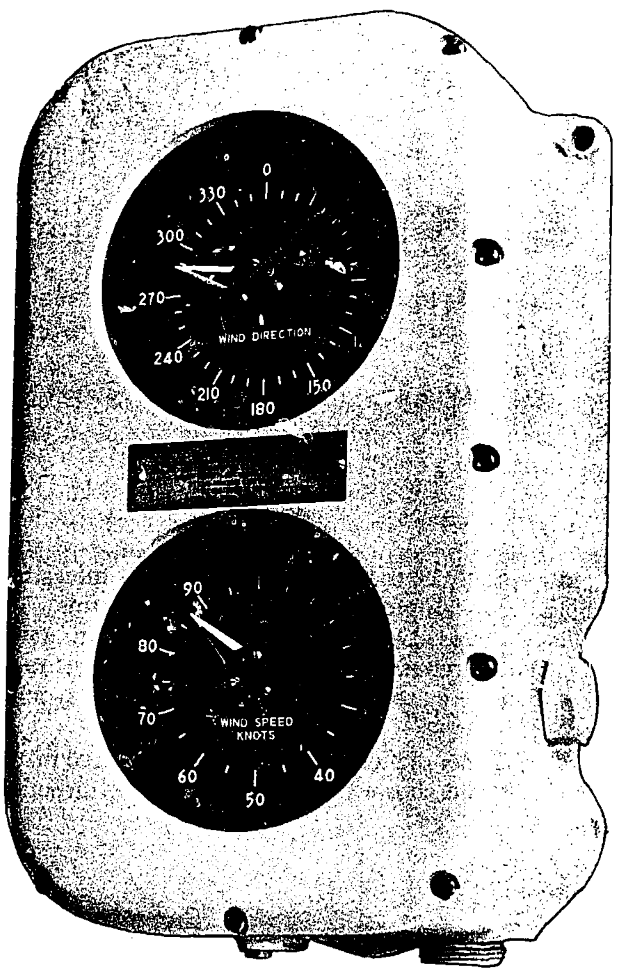


Figure 17-21.–Synchro repeater showing apparent wind velocity and direction. 7.148

from which the wind is blowing. In this illustration the direction is 287°.

The lower dial indicates the apparent windspeed (true windspeed when the ship is stationary). The windspeed dial in the illustration shows 87 knots.. This reading means that the force exerted by 87 knots of wind is whirling the anemometer cups. This apparent force and direction of wind is the result of the true wind plus the movement of the ship and is, therefore, called resultant wind.

Both factors (velocity and direction) must be corrected in order to determine the true wind. It's all done by vectors–lines that represent direction and speed.

Suppose your gyrocompass and electromagnetic log dial tell you that your ship is headed on a true course of 000° at a speed of 10 knots. Take a piece of paper and draw a line for a heading of 000°. Make 1/4″ equal 1 knot. This line will then be 2 1/4 inches long. Your vector should look like the one at the left in figure 17-22, though the scale there is smaller than the one you are using.

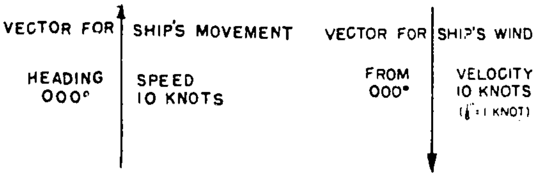


Figure 17-22.–Ship's wind. 69.95

That vector at the right in figure 17-22 is the "ship's wind." Even if the air were motionless in the vicinity of your ship, on deck you still would feel a "wind" blowing if your ship moved at 10 knots. That would be the wind created by the ship's movement – the "ship's wind."

In your diagram, this vector is the one to use–not the one giving the ship's course.

The ship's wind plus the true wind (which you do not yet know) combine to produce a resultant wind. Suppose your synchro repeater dial shows a wind direction of 054° and a velocity of 17 knots, as seen on the synchro repeater in figure 17-23. How about a vector for this example?

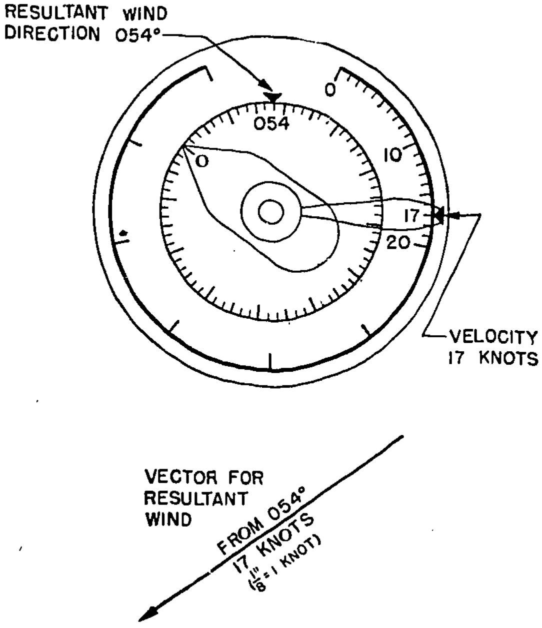


Figure 17-23.–Synchro repeater dial and wind vector. 69.96

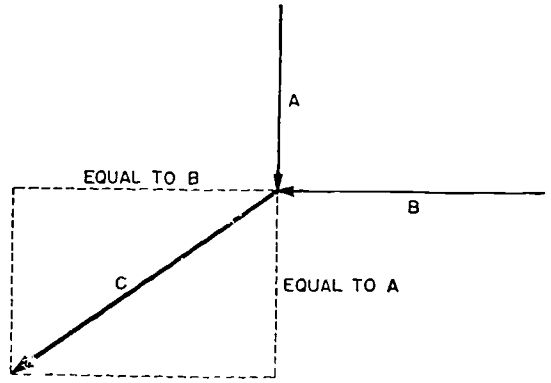


Figure 17-24.–Parallelogram showing ship's wind, apparent wind, and true wind. 69.97

You know the direction in which the line should point, but how long should you make it? Using the same scale as for ship's wind, the line will be 4-1/4 inches long. It is shown in the lower part of figure 17-23.

Figure 17-24 shows all the elements of a wind problem. You cannot actually solve problems in this manner because in the beginning you don't know line B (true wind). What you do know are lines A (ship's wind) and C (resultant wind). Here's the easy way to determine line B. Draw the two known vectors–resultant wind and ship's wind (fig. 17-25). Next, draw the triangle's third side (the broken line in part A of fig. 17-26). This side is all right for velocity of the true wind, but what is the direction? Complete the parallelogram, making certain that the vector for resultant wind forms the diagonal. The result will be as in part B of figure 17-26. The true wind is the other side of the parallelogram.

Answer: True wind is from 090° at 13 3/4 knots (the line being 3-7/16 inches long). You can be sure of the direction of the true wind because all three vectors start from the same point and fan out away from that point.

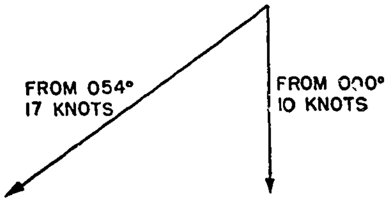


Figure 17-25.–Radial vectors of ship's wind and relative wind. 69.98

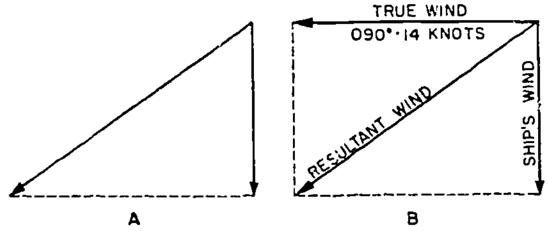


Figure 17-26.–Parallelogram completed from radial vectors. 69.99

You won't always get right angles in your parallelograms. Take a look at a few samples of other ships' winds and resultant winds (fig. 17-27). It's obvious, in the second (middle) example, that you must be careful when the known vectors are almost reciprocals (opposite one another). Be sure to use parallel rulers when drawing your diagram, and use a large scale. If the scale is too small, your third vector might be inaccurate.

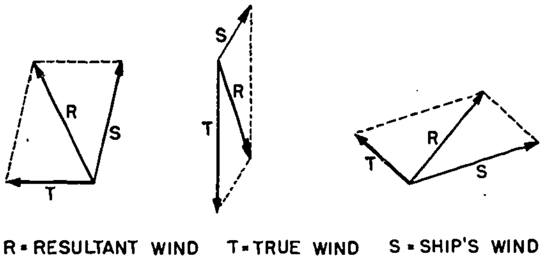


Figure 17-27.–Examples of wind vectors used for converting resultant to true wind. 69.100

The general accuracy of a computed wind problem may be checked easily by means of the rules given here. If the solution to a wind problem violates any of these rules, the solution is wrong and should be reworked.

1. The true direction of the wind is always on the same side of the ship as the apparent direction, but farther from the bow (port or starboard) than the apparent direction.

2. The true speed of the wind is greater than the apparent speed whenever the apparent direction is abaft the beam.

3. The true speed of the wind is the same as (or less than) the apparent speed whenever the true direction is forward of the beam.

True windspeed and direction may also be determined by using a maneuvering board. That method of determining true wind is explained in chapter 18 of this book.

CLOUDS

The atmosphere always contains–in greater or smaller amounts–tiny particles, such as dust from roads, desert sand, plant pollen, salt particles from oceans, and factory smoke. These fragments are hygroscopic nuclei–the term means "particles that readily absorb moisture." A cloud is merely a mass of hygroscopic nuclei that have soaked up moisture from the air.

The heat generated by the sun's energy causes earthbound moisture to evaporate (turn into water vapor). Water vapor is one of the gases that make up the atmosphere. Water vapor is lighter than air, thus it rises. If the air it passes into is cold enough, the vapor condenses, that is, it turns back into moisture. The water droplets that result from this process cling to the hygroscopic nuclei. Many of these water-soaked nuclei bunched together form a cloud. Fog is the same in principle, but it's a cloud on the ground.

Changes in atmospheric conditions account for the many different shapes of clouds and for their presence at various altitudes. Formations of the clouds give a clue concerning the existing forces at play in the atmosphere. That's why you must keep an accurate record of clouds in the deck log.

Figure 17-26 shows you the type of clouds you may expect to see at different altitudes. The sky in figure 17-28 shows more cloud types than actually appear in the sky at any one time. Careful study of this imaginary sky will teach you levels at which these general types of clouds ordinarily appear. Note the altitude scale along the right margin of the picture, and the "mean level" of clouds (discussed later). Individual views of these types, along with some of their variations, are depicted in figures 17-29 through 17-39 and 17-43.

CLOUD FORM NAMES

To aid in identification, the following list correlates cloud pictures with their names, and gives a brief comment on each cloud type. The numbers in the list refer to the inset numbers of figure 17-28.

* Number 1 (stratus) might very well be a fog, because fog and very low stratus are similar (fig. 17-29).

* Number 2 (nimbostratus) is not very distinct in the picture. Such a cloud is no more distinct in reality. It is a low-hanging, dark, shapeless mass (fig. 17-30).

* Number 3 (fractocumulus) and fractostratus (not shown) are simple, brokenoff bits of the basic stratus and cumulus forms (fig. 17-31).

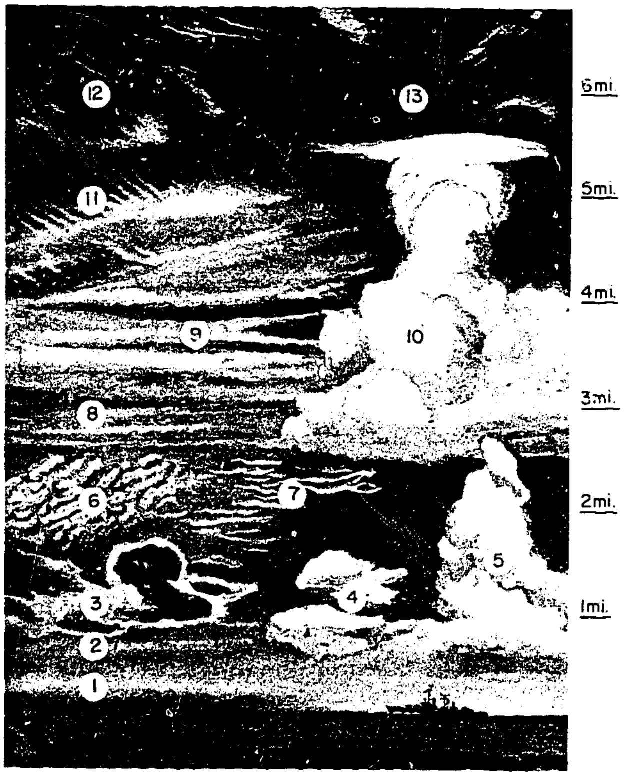


Figure 17-28.–An improbable sky. 69.101

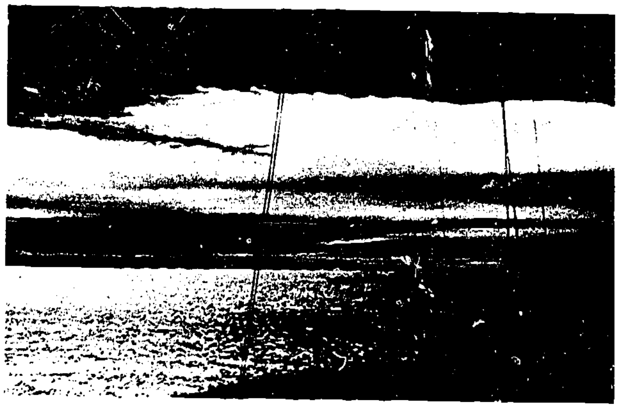


Figure 17-29.–Stratus. 69.102

Figure 17-30.–Nimbostratus. 69.103

Figure 17-33.–Altostratus opacus. 69.106

Figure 17-31.–Fractocumulus. 69.104

* Number 4 (cumulus humilis) and No. 5 (cumulus) have countless variations between them. Figure 17-38 pictures a cumulus humilis cloud.

* Number 6 (altocumulus) and No. 7 (stratocumulus) are easy to recognize in real life. Figure 17-34 shows an altocumulus sky.

* Number 8 (altostratus) is pictured in figure 17-32.

* Number 9 (cirrostratus) is shown in figure 17-36.

* Number 10 (cumulonimbus) is not the fully developed form of this type, but it is "on the way." This cloud might become like the one in figure 17-39. A row of cumulonimbus clouds (defined anvil tops) along a cold front is shown in figure 17-43.

* Number 11 (cirrocumulus) is shown in figure 17-37.

Figure 17-32.–Altostratus. 69.105

Figure 17-34.–Altocumulus. 69.107

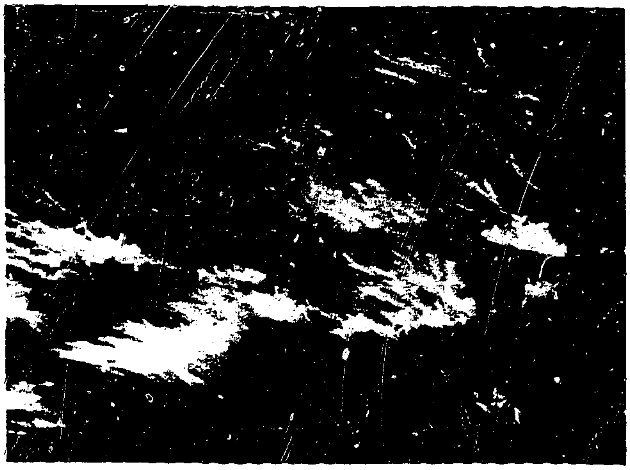


Figure 17-35.–Cirrus. 69.108

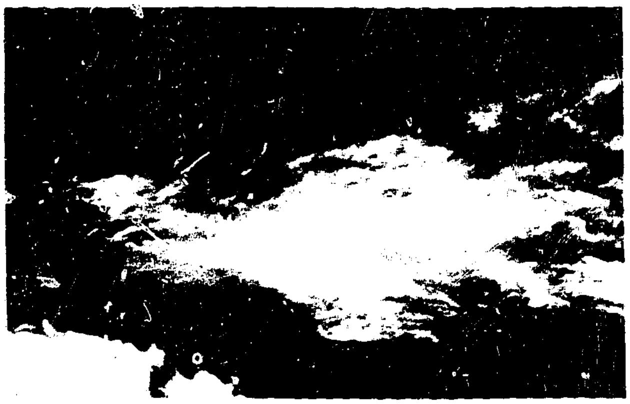


Figure 17-36.–Cirrostratus. 69.109

* Number 12 (cirrus uncinus) and number 13 (cirrus filosus) appear in figure 17-35.

CLOUD FAMILIES

Clouds may be divided roughly into four families. This grouping is on an altitude basis, with one exception–family D. Note in the cloud form names that cumulus and stratus are used for clouds at all levels.

Family A–high clouds (mean lower level 20,000 feet)

Cirrus
Cirrocumulus
Cirrostratus

Family B–middle clouds (mean upper level 20,000 feet; mean lower level 6500 feet)

Altocumulus
Altostratus

Family C–low clouds (mean upper level 6500 feet)

Stratus
Stratocumulus
Nimbostratus

Family D–clouds with vertical development (usually low clouds, but observed all the way from 1600 feet to the upper levels of cirrus)

Cumulus
Cumlonimbus

It may help you to know that cumulus means accumulated; a cumulus cloud is a lumpy cloud. Stratus means straight or flat. No lumps appear in these clouds. Note that both flat and lumpy clouds appear at all levels.

Now for an introduction to cloud recognition, starting with low-lying clouds and working upward.

From the surface of the earth, stratus clouds appear to be gray. In figure 17-28, the cloud rests on the top of a small island, which is characteristic. Often when stratus breaks apart, you see clear, blue sky above. If there is precipitation from such clouds (that is, if the water droplets grow large, and heavy enough to fall), a fine drizzle results. Stratus may settle and become fog, just as fog may lift and become stratus.

The nimbostratus (fig. 17-30) is the well known rain cloud. It is a dark, shapeless mass that brings with it continuous precipitation, heavier than drizzle, but not torrential–just a steady rain. If the barometer rises and wind shifts while this cloud is present, you can expect clearer weather ahead.

The stringy, detached wisps of cloud that lie under stratus or nimbostratus are called "scud" or "scud clouds." Their official name is fractostratus. If they seem to have some "body," they are referred to as fractocumulus.

Of the middle-cloud family, two kinds of altostratus are shown in figures 17-32 and 17-33. Altostratus clouds frequently precede rain by a few hours.

Altocumulus clouds (fig. 17-34) look like flattened globular masses. They usually are large and are grouped together, often so closely that their edges appear to touch. If these clouds are followed

Figure 17-37.–"Mackerel sky" cirrocumulus. 69.110

by cirrocumulus (fig. 17-37), get ready for a thunderstorm.

In the high cloud family are ice-crystal clouds. Certain types of high (cirrus) clouds are referred to as "storm banners" of the wind-swept regions of the upper atmosphere.

The cirrus forms are delicate, threadlike, and silky in structure. The harmless kind appear as isolated, scattered tufts, as thin lines drawn across the sky, or as branching feathery patches ending in hooks. But cirrus clouds that come in long, parallel bands are the first warning of a severe storm. Figure 17-35 shows cirrus of the harmless variety.

Cirrus uncinus is harmless when it appears alone. But when it comes along with cirrocumulus, a storm is probably brewing.

When cirrostratus appears no more than a few hours after one of the types of cirrus, there's a strong probability of rain within the next 24 hours. Cirrostratus is a thin, whitish veil that does not blur the outline of the sun or moon, but usually gives rise to a halo. Figure 17-36 shows this type without the halo.

The fish-scale appearance of cirrocumulus is the familiar "mackeral sky". These clouds are not always as shown in figure 17-37. Sometimes there is more regularity to their arrangement, but you always see the ripples.

Stratus, altostratus, and cirrostratus have almost no vertical development. (Vertical development means "growing tall"–starting at one level and building up to a higher level.) Stratocumulus, altocumulus, and cirrocumulus, being lumpy, do have some vertical development, but they are chiefly recognized by the layerlike arrangement of their lumps lying more or less horizontally in the sky. Family D, clouds with vertical development, which exist at all levels, are distinguished by their vertical measurements.

Figure 17-38.–Cumulus. 69.111

In a sky that is otherwise perfectly clear and blue, you may see detached clouds like those in figure 17-38. These clouds are cumulus humilis, the cumulus clouds of fair weather. Their undersurfaces are usually flat; their tops are somewhat rounded, but irregular. It is not unusual to observe them associated with stratocumulus.

When you see cumulonimbus in the making, a violent disturbance is brewing. This type often forms in the lower levels of the atmosphere and towers, when in full bloom, the level where cirrus clouds are seen. Figure 17-39 shows a characteristic cumulonimbus. This cloud is a peril to aviators because in-

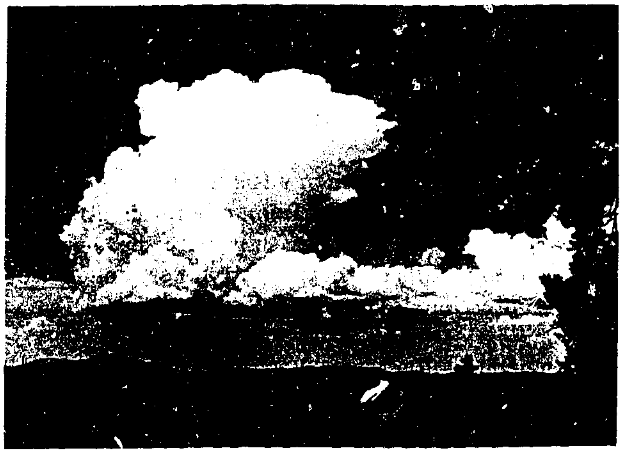


Figure 17-39.–Cumulonimbus. 69.112

side the cumulonimbus the air is in constant turmoil. When the cloud "opens up," the storm is of the cloudburst variety. The precipitation may be rain, snow, or sleet. Thunder and lightning can almost always be expected.

FOG

Fog at sea is frequently formed through the process known as advection (moving forward). If warm air that passed over warm water moves to an area where the water is colder, fog is likely to develop in the latter region. Because the temperature of sea water is fairly uniform within a large area, fog often lasts for many days and nights at sea. Should the clouds at higher levels break up and permit the sun to heat the water noticeably, the airborne water droplets evaporate, and the fog vanishes.

The great fog banks of the North Atlantic, as well as those around the Aleutians, demonstrate what can happen when two adjacent bodies of water have markedly different temperatures. In the vicinity of Newfoundland, warm air that has passed over the warm Gulf Stream quickly turns to fog when it strikes the inshore current of very cold water that flows southward along the coastline.

Off Alaska, the same situation prevails when the air from over the warm Japanese stream (Kuroshio) comes in contact with the cold southward flowing waters of the Bering Sea (Oyashio).

Figure 17-40 gives you an idea of the mechanisms of fog formation and fog dissipation. Along coastlines there are special conditions. Onshore winds blow warm, moist air inland from the ocean. The waters adjacent to the coast are usually colder than those farther offshore. So, as you can see in figure 17-40, at night an onshore wind lays down a thick blanket of fog that often extends some distance inland. The fog hangs on until the sun heats up the land enough to evaporate the droplets, or until an offshore wind drives the fog blanket away.

How can you tell when a fog is on the way, or in the process of formation? Remember, the difference between the temperatures shown by the wet bulb and the dry bulb of the psychrometer, called wet-bulb depression, is your fog indicator.

In general, fog forms when the depression is 4 or less. (When the wet- and dry-bulb temperatures are the same, the fog eventually turns into rain.) A continuous record of the wet-bulb depression serves as a fairly reliable predictor of fog.

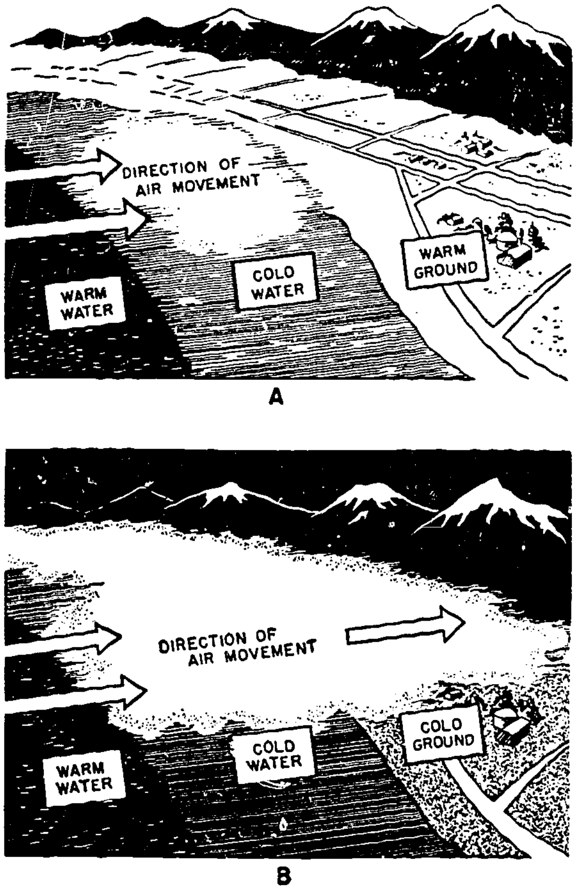


Figure 17-40.–How coastal (advection) fog forms and how it is dissipated (a) by day when the ground is warm, and (b) by night when the ground is cold. 69.113

FRONTS

Fronts are the weather systems that are popularly called waves. A cold wave is actually a front, very much like the fronts in theaters of war. Along the front, two air masses of widely different characteristics fight a battle for supremacy. Usually the colder of the two masses, being heavier, predominates, pushing the warm air ahead of it.

The warm air that is moving ahead of the cold front eventually comes in contact with air of a lower temperature. Because the warm air is not heavy enough to push the cold air out of the way, it rides up over it (fig. 17-41).

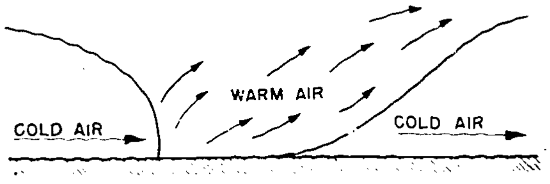


Figure 17-41.–The cold front part and the warm front part of a frontal system. 69.114

A cold front or a warm front may extend for hundreds of miles, but the area in which frontal weather disturbances take place is usually a band 15 to 50 miles wide. The point where the cold and the warm fronts converge is the center of a low-pressure area. Notice point L in figure 17-42.

Figure 17-42 shows how a frontal system is sketched on a weather chart. The figures along the isobars are millibars of pressure. Compare the pressure of 1008 mb around the low with that of 1014 mb within the warm sector.

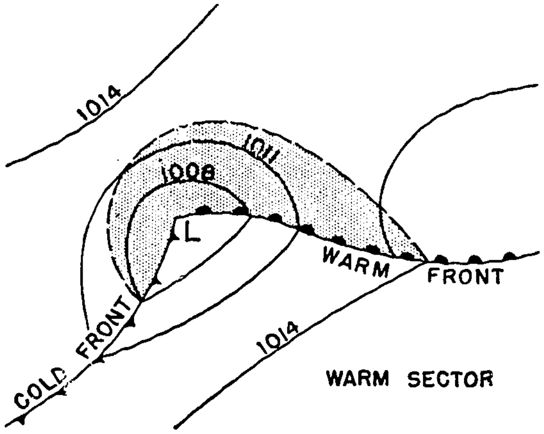


Figure 17-42.–A frontal system sketched on a weather chart. 69.115

When a cold front is coming your way, the first change you notice is a rapid darkening of the horizon to the west and to the north. (See fig. 17-43.) Very soon the cloud ceiling lowers and rain begins. A fast-moving cold front (can move 720 miles in a day); with typical cumulonimbus clouds preceding it, brings sudden violent showers; often it is a thunderstorm. If the cold front is not preceded by cumulonimbus clouds, the rainfall is steady, somewhat like that from nimbostratus.

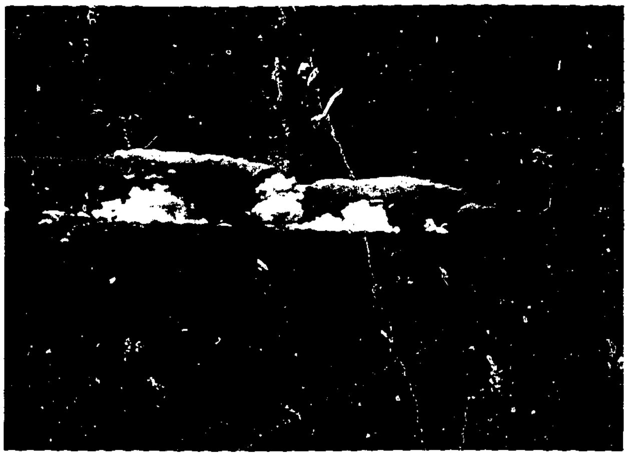


Figure 17-43.–A cold front seen from the air. The anvil-like appearance of the clouds at the top of the picture is another characteristic of cumulonimbus types. 69.116.

A warm front is heralded by cirrus clouds, followed (in order) by cirrostratus, then altostratus. Visibility is poor in advance of a warm front. Thunderstorms may develop ahead of this front. The frontal line is passing when a marked shift occurs in the wind direction, and the temperature of the atmosphere changes sharply.

UNITED STATES STORM WARNING SIGNALS

The combinations of flags and pennants, shown in figure 17-44, are hoisted at the Weather Bureau and other shore stations in the United States to indicate the presence or future presence of unfavorable winds. The meanings of the various displays are given below.

* Small craft warning: One red pennant displayed by day and a red light over a white light at night indicate that winds up to 38 miles an hour (33 knots) and/or sea conditions dangerous to small craft operations are forecast for the area.

* Gale warning: Two red pennants displayed by day and a white light above a red light at night indicate that winds ranging from 39 to 54 miles an hour (34 to 48 knots) are forecast for the area.

* Storm warning: A single square red flag with a black center displayed during daytime and two red lights at night to indicate that winds 55 miles an hour

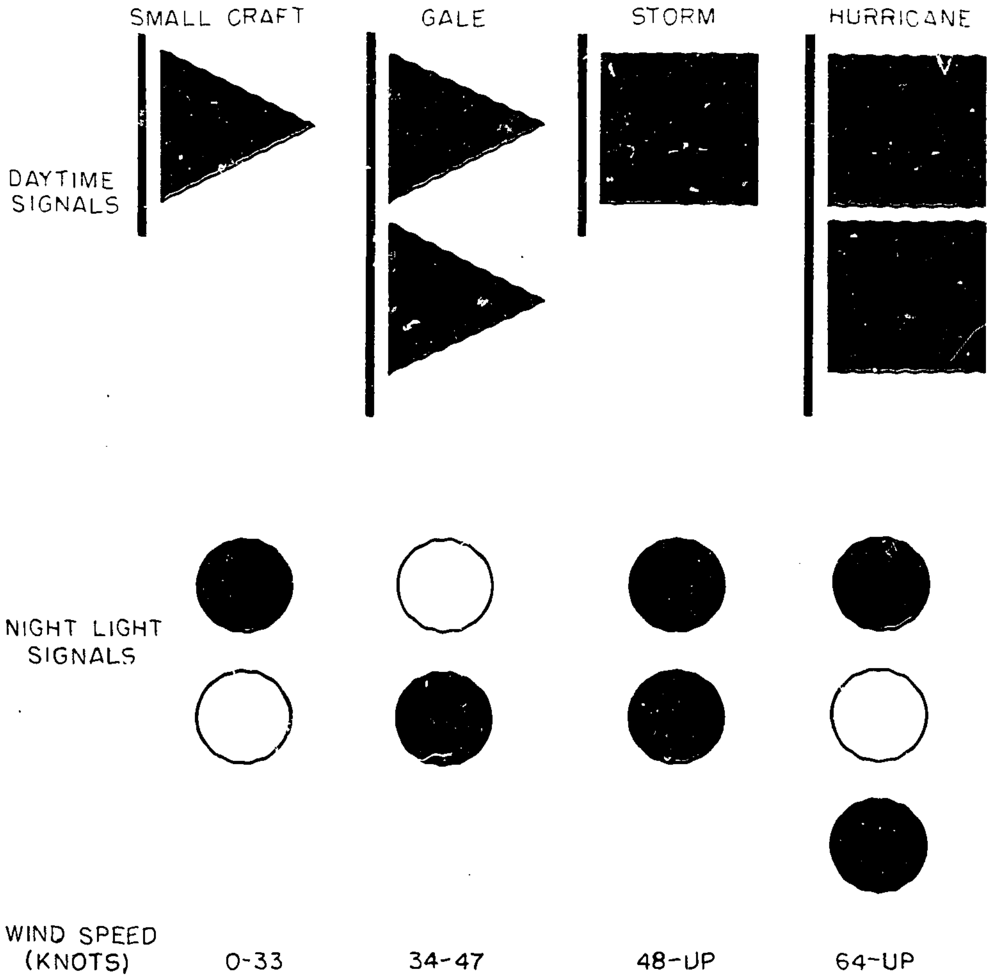


Figure 17-44.–Small Craft, Gale, Storm and Hurricane Warnings. 69.117

(48 knots) and above, no matter how high the speed, are forecast for the area. If the winds are associated with a tropical cyclone (hurricane) the storm warnings display indicates that winds within the range 55 to 73 miles an hour (48 to 63 knots) are forecast.

* Hurricane warning: Displayed only in connection with a tropical cyclone (hurricane). Two square red flags with black centers displayed by day and a white light between two red lights at night indicate that winds 74 miles an hour (64 knots) and above are forecast for the area.

CHAPTER 18

MANEUVERING BOARD

As a Quartermaster you have already learned that you must keep a ship in safe water and navigate her from one point to another by using all available means. Up to this point we have primarily discussed only true (geographical) movement, that is the motion of a ship through the water and over the ground. The course and speed of a ship through the water represents its movement over the ground (disregarding the effect on the ship of such variables as the tide, current, and wind). This is called actual (geographical) movement. However, even actual movement is relative because it is relative to the earth's surface, which is a moving body. All motion is relative to some reference and it is very important when discussing motion to clearly define the reference point used.

RELATIVE MOTION

Relative motion is defined as the apparent movement that takes place between two objects when one or both are moving independently.

For a practical application of relative motion at work, think of it this way: (1) As you stroll along a sidewalk, an understanding of relative motion prevents you from colliding with other pedestrians; (2) when you are driving an automobile, a comprehension of relative motion prevents you from running into other cars; and (3) as you play ball, this knowledge enables you to determine at which point to intercept the ball in order to catch it.

Let us consider a few examples of relative motion in everyday life. These examples are included to explain why relative motion is defined as apparent movement.

1. Driving along a street in a car, you notice a lamppost on the right-hand curb in the next block. As you approach that point, the lamppost changes bearing very slowly to the right. Upon drawing nearer, the motion to the right tends to increase until you are even with the lamppost, when the lamppost disppears behind your line of vision. The lamppost actually remained stationary, but in relation to your movement, it appeared to have motion to the right. The foregoing is an example of relative movement with only one object moving.

2. Now, let us focus on two moving objects under circumstances similar to the preceding example. Assume that you are driving down the same street in the same automobile. But, instead of the lamppost on the curb, you see a person walking along the sidewalk in the same direction that you are headed. As you drive along, the pedestrian changes bearing very slowly to the right. As you continue, this motion to the right increases until the person moves far enough to the right and behind your line of vision. The RELATIVE MOTION of the person walking was opposite to your direction of movement because of your greater speed, the TRUE direction of motion of the person walking was the same as yours.

3. The concept of relative movement is illustrated in figure 18-1 in which two ships leave the same anchorage, one sailing north and the other sailing east. If each ship makes 20 knots, each will travel 5 nautical miles in the first 15 minutes. At that time, the ships will be approximately 7 miles apart. The ship sailing east will now be southeast of the other ship. The movement that has taken place between them– leaving the same spot and being approximately 7 miles apart after 15 minutes–is different from the geographical movement of either ship. It is the result of both their geographical movements measured relative to the other.

If both ships follow their respective routes for another 15 minutes, each will have travelled 10 nautical miles from the starting point and they will be separated by approximately 14 miles. After 45 minutes, they will be separated by approximately 21 miles, although each will have sailed only 15 miles. Each ship, so far as the other is concerned, is moving about 7 miles farther every 16 minutes, but always on the same relative bearing. Thus, in addition to the motion of the individual ships–one to the north and the other to the east–there is also a motion existing between the two in a southeast-northwest direction. This motion is the relative movement between them.

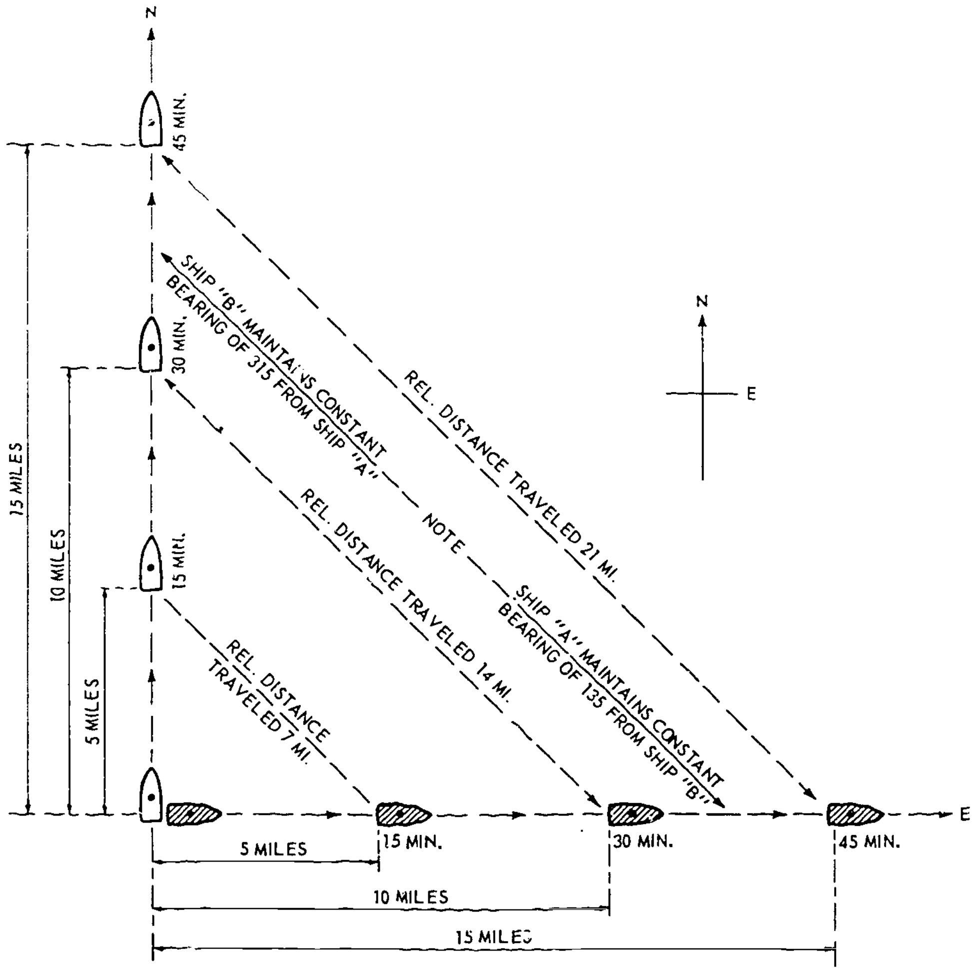


Figure 18-1.–Relative movement. 58.89

RELATIVE PLOT

A relative plot is a drawing to scale showing the position of one moving object relative to other objects. Since we are interested in the movement of one ship relative to another, we can represent relative motion directly if we select one ship as the reference ship and plot the other ship's position by using bearing and distance from the reference ship at set time intervals. These plots are termed relative positions.

The fixed ship, termed reference ship, is placed at the center of the diagram and is normally labeled *R*. Because plotters are interested chiefly in the position of other ships with respect to own ship, it is often preferable to designate own ship as reference ship. If in formation, however, and maneuvering with respect to the guide ship, the guide should be designated as reference ship. It follows that any ship except a reference ship is shown in a different position on the plot.

Figure 18-2 shows ship A proceeding on course 000° at a speed of 15 knots, while ship B is on course 026.5° at speed 22 knots. When ship A is at A_1, ship B is at B_1; when ship A is at A_2, ship B is at B_2 and so on. The full lines represent navigational plots of these two ships. Their bearing and distance at any time can be determined directly by measurement.

In figure 18-3 various positions shown in figure 18-2 are presented on a plan position indicator

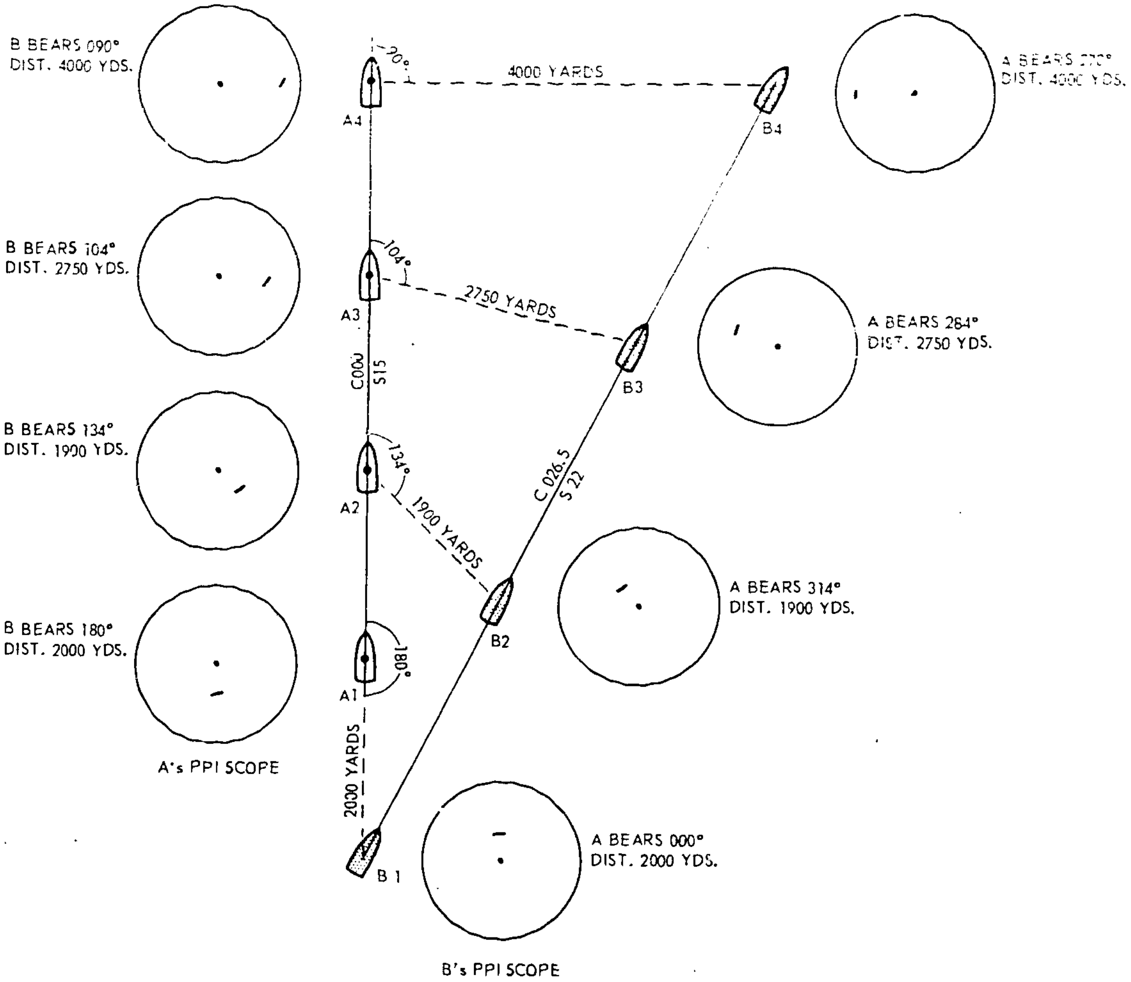


Figure 18-2.–Relative movement on a navigational plot. 58.91

(PPI) scope for each ship. Note that they form a straight line. It can be seen that although ship B is actually on course 026.5°, her movement relative to ship A is in the direction 062°. Similarly, the direction of relative movement of ship A with respect to ship B is the reciprocal of this direction, or 242°, although ship A is actually on course 000°.

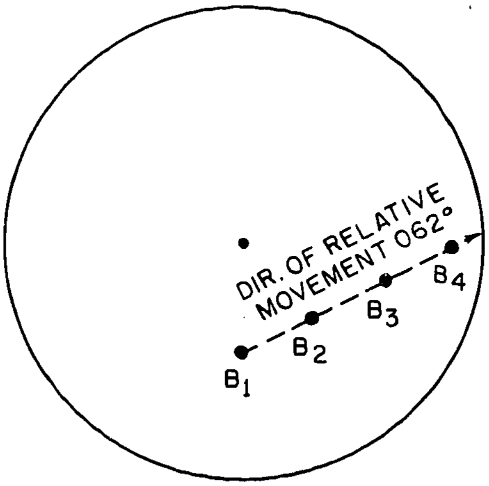
The PPI scope permits visualization of relative movements, inasmuch as all positions of the target ship on the scope are relative to own ship. Hence, motion observed on the PPI scope is relative movement. True motion is seen on a PPI scope only when own ship is stationary.

Figure 18-4 illustrates the relative plot that would be produced by the situation in figure 18-2, with ship A as reference ship (R) and ship B as maneuvering ship (M).

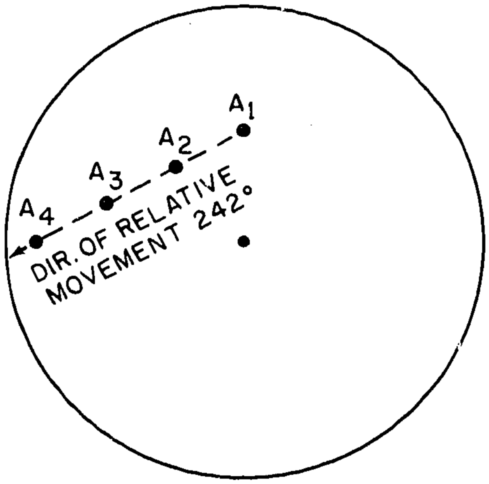
MANEUVERING BOARD

The maneuvering board (MB), (figure 18-5), has been designed specifically for solving problems involving relative movement between ships underway. The maneuvering board is a drawing to scale showing the position of one moving object relative to other moving objects. The center of the maneuvering board is the reference ship from which the positions of other ships are plotted. It is labeled with the capital letter R.

Maneuvering boards are printed with radial straight lines (to aid in plotting bearings and cour-



A'S PPI SCOPE



B'S PPI SCOPE

Figure 18-3.–Relative movement on a radar PPI scope. 58.92

ses) and concentric circles (to aid in plotting distance and speeds).

The maneuvering board has two sets of bearings printed along its outer circle. The outer numbers represent true bearings, and the inner set of numbers is printed as an aid in finding reciprocal bearings quickly. Notice in figure 18-5 that there are 10 circles. These circles represent units of distance, and may be used to form a scale.

Ratio scales are provided on the left and right sides of the maneuvering board (figure 18-5) for convenience in adopting a suitable reduction for quantities pertaining to the problem at hand.

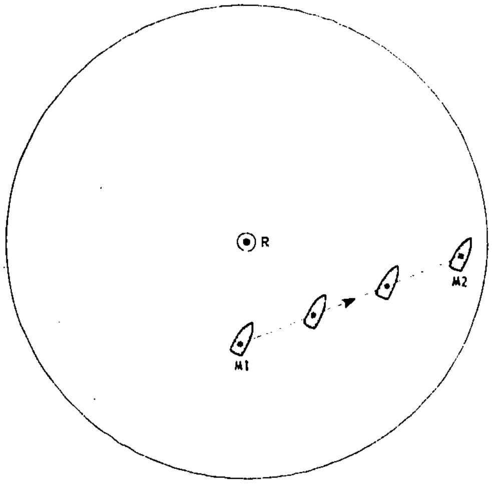


Figure 18-4.–Elements of a relative plot. 58.90(74)

Numerical spacing on each scale is proportionate to that of the circle in the plotting area. When selecting one of these scales, the distance of each circle must be amplified accordingly. For example, when using a 1:1 scale (circle spacing in plotting area) with each circle representing 1000 yards, the 5 circle represents 5000 yards. If the 2:1 scale is used, the 5 circle would represent 10,000 yards (5000 x 2).

Ordinarily, the distance between circles on the maneuvering board represents from 1000 to 5000 yards in the relative plot, and 1 to 5 knots in the vector diagram, (discussed later). Any scale may be selected if it is adequate and convenient to include all required ranges and speeds within the 10 concentric circles on the board.

Deciding the correct range scale to use is comparatively easy. There are 5 different scales, so the maximum range for these scales would be 10 (units of distance for the 1:1), 20 (units of distance for the 2:1), and so on. Thus if range to a contact is 14,000 yards, the 2:1 scale can be used, because this range falls between 10,000 and 20,000 yards. The accompanying table is designed to assist in selecting range scale. If range is–

From	To	Use Scale
0 yards	10,000 yards	1 : 1
10,000 yards	10,000 yards	2 : 1
20,000 yards	30,000 yards	3 : 1
30,000 yards	40,000 yards	4 : 1
40,000 yards	50,000 yards	5 : 1

PLOTTING OWN SHIP IN CENTER OF MANEUVERING BOARD. (MB)

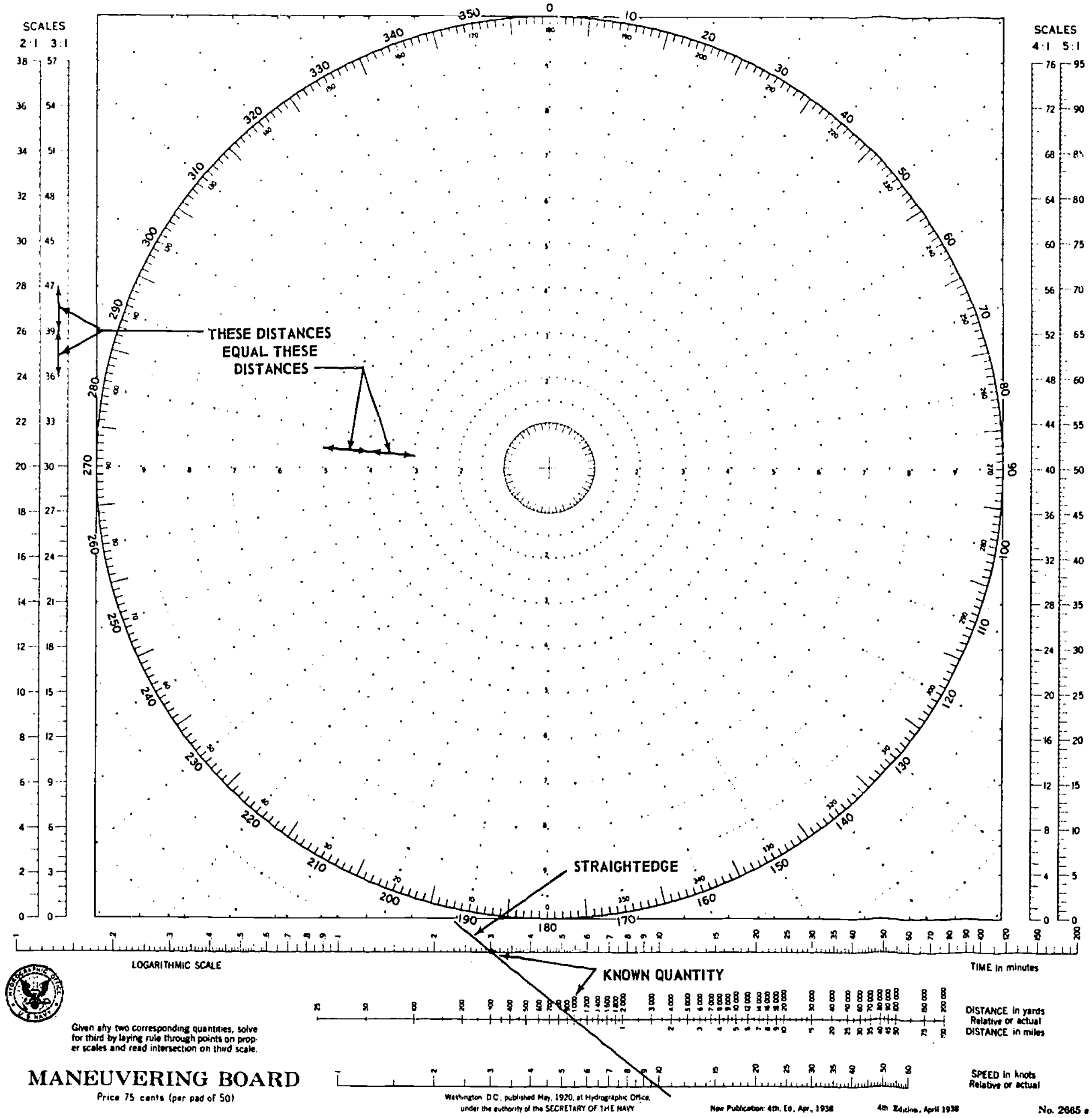


Figure 18-5.–Maneuvering board.
36.65(58)B

PLOTTING OWN SHIP IN CENTER OF MANEUVERING BOARD (MB)

With present day accurate PPI repeaters and precise radars, a direct system of correlation between the picture on the radar repeater and the relative plot on the MB is easily accomplished by always placing own ship in the center of the maneuvering board. Since own ship is always the center of the radarscope on a PPI, the PPI can be used as a maneuvering board, and rapid and fairly accurate maneuvering solutions can be worked directly on the face of the PPI. When precise solutions are desired, the maneuvering board must be used.

Several advantages accrue from placing own ship in the center of the MB. The most important benefits are that (1) the entire plot on the maneuvering board can be seen without conversion on the PPI, and (2) range and bearing of contacts can be plotted directly. Another advantage is that the relative picture drawn on the MB can be seen developing on the PPI, so that any error in plotting becomes immediately apparent as stated earlier in this chapter.

Because plotters are interested chiefly in the position of other ships with respect to own ship, it is often preferable to designate own ship as reference ship. If in formation, however, and maneuvering with respect to the guide ship, the guide should be designated as reference ship. It follows that any ship except a reference ship is shown in a different position on the plot.

Positions of objects (targets or contacts) in a relative plot on a maneuvering board are designated by the capital letter M (for maneuvering ship) accompanied usually by a time. Relative plots are determined by the bearing in degrees, usually true, and measured in yards from own ship, or from the center of the maneuvering board (R).

The first range and bearing of the maneuvering ship is plotted and is labelled M_1 and the next position (range and bearing) is plotted and labelled M_2. If more than two positions of the maneuvering ship are plotted, they are labelled M_3, M_4, M_5, etc. Relative to the reference ship (R), the plots from M_1 to M_2, etc. show the movement of the maneuvering ship (relative movement).

The direction of the line joining the plots from M_1 to M_2, etc. represents the direction in which the maneuvering ship (target), is moving with respect to the reference ship (R). This direction is called the Direction of Relative Movement (DRM) and is expressed as a true bearing. (See figure 18-6.) Remember this is not a true movement but, it is the relative movement which is the result of the reference ship's course and speed and the maneuvering ship's course and speed which makes the maneuvering ship travel down the DRM line.

The distance between the positions of M_1 to M_2, measured to the same scale used to plot M_1 and M_2 is the distance the maneuvering ship (M), traveled with respect to the reference ship (R). This is called relative distance and is labelled (MRM), *M*easurement of *R*elative *M*ovement. (See figure 18-6.) Again, remember this is not a true distance but, it is the relative distance which is the result of the reference ship's course and speed and the maneuvering ship's course and speed which makes the maneuvering ship travel down the DRM line.

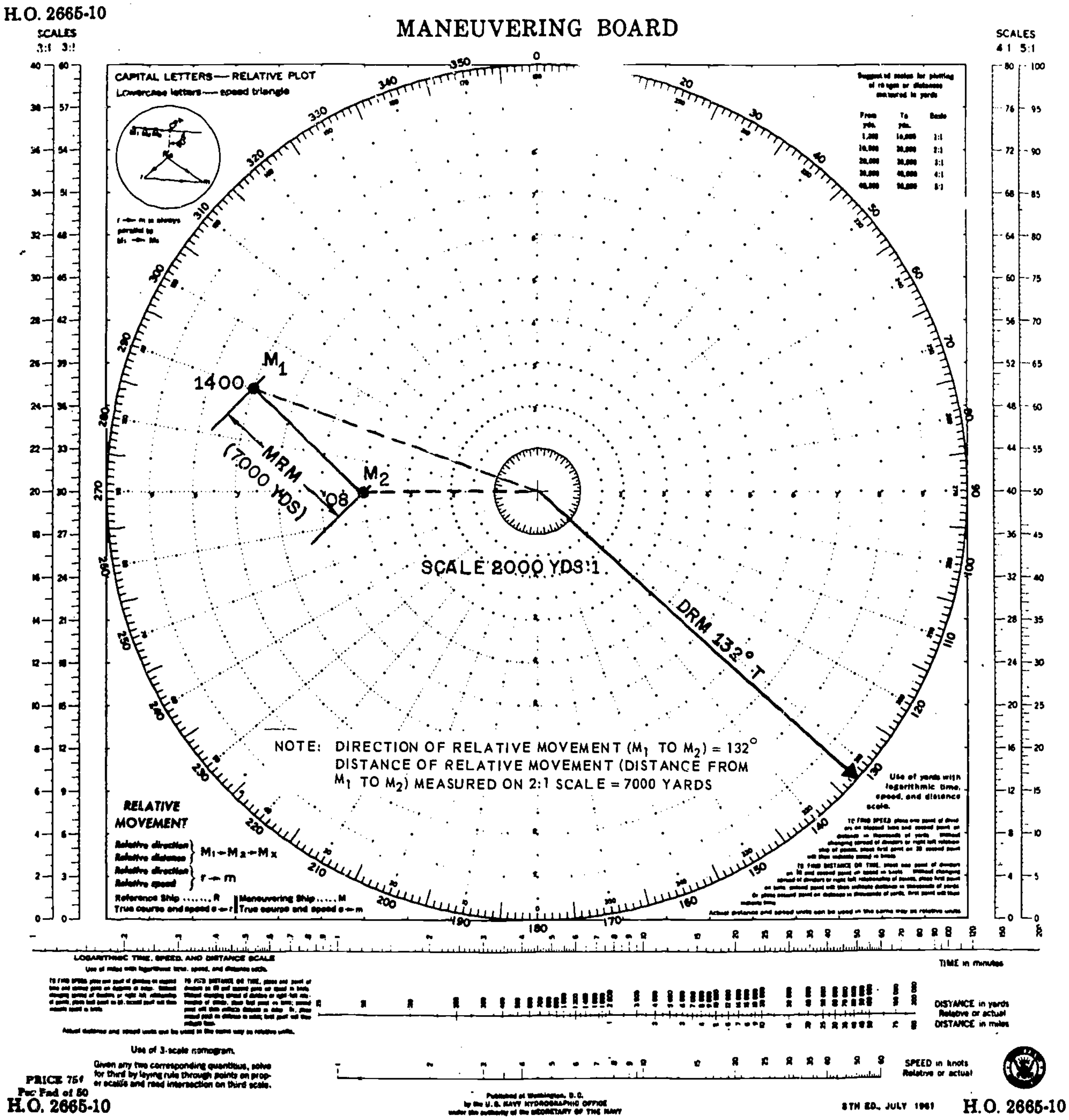
Relative distance then is the measurement of the distance, to scale, between M_1, and M_2, etc. It is important to remember that you must use the same scale used to plot M_1, M_2, etc. for this measurement. When this measurement is made and its value determined (in miles or yards) if we introduce the element of time between these plots (M_1 to M_2, etc.), we can determine the *S*peed of *R*elative *M*ovement (SRM). Speed of relative movement is the speed at which the contact is moving relative to the reference ship. The SRM is determined by using the MRM for the period of time elapsed between the plots (M_1 to M_2, etc.). In order to solve for SRM the nomogram at the bottom of the maneuvering board affords a ready means of interconverting time, speed, and distance, and solving graphically for any one of these quantities when the other two are known.

Figure 18-6 illustrates time-speed-distance scales. The top line is the time line or logarithmic scale in minutes; the middle one is the distance scale. Numbers on top of the distance scale give distance in yards; those below, distance in miles. The bottom line is the speed scale in knots.

The words "relative" or "actual," used with speed and distance scales, are included only to inform the plotter that both relative and actual problems may be solved. When relative distance is used, the corresponding speed must be relative.

Time-speed-distance scales are based on the formula: Distance = speed x time. These scales are so arranged that by marking off any two known values in this formula, and laying a straightedge through the points so marked, the correct value of the third quantity is the point of intersection on the third scale.

It was observed (in figure 18-6) that the contact traveled 7000 yards in 8 minutes. What is the contacts SRM? On the time scale locate 8 minutes and on the distance scale locate 7000 yards. Draw a



NOTE: DIRECTION OF RELATIVE MOVEMENT (M_1 TO M_2) = 132°
DISTANCE OF RELATIVE MOVEMENT (DISTANCE FROM M_1 TO M_2) MEASURED ON 2:1 SCALE = 7000 YARDS

Figure 18-6.–Direction and distance of relative movement. 36.65(69E)A straight line through these two points and extend it across the speed scale. The line will cross the speed scale at 26.5 knots, this is the SRM.

3-MINUTE RULE

Another shortcut in determining speed or distance traveled is the method known a minute rule. It is simple method of solving i tive speed, without having to use the logarithmic scales. The rule is based on the number of yards the contact travels in 3 minutes. Explanation of the 3-minute rule follows.

1. One knot equals 1 nautical mile per hour.
2. One knot equals 2000 yards per 60 minutes.
3. If 1 knot equals 2000 yards per 60 minutes, then reducing the distance traveled in 3 minutes, it is found that a ship covers a distance of 100 yards.

$$\frac{3}{60} \text{ or } \frac{1}{20} \text{ x } 2000 = 100 \text{ yards.}$$

4. Therefore, for every 3 minutes of travel, each knot of speed represents a distance of 100 yards. Thus, if a ship travels 1200 yards in 3 minutes, its speed is 12 knots. (Point off or drop the 2 places from the right side of the number being divided.)

To summarize the 3-minute rule: The number of hundreds of yards traveled by a ship in 3 minutes is the speed of that ship in knots.

VECTOR DIAGRAM

Thus far we have concerned ourselves with only the relative plot, i.e: DRM, SRM, MRM, and CPA. We have not mentioned the true course and speed of the contacts involved, which at the beginning of this discussion we found was a direct cause of the effect known as relative motion. To determine the true course and speed of a contact we must develop a vector diagram.

A vector is a straight line representing direction of movement and speed of movement. Direction (course) is indicated by drawing the line from the center of the maneuvering board toward the direction indicated on the outer bearing circle. (See figure 18-7). Speed is indicated by the length of the vector drawn to scale.

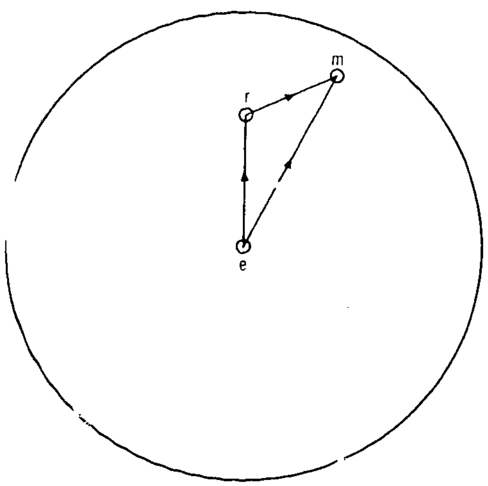


Figure 18-7.–Vector diagram. 36.65(58)A

A vector diagram frequently referred to as a speed triangle, is illustrated in figure 18-7. This diagram is made up of six factors:

1. Course of reference ship–direction from *e* to *r*: e → r
2. Speed of reference ship–distance from *e* to *r*: e → r
3. Direction of relative movement (DRM) of maneuvering ship with respect to reference ship–direction from *r to* m: r → m
4. Speed of relative movement (SRM) of maneuvering ship with respect to reference ship–distance from *r* to *m*: r → m
5. Course of meaneuvering ship–direction from *e* to *m*: e → m
6. Speed of maneuvering ship–distance from *e* to *m*: e → m

The small letter "e" is always at the center of the maneuvering board; small letter "r" is used at the arrowhead of the speed vector for own ship; and small letter "m" is used at the arrowhead of the speed vector of the other ship.

With e always at the center, maneuvering ship's course and speed and own course and speed have the same point of origin at the center. The line drawn from the head of own speed vector r to the head of the maneuvering ship's speed vector m always is the direction of relative movement (SRM).

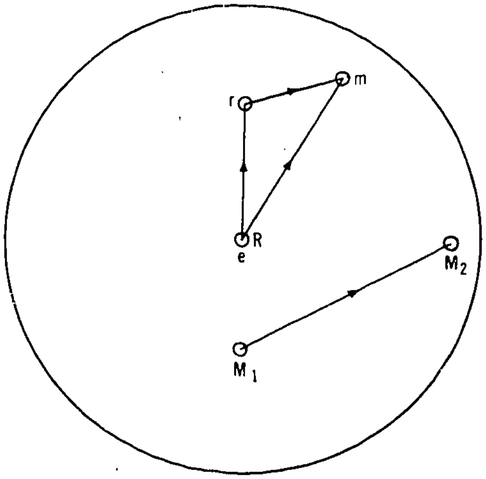


Figure 18-8.–Complete relative movement plot.
36.65(58)A

The direction of relative movement will always go from *r* to *m*, (see figure 18-8), and the arrowhead is always placed at m. The speed scale used in the vector diagram must be common to all vectors.

As can be seen, each line (or vector) represents both direction (course) and speed. The diagram must be labeled properly for correct interpretation.

MANEUVERING BOARD TECHNIQUE

Basically, the solution of all maneuvering board problems is the same. The relative plots must be connected, giving the M_1 - M_2 - M_x line, which is the DRM. Then the vector diagram must be completed. Once it is completed, the problem must be solved and the desired course, speed, etc., can be picked from the vector diagram. Four of the six values of a vector diagram (and time involved) must be known before any solution can be obtained. Depending on information given, a vector diagram may be completed by three methods. These three basic types of solution are (1) speed of maneuvering ship given, (2) course of maneuvering ship given, and (3) time to be on station given.

In addition to basic problems that follow, plotters should know how to set up a maneuvering board to indicate a tactical organization and disposition of own force. This information can be obtained from ATP 1, Volume I.

Dutton's *Navigation and Piloting* and the *Maneuvering Board Manual* (H.O. Pub. 217) serve as excellent references for information on uses of the maneuvering board not covered in this chapter.

MANEUVERING BOARD HINTS

The following guidelines are offered in working maneuvering board problems.

1. Read the problem carefully and understand it before proceeding with the solution. Check all numbers.
2. Determine largest scale possible, both for speed and distance, and keep same scale throughout problem. Different scales may be used, however for relative plot and vector diagram.
3. Avoid using reciprocals. This is particularly true when determining DRM if your ship is maneuvering on another ship.
4. Measure carefully. It is easy to pick off the wrong circle, or make an error of 10° in a direction. Read the plotted answers accurately.
5. Plot only true bearings. Convert relative to true before plotting.
6. Label all points and put arrowheads on all lines.
7. Remember that relative speed is from *r* to m, relative movement from M_1 to M_2.
8. Actual speed vectors always originate at the center of the board.
9. In actual problems, at least three plots are needed on a contact for accurate solutions.
10. Work a problem one step at a time.
11. Be methodical, be careful, and practice diligently.

CLOSEST POINT OF APPROACH

The closest point of approach (CPA) of a contact to the reference ship is the shortest distance between the extended relative movement line and the center of the maneuvering board and must be a line perpendicular to the relative movement line. The direction of this line from the center of the maneuvering board to the outer bearing circle is also true bearing of CPA.

Two methods are used to find the bearing of CPA. The first method is to add 90° to or subtract 90° from DRM. The plotter should be able to tell by inspection whether to add or subtract. In this example, he must add. Hence, at CPA, contact will bear 170° (080°+90°=170°).

A second way to find the bearing of contact at CPA is to use a right angle triangle. Lay one side of the right angle along the relative movement line (RML), move the triangle along the RML until the other side passes through the center of the board. Draw a line across the relative movement line. Lay the parallel rulers along this line and the center of the board. Read the bearing on the bearing circle.

To find the range of CPA, use dividers to measure the distance on the proper ratio scale at the side of the board. In our example, the range is 7200 yards.

At times it helps to know what the relative bearing of CPA will be. To find relative bearing, subtract own ship's heading from the true bearing. Suppose that own ship's course is 340°. Obviously, one cannot subtract 340 from 170, but if 360° is added to the true bearing, the subtraction can be accomplished with no trouble. Thus, 170°+360°=530° and 530°-340°=190°= relative bearing of CPA.

We now know four of the CPA items, but we still must know speed of relative movement (SRM) and time of CPA. To find SRM, measure the distance between M_1 and M_2 on the proper scale. This measurement is the distance traveled in 10 minutes. Mark those quantities on the nomogram at the bottom of the maneuvering board and find speed (explained earlier). Relative speed is 13.5 knots.

To find time of CPA, measure the distance from M_2 to CPA. With this quantity and relative speed, again go to the nomogram. Required information is the time required for the contact to get to CPA. Add this time (27 minutes) to the time at which the contact was at M_2. Time of CPA is 0607.

Suppose that at 0530 CIC reports a contact bearing 236° at 18,000 yards. Ten minutes later the contact bears 229° at 14,000 yards. The plotter will want to figure the following data:

1. Direction of relative movement (DRM) of contact with respect to own ship.
2. True bearing of contact when it reaches minimum range.
3. Minimum range to contact (range to CPA).
4. Relative bearing of contact when it reaches CPA.
5. Speed of relative movement (SRM) of contact with respect to own ship.
6. Time at which contact will reach CPA.

First, plot the M_1 and M_2 positions of the contact. Mark on the bearing circle the first bearing (236°) and lay parallel rulers on that mark and the center of the board. For the range, select the largest scale practicable. Because of the range (18,000 yards) a 2:1 scale seems most logical. Place a dot where the bearing line crosses the 9 ring (fig. 18-10). This dot is the M_1 position. Plot the M_2 position in the same manner. Draw a line between the M_1 and M_2 positions, and extend the line past the center of the board as shown. To find direction of relative movement (DRM), lay parallel rulers along the relative movement line (M_1 to M_2), walk them to the center of the board, and draw a short line through the bearing circle. The DRM (or relative course) is 080.

NEW CPA

The problems just solved show that there is nothing to worry about from the other ship so long as both ships continue on their present courses and speeds, but what happens if one ship changes course or speed?

Naturally, if the contact makes a change, the plotter must work out an entirely new problem.

If own ship is going to change course and/or speed, however, it makes sense to determine a new CPA before the change. This procedure may prevent putting own ship into possible danger. A new CPA can be found by using a vector diagram to solve for a new relative movement and relating the new *rm* to the old problem.

Suppose that own ship is a DD, scheduled to rendezvous with a CVA, and that the night order book contains an order to change course to 270° and speed to 10 knots at 0600.

In actual practice this problem would be worked out on the same board as the old one, but to avoid confusion, a new board is used in our example. (See fig. 18-10.) Needed information: the old relative movement line and contact's true course and speed vector *em*.

First, determine contact's 0600 position on the old relative movement line. (Remember that relative movement was computed on the 2:1 scale.) Contact was at M_2 at 0540. Therefore, go to the nomogram with relative speed (13.5 knots) and time (20 minutes). Mark this distance (9000 yards) from M_2 and label the position 0600.

Draw in the new own ship's vector 270° at 10 knots. (This vector was on the 5:1 scale.) Label own ship's vector *er*. Complete the triangle for the new relative movement *rm*. Walk the rulers to the center of the circle and draw a line across the bearing circle to find the new DRM, 038°. Walk the rulers down to the 0600 position and draw a line past the center of the circle in the new direction of relative movement. The new DRM plus 90° equals true bearing of the new CPA, 128°.

Table 18-1.–Steps in solving Course and Speed Problem. 69.150

To illustrate these solutions, a sample problem is given and its solution shown, step by step, in table 18-1 and figure 18-9.

Own ship is on course 230° T, speed 15 knots. At 0914, radar picks up a contact at 200° T, 18,000 yards. The contact, designated Skunk Bravo, bears 207° T, 15,800 yards at 0917. The OOD requests course and speed of Skunk Bravo. Check each procedural step against the solution in figure 18-9.

Step	Procedure	Reason
1	Choose scale of 1 unit = 3 knots for vector diagram.	Three is an even multiple of 15 and it permits accurate measurement.
2	Draw er on 230° 5 units in length.	Line er represents ship's own course and speed which is 230° at 15 knots (15 ÷ 3 = 5 on 3:1 scale).
3	For relative plot choose scale of 1 unit = 2000 yards	Select the largest scale possible for accuracy.
4	Plot M_1 at bearing 200°, 9 units from e. Label with time.	At 0914 contact was at 200°, T 18,000 yards.
5	Plot M_2 at bearing 207°, 7.9 units from e.	Position of skunk at 0917.
6	Draw a line from M_1 to M_2.	Line M_1 - M_2 represents direction of relative movement.
7	Transfer M_1 - M_2 line to center of the board with parallel rulers and read off DRM on compass rose.	Direction of relative movement is the direction of r to m, 340°.
8	Draw a line from r parallel to and in the same direction as M_1 - M_2.	Line from r to m is also the direction of relative motion, so that line rm is parallel to line M_1 - M_2.
9	With dividers measure line M_1 - M_2 and apply to 2:1 scale. (1.5 units x 2000 yards = 3000 yards).	Distance is necessary to calculate speed.
10	Speed of relative movement (SRM) is 30 knots.	Using nomograms at bottom, plot 3 on time scale and 3000 on distance scale. Connect these dots with line and extend line to speed scale.
11	Lay off 30 knots on line rm, using the 3:1 scale.	Length of rm represents speed of relative movement (3:1 scale was selected in step 1).
12	Draw em.......	Point m is determined where the spread of dividers (denoting relative speed) falls.
13	Course of em is 310°.	Direction of em is contact's course.
14	Measure length of em on 3:1 scale, 28.5 knots.	Length of em is contact's speed.

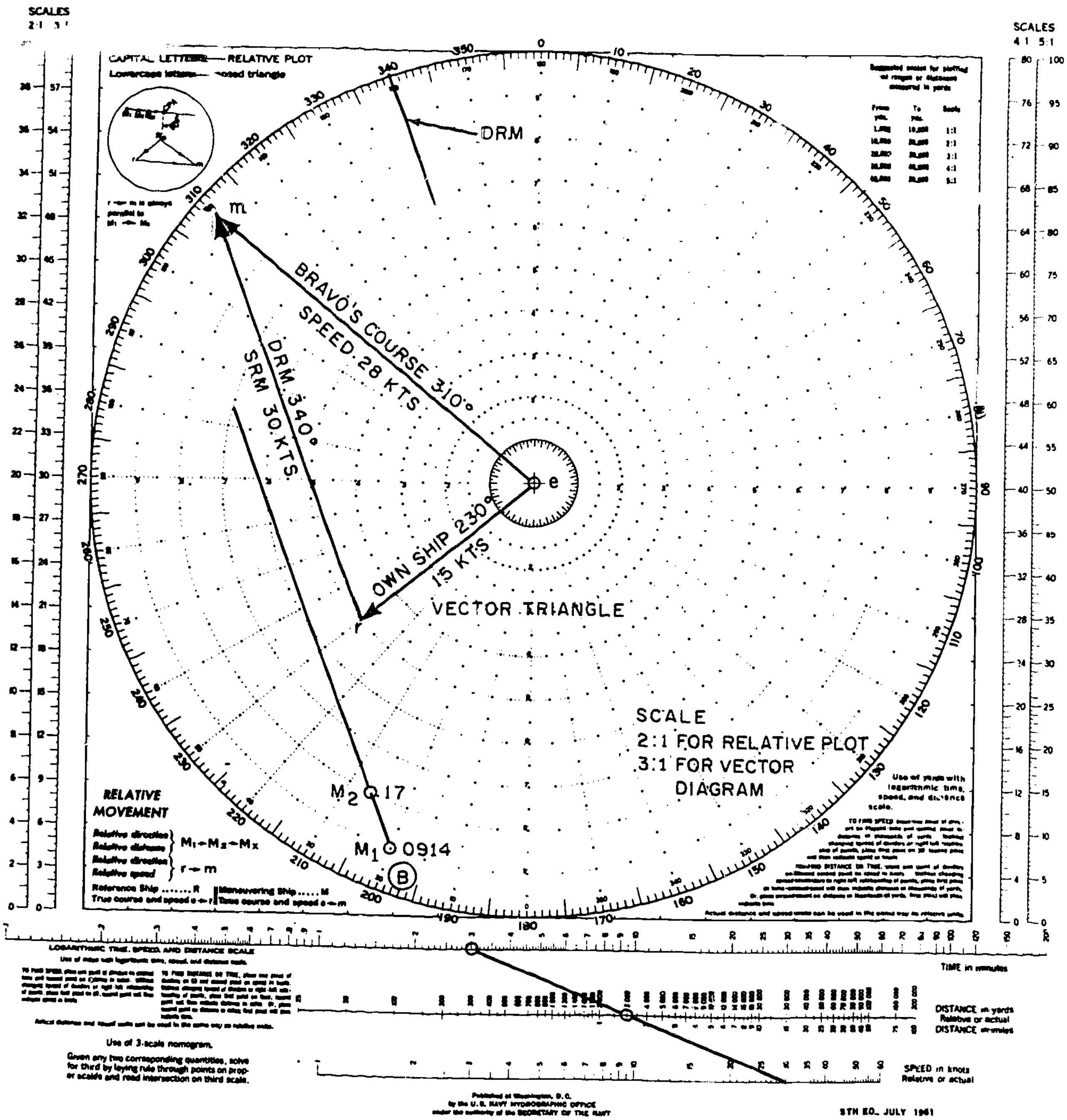


Figure 18-9.–Use of vector diagram in solving a course and speed problem. 36.65(69F)

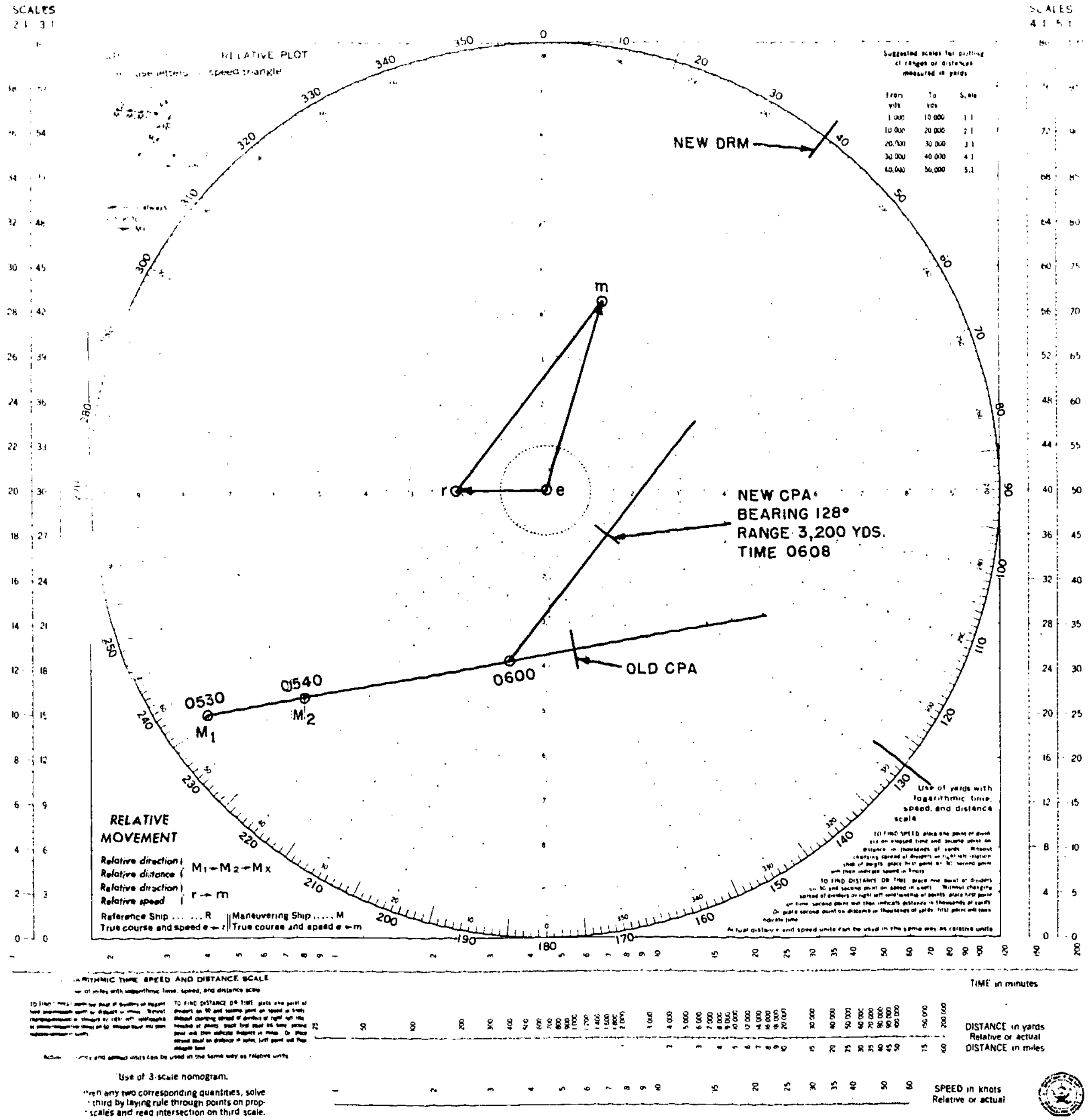


Figure 18-10.–Solving for a new CPA.
36.65(58)D

Measure the distance between the 0600 position and the new CPA. From the nomogram, find the time required to traverse that distance (08 minutes). New time of CPA is 0608, at distance 3200 yards.

CHANGE OF STATION

A common use of the maneuvering board is to determine course and speed to proceed to a new sta-

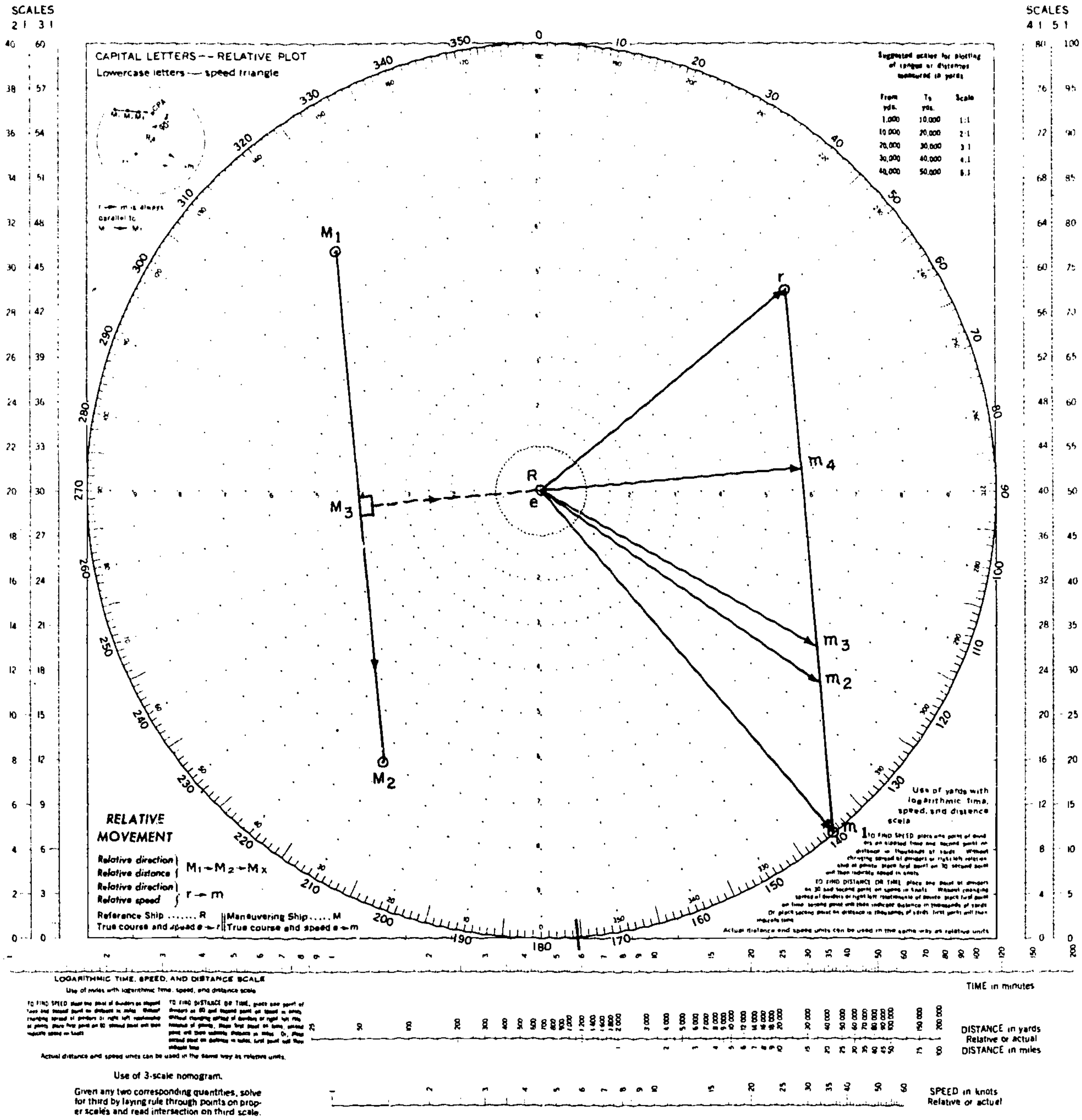


Figure 18-11.–Problem 1. (Course and speed desired for a maneuver.) 36.65(69)B

tion. To illustrate this use, a few change of station problems follow.

* Problem 1 (fig. 18-11). (Course and speed desired for a maneuver.)

Problem 1 is designed to show a maneuvering board solution in determining the required course and speed for a maneuver.

Situation: The guide is on course 050°T, speed 14 knots. The guide bears 140°T, range 7000 yards.

Take station bearing 211°T, range 7000 yards from the guide.

Required:
a. DRM.
b. SRM.
c. CPA.
d. Own ship's course to station at 20 knots.
e. Own ship's course to station at 15 knots.
f. Own ship's speed if course 120°T is steered.
g. Minimum speed to complete maneuver.
h. Own ship's course at minimum speed.

Solution (recommend scale of 2:1 in knots and 1:1 in thousands of yards):

1. Draw the *er* vector to represent true course (050°T) and true speed (14 knots) of the guide (reference ship). Plot M_1. Because the guide (reference ship) is in the center, point M_1 must be plotted in the direction 320°T from the center, on the 7 circle. Hence, the bearing to the guide from own ship will be 140°T. Plot M_2. With the guide in the center, M_2 is then on the 7 circle in the direction 211°T from the center. Connect M_1 and M_2 and place an arrowhead on the relative movement line (M_1M_2 line) to indicate that the direction of relative motion is from M_1 to M_2. The DRM can now be determined by placing the parallel rulers on the relative movement line (M_1M_2 line) and moving them to the center of the maneuvering board. The MRM can also be determined by measuring the distance between M_1 and M_2.
2. Locate the CPA by drawing a perpendicular from the M_1M_2 line to R (shown by the dotted line in fig. 18-11. The direction of the perpendicular from M_3 toward R is the bearing of the CPA from own ship to the guide. In this example, it is found by subtracting 90° from the DRM. The range to the guide at CPA is found by measuring (to scale) the distance from M_3 to R.
3. Using parallel rulers, draw the *rm* vector parallel to the M_1M_2 line and in the same direction as the DRM. Begin this line at point *r* and continue it indefinitely. Using dividers, measure 20 knots on the 2:1 scale. Place one point of the dividers on point *e* and swing the other end of the dividers until it intersects the *rm* (relative speed) vector, labeling the point of intersection m_1. Complete the triangle by drawing the vector em_1 from the center of the diagram (*e*) to m_1. The direction of this line represents own ship's course to station, using speed of 20 knots.
4. Locate the point m_2 on the *rm* line where it intersects the 15-knot circle (7.5 circle, using the 2:1 scale). Connect points *e* and m_2. The direction of em_2 represents the course to station, using a speed of 15 knots.
5. Draw the vector em_3 in the direction 120°T from the center (*e*) to its point of intersection with the *rm* vector. The length of this line (from *e* to m_3), measured on the appropriate scale, represents the true speed to station, steering course 120°T.
6. Minimum speed is the slowest possible speed at which own ship can complete the maneuver. This slowest speed is represented by the shortest value of the *em* vector that can be drawn. The location of *m* for this condition is on the relative speed vector (*rm* line) at its nearest point to *e*, or at the foot of a perpendicular from *e* to the relative speed (*rm*) vector. Connect points *e* and m_4. The length of em_4 represents the minimum speed to complete the maneuver.
7. Proceed as in step 6. The direction of em_4 represents the course to station at minimum speed.

Answers:
a. DRM–175.5°T.
b. SRM–11,400 yards.
c. CPA–085.5°T at range 4050 yards.
d. Course to station at 20 knots 140.5°T.
e. Course to station at 15 knots 125°T.
f. Own ship's speed if course 120°T is steered 13.8 knots.
g. Minimum speed 11.4 knots.
h. Own ship's course at minimum speed 085.5°T.

* Problem 2 (fig. 18-12)

Problem 2 is designed to show a maneuvering board solution in determining the course and speed to complete a maneuver in a specified time.

Situation: The guide is on course 225°T, speed 15 knots. At 0900 the guide bears 160°T, range 9000 yards.

Order received: Take station bearing 100°T from the guide at a distance of 3000 yards. The commanding officer desires own ship to be on station in 20 minutes.

Required:
a. Course to station.
b. Speed to station.
c. CPA.
d. Clock time of CPA.

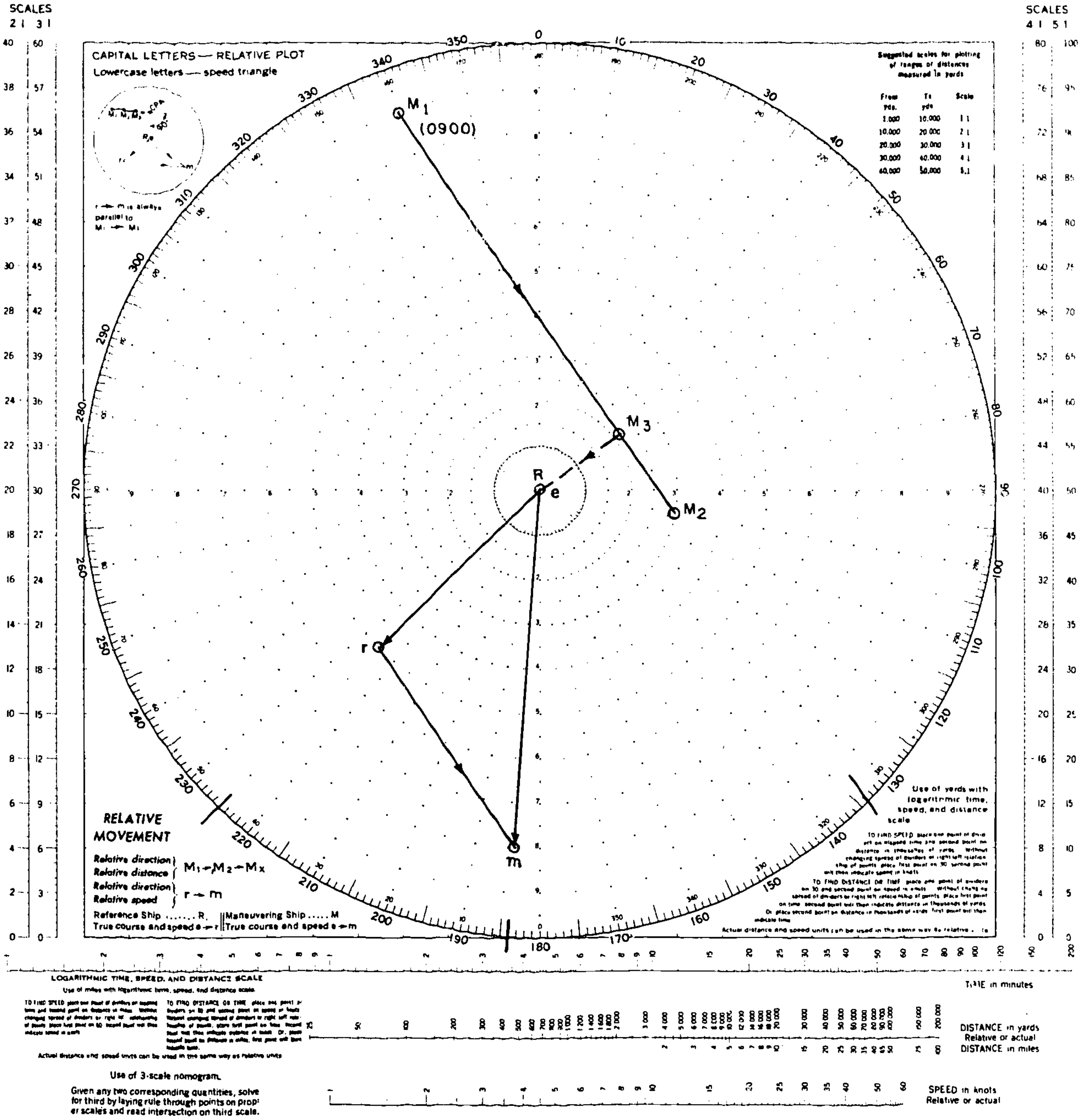


Figure 18-12.–Problem 2. (Course and speed to complete a maneuver in a specified time.)
36.65(69)C

Solution (recommend scale of 3:1 in knots and 1:1 in thousands of yards):

1. Draw the *er* vector to represent the true course (225°T) and the true speed (15 knots) of the guide (reference ship). Plot M_1 and M_2. Connect M_1 and M_2 by a line and place an arrowhead on this line to indicate that the direction of relative motion (DRM) is from M_1 to M_2. Measure distance between M_1 and M_2 to find relative distance (MRM). Using this distance (MRM) and the allotted time to get to station (20 minutes), enter the nomogram to find relative speed (SRM). Draw the *rm* vector parallel to the relative movement line (M_1M_2 line) and in the same direction as the (DRM). Begin this line at point *r* and extend it indefinitely. Measure the relative speed (already found) on the dividers and lay off this value on the relative speed vector, thus locating point *m*. Connect points *e* and *m*. The direction of the *em* vector (from *e* to *m*) represents course to station.
2. To find the speed to station, measure to scale the length of the em vector found in step 1.
3. Locate the point M_3 on the M_1M_2 line by constructing a perpendicular from the relative movement line (M_1M_2 line) to the center, *R* (shown by dotted line in fig. 18-12. Course and speed to complete a maneuver in a specified time.). The direction of the perpendicular from M_3 to *R* is the bearing of CPA from own ship to guide. In this example, it is found by adding 90° to the DRM. The range to the guide at CPA is found by measuring to scale the distance from M_3 to R.
4. To find the clock time of CPA, measure the distance between M_1 and M_3. Take this distance and the relative speed (SRM) found in step 1, and enter the nomogram with these values to solve for the time, in minutes, to CPA. Add this time to 0900 (time of M_1 position) to find clock time of CPA.

Answers:

a. Course to station 184°T.
b. Speed to station 24 knots.
c. CPA 236°T, 2150 yards.
d. Clock time of CPA 0916.3.

TRUE AND APPARENT WIND

True wind is the speed of wind and the true direction from which it blows, as measured at a fixed point on the earth. Apparent wind is the speed and true direction from which wind blows as measured at a point that is moving relative to the earth's surface.

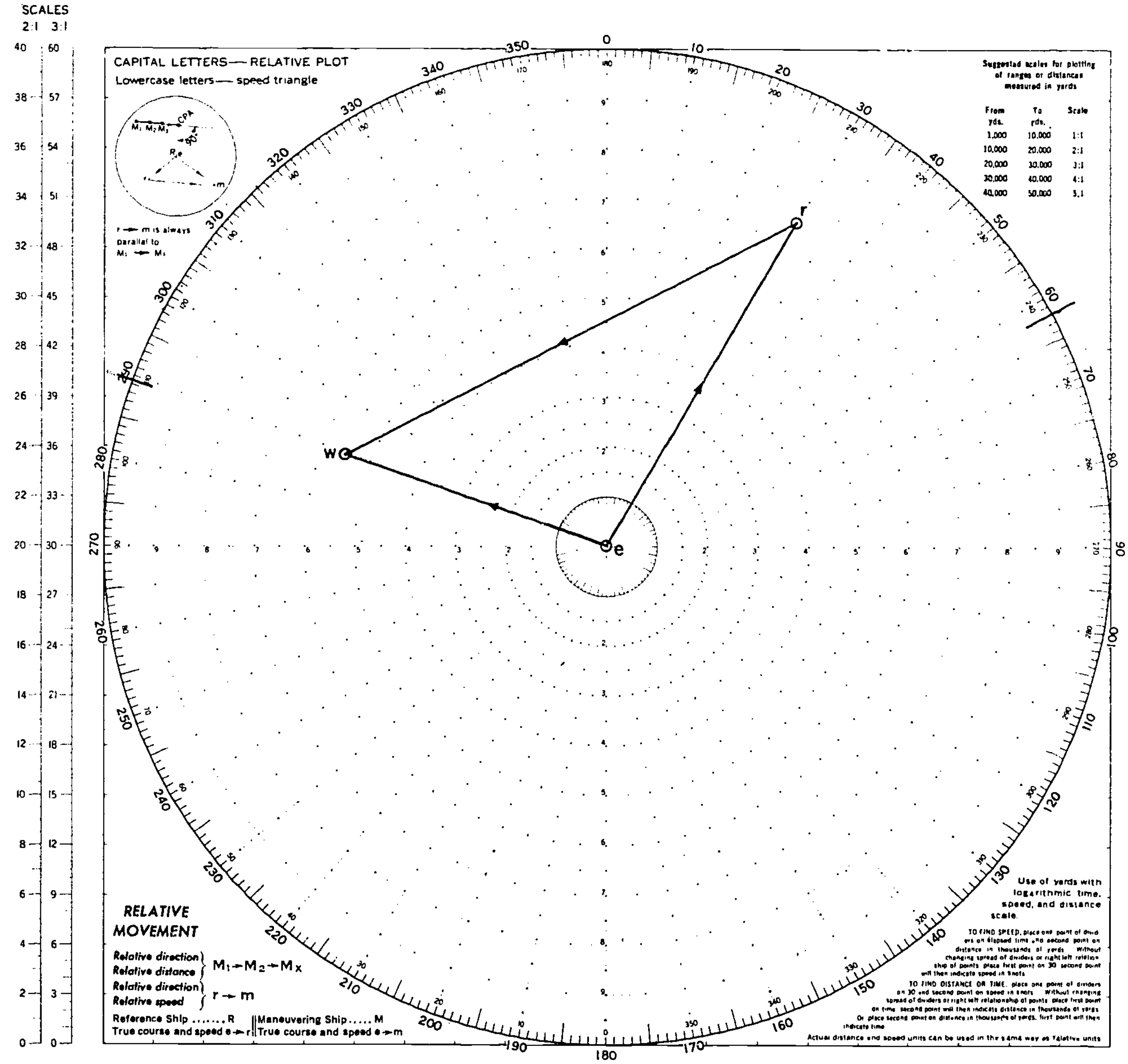


Figure 18-13.–Problem 3. (True wind speed and direction.) 112.47

* Problem 3 (fig. 18-13)

Scale 2:1 in knots

Situation: A carrier on course 030°, speed 15 knots, measures apparent wind as 20 knots from 062°.

Required: Direction and velocity of true wind.

Solution:

1. Draw vector *er* for carrier's course and speed.
2. From *r* draw apparent wind vector, 20 knots, in the direction 242° (062° + 180°) or with apparent wind. Label vector *rw*.
3. Connect *e* and *w*. Vector *ew* represents true wind. Note that the direction from which it blows is given as the answer.

Answer: True wind 10.8 knots from 109.5°.

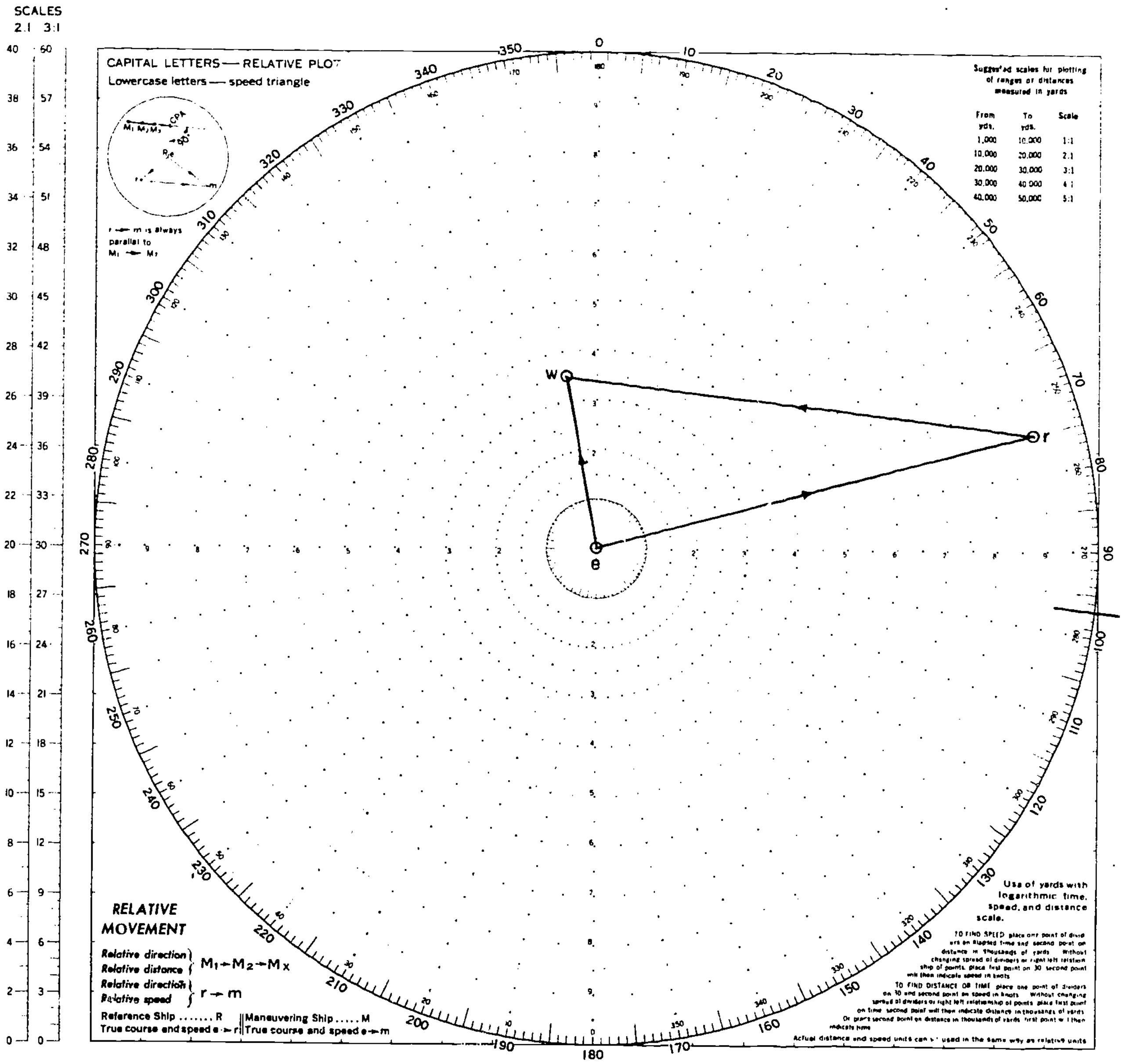


Figure 18-14.–Problem 4. (Apparent wind speed and direction.) 112.48

* Problem 4 (fig. 18-14)

Scale 2:1 in knots.

Situation: A ship is on course 075°, speed 18 knots. True wind is 7 knots from 170°.

Required: Speed and direction of apparent wind.

Solution:

1. Draw vector *er* for ship's course (075°) and speed (18 knots).
2. Draw vector *ew* with true wind toward 350° at 7 knots.
3. Connect *rw*, apparent wind.

Answer: Apparent wind 18.7 knots from 097°.

CHAPTER 19

COMMUNICATIONS

Quartermasters must be familiar with communication systems and methods used in the Navy. Communications are grouped into two basic categories: interior and exterior. Interior communications are concerned only with exchange of information between individuals, divisions, and departments aboard a single ship or station. Exterior communications deal with conveying information between two or more ships, stations, or commands.

Most naval communications are conducted in the form of messages. Messages may be delivered in a variety of ways. The most common methods of delivery are messenger, electronic equipment, visual, and sound.

Interior communications are carried out via direct contact between two people, by messenger, sound-powered or ship's service telephones, MC systems, or such visual methods as the rudder angle indicator and engine order telegraph. All of these methods are discussed in the *Seaman* manual and, therefore, are not elaborated on here. This chapter presents information on apparatus and procedures of exterior communications.

Ship's external communications are conducted by using physical delivery, or telecommunications, or by any combination of the two methods. Telecommunications includes any transmission or reception of signs, signals, writing, images, or sound by visual, wire, radio, or other electromagnetic systems.

In delivering each communication, transmitting stations must take into account the precedence, security requirement, and the limitations of the available equipment. From a security standpoint, the order of desirability of the various methods are: (1) messenger, (2) registered mail, (3) approved wire circuit, (4) ordinary mail, (5) nonapproved wire circuit, (6) visual, (7) sound systems, and (8) radio. Of these methods, Quartermasters normally are concerned only with radio (radiotelephone) and visual systems.

VOICE RADIO

The radiotelephone, commonly known as the voice radio, is an effective and convenient method of naval communications. It is used extensively for ship-to-ship tactical communication, for convoy work, for the control of airborne aircraft, and for countless tasks requiring rapid, shortrange communications. Small vessels, such as district craft, rely almost entirely upon voice radio.

Voice radio supplements both radiotelegraph and visual methods of communications–it does not replace either form. It has the advantages of simplicity of operation and direct transmission of the spoken word, but ease of operation has led to abuse. Careless use of voice procedure, plus overloaded circuits, has created much confusion at times when good communication was imperative. Whether in a small boat or aboard ship, the Quartermaster should know the operation of this equipment, and at all times use proper voice radio procedures.

OPERATION

Voice radio is considered the least secure means of communication. A message sent by radio is open to interception by anyone who has the necessary receiving equipment and is within reception range. Under most circumstances, the following practices are specifically forbidden:

1. Violation of radio silence.
2. Unofficial conversation between operators.
3. Transmitting in a directed net without permission.
4. Excessive tuning and testing.
5. Unauthorized use of plain language.
6. Transmission of an operator's name or personal sign.
7. Use of unauthorized prowords.

8. Linkage or compromise of classified call signs and address groups by plain language disclosures or association with unclassified call signs.
9. Unauthorized use of plain language in place of applicable prowords.
10. Profane, indecent, or obscene language.

Several desirable techniques you should acquire in operating a microphone include–

1. Listen before transmitting. Break-ins cause confusion.
2. Speak clearly and distinctly. Slurred syllables and clipped speech are difficult to understand.
3. Speak slowly. Give the recorder a chance to understand the entire message the first time. By this procedure, you save time and repetitions.
4. Avoid extremes of pitch in voice modulation.
5. Be natural. Maintain a normal speaking rhythm. Send your message phrase by phrase instead of word by word.
6. Use standard pronunciation, avoiding regional dialects.
7. Keep correct distance between lips and microphone. A distance of about 2 inches is correct for most microphones.
8. Speak in a moderately strong voice to override background noises.
9. Shield your microphone. While transmitting, keep your head and body between sources of noise and the microphone.
10. Keep the volume of the handset earphone low.
11. Keep speaker volumes down to a moderate level.
12. Give an accurate evaluation in response to a request for a radio check.
13. Pause momentarily, when possible, and interrupt your carrier. Pausing allows any other station with higher precedence traffic to break in.
14. Adhere strictly to prescribed procedures. Up-to-date radiotelephone procedure appears in the effective edition of ACP 125.
15. Transact your business and get off the air. Preliminary calls are unnecessary when communications are good and the message is short.
16. Do not hold the microphone button in the push-to-talk position until ready to transmit.
17. Apply firm pressure to the microphone button to prevent unintentional release and consequent signal interruption.

PRONOUNCING NUMERALS

Care must be taken to distinguish numerals from similarly pronounced words. Preceding numbers, the proword FIGURES may be used.

Numeral	Spoken as	Numeral	Spoken as
0	zero	5	fi-yiv
1	wun	6	six
2	too	7	seven
3	thuh-ree	8	ate
4	fo-wer	9	niner

The numeral 0 is always spoken as Zero, never as OH. It is written as 0. Decimal points are spoken as DAY SEE MAL. Example: 123.4 is spoken as "Wun too thuh-ree day-see-mal fo-wer."

In general, numbers are transmitted digit by digit, except that exact multiples of hundreds and thousands are spoken as such. Examples:

Numbers	Spoken as
44	fo-wer fo-wer
90	niner zero
136	Wun thuh-ree six
500	fi-yiv hun-dred
1,478	wun fo-wer seven ate
7,000	seven thow-zand
16,000	wun six thow-sand
16,400	wun six fo-wer hundred
812,681	ate wun too six ate wun

Some special instances required procedures different from the normal digit-by-digit pronunciation. Ranges and distances given in mile units and speed given in knots, for instance, are always transmitted as cardinal numbers. Examples:

Number	Spoken as
10	ten
13	thur-teen
25	twen-ty fi-yiv
50	fif-ty
110	wun hun-dred ten
300	thuh-ree hun-dred

Bearings are always given in three digits and are transmitted digit by digit. Examples:

Bearing	Spoken as
090	zero niner zero
180	wun ate zero
295	too niner fi-yiv

PROWORDS

Procedure words (prowords) are words and phrases used to speed the handling of radiotelephone messages. They perform the same functions and are used in the same manner as are prosigns in visual and radiotelegraph procedures. Many prosigns have the same meaning as prowords.

Following is a complete list of prowords (except for precedence prowords), together with an explanation and the corresponding prosign, if one exists.

Proword	Meaning (abbreviated)	Corresponds to
ADDRESS GROUP	The group that follows is an address group.	------
ALL AFTER	All after.	AA
ALL BEFORE	All before.	AB
AUTHENTICATE	The station called is to reply to the challenge which follows.	------
AUTHENTICATION IS	The transmission authentication of this message is....	------
BREAK	Separation of text from other portions of the message.	$\overline{\text{BT}}$
BROADCAST YOUR NET	Link the two nets under your control for automatic rebroadcast.	------
CALL SIGN	The group that follows is a call sign.	------
CORRECT	You are correct, or what you have transmitted is correct	C
CORRECTION	An error has benn made in transmission.	EEEEEEEE
DISREGARD THIS TRANSMISSION—OUT	This transmission is in error. Disregard it.	EEEEEEEE $\overline{\text{AR}}$
DO NOT ANSWER	Do not answer	F
EXECUTE	Carry out the meaning of the message to which this applies.	IX (5-second flash)
EXECUTE TO FOLLOW and IMMEDIATE EXECUTE	Action on the message or signal that follows is to be carried out upon receipt of EXECUTE. EXECUTE TO FOLLOW is used with the normal and delayed executive methods. IMMEDIATE EXECUTE is used with the immediate executive method.	$\overline{\text{IX}}$
EXEMPT	Exempt the following addresses from the collective call.	XMT

Proword	Meaning (abbreviated)	Corresponds to
FIGURES	Numerals or numbers follow.	------
FROM	The originator of this message is ______.	FM
GROUPS	The number of groups in this message is ______.	GR
GROUP NO COUNT	The groups in this message have not been counted.	GRNC
I AUTHENTICATE	The group that follows is the reply to your challenge to authenticate.	------
INFO	The addressee(s) designation(s) immediately following are addressed for information.	INFO
I READ BACK	The following is my response to your instructions to read back.	------
I SAY AGAIN	I am repeating transmission or portion(s) indicated.	------
I SPELL	I shall spell the next word phonetically.	------
I VERIFY	I have verified with originator and am repeating.	C
MESSAGE	A message that requires recording is about to be transmitted.	------
MORE TO FOLLOW	Transmitting station has additional traffic for the receiving station.	B
NET NOW	All stations are to net their radios on the unmodulated carrier wave which I am about to transmit.	------
NUMBER	Station serial number.	NR
OUT	End of transmission; no receipt required.	AR
OVER	Go ahead; or, this is the end of my transmission and a response is necessary.	K
READ BACK	Repeat this entire transmission back to me exactly as received.	G
RELAY (TO)	Transmit this message to all addressees or to the addressee designations immediately following.	T
ROGER	I have received your last transmission satisfactorily.	R
SAY AGAIN	Repeat.	$\overline{\text{IMI}}$
SERVICE	The message that follows is a service message.	SVC
SIGNALS	Groups that follow are taken from a signal book. (This proword need not be used used on nets primarily	------

Proword	Meaning (abbreviated)	Corresponds to
SIGNALS (Cont'd)	employed for conveying signals. It is intended for use when tactical signals are passed on nontactical nets.)	
SILENCE (Repeated three or more times	Emergency silence sign.	$\overline{\text{HM}}$ $\overline{\text{HM}}$ $\overline{\text{HM}}$
SILENCE LIFTED	Resume normal transmissions.	------
SPEAK SLOWER	Your transmission is at too fast a speed. Reduce speed of transmission.	------
STOP REBROADCASTING	Cut the automatic link between the two nets that are being rebroadcast and revert to normal working.	------
THIS IS	From	DE
TIME	What follows is time or data-time group of this message.	------
TO	The addressee(s) designation(s) immediately following are addressed for action.	TO
UNKNOWN STATION	Unknown station.	$\overline{\text{AA}}$
VERIFY	Verify with originator and repeat.	J
WAIT	I must pause for a few seconds.	$\overline{\text{AS}}$
WAIT-OUT	I must pause for longer than a few seconds.	$\overline{\text{AS}}$ $\overline{\text{AR}}$
WILCO	I have received your message, understand it, and will comply.	------
WORD AFTER	Word After.	WA
WORD BEFORE	Word Before	WB
WORDS TWICE	Communication is difficult. Transmit (or transmitting) each phrase twice. (Can be used as an order, a request, or as information.)	------
WRONG	Your last transmission was incorrect. The correct version is________.	------

MESSAGE FORMS

Three military message forms are used in radiotelephone procedure. These forms are–

1. Plaindress, in which the entire address is indicated externally of the text. (Plaindress messages contain all the components of the basic message format, which may be seen in table 19-2, except that the call may serve as the address.)
2. Abbreviated plaindress, which is designed for speed in traffic handling. (The precedence, date-time group, and group count may be omitted from the heading of an abbreviated plaindress message.)
3. Codress, which has the entire message address in its encrypted text.

Abbreviated plaindress is by far the most common form used in voice radio. Regardless of which form is employed, each message must contain the three major parts–heading, text, and ending.

Heading

The heading of a radiotelephone message, like a visual message, may contain any or all of the components that make up the heading (procedure, preamble, address, and prefix). More often than not, however, it contains only the call, preceding the text. One explanation for such general use of the abbreviated form is that, in radiotelephone communication, the station originating is nearly always in direct communication with the station addressed.

Text

The text of the message is the basic thought or idea the originator wishes to communicate. It may be in the form of plain language, signals, code words, encrypted groups, or numerals.

Difficult words or groups within a text of a plain language message are spelled out, using the phonetic alphabet. Groups or words to be spelled are preceded by the proword I SPELL. If the operator can pronounce the word, he should do so before and after spelling.

Ending

Every radiotelephone message ends with the proword OVER or OUT. With the use of OVER, the sender tells the receiver to go ahead and transmit; or: "This is the end of my message to you, and a response is necessary." With the use of OUT, the sender tells the receiver: "This is the end of my transmission to you, and no response is necessary." It is never necessary to use OVER and OUT together.

RADIOTELEPHONE PROCEDURE

Before you start your study of radiotelephone procedure, you should be warned that communication procedure is liable to continual improvement and change. You can keep up with changes only by continued study of current communication instructions.

Radiotelephone transmissions used for illustrative purpose are assumed to pass over the net shown in figure 19-1.

Calling and Answering

Radiotelephone communication is established by a preliminary call, which takes the form of individual or collective call.

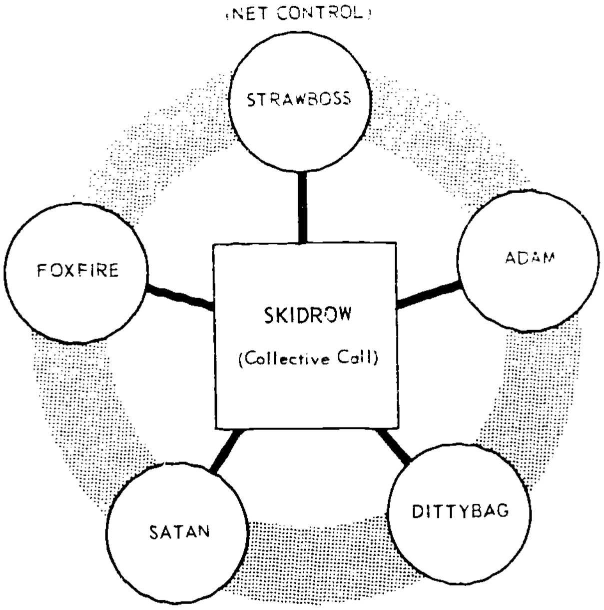


Figure 19-1.–Radiotelephone net. 41.31

Individual call: In this example a single station is called; if two or more stations are called, they would reply in alphabetical order of call signs.

FOXFIRE–	Call sign of receiving station.
THIS IS	From.
STRAWBOSS–	Call sign of the station calling.
OVER	Go ahead, transmit.

The reply is in the same form: STRAWBOSS–THIS IS FOXFIRE–OVER.

* Collective call: When stations in the net are assigned a collective call, that call is used if all the stations are addressed. If, for some reason, one or more stations are to be exempted from the call, the collective call contains the proword EXEMPT, followed by the call signs of the exempted stations. Example:

SKIDROW–	Collective call.
EXEMPT	Exempt.
DITTYBAG–	Call sign of the exempted station.
THIS IS	From.
STRAWBOSS–	Call sign of the station calling.
OVER	Go ahead, transmit

ADAM, FOXFIRE, and SATAN now answer in alphabetical order of their call signs.

Abbreviated Call

The call sign of the called station may be omitted when the call is part of an exchange of transmissions between stations and when no confusion will result. Example: THIS IS ADAM–OVER.

Repetitions

When parts of the heading, text, or ending of a message are missing or are doubtful, repetition is requested by the receiving station. The proword SAY AGAIN (alone or with ALL BEFORE, ALL AFTER, WORD BEFORE, WORD AFTER, and TO) is used for this purpose. In complying with such requests, the transmitting station identifies the portion to be repeated. Examples: DITTYBAG sends a message to SATAN. SATAN misses the word after "ship." SATAN transmits:

> DITTYBAG–THIS IS SATAN–SAY AGAIN–WORD AFTER SHIP–OVER

DITTYBAG transmits:

> SATAN–THIS IS DITTYBAG–I SAY AGAIN–WORD AFTER SHIP–SIGHTED–OVER

Upon receipt of the doubtful portion, DITTYBAG receipts for the entire message with ROGER.

Repetitions may be given in plain language messages by natural phrases or by individual words. In encoded or encrypted messages, they are made by individual characters.

Correcting an Error

When an error is made by the transmitting operator, the proword CORRECTION is sent. The operator then repeats the last word, group, proword, or phrase correctly sent, corrects the error, and proceeds with the message. (NOTE: The first group of all plain language messages consists of the message classification.) Example 1:

> ADAM–THIS IS STRAWBOSS–TIME ONE ZERO ONE TWO ZULU–BREAK– UNCLAS–CONVOY ROMEO THREE– CORRECTION–CONVOY SIERRA ROMEO THREE–SHOULD ARRIVE– ONE SIX THREE ZERO LIMA–OVER

If the error is not discovered until the operator is some distance beyond it, he may make the correction at the end of the message. He must be careful to identify the exact portion he is correcting. Example 2:

> ADAM–THIS IS STRAWBOSS–TIME ZERO SIX THREE ZERO ZULU–BREAK–UNCLAS–ARE YOU RIGGED FOR HEAVY WEATHER–CORRECTION–TIME ZERO SIX FOUR ZERO ZULU–OVER

Canceling a Message During a Transmission

During the transmission of a message, and preceding the transmission of the ending proword OVER or OUT, the message may be canceled by the proword DISREGARD THIS TRANSMISSION. (A message that has been transmitted completely can be canceled only by another message.) Example: During the transmission of a message, STRAWBOSS discovers he is giving it to the wrong station. STRAWBOSS transmits:

> FOXFIRE–THIS IS STRAWBOSS–ROUTINE –TIME ZERO SIX ZERO TWO ZULU–UNCLAS–COMMENCE UNLOADING AT DAWN SIXTEENTH–PROCEED–DISREGARD THIS TRANSMISSION–OUT

Do Not Answer

When it is imperative that called stations do not answer a transmission, the proword DO NOT ANSWER is transmitted immediately after the call. The complete transmission is sent twice. Example:

> SKIDROW–THIS IS STRAWBOSS–DO NOT ANSWER–TIME ONE ZERO THREE SIX ZULU–BREAK–NOVEMBER YANKEE DELTA PAPA–I SAY AGAIN–SKIDROW –THIS IS STRAWBOSS–DO NOT ANSWER–TIME ONE ZERO THREE SIX ZULU–BREAK–NOVEMBER YANKEE DELTA PAPA–OUT

Verifications

When verification of a message is requested, the originating station verifies the message with the originator, checks the cryptography (if the message is encrypted), and sends the correct version. Example 1:

STRAWBOSS–THIS IS ADAM–VERIFY MESSAGE TIME ONE ZERO ZERO EIGHT ZERO ONE ZULU–ALL BEFORE TEXT–OVER

STRAWBOSS transmits:

THIS IS STRAWBOSS–ROGER–OUT

STRAWBOSS, after checking with the originating officer, finds the heading correct as transmitted previously.

STRAWBOSS sends:

ADAM–THIS IS STRAWBOSS–I VERIFY–MESSAGE–TIME ONE ZERO ZERO EIGHT ZERO ONE ZULU–ALL BEFORE TEXT–PRIORITY–TIME ONE ZERO ZERO EIGHT ZERO ONE ZULU–FROM STRAWBOSS–TO–ADAM –INFO–DITTYBAG–GROUPS ONE SEVEN–BREAK–OVER

ADAM transmits:

THIS IS ADAM–ROGER–OUT

Example 2:

STRAWBOSS–THIS IS SATAN–VERIFY MESSAGE TIME ZERO EIGHT FOUR FIVE ZULU–WORD AFTER PROCEED–OVER

STRAWBOSS transmits:

THIS IS STRAWBOSS–ROGER–OUT

After checking with the originating officer, STRAWBOSS finds that he means HONGKONG instead of SHANGHAI as word after PROCEED. STRAWBOSS transmits:

SATAN–THIS IS STRAWBOSS–CORRECTION MESSAGE–TIME ZERO EIGHT FOUR FIVE ZULU–WORD AFTER PROCEED–HONGKONG–OVER

SATAN transmits:

THIS IS SATAN–ROGER–OUT

Read Back

A check on transmission accuracy can be had by using the prowords READ BACK. READ BACK is used when you want your own message (or a portion of it) repeated back to you as received. (When the READ BACK procedure is employed, the proword ROGER need not be used to indicate receipt of a message.) Remember to identify the message portion you want read back. Transmit the READ BACK proword immediately after the call. Example:

ADAM–THIS IS STRAWBOSS–READ BACK TEXT–TIME ONE SIX THREE ZERO ZULU–BREAK–UNCLAS–CONVOY DELAYED ONE TWO HOURS–BREAK–OVER

ADAM replies:

THIS IS ADAM–I READ BACK TEXT– UNCLAS–CONVOY DELAYED ONE TWO HOURS–OVER

STRAWBOSS then sends:

THIS IS STRAWBOSS–THAT IS CORRECT –OUT

If a message is sent back incorrectly, it may be corrected by the proword WRONG, followed by the corrected version. In the preceding example, assume that ADAM made a mistake when he read back the message:

THIS IS ADAM–I READ BACK TEXT– UNCLAS–CONVOY DELAYED TWO ONE HOURS–OVER

STRAWBOSS corrects ADAM:

THIS IS STRAWBOSS–WRONG–UNCLAS–CONVOY DELAYED ONE TWO HOURS –OVER

ADAM reads back again:

THIS IS ADAM–UNCLAS–CONVOY DELAYED ONE TWO HOURS–OVER

STRAWBOSS ends the exchange with:

THIS IS STRAWBOSS–THAT IS CORRECT–OUT

Executive Method

The executive method is used to execute tactical signals so that two or more units can take action at the same time. Usually the abbreviated form is used in such messages. Executive messages contain the proword EXECUTE TO FOLLOW or IMMEDIATE EXECUTE, as appropriate, immediately after the call. The signal to carry out the meaning of the message is the proword EXECUTE. It may be sent shortly after transmission of the message.

Variations of the executive method are (1) the normal executive method, (2) the delayed executive method, and (3) the immediate executive method. (In any event, a warning STANDBY precedes the proword EXECUTE.)

In our first example, the OTC sends a message to the task group by the normal executive method.

SKIDROW–THIS IS STRAWBOSS–SIGNALS FOLLOW–EXECUTE TO FOLLOW–BREAK–CORPEN THREE FIVE SEVEN –OVER

All ships reply in alphabetical order:

THIS IS ADAM–ROGER–OUT
THIS IS DITTYBAG–ROGER–OUT
THIS IS FOXFIRE–ROGER–OUT
THIS IS SATAN–ROGER–OUT

When STRAWBOSS is ready to execute, he sends the executive signal. To save time, only one station is directed to receipt.

SKIDROW–THIS IS STRAWBOSS–STANDBY –EXECUTE–BREAK–ADAM–OVER

ADAM replies:

THIS IS ADAM–ROGER–OUT

A delayed executive method is handled in exactly the same way as a normal executive method message except that, as a memory refresher, the text of the message is repeated just before giving STANDBY–EXECUTE. Assume that the foregoing message is sent by the delayed executive method. The message is transmitted and all stations receipt for it as before. This time, however, STRAWBOSS is not ready to execute until several minutes elapse. When ready he sends:

SKIDROW–THIS IS STRAWBOSS–CORPEN THREE FIVE SEVEN–STANDBY–EXECUTE–BREAK–ADAM–OVER

ADAM replies:

THIS IS ADAM–ROGER–OUT

In the immediate executive method the text of the message is transmitted twice, separated by I SAY AGAIN. The warning proword IMMEDIATE EXECUTE is used in the message instructions instead of EXECUTE TO FOLLOW. The executive signal itself follows in the final instructions of the message. Because only one transmission is made, the immediate executive method message does not allow stations to obtain verifications, repetitions, acknowledgments, and cancellations before the message is executed. Example:

SKIDROW–THIS IS STRAWBOSS–SIGNALS FOLLOW–IMMEDIATE EXECUTE–BREAK–TURN NINE–I SAY AGAIN–TURN NINE–STANDBY–EXECUTE–BREAK–SATAN–OVER

SATAN receipts:

THIS IS SATAN–ROGER–OUT

Acknowledgment

An acknowledgment is a reply from an addressee indicating that he has received a certain message, understands it, and can comply with it. Note the difference between an acknowledgment and a receipt. The receipt means that the message was received satisfactorily. An important feature of the acknowledgment procedure is that only a commanding officer or his designated representative can authorize you to send an acknowledgment.

The request for an acknowledgment is the word ACKNOWLEDGE (not a proword) as the final word of the text. The reply is the proword WILCO. If the commanding officer can acknowledge at once, the operator may receipt for the message with WILCO, because the meaning of ROGER is contained in WILCO. If the acknowledgment cannot be returned immediately, the operator receipts for the message with the proword ROGER, and WILCO is sent later. The return transmission to a request for an acknowledgment is either ROGER or WILCO. (Never use these prowords together.)

In the following example, the OTC sends a tactical signal. He desires acknowledgment from two ships.

SKIDROW-THIS IS STRAWBOSS-SIGNALS FOLLOW-EXECUTE TO FOLLOW-BREAK-TANGO BRAVO-TACK-ONE FIVE-TACK-ZERO ZERO ZERO-TACK-ONE TWO-FOXFIRE-DITTYBAG-ACKNOWLEDGE-OVER

The commanding officer of DITTYBAG hears the message, understands it, and can comply. He directs his operator to acknowledge:

THIS IS DITTYBAG-WILCO-OUT

The commanding officer of FOXFIRE wishes to consider the message before acknowledging. His operator transmits:

THIS IS FOXFIRE-ROGER-OUT

When the commanding officer of FOXFIRE is ready to acknowledge, he has two choices of reply. He can send either:

STRAWBOSS-THIS IS FOXFIRE-WILCO-YOUR LAST TRANSMISSION-OUT

or:

STRAWBOSS-THIS IS FOXFIRE-WILCO-YOUR EXECUTE TO FOLLOW-BREAK-TANGO BRAVO-TACK-ONE FIVE-TACK-ZERO ZERO ZERO-TACK-ONE TWO-OUT

When ready to execute, the OTC transmits:

SKIDROW-THIS IS STRAWBOSS-STANDBY-EXECUTE-ADAM-OVER

ADAM receipts as directed:

THIS IS ADAM-ROGER-OUT

VISUAL SIGNALING

The three principal methods of visual signaling are flashing light, semaphore, and flaghoist. The remainder of this chapter is concerned with these methods and the signaling procedures that the Quartermaster must know.

FLASHING LIGHT

The two types of flashing light communication are directional and nondirectional.

Directional transmissions are sent out by a signal searchlight that is pointed and trained directly at the receiver so as to be visible through a limited arc. It is the longest range visual signaling method.

Nondirectional signals are sent out from yardarm blinkers, or a special nondirectional signaling lantern, which are operated from a transmission key located in the pilothouse or on the signal bridge. The light is visible in any direction away from the ship, thus affording the sender an effective way to communicate simultaneously with many addresses. Yardarm blinkers are restricted to nighttime use among ships in company.

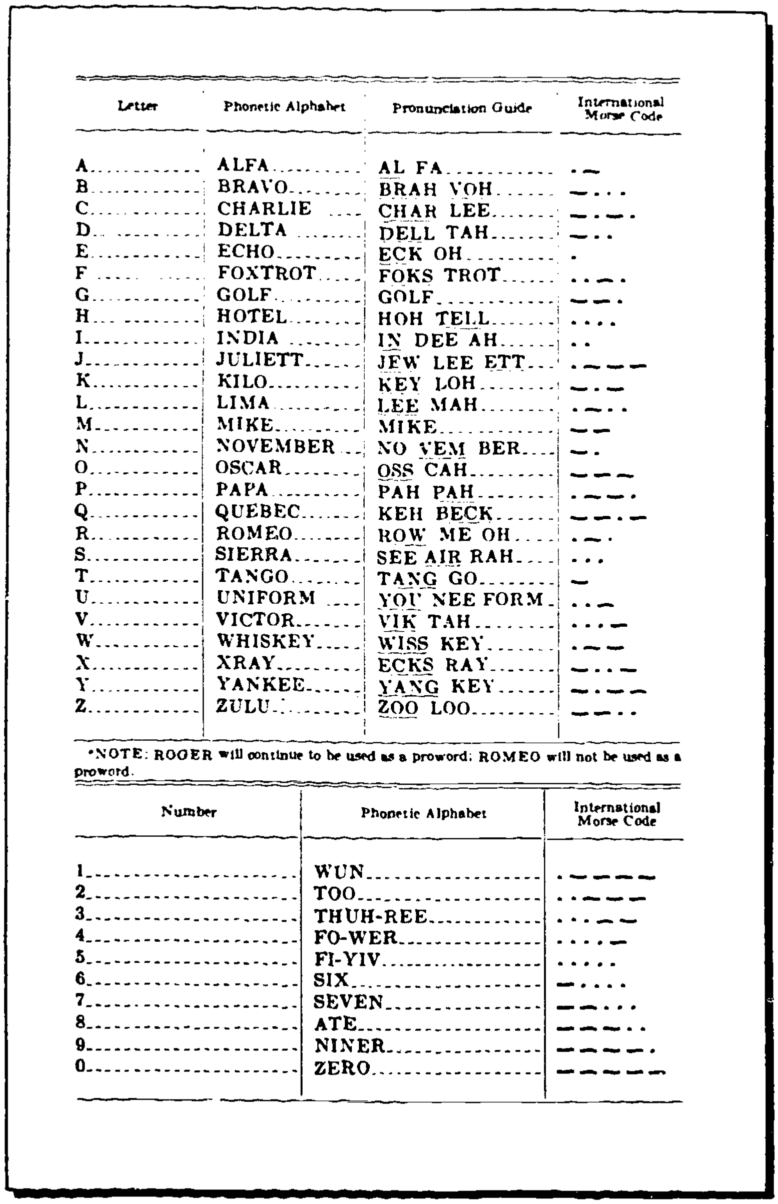
International Morse Code

International Morse code is standard for all naval communications transmitted by flashing light or radiotelegraph. You must know it well before you can use flashing light equipment.

The international Morse code is a dot-dash system. It is not difficult to learn if you go about it the right way. Basically, it consists of sight patterns, which you must recognize. Each of the sight patterns is really a mental picture of dots and dashes arranged in a group. These groups consist of from one to six dots or dashes, or both. Each group represents a letter of the alphabet, a numeral, or punctuation. You'll be surprised how easy it is to learn them-with some practice. But don't neglect it-practice is the secret.

The international Morse code alphabet and number sight patterns, as well as the phonetic pronunciation for each, are shown in figure 19-2. They can be learned in one or two sittings. Experience shows that the best way to learn code is by wholes. The Radioman learns whole tonal sounds. Similarly, the Quartermaster and Signalman should learn by whole sight patterns. Do not break each character into dots and dashes that must be counted. Instead, try to learn each character as a complete mental picture. When you see one dot and one dash (.-), don't count them ("one dot, one dash") and then conclude it's the letter A you saw, but think the letter A as soon as you see the dot and dash.

Ask an experienced man to send to you with a searchlight, multipurpose light, or blinker card. Start by having him send you unknown individual letters or numbers. When you miss, ask him at once to tell you what the letter was, then have him flash it again. When you master each character, try code groups, and, later, after you attain some proficiency, try



Letter	Phonetic Alphabet	Pronunciation Guide	International Morse Code
A	ALFA	AL FA	·—
B	BRAVO	BRAH VOH	—···
C	CHARLIE	CHAR LEE	—·—·
D	DELTA	DELL TAH	—··
E	ECHO	ECK OH	·
F	FOXTROT	FOKS TROT	··—·
G	GOLF	GOLF	——·
H	HOTEL	HOH TELL	····
I	INDIA	IN DEE AH	··
J	JULIETT	JEW LEE ETT	·———
K	KILO	KEY LOH	—·—
L	LIMA	LEE MAH	·—··
M	MIKE	MIKE	——
N	NOVEMBER	NO VEM BER	—·
O	OSCAR	OSS CAH	———
P	PAPA	PAH PAH	·——·
Q	QUEBEC	KEH BECK	——·—
R	ROMEO	ROW ME OH	·—·
S	SIERRA	SEE AIR RAH	···
T	TANGO	TANG GO	—
U	UNIFORM	YOU NEE FORM	··—
V	VICTOR	VIK TAH	···—
W	WHISKEY	WISS KEY	·——
X	XRAY	ECKS RAY	—··—
Y	YANKEE	YANG KEY	—·——
Z	ZULU	ZOO LOO	——··

*NOTE: ROGER will continue to be used as a proword; ROMEO will not be used as a proword.

Number	Phonetic Alphabet	International Morse Code
1	WUN	·————
2	TOO	··———
3	THUH-REE	···——
4	FO-WER	····—
5	FI-YIV	·····
6	SIX	—····
7	SEVEN	——···
8	ATE	———··
9	NINER	————·
0	ZERO	—————

Figure 19-2.–Phonetic and Morse code alphabet and signs. 17.20

plain language. Never try plain language first, because receiving plain language tends to encourage guessing and actually slows the process of learning the code.

Use these code groups as a starter. Other exercises appear elsewhere in this chapter.

SNEVI	GHSOM	AT8LW	QVO72	ERPOL
FOX1R	MINOF	34PRT	ZXCVB	IMTYH
EXCI9	EHOXA	92474	CRBDZ	ULXUK
RHEDC	HILDE	DEL62	ROSE8	PIMON
LJBUH	8YGVT	6FC5R	D4XES	Z3WA2
QPWOE	RITUY	LAKSJ	FDHGO	NAILP
06293	48751	64209	89347	24690

You can make up all sorts of combinations. Just be sure they are code groups–not ordinary words–so you cannot anticipate what's coming next.

Once you become really proficient at code groups, you can graduate to plain language. Even then, try to avoid anticipating the next letter, because you may be wrong and find yourself really confused. In any event, you never will be a good code man if you fall into the bad habit of anticipating.

Tips on Sending

After your receiving progresses, try some sending. You'll find it easy to pick up. Remember that there is a definite physical limitation on the speed with which flashing light can be sent and still be readable. The manufacturer's specifications state that the 12-inch Navy signal searchlight can send up to 15 words a minute. A good sender and receiver can exceed this speed if the characters are made clearly and distinctly, with uniform spacing between them. Incidentally, speed doesn't necessarily mean noise. The light shutters can be moved quickly without banging them up and down.

A good rule to adopt is: never send faster than you can receive. If you transmit a message at 12 words a minute and get a reply at the same rate, you'll be out of luck if you can read only 8 words a minute. It is preferable to send and receive a message correctly at 8 words a minute than to have to send it twice at a 12-word rate.

SEMAPHORE

Semaphore and flashing light can sometimes be used interchangeably. Semaphore is much faster than flashing light for short-distance transmissions in clear daylight. Semaphore may be used to send messages to several addressees at once if they are in

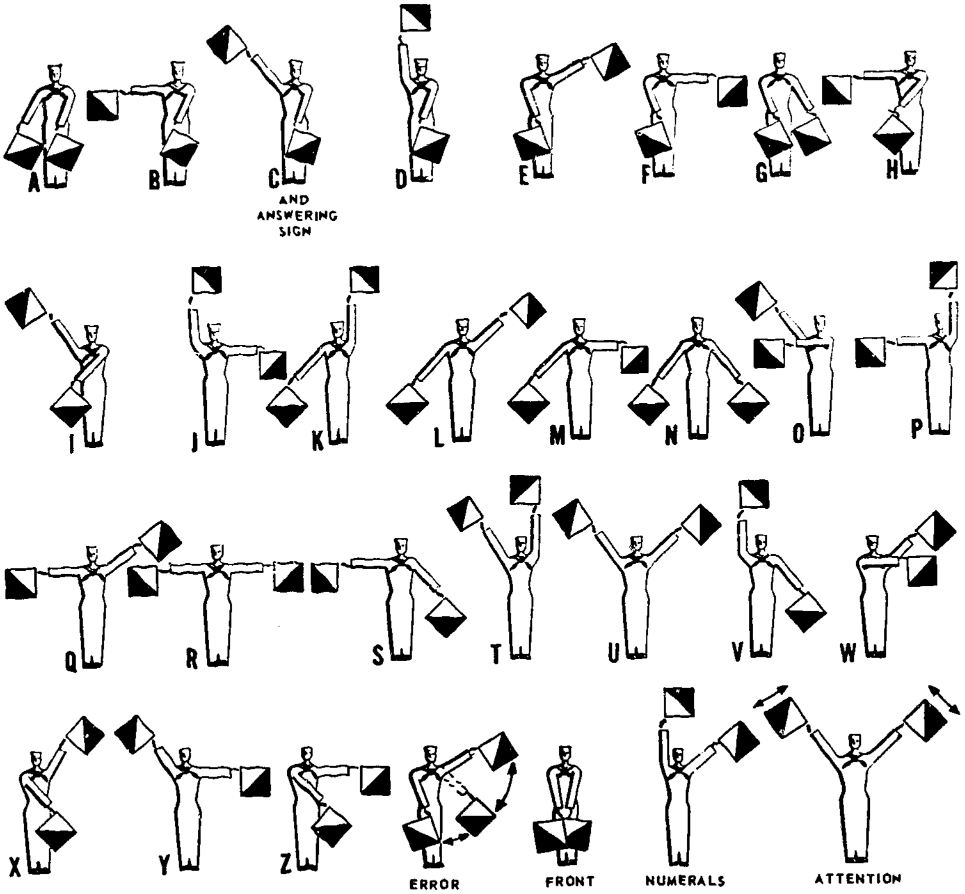


Figure 19-3.–Semaphore alphabet and signs.
17.18

suitable positions. Because of its speed, semaphore is better adapted than are the other visual methods for long messages. When radio silence is imposed, semaphore is considered the best substitute for handling administrative traffic.

Although semaphore's usefulness is limited somewhat by its short range, it is more secure than light or radio because there is less chance of interception by an enemy or unauthorized persons. Speed and security, therefore, are the two factors favoring the use of semaphore under daylight conditions.

Semaphore requires little in the way of equipment. The two hand flags attached to staffs are all you need. Usually the standard semaphore flags are 15 or 18 inches square, and each staff is long enough to enable the sender to grasp it firmly. The flags are similar to the OSCAR alphabet flag. Sometimes the PAPA flag is substituted. Most semaphore flags issued to the fleet today are fluorescent and are made of sharkskin. (When sender and receiver are very close to each other, as when ships are alongside for underway replenishment, no special equipment is necessary. The semaphore characters are made simply by moving the hands to the proper positions.)

When using fluorescent flags, your background while sending is relatively unimportant. With cotton flags, however, a good background must be selected. Otherwise, the receiving operator(s) may be unable to see your flags clearly.

Sending and Receiving

A description of a clear and effective method for learning semaphore communication follows. Take a look at figure 19-3. It shows how the semaphore alphabet and certain special signs used in connection with it are formed by means of your two flags. Before you try to memorize the position for the various letters and signs, practice moving your arms quickly and accurately to each of the various positions. In other words, hold a one-man position drill. Be careful not to confuse the right hand in the illustration with your left hand. The man in figure 19-3 is the sender, and you'll be looking at the illustration as if you were the receiver.

In figure 19-4 you see a man swinging himself through a position drill. He moves his flags smartly to their positions. Notice, for example, that there's no mistaking his Bs for his As or Cs. Take a tip and do likewise, or you'll make a name for yourself as a Sloppy Joe on the semaphore stand. A sloppy sender spends his time repeating messages–because nobody can read them.

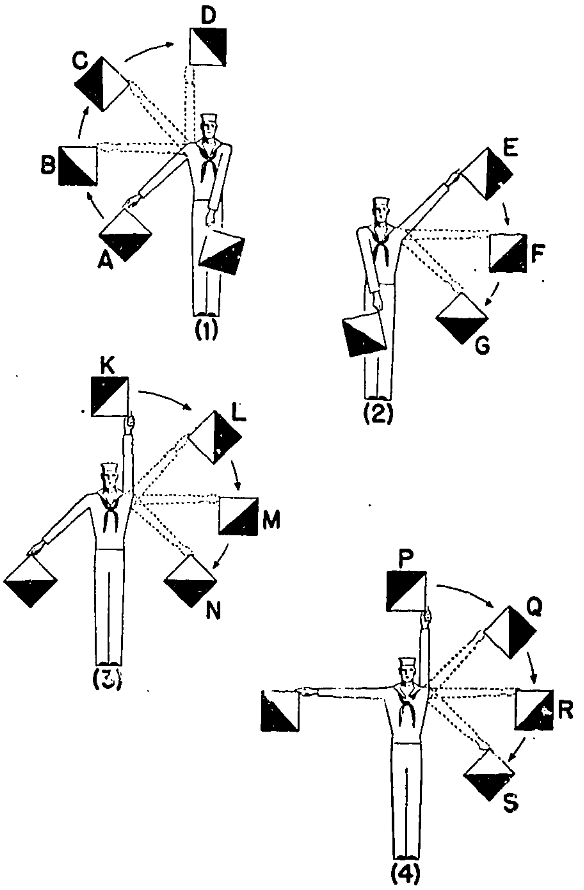


Figure 19-4.–Position drill. 69.119

A single semaphore flag may be held in eight correct positions. You can picture these positions easily if you imagine yourself standing inside a circle, like the man in figure 19-5. Notice that the circle is divided into eight parts by equally spaced marks. These marks represent the correct flag positions. Any position between them is sloppy and only leads to confusion. When you practice, move your arms from one position to another by the shortest route possible. Always make your characters in the same plane as your shoulders, and extend your arms to full length.

Although one flag has only eight positions, a large number of combinations is possible when both flags are used. Of the possible combinations, 28 are used in semaphore communication. There are 26 letters in the alphabet, plus two signs meaning NUMERALS and FRONT.

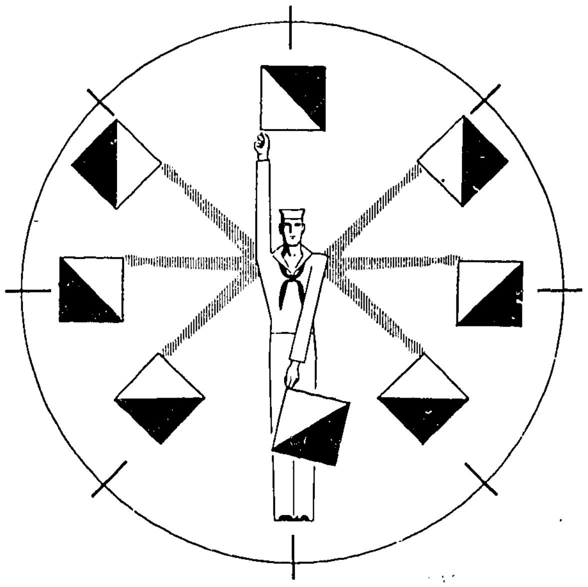


Figure 19-5.–Semaphore position circle.
17.19

The front sign (see fig. 19-3) is used after you finish a word; it's like the space left between words in ordinary writing. It also is used before and after each call sign, code group, or procedure sign, and between all letters and numerals of a call sign.

The numeral sign is given just before you start transmitting a group of numbers that are to be recorded as numerals and again when the numerals are completed.

You'll notice that letters C and E are also used as special signs. The ANSWERING sign is the same as letter C. The ERROR sign consists of letter E, made several times. The ATTENTION sign is made by waving both flags from the horizontal to the overhead position.

The semaphore alphabet isn't at all hard to learn. The speed with which you learn it depends on how consistently you practice. After you master the fundamental positions and can place the flags in these positions quickly and surely, begin practicing the letters as you see them in figure 19-3.

Remember that the positions shown in the illustration are as you would see them if you were the receiver of the transmission–not the sender. Don't try for speed right away. Speed comes after you've thoroughly mastered the alphabet.

The various instructors who teach semaphore in Navy training schools have several different systems, all of which they believe make learning easier. One of the most popular methods is the so-called system of opposites. The trick here is to learn one letter, and then learn the letter made by holding the hands in exactly the opposite position. If you like this system of learning, you can get some help on it as you practice by referring to figure 19-6.

Down the list, you'll find that all the letters of the alphabet have opposites that form other letters–except L, D, and R. If you want to fit D and R into the system of opposites, you can stretch a point and call them opposites too–D is straight up and down, and R is straight out on both sides. Thus, they're opposites in the same way that opposing arms of a cross are opposites.

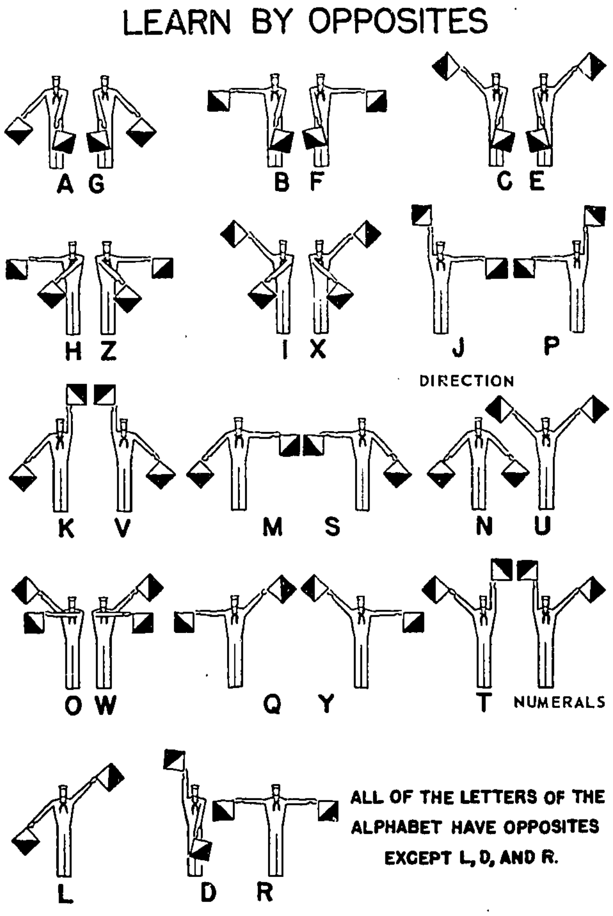


Figure 19-6.–The system of opposites.
69.120

FLAGHOIST SIGNALING

Flaghoist signaling provides a rapid and accurate system of handling tactical and informational signals of reasonable length during daylight between ships in proximity. In general, a flaghoist signal ensures a more uniform execution of a maneuver than any other system.

For signaling by flaghoist, the Navy uses the international alphabet flags and numeral pennants, Navy numeral flags, and special flags and pennants. These groups are shown in figures 19-7 and 19-8. Only the alphabet flags, numeral pennants, FIRST, SECOND, and THIRD substitutes, and the CODE/ANSWERING pennant are used in international signaling procedure. Each alphabet flag has the name of the letter it represents, and a numeral flag takes the name of the numeral it represents.

Parts of a Flag

Figure 19-9 shows the various flag types and their parts. The fly is the length of the flag, measured from the staff to the outside edge. The hoist is the vertical width of the flag when flying free. The tabling is the double thickness of bunting–taped, bound, and stitched– at the hoist of a flag. The tail line is a short length of halyard attached to the lower part of the tabling carrying the snaphook. It serves as a spacer, separating the flags of a hoist for clearness in reading signals. The snap is a brass releasing hook, attached to the lower end of the tail line or uphaul halyard, which fits into the ring of the next succeeding flag or into the ring of the downhaul halyard. The ring is a brass circle attached to the top of the tabling or to the free end of the downhaul halyard. The ring is the receiver for the snap.

A tackline is a piece of signal halyard (about 6 feet long) with a ring at one end and a snap at the other end. Uses of the tackline are discussed later in this chapter.

How to Read Flaghoists

The flags of a hoist are always read from the top down. When a signal is too long to fit on one halyard–when, in other words, it requires more flags than can be made into a single hoist–the signal must be continued on another halyard. When a signal is broken into two or more hoists, it must be divided at points where there can be a natural space without affecting the meaning of the signal.

A complete signal or group of signals– whether on one hoist or on two or more adjacent hoists flying at the same time–is called a display. When displays of more than one hoist are raised, the separate hoists are run up, one by one, in the correct order. Don't try to run them up simultaneously.

As a general rule, if a signal is too long to be shown completely on three halyards, it's better to make two or more displays from the signal. When two or more displays are used, the heading must be hoisted on a separate halyard and kept flying while successive displays are made.

When two or more hoists are flying, they are read from outboard in, or from forward aft. Figure 19-10 shows how to read a three-hoist display from the top down and from outboard in.

Flags may also be hoisted at the triatic stay. It is a line extending from the foremast to a stack or another mast. Such signals are read from forward aft. A triatic stay is illustrated in figure 19-11. This illustration also shows hoists at two positions on a yardarm.

When signals are hoisted at yardarms of different heights, those at the higher yardarm are read first. When several hoists are displayed simultaneously from different points, they are read in the following order: (1) masthead, (2) triatic stay, (3) starboard yardarm, and (4) port yardarm.

Terms used to describe the status of flaghoists follow.

*Close up: A hoist is closeup when its top is touching the block at the point of hoist–in other words, when the hoist is up as far as it will go.

*At the dip: A hoist is at the dip (or dipped) when it is hoisted three-fourths of the way up toward the point of hoist.

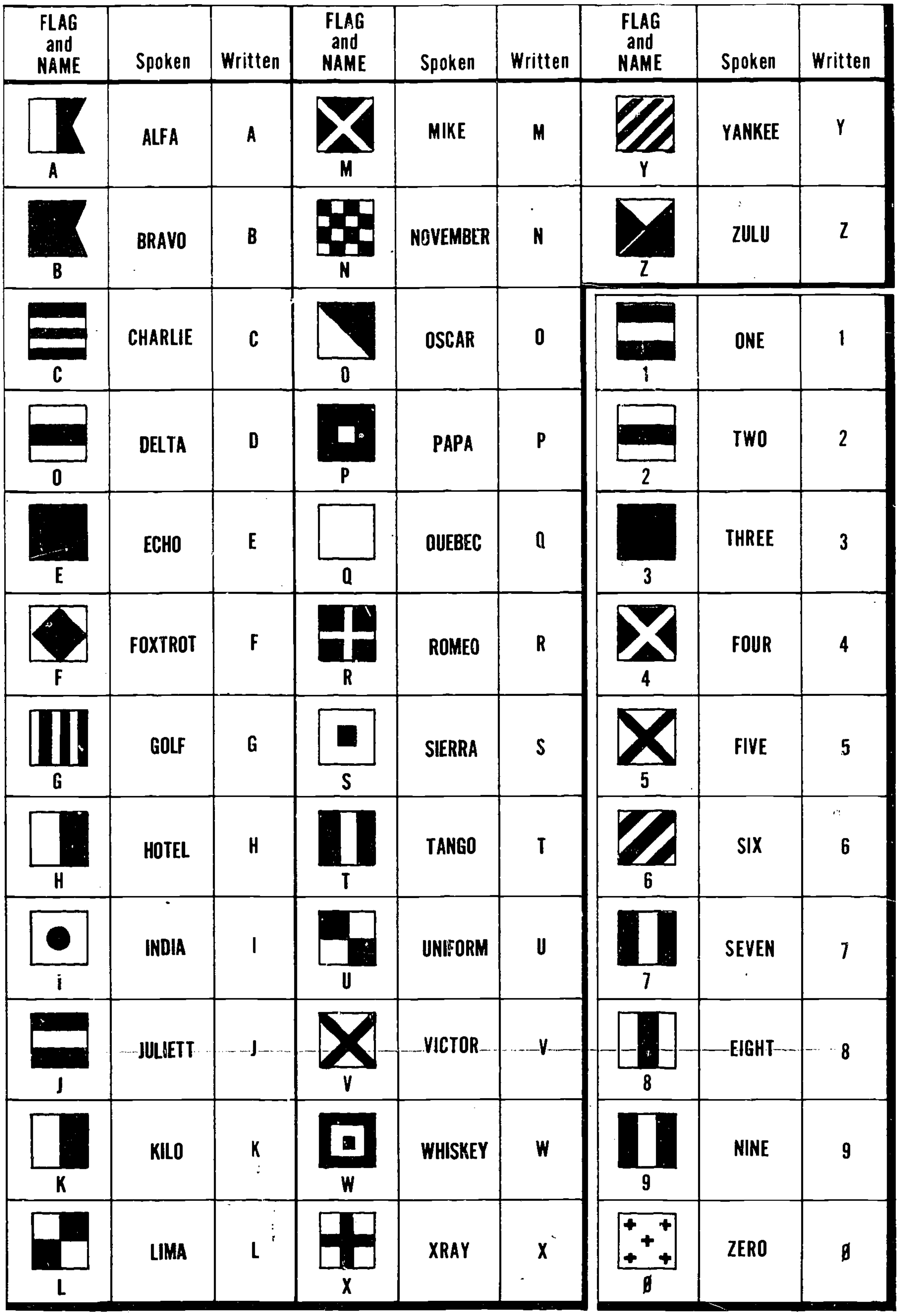
*Hauled down: A hoist is hauled down when it is returned to the deck.

*Superior position: Any hoist or portion of a hoist that is to be read before another hoist or portion of a hoist is said to be in a superior position.

Comparison of Allied/International Procedure

Allied flaghoist procedure (used in military communications) and international procedure (used in merchant and merchant/military flaghoist communications) differ in several particulars. The following paragraphs explain the procedures and point out the differences.

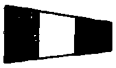
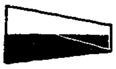
ALPHABETIC AND NUMERAL FLAGS

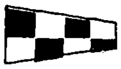
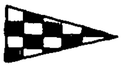


FLAG and NAME	Spoken	Written	FLAG and NAME	Spoken	Written	FLAG and NAME	Spoken	Written
A	ALFA	A	M	MIKE	M	Y	YANKEE	Y
B	BRAVO	B	N	NOVEMBER	N	Z	ZULU	Z
C	CHARLIE	C	O	OSCAR	O	1	ONE	1
D	DELTA	D	P	PAPA	P	2	TWO	2
E	ECHO	E	Q	QUEBEC	Q	3	THREE	3
F	FOXTROT	F	R	ROMEO	R	4	FOUR	4
G	GOLF	G	S	SIERRA	S	5	FIVE	5
H	HOTEL	H	T	TANGO	T	6	SIX	6
I	INDIA	I	U	UNIFORM	U	7	SEVEN	7
J	JULIETT	J	V	VICTOR	V	8	EIGHT	8
K	KILO	K	W	WHISKEY	W	9	NINE	9
L	LIMA	L	X	XRAY	X	0	ZERO	0

Figure 19-7.–Alphabet and numeral flags.

C17.67

PENNANT and NAME	Spoken	Written
 1	PENNANT ONE	p1
 2	PENNANT TWO	p2
 3	PENNANT THREE	p3
 4	PENNANT FOUR	p4
 5	PENNANT FIVE	p5
 6	PENNANT SIX	p6
 7	PENNANT SEVEN	p7
 8	PENNANT EIGHT	p8
 9	PENNANT NINE	p9
 0	PENNANT ZERO	p0
TACK LINE	TACK	

PENNANT or FLAG	Spoken	Written	PENNANT or FLAG	Spoken	Written
 CODE or ANSWER	CODE or ANSWER	CODE or ANS	 NEGATIVE	NEGAT	NEGAT
 SCREEN	SCREEN	SCREEN	 PREPARATIVE	PREP	PREP
 CORPEN	CORPEN	CORPEN	 PORT	PORT	PORT
 DESIGNATION	DESIG	DESIG	 SPEED	SPEED	SPEED
 DIVISION	DIV	DIV	 SQUADRON	SQUAD	SQUAD
 EMERGENCY	EMERGENCY	EMERG	 STARBOARD	STARBOARD	STBD
 FLOTILLA	FLOT	FLOT	 STATION	STATION	STATION
 FORMATION	FORMATION	FORM	 SUBDIVISION	SUBDIV	SUBDIV
 INTERROGATIVE	INTERROGATIVE	INT	 TURN	TURN	TURN

SUBSTITUTES

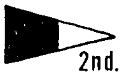
 1st. SUBSTITUTE	FIRST SUB	1st.	 3rd. SUBSTITUTE	THIRD SUB	3rd.
 2nd. SUBSTITUTE	SECOND SUB	2nd.	 4th. SUBSTITUTE	FOURTH SUB	4th.

Figure 19-8.–Numeral pennants, special flags and pennants, and substitutes. C17.68

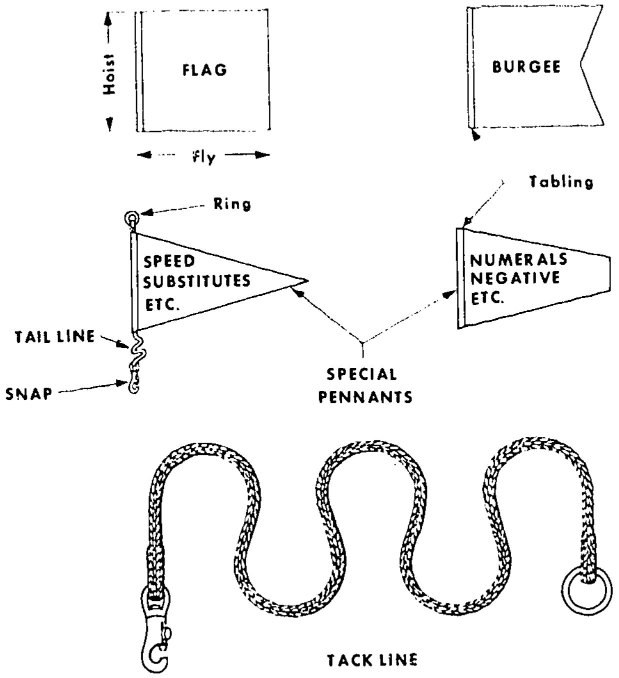


Figure 19-9.–Parts and types of flags and pennants. 69.121

HOW TO CALL.–In allied procedure, call signs, address groups, and unit indicators (all discussed later) may be used to establish communications with ships, units, or commands. When the call is used, it is hoisted in a superior position. The call may be omitted under the following circumstances:

1. By the OTC (SOPA in port) on signals addressed to all ships.
2. By ships addressing OTC, when no relay is required and no confusion will result.
3. By ships originating emergency alarm signals.

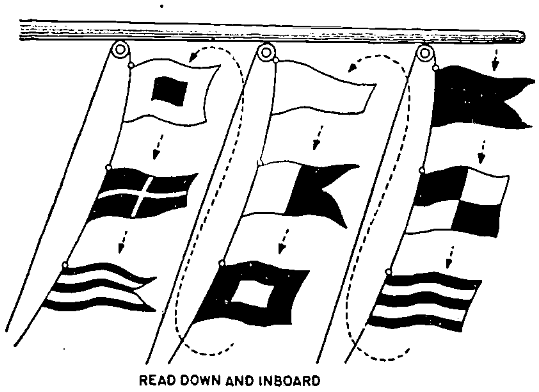


Figure 19-10.–Reading flaghoists. 69.122

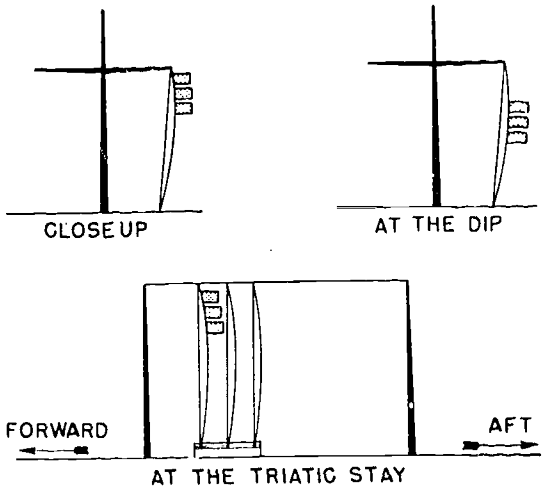


Figure 19-11.–Flaghoist positions. 69.123

In international procedure, the international signal letters of the ship addressed must be hoisted in a position superior to the signal. When no signal letters are hoisted, any signal will be understood as being addressed to all ships within visual signaling distance.

HOW TO ANSWER.–In allied procedure, flaghoists are answered by each addressee hoisting (at the dip) the same flags as the originator. The addressees close up the hoist when its meaning is understood.

In international procedure, hoists are answered by raising ANSWER to the dip. The answering pennant is put close up when the signal is understood.

SIGNALS NOT UNDERSTOOD.–In allied signaling, the interrogative pennant is used to indicate that the addressee does not understand the meaning of a hoist or that he desires to question its meaning. The originator's hoist is repeated, at the dip, and INT is hoisted close up on an adjacent hoist. When an addressee is unable to distinguish a signal, he indicates this fact by hoisting INT 2. A repeating or relaying ship hoists INT 3 to indicate that she has repeated a hoist incorrectly. The originator also may use INT 3, preceded by a call sign, to inform a ship that a hoist is repeated incorrectly.

In international procedure, if a receiving ship does not understand the meaning of a signal she hoists "CODE ZL," signifying "Your signal has been received but not understood," or "CODE ZQ," signifying "Your signal appears incorrectly coded. You should check and repeat the whole." If the receiving ship cannot clearly read the signal made to her, she hoists an appropriate signal from the *International Code of Signals* (H.O. 102). (NOTE: All signals from H.O. 102, when used by naval ships, must be preceded by the CODE pennant.)

USE OF SUBSTITUTES.–Allied procedure specifies that the 1st, 2nd, 3rd, and 4th substitutes repeat the first, second, third, and fourth flag or pennant (respectively), counting down from the top of that hoist. Once a substitute is used, it no longer may be thought of as a substitute. Rather, it is considered the flag or pennant for which it was substituted. Examples:

T1410 may be hoisted as T 1 4 2nd 0.
161416 may be hoisted as 1 6 1st 4 3rd 2nd.

International procedure differs from the allied usage in that substitutes can only repeat a signal flag of the same class as that immediately preceding it–alphabet flags and numeral pennants comprising the two classes. The answering pennant is disregarded in determining which substitutes to use. No substitute can be used more than once in any hoist. Examples:

JULL may be hoisted as J U L 3rd.
BBCB may be hoisted as B 1st C 2nd.
1000 may be hoisted as 1 0 2nd 3rd.
T1330 may be hoisted as T 1 3 2nd 0.

(Note that in the last example both classes of flags are used. Because the second substitute immediately follows a numeral pennant, it can only repeat a numeral pennant. Actually, pennant 3 is the third flag in the hoist, but only the second pennant; therefore, the second substitute is used (instead of the third).)

Flags and Pennants

In learning the alphabet flags, numeral flags and pennants, and special flags and pennants, practice sketching each flag. Label each one according to its proper color(s). When you feel that you know every flag, ask someone to test you. Ask him to call the flags at random, as you name and describe them. Whenever you are topside, pay particular attention to the flaghoists flying from the various ships close aboard, and check yourself on your ability to recognize and name them.

Flags and pennants used in flaghoist messages are written and spoken as shown in figures 19-7 and 19-8. These flags and pennants are transmitted by international Morse code and semaphore as shown in table 19-1. The tackline is spoken and transmitted TACK and written as a dash (—).

Logging Signals

All flaghoist signals–whether incoming, outgoing, or relayed–must be logged, together with the date, time of receipt (or time of delivery), time of execution, originator, and addressee(s). The entire signal (but not its meaning) must be recorded exactly as sent or received.

VISUAL PROCEDURE

The discussion just presented on the methods of visual signaling is only the beginning of this specialized field of communication. Once you become acquainted with these methods, the next step is to know how to go about employing these methods in the systematic way the Navy prescribes. At first, it may seem difficult, but continually studying the necessary signaling publications will soon provide you the working knowledge needed to carry out this responsibility efficiently on your own.

Many new words and terms must be learned before you can begin to understand visual signaling procedure. Examples of these terms are procedure signs, operating signals, call signs, address groups, originator, addressees, and the like. It is not the purpose of this chapter to cover this material in detail. It is your responsibility as a Quartermaster to look up these items and other applicable material in current signal publications. Complete information on visual communication procedures may be found in the effective edition of ACP 129, *Communication Instructions, Visual Signaling Procedures*.

For purposes of simplification and brevity, the Navy has established standardized signals, which, in some instances, apply to one or all of the methods of signaling previously discussed. A short coverage of the more important ones is given here.

PROCEDURE SIGNS

The naval procedure signs or prosigns are special signals of one or more letters or characters, used to facilitate communication by conveying, in condensed standard form, certain frequently used orders, instructions, requests, and information related to communications. A complete list of prosigns, authorized for use in visual signaling, accompanies this text. An overscore indicates that the letters are to be transmitted as a single character (i.e., without pausing between letters).

Table 19-1.–Transmission of Flags and Pennants
69.135

Flag/Pennant	Morse		Semaphore	
	Call sign	Text	Call sign	Text
A-Z	A-Z	ALFA to ZULU [1]	A-Z	ALFA to ZULU [1]
1-0	1-0	ONE to ZERO [1]	ONE to ZERO [1]	
p1-p0	1-0	1 to 0	ONE to ZERO [1]	
ANSWER		ANS		ANS
CODE		CODE		CODE
SCREEN		SCREEN		SCREEN
CORPEN		CORPEN		CORPEN
DESIG		DESIG		DESIG
DIVISION	DIV	DIV	DIV	DIV
EMERGENCY		EMERG		EMERG
FLOTILLA	FLOT	FLOT	FLOT	FLOT
FORMATION		FORM		FORM
INTERROGATIVE		INT		INT
NEGATIVE		NEGAT		NEGAT
PREPARATIVE		PREP		PREP
PORT		PORT		PORT
SPEED		SPEED		SPEED
SQUADRON	SQUAD	SQUAD	SQUAD	SQUAD
STARBOARD		STBD		STBD
STATION		STATION		STATION
SUBDIVISION	SUBDIV	SUBDIV	SUBDIV	SUBDIV
TURN		TURN		TURN
FIRST SUBSTITUTE	First [2]		Not used	
SECOND SUBSTITUTE	Second [2]		Not used	
THIRD SUBSTITUTE	Third [2]		Not used	
FOURTH SUBSTITUTE	Fourth [2]		Not used	

[1] At the discretion of the OTC, when conditions and operator's capabilities permit, all of the alphabetical and numeral flags and numeral pennants comprising a signal from ATP 1A, Vol. II may be transmitted as their Morse symbols to expedite signaling.

[2] Substitutes are used only when expediting by flashing light (a flaghoist preceded by a substitute), or when the operating signal meaning "hoist the following signal" is used and a substitute appears as the first flag. The substitute is then transmitted as first, second, third, or fourth, as appropriate.

Prosign	Meaning
$\overline{\text{AA}}$	Unknown station (flashing light only)
AA	All after
AB	All before
$\overline{\text{AR}}$	End of transmission
$\overline{\text{AS}}$	Wait
B	More to follow
$\overline{\text{BT}}$	Long break
C	Correct
C	Answer sign (semaphore only)
D	Reduce brilliancy or use smaller light
DE	From
EEEEEEEE	Error
F	Do not answer
FM	Originator's sign
G	Repeat back
GR(numeral(s))	Group count
GRNC	Groups not counted
$\overline{\text{HM}}$ (3 times)	Emergency silence sign
$\overline{\text{II}}$	Separative sign
$\overline{\text{IMI}}$	Repeat
INFO	Information addressee sign
$\overline{\text{INT}}$	Interrogatory
$\overline{\text{IX}}$	Execute to follow
$\overline{\text{IX}}$ (5-second flash)	Executive signal
J	Verify with originator and repeat
K	Invitation to transmit
L	Relay or relayed (flashing light and semaphore only)
NEGAT	Exempted addressee sign (flaghoist only)
NR	Number
O	Immediate
$\overline{\text{OL}}$	Show steady dim light
P	Priority (precedence)
$\overline{\text{PT}}$	Call sign follows (flashing light and semaphore only)
R	Received
R	Routine (precedence)
T	Transmit to
TO	Action addressee sign
W	Information addressee sign (flaghoist only)
WA	Word after
WB	Word before
XMT	Exempted addressee sign
Z	Flash (precedence)

PUNCTUATION

Punctuation should be used when it is essential to the sense of a message. When no signal equivalent for a punctuation mark exists, the mark may be abbreviated or spelled out. Punctuation marks authorized for visual communications are indicated in the accompanying list.

Name	Abbreviation
Apostrophe	
Colon	CLN
Comma	CMM
Hyphen or dash	
Parenthesis/left	PAREN
Parenthesis/right	UNPAREN
Period	PD
Question mark	QUES
Quotation marks	QUOTE/UNQUOTE
Slant sign/virgule	SLANT

OPERATING SIGNALS

Operating signals (OpSigs) are a concise, standardized code designed for use by communication personnel in the exchange of information incident to traffic handling. Use of operating signals may reduce both the number and length of transmissions necessary to convey certain information. This code consists of three-letter groups, beginning with the letter Q or Z.

The Q and Z signals–as operating signals sometimes are called–possess no security and must, therefore, be treated as the equivalent of plain language. The Z signals are for use in military communications and should be used when a Z signal of proper meaning is available. The Q signals may be used in military communications when no suitable Z signal exists. Only Q signals may be used in nonmilitary communications.

Some signals may be used as either a statement or as a question. Appropriate signals that normally would be interpreted as a statement may be changed to a question by simply preceding the signal with the prosign INT (in military communications) or by using the prosign IMI after the signal (in nonmilitary communications). Following are two examples of message exchanges between the USS *Graham County* (L6) and the signal tower at NAB, Little Creek (H13). *Graham County* wants to know whether message 080745Z concerns her.

In example 1 (using plain language), *Graham County* transmits:

H13 DE L6 DOES MESSAGE 080745Z CONCERN ME K

The signal tower replies:

L6 DE H13 MESSAGE 080745Z NO LONGER CONCERNS YOU K

Morse	Semaphore	Symbol
.----.		'
---...	$\overline{OS}$	:
--..--	$\overline{MIM}$	,
-....-	$\overline{DU}$	-
-.--.	$\overline{KN}$	(
-.--.-	$\overline{KK}$	)
.-.-.-	$\overline{AAA}$	.
..--..	$\overline{IMI}$	?
.-..-.		" "
-..-.	$\overline{XE}$	/

In example 2 (using operating signal), *Graham County* transmits:

H13 DE L6 $\overline{\text{INT}}$ ZFK 080745Z K

Signal tower replies:

L6 DE H13 ZFK2 K

The same operating signal (ZFK) was used here as both the question and the answer.

It is obvious that the signal exchange in the second example is shorter and less time-consuming to transmit and receive than the plain language exchange in the first example. Other examples of operating signals, together with complete instructions for their use and interpretation, may be found in the effective edition of ACP 131, *Communication Instructions Operating Signals.*

CALL SIGNS AND ADDRESS GROUPS

Call signs (not to be confused with the operating signals) are divided into a number of specialized applications. For example, radio call signs are groups of letters, numerals, or combinations of both, which identify radio stations. Other types of calls in use are visual call signs, individual ship calls, unit indicator call signs, visual commander call signs, international call signs, tactical call signs, and many more. Examples of several call signs follow.

Type	Actual call sign	Unit referred to
Radio and international call sign.	NHRB	USS *Leyte*
Visual call sign	R32	USS *Leyte*
Unit indicator call sign.	D Div pl p2	Destroyer Division 12
Visual commander call sign.	SQUAD D	Commander this destroyer squadron.
Special task organization call sign.	3p6	Commander Task Element 6.

Several of the more important call sign books include *Call Sign Book for Ships*, *Visual Call Sign Book*, *Tactical Call Sign Book*, *and Task Organization Call Sign Book.*

Address groups consist of four-letter groups assigned to activities or commands established to help expedite the transmission and delivery of messages sent by any means. Address groups assigned to our armed forces as well as our allies are listed in ACP 100, *Allied Call Signs and Address Group Systems-Instructions and Assignments.*

THE MESSAGE

The purpose of the brief discussion just given on visual procedure was to point out to you that there is much more to visual communication than learning the dots and dashes of Morse code, or even learning the meaning of the various signaling flags and pennants. To repeat, visual signaling proficiency requires a thorough study of current publications plus continual practice.

The ultimate aim of learning the methods and procedures of visual signaling is to deliver a message correctly, quickly, and in as brief a form as possible.

The Navy defines (in ACP 121) a message as "any thought or idea expressed briefly in plain or secret language prepared in a form suitable for transmission by any means of communications." A message in any form consists of three main parts: the heading, the text, and the ending procedure.

1. The heading is subdivided into four component parts: the procedure, preamble, address, and

prefix. The heading is transmitted at a slower speed than the text, because it may contain many letters and numerals that make it harder to receive.

a. The procedure component contains the call signs of the sender and receiver. Example: NUBP DE NHRB. Here we have NUBP, call sign of the USS *Duluth*; the prosign DE, meaning "This transmission is from the station whose call sign follows"; and NHRB, the call sign of the USS *Leyte*. The call is followed by a prosign giving the transmission instructions, if a relay is necessary.

b. The preamble is the component of the heading between the transmission instructions and the address. It contains the precedence, date-time group, and message instructions. The preamble cannot be changed by anyone except the person who originates the message.

c. The address follows the preamble. It is fixed by the originator, and must not be altered or changed by any other station. It contains the identity of the originator and the addressee(s), with applicable prosigns.

d. The final component of the heading is the prefix. It may contain the accounting symbol, the group count, and the service message indicator.

2. The text is the main part of the message. The text contains the basic idea or information the originator desires to communicate to the addressee(s). The text cannot be changed by any person

Table 19-2.–Summary of the Plaindress Message
76.46(69)D

	Procedure	Cpl DE Hp8	The call, USS Boston from COMNAVBASE
H E A D I N G	Preamble	--P-- 140638Z	Precedence prosign—PRIORITY. Date-time group, Greenwich mean time.
	Address	--FM MOAT --TO LUBA HONK --INFO NAWP	Originator's sign. Originator's address group (NAVSHIPS). Action addressee sign. Address groups of NAVAL SHIPYARD at San Francisco. Information addressee sign. Call sign (USS Boston).
	Prefix	GR7	Numbers of groups in text of message.
	Separation	$\overline{BT}$	Long break prosign—separates heading from text.
T E X T	Text	UNCLAS YOUR, etc.	Text of message.
	Separation	$\overline{BT}$	Long break prosign—separates text from ending procedure.
E N D I N G	Ending Procedure	K	Ending sign.

other than the originator. It may be in plain language or it may be sent encrypted or encoded.

3. Now you know what the heading and the text of a message contain. Only one part remains–the ending procedure–the procedure employed to mark the end of the message. It tells receiving stations to receipt, to wait, to stand by for more messages or for further instructions, or it informs them that a repetition is being made. Often it is the Signalman or Quartermaster who decides what final instructions are to be used in the ending procedure for the message.

The ending sign is the last prosign of every message. It is either K or AR, depending on whether a response is required. The ending sign AR means "This is the end of my transmission to you and no response is required or expected." The ending sign K means "This is the end of my transmission and a response from you, or station indicated, is necessary."

Prosign K is used only in naval procedure. It is not a prosign in international procedure. When communicating with merchant vessels, prosign AR is used.

Table 19-2 shows the parts of the heading, text, and ending. It summarizes the preceding paragraphs dealing with the message.

SOUND SIGNALING

Whistle and bell signals constitute the principal methods of communicating by sound. Sound signals usually are one-way signals with which the originator is able to broadcast information to ships within hearing distance. The most commonly encountered signals of this type are the whistle and bell signals specified in the *Rules of the Road*. Some other uses of whistle and bell signals are discussed in this section.

DISTRESS SIGNALS

The continuous sounding of any fog signal apparatus is a signal of distress. Firing a gun or detonating explosive charges at intervals of about 1 minute are also signals of distress. Use of these signals is prohibited for any other reason than as an indication of distress.

FIRE

To indicate a fire aboard a ship, the ship's organization and regulations manual usually provides for ringing the ship's bell. Rapid ringing, followed by one, two, or three separate strokes, indicates that the fire is foreward, amidships, or aft, respectively.

OTHER EMERGENCIES

Whenever a ship hoists an emergency signal, she sounds, in rapid succession, six short blasts on her whistle, to attract the attention of other ships in the vicinity. Such signals include the hoists for man overboard, collision, fire, enemy sighting, and all flaghoists preceded by the EMERGENCY pennant.

EXERCISES

In furtherance of the intent of this chapter– to aid you in developing basic visual signaling techniques–a few typical exercise drills are included. Quartermasters are required to transmit and receive–

1. Code groups by flashing light at an approximate speed of six groups of five characters a minute (6 wpm). Allowable errors, two.
2. Plain language messages by flashing light at an approximate speed of 40 characters a minute (8 wpm). Allowable errors, one.
3. Plain language messages by semaphore at an approximate speed of 40 characters a minute (8 wpm). Allowable errors, two.

The following drills should help increase your transmitting and receiving rates.

SEMAPHORE DRILL EXERCISE 1

You should now be able to send each letter of the alphabet easily and without hesitation, so you are ready to start sending groups. Start with semaphore drill exercise 1. Do not try for speed; that will come later.

EGMGH	RILCO	MUCVX	LXDIR
ZKOEW	MGQEH	WFKZO	SMGDH
QFWRK	LUIVN	CIJQV	HJEGO
SPJSY	BTSPA	PAYTD	SCIVN
MGQEH	LSMYZ	FXNUV	BTSPA

SEMAPHORE DRILL EXERCISE 2

Practice sending and receiving semaphore drill exercise 2, using the front sign and space sign.

KFUGI AGZMZ LORPZ RAZLG ISMFJ
HOKZV CKEXQ BXQFY FOTUB WBPYQ
AYNDS NAVTR KWUGS ZECQK HCVTE
LMPIB CTEVH NCJIE VORSZ HWDNV
XQTCW RAHED GLKUN JROAX DJXQM

INTERNATIONAL MORSE CODE DRILL EXERCISE 1

Practice sending and receiving the international Morse code drill exercise 1 with flashing light until you can send and receive it at the rate of 25 characters a minute.

J G M O H J M O H G O M G M O J G H O M
V R E W B R W B W E A B R E A E B W W A
T H Y N Q Q N Y T Q H Y N Q V T V N Q V
A P D F P D A A D F P P F D A D F P F D
C K L S U K L S U C L S U C K L S K C U
Z X F D I X F D I Z X Z I X D Z F I D F
V J R Y V T L V X V Y R J F Y C V T Z R
9 7 5 3 1 8 6 4 2 0 0 1 3 5 4 2 9 8 6 7
0 7 1 3 3 8 9 7 6 4 2 9 5 8 1 6 0 4 2 5

INTERNATIONAL MORSE CODE DRILL EXERCISE 2

After you are proficient in sending and receiving exercise 1, work on exercise 2 until you can send and receive each mark of punctuation at the rate of 25 per minute.

' : , - ( ) . ? " / / " ? .) (
- , : ' / ' " . ? :) , - (/ '
" . / :) , - (/ ? " . / :) ,
- (' : , - ( ) . ? " / / " ? .
) (- , : ' (- ,) : / . " ' /
(- ,) : ? . " ' ?

INTERNATIONAL MORSE CODE DRILL EXERCISE 3

Now that you have gained proficiency in transmitting and receiving letters, numerals, and punctuation, practice exercise 3–which is a letter/numeral/punctuation combination–until you can send and receive each character at the rate of 25 per minute.

J 9 ’ G 7 : M0 5 3 , - H1 (J 8) M6
. V 9 / G 7 : R 7 - H B R W Q1 3 ” - ?
0 A D F 7 ’ ’ V U R 5) W Q F C 6 D Z :
V A 0 2 3 (/ C K L S ” . 9 7 1 3 V J R
R Z T 7 6 8 ’ : , F 7 (? - X C Q L Y P
A 1 C ’ Q 2 B ’ O J 3 E , Y K / D ? R B
E R 6 D Z N B J) F 8) A O P Q I K , F
P 9 B / N 1 ” H8 ? M T 2 G T 7 M . V A
H) I 3 S 6 F S (P4 - C Q , C X K L G
5 : 0 ’ W(6) ” U 0 W7 . 8 O ” K B X
W4 - 5 Z Y V L Q ” Z : U F C Y / ? 9 U

INTERNATIONAL MORSE CODE DRILL EXERCISE 4

Practice sending and receiving this exercise until you can send and receive it at the rate of 6 groups a minute without error.

LABAM REDUP HOVBM PRTEW
QUIPS PIMNB GHKJL TYRYU
DSLKI YTIPO MUJYT QPWOI
EURYT LAKSH DHFGM ZNXBC
VYGHE QMWNE RNTBY UVICP
FHZLA QAZPL MXKOS WIEJN
DCRUH FVTBY GIVEN STHOM
ASHEN RYDAG

SEMAPHORE EXERCISE 3

Practice sending and receiving semaphore exercise 3 by semaphore until you can send and receive at the rate of 20 groups a minute.

BQIZF ZGUZT BHMGV NBQIZ
HTEPD NKOYJ FAGLT RSKTB
MYKUC CEUDV ZQUHP MOWQE
GOJSX QTYOA SCIQR IPCGQ
VAWLR IKEJW XOJEV NRXPM
DAFJN JPUSL RWAVL XOGJS
LYSHV FDCXR TEHDP KUMYC

SEMAPHORE EXERCISE 4

Practice sending and receiving semaphore exercise 4 until you can send and receive it without error in 4 minutes.

TQYJR MGLFU MFIZE DLFMS
VDKPD BIZOE AHSKD TPCNV
WSAXH HNXAW JCTGL AOGBU
ECOZB DSPKV BUONX HKQWX
UIFLM RCJYT PWVRY EZJYR
LCPND MKSGU NEDRX PJBPC
QEISV TLFVR WMAOC QKDSA
MAWHR EXHDN FQLPK ULMZI
FZTUO IWOCY SYBVJ ETNWF
XBGKY QPBZJ TIGZU VOGXH
ETKDU LFISG RWCHJ VMQNX
LAQVG MBRWH NCXSI OCTYJ
PIGWU HZJOQ VBNRC AXKSD
WBRMH XCSNI YTDOQ ZEHPK
NCSWD OEYVS PGZUH QIBUJ
NEXVF ODWYH PGZUJ QIATL

INDEX

2647

☆ U. S. GOVERNMENT PRINTING OFFICE : 1972 O - 450-214

2649

VT 016 630
MCKAY, CHARLES W.
CURRICULUM FOR ELECTRONIC INSTRUMENTATION.

LEE COLL., BAYTOWN, TEX.
TEXAS EDUCATION AGENCY, AUSTIN. DIV. OF
OCCUPATIONAL RESEARCH AND DEVELOPMENT
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 20JUN72 179P.

DESCRIPTORS - *POST SECONDARY EDUCATION; TIME BLOCKS; *PROGRAM GUIDES; CURRICULUM GUIDES; BEHAVIORAL OBJECTIVES; PRODUCER SERVICES; STUDENT TESTING; BIBLIOGRAPHIES; VOCATIONAL DEVELOPMENT; PROGRAM EVALUATION; *TRADE AND INDUSTRIAL EDUCATION; ELECTRONIC EQUIPMENT; *ELECTRONICS; *INSTRUMENTATION TECHNICIANS
IDENTIFIERS - EDUCATIONAL AWARENESS; BEGINNING COMPETENCE; EMPLOYMENT SKILLS

ABSTRACT - THIS GUIDE FOR A 2-YEAR PROGRAM AT THE POST-SECONDARY LEVEL WHICH OFFERS AN ASSOCIATE OF APPLIED SCIENCE DEGREE IN ELECTRONIC INSTRUMENTATION CONTAINS 19 COURSE OUTLINES EACH WITH TIME ALLOTMENTS, BEHAVIORAL OBJECTIVES, AND SAMPLE EXAMINATIONS. DEVELOPED BY A COLLEGE CHAIRMAN OF TECHNICAL EDUCATION USING A SYSTEMS APPROACH, THIS DOCUMENT INCLUDES A PROGRAM RATIONALE, A BIBLIOGRAPHY OF PERIODICALS, A TOOL LIST, A PROGRAM EVALUATION SHEET FOR STUDENT FEEDBACK, AND A LIST OF COURSES REQUIRED FOR EACH SEMESTER. (AG)

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TEXAS EDUCATION AGENCY

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June 20, 1972

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ACKNOWLEDGEMENTS AND DEDICATIONS:

To the Texas industries this curriculum is intended to serve;

To the community college teachers of electronics, electromechanics, and instrumentation who train people for our industries;

To the Texas Education Agency for their cooperation and funding;

To the Lee College administration, faculty, and staff for their invaluable assistance;

To the Lee College students who tested portions of the curriculum;

To my family for their patience and endurance;

Without their time and efforts this curriculum would not have been possible.

Thanks,

Charles W McKay

Charles McKay
Project Director
June 20, 1972

Phillip R. Gilliam
Research Assistant

Mary O. Smoke
Stenographer/Typist

INTRODUCTION

Industrial measurement and control has in many respects undergone more changes in the last decade than in its entire previous existence. These changes are primarily due to advancements in solid state technology that are making electronic instruments and the computers they work with more reliable and more economical with every passing day. Recognizing the multitude and growth rate of these innovations, the Texas Education Agency, Division of Occupational Research and Development, funded Lee College to compile with the cooperation of the industries affected, a curriculum to meet the needs of this relatively new and rapidly advancing technology. Over 150 of our larger industries in the state* were asked questions such as: "Do you use electronic instruments for process measurement or control? Do you use computers for process measurement or control?" Over 150 industries replied that they did use electronic instruments, and over 50 industries said they already had computers "on-line" in the process or had one on order for that purpose.

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*The data collection procedures and data are documented in "Final Progress Report on Proposal 29255 Curriculum Development for Electronic Instrumentation prepared by Charles McKay, Project Director for the Division of Occupational Research and Development, Texas Education Agency; June 30, 1972." Obviously this study involves a very small percentage of the industries using electronic instrumentation. However, the author does feel these industries are a representative sample of the various types of industries in the state using electronic instrumentation.

As many as possible of these industries were visited to see the systems in operation. The vendors and manufacturers of the electronic instruments and computers were contacted for technical information so that an appropriate program could be designed to train technicians to maintain and install these devices. Members of the ISA and the IEEE gave generously of their time and information to inprove the course contents.

Those portions of the curriculum judged to be major innovations by the Lee technical faculty were identified and select groups of students; many of them from industry, were used to test and refine the outlines. Finally, after all portions of the rough draft had been tested by at least one control group; teachers of electronics, electro-mechanics, and instrumentation from throughout the state were invited to Lee College on May 22 through May 26, 1972, to discuss the new program and do further testing and refining of its content. This document is a result of these efforts. It is designed as a two-year program to offer an Associate of Applied Science in electronic instrumentation. It should however, also be of benefit to those instructors of existing programs in electronics, electro-mechanics, and instrumentation. When possible each course is broken into three parts: an outline meant to serve as a timetable for the topics to be presented, the behavioral objectives to specify a "minimum" set of desired results in measurable terms, and sample examinations meant to complement the outline and objectives by providing some suggested measurement techniques. In as much as possible this curriculum was developed by a systems approach in that all topics in all courses are intended to converge at the curriculum's conclusion to produce a student with the desired exit skills and behaviors--namely to maintain and install electronic instrument systems in the face of almost daily innovations and changes within the field.

BIBLIOGRAPHY:

A periodical bibliography is referenced on the next page. Because of the extremely dynamic nature of the field, commercial textbooks are not listed. It is recommended that manufacturers of electronic instruments and computers be contacted for manuals and technical data sheets.

PERIODICALS

Communications News
402 West Liberty Drive
Wheaton, Illinois 60187

Computer Decisions
Mayden Publishing Co. Inc.
50 Essex Street
Rochelle Park, N. J. 07662

Computer Design
Circulation Department
P. O. Box "A"
Winchester, Mass. 01890

Control Engineering
Circulation Department
466 Lexington Ave.
New York, N. Y. 10017

Data Product News
Circulation Manager
McGraw-Hill Bldg.
330 W. 42 St.
New York City, N. Y. 10036

Datamation
P. O. Box 200
Greenwich, Conn. 06830

EDN
Criculation Department
P. O. Box 5262
Denver, Colorado 80217

Electronic Capabilities
209 Dunn Ave.
Stamford, Conn. 06905

Electronics
McGraw-Hill Inc.
P. O. Box 514
Hightstown, N. J. 08520

Electronic Design
Circulation Manager
50 Essex Street
Rochelle Park, N. J. 07662

Electronic Industries
Chilton Company
Chestnut & 56th Sts.
Philadelphia, PA 19139
Att: Circulation Dept.

Electronic Instrument Digest
222 West Adams Street
Chicago, Illinois 60606

Electronic Products
Circulation Department
645 Stewart Ave.
Garden City, N. Y. 11530

Electro/Optical Systems Design
222 West Adams Street
Chicago, Illinois 60606

IBM Journal Research & Development
International Business Machines
Armonk, New York 10504

IEEE Spectrum
345 East 47 Street
New York, N. Y. 10017

Instrumentation Technology
Instrument Society of America
400 Stanwix Street
Pittsburgh, PA 15222

Instruments & Control Systems
P. O. Box 2010
Bala Cynwyd, PA 19004

PERIODICALS

Microwave Journal
610 Washington Street
Dedham, Massachusetts 02026

Modern Data
Circulation Department
3 Lockland Ave.
Framingham, Mass. 01701

Oil and Gas Journal
Subscriber Service
P. O. Box 1260
Tulsa, Okla. 74101

Proceedings of IEEE
345 East 47 Street
New York, N. Y. 10017

Product Design & Development
Chestnut & 56th Streets
Philadelphia, PA 19139

Product Engineering
Circulation Manager
P. O. Box 546
Hightstown, N. J. 08520

Scientific American
415 Madison Ave.
New York, N. Y. 10017

Software Age
P. O. Box 2076
Madison, Wisconsin 53701

Telecommunications
610 Washington Street
Philadelphia, PA 19139

RECOMMENDED TOOLS FOR TOOL BOX

1. 4 3/4" long nose plier (coil spring handle)
2. 4 3/16" semi-flush cutting oblique cutter (coil spring handle)
3. 1/2" capacity x 4" adjustable wrench
4. 6 5/8" slim long nose plier (coil spring handle)
5. 6 1/16" flush oblique cutter
6. Phillip screwdriver (point size 1; blade size 3")
7. Shock proof screwdriver (round blade; 3/16" x 4")
8. Shock proof screwdriver (round blade; 1/8" x 3")
9. Electrician's tool (multi-function wire stripper, crimper, cutter)
10. Light duty wire stripper and cutter (adjustable)
11. Terminal pin insert tool (compatible with bread board requirements)
12. Wire-wrap de-wrapping tool
13. 8-foot tape measure
14. 37½ - 44 w. soldering iron with 1/8" chisel tip, sponge, holder
15. Solder (1 lb. reel, 60/40 alloy, 20 ga.)

STUDENT EVALUATION SHEET

(At the conclusion of each examination in each course, the student will be asked to fill in a "Student Evaluation Sheet" and submit it to his instructor. The purpose of this sheet is to insure student feedback to aid the instructor in improving the course.)

Course number and title ____________________________.

Circle one number (5 is highest ranking and 1 is lowest ranking)

1. Were the course objectives made clear to you?

   5 4 3 2 1

2. Did the instructor make an honest effort to present the course objectives clearly?

   5 4 3 2 1

3. Do you feel the instructor was well prepared for each class?

   5 4 3 2 1

4. Based on your out-of-class preparation such as chapter assignments, homework problems, etc., were you well prepared for each class?

   5 4 3 2 1

5. Was this examination fair and did it measure the attainment of the course objectives?

   5 4 3 2 1

6. To what extent did your homework problems and outside reading contribute to the attainment of the course objectives?

   5 4 3 2 1

x

STUDENT EVALUATION SHEET

7. To what extent did your laboratory work contribute to the attainment of your course objectives?

5 4 3 2 1

8. Circle the number which best represents the number of out-of-class hours spent each week in studying for this course.

5 4 3 2 1

Date ________________, Student Signature ______________________________,

Instructor Signature ______________________________

Comments by student and instructor may be written on the back. The department would appreciate any student's suggestions on ways of improving the course.

AAS IN ELECTRONIC INSTRUMENTATION

FIRST SEMESTER

EI 401 - Introduction to D.C. Analog and Digital Circuits
EI 302 - Industrial Instruments and Controls
IP 301 - Industrial Physics, Part I
TM 301 - Basic Technical Mathematics, Part I
TRW 301 - Technical Report Writing
PE - Physical Education

SECOND SEMESTER

EI 403 - Alternating Current Theory
EI 404 - Solid State Devices
EI 305 - Schematics, Diagrams and Construction, Part I
IP 302 - Industrial Physics, Part II
TM 302 - Basic Technical Mathematics, Part II
PE - Physical Education

THIRD SEMESTER

EI 311 - Electronic Instrumentation Systems Layout, Construction and Installation Procedures
EI 412 - Pneumatic and Mechanical Control Instruments
EI 413 - Electronic Control Instruments
EI 414 - Pulse & Digital Circuits
TM 313 - Technical Mathematics, Part III
PE - Physical Education

FOURTH SEMESTER

EI 316 - Electronic Instrumentation Project
EI 415 - Computers & Computer Controlled Systems
EI 417 - Telecommunications/Telemetry
TM 411 - Technical Mathematics: Introduction to Computer Programming
PE - Physical Education

COURSE: EI 401

TITLE: Introduction to D.C. Analog and Digital Circuits

COREQUISITE: TM 301

SPECIAL NOTES: This course is meant to contrast basic analog and digital concepts. Therefore, half the course work in a normal week is analog. The other half of the week is digital.

DATE		HOURS
	I. Digital	
________	A. Course orientation as a subset of curriculum and entry level test	2.0
________	B. Pretest on course objectives	1.0
________	C. Component identification and purchasing	6.0
________	D. Equipment identification and purchasing	3.0
________	E. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
________	F. Gating	6.0
	1. Positive logic	
	2. And	
	3. Or	
	4. Not	
________	G. Combinational And-Or-Not Functions	6.0
	1. Exclusive-Or	
	2. Digital comparators	
	3. Others	
________	H. Diode Action	6.0
	1. Forward and Reverse Bias	
	2. Diode-Resistor Gates	
	3. LED biasing	
________	I. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
________	J. Inductors	4.5
	1. Time constants	
	2. Induced magnetism	
	a. Laws of magnetism	
	b. Applications of electro-magnetism	
	1. Reed switches	
	2. Magnetic pick-up shaft encoders	
	3. Turbin meters	
	4. Magnetic flow transmitters	
	5. SOV's	

DATE		HOURS
	6. Panel counters	
	7. DP transmitters	
	8. Geophones	
	9. Relays	
	3. Diode Suppression	
________	K. Relay Logic	4.5
	1. Ands	
	2. Ors	
	3. Not	
	4. Combinational And-Or-Not Logic	
	5. Status	
	6. Alarm	
________	L. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	II. Analog	
________	A. Electricity	3.0
	1. The atom	
	2. Current carriers	
	a. Electrons	
	b. Holes	
________	B. Ohm's Law	1.5
________	C. Kirchhoff's Law for Series Circuits	1.5
________	D. Series Circuits	9.0
	1. Circuit analysis	
	2. Resistors	
	3. Batteries	
________	E. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
________	F. Power	3.0
	1. Conductors and insulators	
	2. Resistors	
	3. Batteries	
________	G. Kirchhoff's Law for Parallel Circuits	1.5
________	H. Parallel Circuits	3.0
________	I. Series-Parallel Circuits	7.5
________	J. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
________	K. Network Theorems	6.0
	1. Matrix solution of non series-parallel circuits	
	2. Thevinin's Theorem	

DATE		HOURS
	3. Norton's Theorem 4. Superposition theorem	
____________	L. Capacitors 1. Time constant 2. Application of a pulsating D.C. rectangular wave to an RC circuit	3.0
____________	M. Open Note (Objective Test, Student Evaluation, and Corrective Feedback	3.0
	TOTAL HOURS	96.0

EI 401

DIGITAL OBJECTIVES

Special Notes: This course is meant to contrast basic analog and digital concepts. Therefore, half the course work in a normal week is analog; the other half of the week is digital.

Using only paper and pencil, the student shall within twenty minutes identify from a sample, schematic symbol, or a picture, the following components and tools; and shall within a tolerance of fifty per cent, correctly estimate the price of at least 75% of the following items and name at least three establishments where the compenents or tool can be purchased:

Gold band carbon resistor
Wire wound potentiometer
Disc capacitor
Tubular capacitor
"Canned capacitor
Filter choke or inductor
Transformer
Relay
Small signal diode
Power rectifier diode
Small signal transistor
Power transistor
"In line" integrated circuit
TO-5 integrated circuit
Flat pack integrated circuit
Transistor socket
IC socket
Roll of "hook up" wire
Vector board
"Flea" clips
Stand offs
Machine screws and nuts
Wire wrap board
Wire wrap wire
Roll of solder
Long nose pliers
Dykes
Soldering pencil
Soldering gun
"Spin tight" set
Small flat head screw driver
Small phillips head screw driver

Using only paper, pencil, and component catalog, the student shall within one hour, if given specific requirements by the instructor correctly fill out an order form for any selection of components and tools:

Gold band carbon resistor
Wire wound potentiometer
Disc capacitor
Tubular capacitor
"Canned capacitor
Filter choke or inductor
Transformer
Relay
Small signal diode
Power rectifier diode
IC socket
Roll of "hook up" wire
Vector board
"Flea clips
Stand offs
Machine screws and nuts
Wire wrap board
Wire wrap wire
Roll of solder
Long nose pliers

Small signal transistor
Power transistor
"In line" integrated circuit
TO-5 integrated circuit
Flat pack integrated circuit
Transistor socket
Dykes
Soldering pencil
Soldering gun
"Spin tight" set
Small flat head screw driver
Small phillips head screw driver

Using only paper and pencil, the student shall within twenty minutes identify from a sample or a picture, the following items of equipment; and shall within a tolerance of fity per cent correctly estimate the price of at least 75% of the following items and name at least three vendors or manufacturers from whom the item may be purchased:

1 Mega Hz DC coupled scope
Ten times scope probes
Dual trace 10 Mega Hz DC coupled scope
FET-VOM
VTVM
Impedance bridge
Audio frequency generator
Pulse generator
Power supplies
Air operated valves
Wire wrap guns
Thermal stripper
Heat shrink gun
Mini computer
Maxi computer
ASR33
Controllers
Transmitters
Recorders
SOV

Using only paper, pencil, and vendor catalogs, the student shall within one hour, if given specific requirements by the instructor, correctly fill out an order form for any selection from the following equipment list:

1 Mega Hz DC coupled scope
Ten times scope probes
Dual trace 10 Mega Hz DC coupled scope
FET-VOM
VTVM
Impedance bridge
Audio frequency generator
Pulse generator
Power supplies
Air operated valves
Wire wrap guns
Thermal stripper
Heat shrink gun
Mini computer
Maxi computer
ASR33
Controllers
Transmitters
Recorders
SOV

Digital examination 1.

Using only paper, pencil, and logic template, the student shall within ten minutes correctly define and, where appropriate, list symbols and truth tables for: Positive Logic, And Gates, Or Gate, Not Gate, Exclusive Or Combination, and Digital Comparator Combination.

Using only paper, pencil, and a digital logic demonstrator board, the student shall within twenty minutes correctly connect and demonstrate to the instructor or lab assistant the verification of the definition or the truth table of the following: Positive Logic, And Gate, Or Gate, Not Gate, Exclusive Or Combination, and Digital Comparator Combination. The student will then write a brief description of at least one possible application for each gate combination.

Using only paper, pencil, and a diode demonstrator board, the student shall within twenty minutes correctly draw, connect, and demonstrate to the instructor or lab assistant a schematic of a forward biased diode circuit. Both circuits must be labeled with an indication of the voltage dropped across the diode, the current through the diode, the resistance of the diode, and a brief description of the diode's function in the circuit.

Using only paper, pencil, and a diode demonstrator board, the student shall within seventy minutes correctly draw, connect, and demonstrate to the instructor or lab assistant a diode resistor Or Gate, And Gate, and Not Gate. Each schematic should be labeled and accompanied by a brief paragraph describing the circuit action.

Using only paper, pencil, and a diode demonstrator board, the student shall within twenty minutes correctly draw, connect, and demonstrate to the instructor or lab assistant a LED biasing circuit. The schematic will be accompanied by a brief paragraph describing circuit action.

Digital examination 2.

Using notes, slide rule, scope, and a component demonstrator board, the student shall within forty minutes, if given values for R & L and an applied voltage, correctly calculate, connect, and demonstrate to the instructor of lab assistant values for voltage at the end of each of the first five time constants.

Using only paper and pencil, the student shall within twenty minutes correctly identify from a sample or a picture any four of the following items; and write a brief description of the theory of operation and application of each item: Reed switches, magnetic pick-up shaft encoders, turbin meters, magnetic flow transmitters, panel counters, and eophones.

EI 401

Using only paper, pencil, pressure source, component demonstrator board, and appropriate technical manuals, the student shall within sixty minutes correctly describe the theory of operation and demonstrate to the instructor or lab assistant a Solenoid Operated Valve and a Differential Pressure to Current Transmitter.

Using only paper and pencil, the student shall within ten minutes correctly explain the theory and application of diode suppression giving at least three specific examples of its use.

Using only paper, pencil, and a component demonstrator board, the student shall within thirty minutes correctly define, connect, and demonstrate to the instructor or lab assistant any And-Or-Not logic equation of three minterms or less with three variables or less to be implemented with relays.

Using only paper and pencil, the student shall within ten minutes correctly draw and describe both a status and an alarm circuit.

Digital examination 3.

EI 401

DIGITAL EXAMINATION 1 (SAMPLE)

1. Identify the following samples or pictures of components of tools. Name the item, give the correct price within ± 50%, and list three establishments where the item can be purchased. Turn in your answers to the instructor who will then issue you a "components" catalog for use in problem 2.
(20 min)

2. After exchanging your answers to problem 1 for a component catalog, use the attached requisition form to order the following components:

100 - 2N3638's
50 - 2N3569's
10 - 2N404's
20 - SN7400P's
50 - .01µF @ 1000V
30 - 100µF @ 35WV
75 - 10K-5% @ 1/4W
100 - 2.2K-5% @ 1/8W

25 - 33K-10% @ 1/2W
10 - Wire wrap boards with 50 chip density
10 - 12VSPDT Relays
4 - Small spring loaded dykes
4 - Small spring loaded long noses
4 - Soldering pencils
1 - Roll solder

(1 hr.)

3. Identify the following samples or pictures of equipment. Name the item, give the correct price within ± 50%, and list three vendors or manufacturers for the item. Turn in your answers to the instructor who will then issue you an "equipment" catalog for the use in problem 4.
(20 min)

4. After exchanging your answers to problem 3 for an equipment catalog, use the attached requisition forms to order the following items of equipment:

Single trace 1MHZ - DC Scope
Dual trace 1MHZ - DC Scope
4-10X Probes
FET-VOM
Audio frequency generator

Mini computer with 8K of core
Controller with MDSP
DP/I transmitter from 0 to 20" H_2O
1/2" linear air operated valve

(1 hr.)

DIGITAL EXAMINATION 2 (SAMPLE)

1. List the truth table, symbol, definition, and at least one application for the following gates or combinations: And, Or, Not, Exclusive Or, Digital Comparator. Demonstrate the truth tables to the instructor or lab assistant on the digital lab board.

   (20 min)

2. Draw, connect, and demonstrate to the instructor or lab assistant a forward biased and a reverse biased diode schematic. Briefly describe the theory of operation and calculate all valtages, currents, and impedances for lab board verification.

   (20 min)

3. Briefly describe the theory of operation of diode-resistor And, Or, and Not gates. Draw the schematics. Connect the circuits and demonstrate to the instructor or lab assistant.

   (70 min)

4. Draw the schematic and briefly explain the theory of operation of an LED biasing circuit. Demonstrate the circuit to the instructor or lab assistant.

   (20 min)

EI 401

DIGITAL EXAMINATION 3 (SAMPLE)

1. Using one page of instructor approved notes on time constants and rectangular inputs to RL circuits; calculate, connect, and demonstrate to the instructor or lab assistant a RL circuit using R=10K, L=5h, and V=5V. Calculate the voltage for the end of each of the first five time constants.

   (40 min)

2. Identify the following samples or pictures and write a brief description of the theory of operation and application of each item.

   (20 min)

3. Refer to the manufacturer's technical manual and describe the theory of operation and application; then demonstrate to the instructor or lab assistant a working SOV circuit and a working DP/I transmitter circuit.

   (60 min)

4. Explain the theory of operation and application of diode suppression giving at least three specific examples of its use.

   (10 min)

5. Draw the truth table and relay schematic for the logic equation $F = AB\overline{C} + \overline{BA}$ (Assume 2-SPDT-12v Relays). Connect the circuit and demonstrate to the instructor or lab assistant.

   (30 min)

6. Draw and describe both a status and an alarm circuit.

   (10 min)

ANALOG OBJECTIVES

Special Notes: This course is meant to contrast basic analog and digital concepts. Therefore, half the course work in a normal week is analog; the other half of the week is digital.

Using only paper and pencil, the student shall within ten minutes correctly describe current conduction in a semiconductor. He shall explain the terms: proton, neutron, electron, nucleus, rings or shells, valence, electrons as current carriers, holes as current carriers, and batteries (mercury, alkaline, lead acid, or nickel cadmium) as current sources.

Using only paper, pencil, and slide rule, the student shall within ten minutes give three precautions for using each of the following meters: voltmeter, amp meter, and ohmmeter. The student shall demonstrate these precautions to the instructor or lab assistant.

Given only an oscilloscope, a VOM, a VTVM, and a voltage source, the student shall within fifteen minutes correctly demonstrate the use of the three instruments to measure DC voltage.

Using only paper, pencil, slide rule, component demonstrator board, VOM or VTVM, and scope, the student shall within 75 minutes give Ohm's Law and Kirchhoff's Law for series circuits and tell how to determine polarity. The student shall demonstrate the application of the laws by correctly working any five series circuit (given by the instructor, containing one power supply and up to three resistors in series. He shall verify his results on the lab board using both the scope and the voltmeter to measure voltage.

Using only paper, pencil, and slide rule, the student shall within 45 minutes (if given any three series circuits with indicated malfunctions) construct workable binary troubleshooting diagrams.

Analog examination 1.

Using only paper, pencil, and slide rule, the student shall within fifteen minutes (if given a value for a battery, resistors, and wire) draw the schematic for a series circuit and calculate the power ratings for the wire, resistors, and battery. The student shall also give the color code for each resistor.

Using only paper, pencil, slide rule, component demonstrator board, and VOM, the student shall within 45 minutes (if given five parallel circuits by the instructor) calculate all values of voltage, current, resistance, and power demonstrating the use of Kirchhoff's Law for parallel circuits. The student shall then connect the circuits and demonstrate his calculations to the instructor or lab assistant.

Using only paper, pencil, slide rule, component demonstrator board, and test equipment, the student shall within sixty minutes (if given any three series-parallel circuits) correctly calculate all circuit values, connect the circuit, and demonstrate to the instructor or lab assistant.

Using only paper, pencil, and slide rule, the student shall within 45 minutes (if given any three series-parallel circuits with indicated malfunctions) construct a workable binary troubleshooting diagram.

Analog examination 2.

Using only paper, pencil, slide rule, component demonstrator board, and test equipment, the student shall within sixty minutes (if given two non-series-parallel circuits such as the bridge) correctly calculate by matrix solution all currents and voltages. The student shall connect and demonstrate his solution to the instructor or lab assistant.

Using only paper, pencil, and slide rule, the student shall within thirty minutes give Thevinin's Theorem, Norton's Theorem, and the Superposition Theorem and an example of their use.

Using only paper, pencil, slide rule, component demonstrator board, and test equipment, the student shall within forty minutes (if given a value for a capacitor, resistor, and a rectangular wave) correctly calculate the values for V_1, V_1', V_2, V_2'. The student will connect and demonstrate his calculations to the instructor or lab assistant.

Analog examination 3.

EI 401

ANALOG EXAMINATION 1 (SAMPLE)

(Closed reference)

1. Describe in less than a page current conduction in a semiconductor. Explain the terms: proton, neutron, electron, shells, valence, holes as current carriers, electrons as current carriers, and batteries as current sources.

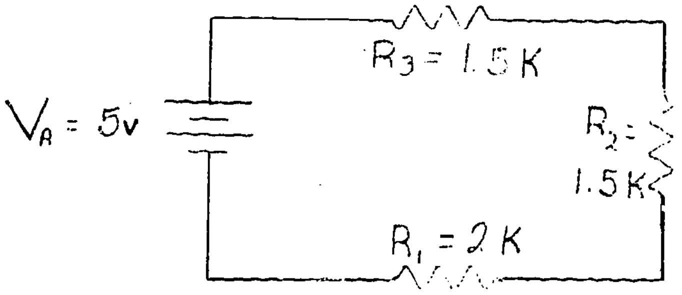
(10 min)

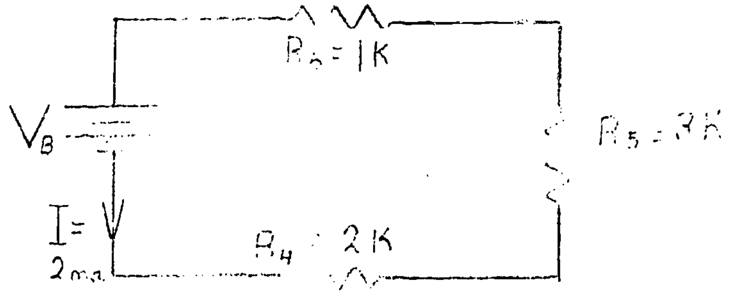
2. List three precautions for using each of the following meters: Voltmeter, amp meter, and ohmmeter.

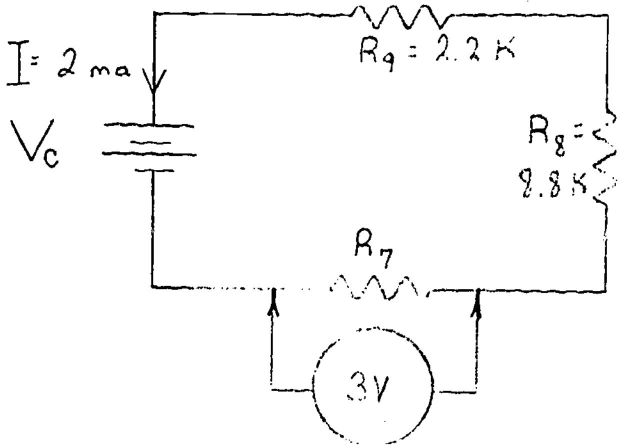
(10 min)

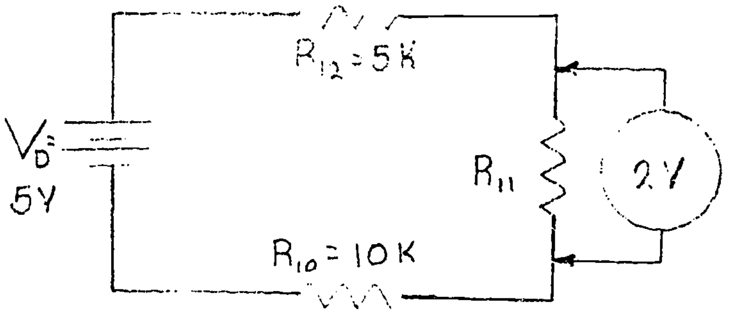
3. Give Ohm's Law and Kirchhoff's Law for a series circuit, and the procedure for determining polarity. Complete the VIR block diagram for the following circuits. Connect and demonstrate to the instructor or lab assistant any circuit they request.

(75 min)

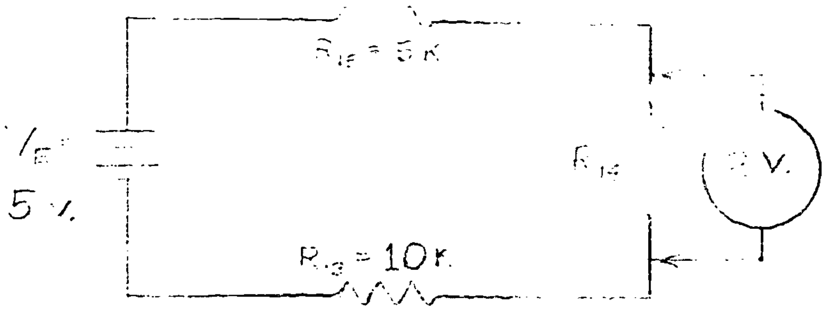








2678



4. For the following malfunctions in the circuits of problem 3, construct a workable binary troubleshooting diagram.

Case a. V_2 = 0v

Case b. V_{11} = 12v

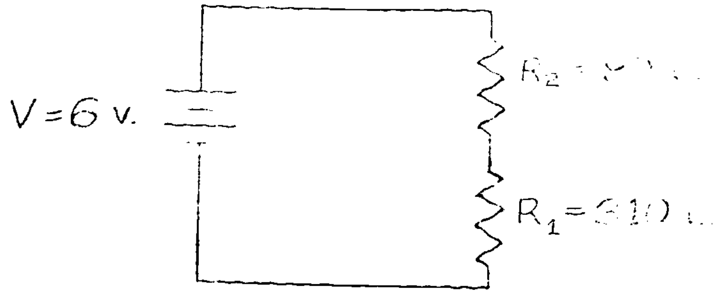
Case c. V_{14} = 3v

(45 min)

ANALOG EXAMINATION 2 (SAMPLE)

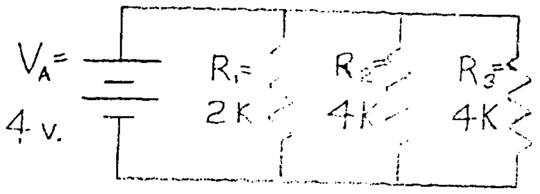
1. From the following circuit, calculate P_1, P_2, and the color code of both resistors. Explain why 4 - #6 cell, #22 gage wire, and 1/16W resistors would or would not do the job.

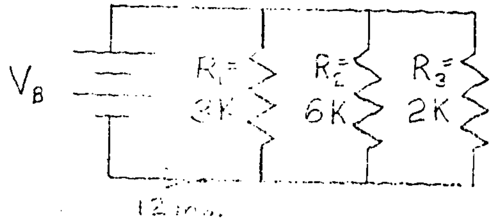
(15 min)

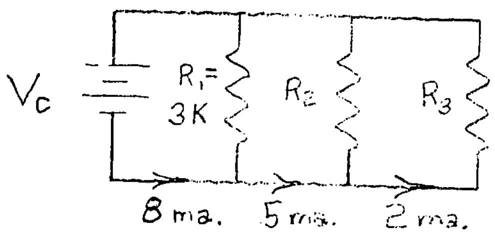


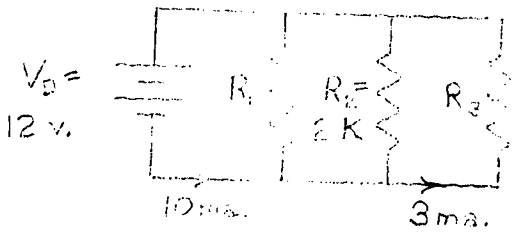
2. Give Kirchhoff's Law for a parallel circuit. Calculate the VIR block diagram plus the power dissipated in all resistors. Give the color code for all resistors. Indicate any resistors which must be rated above 1/8W and any wire which must be below #22 gage. Connect and demonstrate to the instructor or lab assistant any of the following circuits they request.

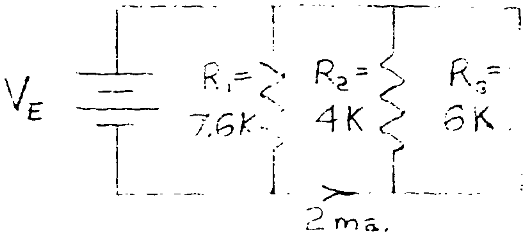
(45 min)





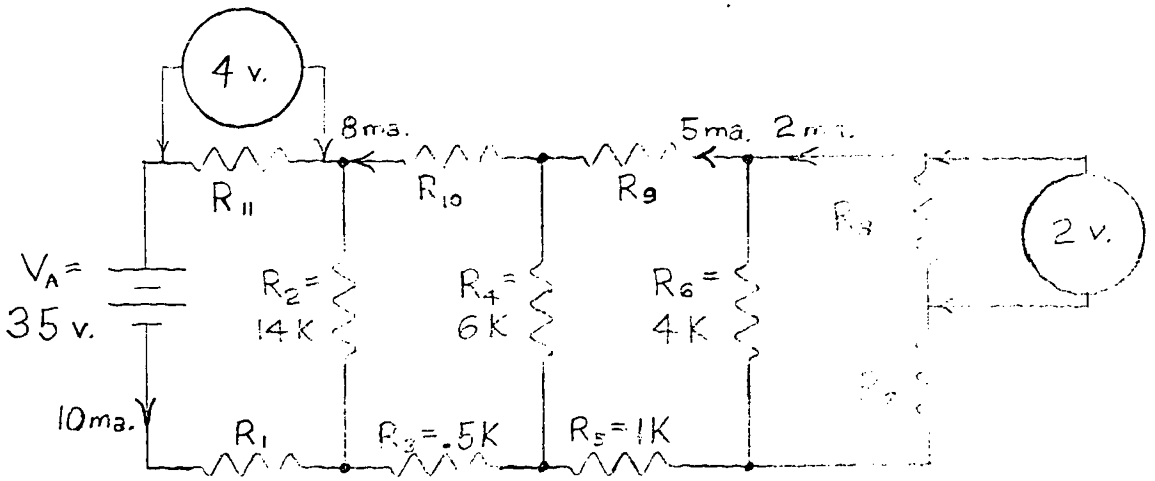




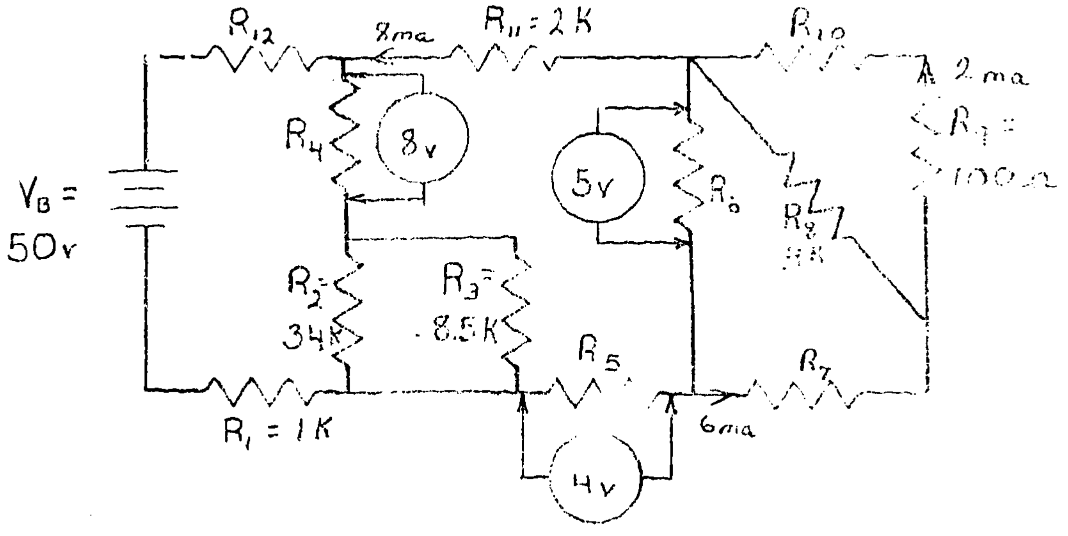


3. Calculate the VIR block diagram for the following circuits. Connect and demonstrate to the instructor or lab assistant any of the following circuits they request.

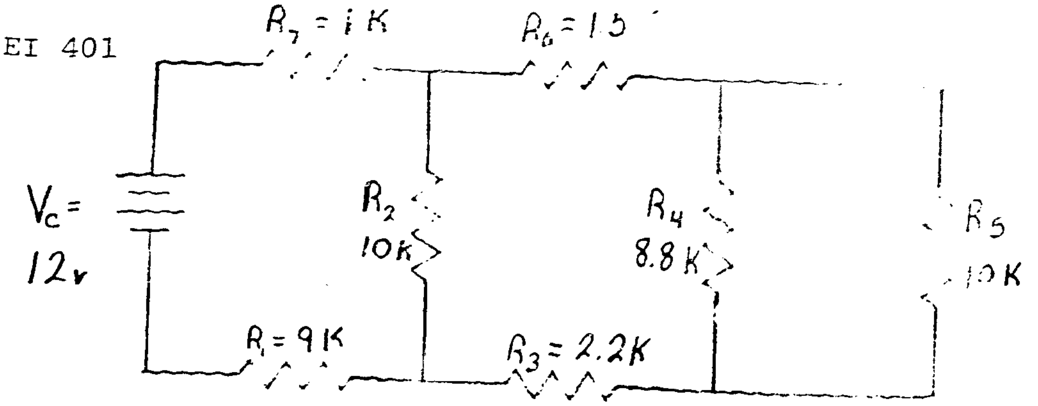
(60 min)



CIRCUIT A



CIRCUIT B



CIRCUIT C

4. For the following malfunctions of circuit C in problem 3, construct a workable binary troubleshooting diagram.

Case a. $V_5 = 0$

Case b. $V_5 = 5$

Case c. $V_2 = 12v$

(45 min)

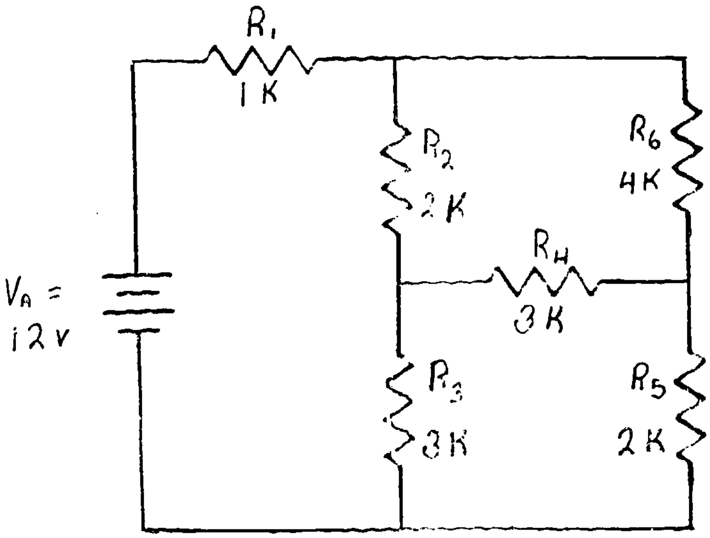
EI 401

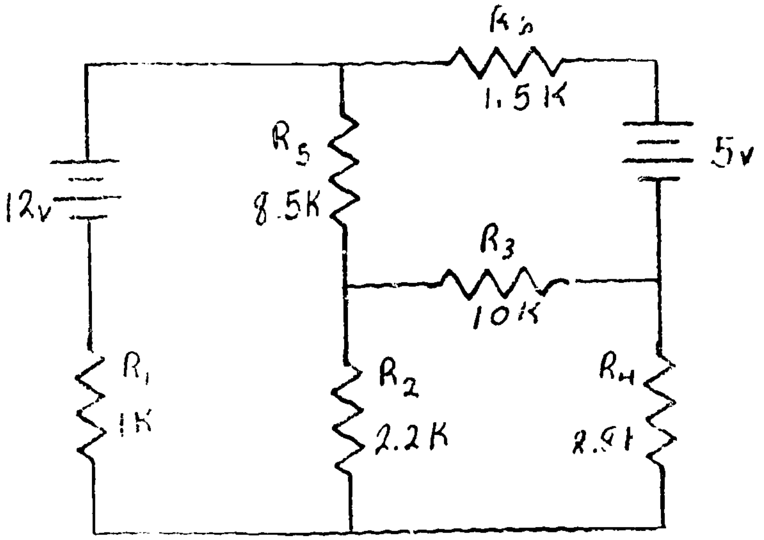
ANALOG EXAMINATION 3 (SAMPLE)

(Closed reference)

1. Calculate all currents and voltages by matrix algebra. Connect circuit #2 and demonstrate to the instructor or lab assistant.

(60 min)





2. Give Thevinin's Theorem, Norton's Theorem, and the Superposition Theorem and an example problem of each.

(30 min)

3. (One page of instructor approved notes allowed)
Given R=10K, C=.02μF, Ton=600ns, T off=800ns, ΔV=5;
in a series circuit, calculate V_1, V_1', V_2, V_2'. Connect the circuit and demonstrate the validity of your calculations to the instructor or lab assistant.

(40 min)

COURSE: EI 302

TITLE: Industrial Instruments & Controls

COREQUISITE: TM 301

DATE		HOURS
________	I. Entry Skills Test, Pretest Over Course Objectives and Course Orientation	2.0
	II. Characteristics of Instruments	1.0
________	A. Static	
________	B. Dynamic	
	III. Pressure Measurements	6.0
________	A. Pressure Scales	
________	B. Manometers	
	1. U-Tube	
	2. Well	
	3. Incline Plane	
________	C. Spring Pressure	
	1. Bourdon Tube	
	2. Capsules	
	3. Bellows	
________	D. Transducers	
________	E. Differential Pressure Transmitters	
	IV. Liquid Level Measurement	3.0
________	A. Direct	
________	B. Indirect	
	V. Temperature Measurement	4.5
________	A. Temperature Scales	
________	B. Thermometers	
	1. Mercury-In-Glass	
	2. Bimetalic	
	3. Thermocouples	
	4. Resistance, Thermometers	
	5. Pressure Spring	
	6. Radiation Measuring	
________	VI. Objectives Test, Student Evaluation, and Corrective	1.5

DATE HOURS

VII. Flow (Fluid and Gas) Measurement 9.0
- ____________ A. Theory of Flow Metering
    1. Potential Energy
    2. Kinetic Energy
- ____________ B. Rate of Flow
    1. Primary Elements
        a. Venturi Tube
        b. Orifice Plate
        c. Flow Nozzle
        d. Pitot Tube
    2. Secondary Elements
        a. U-Tube Manometer
        b. Differential Pressure Transmitter
- ____________ C. Total Flow
- ____________ D. Net Oil Computers

VIII. Electronic Measurements 4.5
- ____________ A. Converting from Pressure Ranges to Current Ranges
- ____________ B. Converting from Current Ranges to Pressure Ranges
- ____________ C. Wheatstone Bridge
- ____________ D. Volt-Ohm-Meters (Operation Only)
- ____________ E. Vacuum Tube-Volt Meters (Operation Only)
- ____________ F. Oscilloscopes (Operation Only)

____________ IX. Objectives Test, Student Evaluation, and Corrective Feedback 1.5

____________ X. Density, Specific Gravity, Viscosity, Acidity and Alkalinity Measurements 1.5

____________ XI. Principles of Automatic Control 3.0

XII. Control and Transmission Systems 6.0
- ____________ A. Pneumatic
- ____________ B. Electronic
- ____________ C. Recorders
- ____________ D. Controllers

DATE			HOURS
	XIII.	Control Valves	3.0
____________		A. Valve Sizing	
____________		B. Air Operated	
____________		C. Electrical Operated	
____________	XIV.	Objectives Test, Student Evaluation, and Corrective Feedback	1.5
		TOTAL HOURS	48.0

EI 302

OBJECTIVES

Using only paper and pencil, the student shall within ten minutes correctly define and contrast static and dynamic characteristics of instruments.

Using only paper and pencil, the student shall within ten minutes correctly name the three pressure scales and will show an example of equivalence between the three scales.

Using only paper and pencil, the student shall within twenty-five minutes if shown pictures or samples of the following items, correctly name the item and describe the theory of operation and application of each. The items are: monometers, bourdon tubes, capsules, bellows, differential pressure transmitters.

Using only paper and pencil, the student shall within ten minutes correctly describe and contrast direct and indirect liquid level measurements and will describe an application of each.

Using only paper and pencil, the student shall within ten minutes correctly name the three temperature scales and show an example of equivalence between the three.

Using only paper and pencil, the student shall within twenty-five minutes if shown a sample or a picture of the following items, correctly name the item, describe the theory of operation, and give a specific application: mercury thermometer, bimetalic thermometer, thermocouple, resistance bulb, pressure spring, radiation measuring.

Examination 1.

Using only paper and pencil, the student shall within ten minutes correctly define potential energy and kinetic energy as it applies to flow measurement and shall contrast between the two.

Using only p and pencil, the student shall within ten minutes correctly name three primary elements used to measure rate of flow. The student will contrast the features of each.

Using only paper and pencil, the student shall within ten minutes correctly name two secondary elements used for measuring flow and will contrast the features of each.

EI 302

Using only paper and pencil, the student shall within fifteen minutes discuss the measurement of total flow. He shall mention positive displacement meters, magnetic flow meters and turbine meters. He shall contrast the characteristics of each.

Using only paper and pencil, the student shall within fifteen minutes correctly describe the theory of operation of a net oil computer.

Using only paper, pencil and slide rule, the student shall within five minutes if given the pressure and current ranges of a DP transmitter correctly convert any pressure input to its appropriate current output.

Using paper, pencil and slide rule, the student shall within five minutes if given the pressure and current ranges of an IP transmitter correctly convert any current input to the appropriate pressure output.

Using only paper, pencil and slide rule, the student shall within five minutes correctly calculate the resistance values of a wheatstone bridge for a given current value in the center arm.

Using only paper, pencil and volt-ohm-meter, the student shall within fifteen minutes list three precautions for using the meter to measure DC volts, DC current and ohms. The student will demonstrate the use of the meter to measure each parameter to the instructor or lab assistant.

Using only paper, pencil and VTVM, the student shall within fifteen minutes list the precautions for using the meter to measure volts and ohms. The student shall demonstrate to the lab assistant or instructor the use of the meter to measure each parameter.

Using only paper, pencil and oscilloscope, the student shall within fifteen minutes correctly demonstrate to the instructor or lab assistant the procedure for calibrating and using an oscilloscope to measure voltage.

Examination 2.

EI 302

Using only paper and pencil, the student shall within fifteen minutes correctly discuss and contrast the measurements of: density, specific gravity, viscosity, acidity and alkalinity.

Using only paper and pencil, the student shall within thirty minutes draw an analog automatic control loop consisting of either electronic instruments, pneumatic instruments, or combinations. The student will correctly describe the function of each instrument in the control loop.

Using only paper and pencil, the student shall within twenty minutes describe the control and transmission systems used for remote process loops that are pneumatic or electronic.

Using only paper, pencil and the manufacturer's cut-away drawing of a control valve, the student shall within fifteen minutes correctly discuss the operation of all elements of a control valve for either air operated or electrically operated action.

Examination 3.

EI 302

EXAMINATION 1 (SAMPLE)

(Closed Reference)

1. Define and contrast static and dynamic characteristics of instruments.

(10 min)

2. Name the three pressure scales and show an example of equivalence between the three scales.

(10 min)

3. Identify from the numbered samples on the lab bench the following items. Name and describe the theory of operation and application of each. The items are: monometers, bourdon tubes, capsules, bellows, differential pressure transmitters.

(25 min)

4. Define and contrast direct and indirect liquid level measurements and describe an application of each.

(10 min)

5. Name the three temperature scales and show an example of equivalence between the three.

(10 min)

6. Identify from the numbered samples on the lab bench the following items. Name the item, describe the theory of operation, and give a specific application: mercury thermometer, bimetalic thermometer, thermocouple, resistance bulb, pressure spring, radiation measuring.

(25 min)

EI 302

EXAMINATION 2 (SAMPLE)

(Closed Reference. Work numbers 6, 9, 10 and any five of the other problems)

1. Define potential energy and kinetic energy as it applies to flow measurement and contrast between the two.
(10 min)

2. Name three primary elements used to measure rate of flow and contrast the features of each.
(10 min)

3. Name two secondary elements used for measuring flow and contrast the features of each.
(10 min)

4. Discuss the measurement of total flow, mentioning positive displacement meters, magnetic flow meters and turbine meters. Contrast the characteristics of each.
(15 min)

5. Describe the theory of operation of a net oil computer.
(15 min)

6. Given an IP transmitter (10-50 ma in with 3-15 PSI out) convert a 15 ma input to the appropriate pressure output.
(5 min)

7. Calculate the resistance values of a wheatstone bridge for a +20 μa current value in the center arm.
(5 min)

8. List three precautions for using a VOM to measure DC volts, DC current and ohms. Demonstrate the use of the meter to measure each parameter to the instructor or lab assistant.
(15 min)

9. List the precautions for using a VTVM to measure volts and ohms. Demonstrate to the lab assistant or instructor the use of the meter to measure each parameter.
(15 min)

10. Demonstrate to the instructor or lab assistant the procedure for calibrating and using an oscilloscope to measure voltage.
(15 min)

EI 302

EXAMINATION 3 (SAMPLE)

(Closed Reference)

1. Discuss and contrast the measurements of: density, specific gravity, viscosity, acidity and alkalinity.
(15 min)

2. Draw an analog automatic control loop consisting of either electronic instruments, pneumatic instruments, or combinations. Describe the function of each instrument in the control loop.
(30 min)

3. Describe the control and transmission systems used for remote process loops that are pneumatic or electronic.
(20 min)

4. Discuss the operation of all elements of a control valve for either an air operated valve or an electrically operated valve.
(15 min)

COURSE: IP 301

COREQUISITE: TM 301

TITLE: Industrial Physics, Part I

DATE HOURS

I. Electricity and Magnetism 15.0
   A. Magnetism
   B. Induced voltage
   C. Lenz's and Faraday's Laws
   D. Direct and alternating current circuits
   E. Direct current motors and generators
   F. Squirrel cage A.C. motors and generators
   G. Transformers and transformer connections

II. Objectives Test, Student Evaluation, and Corrective Feedback 1.5

III. Mechanics 3.0
   A. Units of measurement
      1. Linear and circular
      2. Time
      3. Weight
      4. Mass
      5. Scientific notation
   B. Statics (forces and equilibrium) 8.5
      1. Use of vectors
      2. Torque
      3. Center of gravity
      4. Links & levels
      5. Flapper nozzles
      6. Force, moment, & motion balance machines
         a. Variable transmitter
         b. Motion or displacement transmitter
         c. Variable recorder
         d. Controller (proportional only)
         e. Actuator (with or without positioner)

IV. Objectives Test, Student Evaluation, and Corrective Feedback 1.5

V. Kinetics 9.0
   A. Velocity and acceleration
   B. Newton's Law
   C. Inclined planes
   D. Impulse and momentum

DATE			HOURS
____________	VI.	Objectives Test, Student Evaluation, and Corrective Feedback	1.5
	VII.	Introduction to Strength of Materials	2.0
____________		A. Stress and strain	
____________		B. Hooke's Law	
____________		C. Young's Modulus	
	VIII.	Introduction to Thermodynamics	4.5
____________		A. Temperature	
____________		B. Expansion of liquids, gases, and solids	
____________		C. Specific heat	
____________		D. Adiabatic process	
____________		E. Change of phase	
____________		F. Heat transfer	
____________	IX.	Objectives Test, Student Evaluation, and Corrective Feedback	1.5
		TOTAL HOURS	48.0

IP 301

OBJECTIVES

Using only paper and pencil, the students shall within ten minutes correctly give the law of magnetic poles and the laws for electrically induced voltage as described by Lenz and Faraday. The student shall list at least one application of each law in process measurement and control.

Using only paper and pencil, the students shall within five minutes correctly contrast between direct and alternating current circuits. Give the principal use of each in process measurement and control.

Using only paper and pencil, the students shall within fifteen minutes correctly distinguish between direct current motors and generators and A.C. motors and generators such as the squirrel cage.

Using only paper and pencil, the students shall within ten minutes correctly describe the theory of operation and the application of transformers to process measurement and control.

Examination 1.

Using only paper, pencil and slide rule, the student shall within ten minutes discuss typical process units of measurement, both linear and circular, in terms of frequency, time, weight, mass, degrees and radians. The students shall demonstrate the correct use of scientific notation in making conversions between units of measurement.

Using only paper, pencil and cut-away drawing, the student shall within fifteen minutes correctly classify a drawing of a variable transmitter as to feed forward and feed backward and as to force balance, moment balance or motion balance. The student will then correctly describe the theory of operation naming all portions of the instrument.

Using only paper, pencil and slide rule, the student shall within twenty-five minutes correctly use vectors to calculate five problems involving moments, forces, balances, torques, centers of gravity, links and levers.

Using only paper, pencil and appropriate cut-away drawing, the student shall within fifteen minutes identify a motion displacement transmitter drawing and classify it as to feed forward type or feed backward type and as to force balance, moment balance or motion balance. The student shall then describe the theory of operation naming the components contained in the transmitter.

Using only paper, pencil and appropriate cut-away drawing, the student shall within fifteen minutes correctly identify a variable recorder drawing and classify it as to feed forward or feedback and as to force balance, moment balance or motion balance. The student shall then describe the theory of operation naming all components.

Using only paper, pencil and appropriate cut-away drawing, the student shall within twenty minutes correctly identify a drawing of a proportional controller and classify it as to feed forward or feedback and as to force balance, moment balance or motion balance. The student shall describe the theory of operation naming all components contained.

Using only paper, pencil and appropriate cut-away drawing, the student shall within fifteen minutes correctly identify the cut-away drawing of an actuator with or without a positioner and shall classify it as to feed forward or feedback and as to force balance, moment balance or motion balance. The student shall describe the theory of operation naming all components contained.

Using only paper and pencil, the student shall within fifteen minutes correctly describe the action of a flapper-nozzle giving the accepted transmission tolerances in instrumentation.

Examination 2.

Using only paper and pencil, the student shall within five minutes correctly distinguish between velocity and acceleration.

Using only paper and pencil, the student shall within fifteen minutes correctly discuss Newton's laws for kinetic energy and mention the application of the laws to process measurement and control.

Using only paper and pencil, the student shall within fifteen minutes discuss the measurement and control of kinetic energy as it would relate to velocity and acceleration on flat or inclined planes. The student will relate this to impulse and momentum.

Using only paper and pencil, the student shall within fifteen minutes contrast between work and energy. Given input values by the instructor, he will calculate work and energy.

Using only paper, pencil and slide rule, the student shall within fifteen minutes calculate power and efficiency if given input values by the instructor.

Using only paper and pencil, the student shall within fifteen minutes correctly discuss the measurement and control of circular, rotational and harmonic motion machines.

Using only paper and pencil, the student shall within five minutes correctly discuss the distinction between centripetal and centrifugal forces and give examples of both.

Examination 3.

Using only paper and pencil, the student shall within fifteen minutes correctly discuss stress and strain. The student shall give an example of how it is monitored and how it is controlled. He shall relate this discussion to Hooke's law and Young's modulus.

Using only paper and pencil, the student shall within ten minutes discuss temperature and its relationship to the expansion of liquids, gases and solids.

Using only paper and pencil, the student shall within ten minutes correctly define specific heat and mention an example of its monitoring and control.

Using only paper and pencil, the student shall within fifteen minutes discuss and adiabatic process. The change of phase and heat transfer will be used in the discussion.

Using only paper, pencil, and slide rule, the student shall work two hours of problems most frequently missed on the first three examinations.

Final Examination

IP 301

EXAMINATION 1 (SAMPLE)

(Closed Reference)

1. Give the law of magnetic poles and the laws for electrically induced voltage as described by Lenz and Faraday. List at least one application of each law in process measurement and control.

(10 min)

2. Contrast between direct and alternating current circuits. Give the principal use of each in process measurement and control.

(5 min)

3. Distinguish between direct current motors and generators and A.C. motors and generators such as the squirrel cage.

(15 min)

4. Describe the theory of operation and the applications of transformers to process measurement and control.

(10 min)

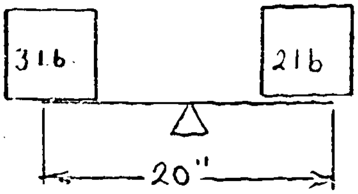
IP 301

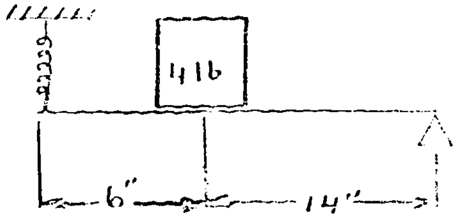
EXAMINATION 2 (SAMPLE)

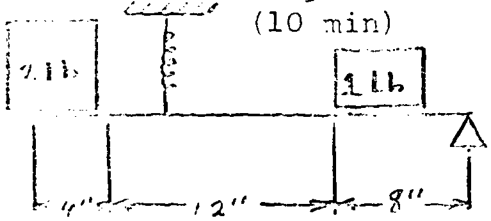
(Closed Reference. Work any six problems)

1. Discuss process units of measurement, both linear and circular, in terms of frequency, time, weight, mass, degrees and radians. Give an example of the use of scientific notation in making conversions between units of measurement of radians, degrees and seconds for a 4 K Hz. waveform.
(10 min)

2. Use vectors to calculate the forces in the balanced systems.
(10 min)







3. Classify the attached drawing of a variable transmitter as to feed forward or feedback and as to force balance, moment balance or motion balance. Describe the theory of operation naming all portions of the instrument.
(15 min)

4. Identify the attached motion displacement transmitter drawing and classify it as to feed forward type or feed backward type and as to force balance, moment balance or motion balance. Describe the theory of operation naming the components contained in the transmitter.
(15 min)

5. Identify the attached variable recorder drawing and classify it as to feed forward or feedback and as to force balance, moment balance or motion balance. Describe the theory of operation naming all components.
(15 min)

6. Identify the attached drawing of a proportional controller and classify it as to feed forward or feedback and as to force balance, moment balance or motion balance. Describe the theory of operation naming all components contained.
(20 min)

7. Identify the attached cut-away drawing of an actuator and classify it as to feed forward or feedback and as to force balance, moment balance or motion balance. Describe the theory of operation naming all components contained.
(15 min)

8. Describe the action of a flapper nozzle giving the accepted transmission tolerances in instrumentation.
(15 min)

IP 301

EXAMINATION 3 (SAMPLE)

(Closed Reference)

1. Distinguish between velocity and acceleration. (5 min)

2. Discuss Newton's laws for kinetic energy and mention the application of the laws to process measurement and control. (15 min)

3. Discuss the measurement and control of kinetic energy as it would relate to velocity and acceleration on flat or inclined planes. Relate this to impulse and momentum. (15 min)

4. Contrast between work and energy. Given a fifty pound weight to be moved six feet up a forty degree ramp within sixty seconds, calculate work and energy. (15 min)

5. Calculate power and efficiency if a transformer primary has 156 volts at 2 amps and the secondary has 12 volts at 25 amps. (15 min)

6. Discuss the measurement and control of circular, rotational and harmonic motion machines. (15 min)

7. Discuss the distinction between centripetal and centrifugal forces. Give an example of each. (5 min)

IP 301

FINAL EXAMINATION (SAMPLE)

(Closed Reference)

1. Discuss stress and strain; how it is monitored; how it is controlled. Relate this discussion to Hooke's law and Young's modulus.

(15 min)

2. Discuss temperature and its relationship to the expansion of liquids, gases, and solids.

(10 min)

3. Define specific heat and mention an example of its monitoring and control.

(10 min)

4. Discuss an adiabatic process and bring the change of phase and heat transfer into the discussion.

(15 min)

Problems most frequently missed on examinations 1, 2 & 3.
(2 hours)

COURSE: TM 301

TITLE: Basic Technical Mathematics, Part 1

DATE HOURS

- I. Scientific Notation and Significant Figures 1.5
  - A. Converting whole numbers to scientific notation (T, G, M, K, 18^{o}, m, μ, n, p)
  - B. Converting scientific notation to whole numbers
- II. Slide Rule 4.5
  - A. Locating Numbers on the C, Cl, and D Scales
  - B. Multiplying
  - C. Division
- III. Fundamental Algebraic Concepts and Operations 7.5
  - A. Numbers
    - 1. Written in explicit and literal form
    - 2. Real numbers
      - a. Rational
      - b. Irrational
    - 3. Imaginary numbers
    - 4. Complex numbers
  - B. Absolute numerical values
  - C. Addition of algebraic expressions
  - D. Subtraction of algebraic expressions
  - E. Multiplication of algebraic expressions
  - F. Division of algebraic expressions
  - G. Exponents
  - H. Symbols of grouping
- IV. Objectives Test, Student Evaluations, and Corrective Feedback 1.5
- V. Linear Equations 8.0
  - A. Solution of linear equations in one unknown
  - B. Solution of formulas with multiple unknowns
  - C. Factoring

TM 301

DATE			HOURS
________	VI.	Functions and Graphs of Linear Equations	3.0
	VII.	Systems of Linear Equations	6.5
________		A. Graphic [illegible]nalysis	
________		B. [illegible]ysis	
________	VIII.	Objectives Test, Student Evaluation, and Corrective Feedback	1.5
________	IX.	Quadratic Equations	3.0
	X.	Functions of a right triangle	7.5
________		A. Sine, Cosine, Tangent 1. Trig tables 2. Slide rule	
________		B. Solution with a given side and an angle	
________		C. Solution with two given sides	
	XI.	Graphs of Trigonometric Functions	2.0
________		A. Graph of $V_p \sin \omega T$ and $V_p \sin (\omega T + \emptyset)$	
________		B. Graph of $V_p \cos \omega T$ and $V_p \cos (\omega T + \emptyset)$	
________	XII.	Objectives Test, Student Evaluation, and Corrective Feedback	1.5
		TOTAL HOURS	48.0

TM 301

OBJECTIVES

Using only paper and pencil, the student shall within five minutes correctly define terra, giga, mega, kilo, milli, micro, nano, and pica; and give an example of the use of each to abbreviate a numerical expression.

Using only paper, pencil, and slide rule, the student shall within ten minutes correctly work fifteen of twenty problems involving two or three numbers to be multiplied or divided in any sequence.

Using only paper, pencil, and slide rule, the student shall within twenty minutes correctly define and give an example of: character set for radix 10, explicit, literal, real numbers, imaginary numbers, complex numbers, rational numbers, irrational numbers, absolute value, scalar, vector, term, coefficient, base, exponent, degree of a term, algebraic expression equation, degree of an equation, "peak" points for an equation, "zero" crossings for an equation.

Using only paper, pencil, and slide rule, the student shall within ten minutes correctly work eight of ten problems in addition or subtraction of algebraic expressions.

Using only paper, pencil, and slide rule, the student shall within fifteen minutes correctly work eight of ten problems in multiplication or division of algebraic expressions.

Using only paper, pencil, and slide rule, the student shall within ten minutes correctly work five of seven problems in exponent manipulation or in removing or inserting symbols of grouping in algebraic expressions.

Examination 1.

Using only paper, pencil, and slide rule, the student shall within seven minutes correctly list and give an example of five steps that will solve any linear equation.

Using only paper, pencil, and slide rule, the student shall within 23 minutes correctly solve eight of ten linear equations requiring a five step solution.

Using only paper, pencil, and slide rule, the student shall within two minutes correctly define and give examples of slope (first derivative) and intercept of a linear equation.

Using only paper, pencil, and slide rule, the student shall within eight minutes correctly plot, using the slope and intercept, three linear equations. The student shall find by substitution three other points on the line besides the intercept.

Using only paper, pencil, and slide rule, the student shall within five minutes correctly solve by graphical analysis a problem involving two equations in two unknowns.

Using only paper, pencil, and slide rule, the student shall within 30 minutes correctly solve at least one of two systems of three equations and three unknowns by the determinant method for Δ, X, Y, & Z.

Examination 2.

Using only paper, pencil, and slide rule, the student shall within twenty minutes record the quadratic formula and use it to correctly solve and graph four of five quadratic equations.

Using only paper, pencil, and slide rule, the student shall within ten minutes correctly define and give an example of: angle, side opposite an angle, side adjacent to an angle, right triangle, hypotenuse sine of an angle, cosine of an angle, tangent of an angle. Pythagorean theorem.

Using only paper, pencil, and slide rule, the student shall within twenty minutes correctly solve four right triangles given a side and an angle in radians or degrees and three right triangles given two sides.

Using only paper, pencil, and slide rule, the student shall within ten minutes correctly draw and label with respect to voltage, degrees, radians, frequency, period, and time a given expression for (one cycle of) $V_p \sin(\omega T + \phi)$

Using only paper, pencil, and slide rule, the student shall within two hours correctly work 80% of a series of problems taken from examinations 1 and 2.

Final examination.

EXAMINATION 1 (SAMPLE)

(Closed Book, Closed Note, Slide Rules Allowed)

1. Define and give an example of: terra, giga, kilo, nano, micro, migra, pica, milli.

(5 min)

2. Use the slide rule to obtain:

35 x 47 =
22 x 34 =
64 x 5.8 =
9.1 x 3.2 =
490 x 250 =

350 ÷ 4.2 =
630 ÷ .75 =
246 x 322 =
458 x 791 =
6,550 x 2.87 =

64 ÷ 21 =
57 ÷ 32 =
86 ÷ 29 =
37 ÷ 58 =
12 ÷ 69 =

25 x 38 x 64 =
42 x 75 x 14 =
(64 x 12) ÷ 5.6 =
(32 x 4.8) ÷ 17 =
(756 - 3.2) ÷ 25 =

(10 min)

3. Define and give an example of:

Character set for radix 10
explicit
literal
real numbers
imaginary numbers
complex numbers
rational numbers
irrational numbers
absolute value
scalar

vector
term
coefficient
base
exponent
degree of a term
algebraic expression
equation
degree of an equation
Number of "Peak" and "Zero Crossings" for an equation

(20 min)

(For Problems 4, 5, 6)

Given: $a = 2XY + 3X^2 - 4X + 5$
$b = 4XY + 5X - Y^2 + 2$
$c = 3XY + 5X^2 + Y^2 + 3$
$d = 3Y^2 + 2X^2 - 4XY + 5X - 2$
$e = 2X + 3$

$f = 4X - 1$
$g = 3Y + 2$
$h = -6Y - 1$
$i = 2X(X + 3Y) - 5$
$j = \{(X + 2)\ (2Y - 1) + 4[(X - 2)^2 - 1]\}$

4. $e + f =$
$g + h =$
$a + b =$
$c + d =$
$a + d =$

$e - f =$
$g - h =$
$a - b =$
$c - d =$
$a - d =$

(10 min)

5. $e \times f =$
$g \times h =$
$a \times f =$
$g \times b =$
$e \times f \times g =$

$a \div e =$
$a \div f =$
$b \div g =$
$b \div g =$
$d \div g =$

(15 min)

6. $e^2 =$
$g^2 =$
$f^2 =$
$h^3 =$

Remove symbols of grouping and simplify i.
" " " " " " j.
" " " " " " k.

(10 min)

<u>NOTE</u>: If a student fails any of the problems on the test, he can still receive credit for the problem by correctly completing and handing in a homework set assigned by the instructor to correct the deficiency.

TM 301

EXAMINATION 2 (SAMPLE)

(Closed Book, Closed Note, Slide Rule Allowed)

1. List and give an example of each of the five steps that can be used to solve any linear equation. (7 min)

2. $$\frac{3(2X - 1)}{4} = \frac{5(3X + 2)}{6}$$

$$\frac{3(2X - 1)}{4} + \frac{2(X - 2)}{3} = \frac{5(3X + 2)}{6}$$

$$\frac{3(2X - 1)}{4} - \frac{2(X - 2)}{3} = \frac{5(3X + 2)}{6}$$

$$\frac{3(2X - 1)}{4} - \frac{2X - 2}{3} = \frac{5(3X + 2)}{6}$$

$$\frac{2(3X - 1)}{3} - \frac{2(2X - 1)}{5} = \frac{3X - 1}{15} + \frac{2(X + 1)}{5}$$

$$\frac{2(3X - 1)}{3} - \frac{2(2X - 1)}{5} = \frac{3(X - 1)}{15} + \frac{2(X + 1)}{5}$$

$$\frac{2(3X - 1)}{3} - \frac{2(2X - 1)}{5} = \frac{3(X - 1)}{15} - \frac{2X + 1}{5}$$

$$\frac{2X}{3} + \frac{3(X + 1)}{4} - \frac{X + 5}{6} = \frac{2(X - 1)}{3} + 2X + 1/3$$

$$\frac{2X}{3} + \frac{3X + 1}{4} - \frac{X + 5}{6} = \frac{2X - 1}{3} = 2X - 1/4$$

$$\frac{2(X + 1)}{3} - \frac{3(X + 2)}{4} = \frac{4X}{3} - 3(X - 2) + 1/3 - 1/2$$ (23 min)

3. Define and give an example of the slope (first derivative) and intercept of a linear equation. (2 min)

4. Plot the following equations. By substitution, solve for three points on the line plus the intercept.
$Y = 2X - 1$
$Y = 2X + 1$
$Y = -2X + 1$
(8 min)

5. Solve graphically: $Y = 2X + 1$
$Y = -2X + 5$

(5 min)

6. Solve by determinants: $2X + Y - 2Z = -3$
$X + 2Y + Z = 4$
$3X - Y - 2Z = -5$

$X + 2Y + Z = 4$
$3X + Y + Z = 7$
$2X + 3Z = 4$

(30 min)

TM 301

FINAL EXAMINATION (SAMPLE)

(Closed Book, Closed Note, Slide Rule Allowed)

1. Record the quadratic formula and apply it to solve each of the following problems:

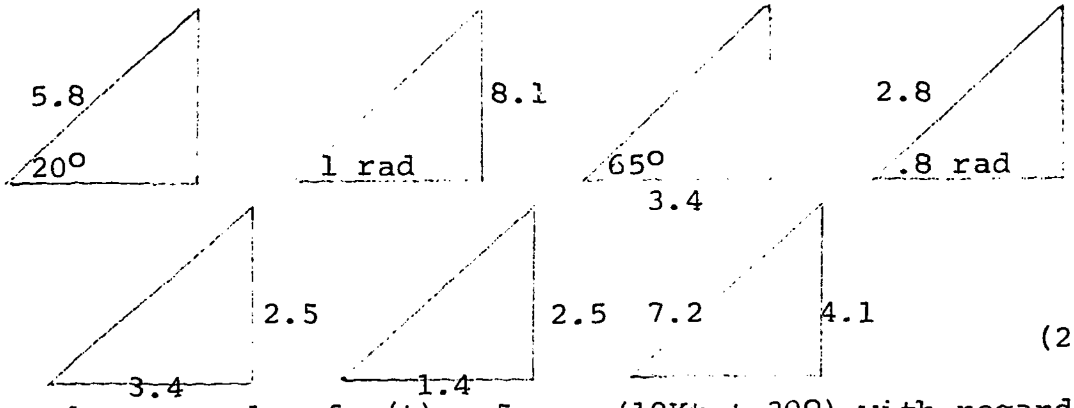
$$y = X^2 - X - 2$$
$$Y = X^2 + 3X + 2$$
$$Y = X^2 - 3X + 2$$
$$Y = 4X^2 + 6X - 18$$
$$Y = 4X^2 + 4X - 24$$

(20 min)

2. Correctly define and give an example of: angle, right triangle, side opposite an angle, side adjacent an angle, hypotenuese, sine of an angle, cosine of an angle Pythagorean Theorem.

(10 min)

3. Solve the following triangle for all unknown sides and angles:



(20 min)

4. Graph one cycle of $v(t) = 5 \cos (10Kt + 30^\circ)$ with regard to voltage, frequency, period, degrees, radians, and time.

(10 min)

5. Problems to be selected from Examinations 1 and 2.

(2 hrs)

COURSE: TRW 301

TITLE: Technical Report Writing

DATE HOURS

I. Introduction to Technical Reports 1.5
- ________ A. What they are
- ________ B. Who writes them
- ________ C. Who uses them

II. Summary of Basic Principles 3.0
- ________ A. Fog index
  - 1. What it is
  - 2. How to calculate it
  - 3. How to use it
- ________ B. Reader analysis
- ________ C. Convergent writing
- ________ D. Language to express rather than impress
- ________ E. "Tell the reader what you're going to tell him. Tell him. Tell him what you've told him."
- ________ F. Attractive reports

III. Definitions 1.5
- ________ A. What to define
- ________ B. How to define it
- ________ C. Where to define it

IV. Description of a Mechanism 3.0
- ________ A. Introduction
- ________ B. Principal steps
- ________ C. Conclusion

V. Description of a Process 3.0
- ________ A. Introduction
- ________ B. Principal steps
- ________ C. Conclusion

VI. Classification, Partition, and Interpretation 1.5
- ________ A. What they are
- ________ B. How to do them
- ________ C. Where to do them

DATE			HOURS
	VII.	Laboratory Reports	3.0
		A. Introduction	
		B. Principal steps	
		C. Conclusion	
		D. Practice	
	VIII.	Objectives Test, Student Evaluation and Corrective Feedback	1.5
	IX.	The Library Research Report	3.0
		A. Finding published information	
		B. Writing the report	
		C. Content	
	X.	Report Layout	1.5
		A. Format	
		B. Graphic Aids	
	XI.	Transitions, Introductions, Conclusions and Summaries	3.0
	XII.	Progress Reports	1.5
	XIII.	Recommendation Reports	1.5
	XIV.	Proposals	1.5
	XV.	Business Letters	3.0
	XVI.	Journal Articles	1.5
		A. How to write them	
		B. How to review them	
	XVII.	Objectives Test, Student Evaluation and Corrective Feedback	1.5
	XVIII.	Oral Reports	3.0
		A. Making a speech	
		B. Conferences	
		C. Conducting Business meetings	
	XIX.	Writing and Speaking Clinic	7.5
	XX.	Objectives Test, Student Evaluation and Corrective Feedback	1.5
		TOTAL HOURS	48.0

TRW 301

OBJECTIVES

Using only paper and pencil, the student shall within ten minutes define "technical reports". He shall tell what they are, who writes them, and who uses them.

Using only paper and pencil, the student shall within ten minutes list and explain the six basic principles of technical report writing as discussed in class. At the conclusion of his answer the student shall demonstrate the correct technique for calculating his own fog index.

Using only paper and pencil, the student shall within ten minutes discuss definitions in technical reports. He shall explain what to define, how to define, and where to define.

Using only paper and pencil, the student shall within twenty minutes list the principal steps for the description of a mechanism. The student shall if given a subject by the instructor illustrate the proper techniques of describing the mechanism.

Using only paper and pencil, the student shall within twenty minutes list the principal steps in the description of a process. Given a process by the instructor the student shall illustrate the correct description techniques.

Using only paper and pencil, the student shall within five minutes discuss classification, partition and interpretation. He shall explain what they are, how to do them, and where to do them.

Using only paper and pencil, the student shall within fifteen minutes list the principal steps in writing a laboratory report. Given a collection of data by the instructor, the student shall illustrate the proper technique in preparing a lab report.

Examination 1.

Using only paper, pencil, and the library, the student shall within twelve hours compile a library research report on a topic in his technical speciality. He shall demonstrate the correct techniques for finding published information and writing the report. He shall also demonstrate the correct techniques for format and graphic aids. The report will serve as examination 3 and will be due the last day of class.

TRW 301

Using only paper and pencil, the student shall within fifteen minutes define and discuss transistions, introductions, conclusions and summaries.

Using only paper and pencil, the student shall within twenty minutes list the principal steps in writing a progress report. The student shall write a sample progress report.

Using only paper and pencil, the student shall within twenty minutes list the principal steps in writing a recommendation report. The student shall write a sample recommendation report.

Using only paper and pencil, the student shall within twenty minutes list the principal steps in writing proposals. The student shall write an example of a proposal.

Using only paper and pencil, the student shall within twenty minutes list the principal steps in writing business letters. The student shall write an example of a business letter.

Using only paper and pencil, the student shall within ten minutes discuss journal articles. The student shall tell how to write them and how to review them. The student shall show the correct procedures in reviewing three articles in his field of technical interest.

Examination 2.

Using only paper and pencil, the student shall within thirty minutes list the principal steps in making oral reports. The student shall prepare and deliver to the class an oral report.

Using paper, pencil, the instructor and the class, the student shall within seven and one-half hours help conduct and participate in a writing and speaking clinic intended to improve the quality of the technical reports generated by the group.

Examination 3. (Library Research Report due)

TRW 301

EXAMINATION 1 (SAMPLE)

(Dictionary allowed)

1. Define "technical reports" telling what they are, who writes them and who uses them.

   (10 min)

2. List and explain the six basic principles of technical report writing as discussed in class. Use your answer to demonstrate the technique for calculating a fog index.

   (10 min)

3. Discuss definitions in technical reports. Explain what to define, how to define, and where to define.

   (10 min)

4. List the principal steps for the description of a mechanism. Use a pair of scissors to illustrate the proper technique of describing the mechanism.

   (20 min)

5. List the principal steps in the description of a process. Use the process of mixing your favorite drink (malt, soda, etc.) to illustrate the correct description techniques.

   (20 min)

6. Discuss classification, partition and interpretation. Explain what they are, how to do them, and where to do them.

   (5 min)

7. List the principal steps in writing a laboratory report. Use the collection of data on the blackboard to illustrate the proper technique in preparing a lab report.

   (15 min)

TRW 301

EXAMINATION 2 (SAMPLE)

(Dictionary allowed. The student may omit one problem chosen from number 3, 4 or 5.)

1. Compile a library research report on a topic in the technical speciality of your choice. Demonstrate the correct techniques for finding published information and writing the report. Demonstrate the correct techniques for format and graphic data. (The report will serve as examination 3 and will be due the last day of class)
(12 hours)

2. Define and discuss transistions, introductions, conclusions and summaries.
(15 min)

3. List the principal steps in writing a progress report. Write a sample progress report.
(20 min)

4. List the principal steps in writing a recommendation report. Write a sample recommendation report.
(20 min)

5. List the principal steps in writing proposals. Write an example of a proposal.
(20 min)

6. List the principal steps in writing business letters. Write an example of a business letter.
(20 min)

7. Discuss journal articles. Tell how to write them, how to review them, and show the correct procedures in reviewing three articles in your field of technical interest. These three articles are due two weeks from today.
(10 min)

TRW 301

EXAMINATION 3 (SAMPLE)

(Closed Reference)

1. List the principal steps in making oral reports. Prepare and deliver to the class an oral report.

   (30 min)

2. Turn in your library research report.

COURSE: EI 403

TITLE: Alternating Current Theory

PREREQUISITE: TM 301 and EI 401

COREQUISITE: TM 302

DATE		HOURS
	I. Inductance	9.0
	A. Theory of Inductance and Electro Magnetism	
	B. RL time constants	
	C. Application of pulsating D.C. waveform to RL circuits	
	II. Alternating Voltages of the Form $V_p \sin (WT + \phi)$	6.0
	A. Peak voltage, frequency, period, & phaseshift	
	B. Effective and average values	
	III. Complex Algebra	9.0
	A. Phasors, vectors, and scalors	
	B. Rectangular form	
	C. Polar form	
	D. Exponential form	
	IV. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	V. RL Series Circuit Analysis	9.0
	VI. RC Series Circuit Analysis	9.0
	VII. RL Parallel	6.0
	VIII. RC Parallel Circuit Analysis	6.0
	IX. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	X. RLC Series Circuit Analysis	6.0
	XI. RLC Parallel Circuit Analysis	6.0
	XII. Multisource Combinational RLC Circuits	3.0

DATE			HOURS
	XIII.	Transformers and Magnetic Flow Transmitters	6.0
	XIV.	Filters	6.0
	XV.	Polyphase Systems	6.0
		A. Balanced	
		B. Unbalanced	
	XVI.	Objective Test, Student Evaluation, and Corrective Feedback	3.0
			96.0 HR

EI 403

OBJECTIVES

Using only paper, pencil, slide rule, component demonstrator board and one page of instructor approved notes, the student shall within forty minutes if given values for R, L, and an applied rectangular voltage correctly calculate, connect and demonstrate to the instructor or lab assistant values for V_1, V_1', V_2, V_2'.

Using only paper, pencil and slide rule, the student shall within twenty minutes if given an alternating voltage waveform on a graph or an oscilloscope calculate the peak voltage, frequency, period, phaseshift, effective and average values for a waveform VP sin (WT + Ø).

Using only paper, pencil and slide rule, the student shall within forty minutes if given any phasor, vector, or scalor in rectangular, polar, or exponential form correctly convert ten such numbers to the other two equivalent forms.

Examination 1.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within twenty minutes correctly analyze any two RL series schematics given him by the instructor. He shall calculate all values of voltage, current and impedance and shall demonstrate the measurement of the values to the instructor or lab assistant.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within fifteen minutes correctly make a binary trouble-shooting diagram for any problem given by the instructor on an RL series circuit.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within twenty minutes correctly calculate all voltages, currents and impedances for any two schematics given him by the instructor of an RC series circuit. The student shall then connect the circuits and verify his calculations.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within fifteen minutes correctly make a binary trouble-shooting diagram for an RC series circuit given him by the instructor with an indicated circuit malfunction.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within twenty minutes correctly calculate all voltages, currents, and impedances for any two RL parallel circuit schematics given him by the instructor. The student will then connect the circuits and verify his results for the instructor or lab assistant.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within fifteen minutes correctly make a binary trouble-shooting diagram for any RL parallel circuit given him by the instructor with an indicated malfunction.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within twenty minutes correctly calculate all voltages, currents, and impedances for any two RC parallel circuit schematics given him by the instructor. The student shall verify his calculations by connecting the circuits and demonstrating them to the instructor or lab assistant.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within fifteen minutes make a binary trouble-shooting diagram for any RC parallel circuit given by the instructor with an indicated malfunction.

Examination 2.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within twenty minutes correctly calculate all voltages, currents and impedances for any RLC series circuit schematic furnished by the instructor. The student shall connect the circuit and verify his calculations.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within fifteen minutes correctly make a binary trouble-shooting diagram for any RLC series circuit schematic furnished by the instructor with an indicated malfunction.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within twenty minutes correctly calculate all voltages, currents, and impedances for any RLC parallel circuit furnished by the instructor. The student shall connect the circuit and verify his results.

EI 203

Using only paper, pencil, slide rule, component board and test equipment, the student shall within fifteen minutes correctly make a binary trouble-shooting diagram for any RLC parallel circuit schematic with an indicated malfunction.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within fifteen minutes correctly form a binary trouble-shooting diagram for any RLC series-parallel circuit schematic with an indicated malfunction.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within thirty minutes correctly calculate all voltages, currents, and impedances in a multisource combinational RLC circuit. The student shall connect the circuit and verify his results.

Using only paper, pencil, slide rule, component demonstrator board, and test equipment, the student shall within twenty minutes calculate the voltages, currents and impedances for a transformer schematic furnished by the instructor. The student will connect the circuit and verify his calculations. The student will write a brief discussion of the theory of operation and application of transformers in process transmitters.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within thirty minutes calculate the values for a highpass, lowpass and notch filter to meet the specifications given by the instructor. The student shall connect the circuit and verify the results.

Using only paper, pencil, and slide rule, the student shall within five minutes discuss balanced versus unbalanced polyphase systems giving specific examples of the applications of each.

Final Examination

EI 403

EXAMINATION 1 (SAMPLE)

(One page of instructor approved notes allowed on V_1, V_1', V_2, V_2')

1. Given: Series circuit, R = 10K, L = 10h, $\Delta V = 5$, Ton = $300 \mu S$, T off = $700 \mu S$
   Find: V_1, V_1', V_2, V_2'. Connect the circuit and demonstrate to the instructor or lab assistant.

   (40 min)

2. Plot: $4 \sin (6280t + 30^\circ)$
   Give average and effective values.

   (20 min)

3. Convert the following numbers from rectangular format to polar format or vice versa.

   a. $75 \angle 20^\circ$
   b. $64 \angle 34^\circ$
   c. $19 \angle -48^\circ$
   d. $12 \angle -63^\circ$
   e. $45 + J34$
   f. $62 + J51$
   g. $56 - J56$
   h. $32 + J48$
   i. $9 + J11$
   j. $45 - J62$

   (40 min)

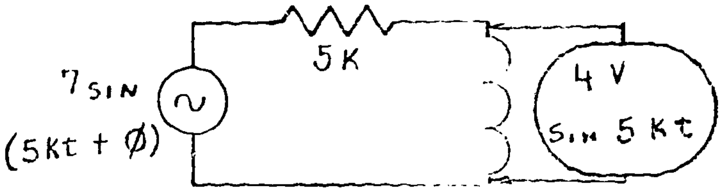
EI 403

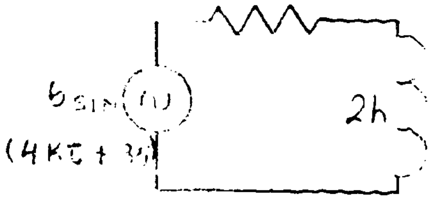
EXAMINATION 2 (SAMPLE)

(Closed Reference)

1. Calculate all unknown values of components, voltages, current, impedance, phase angles, frequency, and power. Connect the circuits and demonstrate the measurement of voltages and phase angles to the instructor or lab assistant.

(20 min)



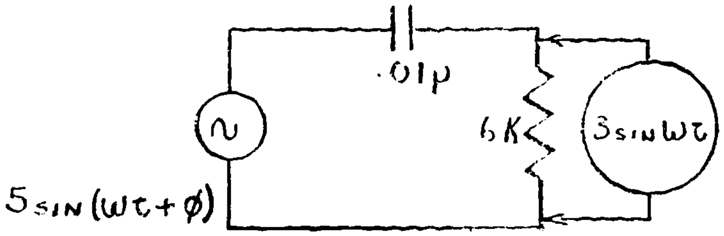


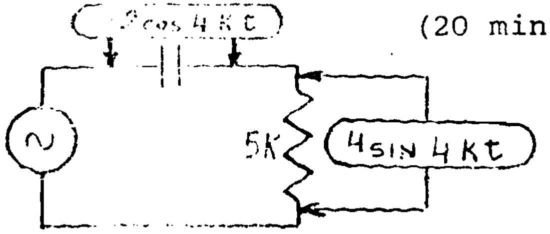
2. If the inductor in problem 1 had 0 volts across it, make a a binary trouble-shooting diagram to isolate and solve the problem.

(15 min)

3. Calculate all unknown values of components, voltages, current, impedance, phase angles, frequency, and power. Connect the circuits and demonstrate the measurement of voltages and phase angles to the instructor or lab assistant.

(20 min)



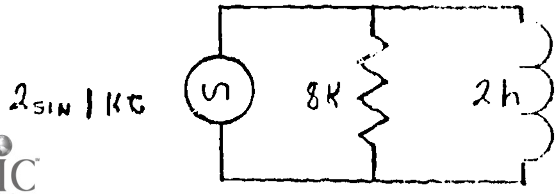


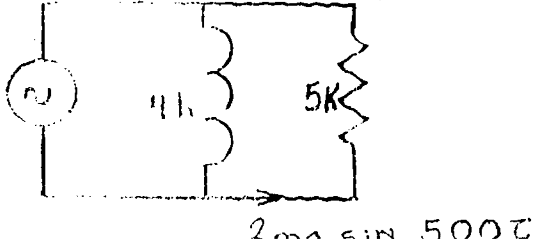
4. If the capacitor in problem 3 had the full applied voltage across it, make a binary trouble-shooting diagram to isolate and solve the problem.

(15 min)

5. Calculate all unknown values of components, voltages, current, impedance, phase angles, frequency, and power. Connect the circuits and demonstrate the measurement of voltages and phase angles to the instructor or lab assistant.

(20 min)



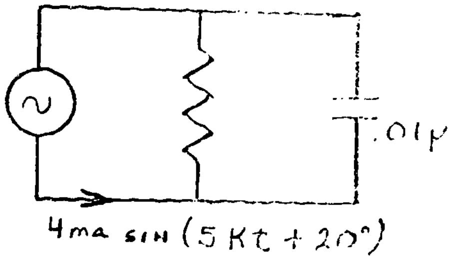


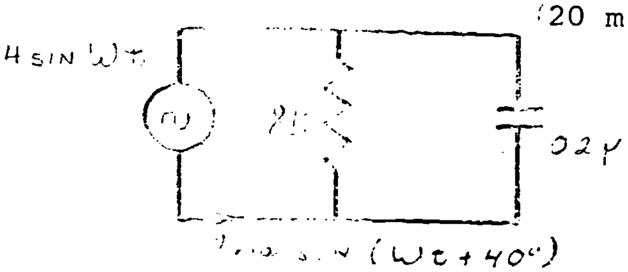
6. If the voltage applied in problem 5 dropped to half value, make a binary trouble-shooting diagram to isolate and solve the problem.

(15 min)

7. Calculate all unknown values of components, voltages, current, impedance, phase angles, frequency, and power. Connect the circuits and demonstrate the measurement of voltages and phase angles to the instructor or lab assistant.

(20 min)





8. If the resistor in problem 7 is operating too hot, make a binary trouble-shooting diagram to isolate and solve the problem.

(15 min)

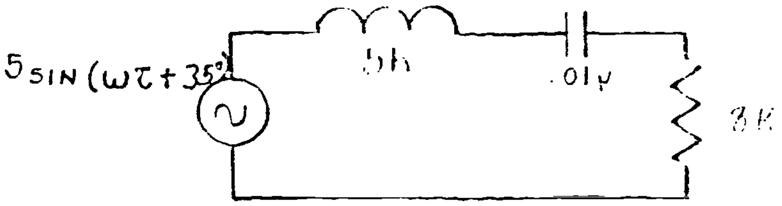
EI 403

EXAMINATION 3 (SAMPLE)

(Closed Reference)

1. Calculate all unknown values of components, voltages, current, impedance, phase angles, frequency, and power. Connect the circuits and demonstrate the measurement of voltages and phase angles to the instructor or lab assistant.

(20 min)

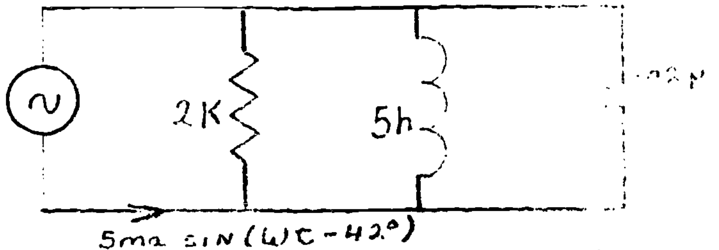


2. If the voltage across the resistor in problem 1 reads full applied voltage, make a binary trouble-shooting diagram to isolate and solve the problem.

(15 min)

3. Calculate all unknown values of components, voltages, current, impedance, phase angles, frequency, and power. Connect the circuits and demonstrate the measurement of voltages and phase angles to the instructor or lab assistant.

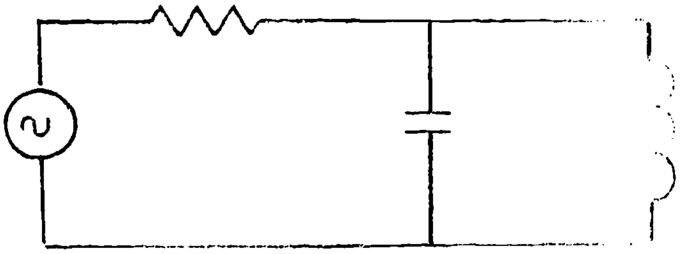
(20 min)



4. If the current in problem 3 should increase to 6 ma, make a binary trouble-shooting diagram to isolate and solve the problem.

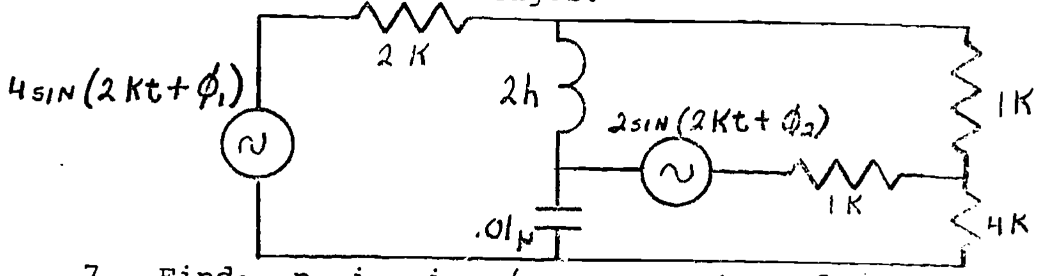
(15 min)

5. If the voltage across the resistor in the circuit below should increase to full applied voltage, make a binary trouble-shooting diagram to isolate and solve the problem.



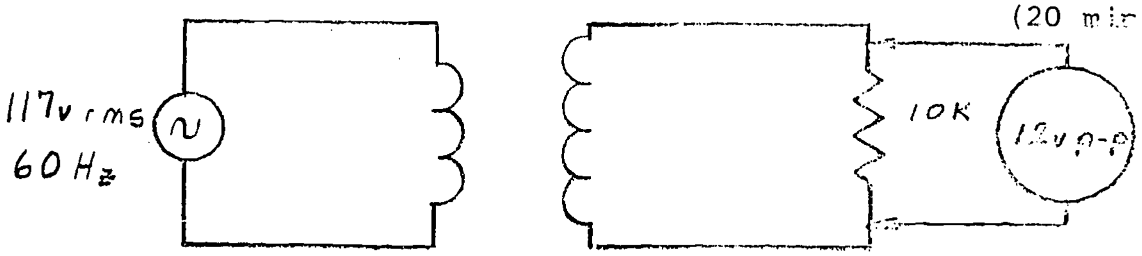
6. Calculate all voltages.

(30 min)



7. Find: n, i_p, i_s (assume no transformer losses)

(20 min)



8. a) Calculate the values for a filter that will pass all frequencies above 10 HZ.
   b) Calculate the values for a filter that will pass all frequencies below 100 HZ.
   c) Calculate the values for a filter that will notch 50 HZ to 70 HZ.

Connect the circuits and demonstrate to the instructor or lab assistant.

(30 min)

9. Discuss the distinguishing features of balanced versus unbalanced polyphase systems. Give a specific example of the application of each.

COURSE: EI 404

TITLE: Solid State Devices

PREREQUISITE: EI401, TM301

COREQUISITE: TM302

DATE [illegible]

____________ I. Entry Skills Test, Pretest over Course Objectives & Course Orientation 2.

II. Device Physics 10.
- ____________ A. Intrinsic semiconductor
- ____________ B. Doping
- ____________ C. Extrinsic semiconductor
  1. N type material
  2. P type material

III. P-N Junction 15.
- ____________ A. Diode
- ____________ B. Diode specifications
  1. Forward Bias
  2. Reverse Bias
- ____________ C. Zeners
- ____________ D. Temperature compensated zeners
- ____________ E. Photovoltaic cells
- ____________ F. Tunnel Diodes
- ____________ G. Light emitting diodes

____________ IV. Objectives Test, Student Evaluation, and Corrective Feedback 3.0

V. Transistors 16.0
- ____________ A. Construction
- ____________ B. Configurations
  1. Common base
  2. Common emitter
  3. Common collector
- ____________ C. Specifications
  1. Reading spec sheets
  2. Reading curve tracer
  3. H parameters
- ____________ D. Checking transistors
  1. Ohm meter
  2. Volt meter
  3. Oscilloscope

DATE			HOURS
______	VI.	Unijunctions	3.0
______	VII.	Field Effect and Mosfet Transistors	6.0
______	VIII.	Silicon Control Rectifiers and Triacs	5.0
______	IX.	Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	X.	Microelectronics	18.0
______		A. Construction	
______		B. Non-linear IC's	
______		C. Linear IC's	
		1. Op amp characteristics	
		2. Operational amplifier circuits	
		(a) Adder	
		(b) Integrator	
		(c) Differentiator	
	XI.	Vacuum Tubes	12.0
______		A. Cathode ray tube	
______		B. Nixie	
______		C. Neon	
______		D. Laser	
______	XII.	Objectives Test, Student Evaluation, and Corrective Feedback	3.0
		TOTAL HOURS	96.0

EI 404

OBJECTIVES

Using only paper and pencil, the student shall within twenty minutes correctly discuss the formation of extrinsic semiconductors from intrinsic. He shall mention the doping process as it is used in forming both N and P-type materials. He should mention specifically those items in columns 3, 4, and 5 of the periodic table that are used in the manufacturing process.

Using only paper, pencil and slide rule, the student shall within twenty minutes correctly describe the formation of a P-N junction and the forward and reverse bias characteristics of this junction. The student shall draw the schematic for the forward bias and the reverse bias diode circuit. He shall make all appropriate calculations and verify the calculations by connecting the circuit.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within twenty minutes discuss the theory of operation and the application of zener and temperature compensated zener circuits. The student shall verify his statements by connecting a working zener circuit according to the specifications given by the instructor.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall discuss within thirty minutes the theory of operation of photovoltaic cells, tunnel diodes and light emitting diodes. He shall draw the correct schematic that would operate each, emphasising the theory of operation and the application. The student shall connect any three circuits and verify his statements.

Examination 1.

Using only paper, pencil and slide rule, the student shall within twenty minutes correctly discuss the construction of NPN and PNP transistors. He shall mention the biasing configurations necessary for operation in the linear saturation or cut-off regions.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within thirty minutes correctly distinguish between the characteristics of biasing, gain and phase between the common base, common emitter and common collector configurations. The student shall draw and construct a dual supply common emitter and a common collector amplifier.

Using only paper, pencil and slide rule, the student shall within fifteen minutes if given a specification sheet from a major solid state manufacturer be able to identify and explain each specification on the sheet.

Using only paper, pencil and slide rule, the student shall within fifteen minutes if given a picture from a transistor curve tracer and all scope settings, be able to derive the h parameters from the curves.

Using only paper and pencil, the student shall within ten minutes correctly list all twelve h parameters.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within twenty minutes correctly discuss checking transistors in circuits with the use of ohm meters, volt meters and scopes. The student shall demonstrate to the instructor or lab assistant.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within twenty minutes correctly describe the theory of operation of unijunctions and name at least one specific application. The student shall then connect a unijunction timer and demonstrate to the lab assistant or instructor.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within twenty minutes correctly describe the theory of operation and application of field effect and mosfet transistors. The student shall draw a circuit of a field effect amplifier or mosfet amplifier and shall connect and demonstrate to the instructor or lab assistant.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within twenty minutes correctly discuss the theory of operation and the application of silicon controlled rectifiers and triacs. The student will draw a schematic of a working SCR circuit and triac circuit and will connect and demonstrate to the lab assistant or instructor.

Examination 2.

EI 404

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within twenty minutes discuss the construction of a nonlinear RTL IC. The student shall explain and demonstrate the operation of a nonlinear IC to the instructor or lab assistant.

Using only paper, pencil, slide rule, component demonstrator board, test equipment and specification sheet for a linear IC, the student shall within forty minutes correctly describe the theory of operation of the ideal operational amplifier. He shall mention specific examples of the applications of the operational amplifier in at least twelve different circuits as discussed in class. The student shall draw a schematic of an adder, an integrater and a differentiator and shall connect the circuits and demonstrate to the lab assistant or instructor.

Using only paper and pencil, the student shall within twenty minutes correctly describe the theory of operation and application of three of the following four tubes: cathode ray, nixie, neon, and laser.

Using only paper, pencil, slide rule, component demonstrator board and test equipment, the student shall within ninety minutes work those problems from examinations 1 and 2 selected by the instructor as most frequently missed.

Final Examination

EXAMINATION 1 (SAMPLE)

(Closed Reference)

1. Discuss the formation of extrinsic semiconductors from intrinsic, mentioning the doping process as it is used in forming both N and P-type materials. The items in columns 3, 4 and 5 of the periodic table used in the manufacturing process should be mentioned specifically.

   (20 min)

2. Describe the formation of a P-N junction and the forward and reverse bias characteristic of this junction. Draw the schematic for the forward bias and the reverse bias diode circuit. Make all appropriate calculations, connect the circuit, and demonstrate to the instructor or lab assistant.

   (20 min)

3. Discuss the theory of operation and the application of zener and temperature compensated zener diodes. Calculate the values for a three volt zener with a 2K load driven by a 5 volt source. Connect the circuit and demonstrate to the instructor or lab assistant.

   (20 min)

4. Discuss the theory of operation of photovoltaic cells, tunnel diodes and light emitting diodes. Draw the correct schematic that would operate each, emphasising the theory of operation and the application. Connect the LED circuit and demonstrate to the instructor or lab assistant.

   (30 min)

EI 404

EXAMINATION 2 (SAMPLE)

(Closed Reference)

1. Discuss the construction of NPN and PNP transistors. Mention the biasing configurations necessary for operation in the linear, saturation, or cut-off regions.
(20 min)

2. Distinguish between the characteristics of biasing, gain and phase between the common base, common emitter and common collector configurations. Draw and construct a dual supply common emitter and a common collector amplifier and demonstrate to the instructor or lab assistant.
(30 min)

3. Given the attached specification sheet for a 2N404, identify and explain each specification of the sheet.
(15 min)

4. Given the attached picture from a transistor curve tracer and the scope settings, derive the h parameters from the curves.
(15 min)

5. List all twelve h parameters.
(10 min)

6. Discuss checking transistors in circuits with the use of ohm meters, volt meters and scopes. Demonstrate to the instructor or lab assistant.
(20 min)

7. Describe the theory of operation of unijunctions and name at least one specific application. Connect a unijunction timer and demonstrate to the lab assistant or instructor.
(20 min)

8. Describe the theory of operation and application of field effect and mosfet transistors. Draw a circuit of a field effect amplifier or mosfet amplifier and connect and demonstrate to the instructor or lab assistant.
(20 min)

9. Discuss the theory of operation and the application of silicon controlled rectifiers and triacs. Draw a schematic of a working SCR circuit and triac circuit and connect and demonstrate to the lab assistant or instructor.

(20 min)

EI 404

FINAL EXAMINATION (SAMPLE)

(Closed Reference)

1. Discuss the construction of a nonlinear RTL IC. Explain and demonstrate the operation of a nonlinear IC to the instructor or lab assistant.
(20 min)

2. Describe the theory of operation of the ideal operational amplifier. Mention specific examples of the applications of the operational amplifier in at least twelve different circuits as discussed in class. Draw a schematic of an adder, an integrator and a differentiator. Connect the circuits and demonstrate to the lab assistant or instructor.
(40 min)

3. Describe the theory of operation and application of three of the following four tubes: cathode ray, nixie, neon and laser.
(20 min)

4. Work the attached problems from examinations 1 and 2 selected by the instructor as the most frequently missed.
(90 min)

COURSE: EI 305

TITLE: Schematics, Diagrams, and Construction, Part I

DATE		HOURS
	I. Principles of Drafting	9.0
____________	A. Basic techniques	
____________	B. Lettering	
____________	C. Orthographing and pictorial drawings	
____________	D. Symbols and components	
____________	E. Templates and applications	
____________	II. Block and Single Line Diagramming	9.0
	III. Schematics	21.0
____________	A. Basic electrical units	
	1. volt	
	2. ohm	
	3. ampere	
____________	B. Symbols and connection techniques	
____________	C. Phototyping	
	1. vector board assembling and layout	
	2. soldering and wiring techniques	
	3. chassis construction	
	a. design and layout patterns	
	b. cutting, bending, assembly	
____________	IV. Objectives Test, Student Evaluations, and Corrective Feedback	3.0
	V. Flow and Logic Diagraming	18.0
____________	A. Logic symbols	
____________	B. Simple logic equations	
____________	C. Wirelisting	
____________	D. Cambi board prototyping	
____________	E. Wirewrapping and assembly	
____________	VI. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	VII. Printed Circuit Boards	18.0
____________	A. Drawings	
	1. schematic drawing	
	2. layout drawing	

DATE		HOURS
	3. master drawing	
	4. drill and contour drawing	
	5. assembly 7 material list drawing	
________	B. Photo reduction of master drawing	
________	C. Fabrication of board	
	VIII. Cabling	12.0
________	A. Drawings and layouts	
________	B. Connectors--assembly of	
________	C. Harness--assembly of	
________	IX. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	TOTAL HOURS	96.0

EI 305

OBJECTIVES

Using only paper, pencil and drafting machine, the student shall within ten minutes demonstrate correct techniques of lettering and drawing lines to the instructor.

Using only paper and pencil, the student shall within twenty minutes draw from a sample an orthogonal or pictorial drawing of any electronic component or piece of equipment.

Using only paper and pencil, the student shall within ten minutes identify from a sample or a picture ten popularly used components. He shall list the components and the associated drafting symbol.

Using only paper, pencil and templates, the student shall within twenty minutes demonstrate to the instructor the correct use of the templates in drawing the symbols and components normally found in electronics instrumentation.

Using only paper, pencil, templates and drafting machine, the student shall within twenty minutes draw a block and single line diagram of an indicated electronic instrument or of an electronic control system. The rough draft will be furnished by the instructor. The student will do the finished drawing.

Using only paper and pencil, the student shall within ten minutes if given a rough sketch of an electrical circuit indicate the symbols for the appropriate electrical unit such as volts, ohms and amperes.

Using only an electronic tool box, vector boards and appropriate components, the student shall within forty-five minutes lay out correctly and assemble any vector board circuit from a schematic furnished by the instructor. The student shall demonstrate proper soldering and wiring techniques.

Using an instrument tool box, the student shall within forty minutes lay out a pattern on a chassis from a rough design furnished by the instructor. The student shall demonstrate the correct use of nibbler, hydraulic Greenlee punch, and drill.

Examination 1.

EI 305

Using only paper, pencil and template, the student shall within fifteen minutes draw the appropriate logic symbol for a list of logic gates furnished by the instructor.

Using only paper, pencil, drafting machine and templates, the student shall within two hours draw the flow diagram for any two logic equations not to exceed five minterms in length or six input variables. The students shall correctly wirelist one logic equation for NOR's and one logic equation for NAND's given the numbers of the integrated circuits readily available.

Using a wirelisting, wirewrapping gun, unwrap tool and thermal stripper, the student shall within forty-five minutes demonstrate correct techniques of wirewrapping and assembly.

Examination 2.

Using only paper, pencil and printed circuit board construction materials, the student shall within forty minutes lay out from a rough sketch a schematic drawing, compile the layout and master drawing, and assemble the parts for construction of the printed circuit board. The student shall properly use the drill and contour drawing techniques.

Using the camera the student shall within thirty minutes show the proper techniques for photo reduction of a master drawing.

Using only the materials to fabricate printed circuit boards and a photo reduction of a master drawing, the students shall correctly demonstrate the complete fabrication of a printed circuit board.

Using only paper, pencil, templates and drafting machine, the student shall within twenty minutes correctly draw and lay out any rough sketch of a cabling diagram furnished by the instructor.

Using a soldering iron and the appropriate connectors, the student shall within thirty minutes demonstrate the correct assembly techniques for construction of a connector and harness.

Examination 3.

EI 305

EXAMINATION 1 (SAMPLE)

(Closed Reference)

1. Demonstrate the correct technique of lettering and drawing lines to the instructor.

   (10 min)

2. Draw from a sample an orthogonal or pictorial drawing of any electronic component or piece of equipment.

   (20 min)

3. Identify from a sample or a picture ten popularly used components. List the components and the associated drafting symbol.

   (10 min)

4. Demonstrate the correct use of the templates in drawing the symbols and components normally found in electronics instrumentation.

   (20 min)

5. Draw a block and single line diagram of an indicated electronic instrument or of an electronic control system. The rough draft will be furnished by the instructor; the student will do the finished drawing.

   (20 min)

6. Given a rough sketch of an electrical circuit, indicate the symbols for the appropriate electrical unit such as volts, ohms and amperes.

   (10 min)

7. Lay out and assemble any vector board circuit from a schematic furnished by the instructor. Demonstrate the proper soldering and wiring techniques.

   (45 min)

8. Lay out a pattern on a chassis from a rough design furnished by the instructor. Demonstrate the correct use of nibbler, hydraulic Greenlee punch, and drill.

   (40 min)

EI 305

EXAMINATION 2 (SAMPLE)

1. Draw the appropriate logic symbol for a list of logic gates furnished by the instructor.
(15 min)

2. Draw the flow diagram for any two logic equations not to exceed five minterms in length or six input variables. Wirelist one logic equation for NOR's and one logic equation for NAND's given the numbers of the integrated circuits readily available.
(2 hours)

3. Demonstrate correct techniques of wirewrapping and assembly.
(45 min)

EI 305

EXAMINATION 3 (SAMPLE)

1. Lay out from a rough sketch a schematic drawing, compile the layout and master drawing, and assemble the parts for construction of the printed circuit board. Use the drill and contour drawing techniques.

   (40 min)

2. Show the proper techniques for photo reduction of a master drawing.

   (30 min)

3. Demonstrate the complete fabrication of a printed circuit board.

   (60 min)

4. Draw and lay out any rough sketch of a cabling diagram furnished by the instructor.

   (20 min)

5. Demonstrate the correct assembly techniques for construction of a connector and harness.

   (30 min)

COURSE: IP 302

TITLE: Industrial Physics, Part II

PREREQUISITE: IP 301

DATE		HOURS
	I. Fluids at Rest (Chapter 9)	7.5
	A. Density	
	B. Pressure	
	C. Archimedes principle	
	D. Specific gravity	
	E. Barometers	
	F. Monometers	
	G. Pressure gages	
	H. Pressure to current transducers	
	I. Current to pressure transducers	
	J. Boyles Law	
	II. Objectives Test, Student Evaluation, and Corrective Feedback	1.5
	III. Fluids in Motion (Chapter 10)	9.0
	A. Bernoullis' Theorem	
	B. Fluid friction and viscosity	
	C. Flow measurements	
	1. Venturi	
	2. Orifice	
	3. Magnetic	
	4. Vortex	
	IV. Properties of Matter (Chapter 11)	4.5
	A. Stress and strain	
	B. Cohesion and adhesion	
	C. Surface tension	
	D. Capillary	
	V. Objectives Test, Student Evaluation, and Corrective Feedback	1.5
	VI. Solid State Physics	10.5
	VII. Objectives Test, Student Evaluation, and Corrective Feedback	1.5

DATE		HOURS
	VIII. Light (Chapters 30-33)	10.5
________	A. Photometry	
________	B. Reflection and refraction	
________	C. Lenses and mirrors	
________	D. Optical instruments	
________	E. Lasers and masers	
________	IX. Objectives Test, Student Evaluation, and Corrective Feedback	1.5
	TOTAL HOURS	48.0

IP 302

OBJECTIVES

Using only paper and pencil, the student shall within fifteen minutes correctly define density, pressure, Archimedes Principle and specific gravity. The student will contrast between the four and will give specific examples of process measurement and control using these four variables.

Using only paper and pencil, the student shall within thirty minutes correctly identify from a sample or a picture the following items: barometers, monometers, pressure gages, pressure-to-current transducers, and current-to-pressure transducers. The students will describe the theory of operation and application of each of the items and shall relate the items to Boyles' law.

Examination 1.

Using only paper and pencil, the student shall within ten minutes define correctly Bernoullis' theorem and relate it to fluid friction and viscosity.

Using only paper and pencil, the student shall within twenty minutes correctly identify from a sample or picture the following items: venturi tubes, orifice plates, magnetic flow transducers and vortex meters. The student shall explain the theory of operation and the application of each.

Using only paper and pencil, the student shall within twenty minutes correctly define the properties of stress and strain, cohesion and adhesion, surface tension, and capillary action. The student shall discuss the measurement of each variable.

Examination 2.

Using only paper and pencil, the student shall within forty minutes correctly describe the formation of a NP junction in solid state physics. He shall discuss the manufacturing procedures including doping.

Examination 3.

Using only paper, pencil and slide rule, the student shall within ten minutes correctly calculate angles of reflection and refractions when given the incident beam and the medium by the instructor.

IP 302

Using only pencil, paper and slide rule, the student shall within twenty minutes correctly identify from samples or pictures optical instruments including lasers, pyrometers, lenses and mirrors. The student will then state the function of the particular optical instruments identified.

Using only paper and pencil, the student shall within twenty minutes discuss the theory of operation of the laser and maser and shall discuss the applications of the device in process measurement and control.

Examination 4.

IP 302

EXAMINATION 1 (SAMPLE)

(Closed Reference)

1. Define density, pressure, Archimedes Principle and specific gravity. Contrast between the four and give specific examples of process measurement and control using these four variables.
(15 min)

2. Identify from the ten numbered samples on the lab bench the following items: barometers, monometers, pressure gages, pressure-to-current transducers and current-to-pressure transducers. Describe the theory of operation and application of each of the items and relate the items to Boyles' law.
(30 min)

IP 302

EXAMINATION 2 (SAMPLE)

(Closed Reference)

1. Define Bernoullis' theorem and relate it to fluid friction and viscosity.

(10 min)

2. Identify from the numbered samples on the lab bench the following items: venturi tubes, orifice plates, magnetic flow transducers and vortex meters. Explain the theory of operation and the application of each.

(20 min)

3. Define the properties of stress and strain, cohesion and adhesion, surface tension, and capillary action. Explain how to measure each variable.

(20 min)

IP 302

EXAMINATION 3 (SAMPLE)

(Closed Reference)

1. Describe the formation of a NP junction in solid state physics. Discuss the manufacturing procedures including doping.

(40 min)

IP 302

EXAMINATION 4 (SAMPLE)

(Closed Reference)

1. Calculate angles of reflection and refraction when a laser beam strikes a tank of water at a fifteen degree angle.
(10 min)

2. Identify from the numbered samples on the lab bench the following optical instruments: lenses, lasers, pyrometers, and mirrors. State the function of the particular optical instrument identified.
(20 min)

3. Discuss the theory of operation of the laser and maser and discuss the applications of the device to process measurement control.
(20 min)

COURSE: TM 302

TITLE: Basic Technical Mathematics, Part 2

DATE HOURS

- I. Exponential Functions 6.0
  - A. Exponential Series E^X (includes slide rule and tables)
  - B. Euler's equations
    - 1. Generating sine table
    - 2. Generating cosine table
- II. Review of Trigonometric Functions 3.0
- III. The Complex Plane 7.5
  - A. The J Operator
  - B. Rectangular operations
    - 1. Addition/subtraction
    - 2. Multiplication/division
    - 3. Exponents
  - C. Polar operations
    - 1. Conversion from rectangular to polar
    - 2. Conversion from polar to rectangular
    - 3. Multiplication/division
    - 4. Exponents
- IV. Objectives Test, Student Evaluation, and Corrective Feedback 1.5
- V. Logarithms 6.0
  - A. Definition and graphs
  - B. Generating tables, reading base 10 and base E tables, reading base 10 and base E scales on the slide rule
  - C. Properties of logarithms
  - D. Computation
- VI. Geometric Functions 4.5
  - A. Basic definitions
  - B. The straight line
  - C. The circle
  - D. The parabola
  - E. The ellipse
  - F. The hyperbola
  - G. Translation of axes
  - H. Cubic equation

DATE			HOURS
__________	VII.	Objectives Test, Student Evaluation, and Corrective Feedback	1.5
	VIII.	Number Systems and Codes	9.0
__________		A. Definition of straight code	
__________		B. Conversion from radix X straight code to radix 10	
__________		C. Conversion from radix 10 to any radix straight code	
__________		D. Mathematical operations in straight code	
__________		E. BCD, BCD+3, ASCII	
__________		F. Addition in BCD, BCD+3, & ASCII	
	IX.	Topology	7.5
__________		A. Point-set definitions	
__________		B. Boolean algebra	
__________		C. Gating equations and definitions	
__________	X.	Objectives Test, Student Evaluation, and Corrective Feedback	1.5
		TOTAL HOURS	48.0

OBJECTIVES

Using only paper, pencil, and slide rule, the student shall within six minutes correctly write the first five terms of the exponential series E^X. The student shall then, given any value of X, evaluate the first five terms, record the derived value and record the more correct value from his slide rule.

Using only paper, pencil, and slide rule, the student shall within fourteen minutes correctly substitute $+J\theta$ or $-J\theta$ for X in the exponential series ϵ^X to derive Euler's equations for generating the Sine and Cosine functions. Given θ in degrees or radians, the student shall correctly solve three terms of the Sine function and three terms of the Cosine function. Solve for the tangent. The student shall record his derived values and the more correct values from his slide rule.

Using only paper, pencil, and slide rule, the student shall within ten minutes correctly solve four of five triangles given either a side and an angle (in radians or degrees) or two sides.

Using only paper, pencil, and slide rule, the student shall within twenty minutes correctly solve six of eight rectangular to polar conversions and correctly solve six of eight polar to rectangular conversions.

Using only paper, pencil, and slide rule, the student shall within twenty minutes correctly solve six of eight addition or subtraction problems in rectangular form and correctly solve six of eight multiplication or division or manipulation of exponents in polar form.

Examination 1.

Using only paper, pencil, and slide rule, the student shall within five minutes correctly solve eight of ten arithmetic problems involving a maximum of four numbers in both log base 10 and log base ϵ.

Using only paper, pencil, and slide rule, the student shall within five minutes correctly write the general equation form for a straight line, a circle, a parabola, an ellipse, a hyperbola, and a cubic equation.

Using only paper, pencil, and slide rule, the student shall within twenty minutes, given equations for a straight line, circle, parabola, ellipse, hyperbola, and a cubic equation, correctly plot five of the six equations.

Examination 2.

Using only paper, pencil, and slide rule, the student shall within forty minutes correctly solve 24 of 28 problems in whole and fractional number conversion between radix 10, radix 2, radix 8, radix 16, radix X, BCD, BCD+3, and ASCII.

Using only paper, pencil, and slide rule, the student shall within thirty minutes correctly solve four of five addition problems involving two numbers in radix X, straight code; correctly solve four of five subtraction problems in either one's complement or two's complement involving two numbers in radix X, straight code; and correctly solve three of four addition problems involving two numbers in BCD, BCD+3, or ASCII complete with code correction.

Using only paper and pencil, the student shall within six minutes correctly define and, where appropriate, illustrate with Venn Diagram and gating symbol the following terms: point, set, universe, null set, $A \cdot B$, $A+B$, $\overline{A}$.

Using only paper and pencil, the student shall within fourteen minutes correctly list twenty of the 26 laws of Boolean Algebra.

Using only paper, pencil, and logic template, the student shall within twenty minutes list the Boolean Heirarchy and correctly gate six of eight equations not to exceed six minterms in length.

Using only paper and pencil, the student shall within ten minutes correctly write the logic equation from four AND-OR-NOT flow diagrams.

Using only paper, pencil, and slide rule, the student shall within one hour correctly solve 80% of a group of problems chosen by the instructor from the first two examinations.

Final examination.

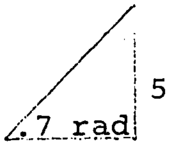
EXAMINATION 1 (SAMPLE)

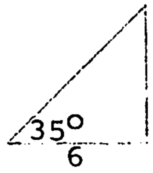
(Closed Book, Closed Note, Slide Rule Allowed)

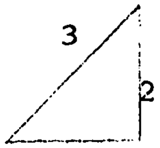
1. Write the first five terms of the exponential series ϵ^{x}. Evaluate this expression for $X = 2$. Record this derived value, and also record ϵ^{2} as read from the slide rule.
(6 min)

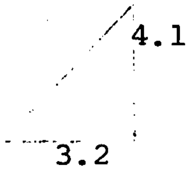
2. Let $X = +J\theta$ in the series for ϵ^{x}. Show your work in deriving Euler's equation for sine and cosine. Using three terms of each expression, find Sine 25°, tangent 25°, and cosine 25°. Record the derived values and record the more correct values from the slide rule.
(14 min)

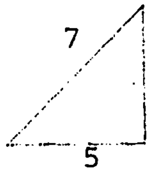
3. Solve for all unknown sides and angles:











(10 min)

(For problems 4 and 5)

Given:
$a = 3 + J2$
$b = 3 + J5$
$c = -2 + J4$
$d = -2 + J1$
$e = -4 - J2$
$f = -5 - J6$
$g = 2 - J3$
$h = 3 - J2$
$i = +J2$
$j = -5$

$k = 4\,\underline{|22^\circ}$
$l = 5\,\underline{|49^\circ}$
$m = 3\,\underline{|120^\circ}$
$n = 2\,\underline{|150^\circ}$
$o = 3\,\underline{|-160^\circ}$
$p = 7\,\underline{|-130^\circ}$
$q = 2\,\underline{|-70^\circ}$
$r = 5\,\underline{|-30^\circ}$
$s = 4\,\underline{|0^\circ}$
$t = 3\,\underline{|-90^\circ}$

4. Convert to polar form:

a
b
c
e
f
g
i
j

Convert to rectangular form:

k
l
m
o

p
q
r
s

(20 min)

5. Solve:

a + b
b + c
c + d
d + e

e - f
f - g
g - h
h - a

k x l
l x m
n x o
n x t

m ÷ l
n ÷ o
t ÷ s
q ÷ k

(10 min)

EXAMINATION 2 (SAMPLE)

(Closed Book, Closed Note, Slide Rule Allowed)

(For problem 1)

Given: $a = 95$
$b = 24$
$c = 12$
$d = 2$
$e = .025$
$f = .38$
$g = .0062$
$h = .5$

1. Show all work. Solve the following problems twice; once using base 10 logs, and once using base ϵ logs.

$a \times b \times c \times e =$

$a \times c \times f \times g =$

$(b \times c \times h) \div a =$

$(e \times f \times b) \div g =$

$[(b \times c) \div e] \div h =$

$a^d \div c^h =$

$(d^c \times h) \div a =$

$(e \times f) \div (g \times h) =$

$a^h \times e^h =$

$a^w = c$ (Find w)

(45 min)

2. Write the general equation form for: circle, ellipse, hyperbola, straight line, parabola, cubic.

(5 min)

3. Label and plot the following equations:

$X^2 + Y^2 = 25$

$Y = 2X - 6$

$Y = 2X^2 - 4X - 6$

$Y = 2X^3 - 6X^2 - 2X + 6$

$2X^2 + 5Y^2 = 10$

$XY = 2$

(20 min)

FINAL EXAMINATION (SAMPLE)

(Closed Book, Closed Note, Slide Rule Allowed)

(For problem 1)

Given:
a. $(77.6875)_{10}$
b. $(64.64)_{8}$
c. $(14.8)_{16}$
d. $(1011011.011)_{2}$
e. $(1001 - 0110.0101)_{BCD}$
f. $(1001 - 0101.0011)_{BCD+3}$
g. $(10110011 - 10111001)_{ASCII}$

1. Convert the following:

a. $\rightarrow (\qquad)_{8} \rightarrow (\qquad)_{2} \rightarrow (\qquad)_{16} \rightarrow (\qquad)_{7}$

b. $\rightarrow (\qquad)_{2} \rightarrow (\qquad)_{16} \rightarrow (\qquad)_{10} \rightarrow (\qquad)_{BCD}$

c. $\rightarrow (\qquad)_{2} \rightarrow (\qquad)_{8} \rightarrow (\qquad)_{10} \rightarrow (\qquad)_{BCD+3}$

d. $\rightarrow (\qquad)_{8} \rightarrow (\qquad)_{16} \rightarrow (\qquad)_{10} \rightarrow (\qquad)_{5}$

e. $\rightarrow (\qquad)_{10} \rightarrow (\qquad)_{BCD+3} \rightarrow (\qquad)_{8} \rightarrow (\qquad)_{ASCII}$

f. $\rightarrow (\qquad)_{10} \rightarrow (\qquad)_{BCD} \rightarrow (\qquad)_{16} \rightarrow (\qquad)_{ASCII}$

g. $\rightarrow (\qquad)_{10} \rightarrow (\qquad)_{BCD+3} \rightarrow (\qquad)_{8} \rightarrow (\qquad)_{ASCII}$

(40 min)

(For problem 2)

Given:
a. $(35.2)_{8}$
b. $(26.7)_{8}$
c. $(12.4)_{8}$
d. $(43.1)_{5}$
e. $(24.2)_{5}$
f. $(13.4)_{5}$
g. $(1705)_{10}$
h. $(1416)_{10}$
i. $(1099)_{10}$

2. Solve:

$a + b$
$a + c$
$b + c$
$d + e$
$d + f$

$a - b$
$a - c$
$d - e$
$d - f$
$e - f$

Convert g & h to BCD & add
Convert g & h to BCD+3 & add
Convert g & i to BCD & add
Convert h & i to BCD+3 & add

(30 min)

3. Define and, where appropriate illustrate with Venn diagram and gating symbol the following terms: point, set, universe, null set, $A \cdot B$, $A+B$, $\overline{A}$.

(6 min)

4. List the 26 laws of Boolean Algebra.

(14 min)

5. List the Boolean Heirarchy and use it to gate the following equations.

F_1 = Exclusive Or

F_2 = Digital Comparator

$F_3 = A \cdot (B + C) + \overline{C}D + \overline{A}\,\overline{D}$

$F_4 = A \cdot (\overline{B} + C) + B(\overline{C} + D)$

$F_5 = A \cdot (BC + \overline{B} - \overline{C}) + \overline{A} \cdot C \cdot D$

$F_6 = AB + C(D + \overline{A}\,\overline{B})$

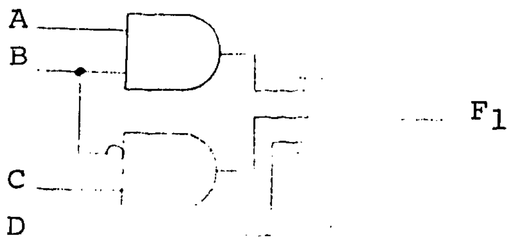
$F_7 = \overline{A} \cdot \overline{B} + \overline{A \cdot B} + C \cdot (\overline{A} + \overline{D}) + \overline{D}(\overline{B + C})$

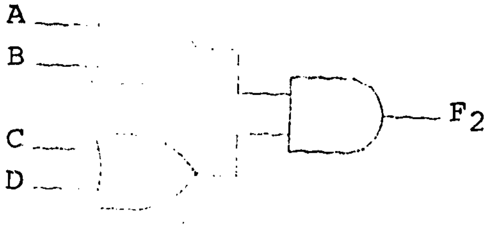
$F_8 = A \cdot B + (C \cdot B + \overline{A}) \cdot (\overline{D} + \overline{A}\,\overline{C})$

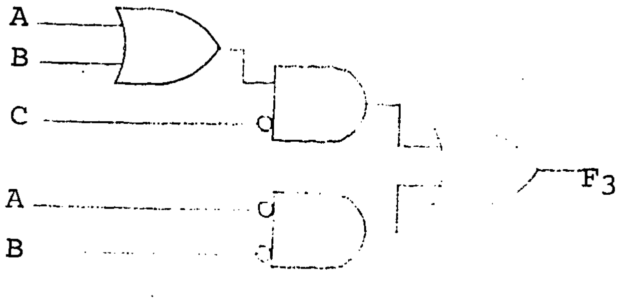
(20 min)

6. Write the logic equations for the flow diagrams shown on the following page.

(10 min)







7. Solve the following problems which were selected from the first two examinations.

(1 hr)

COURSE: EI 311

TITLE: Electronic Instrumentation Systems Layout, Construction and Installation Procedures

PREREQUISITE: EI 305

The electronic instrumentation faculty working under the direction of the department chairman will design an electronic instrumentation system which may be assembled and built by twelve to sixteen students working under the direction of an instructor or instruction team in 96 contact hours. Within two weeks after the close of registration, a contract of behavioral objectives complete with timetable and sample examinations will be signed by both the instructor and students. These objectives must be designed to insure each student learns to cope with "real time" industrial problems including CPM or Pert, procurement, layout, design, construction (including soldering, crimping, wirewrapping, chassis work, printed circuit cards, instrument hook-ups, etc.), and installation.

COURSE: EI 412

TITLE: Pneumatic and Mechanical Control Instruments

PREREQUISITES: EI 302, and TM 301

SPECIAL NOTE: This course is predominately laboratory work.

DATE		HOURS
__________	I. Entry Skills Test, Pretest Over Course Objectives, and Course Orientation	2.0
	II. Control Instrument Mechanisms	7.0
__________	A. Feed Forward	
__________	B. Feedback	
__________	III. Gages, Manometers, and Dead Weight Tester: Theory, Calibration, and Maintenance	6.0
	IV. Transmitters: Theory, Calibration, and Maintenance	21.0
__________	A. Gage	
__________	B. Level	
__________	C. Temperature	
__________	D. Differential Pressure	
__________	V. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	VI. Controllers: Theory, Calibration, and Maintenance	24.0
__________	A. On-Off	
__________	B. Proportional	
__________	C. Integration or Reset	
__________	D. Derivative or Rate	
__________	E. Combinational	
__________	F. External Feedback	
__________	VII. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	VIII. Recorders: Theory, Calibration, and Maintenance	10.0
__________	A. Transmitter Followers	
__________	B. Special Transducer Followers	

DATE			HOURS
____________	IX.	Transducers: Theory, Calibration, and Maintenance	7.0
____________	X.	Actuators and Valves: Theory, and Maintenance	10.0
____________	XI.	Objectives Test, Student Evaluation, and Corrective Feedback	3.0
		TOTAL HOURS	96.0

EI 412

OBJECTIVES

Special Notes: This course is predominantly lab work.

Using only paper and pencil, the student shall within fifteen minutes define feed forward and feedback control instrument mechanisms and shall draw a freehand sketch of a force balance, moment balance and motion balance transmitter, recorder, controller and actuator.

Using only paper, pencil, slide rule, pressure source, gages, monometers, and dead weight tester, the student shall within fifteen minutes demonstrate the theory, calibration and maintenance of gages. He shall identify all parts of the gage and shall, after removing defective parts, calibrate against a water monometer, mercury monometer and dead weight tester.

Using only paper and pencil, the student shall within twenty minutes correctly discuss the theory of operation and application of any of the following pneumatic-mechanical transmitters: gage, level, temperature, differential pressure.

Using only paper, pencil, notes, slide rule, pressure source, tool box, gages and appropriate technical manual, the student shall within thirty minutes if given a working pneumatic-mechanical transmitter of any type correctly write a summary of the calibration procedures and demonstrate to the instructor or lab assistant.

Using only paper, pencil, notes, slide rule, pressure source, tool box, gages and appropriate technical manual, the student shall within ninety minutes if given a malfunctioning transmitter draw a binary trouble-shooting diagram and use the diagram to locate the malfunction and restore the transmitter to active service.

Examination 1.

Using only paper, pencil and appropriate technical manual, the student shall within twenty minutes correctly discuss the theory of operation and application of each of the following pneumatic-controller options: on-off, proportional, integration, derivative, combinational or external feedback.

Using only paper, pencil, slide rule, pressure source, tool box, gages and appropriate technical manual, the student shall within thirty minutes if given a working pneumatic-mechanical controller of any type correctly write a summary of the calibration procedures and demonstrate to the instructor or lab assistant.

Using only paper, pencil, slide rule, pressure source, tool box, gages and appropriate technical manual, the student shall within ninety minutes if given a malfunctioning pneumatic-mechanical controller draw a binary trouble-shooting diagram and use the diagram to locate the malfunction and restore the controller to active service.

Examination 2.

Using only paper, pencil, and appropriate technical manual, the student shall within twenty minutes correctly discuss the theory of operation and application of either of the following pneumatic-mechanical recorders: transmitter followers or transducer followers.

Using only paper, pencil, slide rule, pressure source, tool box, gages and appropriate technical manual, the student shall within thirty minutes if given a working pneumatic-mechanical recorder of any type correctly write a summary of the calibration procedures and demonstrate to the instructor or lab assistant.

Using only paper, pencil, slide rule, pressure source, tool box, gages and appropriate technical manual, the student shall within ninety minutes if given a malfunctioning pneumatic-mechanical recorder draw a binary trouble-shooting diagram and use the diagram to locate the malfunction and restore the recorder to active service.

Using only paper, pencil, slide rule, pressure source, gage, tool box and appropriate technical manual, the student shall within fifteen minutes if given a transducer (pressure, temperature, level, flow) correctly describe the theory of operation and application. The student will then properly connect the transducer to a working transmitter and demonstrate to the instructor or lab assistant.

Using only paper, pencil and appropriate technical manual, the student shall within twenty minutes correctly discuss the theory of operation and application of any air operated actuator and valve.

Using only paper, pencil, slide rule, pressure source, gage, tool box and appropriate technical manual, the student shall within

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EXAMINATION 2 (SAMPLE)

(Closed Reference)

1. Discuss the theory of operation and application of each of the following pneumatic-controller options: on-off, proportional, integration, derivative, combinational or external feedback.

   (20 min)

2. The instructor will issue a working pneumatic-mechanical controller. Write a summary of the calibration procedures and demonstrate to the instructor or lab assistant.

   (30 min)

3. The instructor will issue a malfunctioning pneumatic-mechanical controller. Draw a binary trouble-shooting diagram and use the diagram to locate the malfunction and restore the controller to active service.

   (90 min)

EI 412

EXAMINATION 3 (SAMPLE)

(Closed Reference. Work number 3 or number 6 and the remaining problems.)

1. Discuss the theory of operation and application of either of the following pneumatic-mechanical recorders: transmitter followers or transducer followers.
(20 min)

2. The instructor will issue a working pneumatic-mechanical recorder. Write a summary of the calibration procedures and demonstrate to the lab assistant or instructor.
(30 min)

3. The instructor will issue a malfunctioning pneumatic-mechanical recorder. Draw a binary trouble-shooting diagram and use the diagram to locate the malfunction and restore the recorder to active service.
(90 min)

4. The instructor will issue a transducer (pressure, temperature, level, flow). Describe the theory of operation and application. Connect the transducer to a working transmitter and demonstrate to the instructor or lab assistant.
(15 min)

5. Discuss the theory of operation and application of any air operated actuator and valve.
(20 min)

6. The instructor will issue a malfunctioning actuator and valve. Draw a binary trouble-shooting diagram and use the diagram to locate the malfunction and restore the unit to active service.
(90 min)

COURSE: EI 413

TITLE: Electronic Control Instruments

PREREQUISITE: EI 404

COREQUISITE: TM 313

DATE		HOURS
	I. Signal Conditioning	
________	A. Common emitter amplifiers 1. Stability biased 2. Power 3. Direct coupled 4. Cascaded stages pairs 5. Bandwidth 6. Troubleshooting	12.0
________	B. Emitter follower amplifiers	3.0
________	C. FET amplifiers	3.0
________	D. Operational amplifiers	9.0
________	E. Oscillators 1. Hartley 2. Colpitts 3. Crystal 4. Unijunction 5. Astable 6. Voltage controlled	6.0
________	II. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	III. Transmitters: Theory, Calibration, and Maintenance	18.0
________	A. Gage	
________	B. Level	
________	C. Temperature	
________	D. Potentiometric	
________	E. Differential pressure	
________	IV. Transducers: Theory, Calibration, and Maintenance	3.0
	V. Recorders: Theory, Calibration, and Maintenance	6.0
________	A. Transmitter followers	
________	B. Special transducer followers	

DATE			HOURS
____________	VI.	Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	VII.	Controllers: Theory, Calibration, and Maintenance	27.0
____________		A. On-Off	
____________		B. Proportional	
____________		C. Integration or reset	
____________		D. Derivative or rate	
____________		E. Combinational	
____________		F. External feedback	
____________	VIII.	Objectives Test, Student Evaluation, and Corrective Feedback	3.0
		TOTAL HOURS	96.0

OBJECTIVES

Using only paper and pencil, the student shall within five minutes correctly define "signal conditioning" and give at least three examples of its use.

Using only paper and pencil, the student shall within ten minutes correctly write a brief paragraph on the operational characteristics of common emitter amplifiers (Stability biased, Power, Direct coupled, or Cascaded) with regard to power gain, voltage gain, current gain, decibel gain, band width, phase, and biasing arrangements.

Using only paper, pencil, notes, slide rule, component demonstrator board, and test equipment, the student shall within forty minutes (if given the specifications desired for a stability biased amplifier) correctly calculate all voltage, current, and impedance values including gain. The student shall then construct the circuit and verify his calculations.

Using only paper, pencil, notes, slide rule, component demonstrator board, and test equipment, the student shall within forty minutes (if given the specifications desired for a power amplifier) correctly calculate all voltage, current, and impedance values including gain. The student shall then construct the circuit and verify his calculations.

Using only paper, pencil, notes, slide rule, component demonstrator board, and test equipment, the student shall within forty minutes (if given the desired specifications for a FET amplifier) correctly calculate all voltage, current, and impedance values including gain. The student shall then construct the circuit and verify his calculations.

Using only paper, pencil, notes, slide rule, component demonstrator board, and test equipment, the student shall within forty minutes (if given the specifications desired for a direct coupled amplifier) correctly calculate all voltage, current, and impedance values including gain. The student shall then construct the circuit and verify his calculations.

Using only paper, pencil, notes, slide rule, component demonstrator board, and test equipment, the student shall within sixty minutes (if given the specifications desired for cascaded amplifiers) correctly calculate all voltage, current, and impedance values including gain. The student shall then construct the circuit and verify his calculations.

Using only paper and pencil, the student shall within fifteen minutes correctly define bandwidth explaining phase, roll off, voltage gain, current gain, power gain, and decibel gain at the F_1 and F_2 points. The student shall describe and illustrate the use of a square wave generator to troubleshoot amplifiers.

Using only paper and pencil, the student shall within fifteen minutes (if given the schematic values for an amplifier with an indicated malfunction) correctly draw a binary troubleshooting diagram for the amplifier.

Using only paper and pencil, the student shall within five minutes correctly write a brief paragraph on the operational characteristics of emitter follower amplifiers with regard to gain characteristics, impedance levels, bandwidth, phase, and biasing arrangements.

Using only paper, pencil, notes, slide rule, component demonstrator board, and test equipment, the student shall within twenty minutes (if given the specifications desired for an emitter follower amplifier) correctly calculate all voltage, current, and impedance values including gain. The student shall then construct the circuit and verify his calculations.

Using only paper and pencil, the student shall within fifteen minutes correctly list the characteristics of an ideal operational amplifier; then draw and explain at least six of the op amp circuits discussed in class.

Using only paper, pencil, notes, slide rule, component demonstrator board, and test equipment, the student shall within forty minutes (if given the specifications desired for any of the op amp circuits discussed in class) correctly connect the circuit and demonstrate to the instructor or lab assistant.

Using only paper and pencil, the student shall within five minutes correctly define "oscillator" and describe the theory of operation and application.

Using only paper, pencil, notes, slide rule, component demonstrator board, and test equipment, the student shall within forty minutes (if given the specifications for a hartley, colpitts, crystal, unijunction, astable, or voltage controlled oscillator) correctly calculate all schematic values including period and frequency. The student shall then connect the circuit and verify his calculations.

Examination 1.

Using only paper, pencil, and appropriate technical manual, the student shall within fifteen minutes correctly discuss the theory of operation and application of any of the following transmitters: gage, level, temperature, potentiometric, and differential pressure.

Using only paper, pencil, notes, slide rule, component demonstrator board, test equipment, and appropriate technical manual, the student shall within forty minutes (if given a working transmitter: gage, level, temperature, potentiometric, or differential pressure) correctly write a summary of the calibration and demonstrate to the instructor or lab assistant.

Using only paper, pencil, notes, slide rule, component demonstrator board, test equipment, and appropriate technical manual, the student shall within sixty minutes (if given a malfunctioning transmitter) draw a binary troubleshooting diagram and use the diagram to locate the malfunction and restore the transmitter to active service.

Using only paper, pencil, slide rule, component demonstrator board, test equipment and appropriate technical manual, the student shall within fifteen minutes (if given a transducer: pressure, temperature, level, flow, light, geophone, hydrophone, humidity, capacitive probe, or strain) correctly describe the theory of operation and application. The student will then connect the transducer into a working circuit and demonstrate to the instructor or lab assistant.

Using only paper, pencil, notes, slide rule, component demonstrator board, test equipment, and appropriate technical manual, the student shall within forty minutes (if given either a transmitter follower recorder or a transducer follower recorder) correctly describe the theory of operation and application. The student will then connect the recorder to an appropriate signal source and demonstrate to the instructor or lab assistant.

Using only paper, pencil, notes, slide rule, component demonstrator board, test equipment, and appropriate technical manual, the student shall within sixty minutes (if given a malfunctioning recorder) draw a binary troubleshooting diagram and use the diagram to locate the malfunction and restore the recorder to active service.

Examination 2.

Using only paper, pencil, and appropriate technical manual, the student shall within twenty minutes correctly discuss the theory of operation and application of any of the following controller options: on-off-proportional, integration, derivative, [illegible]national, and external feedback.

Using only paper, pencil, notes, slide rule, component demonstrator board, test equipment, and appropriate technical manual, the student shall within thirty minutes (if given a working controller of any type) correctly write a summary of the calibration procedures and demonstrate to the instructor or lab assistant.

Using only paper, pencil, notes, slide rule, component demonstrator board, test equipment, and appropriate technical manual, the student shall within ninety minutes (if given a malfunctioning controller) draw a binary troubleshooting diagram and use the diagram to locate the malfunction and restore the controller to active service.

Examination 3.

EI 413

EXAMINATION 1 (SAMPLE)

(Part I, closed reference)

1. Define "signal conditioning" and explain at least three applications.
   (5 min)

2. Write a paragraph on the stability biased amplifier. Explain gain characteristics and temperature response; then draw a schematic.
   (10 min)

3. Define "bandwidth." Explain F_1, F_2, power gain, voltage and current gain, roll off, and phase as they relate to "bandwidth." Illustrate and explain how to use a square wave to test an amplifier's frequency response.
   (15 min)

4. A stability biased amplifier has .1 volt potential difference between collector and emitter. Draw a binary troubleshooting diagram.
   (15 min)

5. Write a brief description of the operational characteristics of an emitter follower amplifier. Explain gain characteristics, impedance levels, bandwidth, phase, and biasing arrangements for emitter followers.
   (5 min)

6. List the characteristics fo an ideal operational amplifier. Draw and explain the operation of at least six of the operational amplifier circuits discussed in class.
   (15 min)

7. Define "oscillator" and describe the theory of operation and application.
   (5 min)

Turn in Part I and the instructor will issue the spec sheets necessary for Part II.

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(Part II, open reference)

8. Use a 2N3569, a 12 volt power supply, and a 10mv-600 ohm-transducer @ 60 Hz. Calculate all parameters for a stability biased amplifier. Construct the circuit and demonstrate to the instructor or lab assistant.

(40 min)

9. Use a μA741, a 12 volt and a 5 volt power supply, and a 10mv-600 ohm-transducer @ 60 Hz. Calculate all parameters for an inverting amplifier with a voltage gain of 50. Construct the circuit and demonstrate to the instructor or lab assistant.

(40 min)

EI 413

EXAMINATION 2 (SAMPLE)

(Part I, closed reference)

1. Refer to the attached block diagram of a Taylor type 1302T differential pressure transmitter and explain the theory of operation and application.

(15 min)

2. Explain the theory of operation of a capacitive probe and its application in a net oil computer circuit.

(15 min)

Turn in Part I and obtain the technical manuals necessary for Part II.

(Part II, open reference)

3. A Taylor type 1302T differential pressure transmitter has been "bugged" so that the current output is constant for any input. Draw a binary troubleshooting diagram, locate the malfunction, restore the transmitter to active service, and demonstrate to the instructor or lab assistant.

(60 min)

4. A Taylor type 930J recorder is not tracking. Draw a binary troubleshooting diagram, locate the malfunction, restore the recorder to active service, connect the recorder to the transmitter repaired in problem 3, and demonstrate the working loop to the instructor or lab assistant.

(60 min)

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EI 413

EXAMINATION 3 (SAMPLE)

(Part I, closed reference)

1. Refer to the attached schematic of a Taylor type 944R conbinational controller. Discuss the theory of operation and application.
(20 min)

Turn in your answer to the instructor and obtain the necessary technical manuals for Part II.

(Part II, open reference)

2. Write a summary of the calibration procedures for a Foxboro type 62H controller. Calibrate the controller and demonstrate to the instructor or lab assistant.
(30 min)

3. A Taylor type 944R controller has been "bugged" so that the span will not expand to capacity. Draw a binary troubleshooting diagram, locate the malfunction, restore the controller to active service, and demonstrate to the instructor or lab assistant.
(90 min)

COURSE: EI 414

TITLE: Pulse & Digital Circuits

PREREQUISITES: TM 302, and EL 404

DATE		HOURS
__________	I. Switching Diodes	3.0
	II. Switching Transistors	3.0
__________	A. Saturation Characteristics	
__________	B. Cutoff Characteristics	
	III. Number Systems, Straight Code	5.0
__________	A. Radix 10, 2, 8, & 16	
__________	B. Mathematical Operations	
	IV. Number Systems, Other Codes	8.0
__________	A. Binary-Coded Decimal	
__________	B. Excess Three	
__________	C. ASCII	
__________	D. Parity	
__________	E. Biquinary	
__________	F. Longitudinal Redundancy Character	
__________	G. Bose Chaudhuri Coding	
	V. Point Set Theory	5.0
__________	A. Point, Universe, Set, Null Set	
__________	B. Intersection or AND Set	
__________	C. Union or Or Set	
__________	D. Compliment or NOT Set	
	VI. Gating	3.0
__________	A. Positive Logic	
__________	B. AND	
__________	C. OR	
__________	D. NOT	
__________	E. NAND	
__________	F. NOR	
	VII. Boolean Algebra	5.0
__________	A. Twenty Six Laws	
	1. Point Set Realization	
	2. Gating Realization	
__________	B. Theorems	

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DATE			HOURS
______	VIII.	Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	IX.	Minimizations Aids for Lease Minterm Form	6.0
______		A. Boolean Algebra	
		1. Exclusive OR	
		2. Digital Comparator	
		3. Half Adder	
		4. Full Adder	
______		B. Karnaugh Maps	
______		C. Multiple Mapping	
______		D. Quine-McCluskey	
______		E. Mahoney Mapping	
	X.	Digital Integrated Circuit Characteristics	3.0
______		A. Logic Voltage Levels	
______		B. Threshold	
______		C. Noise	
______		D. Onspeed	
______		E. Fan in	
______		F. Fan out	
______		G. Unit load	
______		H. t_r, t_t (let, tet)	
______		I. Prop delay	
______		J. Package delay	
______		K. On temp	
______		L. Power dissip	
	XI.	Digital Integrated Circuit Families	3.0
______		A. RTL	
______		B. DTL	
______		C. T^2L	
______		D. ECL	
______		E. Mos Logic	
	XII.	NOR Logic Analysis	5.0
______		A. Implementation by Gate Substitution	
______		B. Implementation by Theorems	
______	XIII.	Objectives Test, Student Evaluation, and Corrective Feedback	3.0

DATE			HOURS
	XIV.	NAND Logic Analysis	5.0
		A. Implementation by Gate Substitution	
		B. Implementation by Theorems	
	XV.	Coupling	3.0
		A. Direct	
		B Differentiator	
	XVI.	S-R Flip Flops	5.0
		A. NOR Realization	
		B. NAND Realization	
		C. Shift Registers and Ring Counters using Clocked S-R Flip Flops	
	XVII.	Multivibrator Family	6.0
		A. S-R Flip Flop	
		B. D Flip Flop	
		C. T Flip Flop	
		1. Discrete	
		2. Counting Circuit	
		D. J-K Flip Flop	
		1. Counting	
		2. Shift Register and Ring Counters	
		E. Monostable	
		F. Astable	
	XVIII.	Arithmetic Operations	6.0
		A. Series Addition	
		B. Parallel Addition	
		C. Subtraction	
		D. Multiplication	
		E. Division	
		F. Shut-down Circuits	
	XIX.	Digital to Analog Conversion	5.0
		A. Ladders	
		B. Level Amplifiers	
	XX.	Analog to Digital Conversion	8.0
		A. Analog Comparators	
		B. Frequency Count Technique	
		C. Successive Approximation Technique	

DATE			HOURS
________	XXI.	Objectives Test, Student Evaluation, and Corrective Feedback	3.0
		TOTAL HOURS	96.0

EI 414

OBJECTIVES

Using paper and pencil, the student shall within ten minutes define switching diodes and list those characteristics which distinguish them from other diodes.

Using only paper and pencil, the student shall within ten minutes define switching transistors and list those characteristics (saturation and cut-off) that distinguish them from other transistors.

Using only paper and pencil, the student shall within twenty minutes convert any eight straight code radix x number, both whole and fractional parts, into any other straight code radix y numbers requested by the instructor. The student shall perform any arithmetic operation requested in any radix.

Using only paper and pencil, the student shall within twenty minutes correctly code any eight BCD, excess three, or ASCII number into straight code or vice versa.

Using only paper, pencil, teletype and computer, the student shall within ten minutes correctly read and record either from computer memory or from teletype tape messages in ASCII code.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within forty minutes correctly draw and construct a message security check feature as parity, biquinary, longitudinal redundancy character, and Bose Chaudhuri coding. The student will construct the circuit and demonstrate to the instructor or lab assistant.

Using only paper and pencil, the student shall within ten minutes correctly define point, universe, set, null set, AND set, OR set, NOT set.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within thirty minutes correctly define in gating terminology, positive logic, AND, OR, NOT, NAND, NOR and demonstrate the circuit to the instructor or lab assistant.

Using only paper and pencil, the student shall within twenty minutes list the twenty-six laws of Boolean algebra. The student shall illustrate the laws both by Venn diagram and by gating.

Examination 1.

EI 414

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within twenty minutes give the equation, truth table and flow diagram for an exclusive OR, digital comparator, half adder, and full adder. The student shall connect the circuit and verify the truth table.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within forty minutes if given five problems of four input variables with the desired numerical output sequence, use Karnaugh maps, multiple maps, Quine-McCluskey reduction or Mahonney mapping to reduce the equation. The student shall then draw and construct the flow diagram and verify his results.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within twenty minutes if given any AND-OR-NOT flow diagram reduce the diagram to four input equations, derive the function realizations from the Karnaugh map and verify his results on the logic board.

Using only paper and pencil, the student shall within fifteen minutes correctly define the following integrated circuit specifications: logic voltage levels, thresh hold, noise, fan-in, fan-out, unit load, T_r, T_t, (let, tet), propagation delay, package delay, power dissipation, package type.

Using only paper and pencil, the student shall within fifteen minutes correctly define RTL, DTL, TTL, ECL, and MOS logic. Give the distinguishing characteristics of each of these integrated circuit families.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within forty minutes if given any five logic equations implement the equations in NORs, either by gate substitution or by the NOR theorem. The student will verify his implementation on the logic board.

Examination 2.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within twenty minutes if given any five logic equations by the instructor implement the equations in NANDs, either by gate substitution or by the NAND theorem. The student shall verify his implementation on the logic board.

EI 414

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within ten minutes if given the specifications for a differentiator couple calculate the necessary circuit parameters and verify his calculations on the logic board.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within fifteen minutes define an S-R flip flop made with NORs and and S-R flip flop made with NANDs. The student shall then verify the truth tables for the flip flops on the logic board.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within fifteen minutes correctly define a clocked S-R flip flop, a shift register, and a ring counter. The student will draw a flow diagram for a ring counter using clocked S-R flip flops. He will connect the circuit and verify his ring counter definition.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within thirty minutes define D flip flop, T flip flop, JK flip flop, monostable, and astable. The student will draw and connect the flip flops out logic gates and verify his truth tables.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within thirty minutes draw a flow diagram of an octal up counter, a hexidecimal down counter, a decade counter, an excess three counter and an octal up-down counter. The students will verify the counter arrangements on the lab board.

Using only paper and pencil, the student shall within thirty minutes correctly write a discussion with examples on the arithmetic element of a digital computer covering the topics of serial addition, parallel addition, subtraction, multiplication, division and shut down circuits.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within two hours correctly draw a three register arithmetic element for four bit serial manipulation of addition, subtraction, multiplication and division. The student shall construct the circuit and verify his calculations.

EI 414

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within two hours write a brief paragraph on digital-to-analog conversion explaining ladders and level amplifiers as they are used in DAC units. The student shall then construct a DAC unit on the logic board, applying a four bit up counter to the DAC inputs. He shall observe the staircase output on a scope recording the values for all steps and for all glitches.

Using only paper and pencil, the student shall within fifteen minutes write a brief description of analog comparators as used in analog-to-digital conversion.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within three hours draw an ADC unit using the successive approximation technique. The student shall connect and verify his circuit on the lab board.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within two hours correctly draw a flow diagram for an ADC unit using the frequency count technique. The student shall connect the circuit and verify his results on the lab board.

Examination 3.

EXAMINATION 1 (SAMPLE)

(Closed Reference)

1. Define switching diodes and list those characteristics that distinguish them from other diodes.

(10 min)

2. Define switching transistors and list those characteristics that distinguish them from other transistors.

(10 min)

3. Convert the following numbers as indicated:

$(37.625)_{10}$ --- $(\qquad)_{8}$ --- $(\qquad)_{2}$ --- $(\qquad)_{5}$

$(37.6)_{8}$ --- $(\qquad)_{10}$ --- $(\qquad)_{16}$ --- $(\qquad)_{7}$

$(2C.F)_{16}$ --- $(\qquad)_{2}$ --- $(\qquad)_{10}$

(20 min)

4. Convert the following numbers as indicated:

$(24.5)_{10}$ --- $(\qquad)_{BDC}$ --- $(\qquad)_{BDC+3}$ --- $(\qquad)_{ASCII}$

$(1001\text{-}0101)_{BCD}$ --- $(\qquad)_{10}$ --- $(\qquad)_{BCD+3}$ --- $(\qquad)_{ASCII}$

$(1000\text{-}0100)_{BCD+3}$ --- $(\qquad)_{BCD}$ --- $(\qquad)_{ASCII}$

(20 min)

5. Go to location 100 on the first page of memory. Read and record the ASCII coded message in the next five locations.

(10 min)

6. Draw, construct and demonstrate a four bit LRC circuit to be transmitted at the conclusion of a sixteen bit word.

(40 min)

7. Define in topological terms: point, set, universe, null set, AND set, OR set, NOT set.

(10 min)

8. Define in gating terms: positive logic, AND, OR, NOT, NAND, NOR. Give the truth tables and demonstrate their validity to the instructor or lab assistant.
(30 min)

9. List the 26 laws of Boolean Algebra. Illustrate them with Venn diagrams and with gating definitions.
(20 min)

EXAMINATION 2 (SAMPLE)

(Closed Reference)

1. Give the equation, truth table, and flow diagram for an exclusive OR, digital comparator, half adder, and full adder. Connect the circuit to verify the truth table and demonstrate their validity to the instructor or lab assistant.

(20 min)

2. Given the following problems of four input variables with the desired numerical output sequence; use Karnaugh maps, multiple maps, Quine-McCluskey reduction or Mahonney mapping to reduce the equation. Draw and construct the flow diagram and verify his results for the instructor or lab assistant.

(40 min)

$F_1 = \Sigma_{16}$ 0, 2, 5, 7, 8, A, D, F

$F_2 = \Sigma_{16}$ 1, 3, 5, 7, 9, B

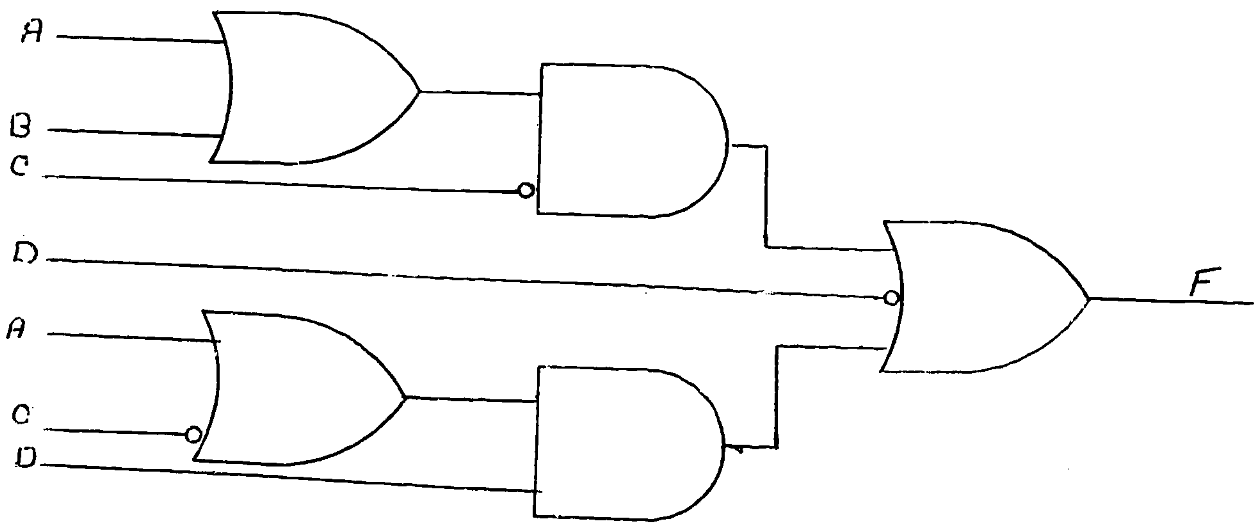
$F_3 = \Sigma_{16}$ 2, 6, A, C, D, E, F

$F_4 = \Sigma_{16}$ A, B, C, D, E, F

$F_5 = \Sigma_{16}$ 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

3. Given the following AND-OR-NOT flow diagram reduce the diagram to four input equations, derive the function realizations from the Karnaugh map and verify his results on the logic board for the instructor or lab assistant.

(20 min)



4. Define the following integrated circuit specifications: logic voltage levels, threshold, noise, fan-in, fan-out, unit load, T_r, t_t, (let, tet), propagation delay, package delay, power dissipation, package type.

(15 min)

5. Define and give the distinguishing characteristics of each of these integrated circuit families: RTL, DTL, TTL, ECL, and MOS Logic.

(15 min)

6. Given the following logic equations implement the equations in NORs, either by gate substitution or by the NOR Theorem. Using the logic board verify implementation for the instructor or lab assistant.

(20 min)

$$F_1 = A \cdot B + \overline{C} \cdot \overline{D} + E$$

$$F_2 = (A+B) \cdot (C+D) + \overline{A} \cdot \overline{D}$$

$$F_3 = A \cdot (B+C \cdot D) + \overline{A} \cdot \overline{B}(\overline{C}+\overline{D})$$

$$F_4 = (\overline{A}\ \overline{B}+AB) \cdot (C \cdot \overline{D}+\overline{C} \cdot D)$$

$$F_5 = \overline{(\overline{A}+\overline{B} + (\overline{C+D}) + \overline{\overline{(\overline{A}+\overline{D}}}}$$

EXAMINATION 3 (SAMPLE)

Closed Reference, Part I (3 hrs.)

1. Implement the following equations in NAND's. Connect the flow diagram and demonstrate to the instructor.

(20 min)

$$F_1 = A \cdot B + \overline{A} \cdot \overline{B}$$

$$F_2 = A \cdot \overline{B} + \overline{A} \cdot B$$

$$F_3 = A - B + A = C + B \cdot C$$

$$F_4 = \overline{A}\,\overline{B}C + \overline{A}B\overline{C} + A\overline{B}\,\overline{C} + ABC$$

$$F_5 = A \cdot (B+C)$$

2. A TTL gate requires a differentiator with a three nano second trailing edge. Calculate the values; construct the circuit, and demonstrate to the instructor or lab assistant.

(10 min)

3. Give the truth table for a SR flip flop made with NOR's. Give the truth table for a SR flip flop made with NAND's. Connect both circuits and demonstrate to the instructor.

(15 min)

4. Define a clocked SR flip flop, a shift register, and a ring counter. A four bit ring counter reads 1100. What will it read after three pulses? Draw and connect the circuit and demonstrate to the instructor.

(15 min)

5. Define the following flip flops: D, T, J, J, monostable, astable, and master-slave. Draw the logic dates to form each type. Connect the circuits and demonstrate to the instructor or lab assistant.

(30 min)

6. Draw a flow diagram of an octal up counter, a hexidecimal down counter, a decade counter, an excess three counter, and an octal up-down counter. Connect the octal up-down counter and demonstrate to the instructor or lab assistant.

(30 min)

7. Discuss the operation of the arithmetic element of a digital computer. Use examples of addition, subtraction, multiplication, and division.

(30 min)

8. Write a brief description of analog comparators as used in analog-to-digital converters.

(15 min)

Closed Reference, Part II (3 hrs.)

Note: Students will assigned at random to work one of the four problems below.

1. Draw a three register arithmetic element for a four bit serial manipulation of addition, subtraction, multiplication, and division. Construct the circuit and verify all calculations for the instructor or lab assistant.

(2 hrs)

2. Write a brief paragraph on digital-to-analog conversion explaining ladders and level amplifiers as they are used in DAC Units. Construct a DAC Unit on the logic board, applying a four bit up counter to the DAC inputs. Observe the staircase output on a scope and recording the values for all steps and for all glitches. Results should be demonstratedto the instructor or lab assistant.

(2 hrs)

3. Draw an ADC Unit using the successive approximation technique. Construct and verify the circuit on the lab board for the instructor or lab assistant.

(3 hrs)

4. Draw a flow diagram for an ADC Unit using the frequency count technique. Construct the circuit and verify the results on the lab board for the instructor or lab assistant.

(2 hrs)

COURSE: TM 313

TITLE: Technical Math, Part III

PREREQUISITE: TM 301

DATE		HOURS
	I. Review of Exponential Functions	3.0
	II. Equations of Degree Three and Above	4.5
	A. Remainder Theorem and Factor Theorem	
	B. Synthetic Division	
	C. The Roots of an Equation	
	D. Rational Roots	
	E. Irrational Roots	
	III. Inequalities	3.0
	A. Properties	
	B. Graphical Solution	
	C. Algebraic Solution	
	D. Inequalities Involving Absolute Values	
	IV. Derivative	6.0
	A. Limits	
	B. Slope	
	C. Meaning	
	D. Polynomials	
	E. Products & Quotients	
	F. Chain Functions	
	V. Objectives Test, Student Evaluation, and Corrective Feedback	1.5
	VI. Applications of the Derivative	9.0
	A. Tangents and Normals	
	B. Curvilinear Motion	
	C. Curve Sketching	
	D. Maximum and Minimum	
	E. Series RC and Parallel RL Networks with Linear Input Variations	
	VII. Integration	3.0
	A. Differentials	
	B. Inverse Differentials	
	C. Indefinite Integral	

DATE			HOURS
		D. Areas	
		E. Trapezoidal Rule	
	VIII.	Applications of Integration	4.5
		A. Indefinite Integral	
		B. Areas	
		C. Volumes	
		D. Parallel RC and Series RL Networks with Linear Input Variations	
	IX.	Objectives Test, Student Evaluation, and Corrective Feedback	1.5
	X.	Least Squares Curve Fitting From Multiplexed Valves	4.5
	XI.	RLC Networks with any Input Variation	6.0
	XII.	Objectives Test, Student Evaluation, and Corrective Feedback	1.5
		TOTAL HOURS	48.0

TM 313

OBJECTIVES

Using only paper, pencil and slide rule, the student shall within fifteen minutes correctly give the exponential series and shall show the derivation of the sine, cosine, and tangent functions.

Using only paper, pencil and slide rule, the student shall within fifteen minutes correctly solve at least two of three equations of degree three and above. He may use the remainder and factor theorem as well as synthetic division to find the rational and irrational roots of the equations.

Using only paper, pencil and slide rule, the student shall within fifteen minutes correctly solve two of three inequalities by both graphical and algebraic solution.

Using only paper and pencil, the student shall within five minutes correctly list at least five of the properties of inequalities discussed in class.

Using only paper and pencil, the student shall within five minutes correctly define and give an example of derivative.

Using only paper and pencil, the student shall within twenty minutes correctly solve eight polynomials for first derivative. Six of these equations shall require the application of the product rule, the quotient rule, or the chain function rule for extracting first derivatives.

Using only paper and pencil, the student shall within ten minutes discuss the application of exponential functions, inequalities and derivatives to electronic instrumentation giving at least one specific example of each.

Examination 1.

Using only paper, pencil and slide rule, the student shall within ten minutes correctly solve and plot a polynomial applying the derivative to find maximum and minimum points to sketch the curve and to find all tangents and normals at the real axis.

Using only paper, pencil and slide rule, the student shall within twenty minutes correctly solve two of three problems on series RC or parallel RL networks with linear input va ited to six).

Using only paper and pencil, the student shall within ten minutes correctly solve two of three polynomials consisting of four terms or less and degree three or less by integration and evaluation at the lower and upper limits.

Using only paper, pencil and slide rule, the student shall within ten minutes correctly solve for the area bounded by the real axis, any two defined limit points and any polynomial equation.

Using only paper, pencil and slide rule, the student shall within ten minutes work correctly two of three problems involving computation of areas or volumes of common geometric figures.

Using only paper, pencil and slide rule, the student shall within twenty minutes correctly solve two of three problems on parallel RC or series RL networks with linear input variations (limited to six).

Using only paper and pencil, the student shall within ten minutes correctly discuss the application of differentiation and integration to electronic instrumentation.

Examination 2.

Using only paper, pencil and slide rule, the student shall within forty-five minutes if given a table of values acquired from a multiplexer of known sample window use the least squares curve fitting technique to fit and plot either a first, second or third degree curve as indicated.

Using only paper, pencil and slide rule, the student shall within one hour correctly solve and plot any RLC network with any input variations.

Using only paper, pencil and slide rule, the student shall within fifteen minutes discuss the application of least square curve fitting to electronic instrumentation.

Using only paper, pencil and slide rule, the student shall work one hour of the most frequently missed problems selected from the first two examinations.

Final Examination

TM 313

EXAMINATION 1 (SAMPLE)

(Closed Reference)

1. Give the series for ϵ^x. Show the derivation of the sine, cosine, and tangent function from this series.

(15 min)

2. Solve for the roots:

   a) $F(x) = 6x^3 - 5x^2 - 12x - 4$

   b) $F(x) = 6x^3 - 17x^2 - 5x + 6$

   c) $F(x) = 12x^3 - 50x^2 + 46x - 12$

(15 min)

3. Solve graphically and algebraically:

   a) $5x - 2 > x - 1$

   b) $2x^2 > x - 4$

   c) $x^3 > 2 - 3x$

(15 min)

4. List at least five properties of inequalities discussed in class.

(5 min)

5. Define and give an example of derivative.

(5 min)

6. Obtain the first derivative:

   a) $F(x) = 4x^3 - 5x^2 + x - 12$

   b) $F(x) = x^2 - 4\sqrt{x} + 9$

   c) $F(x) = (x^3 - 4)(2x^2 - 9x + 5)$

   d) $F(x) = (2x^2 - 4x + 1)(x + 12)$

e) $F(x) = \frac{x}{3x - 1}$

f) $F(x) = \frac{x + 5}{x^2 - 2x + 1}$

g) $F(x) = (x^2 + 5x - 1)^2$

h) $F(x) = (x^2 - 2)^2(3x^2 - 5x + 1)^3$

(20 min)

7. Discuss the application of exponential functions, inequalities and derivatives to electronic instrumentation giving at least one specific example of each.

(10 min)

TM 313

EXAMINATION 2 (SAMPLE)

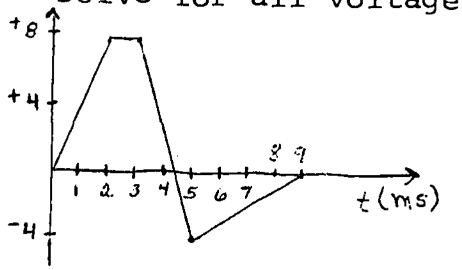
(Closed Reference)

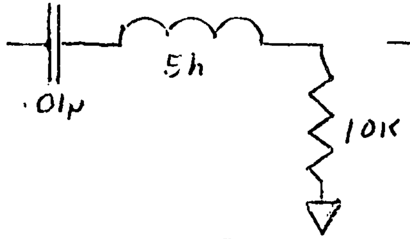
1. Solve and plot using the derivatives to find maximum and minimum points. [illegible] the tangents and normals at the real axis.

$$F(x) = x^3 - 4x^2 - 4x + 16$$

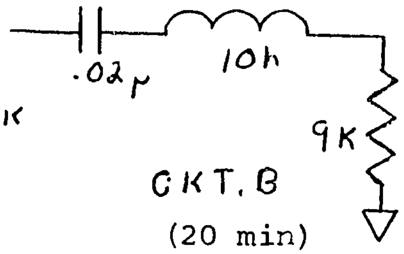
(10 min)

2. Apply the following periodic input current to both circuits. Solve for all voltages and plot.





CKT. A



CKT. B

(20 min)

3. Integrate and evaluate.

a) $\int_1^3 (x - 4)\,dx$

b) $\int_2^3 (3x^2 - 2x + 1)\,dx$

c) $\int_1^2 (x^4 - \sqrt{x})\,dx$

(10 min)

4. Solve for the area bounded by the curve, the real axis, and the roots of the equation.

$$F(x) = x^2 - 4$$

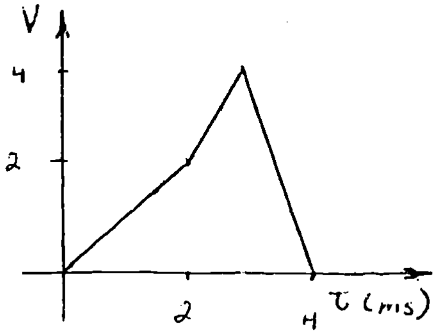
(10 min)

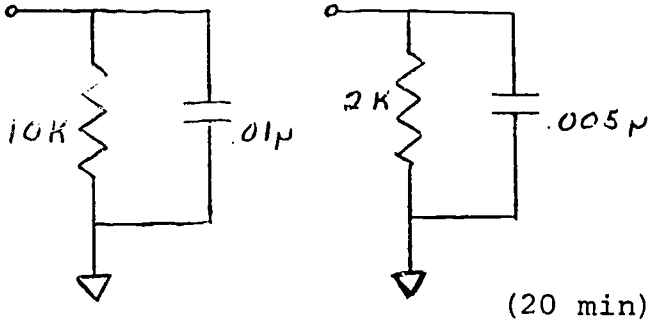
5. Calculate the following volumes:

a) a cone with a 4 foot radius and a 6 foot height
b) a sphere with a 30 foot radius
c) rotate the area bounded by $y = 2x^2$, $x = 4$, and $y = 0$ about the x axis and calculate the colume contained.

(10 min)

6. Apply the following periodic input voltage to both circuits. Solve for the currents and plot.





(20 min)

7. Discuss the application of differentiation and integration to electronic instrumentation.

(10 min)

TM 313

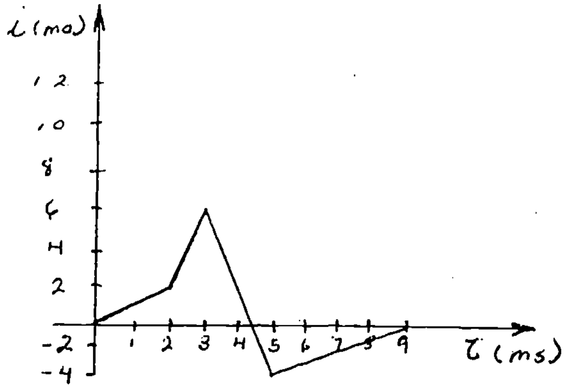
FINAL EXAMINATION (SAMPLE)

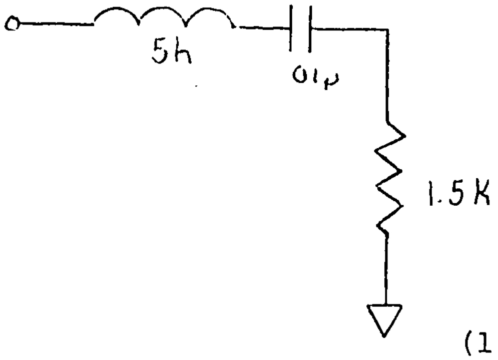
(Closed Reference)

1. A multiplexer with a 5 millisecond sampling interval reveals the following data: 1, 2, 3, 3, 2, 1, 1, 2, 3, 4
Fit a cubic equation by "least squares".

(45 min)

2. Solve and plot.





(1 hour)

3. Discuss the application of least squares curve fitting to electronic instrumentation.

(15 min)

4. Work the following problems which were selected from the most frequently missed problems of examinations 1 and 2.

(1 hour)

COURSE: EI 316

TITLE: Electronic Instrumentation Project

With the consent and direction of the department chairman, the student shall earn three credit hours upon satisfactory completion of an Applied Research Project in Electronic Instrumentation.

The student and the chairman will together determine an area of electronic instrumentation in which further research and specialization would benefit the student. A contract of behavioral objectives for 48 contact hours will be drawn up and signed by the chairman and the student within two weeks after registration. Minimum criterion performances for grade levels A, B, and I will be specified in the contract.

COURSE: EI 415

TITLE: Computers & Computer Controlled Systems

PREREQUISITE: EI 414, TM 302

DATE		
—	I. Entry Skills Test, Pretest Over Course Objectives, Course Orientation	2.0
	II. Computer Operations	4.0
______	A. Special purpose and general	
______	B. Large computers versus small computers	
______	C. Time sharing	
______	D. Use of computers for real time control	
	III. Software Constraints On Real Time Control	9.0
______	A. Assembly language	
______	B. Machine language	
______	C. Diagnostics	
______	D. Instructions set affecting the interfaces	
______	IV. Memory Elements Reserved For Interface Device	3.0
	V. Modes of Operation and Control	12.0
______	A. Data acquisition	
______	B. Supervisory	
______	C. Direct digital control	
______	VI. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	VII. Input-Output Devices	12.0
______	A. Tape units	
______	B. Printers	
______	C. CRT displays	
______	D. Digital to analog converters	
______	E. Analog to digital converters	
______	F. Multiplexers	
______	G. Alarm/status/interrupt circuitry	
______	H. Decoders	
______	I. Sample and hold units	
______	J. Modems	

DATE			HOURS
	VIII.	Interfaces	24.0
		A. Data channels	
		B. IO buses	
		C. Timing	
		D. Byte formats	
		E. Buffering	
		F. Error detection and correction techniques	
		G. Systems consideration	
		H. Stimulation/emulation	
	IX.	Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	X.	Organization of Control Circuitry	6.0
		A. Instruction and execution time	
		B. Sequence of control registers	
		C. Distributed and centralized control	
		D. Index registers	
	XI.	Trouble Shooting	15.0
		A. Central processing unit	
		B. Computer peripherals	
		C. Interfaces	
		D. Isolation of field troubles from the CPU front panel	
		E. Isolation of more difficult field troubles from the interface	
	XII.	Objectives Test, Student Evaluation, and Corrective Feedback	3.0
			96.0

EI 415

OBJECTIVES

Using only paper, pencil, and templates, the student shall within fifteen minutes draw a block diagram of a digital computer labeling all blocks and showing the direction of data flow.

Using only paper and pencil, the student shall within fifteen minutes list the advantages, disadvantages and distinguishing features of large computers versus small computers.

Using only paper and pencil, the student shall within fifteen minutes define time sharing and its application in the use of computers for real time control.

Using only paper, pencil and templates, the student shall within twenty-five minutes write and run an assembly language program to type a message on the teletype. The program is to be entered and executed via the front panel in machine language.

Using only paper, pencil and templates, the student shall within thirty minutes write and run a program in assembly language which takes in a number from the keyboard of the teletype, subtracts the number from a set point value contained in core, and prints the result on the teletype. The program is to be entered via the front panel in machine language.

Using only paper and pencil, the student shall within twenty minutes list the entire instruction set affecting the interface to the IO section. The student will explain each instruction.

Using only paper and pencil, the student shall within fifteen minutes list at least five elements of external memory which can be attached to the computer. The student will list the major advantages and disadvantages including the approximate price of each memory element.

Using only paper, pencil and templates, the student shall within twenty-five minutes correctly draw a block diagram of a data acquisition system, supervisory system, and a direct digital control system. The student will explain the function of each block in the diagram.

Examination 1.

EI 415

Using only paper, pencil and templates, the student shall within twenty minutes define and give the distinguishing characteristics of the following input-output devices: tape units, printers, CRC's, DAC's, ADC's, multiplexers, alarm/status/interrupt circuits, decoders, sample and hold units, and modems.

Using only paper, pencil, templates, logic demonstrator board and test equipment, the student shall within three hours draw and construct a successive approximation four bit ADC with an eight bit multiplexer.

Using only paper, pencil, templates, logic demonstrator board and test equipment, the student shall within two hours draw and construct a four bit DAC complete with multiplexer and four sample and hold units.

Using only paper, pencil, and templates, the student shall within ten minutes distinguish between data channels and IO buses. The student will explain the importance of timing byte formats and buffering on both data channels and buses.

Using only paper, pencil, templates, logic demonstrator board and test equipment, the student shall within twenty minutes if given a request by the instructor draw and construct an error detection circuit.

Using only paper, pencil, templates, wire wrap board, vector board, wire wrap gun, thermal stripper and tool box, the student shall within three hours draw and construct an interface designed by the instructor to simulate and emulate class I, II, III and IV control.

Examination 2.

Using only paper, pencil and templates, the student shall within twenty minutes list typical instruction and execution times for the interface constructed prior to examination 2. He shall also explain the sequence of control and index registry used to manipulate his IO devices.

Using only paper, pencil, templates and test equipment, the student shall within two and one-half hours draw a binary trouble-shooting diagram for isolation of field trouble from the CPU front panel. The student shall then draw a binary trouble-shooting diagram for isolation of field and peripheral troubles from the interface. The student shall demonstrate the procedures to the instructor or lab assistant.

EI 415

Using only paper, pencil, templates and test equipment, the student shall within two and one-half hours if given the flow diagrams for any of the four major sections of the computer, draw a binary trouble-shooting diagram and use the diagram to locate the malfunction and restore the computer to active service. The student shall demonstrate this procedure to the instructor or lab assistant.

Examination 3.

EI 415

EXAMINATION 1 (SAMPLE)

(Closed Reference)

1. Draw a block diagram of a digital computer labeling all blocks and showing the direction of data flow. (15 min)

2. List the advantages, disadvantages and distinguishing features of large computers versus small computers. (15 min)

3. Define time sharing and its application in the use of computers for real time control. (15 min)

4. Write and run an assembly language program to type a message on the teletype. The program is to be entered and executed via the front panel in machine language. (25 min)

5. Write and run a program in assembly language which takes in a number from the keyboard of the teletype, subtracts the number from a set point value contained in core, and prints the result on the teletype. The program is to be entered via the front panel in machine language. (30 min)

6. List the entire instruction set affecting the interface to the IO section. Explain each instruction. (20 min)

7. List at least five elements of external memory which can be attached to the computer. List the major advantages and disadvantages including the approximate price of each memory element. (15 min)

8. Draw a block diagram of a data acquisition system, supervisory system, and a direct digital control system. Explain the function of each block in the diagram. (25 min)

EI 415

EXAMINATION 2 (SAMPLE)

(Closed Reference. Work problems 1, 3, 4 & 5 or problem 2 or problem 6.)

1. Define and give the distinguishing characteristics of the following input-output devices: tape units, printers, CRC's, DAC's, ADC's, multiplexers, alarm/status/interrupt circuits, decoders, sample and hold units, and modems. (20 min)

2. Draw and construct a successive approximation four bit ADC with an eight bit multiplexer. (3 hours)

3. Draw a four bit DAC complete with multiplexer and four sample and hold units. (2 hours)

4. Distinguish between data channels and IO buses. Explain the importance of timing byte formats and buffering on both data channels and buses. (10 min)

5. Draw and construct a Bose Chaudhuri detection circuit. (20 min)

6. Draw and construct an interface designed by the instructor to simulate and emulate class I, II, III and IV control. (3 hours)

EI 415

EXAMINATION 3 (SAMPLE)

(Closed Reference. Work number 1 and either number 2 or number 3.)

1. List typical instruction and execution times for the interface constructed prior to examination #2. Explain the sequence of control and index registry used to manipulate his IO devices.

(20 min)

2. Draw a binary trouble-shooting diagram for isolation of field trouble from the CPU front panel. Draw a binary trouble-shooting diagram for isolation of field and peripheral troubles from the interface. Demonstrate the procedures to the instructor or lab assistant.

(2.5 hours)

3. The instructor will issue the flow diagrams for the arithmetic unit of the computer. Draw a binary trouble-shooting diagram and use the diagram to locate the malfunction and restore the computer to active service. Demonstrate this procedure to the instructor or lab assistant.

(2.5 hours)

COURSE: EI 417

PREREQUISITES: EI 413, EI 414, TM 303

DATE		HOURS
	I. Introduction to Telemetry	6.0
______	A. History	
______	B. Applications	
______	C. Irig Rules	
______	D. Frequencies	
	II. Techniques of Data Handling	15.0
______	A. Data Sampling	
______	B. FM/FSK	
______	C. PAM	
______	D. PCM	
______	E. PDM	
______	F. PSK	
______	G. QPSK	
______	III. Objectives Test, Student Evaluation, & Corrective Feedback	3.0
	IV. Equipment in Telemetry	21.0
______	A. Signal Conditioners	
______	B. Subcarrier Oscillators	
______	C. Commutation 1. Mechanical 2. Solid State	
______	D. Transmitters 1. Modulators 2. Multipliers	
______	E. Objectives Test, Student Evaluation, & Corrective Feedback	3.0
______	F. Receivers 1. Preamplifiers 2. Amplifiers 3. Multicouplers 4. Demodulators	21.0
______	G. Discriminators	
______	H. Decommutation	
	I. Antennas	
______	J. Objectives Test, Student Evaluation, & Corrective Feedback	3.0

DATE		HOURS
	V. Telemetry System	21.0
____________	A. Measurement Considerations	
____________	B. Equipment Considerations	
____________	C. Ground Stations	
____________	D. Airborne Stations	
____________	E. Orbiting Stations	
____________	F. Objectives Test, Student Evaluation, & Corrective Feedback	3.0
	TOTAL HOURS	96.0

EI 417

OBJECTIVES

Using only paper and pencil, the student shall within twenty minutes discuss the applications of telemetry to process control. The student shall explain IRIG rules and frequency allocations as they pertain to telemetry in simplex, half duplex and duplex modes. The student shall relate the discussion to radio, microwave, voice grade lines and lease lines.

Using only paper and pencil, the student shall within twenty minutes define data sampling and draw a circuit diagram for a data sampling system. The student will use either ASCII, Baudot, four of eight, or Hollerith for the system.

Using only paper, pencil and templates, the student shall within twenty minutes draw a block diagram and explain the theory of operation of an FM or FSK telemetry system.

Using only paper, pencil and templates, the student shall within twenty minutes draw a block diagram and explain the theory of operation of a PAM telemetry system.

Using only paper, pencil, templates, logic demonstrator board, test equipment and wire wrap materials, the student shall within sixty minutes draw a block diagram, explain the theory of operation, and construct a PCM telemetry system consisting of transmitter and receiver.

Using only paper, pencil and templates, the student shall within thirty minutes define PDM, PSK, QPSK and describe the distinguishing features of each.

Examination 1.

Using only paper, pencil, logic demonstrator board and test equipment, the student shall within fifteen minutes draw and construct a telemetry signal conditioner.

Using only paper and pencil, the student shall within fifteen minutes discuss subcarrier oscillators as employed in telemetry systems.

Using only paper, pencil and wire wrap materials, the student shall within two and one-half hours draw and construct the transmitter portion of a telecommunication modem complete with modulator, solid state commutation excluding security check word.

Examination 2.

Using only paper, pencil, wire wrap construction materials and vector board construction materials, the student shall within two and one-half hours correctly draw and construct the receiver of a modem complete with demodulators, discriminators, phase lock loops, decomutators, excluding security check word.

Using only paper and pencil, the student shall within twenty minutes discuss antennas as used in telemetry systems.

Examination 3.

Using only paper, pencil, and test equipment, the student shall within twenty minutes discuss and demonstrate to the instructor or lab assistant measurement systems considerations for industrial telemetry.

Using only paper and pencil, the student shall within thirty minutes discuss equipment considerations for a telemetry system and shall within plus or minus fifty per cent estimate the price of all items of equipment necessary for the telemetry system including test equipment. The student shall name at least three vendors or manufacturers for each piece of equipment.

Using only paper, pencil, order blanks and manufacturers catalogs, the student shall within forty-five minutes correctly fill out the order forms for all items of equipment in a telecommunications system including the necessary test equipment.

Using only paper and pencil, the student shall within forty-five minutes discuss the distinguishing features of air borne and orbiting telemetry stations as opposed to process control.

Examination 4.

EI 417

EXAMINATION 1 (SAMPLE)

(Closed Reference)

1. Discuss the applications of telemetry to process control. Explain IRIG rules and frequency allocations as they pertain to telemetry in simplex, half duplex and full duplex mode. Relate the discussion to radio, microwave, voice grade lines and lease lines.

   (20 min)

2. Define data sampling and draw a circuit diagram for a data sampling system. Use either ASCII, Baudot, four of eight, or Hollerith for the system.

   (20 min)

3. Draw a block diagram and explain the theory of operation of FM or FSK telemetry system.

   (20 min)

4. Draw a block diagram and explain the theory of operation of a PAM telemetry system.

   (20 min)

5. Draw a block diagram, explain the theory of operation, and construct a PCM telemetry system consisting of transmitter and receiver.

   (60 min)

6. Define PDM, PSK, QPSK and describe the distinguishing features of each.

   (30 min)

EI 417

EXAMINATION 2 (SAMPLE)

(Closed Reference)

1. Draw and construct a telemetry signal conditioner.

(15 min)

2. Discuss subcarrier oscillators as employed in telemetry systems.

(15 min)

3. Draw and construct the transmitter portion of a telecommunication modem complete with modulator and solid state commutation.

(2.5 hours)

EI 417

EXAMINATION 3 (SAMPLE)

(Closed Reference)

1. Draw and construct the receiver of a modem complete with demodulators, discriminators, phase lock loops and decommutators.

(2.5 hours)

2. Discuss antenas as used in telemetry systems.

(20 min)

EI 417

EXAMINATION 4 (SAMPLE)

(Closed Reference)

1. Discuss and demonstrate to the instructor or lab assistant measurement systems considerations for industrial telemetry. (20 min)

2. Discuss equipment considerations for a telemetry system and with plus or minus fifty per cent estimate the price of all items of equipment necessary for the telemetry system including test equipment. Name at least three vendors or manufacturers for each piece of equipment. (30 min)

3. Fill out the order forms for all items of equipment in a telecommunications system including the necessary test equipment. (45 min)

4. Discuss the distinguishing features of air borne and orbiting telemetry stations as opposed to process control. (45 min)

COURSE: TM 411

TITLE: Technical Math: Introduction to Computer Programming

PREREQUISITE: TM 301, and TM 302

DATE		HOURS
______	I. Introduction to the Organization and Utilization of Digital Computer Systems	3.0
	II. Overview of Assembly Languages	16.0
______	A. Front panel control	
______	B. I/O transfers	
______	C. Masking and stripping	
______	III. Objectives Test, Student Evaluation and Corrective Feedback	3.0
	IV. Arithmetic Expressions and Assignment Statements	6.0
______	A. Algorithmic notation	
______	B. Constants	
______	C. Variables	
______	D. Labels	
	V. Coding Arithmetic Statements	6.0
______	A. Functions	
______	B. Mixed mode expressions	
	VI. I/O Statements (elementary)	9.0
______	A. Read	
______	B. Format	
	1. I format	
	2. F format	
	3. H format	
	4. X format	
______	C. Write	
______	VII. Objectives Test, Student Evaluation, and Corrective Feedback	3.0
	VIII. Procedural/Logical Statements	19.0
______	A. Flow charts	
______	B. Go To	
	1. Unconditional	
	2. Conditional	

DATE		HOURS
	a. Assigned	
	b. Computed	
	IX. I/O Statements (advanced)	12.0
____________	A. Read	
____________	B. Format	
	1. E format	
	2. T format	
	3. L format	
	4. A format	
____________	X. Objectives Test, Student Evaluations, and Corrective Feedback	3.0
	XI. Library Functions	6.0
____________	A. Trigonometric	
____________	B. Logarithmic	
____________	C. Exponential series, etc.	
	XII. Specification Statements	7.0
____________	A. Common	
____________	B. Data initialization	
____________	C. Dimension	
____________	D. Equivalence	
____________	E. Data image	
	1. Integer	
	2. Logical	
	3. Real	
____________	F. Title	
____________	XIII. Objectives Test, Student Evaluations, and Corrective Feedback	3.0
	TOTAL HOURS	96.0

OBJECTIVES

Using only paper, pencil, and templates, the student shall within fifteen minutes draw a block diagram of a digital computer labeling all blocks and showing the direction of data flow.

Using only paper, and pencil, the student shall within fifteen minutes list the advantages, disadvantages, and distinguishing features of large computers versus small computers.

Using only paper, pencil, and templates, the student shall within twenty minutes define and give the distinguishing characteristics of the following input-output devices: disc, tape, printer, plotter, CRC, teletype, modem, acoustic coupler, and drum.

Using only paper, pencil, and templates, the student shall within twenty-five minutes write and run an assembly language program to type a message on the teletype. The program is to be entered and executed via the front panel in machine language.

Using only paper, pencil, and templates, the student shall within thirty minutes write and run a program in assembly language which takes in a number from the teletype, subtracts the number from a set point contained in core and prints the results on the teletype. The program is to be entered via the front panel in machine language.

Using only paper and pencil, the student shall within twenty minutes list the entire instruction set affecting interfaces to the IO structure. The student will explain each instruction.

Using only paper, pencil, and templates, the student shall within twenty minutes write and run an assembly language program to take in a number from the teletype and to mask and strip it. The program will be entered via the front panel in machine language.

Examination 1.

Using only paper and pencil, the student shall within fifteen minutes define and give an example of the following terms: algorithmic notation, constants, variables, and labels.

Using only paper, pencil, and templates, the student shall within thirty minutes write a Fortran IV program to read in from the card reader numbers in I format, F format, and X format. The student will add the numbers in the mixed mode expression and will print the results in I format using message tags in H format.

Examination 2.

Using only paper, pencil, and templates, the student shall within thirty minutes draw a flow chart and write a program which involves the unconditional "go to" as well as the assigned and computed conditional "go to's."

Using only paper, pencil, and templates, the student shall within thirty minutes write a program involving the reading and writing of values in E format, T format, L format, and A format.

Examination 3.

Using only paper, pencil, and templates, the student shall within thirty minutes write a program demonstrating the correct use of the following library functions: trigonometric, logarithmetic and exponential series.

Using only paper, pencil, and templates, the student shall within forty-five minutes write a program to read in a matrix and to solve for Delta.

Examination 4.

EXAMINATION 1 (SAMPLE)

1. Draw a block diagram of a digital computer labeling all blocks and showing the direction of data flow.

   (15 min)

2. List the advantages, disadvantages and distinguishing features of large computers versus small computers.

   (15 min)

3. Define and give the distinguishing characteristics of the following input-output devices: disc, tape, printer, plotter, CRC, teletype, modem, acoustic coupler, and drum.

   (20 min)

4. Write and run an assembly language program to type a message on the teletype. Enter and execute the program via the front panel in machine language.

   (25 min)

5. Write and run a program in assembly language which takes in a number from the teletype, subtracts the number from a set point contained in core and prints the results on the teletype. Enter the program via the front panel in machine language.

   (30 min)

6. List the entire instruction set affecting interfaces to the IO structure. Explain each instruction.

   (20 min)

7. Write and run an assembly language program to take in a number from the teletype and mask and strip it. Enter the program via the front panel in machine language.

   (20 min)

EXAMINATION 2 (SAMPLE)

1. Define and give an example of the following terms: algorithmic notation, constants, variables, and labels.

(15 min)

2. Write a Fortran IV program to read in from the card reader numbers in I format, F format, and X format. Add the numbers in the mixed mode expression and print the results in I format using message tags in H format.

(30 min)

TM 411

EXAMINATION 3 (SAMPLE)

1. Draw a flow chart and write a program which involves the unconditional "go to" as well as the assigned and computed conditional "go to's."

   (30 min)

2. Write a program involving the reading and writing of values in E format, T format, L format and A format.

   (30 min)

TM 411

EXAMINATION 4 (SAMPLE)

1. Write a program demonstrating the correct use of the following library functions: trigonometric, logarithmetic, and exponential series.
(30 min)

2. Write a program to read in a matrix and to solve for Delta.
(45 min)

VT 016 633
SAFETY IN INDUSTRY, INSTRUCTOR OUTLINE.
INSTRUCTOR INSTITUTE.

WAGE AND LABOR STANDARDS ADMINISTRATION
(DCL), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
BULL-316
SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT
PRINTING OFFICE, WASHINGTON, D.C. 20402
(L16.3:316,$.60)
PUB DATE - 70 64P.

DESCRIPTORS - *SAFETY; *TEACHING GUIDES;
*MANUALS; *INDUSTRIAL PERSONNEL; SAFETY
EDUCATION; *CONSULTANTS

ABSTRACT - THIS MANUAL IS ONE IN A SERIES OF EIGHT DESIGNED SPECIFICALLY AS TEACHING GUIDES FOR USE IN A SAFETY COURSE DEVELOPED PRIMARILY FOR INDUSTRIAL PERSONNEL. RECOMMENDED INSTRUCTIONAL PERIODS OF TWO 50-MINUTE PERIODS WITH A 15 MINUTE BREAK BETWEEN ARE SUGGESTED FOR ONCE OR TWICE A WEEK. PARTICIPANTS ATTENDING THE CONFERENCE SESSIONS SHOULD BE AT THE SAME SUPERVISORY OR WORKER LEVEL. ADDITIONAL AIDS AND MATERIALS ARE REQUIRED TO SUPPLEMENT THE BASIC TEXT. INITIATION OF THE CONSULTATIVE APPROACH FOR SAFETY PROMOTION IS THE MAJOR FOCUS OF THIS BOOKLET. SAFETY TRAINING TECHNIQUES AS WELL AS INFORMATION CONCERNING EFFECTIVE WAYS OF UTILIZING THE EXPERTISE OF GUEST INSTRUCTORS ARE GIVEN. OTHER SUBJECT CONTENT INCLUDES: (1) THE CONSULTATIVE APPROACH, (2) QUALIFICATIONS OF CONSULTANT, (3) SELLING SAFETY, (4) SURVEY FOR APPRAISAL, (5) PREPARING RECOMMENDATIONS, (6) THE WRITTEN REPORT AND (7) FOLLOW-UP. (SN)

SAFETY IN INDUSTRY ■ INSTRUCTOR OUTLINE
U.S. DEPARTMENT OF LABOR SAFETY TRAINING PROGRAMS

INSTRUCTOR INSTITUTE

U.S. DEPARTMENT OF LABOR, Wage and Labor Standards Administration, *Bulletin 316*

2829

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402—Price 60 cents

LS No. S30

INSTRUCTOR INSTITUTE

This instructor outline is one of a series developed in the Office of Occupational Safety, Bureau of Labor Standards, Wage and Labor Standards Administration.

This outline is intended only as a guide to standard presentation of the subject in sequence and basic content. Additional information, material, and illustrations should be included for a complete presentation suitable to the conditions, locality, industry, or occupational group.

This outline was prepared in the Office of Occupational Safety by Stanley J. Butcher, chief of the Training and Education Branch.

TABLE OF CONTENTS

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INTRODUCTION

The instructor might profit from consideration of these philosophies on the subject of Safety Education.

1 Safe behavior is a matter of choosing low-risk rather than high-risk alternatives. Safety training should be directed toward increasing the probability that low-risk choices will be made which requires an understanding of the factors underlying such decisionmaking.

2 High-risk choices may be made if the person does not know the hazards in a situation and therefore does not suspect the degree of risk, or if he is aware of the hazards but does not evaluate them according to the realities of the situation. The realities for an individual may be what he believes exist rather than what actually exists. What he perceives is influenced by his past experiences and by what he expects. The resulting behavior is a response to the way the situation appears to him. Therefore, any difference between the situation as it exists and as it is perceived may lead to high-risk behavior which would not otherwise be chosen.

3 When an individual's *assessment* of a situation matches the *actual* situation, a *low-risk* response might reasonably be expected.

4 While knowledge is an important element in decisionmaking, knowledge alone does not guarantee either low-risk choices or behavior guided by these choices. The appropriate attitude seems to be necessary to impel action. The development of positive attitudes and a disposition to make wise choices in matters of safety are essentially a teaching-learning process.

5 Behavior is a product of several interacting factors. When a person acts, his knowledge is only one of many factors involved. He has developed certain skills, and he has feelings and desires. He may reject the expected pattern of behavior for a given situation, because using this pattern will not help in attaining his goals.

Assuming that these philosophies express truths, safety training should combine the mechanical and physical aspects of knowledge and skill training with the psychological factors of personality traits and attitudes as related to behavior. It must be recognized that behavior depends upon the situations (working conditions) and the specific determination of what to do and how to do it at the precise moment when such determination will either prevent or possibly result in an accident.

The results of the safety training will show up in the amount of influence that training has had in the action of the trainee in a critical situation. Because of the many variables involved, training can only be an influence and a guide to behavior and cannot be considered as assurance of safe actions.

Training in skills and knowledge must be supplemented by training in safe attitudes to result in safe behavior on the job.

INSTRUCTOR OUTLINE

SAFETY TRAINING PRINCIPLES

SCOPE

A review of modern concepts of safety programing and the melding of safety training into the total training program serve as an introduction to the learning process and the various techniques used in safety training.

CONCEPTS OF SAFETY PROGRAMING

Mechanical

1– Safety Environment

2– Preventive Maintenance

Personal

1– Job Qualification Standards

2– Physical Examinations

3– Safety Operating Procedures

4– Training

MODERN TREND

The modern trend of safety programing is to an integration of safety into the production system from the standpoint of materials, machines, and people—and away from being considered as an adjunct or afterthought if time and money permit.

CONCEPTS IN SAFETY PROGRAMING

The concepts of safety programing now being used in many large organizations take into consideration both mechanical and personal factors. These are closely allied with unsafe conditions and unsafe acts as accident causes.

MECHANICAL

1 Provides a safe environment including safe tools, equipment, and machinery. While the production or servicing aims of the organization may require the use of hazardous materials or chemicals, safety programing includes such controls as are necessary to provide and maintain a safe environment. These controls are established by specifications for safety along with other production specifications. Where separate specifications are required for tools, equipment, and machinery, these are set up to include safety requirements to meet standards or codes. In short, safety is built in rather than added on.

2 Provides a continuing, organized procedure for preventive maintenance. When the investment in plant, equipment, machinery, etc. is considered, it is economically desirable and necessary for safety to keep everything in a safe and proper operating condition. If safe working conditions are provided and maintained, the possibilities of "Unsafe Conditions" as accident causes are practically eliminated—and efforts may be concentrated on controlling the personal factors.

PERSONAL

People who create such conditions, or allow them to exist or be created, are responsible for unsafe conditions. The personal factors of safety programing encompass the thinking, planning, and duties of all persons in the establishment. Architects, engineers, chemists, or physicists, electricians, purchasing agents, personnel and employment managers, production management, supervisors, and workers have their responsibilities for including the applicable elements of safety in their job activities. Through thorough and complete integration of safety into the whole operation, the elimination of unsafe conditions due to the failures of people may be accomplished.

The workers—because they are directly involved in the actual operations, and because there are more of them—have the greatest exposure to "hazards" and the most extensive opportunities for unsafe actions. It is necessary that full consideration be given to the "personal" angles relating to work situations.and procedures.

1 Job qualification standards should be established for each job, to designate the requirements as to skills, experience, training, physical capabilities (such as vision, dexterity, hearing, height, absence of infirmities due to heart conditions, asthma, epilepsy, diabetes, etc.), and mental alertness and abilities. As these standards are established, consideration should be given to requiring the worker's ability to do the job in such a manner as to minimize the the opportunity for injury to himself or to others.

2 Physical examinations should be provided to determine that the prospective employees meet the physical requirements of the job qualification standards and to identify existing physical impairments or frailities which might be aggravated or which might result in limitations in the employment.

3 Safe operating procedures should be established, specifying exactly how each job should be done, including the safety equipment or devices to be used.

4 Training in skills, knowledge, and attitudes can be considered as the next step of safety programing to guide, direct, and regulate the actions of employees. The importance of this phase of safety has been recognized in the past few years as the key to accident prevention—especially in those establishments which had put time, effort, and money into the other segments of safety programing, but found that injury rates still were excessive.

WHY SAFETY TRAINING IS NEEDED

New Employees

Changed Job

Expanded/Different Responsibilities

New Equipment

New Machinery

New Process

Changed Layout or Physical Conditions

Accidents

WHY SAFETY TRAINING IS NEEDED

What safety training is needed and for whom should be determined before setting up a training program. The following are some of the areas or situations which may indicate a need for such training.

NEW EMPLOYEE

Every new employee is a candidate for safety training, because the type of work, safe operating procedures, safety policy and requirements for use of safety devices or equipment may be entirely different from those encountered in previous employment—or this may be the employee's first employment. The typical 5-minute "orientation" in which the employee is handed a rule book and pair of goggles is totally ineffective, except to give him the impression that safety is not very important in this establishment. A well oriented, complete safety training program will be a worthwhile asset in developing a good safety attitude, as well as giving the employee the necessary information which will enable him to do his job safely.

CHANGED JOB

Whenever an employee, supervisor, or worker is transferred to another job, there may be conditions, machines, or activities different from those on the previous job. A comparison of job qualifications and safe operating procedures for each job will indicate any areas or activities requiring additional safety training.

EXPANDED/DIFFERENT RESPONSIBILITIES

If an employee is given expanded or different responsibilities, there may be new situations or conditions requiring safety training. A study of the reasons for the change in responsibilities may reveal the need for developing additional training materials.

NEW EQUIPMENT

The use of new equipment, such as tools, trucks, scaffolds, may require safety training in safe operating procedures. Any new equipment purchased should be analyzed to determine if and what safety training is necessary.

NEW MACHINERY

While new machinery generally is better guarded than old machinery, there may be differences in operating methods, or different types of hazards requiring operator training. A job hazard analysis should be conducted on each new machine to determine additional safety training need.

NEW PROCESS

A new process, being a series of mechanical or chemical operations, may include new machinery or may merely be a change in chemicals used. Here again, a careful study is required to determine what safety training should be given.

CHANGED LAYOUT OR PHYSICAL CONDITIONS

If there are changes in the layout, such as rearrangement of machinery or operations (which may be accompanied by the elimination of some machinery or addition of new machinery), or changes in physical conditions, by demolition, remodeling or addition of buildings, etc., it should be assumed that safety training or retraining to permit workers to cope with the new situation will be necessary.

ACCIDENTS

A series of accidents in one area, department, process, or machine operation indicates faulty conditions and/or actions. In addition to all other corrective and preventive considerations, the need for specific safety training of supervisors and employees is clearly indicated.

FACTORS OF TRAINING NEEDS

Organizational Objectives

Amount product/service
Operate within budget
Maximum efficiency

Training Objectives

- Reduce costs
  - Employ proficiency-safety
  - Reduce waste, defects
- Reduce accidents, absenteeism, turnover, grievances
- Reduce administrative costs

FACTORS OF TRAINING NEEDS

The factors of training needs should be directed to the ORGANIZATIONAL OBJECTIVES from which are determined the TRAINING OBJECTIVES.

Organizational objectives are not necessarily static, so training objectives may need to be changed with these objectives. Organizational objectives reflect the generally expected achievements within certain periods, which may be 1 month, 1 year, 5 years, or 50 years. Usually organizational objectives include:

1. Produce a specified amount of product or service within the certain time period.
2. Operate within the budget—or show a certain profit.
3. Operate with maximum efficiency in the use of physical environment, machinery, materials, and personnel.
4. Indirectly, meet the personal objectives of employees.

Training objectives should be established to contribute to all phases of the organizational objectives, such as:

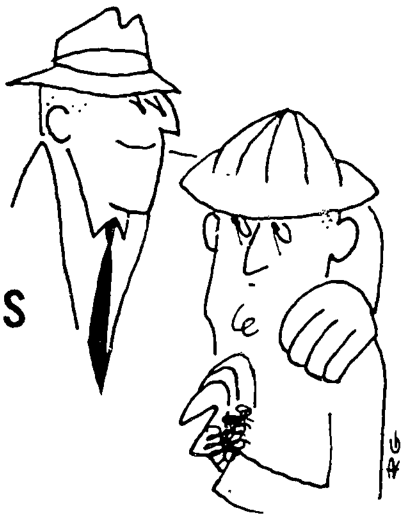
1. Reduction of overhead and labor costs by bringing employees to an acceptable level of job proficiency and safety.
2. Reduction of costs of materials and supplies by reducing losses due to excess waste and defective products.
3. Reduction in accidents, absenteeism, turnover, grievances.
4. Reduction of administrative costs by creating a psychological climate through which the activities of each employee contribute to achieving the major goals of the organization.

SUPERVISOR TRAINING NEEDS

- **Management Duties**
  - **Policies**
  - **Objectives**
  - **Reports**
  - **Procedures**
- **Safety Standards**
- **Process, Machines, Chemicals**

EMPLOYEE TRAINING NEEDS

- **Job-Related Knowledge, Skills**
- **Attitudes**



SUPERVISOR-WORKER

The specific training needs of the supervisor and the worker are interrelated, because there are many areas in which both must have the same knowledge—although the supervisor has additional responsibilities and in some cases he may not need to possess the worker's skills. The training responsibility includes the study of all phases of operations and management to determine where and what training is needed.

MANAGEMENT DUTIES

Supervisors need to be fully informed as to their management duties, including policies, objectives, reports, and procedures. This may include the methods of *instruction,* regulating, supervising, and handling personnel problems of employees. Instructing in safe work methods would apply here.

SAFETY STANDARDS

Of all personnel in the organization, the supervisor is the most important in the application of safety standards. While he could not be expected to know all the details of each safety standard, State or Federal safety code which would apply to his operations, he should know the basic concepts and where to obtain details if necessary. This implies an analysis of operations under each supervisor to determine applicable standards.

KNOWLEDGE OF PROCESS, MACHINES, CHEMICALS

In addition to knowing the processes, machines, and chemicals operating or being used under his supervision, the supervisor must know their hazards and protective or control measures.

The worker, while not required to know the details of every operation, should be equally familiar with the safety and health factors of the part of the job in which he is involved.

JOB-RELATED INSTRUCTION SKILLS

The prime requirements for the workers are their abilities, through knowledge and skills, to perform their duties safely and efficiently. While they may be performing their jobs satisfactorily, under normal circumstances it may be necessary to question whether these performances are the most efficient and are being accomplished in the safest possible manner. If a study of the operations indicates certain requirements of safety knowledge or skill, a test of the employee would indicate what training is needed.

ATTITUDES

The attitudes of supervisors and workers are important factors in the accomplishment of the organization's objectives. Attitudes toward safety, which are most important for accident prevention, are closely related to attitudes toward the company's policies, working conditions, personnel, wages, and other job-connected factors.

Attitudes can be changed, for better or for worse, through guidance, example, information, training, engineering, and enforcement.

WHO TO TRAIN DETERMINED BY

1– Changes contemplated or made

2– Improvements or changes desired

3– Specific personnel involved

4– Previous training, education, experience

WHO TO TRAIN

After the determination has been made that certain training is necessary or advantageous, the next step is to determine who should receive this training. The following are considerations to guide this determination:

CHANGES CONTEMPLATED OR MADE

Discussions of changes contemplated in the establishment layout, machinery, processes, materials to be used, and products, or services should include the consideration of desirable training. If changes have been made, training probably is needed. Either of these conditions will indicate the departments, groups, or trades to be included in the training.

IMPROVEMENTS OR CHANGES DESIRED

In many cases, improvements or changes in work procedures, production, activities, or attitudes are desired to meet the organizational objectives; to reduce the incidence of accidents and injuries; to change attitudes; to meet increased commitments; to improve skills or knowledge; etc. The determination must be made as to whether the entire staff or only certain departments or groups should be trained.

SPECIFIC PERSONNEL INVOLVED

After the process of determining where the training is needed, and what training is proposed, it becomes necessary to choose those to be considered for training from involved areas, departments, or groups.

PREVIOUS TRAINING, EDUCATION, EXPERIENCE

The final determination may be guided by the previous training, education, and experience of the potential candidates. There may be some who need no additional training. From a study of the personnel records and personal interviews, it can be determined who will benefit from the training to be given.

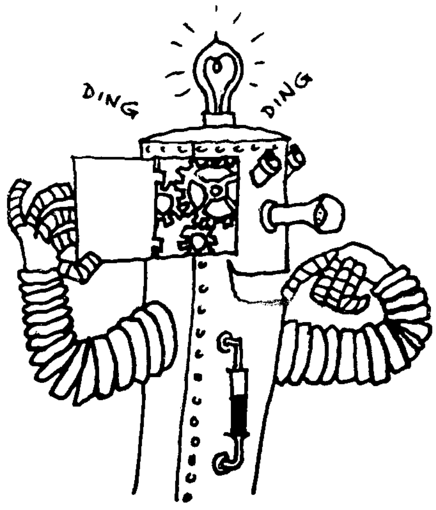
HUMAN MECHANICS OF LEARNING

1– Goals

2– Motivation

3– Behavior

4– Activation



HUMAN MECHANICS OF LEARNING

Learning may be considered as a process resulting in changed performance (usually improved) which can be detected by observing behavior. The varieties of learning include acquiring knowledge, developing the ability to solve problems and to make decisions, and the development of skills.

GOALS

It is generally agreed that human beings are GOAL oriented. Nearly everything we do is related to our personal goals—making money, improving our status on the job or in the community, owning a home, automobile, boat, or some other possession, retirement, vacation, etc. Consciously or subconsciously, we are attempting to attain these goals.

Such goals vary from person to person.

INSTRUCTOR'S NOTE: Ask each participant to take a few minutes to try to determine his *goals* in attending this session. Rather than ask that they disclose these goals, suggest a few of the possibilities and have them check themselves against this list:

To gain further knowledge of safety.
To gain favor with the boss by attending.
To show other persons that you are interested in safety or training.
To get some relief from the monotony of your job.
To get a night off from the family (wife).

You probably will make the participants realize that they have a goal or some goals which they may not have recognized or realized—with some thought these are brought to their attention.

Goals may be changed from time to time. As an example, some persons may have had a goal of attending this session to be with the boys, or some other goal similar to those previously suggested, but through interest aroused by this training, these goals may have been changed, or another one added "to learn more about safety or training methods."

Goals have been defined as positive or negative. In cases of an accident, a positive goal would be to complete the accident report form. The negative goal would be to try to get away with not making a report. A person's thinking may go from one to the other as he contemplates the consequences.

The goals of the participants in a training session may not be the same as the instructor's goals. At this time, the instructor probably has a goal of getting information across to the participants whose goals may be one of those above, or making a show of conforming to an unwelcome policy.

The goals of the participants may not be *influenced* by the instructor—if his facts do not apply to their jobs or if his presentation does not convince them that his facts do apply to their jobs. Successful training, then, must be directed to the attainment of personal goals—even if those goals must first be established by the instructor.

INSTRUCTOR'S NOTE: Discuss with the participants the [illegible] a means of attaining certain goals [illegible] compared with impediment to [illegible] there is an accident and injury to [illegible] is a supervisor, to one of his

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MOTIVATION

Motivation might be described as the *inducement* or *stimulus* which drives us to strive (reach) for our goal. We learn most effectively and easily if we *are motivated* toward this goal. If we can see that the learning of safety will make our goals more attainable, we will have a greater desire to learn. It is necessary that both the outcome (goal) be desired and the behavior (working safely, promoting safety) appear to the learner as having some relation to achieving the goal, and if he recognizes this, he is motivated.

As there may be several goals, or as goals may change, motives also may vary or change. As goals change, the intensity or degree of motivation probably will change also.

> **INSTRUCTOR'S NOTE: Have the participants state what would be important to them as motivation to certain goals.**

BEHAVIOR

The primary purpose of a training program is to modify the *behavior* of the trainees. Whether the training program is for production employees, secretaries, engineers, supervisors, or managers, the objective is to change the behavior of the individual so he will perform his job in the manner desired. In safety training, data, facts, principles, and practical applications are intended to give the trainees the knowledge which will improve their safety performance. Therefore, it is necessary to determine what behavior the training is expected to produce, then to orient the training toward the personal goals which will achieve this behavior.

Even spectacular or intensive training usually will not produce a sudden change in behavior. Behavior usually changes gradually. The trainee must deduce as he learns the details of the desired behavior. Changes are likely to be very slow if the training poses ideas, methods, or procedures which conflict with previous instructions, experience, or habits.

The training objectives, in order to accomplish the desired safety behavior, must do two things:

1 Induce learning.
2 Transfer the learning to the job.

To induce learning is to give guidance in the establishment of the desired goals, establish the necessary motives, and provide the material and information which the trainees are expected to learn.

For the training to result in the desired behavior, this learning must be transferred to the job. While the learning might be quite complete in the classroom situation, the actual application of this learning on the job situation must be attained if the results of the training are to be successful.

Teaching a principle may result in its application on the job at the appropriate time and place. The trainees must not only know and understand the rule or principle, but they must also learn where and when, and when not, to apply it. Practice in applying the principle under realistic situations would be conducive to a transfer of the learning to the job.

The success and extent of learning can be measured and demonstrated only by the resultant performance.

ACTIVATION

Activation is putting into practice the information or skills the trainees have learned—the application of the behavior which was the intent of the training. This is the act of attaining the goal of the instructor, and, hopefully, one of the goals of the trainee, thereby completing the cycle from determination of training needs to the ultimate conformance with safety standards and safe work procedures.

TYPES OF TRAINING

On-the-job

On- and off-the-job

Vestibule

Classroom

TYPES OF TRAINING

ON-THE-JOB

Although it is theoretically possible to create on the job a maximum opportunity for trainees to learn, training is not the primary function of the shop or office; production is. On-the-job training can be effective, but it requires careful planning and organization to make certain that the trainee has a satisfactory situation for learning. In on-the-job training; the learner has the opportunity to acquire job skills, knowledge, and attitudes, and to use the machinery equipment, tools, and materials which he will be using when the training is completed. The difference between merely assigning the employee to an experienced worker or journeyman to be shown the job and a formal training arrangement is that trained instructors are assigned to train, guide, and evaluate the learning efforts of the trainee.

ON- AND OFF-THE-JOB

This type of training is used for jobs which require long learning periods and require skills and knowledge which cannot be taught effectively by on-the-job training alone. The most commonly recognized example is apprenticeship training. Through the use of both on- and off-the-job training, the transfer of skills and knowledge from the classroom to the job is made easier. But, this transfer is not automatic, it must be planned if it is to be accomplished.

VESTIBULE

Vestibule training is conducted in an area usually removed from the actual workplace, but containing the same equipment, machines, and materials, and following the same procedures as if the trainee were learning the tasks in the workplace. Preferably, a skilled trainer is in charge.

CLASSROOM

Classroom (formal) training is most frequently used in training supervisory, staff and management personnel, and may have some value with production workers when the purpose is to develop knowledge on processes or procedures, or to develop attitudes.

INSTRUCTIONAL SETTING

Provide good learning conditions—surroundings, comfort
Set up definite goals—based on determined needs
Establish suitable standards
Adopt or develop new select methods and techniques
Group or individual instructor (supervisor or specialist)
Programed instruction (mechanical or printed)
Determine equipment, devices needed—
    Demonstrations
    Visual Aids
    References
    Guides

INSTRUCTIONAL SETTING

Successful training, from the standpoint of both the instructor and the trainees, depends upon complete preliminary planning to provide all of the necessities of a good instructional setting.

GOOD LEARNING CONDITIONS

There should be a minimum of distraction from noise or interruptions; lighting, temperature, and ventilation should be at comfortable levels; and chairs, tables, or other facilities should be comfortable and suitable to the training situation.

DEFINITE GOALS

The scope and content of training should be based on previously determined goals so the training will be applicable to the trainees and to the desired final results and activation.

ESTABLISH STANDARD OPERATING PROCEDURES

Suitable standards for work and operating procedures, safety, and environmental conditions which are to be included in the training should be established. These standards also may be used in measuring or evaluating the results of the training. In some cases, where suitable standards are not available, it may be necessary to develop new standards for this purpose.

SELECT METHODS

The methods and techniques to be used depend upon the number of trainees; scope and extent of material to be presented; necessity for use of machines, devices, or equipment and related demonstrations or practice; availability of teaching or training facilities.

GROUP OR INDIVIDUAL

Under some conditions and circumstances, it may be necessary to provide individual instruction. A foreman breaking in a new operator, or a journeyman supervising an apprentice, would be examples of individual instruction.

If the same training material can be applied to all the members of a group, this may be the most efficient arrangement where there can be discussion or interchange of ideas and where the individual activation desired will be the same for all trainees.

INSTRUCTOR

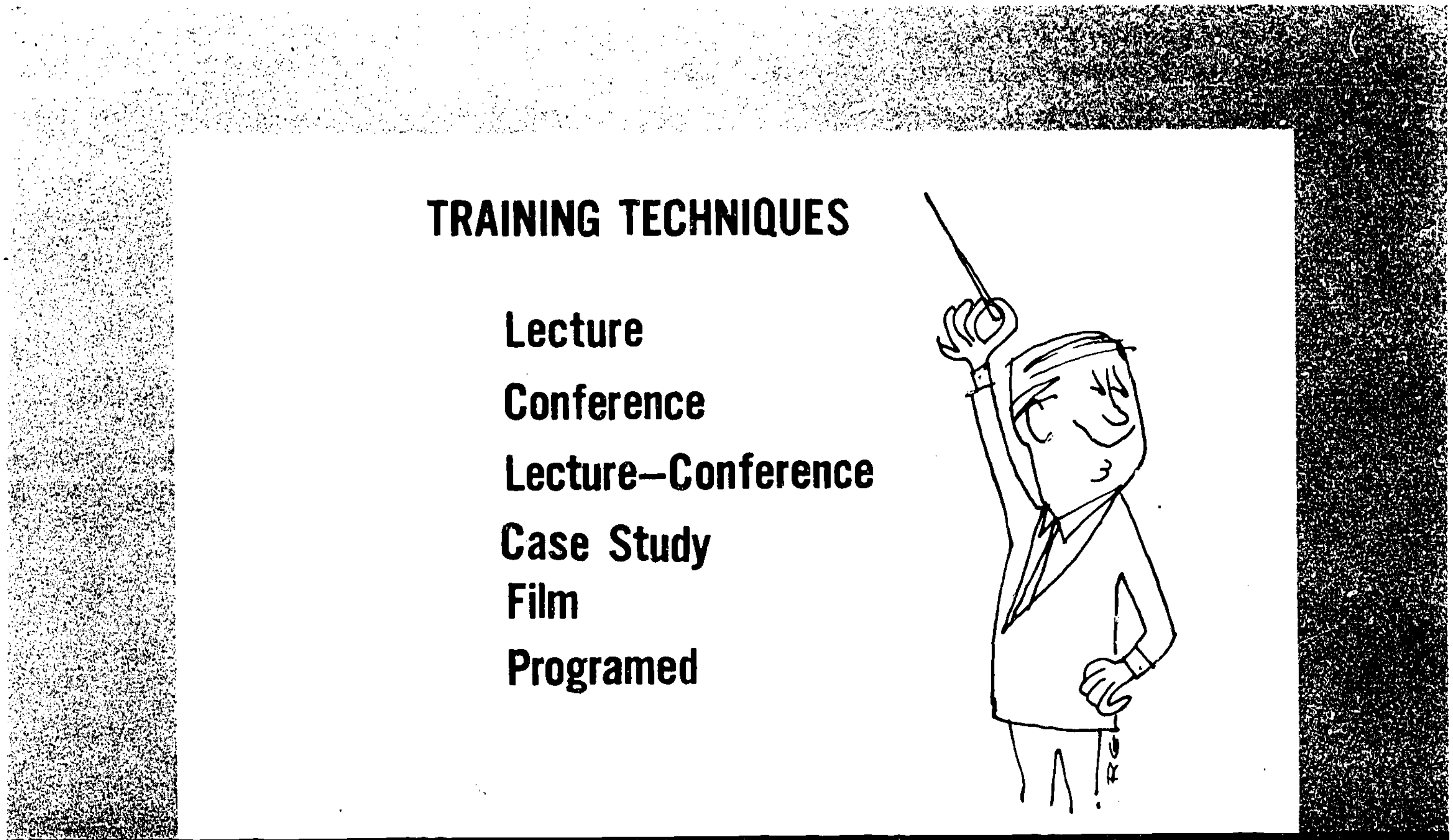
The choice of instructor is a most important factor in the training function. If the supervisor has the proper training techniques and the materials and equipment to be used in the training, it may be most practical and efficient to have him conduct the training. Because of the time required or the specialized knowledge, experience, or training necessary to carry on this training assignment, it may be important that a qualified specialist conduct the training. For example, the introduction of radioactive detectors or laser beam equipment would require specialized training and instructors.

PROGRAMED INSTRUCTION

The type of material to be presented might very well be most practically presented through some type of programed instruction, requiring a minimum of instruction or supervision in the training activity. Either the mechanical type, or the printed book, or teaching device method might be used.

DETERMINE EQUIPMENT, DEVICES NEEDED

The final phase of providing the proper instructional setting includes the determination of the equipment, devices, and training aids needed. This includes demonstrations, visual aids, student references, and guides.



TRAINING TECHNIQUES

- Lecture
- Conference
- Lecture–Conference
- Case Study
- Film
- Programed

TRAINING TECHNIQUES

The same training techniques are not applicable to all training situations, materials, or goals, so a determination must be made as to the techniques which would be most practical for the type, extent, and content of safety information to be presented, number of trainees, cost, kinds of behavior to be acquired, advantages and disadvantages of the various techniques.

LECTURE

The lecture method is one in which the instructor verbally presents information to a group of trainees. Usually, lectures are given from a completely prepared script, or from an outline or notes. As the lecture normally allows for little deviation and only occasional side references to experiences or examples, the lecturer may be confined to the prepared material—which may be so complete as to be reproduced in its entirety and distributed to participants for later reference. There usually is a minimum of participation or activity on the part of the trainees and little communication from the students to the instructor. The nature of this procedure makes it a technique of limited value in industrial training, especially because of the failure to provide the opportunity for the learner to participate and to demonstrate what he has learned.

CONFERENCE

While there are various interpretations of the term "conference," it may be considered for this purpose as a carefully planned meeting with specific purposes and goals, conducted by a conference leader who defines problem areas and guides the group to resolving the problems themselves. The usefulness of the conference method comes from participation of all trainees in decisionmaking.

A conference is intended to permit participants to arrive at conclusions or to solve problems. Material prepared for a conference consists of statements (including supporting, background information) of the problem or problems to be discussed. It is important that the statements be so worded as to indicate exactly what is intended so that all participants have the same understanding of the subject of discussion.

LECTURE-CONFERENCE

The lecture-conference method combines these two techniques by providing for lecture periods followed by a conference in which all trainees may participate in the discussion. This system seems to be especially effective in safety training. It permits questions by trainees to help them more thoroughly understand the material presented and intertrainee discussions, usually bringing out actual examples and experiences which support information given in the lecture.

The most commonly used type of formal training is the lecture-conference method. Its flexibility, combined with the opportunities and possibilities for using visual aids, demonstrations, and discussions, makes it a most convenient and acceptable means for conducting training in a variety of fields, and has proven to be especially adaptable to safety training.

CASE STUDY

In case study training, participants in a discussion group are given a case or problem and, through questions and discussion, bring out principles and practices related to the case or problem. This is most effective in conceptual and attitudinal learning with supervisory personnel. It is thought that training taught in this manner will be more meaningful and that the trainees will learn and remember better those items which they discover themselves.

FILMS

Films have many of the disadvantages of lectures, as they depend on *passive* learning by the trainee. However, there are advantages;

conditions, places, closeup views, etc., can be shown which may not be available for actual viewing. While a single film can convey only limited information, a repeat showing can enhance learning.

PROGRAMED

The four basic features of programed learning are:

1. Preparation and presentation of text materials in simple steps.
2. Subdivision of course material into orderly progressive units.
3. Active participation of the student during all steps in the learning process.
4. Student has immediate knowledge of the results (reinforcement) for each step presented.

Programing, the process of arranging materials to be learned in a series of small steps, is designed to lead the student through self-instruction from what he knows to new and more complex knowledge and principles. The student responds at each step, and proceeds to the next step only when his response is correct.

The various approaches developed by proponents of this system require trained, experienced programers to arrange the material into the determined form and method. If this is to be done "in-house," the personnel assigned to this work should be given the required training. There are a number of firms which specialize in the preparation of programed courses, using previously prepared materials.

Programed learning may be considered as an effort to complete a total educational cycle through stimulus, response, and reinforcement—

Stimulus—information or clues presented.
Response—filling in a blank with a reply; marking a choice; turning to a prescribed page; etc.
Reinforcement—reward of some kind; acknowledgment of correct response.

Programed learning is being applied to a number of subjects in both educational institutions and in industry, but only limited safety applications are available—primarily because of the cost of developing the programs and of the desire to apply the material to specific operations and local situations.

Methods of presenting program materials include simple books, self-instructional texts, and different types of teaching machines which may use slide projectors, sound tapes or records, and various response buttons.

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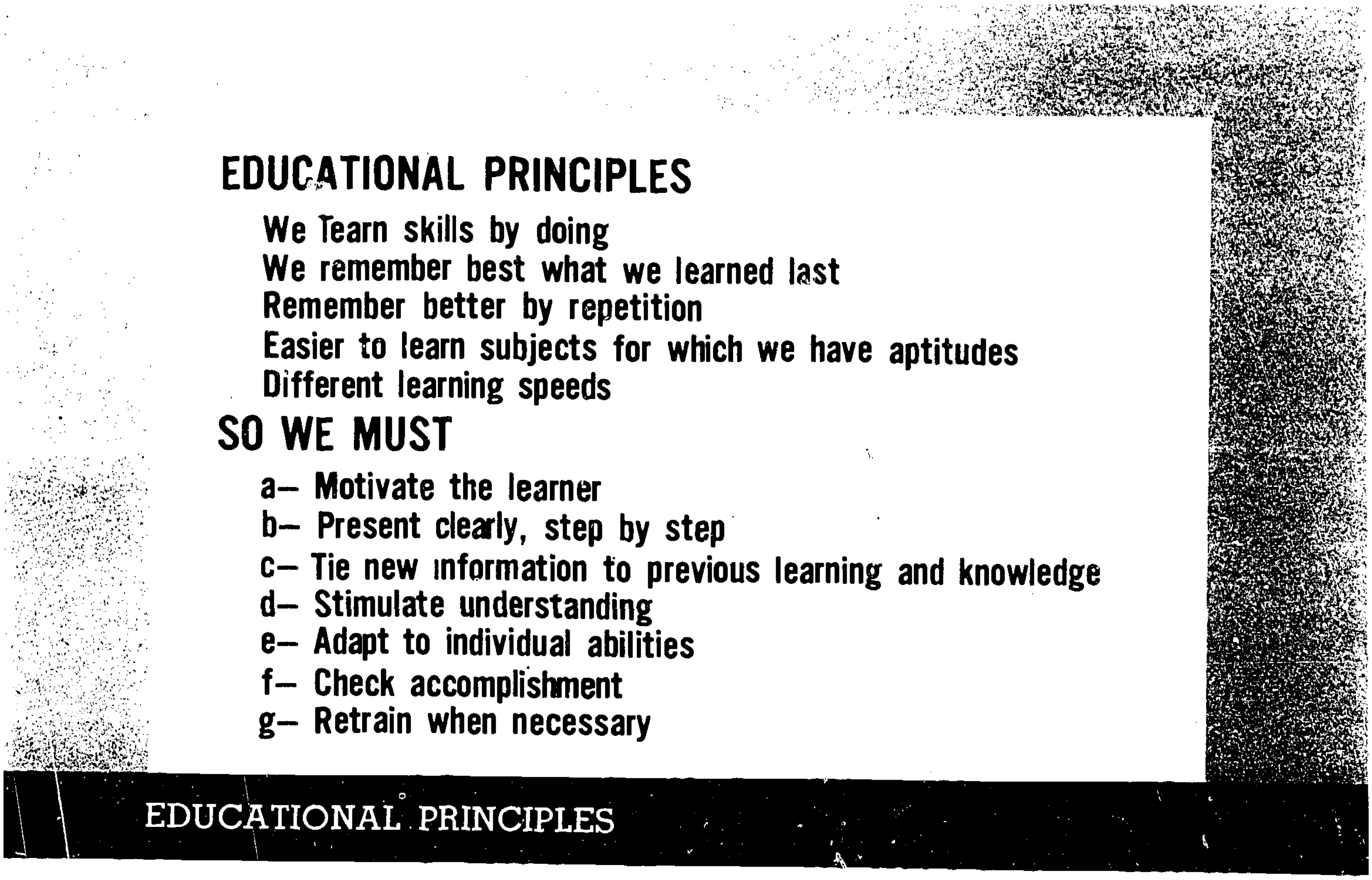

EDUCATIONAL PRINCIPLES

We learn skills by doing
We remember best what we learned last
Remember better by repetition
Easier to learn subjects for which we have aptitudes
Different learning speeds

SO WE MUST

a– Motivate the learner
b– Present clearly, step by step
c– Tie new information to previous learning and knowledge
d– Stimulate understanding
e– Adapt to individual abilities
f– Check accomplishment
g– Retrain when necessary

EDUCATIONAL PRINCIPLES

In summary, there are certain educational principles which can be applied to safety training:

1 We learn skills by *doing*. While one can obtain knowledge of how to do something by reading, seeing pictures, or watching someone else do it, he must do it himself to obtain the coordination, timing, etc., necessary to full learning.

2 We remember best what we learned last. Since most people have had little or no safety training, they are more likely to remember new safety information than work methods learned 30 years ago.

3 Remember better by repetition. The use of various examples to repeat the principle or method being taught helps the learner to retain the information.

4 It is easier to learn subjects for which we have aptitudes. While trainees may not have or may not recognize aptitudes in relation to safety, it is possible to make learning easier by tying safety into their mechanical or mental aptitudes.

Different learning speeds. The recognition that trainees have different learning speeds is invaluable to instructors who must attempt to maintain interest of both fast and slow learners. One of the prime advantages of programed learning is the opportunity for the learner to pace himself at his own learning speed.

SO WE MUST—

a Motivate the learner. It is necessary that the learner be motivated with the desire to learn.

b Present clearly, step by step. It is important that the trainee know each step in progressive information before the next step is presented.

c Tie new information to previous learning and knowledge. Understanding and acceptance of the information is improved when there is an obvious relationship between the new information and that already possessed by the trainee.

d Stimulate understanding. The trainee may have no desire or interest in learning about safety, so it will be necessary to provide a stimulus through facts, figures, and examples so he will become mentally conditioned to understand and accept the information to be learned.

e Adapt to individual abilities. The information presented must be within the range of mental capabilities and understanding of the trainee.

f Check accomplishment. The progress of the trainee's learning can be determined only by using planned checkpoints to evaluate the extent of learning as a guide to continued presentation of material.

g Retrain when necessary. Checks on accomplishment, through tests, quizzes, or actual job performance, may indicate that the trainee has not learned all of the presented information, or sufficient information to continue without retraining in all or some aspects of the training, and should be retrained.

DEVELOPING TRAINING MATERIALS

NEED FOR GUIDES

The development and preparation of instructor outlines or other guides is necessary for orderly presentation, to encompass the desired scope, and to make certain that material being presented is most suited to accomplish the desired learning. Adequate preparation can result in the most efficient use of the time of instructor and students, with a minimum of haphazard, off-the-cuff type of presentation or lengthy discussions of side issues.

While this development and preparation may seem simple in theory, it is complicated in doing and requires the time and effort for a thorough job. The concepts of training principles must be followed throughout the development to produce the utmost in learning potential.

TWO AREAS INVOLVED

The two areas which are involved in this development are:
1 Outlines or Instruction Guides.
2 Mechanical Aspects of Instruction.
These are to be considered separately.

OUTLINES OR INSTRUCTOR GUIDES

Determine Subject Area

With the needs analyzed and the general area of instruction determined, the next step is to determine the specific subject area for the training.

As an example, assume that it has been determined that accident experience shows safety training is required. A listing of potential subject areas could include: Housekeeping, *Personal Protective Equipment*, Safeguarding Machinery, Handling Materials, Working Surfaces, etc.

Assuming further that it has been determined that there is a problem in getting some employees to use their *Personal Protective Equipment*, this subject area may be chosen for the training.

Determine Scope

The decision as to the scope of the subject area to be covered in the training depends on several factors, such as:

1 Demonstrated need.
2 Time available.
3 Total scope of the subject.
4 The specific information trainees are expected to learn.

Continuing the example: The subject area Personal Protective Equipment might be separated into subsubjects: *Head Protection*, Body Protection, Foot and Leg Protection, Hand and Arm Protection. The scope for the intended training may be limited to one subsubject, such as *Head Protection*, because of the number of head injuries.

Expand Details and Compile Information

With the scope of the general subject limited, the next step is to expand the details of the final subject. This develops the specific information to be taught to the trainees and helps them to associate the proper equipment with specific hazards, and identify the equipment to be used.

It may be necessary to conduct research to develop, separate, and classify information. Materials from articles, books, standards, specifications, catalogs, as well as pictures and drawings may be assembled to provide the basis for the development of training guides and aids.

Establish Order of Progression

The material should now be organized into the order of progression for the presentation most suitable for trainee learning, rather than suit the desire or convenience of the instructor. This order may be influenced by the extent of the hazards, complexity of devices, and by relationship of subsequent information. If possible, each step of the learning should be a further development of the previous steps, and should at the same time lead into future steps. This may be the process of going from the simple to the complicated or from discussion of individual parts to the whole, complete device.

This factor of the training procedure is of such importance that it should be given time and thought—considering various possibilities where there seems to be equally important alternatives, and attempting to critically analyze the expected pattern of understanding of the trainees.

Determine Method of Presentation

Before proceeding further, determine the method of presentation to be used in conveying this instruction to the trainees, so that the material may be put together in the most practical and usable form.

Need for Instructor Guidance

Years of experience are required for an instructor to be able to present a course, or even some subjects, without referring to some type of guides. Even then, such instructors have memorized the sequence of topics to be presented, or used some type of visual aids which provided the leads on subject material. Some instructors always use guides of some kind to make certain they follow the proper sequence and include all pertinent points and information. To the trainee, the instructor's use of guides may mean the difference between "learning" and "being exposed to information."

Recalling the Human Mechanics of Learning (goals, motivation, behavior, activation) and Education Principles (motivate, present step by step, tie new information to previous, stimulate understanding, adapt to individual, check accomplishment, retrain when necessary) shows that "learning" requires much more than the presentation of a large amount of "information." Consequently, to induce learning, the instructor can best accomplish this result by the use of properly, thoroughly prepared guides developed from the material previously assembled.

Format for Guides

The most convenient format for instructor reference is an "outline" which contains the principal topics to be discussed. The Standard Outline style may be used for this purpose, although it may present problems to the instructor if he attempts to visualize the main subtopics and keep track of specific details to be discussed.

The Instructor Outline style as used in this outline, containing key points in the left column and discussion items in the right side, has been widely accepted for its convenience, as well as its usefulness in presenting necessary details.

STEPS IN DEVELOPING AN OUTLINE

1 Set Up Broad Content Limits of Course

Get Clear Picture of Coverage	First step in planning—set up broad content limits for course. "Frame of reference" or set of boundary lines within which course should be confined.
EXAMPLE:	If subject were Fire Protection—decision would have to be made whether to include: **1** Methods to prevent fires from starting. **2** Methods to limit fire spread. **3** Methods of extinguishment. **4** Cooperation with fire companies and own apparatus. **5** Disaster evacuation.
Scope Can Be Broad or Limited	In example above, any one of the five topics could be subject of course.
How Detailed Coverage Shall Be	Course may cover only broad essentials or may cover only a limited scope but go into great details. Decision must be made before beginning outline.

2 Assemble List of Items in Course Content

Reasonably Complete	Second step is to assemble a list of items or topics to be covered. Make list complete as long as topic is *within* broad limits *already set.*

List Determined By Analysis of Field	**1** The list of items or topics will be determined by careful analysis of the field to be covered. **2** Similar courses offered elsewhere are helpful. **3** Pertinent published material on subject should be analyzed. **4** Personal knowledge and information from others in field covered by subject should be sought.

3 Classify Items Into Homogeneous Group

Determine Categories	Suitable categories are determined into which the various items may be grouped for further study. These categories can be determined by nature of items and by reference to other similar courses.

4 Make Tentative Selection of Items

Selection **Factors**	**1** Is item *essential* or is it something "nice to know"? **2** How *frequently* does this item occur in *trainee's activities?* **3** Is item of such *importance* that it *must* be included even though seldom used? **4** Is this an item that trainees would be *expected* to know? **5** Can item be more *effectively* taught another *way* or in another course? **6** Is item one over which there is *controversy* as to overall policy? **7** Is item one which *can* be taught with *available equipment?*

5 Check Outline for Accuracy and Completeness

Requires **Care**	This is a very important step. It is easy to overlook items of importance. Use may be made of a check chart.
Completeness	Check items against other outlines for completeness. Also against analysis of subject matter from texts. Against any job analysis of subject which might be available.

Accuracy

It is of *utmost importance* that statements in an outline be *accurate.*

Specifications or figures should be checked against *latest* information available.

Never use old materials which quote figures until the accuracy is verified. A *note* of the *source* should be *in the outline* for quick reference where question might arise.

Where codes are source material, latest code should be used.

6 Choose Suitable Instructional Units

Length Important

The *length* of instructional units and *amount* included in each unit will vary. *Chief factors* for determining:

1. As much homogeneous material as possible in a single unit.
2. Length of class periods.
3. Training setting.
4. Degree of competence required. If mastery is desired, it may be necessary to devote more than one period to a unit.
5. Does course length permit duplicate sessions on a unit?
6. What equipment is available?
7. How much do trainees already know about subject?

7 Arrange Course in Proper Order

Flow

A good instructional course flows smoothly. It is easy for trainees to follow thought.

Each step helps to set up the following step.

Factors in the Arrangement

1. Make sequence logical.
2. Follow steps of analysis of subject.
3. Begin with easy and progress to difficult.
4. Begin with units commensurate to present knowledge of trainees.
5. Be sure that no unit is placed so that it requires information or methods in later units.
6. Be sure that arrangement gives a well rounded concept of the new materials.

METHODS OF PRESENTATION

INTRODUCTION

Many Methods

There are many methods of presentation of instructional materials. Each is prepared to meet specific training problems.

Classifications

But most can be classified into four general methods of presentation:

1. Lecture.
2. Conference.
3. Classroom and discussion.
4. On-the-job training.

Selecting Method

Each method of presentation is useful for certain purposes, but may be of little value in attaining other training objectives.

Whatever method is selected, it must be geared to the objectives, and course outline must be consistent with method.

LECTURE

Instructor Does All the Talking

Lecture method is where new information is presented by an instructor who does all of the talking—he performs demonstrations.

Trainee Participation

1. Trainees participate only to the extent of taking notes —they watch demonstrations.
2. Usually outside reading is expected of trainees.
3. Written reports are frequently required.
4. Normally these are written examinations.

Principal Use

Lecture methods are most useful for large groups where discussion is impossible because of group size.

Specially useful where materials being presented are not in books or printed form that can be readily studied.

Often useful in influencing or developing attitudes and appreciation.

Limitations

Lecture method is very limited in use—limited to two kinds of learning:

1 New knowledge or facts.
2 Attitudes.

Useless where skills or involved understanding are included.

Has great weakness in that while it may be interesting, even entertaining, trainee is inactive and it is easy for him to hear but not to understand.

Use of visual aids is also very limited in scope and must be very carefully prepared to be of any use at all.

CONFERENCE

Training conferences find an important place in industrial training programs. In this type of course, the trainees are active participants. They not only discuss all the materials, but assist in arriving at conclusions.

In some cases they may even determine conclusions.

Conference Leader

The conference leader *directs* the course of the discussion regarding the problem under consideration.

He does *not* set up conclusions that are to be reached.

Conference method might be conducted by a leader who had even less knowledge of the problem than trainees.

He merely *aids* the trainees to reach decisions or to reach or develop common understandings.

He guides discussion, helps keep the trainees on the track, and summarizes the findings at appropriate points.

He may later prepare a report of the conference and make it available to the trainees.

Principal Use

Conference is suitable for use only for small groups which allow each person an opportunity for considerable participation.

It is very useful in the development of common standards, such as standard operating procedures.

EXAMPLE

A plant with several garages, all repairing buses, should use the same specifications on clutch-throwout bearings. A conference could be used to come to a conclusion as to the proper specification to use.

Conference leader might know nothing about clutches and still be able to lead such a conference.

Limitations

1. Group members must have *previous knowledge* of the topics to be discussed.
2. They are very time consuming.
3. They have to be limited to very small groups.
4. Conclusions are frequently very difficult to arrive at —and they are often inconclusive.
5. Conferences are useful only where a skillful leader is available.
6. Prepared outlines are of limited use.

CLASSROOM

Classroom presentation and discussion is a widely used method of instruction. One reason is its adaptability to a wide variety of training problems—range of ability in trainees and equipment.

In this method the instructor presents new material by a familiar four-step method, together with class participation and discussion.

Methods Presentation

Demonstrations of equipment may be made by oral presentation—oral-visual aids, charts, blackboard —or with actual equipment.

[illegible] and other student references may be used as needed or available. Topics for outside study may be assigned. Reports thereon may be required, or the assignments later discussed in class sessions. Test may be used to check trainees' progress or accomplishments.

Principal Use

1. Useful for wide variety of content fields.
2. Adaptable to wide participation by trainees or to a comparatively small amount, as conditions dictate.
3. Adaptable to wide range of trainee ability.
4. Individual attention can be given to those who need it.
5. Is adaptable to a great deal of variations in size of group—but groups of less than 10 or more than 30 are not desirable.

LEARNING NEW IDEAS-ABILITIES-SKILLS

MECHANICAL ASPECTS OF INSTRUCTION

Need For Instructional Aids

Learning new ideas, abilities, and skills is accelerated through the senses of seeing, hearing, feeling, and smelling. Wherever it is possible to use more than one or all of the senses, trainees may learn quicker, have a better understanding, and retain the information longer than when only one sense is used. It is evident then, since lectures depend primarily on hearing, and programed instruction on "seeing," that a lecture-conference, vestibule, or on-the-job presentation is better suited to the use of instructional aids which involves more of the senses.

Seeing—The sense of seeing can be used more advantageously than merely reading literature or looking at the instructor. Illustrations, charts, visuals, demonstrations, actual equipment may be used to permit the trainee to aid his visualization by seeing the information or movements the instructor is teaching.

Hearing—In addition to hearing the spoken or recorded word, the trainee may be permitted to hear actual or reproduced sounds which may be of great importance to his learning. For example, it may be desireous for him to recognize the sound and tone of a crane signal or warning bell to identify and distinguish this sound from other shop noises; to recognize the sound of an electric motor when it has attained operating speed; to recognize the sound of some equipment or apparatus when it has completed its cycle or has completed a certain operation; to identify beeps, squeals, or tones. No amount of explanation, gestures, or pictures can substitute for hearing such sounds

Feeling—For the trainee to learn some things, it is essential for him to be able to feel the material or object. This includes temperature, weight, shape, size, location, composition, and hardness. For example, a person could look at an electric drill all day and not get any impression of the weight, balance, switch action, vibration, or torque. But, by actually holding and operating the drill and using various size drills or disks, the trainee could understand and acquire skill in using this equipment.

Smelling—There are many odors which may be important in the trainee's learning. Merely seeing or feeling certain chemicals or compounds may not enable the trainee to identify them, but by smelling, he can learn to distinguish or recognize many substances because of their peculiar or characteristic odor. As an example, gasoline, kerosene, and carbon-tetrachloride might look very similar, but could easily be identified by their distinctive odors.

GOOD TRAINING AID

1– Appropriate

2– Simple

3– Accurate

4– Attractive

5– Necessary

CHARACTERISTICS OF GOOD TRAINING AID

Five characteristics of a good training aid are:

1 Appropriate—The aid should be appropriate to the points being made and to the groups or individual trainees. Training for carpenters should show woodworking tools, rather than machinist's tools; discussion of safe motor vehicle handling in Florida would not include snow tires and chains.

2 Simple—Simplicity might be described as showing the cover, title page, or an excerpt, rather than the complete contents of a book. The best technique is to isolate and illustrate (by words, drawings, or pictures) the specific point or items that the student is expected to learn.

3 Accurate—Accuracy is essential to proper learning. If the visual aid depicts incorrect information (in contrast with intentionally showing a "wrong way" for comparison), the student will be confused and is likely remember the incorrect or inaccurate information depicted.

4 Attractive—Aids that are attractive to the eye or ear are more readily accepted and remembered. The use of color, variations in style, type faces, backgrounds, etc., can be combined with neatness to make aids as attractive as possible.

5 Necessary—Be certain the aid is necessary to the learning desired. Aids without a definite purpose or excess variations or examples are more likely to confuse than to train.

What Visual Aids Do

In general, visual aids are used to depict:

Symbols
Words
Figures
Graphs
Diagrams

Facsimiles
Pictures
Realistic drawings

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MECHANICAL AIDS TO INSTRUCTION

Blackboard
Charts
Projectuals
Slides
Filmstrips
Transparencies
Movies
Photos
Sound Tapes
Demonstrations
Text Books
Study Guides
Charts–Sheets
Exhibits

MECHANICAL AIDS TO INSTRUCTION

INSTRUCTOR'S NOTE: The instructor should set an example by showing and demonstrating as many of the types of equipment as can be made available.

To help the trainee use the senses in the learning process, various types of mechanical aids may be used which will best aid and improve his learning. There may be a tendency to put too much reliance or emphasis on mechanical aids, and to use them as the instruction media rather than for supporting and reinforcing learning. It is doubtful that very much learning transferred to the job would be retained from seeing a movie or a set of slides, even though they were quite dramatic or shocking.

Blackboard

The blackboard (or a chart pad) can be most useful and effective for making lists, simple charts, or sketches. Some instructors attempt to use the blackboard as a substitute for more effective aids, with less than satisfactory results. When the instructor puts complicated material on the blackboard, the lapse in the learning process caused by this interruption may cause the trainee to lose the continuity and fail to learn the points being taught.

The use of the blackboard should be purposeful and items to be put on the blackboard should be included in the plan and guides for the presentation.

Chart

Charts are previously prepared visuals, showing lists, diagrams, or illustrations which supplement, explain, detail, or clarify information being presented by the instructor. Having charts prepared in advance permits showing information requiring drawings or listings which would be impractical for blackboard presentation. The number of items should be limited, and lettering should be of sufficient size to be seen by all participants.

Projectuals

Projectuals are media projected on a screen by some type of projection device. There are numerous advantages in using these which will be mentioned briefly under each type.

Slides

The most commonly used slides are 2- by 2-inch mounts of 35mm film, which can be used in relatively inexpensive projectors. By using a 3-inch projection lens, the instructor can show a large screen-size picture from a distance of 10 to 12 feet, making it possible for him to have the projector near his table or podium for ease of operation—and to overcome the problem of the sound of the blower being in or behind the audience. Slides can be made with almost any 35mm camera under various lighting conditions, as determined by the film speed and lens opening. A camera with a 1.9 lens opening, and an ASA film speed of 125, can produce acceptable pictures with almost no light.

Advantages of slides:

1. Pictures of actual conditions may be used.
2. Slides may be interchanged or substituted.
3. The image may be held on the screen for any period of time.
4. The cost of slide preparation is relatively low.

Filmstrips

Filmstrips are also made on 35mm film, but use only one-half the size of the slide picture, resulting in two frames on a film that produces one slide. The pictures are taken with a movie camera, although processing companies can make a filmstrip from a set of slides. Usually, a script, record, or tape accompanies the filmstrip.

Advantages of filmstrips:

1. Contains a standard or "canned" presentation with no variations.
2. Can be "spotted" to pick out certain illustrations for discussion after the original presentation.

Transparencies

Transparencies are made of acetate specially treated to produce colors and reproduce drawings, lettering, etc. They are shown on an "overhead" projector, most of which are 5 by 5 inches, 7 by 7 inches, or 10 by 10 inches.

Advantages:

1. Transparencies can be produced with a minimum of equipment.
2. Colors, overlays, and other techniques may be used to produce a variety of effects.
3. By use of a polarizing device, simulated motion may be produced.
4. The instructor may mark, draw, or write, as on a chart or blackboard.

Movies

While movies are conducive to "passive" learning—the students have no opportunity to participate—they may be used to provide information for later discussion. Too many movies invariably result in too little learning, so their use should be carefully woven into the training procedures.

Advantages of movies:

1. Places, situations, actions not readily shown by any other means may be shown in movies.
2. A scene may be brought to the trainees, where it may not be possible or practical to take the trainees to the scene.
3. Actions, movements, and positions may be shown.
4. Motion may be slowed or stopped.
5. Many actions may be shown in a short period of time.

Photos

Where actual situations, conditions, or machines cannot be made available, photos may be substituted. However, unless the pictures depict the purpose intended, they may not show exactly what the trainee should learn, or the angle may be such that something important is obscured or difficult to see.

Advantages of photos:

1. There is not necessarily a time limit for studying the photo.

2 As with movies, scenes may be brought to trainees.
3 Within limits, enlargements of the whole or parts of a picture (negative) may be made to show details.
4 Where color is a factor (such as with symbols, pipe contents, color coding, etc.) color photos can give a fairly true color picture.

Sound Tapes

Sound tapes may be used as an instructional unit (as in a "better listening" course, or as used in conjunction with slides or movies in some programed instruction devices), as a supplement to other verbal teaching (as in a language course), as a means of presenting sounds (warning bells, properly adjusted machine as contrasted with one which is out of order). Where tapes are used with projected material, it is important that synchronization be perfect.

Advantages of sound tapes:
1 Inexpensive to produce.
2 Sounds obtained from industry, etc., can be reproduced in the classroom.
3 Easily changed, edited.

Demonstrations

Demonstrations, using actual equipment or working models, often are necessary, especially where a skill is being taught. Demonstrations may be used to show how equipment, tools, or machines are operated, the practical application of theories or mechanics, layouts, construction, actions or reactions.

Advantages of demonstrations:
1 Actual, full-sized items may be used.
2 Where full-sized items are not practical, models may serve the same purpose.
3 The trainee may be able to hold, feel, operate the item.
4 Greater understanding, knowledge, and experience may be acquired than could result from visualization, verbal descriptions, or other types of illustrations.

Text Books

Where supplementary reading, study, and reference is required, text books may be necessary or advantageous to extend the learning provided in the classroom or on the job. It is important that the text books present information in accord with and, preferably, in the same order as the presentations.

Study Guides

Study guides, consisting of specially prepared pamphlets, flyers, essays, drawings, or photos, may be provided for additional data, concentration, or supplementary to information given in the formal presentation.

Charts—Sheets

Charts or sheets, showing patterns, layouts, illustrations, plans, procedures, listings, or other supplemental or supporting information, may be necessary to enforce or extend learning.

Exhibits

Exhibits of equipment, charts, etc., can be helpful to the learning process if so designed and placed as to lend atmosphere and provide opportunity for study or casual observation.

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EVALUATING TRAINING

Measure Requirements
Must Be Practical
Characteristics–
    Objective–Subjective
    Direct–Indirect
    Intermediate–Ultimate

EVALUATING TRAINING

There are many facets to the problem of evaluating safety training. The fact that we are dealing with human behavior or the results of human behavior, which are not necessarily constant, creates a basic variable that may not be measurable. As safety is not a separate entity, but a combination of production and safety, attitudes and safety, or mechanical or managerial skills and safety, it may be difficult, or impossible, to evaluate the influence of safety training in modifying behavior or contributing to the organizational goals. Training in many other areas or subjects may be accompanied by changes in process or machine, layout of the physical environment, wage system, temperatures or ventilation, etc., which could have equal or more influence on the ultimate production or behavior than the safety training given.

Measure Requirements

Inasmuch as it was determined, through the reasoning discussed earlier, that training was needed, it now becomes necessary for an evaluation to be made to determine if the training given was successful, and whether or not the material or manner of presentation needs changing. Evaluation probably will be required to justify continuation of further training. If the expenditures in time, money, and effort result in little or no changes or changes which would

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have come about any way, it would be difficult to justify the training in the first place.

Consequently, the type and extent of evaluation should be worked out carefully. If the trainees were given pretests before the training to demonstrate their knowledge or skills posttesting may indicate the extent of improvement—especially if followed up with another posttest 2 or 3 months later to measure retention. In any case, the evaluation should be based on what the trainees should learn.

Practicality

As an example: this course was intended to improve the knowledge and skills of the participants so they would be capable of teaching others how to instruct. The evaluation of this course would require a followup to determine if the persons instructed can give presentations which would meet acceptable standards—and would result in their students working safely. What measures could be used?

1 The number of persons you instruct?
2 The number of persons instructed by those you instruct?
3 Comparison of injury rates before and after training?
4 Comments of persons receiving training?
5 The personal evaluation of your presentation by your instructor?

Understandably, whatever the measures, they must be practical —within reach of obtaining information and with direct application to the training conducted.

Characteristics of Measures

Some educational psychologists claim that there are several basic characteristics or categories of training measures:

1 Objective—Subjective
An objective measure is derived from overt behavior—such as the amount of work done in a specified time.

A subjective measure represents an opinion, belief, or judgment.

2 Di —Indirect
A direct measure is taken from a person's behavior or the results of his behavior—such as the manner in which he operates a machine, or the number of units produced by the machine.

An indirect measure assesses the action of a person whose behavior can be measured only by its influence on the actions of others—such as a supervisor being measured by the housekeeping or safe work practices of his employees.

(from Frame 26) 27

YOUR ANSWER: The most important advantage of this program is that it allows me to progress at my own speed.

Yes, we know you are a busy person. This program is designed to allow you to go as fast or as slowly as you need to go. If you understand certain parts quickly, you can rapidly advance to the next part. On the other hand if you need to spend more time on a lesson, you can take as much time as you need.

You're doing well! Continue to the next question, please, by going to frame 30.

(from Frame 22) 28

YOUR ANSWER: This program was developed to squeeze a whole course in teacher training into one short lesson.

Painfully, you are partially right. We cannot expect to offer you everything you need to know to be a good instructor, but we are attempting to give you a plan of action to use right now when you need it the most. You know your subject matter, but teaching involves more than telling someone everything you know. Think how many classes you slept through while the teacher droned on and on.

There is a better answer which more adequately describes the purpose of this program. Return to the original frame 22 and select the correct answer.

(from Frame 30) 29

YOUR ANSWER: I expect to learn from this program what the Federal Government is doing with my money lately.

If this is the purpose of your taking this lesson, we hope you will be pleased. We hope, too, that you will take advantage of this opportunity to invest your money wisely by getting all that you can from this program. As you're taking this program, you might remember the advice of a poor mother to her son dining at their rich uncle's home. The child was timidly serving his plate with one small chicken leg when the mother leaned over and whispered, "Eat, child, eat! Heaven knows when you'll get any more!"

When you choose the correct answer, you do not have to read a sermon. Rest easy that your money is being spent wisely, and return to frame 30 to select the correct answer.

(from Frame 27) 30

What do you expect to learn from this program?

	FRAME NO.
Nothing of any consequence.	23
What the Federal Government is doing with my money lately.	29
How to use the 4-Step Method of instruction.	31

(from Frame 30)

YOUR ANSWER: From this program I expect to learn how to use the 4-Step Method of Instruction.

Congratulations! Now that you have demonstrated that you are ready to proceed, we will get down to business. Our first task will be to learn the steps of preparation necessary before you actually teach.

You may now proceed to the second lesson in this series, Module 2 of "The Four-Step Method of Instruction."

VT 016 181
TERRY, MARTHA, ED.
THE FOUR-STEP METHOD OF INSTRUCTION. A PROGRAMMED COURSE FOR OCCUPATIONAL INSTRUCTORS. MODULE 2.

REHABILITATION RESEARCH FOUNDATION, ELMORE, ALA.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
OEC-2-7-006711-4542
PUB DATE - ND 56P.

DESCRIPTORS - *LESSON PLANS; *TEACHING METHODS; TEACHING TECHNIQUES; *PROGRAMED INSTRUCTION; EFFECTIVE TEACHING; *TRADE AND INDUSTRIAL TEACHERS; *VOCATIONAL EDUCATION TEACHERS; *TEACHER EDUCATION; PROGRAMED MATERIALS

ABSTRACT - THIS MODULE IS THE SECOND IN A SERIES OF SIX WHICH CONSTITUTE A PROGRAMED COURSE IN TEACHING TECHNIQUES AND STRATEGIES. DEVELOPED PRIMARILY FOR USE BY OCCUPATIONAL INSTRUCTORS, THE PACKAGE IS INTENDED TO SERVE AS AN AID IN HELPING TO IMPROVE INSTRUCTIONAL COMPETENCY. MODULE 2 FOCUSES ON THE PREPARATORY ASPECT OF TEACHING, CHIEFLY THAT OF DESIGNING GOOD LESSON PLANS AND IS PRESENTED IN SIX PARTS: (1) DIVIDING THE COURSE INTO LESSONS, (2) CHOOSING OBJECTIVES, (3) PREPARING A TIMETABLE, (4) LISTING TOOLS AND EQUIPMENT, (5) SELECTING THE APPROPRIATE TEACHING METHOD, AND (6) ARRANGING THE WORK AREA. OTHER COMPONENTS IN THIS SET ARE AVAILABLE AS VT 016 180-VT 016 185 IN THIS ISSUE. (SN)

VT 016 181

THE FOUR STEP METHOD OF INSTRUCTION

A Programmed Course
For Occupational Instructors

MODULE 2

THE FOUR-STEP METHOD OF INSTRUCTION

A Programmed Course

for

OCCUPATIONAL INSTRUCTORS

Module 2

Developed by the

REHABILITATION RESEARCH FOUNDATION
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Pursuant to a Contract with

U. S. Office of Education
Contract No: OEC2-7-006711-4542

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Teaching may be compared to a trip such as Mr. Bright is about to take. Before the trip actually starts, he must make plans. 1) He must divide his trip by deciding the places he wishes to stop, just as you must divide your course into lessons and each lesson into steps. 2) He must decide what he wants his passengers (trainees) to learn at each stop, just as you must decide what you want your trainees to know or be able to do at the end of a lesson. 3) He must decide how much time he needs to spend at each stop, just as you must decide how much time to spend on each lesson. 4) He must make a check list of the equipment he needs to take with him, just as you must list and determine what aids, materials, tools, and equipment you will need for each lesson. 5) He must route his trip choosing the shortest route and the best roads, just as you must decide how you will go about teaching each lesson so that every trainee will learn. Putting this in the "trade language" of an instructor, you would say he must:

1) Break down the teaching job (divide the course into lessons and each lesson into steps and key points).

2) Decide upon objectives (decide what the trainee should know and be able to do at the end of each lesson).

3) Prepare a timetable (decide how much time to spend on each lesson).

4) List tools, equipment, aids and materials.

5) Choose the best methods to teach this lesson (decide how to teach each lesson so that every trainee will learn).

In addition, you can add to the task of planning:

6) Arrange the work area as the trainee will use it in actual performance of the job.

GO ON TO THE NEXT PAGE

(frame 1 continued)

When the instructor goes through these steps, what would we say he is doing?

	FRAME NO.
Preparing his trainees to learn	3
Making lesson plans	6
Getting his classroom ready for the trainee	10

(from Frame 6) 2

YOUR ANSWER: "Check the tires" is not a step.

Let's look at the definition of a step again. "A STEP is a significant action which advances the job or operation toward completion." Remember, our operation is "Getting the bus ready." If a step is classified as an ACTION which helps you get the job done, you should ask yourself, "Is checking the tires an action?" It is something that you do, isn't it? It is one action which helps you complete the task of getting the bus ready for the trip, isn't it? Then you must conclude that it is a step.

When you return, ask yourself of each answer choice, "Is this an action which, when completed, will help me finish the job of getting the bus ready?" Another clue is that steps usually begin with a command like "check," "make," "hit," "take," etc. Now you are ready to make another selection. Turn back to frame 6.

(from Frame 1) 3

YOUR ANSWER: When the instructor goes through these steps, we would say that he is preparing his trainees to learn.

As you recall, we were comparing your teaching task to a trip. The second sentence of the last frame states, "Before the trip (class) actually starts, ..." This tells you that what follows takes place before the instructor actually meets with the trainees. You must know what you are going to teach, how you wish to teach it, and so on, before you ever see the trainees. You do not wait until the train is ready to leave the station before you pack your clothes, do you? Teaching, like anything of importance, requires careful planning. Preparation of the trainees takes place as the first step in the instruction itself. Planning involves only the instructor. We are not saying that these plans cannot be changed after the instructor meets with the trainees. What we are suggesting is that the instructor have a flexible plan to follow so that he won't be jumping into the lesson blindfolded.

Re-read, if necessary, the material in frame 1 before making another selection.

(from Frame 6)

4

YOUR ANSWER: "Check the brakes" is not a step.

What do you do when you get your car ready for a long trip? You go through several steps, don't you? You are trying to make sure that your car will be in safe working condition. If you were to write down the things you wanted to do to make sure nothing was forgotten, wouldn't you include "Check the brakes" on your list? Of course! Unless you do include this step, the job of getting the car ready would not be completed, would it? Your failure to ready your car in this respect might prove to be dangerous and even fatal.

When identifying or writing the steps necessary to follow in completing a job or operation, you might remind yourself that steps tell you to do something. They usually begin with a command like "check," "take," "put," "hit," etc.

Keeping these points in mind, return to frame 6 and make the correct response.

(from Frame 7)

5

YOUR ANSWER: Number 1 is a key point.

Number 1 reads, "check the lights." It is listed under STEPS, so let's test to see if it is a step. Does it begin with a command? Yes, it tells you to check the lights. When you complete the action of checking the lights, will you have furthered the task of getting the bus ready? Certainly, so it passes the test for a step.

Let's try an exercise to help you recognize steps. We all go through a ritual at bedtime of putting the house in order for the night. This, then, we will call our OPERATION. What are some of the things you do in order to complete this operation ? Your list may look like this:

1. Put out the cat.
2. Lock the doors.
3. Turn out all the lights.
4. Raise the bedroom window.

Your list could vary somewhat, but it should be similar. It is a list of things to do. Each item begins with a command--"Put," "Lock," "Turn," and "Raise." Each one is a STEP toward completing the operation of putting the house in order.

Put each part of the job breakdown to the proper test before making another selection. You may even want to read the explanation again. Return now to frame 7.

(from Frame 1)

YOUR ANSWER: When the instructor goes through these steps, we would say that he is making lesson plans.

Correct! All six of these steps must be followed before the instructor ever meets with his class to begin a lesson. Each is very important, so we will discuss each one briefly before we actually begin to study the "Four-Step Method."

Mr. Bright's trip will be much easier to take because he is making careful plans. Let's see how he carries out each step and compare his task with the job you have ahead.

The first step is to break down the job. As an instructor, this means that you first divide the course into lessons. You then divide the lesson into <u>steps</u> and <u>key points</u>. A step is a significant action which advances the job or operation toward completion. The word to remember here is ACTION. Let's look at an example:

> If you were breaking down the job of a batter on a baseball team, what would be the first step? What action must he complete first? He would choose a bat, wouldn't he? This is a significant action which advances the job, isn't it?

GO ON TO THE NEXT PAGE.

(frame 6 continued)

Now let's see how Mr. Bright is coming with his breakdown. The first job he has chosen to break down is "Getting the bus ready for the trip." Below is a list of things. Which one is NOT a step?

	FRAME NO.
Check the tires	2
Check the brakes	4
Examine the engine	8
Spark plugs should not be touched while the motor is running	12

JOB: Getting ready for the trip OPERATION: Getting the bus ready

STEPS	KEY POINTS
1. Check the tires	
2. Check the brakes	
3. Examine the engine	
4. Spark plugs should not be touched while motor is running	

YOUR ANSWER: The following would be a good key point for the step, "Insert the pencil into the sharpener": The pencil should be inserted as far as it will go without breaking.

Very good! Distinguishing between steps and key points is not easy, but you are doing some good thinking! Now look at the exercise below. A step and two key points are listed on a job breakdown sheet, but they are not listed correctly. Examine the exercise carefully:

JOB: OPERATION: Disassembling air cleaner

STEPS	KEY POINTS
1. Clamps at the botton of the air cleaner must be loosened.	a. Remove the air cleaner from the car. b. If you have the oil bath type, you should now pour away the dirty oil.

GO ON TO THE NEXT PAGE.

(frame 7 continued)

How can you tell which sentences are steps and [illegible] key points ? First of all, ask yourself, "What is the OPER[illegible]ant to break down into steps?" You look and find that i[illegible]mbling an air cleaner." You can then find the sentence that is a step by asking yourself the first thing you must do to disassemble the air cleaner. Of course, you remove the air cleaner from the car. This STEP has been listed as part "a." under KEY POINTS. In your mind, erase this sentence and list it as part "1." under STEPS. Now find the key points for this step by asking, "What is the BEST WAY to remove the air cleaner?" Part "1" listed under STEPS answers this question, doesn't it? Of course you must loosen the clamps at the bottom of the air cleaner so you can remove it! Mentally erase this sentence and put it as part "a." under KEY POINTS. Is there another sentence that tells you the best way to remove the air cleaner? Certainly, part "b." under KEY POINTS tells you something else important to remember in removing the air cleaner. It, too, is a KEY POINT, and it is listed correctly!

Let's see how Mr. Bright is coming with his breakdown of the job, "Getting the bus ready." Examine each part carefully and decide if Mr. Bright has identified steps and key points correctly:

STEPS	KEY POINTS
1. Check the lights	a. One person should work switch while another observes lights. b. If light is out, it is best to go ahead and replace bulb.

Which of the following is the best analysis of this part of Mr. Bright's job breakdown?

	FRAME NO.
Number "1." is a key point	5
Parts "a" and "b" are steps	9
This part of Mr. Bright's job breakdown is correct	13

YOUR ANSWER: "Examine the engine" is not a step.

Steps tell you something you must do to complete a job or operation. What are you told to do to the engine? Examine it! Will "Examine the engine" help you to make sure that the bus is ready for a trip? Of course, assuming that you know what you should look for.

Let's look at some other steps. Suppose you want to break down the job of using a ruler to measure a piece of paper. What might some of the steps be? Look at these possible steps below and decide which one is NOT a step.

1. Turn the ruler so that the lowest number is on your left and the highest, on your right.
2. Turn the paper so that one edge is facing you.
3. The paper should be lying on a perfectly flat surface.
4. Place the ruler on the paper.

All of the sentences above except one tells you to do something. They are the steps. One sentence suggests something that will make the step easier to do. It is not a step. Which sentence is this? You have probably discovered by now that it is sentence #3. All the other sentences begin with a command (another clue) such as "turn" and "place."

Using what you have learned from this example, return to frame 6 and make the correct response.

(from Frame 7)

YOUR ANSWER: Parts "a" and "b" are steps.

To refresh your memory, let me list "a" and "b" again for you.

a. Someone to work the light switch while you observe would be the best approach.

b. If light bulb is out, it is best to go ahead and replace it

Keeping in mind that the operation is "Getting the bus ready," ask yourself if part "a" helps to further this operation. It doesn't even make sense, does it? There is something that is not made clear by this statement. It couldn't stand by itself as a step. Just to make sure, check to see if it begins with a command. No, it begins with the pronoun, "Someone." It must be a key point, then. Put part "b" to the same test. I think that you will have the same results.

Suppose you were trying to teach a child to put his shoes on. The first step would be, "Put the right shoe on the right foot." To adults, this would be easy; we know our left from our right and know which shoe is for the left foot and which for the right. A child, however, would need some KEY POINTS to help him do the step right. Can you think of a key point that will help him? If the child is right-handed, one key point might be:

a. Your right foot is on the same side as the hand you hold your pencil with.

b. The right shoe curves the same way that your right foot does.

Both of these give information that helps to carry out the step. They are "keys" to making the step work.

Return now to frame 7 and see if you can answer the question correctly.

YOUR ANSWER: When the instructor goes through these steps, we would say that he is getting his classroom ready for the trainees.

This is only part of the instructor's task before he begins instruction. It is true that aids and materials that are going to be used to introduce a lesson should be on display attractively, OR in the case of a skill lesson, the tools and equipment should [illegible] made available and the work area arranged as it will be when the trainee actually gets a job. What will you teach first? What specifically do you want the trainee to be able to do at the end of a lesson? How long do you expect the lesson to last? What aids, tools, and equipment do you expect to need to teach this lesson? Which teaching methods do you think you should use to get the instruction over to the trainee best? All of these questions should be answered satisfactorily ON PAPER before the class begins.

There is a better answer for this question. Return to frame 1 and select this response.

YOUR ANSWER: The following would be a good key point for the step, "Insert the pencil into the sharpener": Turn the crank on the right side of the sharpener.

Stop and think a moment. Key points give you information to help you do a step. Does "Turn the crank on the right side of the sharpener" tell you anything that will help you insert the pencil correctly, safely, efficiently, or accurately? As a matter of fact, how could you classify "Turn the crank. . . ."? Isn't that the next thing you do after inserting the pencil? Isn't it an action? Doesn't it begin with a command? It fits all the tests for a step, doesn't it?

To help you understand key points, let's try another exercise. Taking the step "Turn the crank on the right side of the sharpener" think of some key points that might be used here. Keep in mind that key points are the KEY to doing the step correctly, safely, efficiently, or accurately. Which one of the following would NOT make a good key point for this step?

a. The crank should be turned clockwise.

b. The pencil should be held firmly but not pushed.

c. Withdraw the pencil slowly.

d. Turning the crank too fast may result in a broken lead.

One of the choices above is a step. Rather than telling you how a step can best be performed, it tells you the next action to take in order to complete the job "Sharpening the pencil." You probably already realize that part "c" is the step. All the rest tell you how you can best perform the step, "Turn the crank. . ." Return to frame 12 now and make the correct response.

(from Frame 6)

YOUR ANSWER: "Spark plugs should not be touched while the motor is running" is not a step.

Excellent! You examined each choice after reading the explanation carefully and came to the conclusion that this sentence does not tell you to do something. It is actually warning you not to do something, isn't it?

This kind of sentence in a job breakdown is a KEY POINT. Steps tell you what to do in order to complete a job. KEY POINTS give you pointers that help you do the step correctly, safely, efficiently, or accurately. Each step may have several key points. Let's take another step and decide upon the key points for it. The step is, "Check to see if the oil is low." You ask yourself, "What do I need to know that will help me check the oil?"

Here is a list of key points you might include.

a. Dip stick must be pulled completely out, wiped, replaced in holder, and pulled out again to read.

b. Indicator of amount of oil is on the end of the stick.

c. Oil need not be added unless indicator is at or below the "ADD" mark.

Safety is always a key point.

GO ON TO THE NEXT PAGE

(frame 12 continued)

Now let's see how well you understand key points. Suppose you were doing a breakdown on sharpening a pencil. The first step would be, "Insert the pencil into the sharpener." Which of the following would be a good key point for this step? Remember a key point tells you the best way to do a step.

	FRAME NO.
The pencil should be inserted as far as it will go without breaking.	7
Turn the crank on the right side of the sharpener.	11
Withdraw the pencil from the sharpener.	14

JOB OPERATION: Sharpening a pencil

STEPS	KEY POINTS
1. Insert the pencil into the sharpener.	

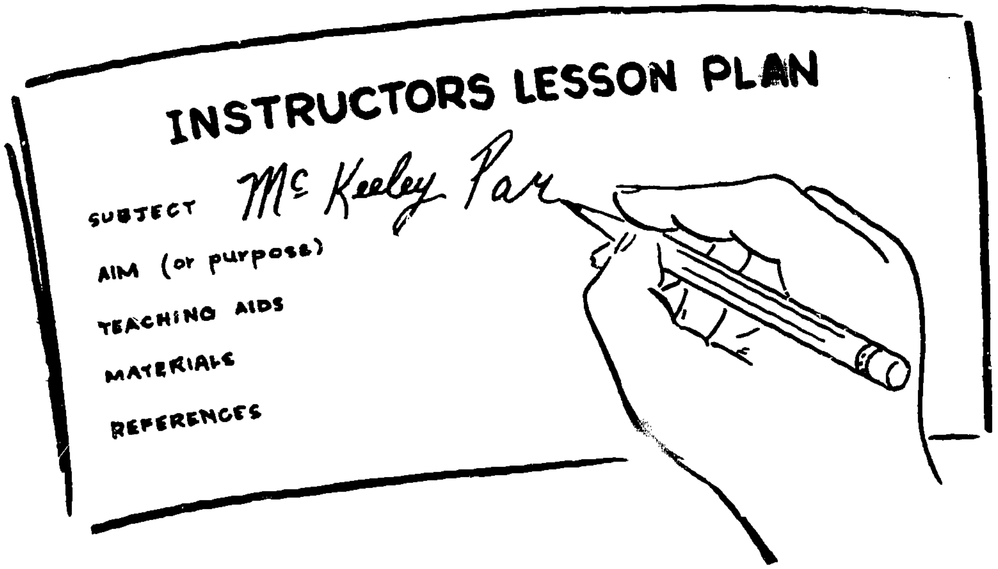
YOUR ANSWER: This part of Mr. Bright's job breakdown is correct.

Excellent! Now that you have learned how to break down your course into lessons and your lessons into steps, you are ready to learn the next phase of planning--setting the goals for each lesson. Your reaction to t [illegible] be, "But I already have my goal; I'm going to teach my trainees how to weld (or whatever your trade may be)." This is true but how do you know that each lesson will contribute to this goal unless you have individual goals for each lesson. Having a goal for each lesson gives your instruction direction and provides the trainees with the opportunity to experience success at short intervals throughout the course.

You may be asking yourself, "Just what is a goal in relation to teaching?" There are several words that can be used for the term "goal." Whether you say aim, goal, objective or purpose, they all mean essentially the same--something toward which effort is directed. In other words, now that you know <u>what</u> you're going to teach, you must decide what you wish the trainees to be able to <u>do</u>, what he will <u>know</u>, and what his <u>attitude</u> should be after you have taught him.

Let's see how Mr. Bright is doing. He has divided his trip into tours. What must he do now?

	FRAME NO.
break the trip down	15
decide upon objectives	17
decide what he wants his trainees to know and understand	20



(from Frame 12) 14

YOUR ANSWER: The best key point for the step "Insert the pencil into the sharpener" is "Withdraw the pencil from the sharpener."

Remember, a KEY POINT tells you the best way do a step. The best way to insert a pencil into the sharpener (the step) would NOT be to withdraw the pencil from the sharpener, would it? Of course not! Actually, what you have chosen as a key point is a STEP! It tells what you Do after you insert the pencil, not the BEST WAY to insert the pencil.

Go back to frame 12 and find the answer which tells you the BEST WAY to insert the pencil into the sharpener. This will be the KEY POINT for this step.

(from Frame 13) 15

YOUR ANSWER: After Mr. Bright has divided his trip into tours, he must break down the trip.

We'd better review what is involved in breaking down the course. When you start to teach, you have one main subject--carpentry, or the like. You cannot teach all you want your trainees to learn about carpentry in one session. It takes weeks, even months. It is necessary to divide your subject into lessons. You would make the simplest topic the subject of your first lesson. This lesson, then, you would break down into <u>steps</u> and <u>key points</u>. All of this is called breaking the course or lesson <u>down</u>.

Have you ever heard someone say the Rio Grande River? What he is actually saying is the Grand River River! Actually, what this answer says is that after Mr. Bright breaks down his trip, he will break down his trip! Dividing the trip into tours is a part of Mr. Bright's whole breakdown of the course.

Don't let wording fool you. Consider the meaning of each answer before you make your choice. I am sure you can return to frame 13 and make the correct response now.

YOUR ANSWER: An instructor needs to make a timetable so that he will be sure to finish the course on schedule.

You are correct! Like Mr. Bright, you have a limited time to finish your course. In order to give the trainee the things he needs to be a successful tradesman, you have to cover many topics. Unless you make a timetable, you can easily spend more time on some topics than necessary; when you become pushed for time toward the end of the course, you will tend to try to cram your trainees with all that you have not taught.

Do not get the idea that a timetable should be a rigid schedule to be followed religiously. You may discover when you meet with your class that their needs are not the same as you had anticipated. Some lessons may take less time; some, more. You must remember, too, when making your timetable, that there will be necessary delays. Give yourself enough leeway in planning your timetable to take care of slow learners, reviews, and repetition of instruction.

What is the most important characteristic of a good timetable?

	FRAME NO.
A good timetable tells you when you need to stop, review, repeat instruction or try a different method.	19
A good timetable holds the students strictly to its schedule.	24
A good timetable must be flexible.	27

YOUR ANSWER: After dividing his course into tours (units), he must decide upon his objectives.

Excellent! Objectives tell just what you want a trainee to achieve with a unit of work. They should tell you exactly what the trainee will be able to do at the end of a lesson. Here are two objectives for a lesson on the simple tools of carpentry:

1. The trainee will identify each tool and demonstrate one use for each.
2. The trainee will understand the use of carpentry tools.

The first objective tells what a trainee must do to show that he has mastered the lesson. It would be even better if the objective told how many tools the trainee must identify and use.

The second objective isn't very good, is it? How will the instructor know that the trainee "understands"? What good is "understanding" if the trainee cannot use the tools? When you prepare objectives, avoid words like "understand" and "appreciate." Understanding and appreciation are hard to measure!

Here are some more objectives:

Lesson Title	Objective
Servicing Oil Bath Carburetor Air Cleaners	Trainee will be able to clean and replace an oil bath air cleaner in 10 minutes.
Introduction to the Volt-Ohm-Milliammeter	Trainee will be able to identify the 6 major parts of the VOM and tell the function of each.

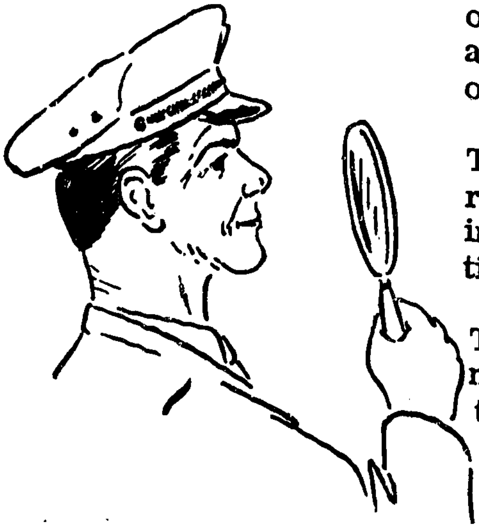
GO ON TO THE NEXT PAGE

(frame 17 continued)

Notice that these objectives not only say that the trainee will be able to do. They also state some standards of performance: in ten minutes; the six major parts.

Remember, your training objectives should always be stated in terms of what your trainee will be able to do and how well he will be able to do it.

Which of the following is the best objective for Mr. Bright's tour of McKeeley Park?



	FRAME NO.
Trainees will gain a total picture of the facilities offered at the park and will learn at least ten varieties of plant life	18
Trainees will be able to list 3 varieties of recreation and describe in no more than 50 words the facilities offered for each	22
Trainees will be able to use the material they gather to complete their projects on McKeeley Park	23

(from Frame 17) 18

YOUR ANSWER: The following objective for Mr. Bright's tour of McKeeley Park is the best:

> The trainees will gain a total picture of the facilities offered at the Park and will learn ten varieties of plant life.

Remember, you use your objectives as goals. They must be stated clearly enough that you will be absolutely sure when your trainees have reached the goal. Your trainees will expect you to be fair with them; they want you to tell them what they must do to be successful learners. Does this goal tell you or the trainee anything? What is a "total picture" of the facilities? How will you know when this "total picture" is gained? What will the trainees need to do to demonstrate that they have "learned" ten varieties of plant life?

It is easy to say in very general terms what your goal is, but it takes a little more thought to state exactly what the trainee will be able to do to show that he reached your goal.

With these things in mind, return to frame 17 and select the correct answer.

(from Frame 16) 19

YOUR ANSWER: A good timetable tells you when you need to stop, review, repeat instruction, or try a different method.

Your trainees' progress--not a timetable--tells you these things. Timetables are guides. They cannot dictate the needs of your trainees. They should be planned carefully enough that they provide for stops, reviews, repetitions of instruction, or a variation of approach without throwing your time schedule completely off base.

When you meet with your trainees, you may want to change your timetable to meet their needs. Time is important, but you cannot allow it to completely dominate each lesson. You cannot decide ahead of time where your trainees will have trouble; each is an individual with individual learning problems. You may know where your trainees are likely to have trouble. This is the point in the timetable to allow ample time for ironing out their difficulties.

There is an answer which best describes the most important characteristic of a good timetable. Return, now to frame 16 and select that response.

(from Frame 13) 20

YOUR ANSWER: After Mr. Bright has divided his trip into tours, he must decide what he wants his trainees to know and understand.

To "know" or to "understand" are poor words to use to describe the intended results of any training. It is easy to generalize about your goals, but an effort must be made to state them in terms of what the student will be doing to show that he "knows."

With this in mind, return to frame 13 and make the correct selection.

(from Frame 22) 21

YOUR ANSWER: An instructor needs to make a timetable so that he will spend no more time on one lesson than another.

Think a moment. Do you think it would take the same amount of time to teach someone how to hit a nail with a hammer as it would to teach him how to construct a hip roof? You would not spend a week teaching him to hit the nail just because it will take that long to teach him to construct the hip roof, would you?

Timetables are necessary to keep from spending too much time on a short, easy lesson or too little time on a long, involved lesson. Their overall function is to make sure that the trainee is not left with only a part of the training that he needs at the end of the course.

You are ready to return now to frame 22 and make the correct response.

(from Frame 17)

YOUR ANSWER: The following objective for Mr. Bright's tour of McKeeley Park is the best:

> The trainees will be able to list 3 varieties of recreation found here and describe in no more than 50 words the facilities offered for each.

Yes, of the three objectives you were given, this is the only one that tells you and the trainee exactly what will be considered successful performance for this lesson.

Let's see how far we have come in planning to teach. We have broken our subject matter down into lessons, and our lessons into steps and key points. We have stated a precise objective for a lesson. We, then, know what we are going to teach and exactly what we want the trainee to get from the lesson. We have divided the course in such a manner that we start with the most familiar, easiest subject for the trainee to learn and end our course with the most difficult lesson involving subject matter that is unfamiliar to the trainee. We want to make sure that we spend enough time on each subject and still finish the course on schedule. This is the point in our planning when we need to make a timetable. A timetable is a schedule which shows where the instructor hopes to be in a course by a particular date.

CONTINUE TO THE NEXT PAGE

(frame 22 continued)

Timetables are necessary for trips, but why does an instructor need to make one?

	FRAME NO.
So that he will be sure to finish the course on schedule.	16
So that he will spend no more time on one lesson than another.	21
So that the trainee can see his progress in comparison to his classmates.	25

(from Frame 17) 23

YOUR ANSWER: The following objective for Mr. Bright's tour of McKeeley Park is the best:

> The trainees will be able to use the material he gathers to complete his project on McKeeley Park.

Compare your objectives to the goal post on the football field. Rules are made to tell the football player exactly what the requirements are to make a touchdown. Would this be a good rule?

> The football player must use the football to make a touchdown.

This wouldn't tell the player or the referee what was required to make a touchdown. The player would be at the mercy of the referee's decision even though he thought he had done what he considered necessary to make a touchdown. Look again at the objective you have chosen. Doesn't it have the same weaknesses that the football rule has? It does not give the the trainees or the instructor the line of direction for the lesson that good objectives give. Trainees could interpret this objective one of a thousand ways and go off on all kinds of tangents to try to reach it. Then you, as their instructor, would have the difficult task of deciding if the trainee had actually reached the goal you had set.

You may re-read the material in frame 17 if you feel it necessary before making another response.

(from Frame 16) 24

YOUR ANSWER: A good timetable holds the trainees strictly to its schedule.

It would be simple to make a timetable for a class of robots. You know that they are all alike, and all you have to do is to push a button to make them respond the way you want. All you would have to figure into your timetable is the amount of time necessary to push the right button! Each trainee reacts in his own particular manner to learning. What appeals to some may be boring and difficult for others. You can estimate the time for each lesson, but you must leave room for change if change is necessary.

Now you are ready to return to frame 16 and make the correct response.

(from Frame 22) 25

YOUR ANSWER: An instructor needs to make a timetable so that the trainee can see his progress in comparison to his classmates.

Timetables are not designed to clock the trainee's progress. They tell you, the instructor, how quickly you should move through the course, and they help the trainee to pace himself so that he can keep up with the rest of the class.

People learn at different speeds. One trainee will grasp a manual skill lesson quickly because he is good with his hands. The same trainee may move slowly through a related information lesson because he lacks concentration ability. For that reason, it is not wise to chart a trainee's progress for view of the entire class.

There is a better answer to this question. Return to frame 22 and select the correct response.

(from Frame 31) 26

YOUR ANSWER: You can make sure that tools, equipment, supplies, and materials will be on hand when you need them by having a trainee in charge of them.

How will the trainee know what equipment, etc., to have on hand for a particular skill? You are the only one who knows exactly what you are going to teach and how you are going to teach it. Only you can be the judge of the tools and so on that will be required to teach a skill of your trade. We are not saying that you should not give responsibility to your trainees; after you have decided which tools, equipment, supplies, and materials you need, you may have one or several trainees in charge of making sure that these things are available when they are needed.

There is an answer which better responds to the question. Return now to frame 31 and select that answer.

YOUR ANSWER: A good timetable must be flexible.

Good! Remembering that you are in the planning stages of instruction. you will want your timetable to allow room for change should you see the need when you begin to instruct. It may be that the trainee will grasp easily the very topic on which you planned to spend the most time. Spending extra time on a topic already learned just because the timetable demands it would be like burning a cake just because the recipe said you should cook it 10 minutes longer than was actually necessary.

Now that you have broken down the lesson, chosen objectives, and made a timetable, you are ready for the next planning step--selecting aids and materials. We will devote more time to this subject a little later. Right now, the important point to remember is that you make a list of ALL available teaching aids and materials on the topic that you are planning to teach. Teaching aids and materials include textbooks, manuals, reference works, workbooks and study guides, programmed lessons, display aids, projected aids, three-dimension aids, audio aids, and assignment sheets.

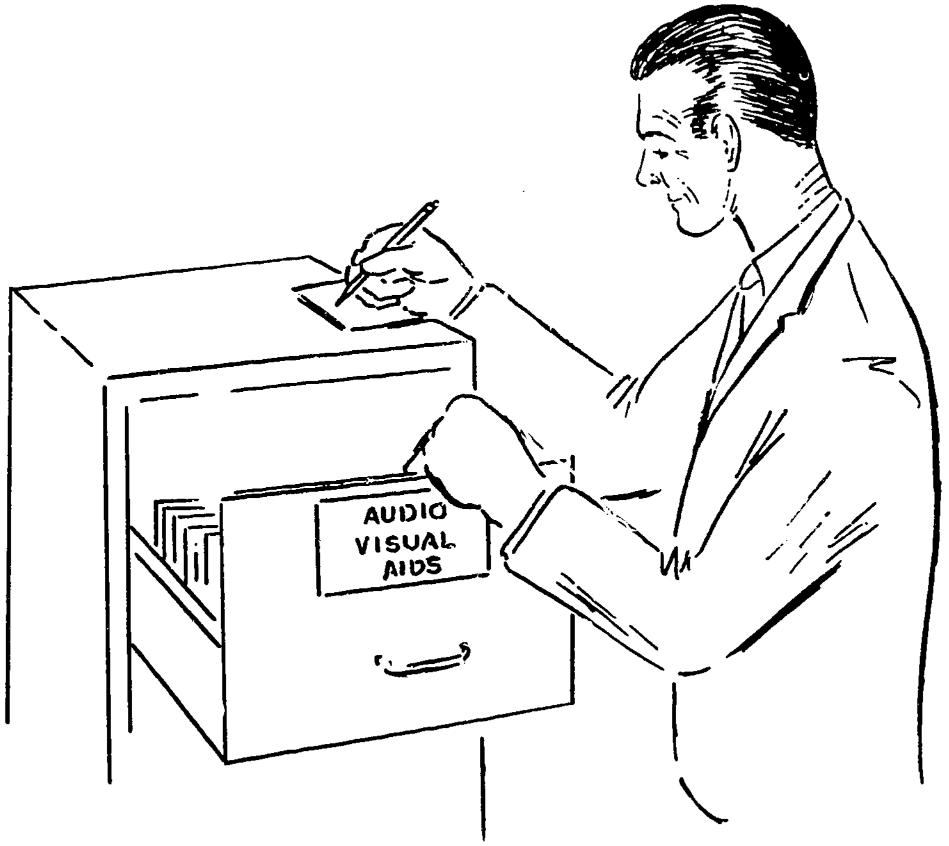
By this point, you are probably asking yourself why you should list ALL aids and materials on this subject. You will not want to use them all, but you do want to use the best of those available. Before you actually teach the lesson, you will need to preview each aid and material. Having a list in advance will save you from thumbing wildly through materials the day that you need them. It's like having a list when you go shopping; you save about half the time because you know what you're looking for.

CONTINUE TO THE NEXT PAGE.

(frame 27 continued)

What is the first step you take in planning to use aids and materials?

	FRAME NO.
Preview all aids and materials that might be used.	28
Make a list of all aids and materials that might be used.	31
List only aids and materials that you are sure you can use.	33



(from Frame 27) 28

YOUR ANSWER: The first step you take in planning to use aids and materials is to preview all aids and materials that might be used.

Previewing aids and materials certainly is a very important part of planning to use them. The first step you take, however, makes this step easier. There may be dozens of aids and materials that you might possibly wish to preview. Tying colored strings on your fingers to remind you of each might become awkward, and you would probably run out of colors. Instead, you make a simple list that you can use to refresh your memory and to check off those that you find unsuitable.

Return to frame 27 and think before you make your next answer response.

(from Frame 31) 29

YOUR ANSWER: You can make sure that tools, equipment, supplies, and materials will be on hand when you need them by keeping all of them on hand in the classroom.

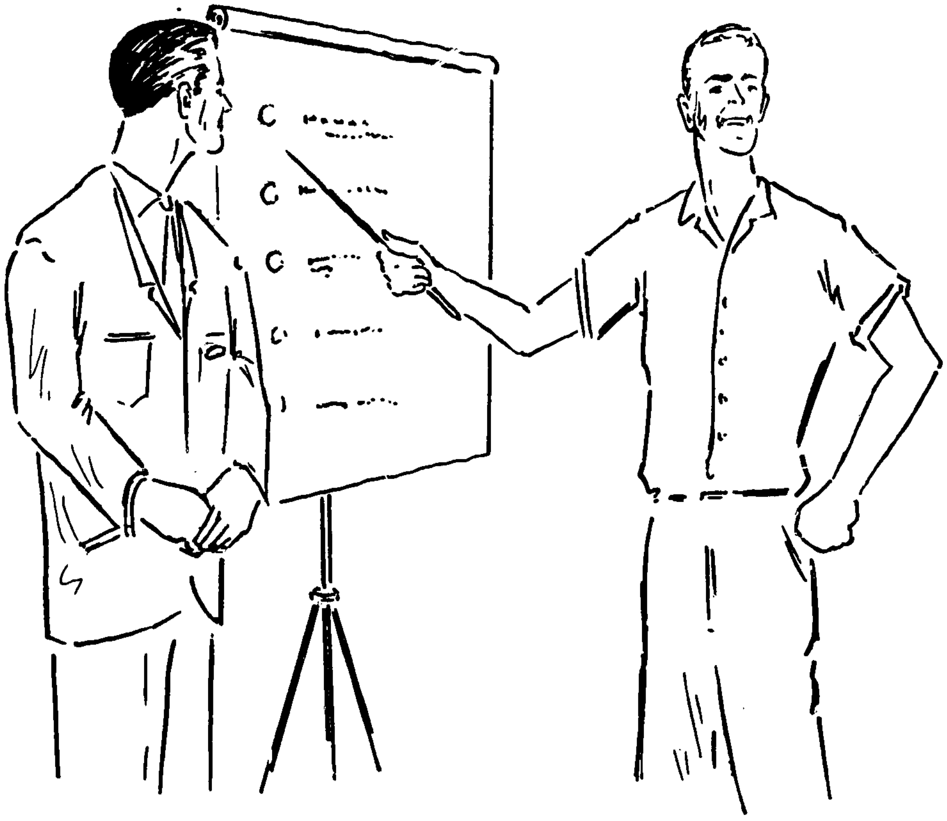
It would be physically impossible to keep all the equipment, tools, materials and supplies for a whole course on hand in the classroom at all times. Your room would become a storage area instead of a learning area. The equipment, and so on, that you need for one particular lesson should be on hand in the classroom when you need it, but how can you be sure that you will remember all pieces of equipment on the day that you need them?

The answer to this question is your clue to the correct response. Return to frame 31 and find that response.

YOUR ANSWER: The method that we have discussed which is completely dominated by the instructor is demonstration.

Sometimes this is true, but it is not a hard-and-fast rule. It is best to allow a trainee who has a good understanding of the skill to carry out the demonstration. A class is much more attentive when one of its peers is part of the teaching situation. You, as the instructor, add variety to the class activities to involve as many of your trainees in the teaching activity as possible. Because the trainees speak each other's "language," they may be able to get the idea across better than you. You enrich the learning of the trainee who teaches, too, for there is no better way to learn than to try to teach what you know to someone else. There is something about putting knowledge into your own words and actions that makes it uniquely yours.

You are on the right track. With this hint you should be able to return to frame 35 and select the correct response. Look for the method which involves only the instructor in the teaching situation.



(from Frame 27) 31

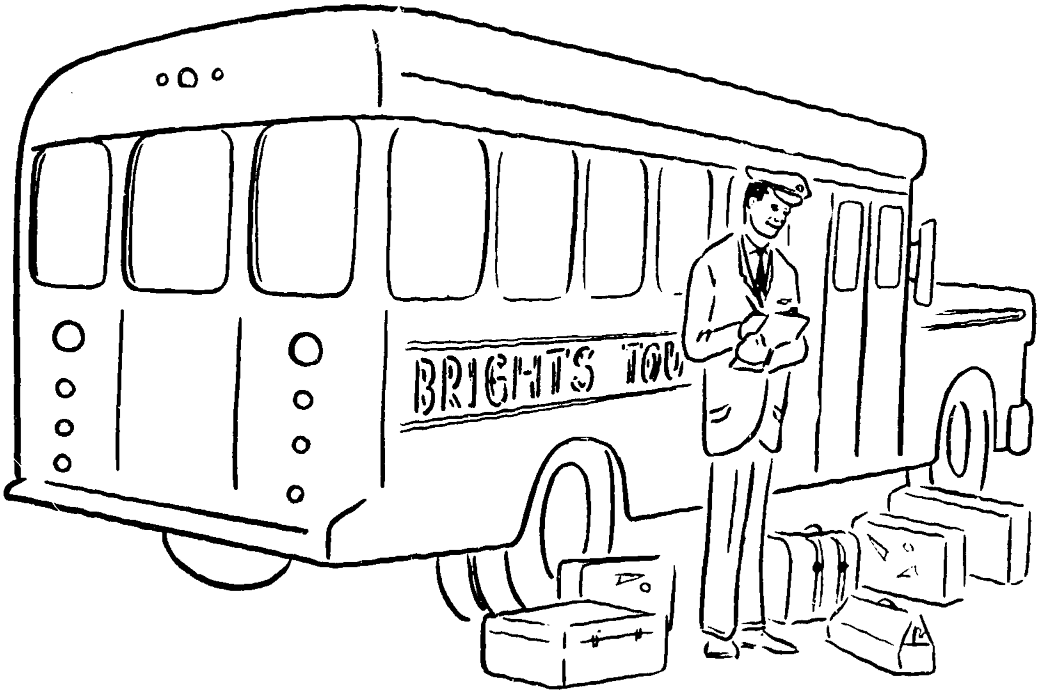
YOUR ANSWER: The first step you take in planning to use aids and materials is to make a list of all aids and materials that might be used.

Yes! This is your shopping list, and when you go to preview aids and materials you will know exactly what you are looking for. You will be assured of having the most complete selection of aids and materials on the topic, too.

In teaching a skill, another list is necessary in your planning. You should make a careful list that includes all the equipment, materials, supplies, and tools necessary to perform the skill. With this list in hand it will be easy to make sure that you and the trainee will have within reach everything you need to perform the skill. You will not have to fumble and search during the class period for the things you need.

How can you be sure that tools, equipment, materials, and supplies will be on hand when you need them?

	FRAME NO.
Have a trainee in charge of them.	26
Keep all of the equipment, materials, tools, and supplies on hand in the classroom.	29
Make a check list of equipment, etc.	35



YOUR ANSWER: The method that we have discussed which is completely dominated by the instructor is role playing.

This is the one method of the five we have discussed that is anything except instructor centered. Role playing consists of having trainees act out a part. This play may be written ahead of time by a committee of trainees or may be spontaneous. All involved in this method learn. The trainees acting out the parts "become" the people they are pretending to be. Their understanding of the situation is increased because they actually think from the point of view of their characters. Because they are made the center of attention, they will not easily forget what they have learned. The trainees who watch, see the information in a different light. The dull pages of printed material become interesting and vivid because the trainees see the facts come to life. The beheading of Marie Antoinette doesn't mean much to us today. Most of us probably don't even remember when she lived or why she was guillotined. If we had actually seen the blade drop to her neck, however, the incident would have been engraved on our memory.

Anytime trainees are involved in teaching, the class will be more attentive. A method such as this one leads logically into the group discussion method, too.

As you can see, this method can involve a number of trainees and can lead to a method in which all trainees can participate. If you need to, reread the material on frame 35 before making another response.

(from Frame 27)

33

YOUR ANSWER: The first step you take in planning to use aids and materials is to list only those that you are sure you can use.

If it were possible to do this, it would be fine. There will be new aids and materials relating to your topic that you should have on your list. Even aids and materials that you do not think you will use might be added to your list. At this point in your planning, anything that deals with your subject should appear on your list. The weeding out of "undesirables" takes place when you preview. In this way you can weigh the value of your aids and materials against each other and come out with the very best selection available.

Return now to frame 27 and make the correct response.

(from Frame 39)

34

YOUR ANSWER: Mr. Bright should plan to use group discussion and directed activity.

These methods might be very effective for teaching this lesson, but can you be sure that they would be? What do you base your choice upon? How can you limit this lesson to these two methods? Isn't there some information lacking that would help you make this choice. Of course, there is! You are not told what Mr. Bright wants his trainees to learn about McKeeley Park. Only he knows what the objectives for his lesson are, and, therefore, only he is qualified to choose the best methods for reaching these goals.

Attention to the underlined cues in the original frame will help you in making the correct response. You may return now to frame 39.

(from Frame 31)

35

YOUR ANSWER: You can be sure that tools, equipment, supplies, and materials will be on hand when you need them by making a check list for each lesson.

Good! This is the mark of a well-organized instructor. Trainees recognize this quality in their instructors, and it gives them a sense of confidence.

Your next planning strategy is to select the methods of instruction that will be best for this particular lesson. The five main methods are demonstration, role playing, group discussion, directed activity, and lecture. Demonstration consists of a display accompanied by a complete description of the process involved--a kind of "show and tell." This method is usually instructor-centered, but may involve a trainee who shows mastery of the skill. Role playing is a learning situation in which the trainee acts out a given set of circumstances. This method is successful because it draws the trainees into the study. It causes those who are actually involved in the acting to "live" the experience. It keeps the interest of those who observe the performance because they are eager to see what their classmates will do. This method may be used effectively in teaching information lessons. Group discussion is a method in which thought-provoking questions are asked in large or small groups and discussed freely until some conclusion is drawn. The discussion may be led by the instructor or by an advanced trainee within each of several groups. This method gives the trainees an opportunity to participate in the learning situation; in small groups, it helps to draw timid trainees into the conversation. Directed activity is instruction by which the trainee is put on his own with a given task (such as a work book or project), but receives guidance from the instructor. This method gives the instructor the opportunity to work with individuals and to see where possible weaknesses lie. Lecture is the teaching method in which the instructor delivers a speech or discourse on the lesson. This method is useful in reviewing or summarizing a lesson on related information.

Which of the methods we have discussed above is always dominated by the instructor?

	FRAME NO.
demonstration	30
role playing	32
group discussion	36
directed activity	37
lecture	39

(from Frame 35) 36

YOUR ANSWER: The method that we have discussed which is completely dominated by the instructor is group discussion.

The very name of this method should tell you that it is not instructor dominated. Group discussions should involve as many of the trainees as possible and may be led by the instructor or by a trainee. Breaking the class into several small groups allows a student from each group to lead the discussion; trainees who would not normally participate in large class discussions are given an opportunity to speak.

Group discussions involve everyone if they are handled correctly. You must, therefore, return to frame 35 and look for a better response to the question.

(from Frame 35)

YOUR ANSWER: The method that we have discussed which is always dominated by the instructor is directed activity.

Both the trainee and the instructor dominate this situation. The trainee is involved in teaching himself by means of workbooks, assignment sheets, or projects. The instructor, then, has a chance to watch the trainee's progress and help him if he becomes confused. This method allows the instructor to work with individuals who need added instruction and lets the quicker trainees go on at their own pace.

As you can see, the individual trainee and the instructor share the teaching task in the execution of this method. There is, then, a method which is completely instructor-centered that you must find. Return, now, to frame 35 and select that method.

YOUR ANSWER: The most important point for Mr. Bright to remember in completing this phase of his planning is to arrange the area the way the trainees must use it in performing the job.

Good! A doctor, regardless of his knowledge of surgery, could do little good without the proper surgical tools and a patient. His work area must be properly arranged, too, so that everything he needs will be right at his fingertips. He cannot afford to run wildly around the operating room looking for a clamp while his patient bleeds to death! Proper arrangement of the work area may not be a matter of life or death in performance of your skill, but teaching your trainees the proper, most efficient method of performance is necessary. It will be too late to try to teach them proper arrangement of their work area after the course is half way to completion. They will have already learned correctly or incorrectly from observation since the first day of class.

Now, just a few words about preparing to use teaching aids. It is just as important to prepare for the use of aids and materials as it is to prepare to teach. At the beginning of your planning, you broke your course into lessons and your lessons into steps. These steps represent the points that you plan to teach. They will serve as a guide to you in selecting teaching aids and materials. No aid or material should be chosen without deciding which teaching point you wish this aid or material to help teach. Remember, you can use a variety of materials and aids to help teach one step; no one aid or material should attempt to teach all of a lesson or even all of a step! Teaching aids and materials are things that help the instructor do his job better, not things which replace him.

CONTINUE TO THE NEXT PAGE

(frame 38 continued)

Mr. Bright's first lesson is on McKeeley Park. If his first step is "Give an overview of the park's recreational facilities," what should his reaction be to a color movie he has just found entitled, "A Summer at McKeeley Park"?

	FRAME NO.
He should plan to use it to teach this step, for it would give a good overview for the study.	40
He should not plan to use this film to teach this step.	41
He should list the film for consideration.	45

YOUR ANSWER: The method that we have discussed which is always dominated by the instructor is the lecture method.

Correct! In the other methods, there is room for trainee participation and activity if you so desire, but the entire teaching situation is centered around the instructor when he uses the lecture method.

Now that you know what the methods of instruction are, your next concern is how to use them. The first cue is to use a variety of methods to teach one lesson. We human beings do not function well on a diet of nothing but starches. In order to grow properly, we must have meats, starches, vegetables, and fruits. There are times when our body needs more protein for growth; when we are active we need the starches for energy. Because we do not know which our body needs the most on certain days, we eat a balanced diet. Because you, as the instructor, do not know which method will meet the needs of every trainee and because each trainee has different needs, you must plan to use several methods to teach a lesson. The second cue is never to overuse one method in your teaching. Suppose you enjoyed strawberry shortcake. How long do you think it would take you to become sick of the sight of strawberry shortcake? If you like lectures and decided to use at least one for every lesson, how long do you think it would take your trainees before they said to themselves, "OH, NO! Not another sermon!" and changed stations on their mental radios? The following statistics are a cue to choosing methods and aids and materials:

We retain:

10% of what we read

20% of what we hear

30% of what we see

50% of what we see and hear

GO ON TO THE NEXT PAGE

(frame 39 continued)

When we are combining methods, we should keep these statistics in mind to make sure that we present the lesson in the manner most meaningful to the trainee.

Mr. Bright is planning the methods he will use in teaching the lesson on McKeeley Park. Which of the following courses of action should he take?

	FRAME NO.
Plan to use group discussion and directed activity.	34
Plan to use several methods.	42
Plan to teach by demonstration, for the trainee will have 50% retention.	43

(from Frame 38) 40

YOUR ANSWER: Mr. Bright should plan to use the movie entitled "A summer at McKeeley Park" for it would give a good overview for the study.

Keep in mind that the step is, "Give an overview of the park's recreational facilities." By saying that he should plan to use the movie, you are taking for granted that the film will have something to do with the recreational facilities offered at the park. Does the title of the film tell you this? For all you know, the film may be designed to interest gardening enthusiasts in the varieties of flowers found in the park during the summer. It may have nothing at all to do with the recreational facilities offered.

This film may or may not be of value. There is another step you must take before you can decide definitely to use the film.

Return to frame 38 and make the correct response.

(from Frame 38) 41

YOUR ANSWER: Mr. Bright should not plan to use the film A Summer at McKeeley Park" to teach this step.

On the face of the situation, this would probably be a logical answer. The step is "Give an overview of the park's recreational facilities," and the title of the film sounds like it might be a general look at the park as a whole. Since you want to make sure that the aids or materials used help teach the step for which you are planning, you might assume that the whole film may take up too much time and give too little information on your topic. The saying, "Never judge a book by its cover" applies here. The title of the movie tells you only one thing for certain--that the movie is about McKeeley Park in the summertime! It might deal with plants and animals found in the park; it might be a survey of the lodgings and living facilities offered at the park; it might well emphasize the forms of recreation found in the summer at the park.

How will you know if Mr. Bright should plan to use the film? Your answer to this question will help you choose the correct response. Return now to frame 38.

(from Frame 39) 42

YOUR ANSWER: He should plan to use several methods.

Good! No one method is appropriate to teach a lesson. Variety is the key to chosing methods of presentation. Now we come to the last phase of your planning: ARRANGING THE WORK AREA. Here we have a case of "last but not least." This is a very important phase.

You must plan a work area that is as much like the work area of a real job as possible. Your trainees will stand a much better chance of learning to perform skills correctly if the learning situation is as much like "real life" as you can make it. After all, you wouldn't try to teach someone to play baseball on a football field, would you?

Of course, it goes without saying that you will have the work area as clean and orderly as possible, and you will plan to have your trainees keep it that way. The important thing to remember in planning your work area, however, is this: No matter what your trade, when your trainees become employees, they will perform better on the job if they have learned their skills in a setting which is similar to the job.

Mr. Bright is getting his bus ready for his trainees. The bus will be their work area during the tour. What is the most important point for him to remember in this phase of his planning?

	FRAME NO.
Arrange the area the way the trainees must use it in performing the job.	38
Make the area clean and orderly as a good example to the trainees.	44
Wait until he meets the trainees to decide arrangement of the area.	46

(from Frame 39) 43

YOUR ANSWER: Mr. Bright should plan to teach by demonstration, for the trainee will have 50% retention.

The first cue given on the previous frame tells you that it is necessary to use a variety of methods to teach one lesson. Perhaps this point was not stressed enough for you. You are thinking, "Mr. Bright will be showing the park to his passengers (trainees). He will be telling them about the park. This is what constitutes the demonstration method." There are two points that you have not considered. First of all, you do not know Mr. Bright's objectives. His objective may be, "The trainee will be able to write a short paragraph describing the history of McKeeley Park from its foundation in 1948 to the present." Mr. Bright couldn't demonstrate the history, could he? Second, even if the demonstration method were appropriate to the objectives, you cannot be sure that every trainee will be reached by this method. Jack, for instance, gets long lectures at home constantly. All his life has seemed to be one long demonstration. He has remedied this irritation by throwing up a blank wall to long, involved demonstrations. He enjoys expressing himself--hearing himself talk. What do you do in order to reach the Jacks? You use methods which call for trainee participation in which he can play a part. The needs of each of your trainees must be considered before you decide upon the methods of instruction that you will use.

Considering these things, return to frame 39 and make the correct response.

(from Frame 42) 44

YOUR ANSWER: The most important point for Mr. Bright to remember in completing this phase of his planning is to make the area clean and orderly as a good example to the trainees.

This is important and should be carried through as much as possible. The key words in the question, however, are the words "most important." Could an auto mechanic perform his job properly in a doctor's office? Would the well-organized equipment of a laboratory technician be any help to a brick layer? Could a barber use the equipment and surroundings in a welding shop to give a good shave and haircut? Of course not! None of these situations provide the proper equipment or surroundings which these tradesmen need to perform their jobs correctly and efficiently.

With this reminder, you should be able to return to frame 42 and make the correct response.

YOUR ANSWER: Mr. Bright should list the film for consideration.

Correct! He knows what he wishes the movie to teach, but he does not know if the movie will help teach this step. It may contain too much information for his purposes, or not enough. It may have nothing at all to do with the teaching point. Because he knows that it deals with his general subject--McKeeley Park--in some manner he must list it for consideration.

The next question is, "How does he go about approving the film for use?" Some aids and materials are accompanied by reviews from the publishers that give good summaries of the contents. These will be helpful to you in making your decision. Most important, however, is your own preview. "The proof of the pudding is in the eating!" You can only determine the merits of the aids and materials you have listed by looking carefully at each one. As you preview you can remove the culls from your list. Any aid or material REGARDLESS OF HOW INTERESTING must be removed from your list if it does not meet the needs of your lesson OR if it is not on your trainees' level of understanding.

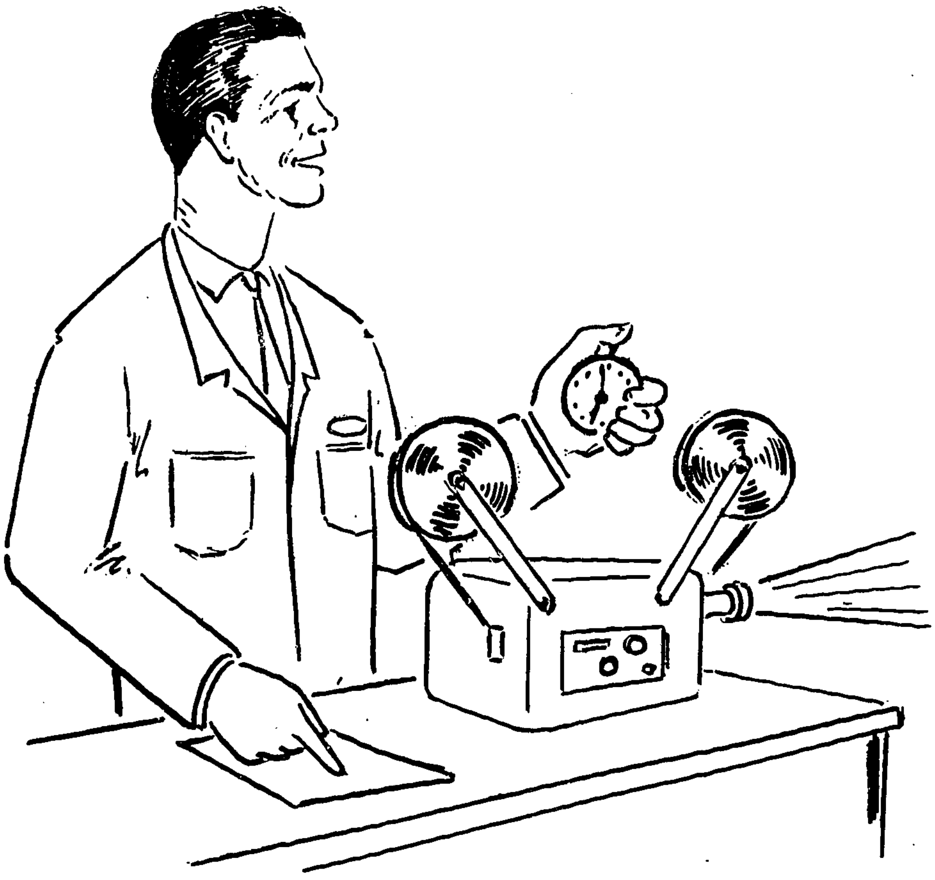
Once you have selected the aids and materials that you will use, you must rehearse their use. Why? You must plan ahead of time what you wish the trainees to learn from the aid or material so that you can tell them what to look for. You must make sure vou know how to set up the equipment if you are using projected aids, complicated models. or the like, so that there won't be an awkward pause or delay on the day of the presentation while you get ready. Time is important, so you must know how long your presentation of the aid or material will take.

GO ON TO THE NEXT PAGE.

(frame 45 continued)

After listing possible aids and materials, what steps do you take to insure that the trainee gets the most from an aid or material?

	FRAME NO
Preview each aid or material. Rehearse the use of aids and materials.	48
Preview audio-visual aids. Rehearse setting up equipment.	51
Choose the most eye-appealing aids and materials. If an aid or material is of vital interest, use it.	53



(from Frame 42) 46

YOUR ANSWER: The most important point for Mr. Bright to remember in completing this phase of his planning is to wait until he meets the trainees to decide the arrangement of the area.

There are many areas of planning that will involve meeting the trainees before their precise needs can be determined and met. This is not one of them, however. You and Mr. Bright are the instructors. You and only you know what is needed in order to perform the skill you will teach. The trainee's first impression of the work area will be important. Every piece of equipment and every tool should be laid out in the order in which he will be expected to use it. He will learn by observation and experience, then, how he should arrange his own tools and equipment when he is out on his own.

If necessary, look again briefly at the information on frame 42 before making another answer choice.

(from Frame 52) 47

YOUR ANSWER: The correct response is "Number one (1) is a key point instead of a step, and part "a" is a step.

Very good! You have demonstrated that you understand the difference between steps and key points in a job breakdown. Now you are ready to go on to the next question. Turn to frame 55, please.

YOUR ANSWER: After listing possible aids and materials, you must preview each aid or material and rehearse the use of each.

Excellent! You are an instructor. Every part of your planning is directed toward teaching the student. Anything that does not help you to complete this task to the satisfaction of your objectives must be avoided. Screening your aids and materials in this manner will help to insure that you do not waste your teaching time and your trainees' learning time with anything unrelated to the lesson at hand. It will also assure that the trainees will be properly prepared for the aid or material and that the proper time for their presentation is allowed.

Let's summarize briefly the important points in planning to use teaching aids and materials:

1. Refer to your lesson plans, checking the steps in your breakdown. Examine the objectives you have chosen for this lesson.
2. Make a list of all possible aids and materials that might be used.
3. Preview each aid and material that might be used.
    a. Select from this preview only those which pertain to the lesson being taught.
    b. Make sure that the aids and materials that you select are neither too elementary nor too advanced for your trainees.
4. Rehearse the use of each aid and material that you select.
    a. List the points that you wish the student to learn from the aid or material.
    b. Time your presentation of the aid or material.
    c. Familiarize yourself with any equipment that might be used.

Turn to frame 50 and we will look quickly at your job of planning to teach.

YOUR ANSWER: The correct response is "Parts 'a' and 'b' are steps instead of key points."

You are partially correct. Let's examine your answer carefully. To refresh your memory, the key points listed are:

a. Check the tires on the bus.

b. Treads should be checked for wear, for cracks in the wall, and for cuts and slashes.

There is a logical order in which an operation can be accomplished. When you list this order of things to do, you are listing steps. The operation is "Getting the Bus Ready." Does either "a" or "b" tell you one thing to do toward getting the bus ready? Of course--check the tires! This, then, is a step. Now, is "b" also a step? Does it tell you something else to do to the bus besides check the tires? No! What does "b" do then? It tells you one point to remember when checking the tires, doesn't it? Is "b" a step or a key point? It is a key point because it gives information that will help you do the step, "Check the tires......."

Remember, if it tells you what to do, it is a step; if it is a safety precaution or tells you something you should know to be able to do the step, it is a Key Point.

Return, now, to frame 52 and make another choice.

Just as a building must have a good foundation, each lesson you teach must have substantial planning to form a base from which to build a good learning situation. These are the steps that make a firm foundation:

1. Break your course topic (welding, barbering, carpentry, auto mechanics, etc.) down into lessons and your lessons into steps and key points. (Step--a significant ACTION which advances the job or operation toward completion; Key point--the KEY to doing the step correctly, safely, efficiently, or accurately.)
2. Decide upon the aim, purpose, or objective of each lesson. Objectives must be stated in terms of what you wish the trainee to be able to do, what he should know, and what his attitude should be.
3. Make a timetable that will help you pace each lesson and arrive at your desired destination at the end of the course.
4. Make a list of all possible teaching aids and materials that might be used to teach this lesson. (If it is a skill lesson, you must also list all tools, equipment, and supplies that must be used in performing the skill.)
5. Decide which teaching method are best for this lesson. Remember to use a variety of methods so that each trainee will be reached by your presentation.
6. Arrange the work area as the trainee will be expected to use it in performing the actual job.

Before you learn how to use your planning in the Four-Step Method of Instruction, let's see how well-prepared you are by answering the following questions. Please turn to frame 52 for the first question.

YOUR ANSWER: After listing possible aids and materials, you must preview audio-visual aids and rehearse setting up the equipment.

This is certainly important, but it is necessary to preview and rehearse all aids and materials that you wish to present to your class. Suppose that you found a programmed lesson whose title suggested that it would be ideal for helping teach a particular lesson. After going through the program for yourself, you discovered that it stressed some points which you did not want to take up with your trainees until later in the course. Previewing saved you from using material unsuitable for your lesson and gave you time to spend on an aid or material that would enrich and clarify your lesson.

Again, suppose that you had spent a great deal of time developing some transparencies for the overhead projector. Since you had made them yourself, you knew that they were perfectly suited to the lesson. Unless you planned your remarks carefully and timed your performance, leaving room for questions and discussion, you might have left your class hanging in the middle of a sentence at the end of the period. Everything that you had accomplished up to that point would be lost. Your trainees like to have a feeling of accomplishment at the end of a class period, too, and they would be left dangling from the end of the chain of thought you had begun to weave.

Good teaching aids and materials completely lose their effectiveness in the hands of instructors who will not take the time to preview and rehearse their use before presentation in the classroom.

With this reminder, you are ready to return to frame 45 and make the correct selection.

(from Frame 50)

Mr. Bright is attempting to make a job breakdown of the things he must do before the tour begins. Examine his first step and key points to determine if he's on the right track:

JOB: Preparing for the Tour OPERATION: Getting Bus Ready

STEPS	KEY POINTS
1. Air pressure in the tires should be maintained at the level indicated on the tire.	a. Check the tires on the bus. b. Treads should be checked for wear, for cracks in the wall, and for cuts and slashes.

Which of the following responses is correct:

	FRAME NO.
Number 1 is a key point instead of a step, and part "a" is a step.	47
Parts "a" and "b" are steps instead of key points.	49
The steps and key points shown here are correct as they are.	54

YOUR ANSWER: After listing possible aids and materials, you must choose the most eye-appealing aids and materials. If an aid or material is of vital interest, use it.

We are glad that you recognize the importance of selecting aids and materials that are eye-appealing. They are much more apt to hold the attention of the learner if they are well-arranged and laid out attractively. Aids and materials should be of vital interest, too. Both of these points are of little value, however, if the aid or material is not suitable to the lesson and to the trainee's comprehension level. Have you ever heard an instructor say, "We are going to see some slides today. They have nothing to do with what we are studying, but they are very interesting. They are in color, and we may not have the opportunity to see them again." This instructor is abusing the purpose of the teaching aid. He is interrupting the logical learning process by inserting something that has nothing at all to do with the lesson.

Aids and materials should not be used as substitutes for teaching, nor should they be presented simply because they happen to be available. Aids and materials are to a lesson as a tie is to a suit. They are not necessary, but they help make a good impression upon the beholder.

Survey the information on frame 45 briefly before making your next answer choice.

YOUR ANSWER: The correct response is, "The step and key points shown here are correct as they are.

You do not seem to be able to tell the difference between steps and key points. Let's review a little. Steps tell you what to do. Key points give you pointers that help you do the steps. Safety must always be a key point.

All of us have assembled a toy at one time or another. It is usually accompanied by instructions that tell us what goes where. Let's pretend that you are writing the instructions for assembling a model airplane. You must first decide what you must do to put the toy together. Your list may look like this:

1. Find the fuselage
2. Attach wings to notches on fuselage at A
3. Attach rudder to rear of fuselage at B

This list tells you what you must do to assemble the airplane. They are, therefore, STEPS. Look at the first step, "Find the fuselage." Ask yourself, "What might help me find the fuselage? Its shape and color, perhaps." A key point might then be, "The fuselage is the cigar-shaped piece with red and blue strips down both sides." Might there be a safety point to remember here? "Be careful when handling this piece, for it is easy to break and splinter."

Remember, steps tell you what to do; key points add information that helps you do the step. There may be several key points for each step.

Return to frame 52 now and study it carefully before making another choice.

(from Frame 47) 55

Which one of the following is the best stated objective for Mr. Bright's tour of McKeeley Park?

	FRAME NO
The passengers will be able to answer 10 questions about McKeeley Park.	57
The passengers will be able to name the five points of interest and describe the main attraction of each in 100 words or less.	60
The passengers will learn what they need to know to complete their individual tasks.	63

(from Frame 61) 56

YOUR ANSWER: The purpose of a timetable is to show each student how quickly he can perform a skill as compared to his classmates.

You evidently do not understand the purpose of a timetable. One thing that you, as an instructor, must avoid is pressuring trainees to compete with each other in the speed with which they learn either a skill or information. Some trainees learn at a faster rate than others; some trainees will be able to do things with their hands more quickly than others; your personality or teaching methods may appeal to some trainees, but may not be as clear to others. For these reasons, you should try not to make examples of trainees who are able to perform more rapidly than others. Competition is good when it is handled properly; you will find that trainees who are encouraged to do better by competing with other students compete naturally without aid from the instructor.

Timetables are not charts of trainee progress. The instructor makes timetables for his course before he ever meets with his class. This kind of planning insures that the proper amount of time is spent on each lesson and that the course is completed on schedule.

Now that your memory has been refreshed, return to frame 61 and think through the two remaining responses before making another answer choice.

(from Frame 55) 57

YOUR ANSWER: The best stated objective for Mr. Bright's tour of McKeeley Park is, "The passengers will be able to answer 10 questions about McKeeley Park."

You are on the right track. You recognize that the statement named what the passenger (trainee) should be able to do when the tour was completed. You also note that the quantity of test questions he is expected to be able to answer is included.

What, then, is wrong with this objective? We may be able to answer this with another question. What will these 10 questions cover? There is an infinite variety of topics which could possibly be tested--from history to wildlife.

Remember, lesson plans are built around the effects of instruction upon the trainee. This is why objectives must be thought out and worded precisely. The trainee must know exactly what is expected of him so that he will have a fair opportunity to experience success.

Now that your memory is refreshed a bit, you should be able to return to frame 55 and make the right response.

(from Frame 62) 58

YOUR ANSWER: When selecting the teaching method for a lesson, choose one method that best suits the lesson.

This is a common error with instructors. One method seems to lend itself best to a lesson, so the instructor uses this method--and only this method--to teach the whole lesson. What is the danger here? It is the same danger that drivers have on a long trip. Doing the same thing for hours on end day after day causes the driver to become bored, sleepy, and careless. If he takes a route that he hasn't traveled before--perhaps a winding road through the countryside--the trip will be more enjoyable, and he will have a better chance of arriving safely.

The one method that you have chosen, you may argue, is a good one. It is perfectly suited to the lesson. Good! Use it, but remember that there are other roads that can get you where you want to go. There may be trainees who did not learn well by the method that you have chosen but could learn if their attention were captured by a change in teaching tactics. Even you will enjoy your classes more if you use variety in teaching.

Return to frame 62 and choose the correct response.

(from Frame 61) 59

YOUR ANSWER: The purpose of a timetable is to help trainees and instructor pace themselves in the course.

Good! It takes a good instructor to recognize the importance of making a timetable. Without a timetable it is easy to spend too much or too little time on a lesson and wind up at the end of the course with material that has not been studied or with time on the hands of the trainees and instructor.

Only you are qualified to determine which lessons are of most importance and should be emphasized most. Only you can keep your class on the path without straying to unimportant or unnecessary subjects. Timetables help you to stick to your subject and to arrive at your destination on schedule.

You are now ready to continue to the next question on frame 62.

(from Frame 55) 60

YOUR ANSWER: The best stated objective for Mr. Bright's tour of McKeeley Park is, "The passengers will be able to name the five points of interest and describe the main attraction of each in 100 words or less."

Very good! This objective tells exactly what Mr. Bright wishes his passengers to be able to do to show their success with the tour.

You are now ready to go on to the next question on frame 61.

(from Frame 60) 61

What is the purpose of a timetable?

	FRAME NO.
It shows each trainee how quickly he can perform a skill as compared to his classmates.	56
It helps trainees and instructor to pace themselves in the course.	59
It gives an equal amount of time to each lesson to be studied.	64

(from Frame 60) 62

How should you select the teaching method for a lesson?

	FRAME NO.
Choose one method that best suits the lesson.	58
For teaching a skill, use demonstration; for related information, use lecture.	65
Plan to use several methods.	67

(from Frame 55) 63

YOUR ANSWER: The best stated objective for Mr. Bright's tour of Mc-Keeley Park is, "The passengers will learn what they need to know to complete their individual tasks."

This answer is incorrect. Objectives should be stated so that the trainee knows exactly what is expected of him. Does this objective tell you what the passengers (trainees) need to know or how you will be sure that the passengers (trainees) have learned? Does this objective tell you what the passengers (trainees) will be able to do? This objective sounds good, but it tells neither the instructor nor the trainee what is expected of him.

Objectives should answer the questions, "What must the trainee know? What should he be able to do? How well should he be able to do this?" Words like <u>learn</u>, <u>know</u>, <u>understand</u>, <u>appreciate</u>, or <u>grasp</u> have different meanings to different people, and unless you state fully how you will know when the trainee <u>understands</u> or <u>knows</u>, these words should be left out of an objective.

Go back to frame 55. Ask of each of the objectives: "Does this objective tell me <u>exactly</u> what the trainee should be able to <u>do</u> to show me that he has learned?"

(from Frame 61) 64

YOUR ANSWER: The purpose of a timetable is to give an equal amount of time to each lesson to be studied.

Perhaps you are not thinking. Would it take the same amount of time to teach a trainee how to change the oil in a car as it would to teach him how to repair an automatic transmission? Of course not! Would you, then, spend the same amount of time teaching each of these skills? I certainly hope not!

It takes a little more time to decide which lessons need the most time than it would to divide the course into lessons of equal time value, but a good timetable, if it is followed, can help the class to progress smoothly and give the trainees a feeling of accomplishment.

I think that you can return now to frame 61 and make the correct answer choice.

(from Frame 62)

YOUR ANSWER: When selecting the teaching method for a lesson, use demonstration for teaching a skill; use the lecture method for related information lessons.

The one point that you should learn before you go any further is that the lesson should dictate which methods you use. The method should not dictate the lesson. Certain lessons might be best taught using demonstration, while another lesson taught using demonstration might not be at all effective. To illustrate my point, suppose you decided to paint your livingroom. When you finished, you were so pleased with the results that you decided to use the same paint on the outside of the house. Imagine what happened when it rained! Just as ONE paint is not suited to all painting jobs, one method is not suited to all skill lessons or all related information lessons.

The demonstration method is not limited to only skill lessons. It may be used to teach a related information lesson as well. Neither demonstration nor lecture methods by themselves can do an effective job of teaching. Remember what we learned about the part that our 5 senses play in the learning process. Anytime we can combine the use of many senses in the learning process, the trainee retains more of what he learns. Demonstration, which consists of seeing and hearing, would result in 50% retention. Lecturing, which is only hearing, would result in only 20% retention.

Remember no one method must always be used to teach one particular subject. Return to frame 62 and reread the choices before making another selection.

(from Frame 67)

66

What is the most important thing to remember about arranging the work area?

	FRAME NO.
Arrange the work area as the trainee will be expected to use it when performing the job.	69
Never arrange the work area until you begin the lesson.	71
Arrange the work area in such a way that all trainees will be visible to you at all times.	73

(from Frame 62)

67

YOUR ANSWER: When selecting the teaching method for a lesson, plan to use several methods.

Excellent! You are doing well to realize that the most effective means of teaching is to use a variety of methods so that you will reach each trainee and prevent boredom.

Go on to the next question, please, by turning to frame 66.

(from Frame 70) 68

YOUR ANSWER: The most important steps in preparing to use aids and materials are:

Make a list of all possible aids and materials that might be used.

Practice using each aid or material.

Arrange room for best use of aid or material.

Each of the steps you have chosen are necessary in preparing to use aids and materials, but are they really the most important steps? What things do you look for in selecting aids and materials? Do you use every aid and material that you list? How do you narrow the list? How do you make sure that the trainee gets the most from the aid or material? The steps you have chosen do not answer these questions, do they? Although they are important, they miss the primary purpose of careful selection of aids and materials.

Keeping these questions in mind, return to frame 70 and select the correct response.

(from Frame 66) 69

YOUR ANSWER: The most important thing to remember about arranging the work area is to arrange it as the trainee will be expected to use it when performing the job.

Very good! In order for the trainee to be able to apply what he has learned in his actual vocation, you must set up his work area as much like the actual job layout as possible.

You are ready to go on to the next question now. Turn to frame 70.

(from Frame 69) 70

Which of the groups of statements below names the most important steps in preparing to use aids and materials?

	FRAME NO.
Make a list of all possible aids and materials that might be used. Practice using each aid or material Arrange room for best use of aid or material.	68
Preview every aid and material that might be used. Select those that best pertain to the subject being taught and that are on the level of trainee understanding. List what you wish the trainee to learn from the aid or material.	72
Select the most appealing aids and materials. Practice the use of each aid and material. Prepare the trainee for the presentation of the aid or material.	74

(from Frame 66) 71

YOUR ANSWER: The most important thing to remember about arranging the work area is never to arrange it until you begin the lesson.

Let's examine your answer to see why it is incorrect. Have your trainees any experience in the skill that you plan to teach them? In most cases the answer will be "no." If they were experienced, they probably would not be in your class. You, then, are the only person who really knows how to set up the work area suitably. You say, then, that you could supervise the arrangement of the work area after class has begun. There will be many things to take up instruction time without using class time to arrange the work area. More important, the trainee's first impression of the area is very important. Everything should be in its place as you wish the trainee to use it. This gives him a feeling of order and helps to establish good work habits.

Look more carefully at the answer choices before making another selection. Return to frame 66.

(from Frame 70) 72

YOUR ANSWER: The most important steps in preparing to use aids and materials are:

Preview every aid and material that might be used.

Select those that best pertain to the subject being taught and that are on the level of trainee understanding.

List what you wish the trainee to learn from the aid or material.

Correct! If you follow these steps, you will find that your trainees will get more from the aids and materials that you choose, and your teaching time will be better spent. All of the other steps listed were important, but without following the steps above, they would mean little to the effective presentation of the aid or material.

Congratulations! You have passed the test and are now ready to progress to the next lesson. In this lesson, you will study the Four-Step Method of Instruction, how it should be used, and the teaching principles which apply to its use. Go forward to frame 75.

(from Frame 66 73

YOUR ANSWER: The most important thing to remember about arranging the work area is to arrange it in such a way that all trainees will be visible to you at all times.

Although this may be important, it is not always possible. In some work areas the equipment that must be used would obscure trainees from view. In this case the important point for the instructor to remember is not to try to see all trainees at one time, but to make himself available to each of them as often as possible.

There is a more important point to remember. Return to frame 66 and make the correct choice.

(from Frame 70) 74

YOUR ANSWER: The most important steps in preparing to use aids and materials are:

Select the most appealing aids and materials.

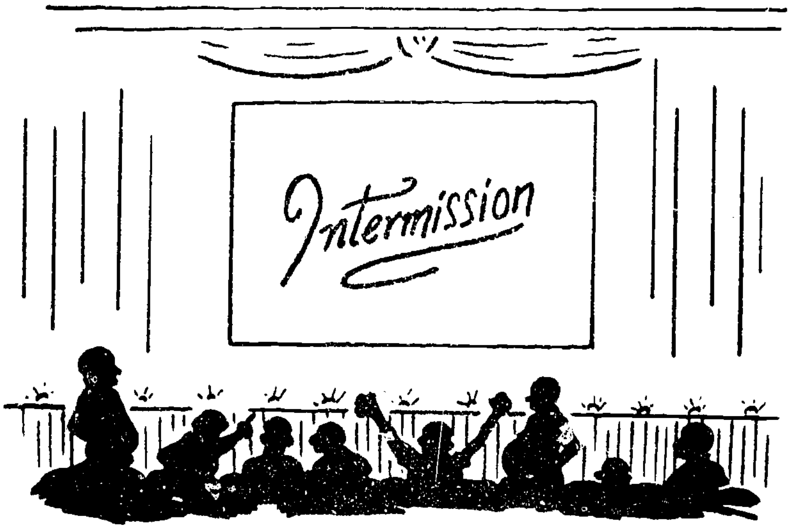
Prepare the trainee for the presentation of the aid or material.

Practice the use of each aid and material.

We cannot deny the importance of the steps you have chosen. They are important, just as bread is important to a sandwich. They, like the bread lack the most important ingredients of preparation. If you served the bread without a filling, you would have a tasteless sandwich, wouldn't you? If you "served" the aid or material to the trainee following the steps you have chosen, the entire purpose of the aid or material would be missed. How do you know that the aid or material you have chosen will be suitable? What do you expect the trainee to learn from the aid or material? The answers to these questions will supply the filling for your sandwich.

Return now to frame 70 and read the answer choices more carefully before making your next response.

(from Frame 72)



You've done such a good job so far, we thought you might like to take a break before continuing the lesson.

The second half is even better than the first. Action! Suspense! These are words producers use to advertise their movies. In this production, we are the director and you are the star! The script is "The Four-Step Method of Instruction." There will be plenty of action--on your part as well as your trainees'. Because the "Four-Step Method" offers you an immediate plan of action to use in the classroom, you will not be held in suspense wondering what to do next! You will, however, keep enough suspense in the classroom to ward off boredom!

Take your break now, and when you return you may begin the third lesson, Module III of the "Four-Step Method of Instruction."

VT 016 182
TERRY, MARTHA, ED.
THE FOUR-STEP METHOD OF INSTRUCTION. A
PROGRAMMED COURSE FOR OCCUPATIONAL
INSTRUCTORS. MODULE 3.

REHABILITATION RESEARCH FOUNDATION, ELMORE,
ALA.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
OEC-2-7-006711-4542
PUB DATE - ND 40P.

DESCRIPTORS - *CLASSROOM TECHNIQUES;
*PROGRAMED MATERIALS; INSTRUCTIONAL AIDS;
*TEACHER EDUCATION; TEACHING TECHNIQUES;
*EFFECTIVE TEACHING; *VOCATIONAL EDUCATION
TEACHERS

ABSTRACT - THIS MODULE IS THE THIRD IN A SERIES OF SIX WHICH CONSTITUTE A PROGRAMED COURSE IN TEACHING TECHNIQUES AND STRATEGIES. DEVELOPED PRIMARILY FOR OCCUPATIONAL INSTRUCTORS, THE PACKAGE WAS DESIGNED TO SERVE AS AN AID IN HELPING TO IMPROVE INSTRUCTIONAL COMPETENCY. MODULE 3 FOCUSES ON PREPARING THE LEARNER FOR INSTRUCTION. THIS PREPARATION INCLUDES: (1) MAKING THE LEARNER COMFORTABLE WITH PROPER SEATING, LIGHTING, AND VENTILATION, (2) MOTIVATING HIM TO LEARN, (3) DETERMINING HIS READINESS TO LEARN, (4) INVOLVING THE LEARNER IN THE COURSE, AND (5) DISCOVERING INTERESTS AND ABILITIES OF THE LEARNER. OTHER COMPONENTS TO THE SET ARE AVAILABLE AS VT 016 180-VT 016 185 IN THIS ISSUE. (SN)

VT 016 182

THE FOUR STEP METHOD OF INSTRUCTION

A Programmed Course
For Occupational Instructors

MODULE 3

THE FOUR-STEP METHOD OF INSTRUCTION

A Programmed Course

for

OCCUPATIONAL INSTRUCTORS

Module 3

Developed by the

REHABILITATION RESEARCH FOUNDATION
Elmore, Alabama

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Pursuant to a Contract with

U. S. Office of Education
Contract No: OEC2-7-006711-4542

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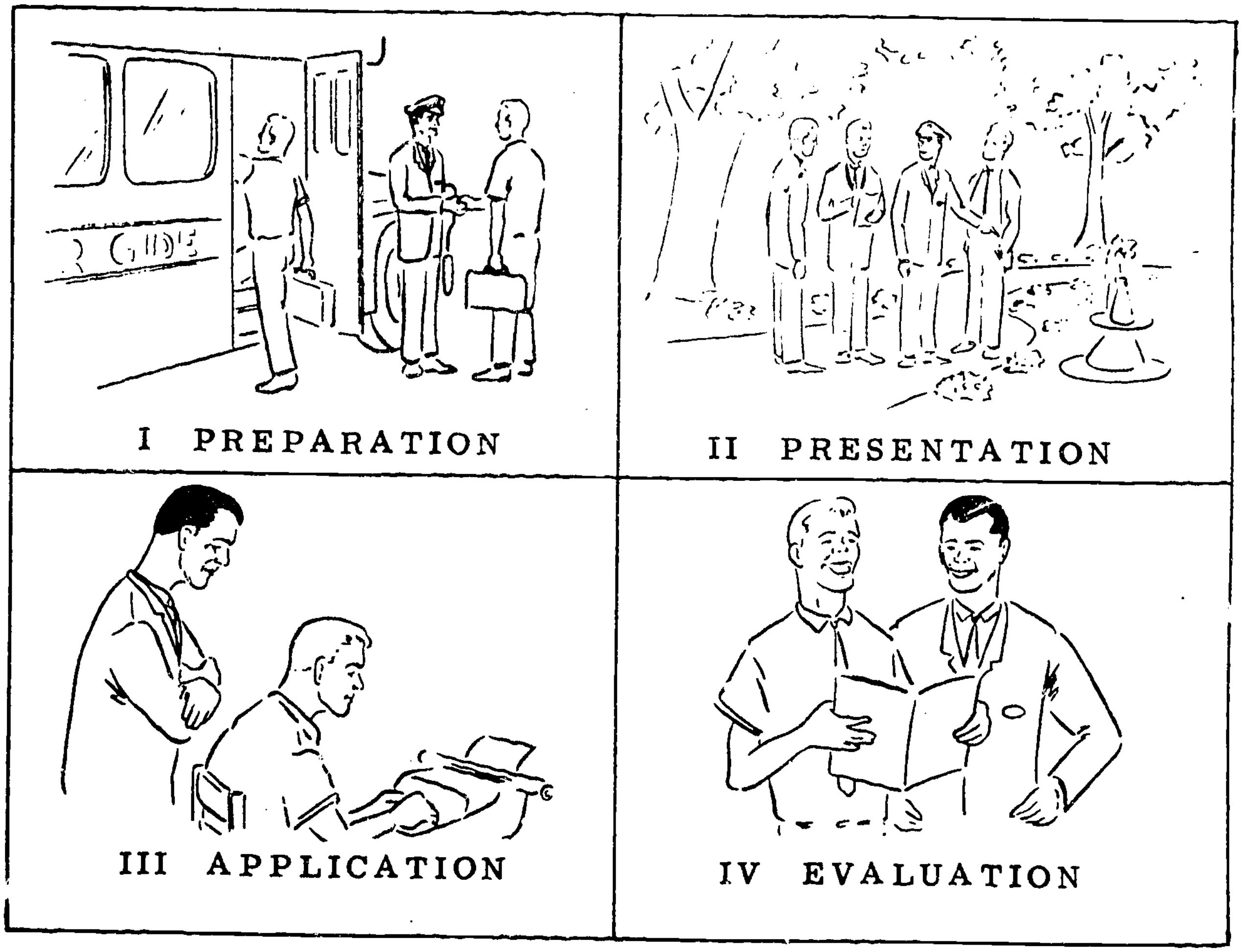
Curtain up! Our play will now begin. Everything we have done so far has been in preparation for this moment. Now you are ready. The play, entitled "The Four-Step Method of Instruction," is divided into four acts (or parts). The first "act" is entitled "Preparation of the Learner"; the second, "Presentation of Information"; the third, "Application of Skill and Information"; and the fourth, "Evaluation of the Learner and the Instructor."



I PREPARATION

II PRESENTATION

III APPLICATION

IV EVALUATION

When you actually begin to instruct, what do you do first?

	FRAME NO.
Prepare the learner	4
Arrange the work area	6
Present the lesson	9

(from Frame 4) 2

YOUR ANSWER: In the preparation step it is necessary to make the students comfortable because you want to be a good host.

It is important that you be a good host. Many things are a part of being a good host, however. For instance, you want to make your trainees feel welcome and at ease. You also want to make sure they are comfortable. Right now we are concerned with the trainees' comfort. What is the purpose of making them comfortable? This is the question that we wish to answer now.

Have you ever sat in a classroom chair or desk that was too high for you? Soon your legs grow numb. You squirm and fidget trying to get the blood to circulate. At the same time, you are trying not to draw attention to yourself. Until you are comfortable again, you are conscious of nothing else around you.

The answer should be clear to you now. Please return to frame 4 and make the correct response.

(from Frame 5) 3

YOUR ANSWER: We apply the principle of motivation in the preparation step because there will be no time to motivate the trainee in the other steps of instruction.

A car won't run without gas. A trainee won't learn without motivation. We motivate the trainee in the preparation step because we want him to be ready and eager to learn when we present the lesson. This does not mean that motivation ends with the preparation step. The reason that you give him in the preparation step may interest him enough to start with, but when he runs out of "fuel" you must revive his interest. You will learn as we study the other steps of instruction just how this is accomplished.

The important point for you to remember right now is that you motivate the trainee during the preparation step to get him ready to learn. Motivation is a continual process, however, especially when the lesson is a long one.

With this in mind return now to frame 5 and make the correct response.

YOUR ANSWER: When you actually begin to instruct, the first thing you do is to prepare the learner.

Certainly! The farmer cannot plant his crops without preparing the ground to receive the seeds. You cannot teach your trainees until you are sure they are ready to receive instruction.

By this time you are beginning to wonder just what is involved in preparing the trainees to learn. We can divide this step into two parts: 1) Provide proper facilities for the trainees and 2) Motivate the trainees to wish to learn. Let's look at the first part: What is involved in providing the proper facilities, and why is this necessary?

In the last stage of planning, you arrange the work area. The work area must be set up properly for the job to be performed. Certain modifications (or changes) must be made, however, when you meet with your trainees for the first time OR when you begin a lesson. Why? Your trainees are individuals. Each one of them has special needs--both physical and mental--which must be satisfied before he can learn to the best of his abilities. The classroom should not be an obstacle course. You must correct or eliminate anything that hinders or distracts the trainee from learning.

Look at the picture on the next page. How many of these trainees do you think have their minds on the lesson being presented?

(frame 4 continued)

How can you eliminate these obstacles?

a) arrange comfortable seating
b) provide proper lighting and ventilation
c) obtain desks, chairs, tables, or work areas suitable for the task you ask your trainees to perform

Why is it necessary in the preparation step to make the trainees comfortable?

	FRAME NO.
Because you want to be a good host	2
Because you want your trainees to have their minds on the lesson	8
Because you want your trainees to be able to see the presentation of the lesson	10

(from Frame 8)

YOUR ANSWER: Besides keeping the trainees' attention, another good reason for providing proper seating, lighting, and ventilation is for the promotion of safety and health.

Correct! Your trainees' health and safety are important considerations in preparing them to learn. Nothing should keep them from doing the job to the best of their abilities.

Now that you have placed your trainee in a safe, healthful atmosphere and made him physically comfortable, you are ready for the second part of the preparation step--motivating the trainee to wish to learn. Gas is the "Motivation" for a car. When you want a car to go somewhere, you merely point it in the right direction and put the gas to it. Humans are a bit more complicated. We must be reasoned with. We want to know "why?" When you motivate the trainee, you give him a reason for learning; you show him the need for his learning something; you interest him in wanting to learn. Motivation is one of the most important principles of teaching and learning because we learn well those things in which we are interested, but we rebel and cease to learn when we become bored or fail to see the need for learning a certain lesson.

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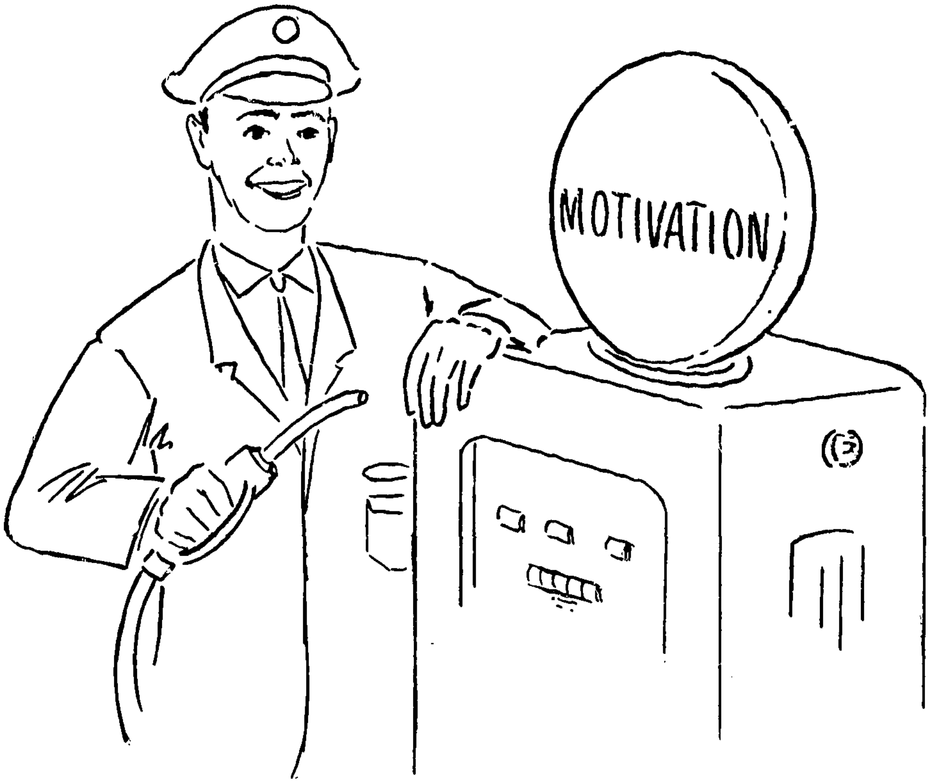
(frame 5 continued)



Why do we apply the principle of motivation in the preparation step?

	FRAME NO.
Because there will be no time to motivate the trainee in the other steps of instruction	3
Because he needs to understand our purpose for teaching him	12
Because the trainee must want to learn before we can teach him	16

(from Frame 1) 6

YOUR ANSWER: When you actually begin to instruct, the first thing you do is to arrange the work area.

Did we catch you dozing? If you had thought for a moment, you would have realized that this is the last step in planning to instruct.

We are not saying that you will not have to make some changes when instruction actually begins, but the changes should be minor ones involving only a small portion of instruction time.

Let me remind you again to consider each answer choice before making your decision. Please return now to frame 1 and make the correct response.

(from Frame 8) 7

YOUR ANSWER: Besides keeping the trainees' attention, another good reason for providing proper seating, lighting, and ventilation is for the prevention of accidents.

This is only part of the reason. Proper seating assures that the trainees' circulation will not be cut off by a desk or seat that is too high. Proper lighting keeps the trainees from straining their eyes to see materials and presentations. Proper ventilation allows fresh air to circulate and keeps the trainee from becoming overheated or cold.

You could have a well-organized, safe classroom, but this would be of little consolation if your trainees were unable to perform properly. Even though there are many people working together in a limited space, you can help to promote good health by providing the proper facilities.

You may return now to frame 8 and select the most <u>complete</u> response to the question.

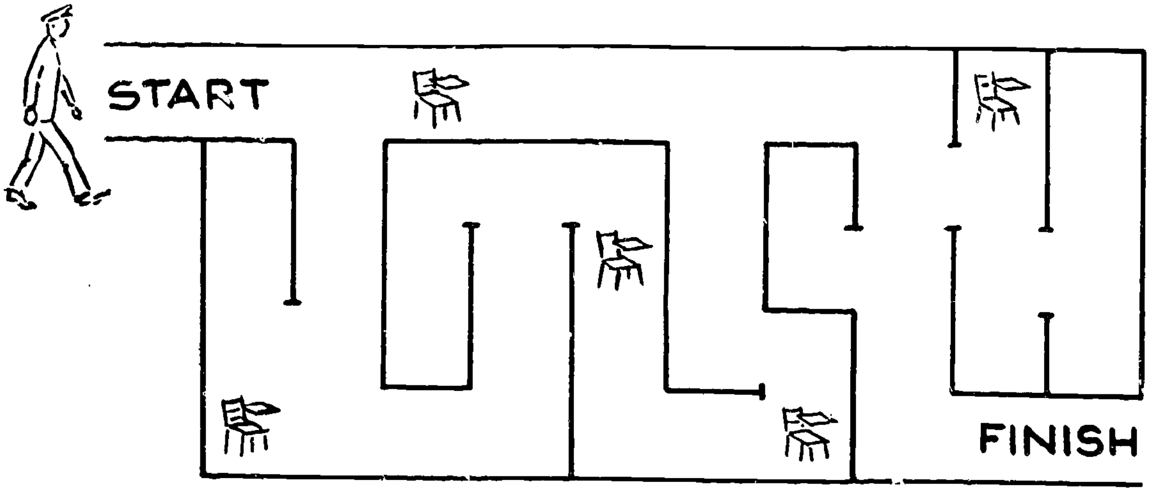
YOUR ANSWER: In the preparation step, it is necessary to make the trainees comfortable because you want them to have their minds on the lesson.

Very good! Unless you make your trainees comfortable, they will become so pre-occupied with their discomfort that they will forget all about the lesson in progress. Have you ever had a splinter in your finger? It is amazing how much pain a tiny little splinter can cause. Until you remove it, it is continually hampering your work. As an instructor, you cannot remove all distractions and discomforts. You must make it a point to remedy as many such "splinters" to the learning process as you can, however.

Not only must you provide the proper facilities for the trainees in order to keep their attention focused on the lesson, but you are responsible for your trainees' health and safety while they are in your class. In providing proper lighting for comfort, you help to prevent eyestrain. Make sure when you check the lighting that there are no faulty connections or exposed wiring. Light should also be evenly distributed throughout the room. In ventilating the room properly, you not only help the trainee to keep awake, but you insure that the air does not become stagnant with disease-carrying germs. When arranging the seating so that each trainee can see and hear, you must be sure that your room does not become a maze through which you must carefully plot your movement to keep from hitting desk corners and stumbling over feet.

GO ON TO THE NEXT PAGE

(frame 8 continued)



Besides keeping the trainees' attention, what is another good reason for providing proper seating, lighting, and ventilation?

	FRAME NO.
Promotion of safety and health	5
Prevention of accidents	7
Advancement of enrollment	11

(from Frame 1)

YOUR ANSWER: When you actually begin to instruct, the first thing you must do is to present the lesson.

You are trying to leave on a long trip with an empty gas tank! Result? You won't get very far! One trainee sitting at the back of the room can't see the blackboard. Another has a hearing difficulty. This student is a poor reader. Some of the trainees have had experience with the trade they are to learn. Others know nothing at all about it. A few of them really want to learn. Others feel they must learn. Still others are being compelled to learn for some reason or another. If you jump into teaching these trainees without solving these difficulties as best you can, without organizing them for the study, or without causing them to <u>want</u> to learn, you have defeated yourself before you begin.

"I'm not their mother," you're thinking. "My job is to instruct, not baby-sit!" Right! But you must anticipate some of your teaching problems and take care of them before they become severe enough that nothing can be done. A highway engineer has the job of building an interstate highway system. Before he pours the concrete or tar, he knows that he must iron out all the obstructions such as trees and hills and make a bed for the road. If he does not go through this preparation, the road would be rough for travel and would finally shift and crack. All of his hard work would be for nothing!

Think through this before returning to frame 1 to make the correct response.

(from Frame 4) 10

YOUR ANSWER: In the preparation step, it is necessary to make the trainees comfortable because you want them to be able to see the presentation of the lesson.

This is only part of the job of making your trainees comfortable. What about the trainee in the back of the room who cannot hear you? What about those who are becoming drowsy because the room is poorly ventilated? What about the ones sitting in a dimly lighted portion of the room? How can you expect the students to perform properly if they do not have a large enough desk, table, or work area?

Each of these questions suggests that there is more to making the trainee comfortable than just insuring that he can see the presentation. The question that we want to answer here is "What is the purpose of making the trainee comfortable?" Return, now to frame 4.

(from Frame 8) 11

YOUR ANSWER: Besides keeping the trainees' attention, another good reason for providing proper seating, lighting, and ventilation is for the advancement of the enrollment.

You are not concerned with advancing the enrollment. In most cases the problem is what to do with the trainees that you have. You are concerned with keeping those that you have, however. Their ability to perform must not be determined by how well they can dodge desks, withstand electrical shock, see a book in a darkened room, or resist disease in a poorly ventilated classroom.

Within the preparation step of instruction, you want to make sure that your trainees' performance will be aided, not hampered by the classroom surroundings.

Perhaps it would be helpful for you to review the material in the previous frame 8 before making your next response. You may return now.

(from Frame 5) 12

YOUR ANSWER: We apply the principle of motivation in the preparation step because the trainees needs to understand our purpose for teaching him.

A trainee can understand your purpose (or aim) for a lesson and still not be motivated. You may understand why a child misbehaves, but still not approve. You may understand someone's political or religious views without wishing to have the same views. This is the test of motivation. You have set your objectives for the course and for a lesson before you ever come to class. When your trainees wish to reach the same objectives and feel the need for making these objectives their own, they are motivated.

A highly successful salesman was asked the secret of his salesmanship. His reply was, "You convince the customer that he not only wants the product, but that he can no longer do without it; that it is not a question of whether he can afford it, but whether he can afford to be without it." This salesman makes his customer believe that he needs his product; he motivates his customer to buy his bill of goods!

Remember, you must sell your trainees on your course, too. You must show him why he needs each lesson. Return now to frame 5 and make the correct response.

(from Frame 16)

YOUR ANSWER: Actually this picture does not apply to the preparation step of the "Four-Step Method."

Have you ever extended your hand to someone in greeting and had it ignored? Then you know the awkward feeling of uneasiness that such an incident leaves with you. Your trainees have this awkward feeling because they are meeting a new situation and are not quite sure how to react. Because they are adults, they may feel foolish being in a classroom again. Some of them don't meet people well, and this causes them to feel shy and out of place. Whatever their reason, most of them will feel a little uneasy. Until they can get rid of this feeling, they will not be able to work well in the classroom or learn to the best of their ability.

We chose the picture of Mr. Bright's shaking hands with his students as they arrive because a warm handshake can convey to the trainee that you are glad he will be a part of your class. You have shown him that you accept him on your own level. This is [illegible] intended to mean that you must shake hands with all of your trainees. Each of us has our own way of making our trainees feel at ease. The manner that comes most natural to you is the one you should use.

Return now to frame 16 and make the correct response.

(from Frame 19) 14

YOUR ANSWER: The teaching principle you must apply in order to help you carry out the principle of motivation is reason.

Evidently you are confused. You seem to be thinking of the principle of motivation. In order to motivate a trainee you must give him a reason or need for learning. The question asked you to name the principle which helps you give the trainee a reason for learning. It would be impossible to swim without water or at least a liquid, wouldn't it? It would be almost as impossible to give the trainee a reason for learning a subject (motivate) without discovering what his background in the subject is.

When you discover the trainee's past experience in the subject, what he knows about the subject, and what he needs to know to learn the lesson well, you have put into use the principle that you have been asked to find. Return to frame 19 and discover what this principle is. Then make another answer selection.

(from Frame 19) 15

YOUR ANSWER: The teaching principle you must apply in order to help you carry out the principle of motivation is <u>interest</u>.

Interest is not a teaching principle, but a part of the principle of motivation. Motivation is showing the trainee his need to learn a lesson, giving him a reason for learning, and capturing his interest in learning Where do you start in order to do these things that motivate? The trainee would not be interested in learning something that he already knows. He would not see the need in repeating instruction of something he understands completely. You must put to play the principle that you have been asked to name before you can motivate the trainee.

With this in mind, return to frame 19 and make the correct response.

YOUR ANSWER: We apply the principle of motivation in the preparation step because the trainee must want to learn before we can teach him.

Excellent! A good way to remember the meaning of motivation is by thinking of the word "motive." Someone who commits a robbery has a motive--something that causes him to steal. You must give your trainees a motive for learning a lesson. Once your trainees are motivated, your teaching task is simplified.

You are probably wondering just what you have to do in order to motivate your trainees. There are six points that will help you to accomplish this part of student preparation. Look carefully at each one:

1) Put the trainee at ease.
2) Determine if the trainee is ready to learn.
3) Preview the course.
4) Let the trainee know what to expect from you and from the course.
5) Discover special interests and abilities of students.
6) Involve the trainee in planning.

GO ON TO THE NEXT PAGE

(frame 16 continued)

You actually begin the process of motivation the moment the trainee walks into the classroom. The manner in which you greet your students and conduct the first phase of instruction sets the tone for your classroom. Remember that your trainees are facing a new situation and they might be nervous. If you have a pleasant attitude and let the trainees know that you want to help them, you will ease their tensions so that they can work at peak performance. If you let them know that you want your classroom to function in an informal, friendly fashion, you and your trainees will work together cooperatively--not instructor versus trainees.

This picture appears at the beginning of this lesson. Why does it demonstrate one part of the Preparation Step of the "Four-Step Method"?

	FRAME NO.
Actually this picture does not apply to the Preparation Step.	13
A cordial greeting helps to put the learner at ease.	19
The instructor should set a good example for his trainees.	20

YOUR ANSWER: The following best demonstrates a portion of a good course preview:

> "This is a particularly difficult lesson. You will need to pay close attention to detail and take notes. Because of our limited time schedule, we cannot repeat instruction. You should know that I give hard tests. I won't give you one point that you don't earn."

Some people would call this "laying the facts on the line." This is the tone that some instructors take to get the respect of their trainees. The question is, "Does this kind of approach motivate?" You are trying to interest your trainee in learning your trade. Would a salesman approaching you in this manner get very far? You would probably close the door in his face. This is what the trainee would mentally do to you. You would have discouraged his interest in your product before you had a chance to demonstrate its worth to him.

Remember, you must be sold on your product before you can sell it to others; you must also remember that your product is seen in the light of your own personality. Be pleasant and make your product seem attractive to your trainees. Let them know that you are interested in their success in your class, not their failure. Return now to frame 21 and reread the previous frame before making the correct response.

YOUR ANSWER: The following best demonstrates a portion of a good course preview:

> "This mimeographed sheet describes the grading system to you. It's yours to keep. Let's go over the point listed and discuss each one. Then, if you still have questions, I will try to answer them."

Excellent! First of all, you were wise to read the question carefully. It asked you to identify a portion of a good course preview, and you remembered that previewing the course included discussing the grading system plus anything else that the trainee would need to know in order to do well in your class. Some instructors, when asked what kind of tests they give, smile fiendishly and reply, "You'll see soon enough!" It is as if they are plotting their trainees' destruction! This answer suggests a good method of discussing the grading system. The instructor distributed mimeographed sheets for the trainees to refer to as they discussed the information. Then the instructor gave the trainees an opportunity to ask questions.

The last two steps in motivating the trainee are:

5. Involve the trainee in course and lesson planning.
6. Discover special interests and abilities of trainees to interest them in learning.

For a discussion of these two points please turn to page 22.

YOUR ANSWER: This picture demonstrates one part of the Preparation Step because a cordial greeting helps to put the learner at ease.

Very good! You remembered that one of the major tasks of the Preparation Step is motivating the learner. The first of the six points which help you to accomplish this task is, "Put the student at ease." In order to do this you must create a friendly, cordial atmosphere in your classroom. You must make the trainee feel that he is a welcome, important part of the class. If you try to play the role of the dictator, you only frighten some trainees and make others resentful. Instead of making your objectives theirs, they will do all within their power to resist your instruction. Have you ever been rested after an exhausting day by soft, soothing music? You soon forget how tired you are and lose yourself in the beauty of the music. You must create a relaxed atmosphere in your classroom that makes the student forget his tensions and feelings of uneasiness.

Your trainee is now comfortable and at ease. At this point you can begin concerning yourself with the trainee's instruction. Where do you start? You must begin instruction at the point where the trainee's knowledge and understanding of the subject end. You cannot possibly motivate the student to learn if you do not know what the student's background on the subject is, what he already knows about the topic, and what he needs to know in order to reach the objectives you have set. This brings us to the teaching principle of readiness. Determining the trainees' readiness to learn is the second step toward motivating him to learn. A man who has just bought wall-to-wall carpeting for his whole house would hardly be interested in a carpet salesman's pitch. A man who knows how to use a skill saw would not be the least bit motivated for a lesson on the elementary use of a skill saw. Unless you are aware of his knowledge of the lesson (his readiness to learn this lesson), you would waste his time repeating what to him is "old hat"! By determing his readiness, (what he knows and what he needs to know) you can motivate him for this lesson by allowing him to help you teach it to his classmates.

GO ON TO THE NEXT PAGE

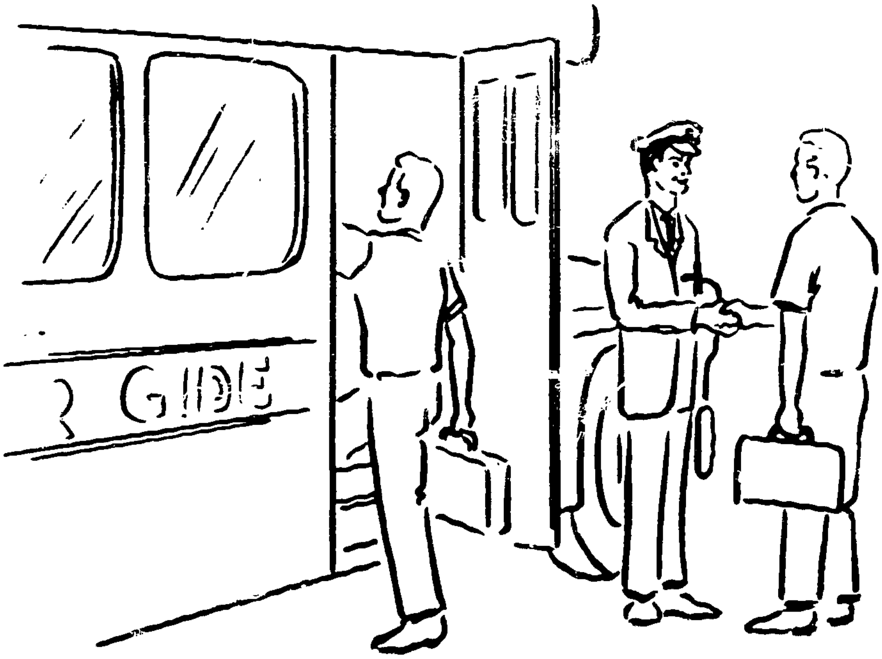
(frame 19 continued)

One way to remember readiness and its effect on motivating the student is to think of it as the launch pad from which the "motivational" rocket takes off. You cannot motivate a student to learn until you discover what he needs to know.

What teaching principle must you apply in order to help you carry out the principle of motivation?

	FRAME NO.
reason	14
interest	15
readiness	21

YOUR ANSWER: This picture demonstrates one part of the Preparation Step because the instructor should set a good example for his trainees.



It is true that the instructor should set a good example for his trainees. This, however, is not the purpose of the Preparation Step. Everything that we do in the "Four-Step Method" as well as in our planning is directed toward one goal--aiding the trainees' learning of your vocation. You are not responsible for the trainees' manners; being adults, most of their habits are already formed.

Even though we want Mr. Bright to be a well-mannered person, his main function is to show you how to go about being a good instructor. In this case, his shaking hands with one of his passengers demonstrates one of the six points found on the previous frame that will help you to motivate your trainees.

Return to frame 16 now and read the material carefully before making another selection.

YOUR ANSWER: The teaching principle you must apply in order to help you carry out the principle of motivation is readiness.

Correct! When you are going on a trip, you do not get in your car and take off without packing a bag, checking the car, and referring to a road map. In order to motivate the trainee, you must first determine if he is ready to learn what you have planned to teach him.

So far you know that the first two steps in motivating the trainee are to put him at ease and to determine if he is ready to learn. Now that you are aware of what he needs to know, you can initiate the next two steps toward motivating him. Let's look at them again to refresh your memory:

3) Preview the course or the lesson.

4) Let the trainee know what to expect from you and from the course.

Remember, you are motivating the trainee. You do not want to scare him to death by giving him a full rundown of the course, how hard it will be to make good grades, and how hard he will have to work. You are still selling your goods. Don't lose your customer before you finish your sales pitch!

GO ON TO THE NEXT PAGE

(frame 21 continued)

When you preview the course or the lesson, you should do the same thing that a good preview of a motion picture or a good book review does. You should tell the trainee just enough to interest him in the study--just the high points. You should tell him what you want the class to achieve and some of the ways you have thought of to make the study interesting. This does not mean that you are expected to sugar-coat the course. Learning is interesting and even fun; it is also a serious business. Reflect both of these attitudes in motivating the trainee. You should discuss the grading system used by your school, the types of tests you give, and the standards by which you judge your trainees' work. You should not try to keep them in the dark about such matters. In order to perform in the manner that you desire, they must know just exactly what you expect of them.

Mr. Bright is previewing the tour to McKeeley Park with his passengers. Which of the following demonstrates a portion of a good course preview?

	FRAME NO.
"This is a particularly difficult lesson. You will need to pay close attention to detail and take notes. Because of our limited time schedule, we cannot repeat instruction. You should know that I give hard tests. I won't give you one point that you don't earn."	17
"This mimeographed sheet describes the grading system to you. It's yours to keep. Let's go over the points listed and discuss each one. Then, if you still have questions I will try to answer them."	18
"McKeeley Park is located in the northwestern corner of the state twenty-two miles south of Rockville. It was founded as a State Park in 1936 as a part of the conservation program of Roosevelt's administration. This sight was chosen because of the warm sulfur springs that flow here in a naturally beautiful mountain setting. The source of the springs............"	23

Up to this point, you have been the center of attention. You have allowed the trainees to get to know you and to get to know what to expect from you and from your class. Now you want to learn more about your trainees so that you will be of more help to them when they begin to learn. You also want them to take an active interest in their class. One good way to do this is to involve them in planning their study of a lesson. Since the preview of the lesson is fresh on their minds, it might be a good idea to discuss objectives.

Besides discussing objectives, you might ask them of ways to go about studying the lesson. Do they have any ideas for a project or a visiting speaker or an interesting class activity? Lastly, have them discuss rules for classroom organization and behavior. Again, they will be more willing to follow the rules because they themselves have made them.

During the discussion of these topics, you should be observing your trainees closely. You should now know who your class leaders are and something about the interests and abilities of all your trainees. This is important, because you can use this information to draw each student into the study. You may have discovered, for instance, that one student has artistic ability. Another may have had previous experience in the skill taught in this lesson. You can give these trainees the opportunity to use their abilities in teaching the lesson and thereby stimulate their interest and desire to learn.

GO ON TO THE NEXT PAGE

3 Intermediate—Ultimate

A grade made on a trade test, the amount of time required to learn a job or task, or an attitude toward safety would be classified as intermediate as it pertains to one phase or part of the person's contribution to the organizational goals.

The combination of all of the factors of employment (all contributions of work, attitudes, morale, etc.) would be the ultimate value to the organization. Since many of these would be impossible to measure, it would be necessary to measure some of the intermediate performances of specific tasks or jobs.

Measure Small Units

The evaluation of safety training probably would have to be set up into small units, such as:

Does the employee—

1. Keep his workplace clean?
2. Keep his tools or machines in safe condition?
3. Use all protective devices and safety equipment?
4. Use safe work methods at all times?
5. Have a positive safety attitude?
6. Promote safety with others?
7. Point out potential hazards?

SUMMARY

With an evaluation made, certain conclusions must be reached:

1. The training was successful and should be continued on the same basis when and if the need persists or arises.
2. The training made some contribution, but was not a major influence on behavior.
    - **a** This training should be discontinued.
    - **b** The materials should be improved.
    - **c** The methods of presentation should be changed.
3. The training had no influence.
    - **a** This training should be discontinued.
    - **b** The training program should be entirely revamped.

2880

A GOOD INSTRUCTOR

Develops his Personality

Knows his Subject

Masters Delivery

Controls Class

A GOOD INSTRUCTOR

HOW TO BE A GOOD INSTRUCTOR

While the following discussion relates primarily to the classroom type of instruction, many of these principles also apply to vestibule or on-the-job training. These suggestions are intended to help the instructor provide the atmosphere, conditions, and methods suitable to maximum learning for the trainees.

Develops his Personality

While instructors cannot be expected to act or react the same, and since each person has his own individuality, there is no style, shape, or form to denote an instructor as contrasted with other people. However, with these variances in appearance, approach, and personality, certain traits can be developed, or improved if necessary, to make presentations and instruction successful.

1 Pleasant—While it is not necessary for the instructor to hold a constant smile on his face or attempt to amuse the trainees with jokes and wisecracks, a pleasant attitude and approach will reflect the attitude of the trainees and be most conducive to good learning. The grouchy instructor will produce grouchy students who are not psychologically prepared for learning.

2 Assured—An attitude of assurance is an advantage to the instructor and to the students. A reticent, timid instructor gives the impression that he is not sure of himself or his subject.

3 Patient—The questions, slow understanding, or actions of trainees may tax the patience of the instructor. If he maintains his composure and patience, he can proceed to conduct the instruction on his terms; whereas, should he lose his patience, he will become angry or frustrated and fail to "teach."

4 Tactful—Tact is the ability to deal with others without giving offense. Trainees may act stupid, conceited, aggressive, or recalcitrant, requiring the instructor to think before he speaks or acts in order to remain tactful.

5 Firm—An instructor may be firm without being overbearing. Firmness denotes strength of character and intent of purpose, traits which not only make a favorable impression on trainees, but which also produce a desire to learn.

Know his Subject

While it may be assumed that a person chosen or assigned to be an instructor does know his subject, it cannot be assumed that he knows what he is to teach and the order of presentation. A good background of education, study, and experience is necessary to prepare for being an instructor. While it is an advantage to know more about the subject than the scope which he is to present, it also is necessary that he be well versed in the details of the subject as it is to be presented.

Masters Delivery

The delivery of information and visuals has considerable influence on the learning and retention of the trainee. This form of communication requires the instructor to project the information in such a manner that the trainee may hear, understand, associate, and remember. This requires that attention be paid to various factors of delivery.

Pitch—For every voice there is a key at which it performs most effectively and pleasantly. While this may vary in accordance with the exertion and volume required, and tends to get higher when it must be louder, this is a quality which can be trained and controlled. The voice should not rumble down in the throat or be high and shrill. Fog horns and sirens are effective for emergencies, but both become irritating after extended exposure.

Pronunciation—Good pronunciation requires good usage of sounds of letters, syllables, and words conforming with accepted standards. For example: syllable is pronounced "syl'lable" rather than "syllab'le." If an instructor were to say, for torque wrench, 'torkyew' rather than 'tork,' the trainees probably would learn it that way.

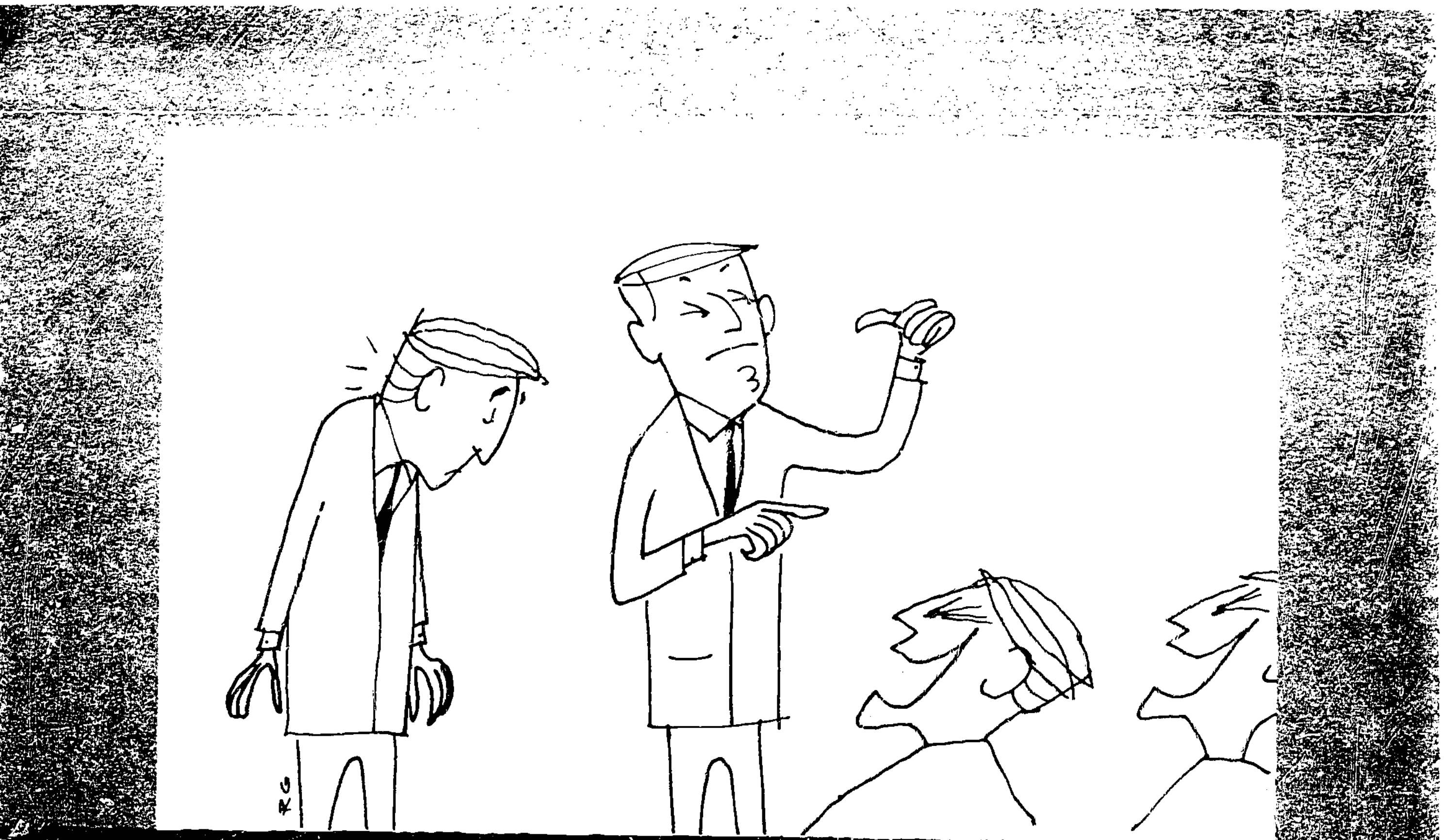
Enunciation—Enunciation is the way in which a person uses his tongue, teeth, palate, and lips to form distinct syllables and words. Good instruction requires special attention to saying words clearly and distinctly, with emphasis on unstressed vowels and using consonants rather than "swallowing" them. The word is "amp-*li*-fier," not "amp-fier."

Volume level—Good volume level is that level at which all trainees may hear comfortably. A voice which is too loud can cause distress to the listener, while a level which is too low either causes strain in trying to hear or results in the listener "tuning out" and not even trying to hear or learn.

Flexibility—A monotonous single tone delivery is more conducive to sleep than to attention and interest. An effort should be made to include a variety of tones, pitches, and rhythms for emphasis, and expressions of feeling, such as sympathy, enthusiasm, earnestness.

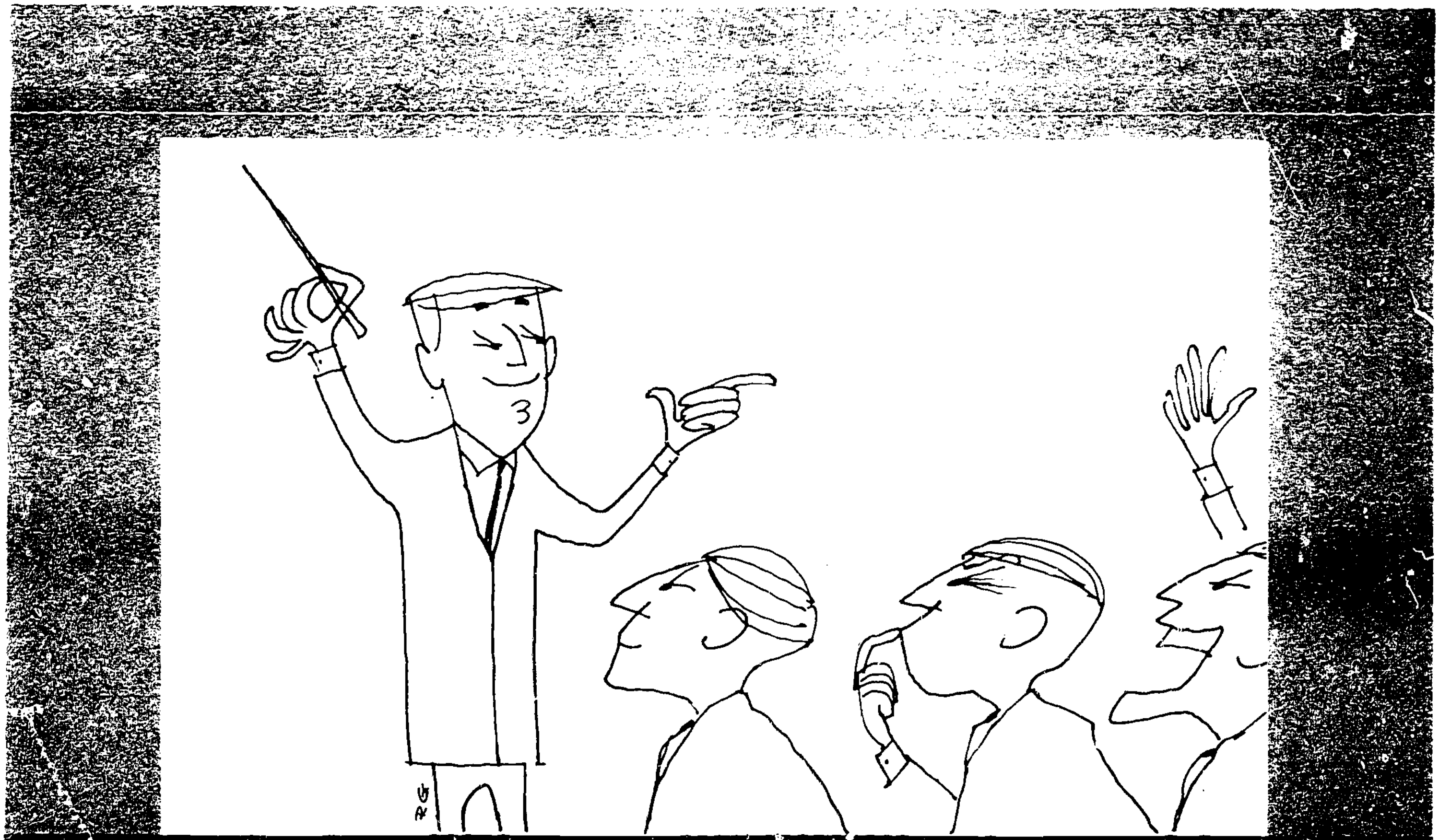
Pauses—Pauses, whether for emphasis to indicate a change in subject or to enable the instructor to gather his thoughts, should be SILENT. It is not necessary to keep the room filled with sound waves, or to fill the gaps between thoughts with "ah," "er," or "uh." When the instructor pauses without speech, the trainees credit him with thinking—and have a chance for their thinking to catch up with the instructor's.

Habits—Keys and money jangling, pencil tapping, glasses handling, scratching, pointer twirling, and chalk bouncing are only a few of the distracting habits which seem to fascinate the attention of the listeners in preference to the presentation of the instructor. Many of these are subconscious actions which the instructor may have to recognize and control.



Controls Class

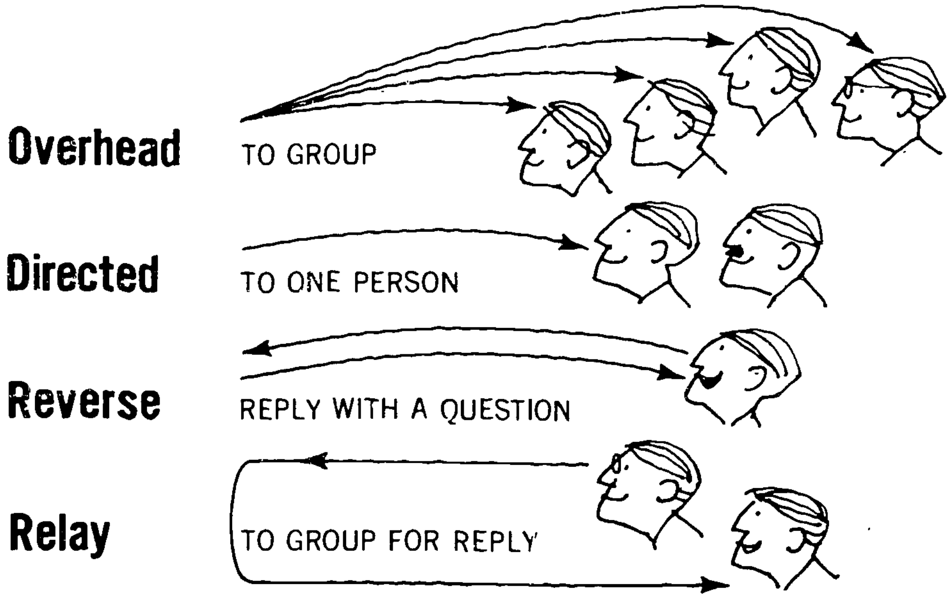
It is the instructor's duty and responsibility to maintain control of the class at all times. This is not to imply that the instructor must be a tyrant; but in a firm way, he must maintain order, keep discussion concentrated on the subject, and regulate the time for presentation and discussion. He may have to defer questions or discussions or suggest that the subject be brought to attention after the session; he may have to control a "know-it-all" or encourage a nonparticipant. Unless the class has been opened to free discussion, the instructor should be certain that he controls the class, rather than the class controlling him.



MAKE CERTAIN STUDENTS UNDERSTAND

If an instructor has a tendency to show how much he knows, or to discuss a certain subject without giving preliminary or background information, he is speaking beyond the comprehension and understanding of the trainees—and they are not learning. The subject may be so familiar and seem so simple to the instructor that he assumes that the trainees know the background information. A few questions can be used to determine the level of knowledge of the trainees, so the instructor can determine the point from which he may proceed.

POWER OF A QUESTION



POWER OF A QUESTION

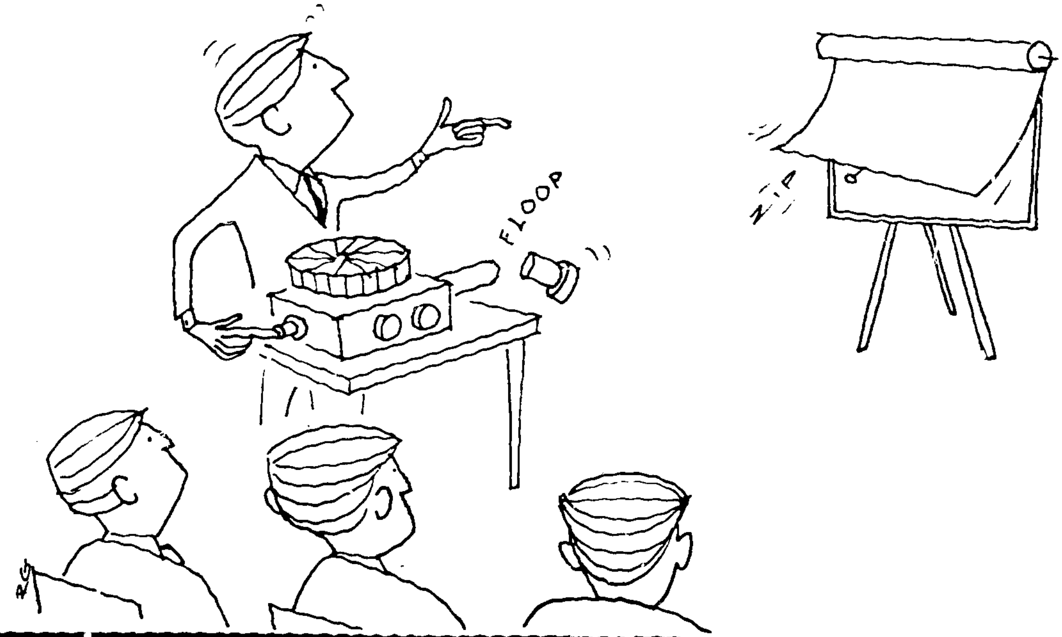
Group discussion seldom stems from statements made by the instructor unless prompted by a question. There are four types of questions which may be used to do this:

Overhead: The overhead question is one directed to the entire group, providing the opportunity for anyone to reply. Such questions usually are general in nature or intended to obtain a group reply to a point made by the instructor. As an example, the question "What are the two causes of accidents?" may be intended to elicit the reply, "Unsafe Conditions and Unsafe Acts," from everyone in the group.

Directed: The directed question is given to one person for reply —because the instructor believes that this person will give the reply he expects, to encourage participation, to determine whether or not this person has learned a specific point, or just because it is his turn to answer.

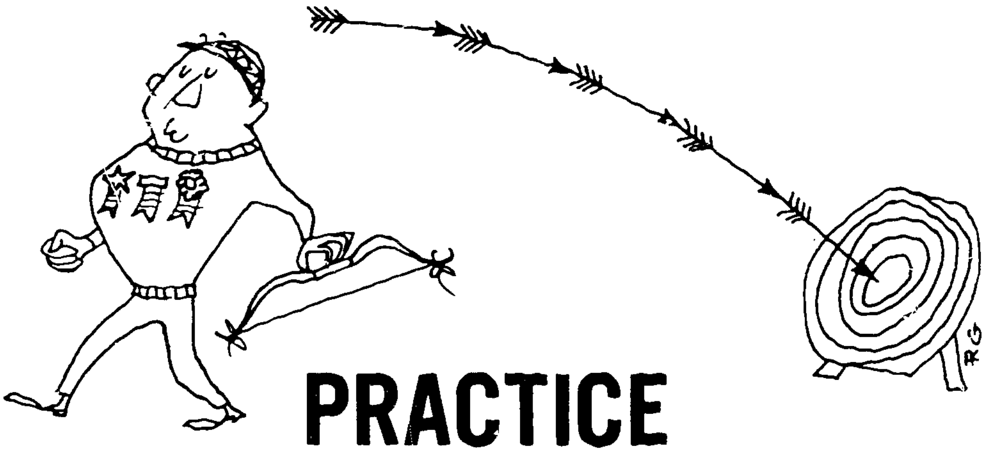
Reverse: The reverse question is used when a trainee asks a question, for the purpose of information or verification of his own answer to the question. To get further explanation or clarification, the instructor reverses the question to the questioner by in turn asking, "What do you think the answer should be?" or "What would you do about that?" or a similar question back to the original questioner. Of course, the instructor will eventually give his answer or agree with the answer given by the questioner.

Relay: A relay question is one asked by a trainee and repeated by the instructor to the entire group for their replies. From the replies received, the instructor provides the best answer or answers.



HAVE EQUIPMENT READY

Time is, or should be, of prime importance in any presentation—and time wasted trying to get equipment, visual aids, or demonstrations in order can be frustrating to both the instructor and the trainees. The instructor should have the equipment ready to operate before the session begins. If electrical equipment is to be used, outlets should be located, extensions provided if necessary, the equipment turned on to make certain it operates, etc. A smoothly conducted, well organized session requires sufficient time and preparation to permit the instructor to present visual aids as an integrated part of the presentation.



PRACTICE MAKES PERFECT

PRACTICE MAKES PERFECT

Applying the adage "practice makes perfect" to the development of a good instructor, implies that the practice will include self-criticism and analysis to accomplish continuous improvement. If the practice includes poor habits and fails to show improvement of material, information, and method of presentation, the results may be that "practice makes perfectly poor" presentations. It should be remembered that "practice" is considered as a systematic exercise or repetition intended to improve a person's discipline, thinking, and actions. This would imply that the practice should be undertaken preparatory to giving the presentation to a group, rather than practicing on the class.

The last phase of the Instructor Institute is the actual presentations made by the participants and evaluation by the instructor. The following procedures are recommended:

ASSIGNMENT OF SUBJECTS

Unless there is a sufficient period of time between the assignment of subjects and the actual presentation, the participants may not be able to prepare properly—as stated in the instruction. Therefore, it is suggested that subjects be assigned on the first or second day to give the participants an opportunity to assemble information, prepare guides and visuals, and learn the subject. If the Department of Labor "Safety in Industry Instructor Outlines" are to be used, the participants may only need to develop supporting material and examples. If not, more time will be required for preparation. In any case, subjects assigned or chosen should be those which the participant probably will use in his future activities.

PREPARATION

Each participant should be advised as to the date and time he will make his presentation. The time allotted to each one will depend upon the number of participants and the total time available, but it is preferable that each be given 35 to 45 minutes with an additional 10 minutes for discussion of his evaluation. The instructor should set the stage by introducing the speaker and his subject, and stating the type of training and students supposedly represented.

EVALUATION

During each presentation, the instructor should use a form (example on pages 59 and 60) to analyze and record his evaluation of the presentation. This should be discussed carefully following the presentation—making certain that comments are helpful and positive suggestions with no indication of ridicule. It must be remembered that the presentation and evaluation are for the purpose of giving the participant an opportunity to know those factors which need improvement, so he will eventually be a better instructor.

INSTRUCTOR EVALUATION GUIDE

Instructor

Evaluation by

Date

	100	90	80	70	60	50
1 Planning Course:	☐	☐	☐	☐	☐	☐
2 Knowledge of Subjects: 1	☐	☐	☐	☐	☐	☐
2	☐	☐	☐	☐	☐	☐
3	☐	☐	☐	☐	☐	☐
4	☐	☐	☐	☐	☐	☐
5	☐	☐	☐	☐	☐	☐
3 Professional Attitude:	☐	☐	☐	☐	☐	☐
4 Leadership:	☐	☐	☐	☐	☐	☐
5 Personality (Enthusiam):	☐	☐	☐	☐	☐	☐
6 Techniques:						
a Establishing, maintaining contact—	☐	☐	☐	☐	☐	☐
b Order of presentation—	☐	☐	☐	☐	☐	☐
c Timing—	☐	☐	☐	☐	☐	☐
d Flexibility—	☐	☐	☐	☐	☐	☐
e Technical accuracy—	☐	☐	☐	☐	☐	☐
f Adaptation to group—	☐	☐	☐	☐	☐	☐
g Group participation—	☐	☐	☐	☐	☐	☐
h Mannerisms—	☐	☐	☐	☐	☐	☐
i Tact—	☐	☐	☐	☐	☐	☐
j Grammar—	☐	☐	☐	☐	☐	☐
k Voice—	☐	☐	☐	☐	☐	☐

	100	90	80	70	60	50
7 Use of Visual Aids:						
a Blackboard—	☐	☐	☐	☐	☐	☐
b Slides—	☐	☐	☐	☐	☐	☐
c Charts, posters—	☐	☐	☐	☐	☐	☐
d Demonstrations—	☐	☐	☐	☐	☐	☐
e Illustrations—	☐	☐	☐	☐	☐	☐
f Student reference materials—	☐	☐	☐	☐	☐	☐
g Worksheets—	☐	☐	☐	☐	☐	☐
8 Assignments:	☐	☐	☐	☐	☐	☐
9 Discussion Periods:	☐	☐	☐	☐	☐	☐

GENERAL EVALUATION COMMENTS

☆ U. S. GOVERNMENT PRINTING OFFICE : 1970 O - 374-382

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SAFETY IN INDUSTRY, INSTRUCTOR THE
CONSULTATIVE APPROACH FOR SA ON.

BUREAU OF LABOR STANDARDS (INGTON,
D.C.
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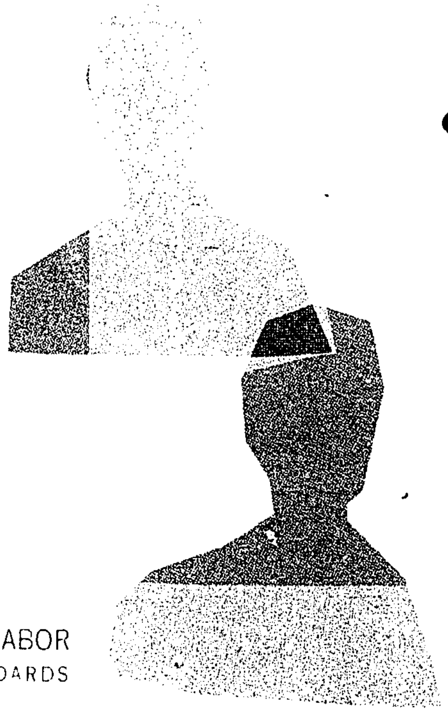
BULL-301
SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT
PRINTING OFFICE, WASHINGTON, D.C. 20402
(L16.3:301,$.25)
PUB DATE - 67 27P.

DESCRIPTORS - *SAFETY; *TEACHING GUIDES; *MANUALS; *INDUSTRIAL PERSONNEL; *TEACHING TECHNIQUES; SAFETY EDUCATION; INSTRUCTIONAL AIDS; TEACHING METHODS; TEACHING TECHNIQUES

ABSTRACT - THIS INSTRUCTOR OUTLINE, ONE IN A SERIES OF EIGHT IS DESIGNED SPECIFICALLY AS A TEACHING GUIDE FOR A SAFETY COURSE FOR INDUSTRIAL PERSONNEL. ADDITIONAL AIDS AND MATERIALS SHOULD BE USED AS SUPPLEMENTS TO COMPLETE THE COURSE CONTENT AND APPLY THE INFORMATION TO THE LOCALITY, EXISTING CONDITIONS, AND GROUP IN ATTENDANCE AT THE SESSIONS. AN INTRODUCTION DIRECTED TO THE TEACHER PROVIDES A RATIONALE FOR SAFETY EDUCATION, PHILOSOPHIES INVOLVED, AND RESULTS EXPECTED FROM SAFETY TRAINING. TOPICAL AREAS THAT ARE COVERED INCLUDE: (1) SAFETY TRAINING PRINCIPLES, (2) WHY SAFETY IS NEEDED, (3) FACTORS OF TRAINING NEEDS, (4) HUMAN MECHANICS OF LEARNING, (5) TYPES OF TRAINING, (6) INSTRUCTIONAL SETTING, (7) TRAINING TECHNIQUES, (8) EDUCATIONAL PRINCIPLES, (9) DEVELOPING TRAINING MATERIALS, (10) STEPS IN DEVELOPING AN OUTLINE, (11) METHODS OF PRESENTATION, (12) LEARNING NEW IDEAS--ABILITIES--SKILLS, (13) GOOD TRAINING AID, (14) MECHANICAL AIDS TO INSTRUCTION, (15) EVALUATING TRAINING, (16) A GOOD INSTRUCTOR, (17) POWER OF A QUESTION, (18) PRACTICE MAKES PERFECT, AND (19) INSTRUCTOR EVALUATION GUIDE. (SN)

SAFETY IN INDUSTRY
INSTRUCTOR OUTLINE

U. S. DEPARTMENT OF LABOR SAFETY TRAINING PROGRAMS



the consultative approach for safety promotion

U.S. DEPARTMENT OF LABOR
AU OF LABOR STANDARDS

This instructor outline is one of a series developed by staff of the Office of Occupational Safety and the International Division, Bureau of Labor Standards.

The outline is intended only as a guide to standard presentation of the subject in sequence and basic content. Additional information, material, and illustrations should be included for a complete presentation suitable to the conditions, locality, industry, or occupational group.

Note. American Standards Association name was changed to United States of America Standards Institute (USASI) August 1966. All American Standards now known as USA Standards (USAS).

For sale by the Superintendent of Documents, U.S. Government Printing Office
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SAFETY IN INDUSTRY

INSTRUCTOR OUTLINE

the consultative approach for safety promotion

U. S. DEPARTMENT OF LABOR
Willard Wirtz, Secretary
REAU OF LABOR STANDARDS
lson M. Bortz, Director

2836

Bulletin 301

SUGGESTIONS FOR THE INSTRUCTOR

Each of the eight manuals contains material which will serve as an organized guide for instruction in the safety subjects that are discussed. The text may be used as basic teaching material, but it is advisable to include additional local material in order to present a specific training course in safety which is tailored to the conditions and situations peculiar to the locality and adapted to the needs of the particular conference that the instructor is conducting.

It is recommended that conferences be held once or twice a week, and that they consist of two 50-minute periods with a "break" of 15 minutes between periods. If conferences are held once or twice a week, the instructor will be able to study and organize the instruction material thoroughly in order to prepare himself before the next conference, and the participant will be provided sufficient time for study between conferences. The entire course which is based on the eight manuals can be satisfactorily completed in this manner in 22 weeks to 1 year.

If at all possible, the participants who are selected for each conference should be at the same supervisory or worker level, and they should not have conflicting interests. It is recommended that 15 to 20 participants be the maximum number allowed to attend such conference so that enough time will be made available for discussion and individual participation. Every participant should be encouraged to take an active part in the discussion.

The conference room should be well lighted and comfortable, and devoid of noise and other distractions. A blackboard, chalk, and erasers should be available, and each participant should have facilities for taking notes, which he should, of course, be encouraged to do. A projection screen and projector should be provided for showing motion pictures and slide films which may be selected on the various safety subjects.

SAFETY TRAINING TECHNIQUES

It is of utmost importance that the instructor become acquainted with some of the basic training techniques in order to better prepare himself to conduct the course successfully.

Planning

1. The instructor should have such visual aids as are pertinent to the subject matter of the course. These should be set up in proper sequence. An indication or note on the instructor's outline could be very helpful as a guide that a particular visual aid should be used.

2. The course outline as well as the handout material and the visual aids should be checked at regular intervals. This should be done by the instructor in order to revise, improve, and modernize the course presentation. The material should also be checked to make sure that it conforms with policies of labor and management in the country where it will be presented.

3. The instructor's outline should be adapted by him to his particular method of presentation, keeping in mind that this is a discussion conference type of session.

4. The instructor would do well to get an advance list of the students that will participate and their positions and backgrounds. A study of such information could be very helpful to the instructor when he faces his class.

Preparation of Classroom

Many conferences and courses have failed simply because no preparation was made for the classroom facilities.

1. The classroom should be located in an area where there is the least amount of noise or distraction.

2. Good ventilation, lighting, and sufficient room are important aspects to consider.

3. The seating arrangement and seats should be comfortable as well as informal. A round-table seating arrangement is the most effective for discussion-conference sessions.

4. The room should be equipped with a good blackboard, sufficient chalk, and a clean eraser. A stand should be available for mounting the charts and visual aids to be used during the conference. A 35-mm. slide projector should be available.

Teaching

1. An official of the organization should open the first session with a statement regarding the general objectives of the course. He should then introduce the instructor to give him the proper prestige in relation to the group he will teach.

2. At the first session, the instructor should open with an explanation of the course objectives and its method of presentation. At this time, he should draw upon his experience to relate an illustrative incident that will bring him in closer relationship with the group and, at the same time, enable him to introduce the theme of the first session.

3. The course should be presented by employing the discussion-conference method.

4. The instructor should have the class follow a predetermined schedule and maintain order at all times. Only one participant should be permitted to give his viewpoint at a time. The instructor should keep the class discussion within the subject matter as contained in the instructor's outline.

5. If possible, an official should be asked to speak at the termination of the course.

Tips for Instructors

Learning is actually the acquisition of new ideas, abilities, and skills acquired through the senses of hearing, seeing, and feeling by touch.

1. New ideas are conveyed through the presentation of knowledge, and thought is stimulated through the student's sense of hearing.

Abilities and skills are presented through the media of telling, demonstrating, and having students demonstrate under the supervision of the instructor. Students acquire abilities and skills via the senses of hearing, seeing, and feeling by touch.

2. An important aspect of teaching is to remember that the student absorbs more when he participates in a discussion. The instructor, therefore, strives to get 100-percent class participation.

3. The instructor should become aware of outstanding characteristics of his students. This could be very helpful when leading discussions. For example:

A. Some may be more mature.
B. Some may have a knowledge of safety.
C. Some may have actual experience to draw upon in the discussion.
D. Some may have a faster learning speed than others.
E. Some may be "stallers" who can slow down the discussion.
F. Others may be aggressive and want to monopolize the discussion.

E. Some may be "stallers" who can slow down the discussion.

F. Others may be aggressive and want to monopolize the discussion.

G. There may be a "know-it-all" in the group who must be properly controlled.

H. Some may be constant latecomers who ask questions about previous discussions and delay the class.

4. The teaching process consists of:

A. Telling—this means giving background information to introduce a subject.

B. Showing—a demonstration of some equipment pertaining to the subject to be discussed is very impressive.

C. Illustrating—using charts, blackboard, slide, or films are very helfpul to highlight specific points in the discussion.

D. Discussion conference—the participation of the students in formulating their thinking about the subject under discussion is fundamental to getting the most out of the session.

E. Conclusions—the instructor's summation of the session should knit together the points discussed during the session, and should include other important details that may have been overlooked by the group.

F. Questions—during the session, the instructor should use questions to stimulate discussion, and also to help bring the discussion back to the subject matter if it has strayed.

Guest Instructors

It is necessary that the instructor be granted full responsibility for conduct of the class; at times, however, he may wish to call in an expert in a particular field as a guest instructor (or lecturer). In such event, it is essential that the instructor maintain control of the course.

The instructor must tie in the work of the guest instructor with the balance of the course; he must outline the phase of the subject to be covered by the guest and satisfy himself that the guest limits himself to the field as outlined; he should summarize the guest's contribution, pointing out its relative inportance in the field of accident prevention. While the use of a few guest instructors (properly utilized) can add to the effectiveness of the course, a series of "lecturers" whose topics are not correlated will inevitably result in confusion.

It is recommended that "guest experts" be used only for *supplementary* training, and not to replace even part of this course which should be taught by *one instructor*.

THE CONSULTATIVE APPROACH

The Consultative Approach

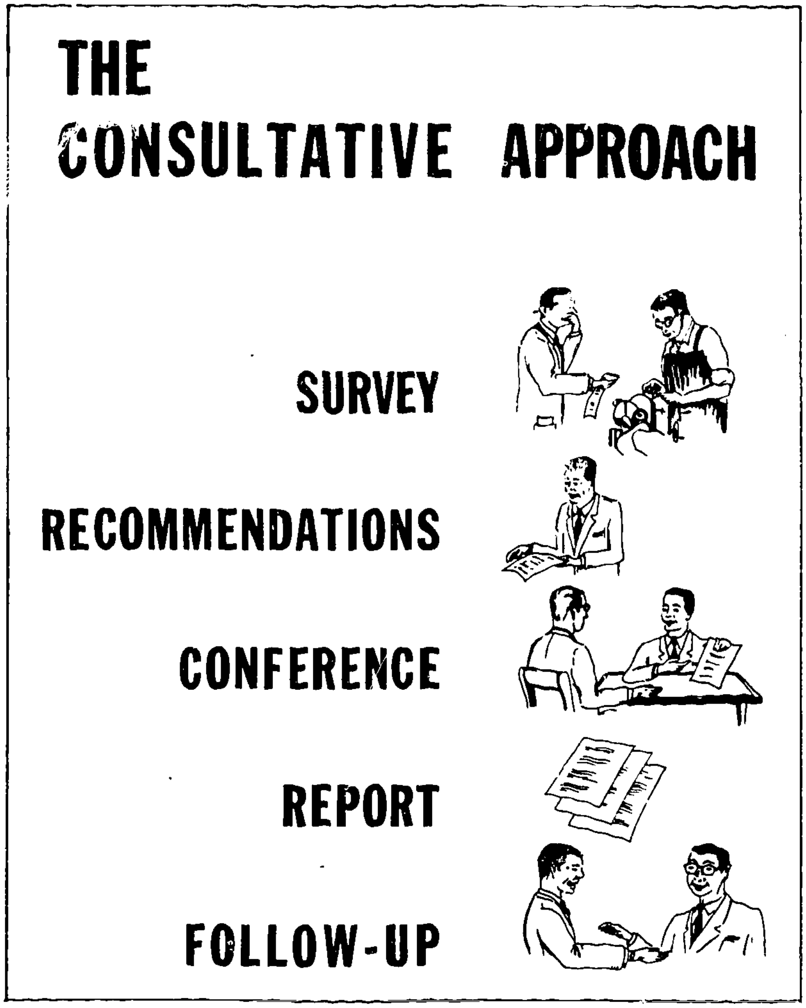
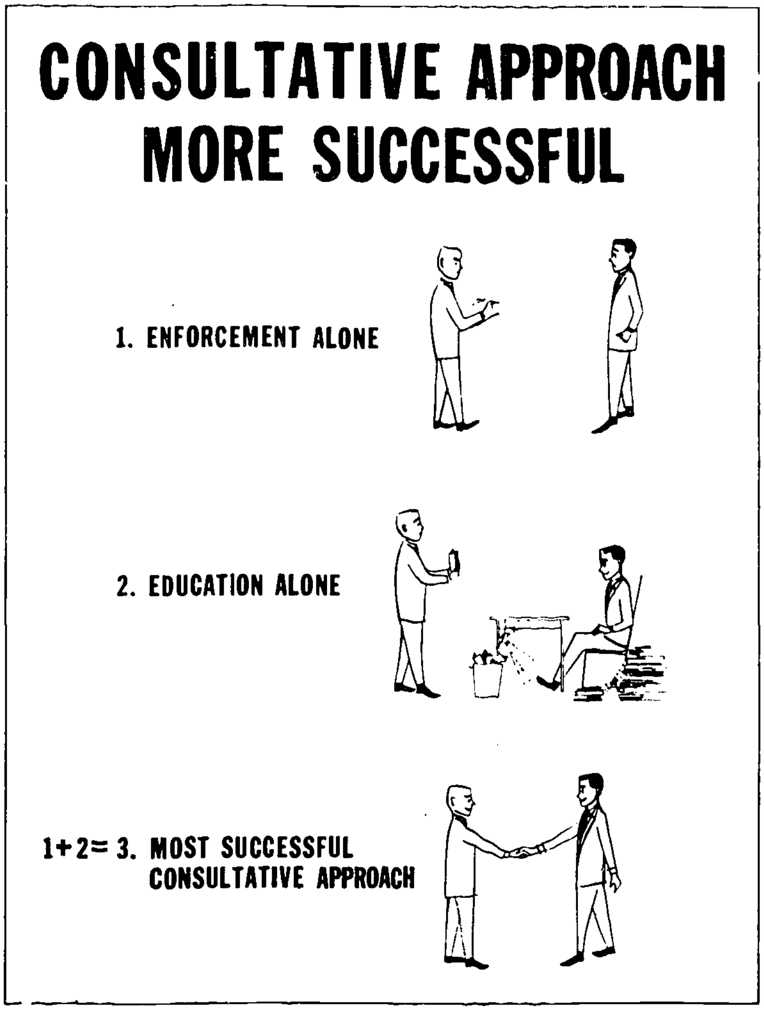


CHART 38—H

WHAT IT IS	
ENCOURAGEMENT OF VOLUNTARY EFFORT	The consultative approach is the encouragement of voluntary effort by management to improve working conditions and plant productivity. The consultant advises and assists management but he has authority to use enforcement of laws and codes. The inspector remains in the role of enforcement officer. He enforces the safety codes and laws of the State Department of Labor.

ELEMENTS OF PRODUCTION CONCEPT	The consultant offers assistance to plant management with the protection of the manpower, machinery, material, equipment and production through an industrial safety program. The expected results are increased productivity and worker protection.
HOW IT OPERATES	
SURVEYS	The program consists of: 1. A survey of the safety performance of the plant, the safety organization, its activities and results. 2. An appraisal of the mechanical hazards, transmission of power machines, materials handling, unsafe conditions and unsafe work methods, and hazardous processes. 3. A survey of the potentially hazardous substances used or produced in the plant, including products, byproducts, and waste handling, removal and disposal.
RECOMMENDATIONS	The consultant, after finishing a detailed survey of the actual conditions in the plant, should make a report embodying his recommendations for the elimination of hazards, improvement of the safety organization, and the means of intensifying safety promotion activities.
CONFERENCE WITH MANAGEMENT	The consultant should analyze the results of his survey and his recommendations for correction, and should use all means at his disposal to sell top management on the real need for and advantages of an effective safety program. He should set a date for a followup visit enough in advance to provide management with time to show progress in carrying out his (the consultant's) recommendations.
REPORT	The consultant should present, in final form, a report of his findings and recommendations to both his own superior and to the designated company representative.
FOLLOWUP	The consultant should, on occasion of his conference with top management, have set a date for a future call. This followup visit to the company will prevent loss of interest by the official and should assure future cooperation.



CONSULTATIVE APPROACH MORE SUCCESSFUL

1. ENFORCEMENT ALONE

2. EDUCATION ALONE

1+2= 3. MOST SUCCESSFUL CONSULTATIVE APPROACH

CHART 39—H

ENFORCEMENT	
EARLY ATTEMPTS BY LEGISLATION	Some of the first attempts to prevent accidents in the early development of industrialization in the United States were: 1. Gathering accident statistics. 2. Laws requiring guarding of dangerous machinery. 3. Laws requiring emergency signaling and stopping devices. This was followed by enforcement procedures, generally under the inspection department of that State.
DEVELOPMENT OF REGULATIONS AND CODES	Later, some States enacted laws delegating to an enforcement official or to a board or commission the responsibility of drafting rules and regulations with force of law. Other States used advisory standards as a guide, and issued orders requiring the guarding of specific hazards in accordance with rules of these standards.

INSPECTION AND ENFORCEMENT

In each State, for a few years after the establishment of an inspection and enforcement procedure, we found the inspection force fully occupied with uncovering and guarding unsafe mechanical conditions. Because little guarding had been done up to that time, its efforts had an important effect upon reducing injuries, because of the unguarded belts, gears, pulleys, shafting, and other mechanical hazards. With the passing years, the inspection and enforcement phase produced a fairly good level of mechanical safeguarding in industry.

INSPECTION AND ENFORCEMENT ALONE —INSUFFICIENT

At present, in most States, it seems that enforcement is having little effect in further reducing injuries to workers. It is obvious that a visit once or twice a year to any plant will only reveal comparative working conditions found at each visit. Even the most thorough inspection will have only slight effect, if any, upon general safety conditions. A real safety program cannot be "sold" on a "one-call" basis.

EDUCATION

EDUCATION AND PROMOTION ALONE

The majority of industrial injuries are due to accidents caused by unsafe acts, or a combination of unsafe acts and unsafe conditions. Many States recognized this some years ago, and some started experimenting with educational and promotional activities. Some are carrying on these educational and promotional activities with staff other than that carrying on inspection for purposes of enforcement.

GENERALLY UNSUCCESSFUL

Generally speaking, this has not been completely satisfactory, for the following reasons:

1. Unsatisfactory management contact. The consultant (without enforcement or right of entry) is readily sent to a lower official of the company or he is brushed aside.
2. Survey requires management approval. This has been found to be difficult to arrange without complicated negotiations and official arrangements. Such a survey is essential for obtaining accurate information; without it there can be no way to measure the education which is required.
3. Most managements are reluctant to admit need of such services.

PROBLEM

The problem here is that those companies, which need assistance most, either do not recognize their need or will not admit it. Those companies which recognize the value of such a survey, and approve of it being made, are generally the companies which need such services least.

EDUCATION, PROMOTION, INSPECTION, AND ENFORCEMENT AUTHORITY

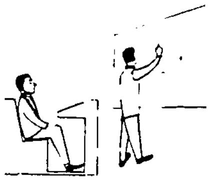
COMBINATION MORE EFFECTIVE

This combination will be most effective because it will:

1. Provide the consultant with the proper authority, which he uses only to receive the proper prestige from top management.
2. Give the consultant the opportunity to sell top management on the need for a survey. He can then make the survey for facts; facts which will furnish the basis for his recommendations for improvements in the safety program, and for educational needs. It will also give him the opportunity to follow the progress of his recommendations with top management.

QUALIFICATIONS OF CONSULTANT

1. TRAINING



2. PRACTICAL EXPERIENCE

3. EDUCATION

CHART 40—H

COMPETENT SAFETY TECHNICIAN

The consultative approach requires a competent State safety technician:

1. To be technically qualified.
2. To be sincerely interested in his work.
3. To be a good salesman.
4. To have the ability to effectively present his findings.
5. To have training that covers a wide scope of subjects, industries, methods, and details.

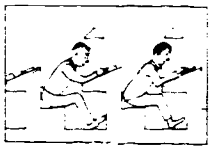
PRACTICAL EXPERIENCE

He should have enough broad practical experience to give him a good general understanding of industrial operations, processes, and work methods. This should enable him to appraise performance in each establishment, to know what to look for, and how to determine whether a condition, a practice, or an operation is in need of correction. He should understand industrial organization and managerial

	functions regarding safety and the means by which those functions are effectively performed.
FORMAL EDUCATION	His education should be broad, but not necessarily scientific. A college degree and or technical training is valuable, but not essential if the consultant has a logical mind, is a student, and has had sufficiently wide experience to give him a good background of knowledge in the fields indicated.
COURSES OR INSTRUCTION	He would also be better prepared for his duties if: 1. He had completed a systematized course of instruction in allied subjects—not necessarily safety, but such subjects as materials handling, plant layout, public speaking, and report writing. 2. He knows where to find additional information and how to use reference material. 3. He receives training in how to study and analyze properly—this leads to alertness and increases his ability to size up situations and conditions quickly.

SELLING SAFETY

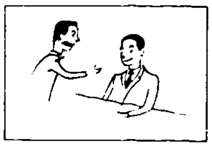
1. PREPARATION



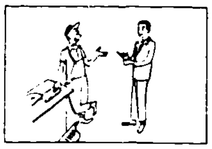
2. CONTACT

3. INTERVIEW

CONVINCE MANAGEMENT



4. PLANT SURVEY



5. INTERVIEW

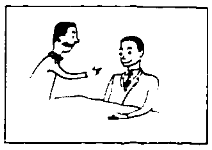


CHART 41—H

PREPARATION	
SECURE INFORMATION	The consultant should obtain information about the plant, its accident record, the reports of previous inspections or surveys, attitudes of management and supervisors, the products manufactured, byproducts, and about the disposal of wastes.
PREPARE SAFETY MATERIAL	He should obtain or prepare general safety material, such as standards of mechanical guarding, illumination, and educational or informational material for the industry and processes of the plant to be visited, as well as copies of the applicable State standards, regulations, or statutes. This should be organized to make an attractive and interesting presentation.
HAVE A PLAN	He should prepare his line of approach to the management of the plant to be visited. He should have a definite plan. He should use a

positive approach based on benefits to the company and its officials, supervisors, and employees, in the use of his product (safety).

CONTACT	
INITIAL CONTACT	The initial contact with the top management of the company should be by letter or by phone when practical, and should be done by someone in the State labor commissioner's office, if possible. The arrangement should be for the consultant to see the top management representative personally. By this means, the consultant is given proper prestige.
FIRST INTERVIEW	
MAKE GOOD IMPRESSION	Create a friendly atmosphere—personal neatness, conduct, attitude, interest, sincerity. The consultant should endeavor to get the favorable attention of top management representative.
CREATE INTEREST	Create interest. At this point the consultant should have the favorable attention of the top management representative, and may now explain what can be done. The positive approach should be used. The consultant should be able to sell the advisability of his making a survey in the plant.
PLANT SURVEY	
PLANT TOUR	He should ascertain the safety organization of the plant, as well as the plant's injury rates, and then should follow through with a plant tour, accompanied by a designated plant official.
PROFESSIONAL AND FRIENDLY ATTITUDE	A friendly atmosphere should be maintained during the entire time the consultant is in contact with the plant, its officers, officials, supervisors, workers, and his guide. His personal prestige and that of his agency should be preserved by the types and quality of questions he asks and the ability he demonstrates in discussing problems and their solutions with foremen and others. He should plan recommendations to fit the needs of that particular plant, and should justify his recommendations by the benefits which will result by their being put into practice.
FINAL INTERVIEW	
SELL PLAN	The consultant should again speak to the general manager and sell his plan covering recommendations concerning safety organization, housekeeping, mechanical guarding and all other phases of safety covered by his survey. The consultant should recommend compliance with all State safety regulations as a matter of course.

GIVE PRAISE	Praise should be given for good conditions found, for safety minded foremen, good housekeeping, well guarded machines, a good tool control program, and for any other condition or action worthy of favorable mention. (Do not give unwarranted praise.)
NO SEVERE CRITICISM	Do not severely criticize or condemn conditions or actions of foremen or others. The consultant should remember to maintain the sales "atmosphere," to use the positive approach, and cite benefits which would result from making the recommended improvements.
AVOID ARGUMENTS	The consultant may avoid arguments by gaining acceptance of himself and his recommendations by each foreman as the survey develops. Should a supervisor differ with any recommendation, the consultant should diplomatically lead the discussion to an agreement based on facts and logic.
ENCOURAGE COMMENTS	The consultant should encourage full discussion of his recommendations to learn how everyone feels and thinks about them. Many times such discussions will clarify a situation where misunderstanding exists.
PROVIDE DETAILS	The consultant should be prepared to provide more details on statements or recommendations he has made. He should be ready to supply drawings, examples, descriptions or explanations of any matter which is not clear.
SELL RECOMMENDATIONS	He should state the exact location, what is to be done, how it is to be done, and what this will accomplish, i.e., why it is desirable and what benefit will be derived by the company. This should be done with enough instructions to carry it to completion.
TRY TO GET ACTION	As each recommendation is discussed, the consultant should try to get approval for action on it before starting discussion on the recommendation following it. Try to pin down *who* will be responsible for carrying out the recommendation and *when* the action will be started and finished, if possible.

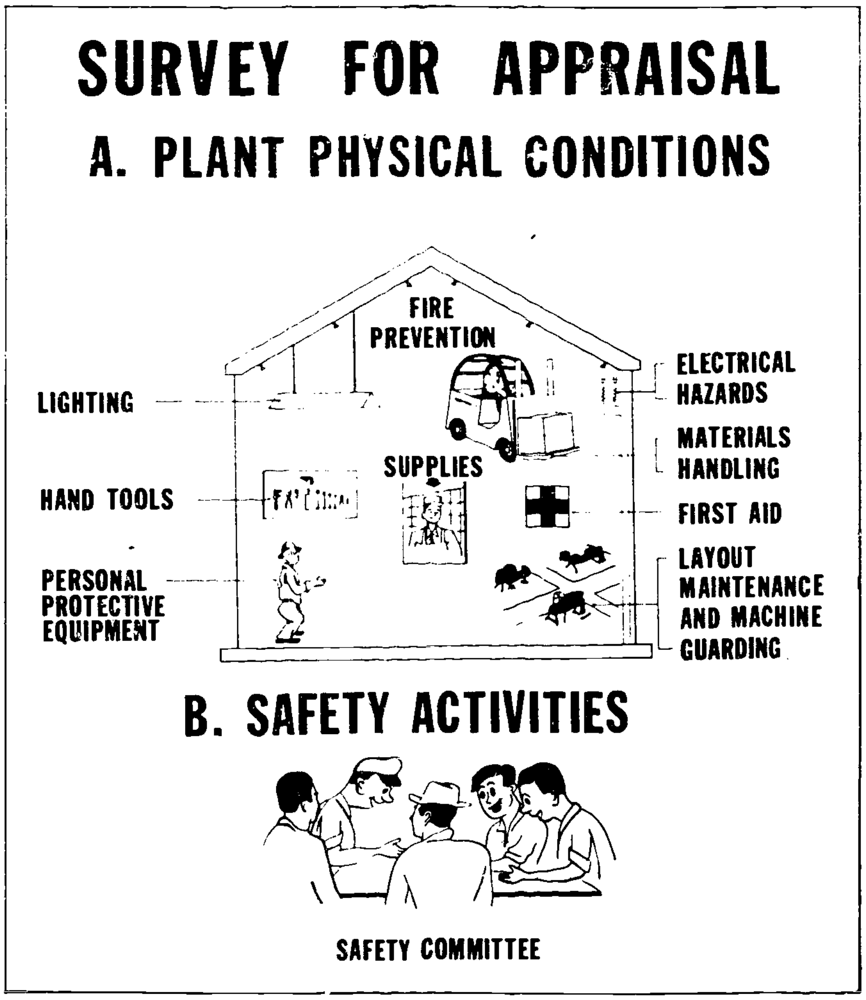


CHART 42—H

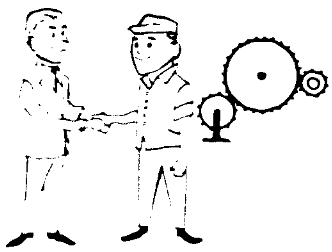
PLANT PHYSICAL CONDITIONS	
MACHINE GUARDING	The safety consultant should check the standard of machine guarding that has been applied, and in examining and inspecting each machine look for specific lacks or defects which involve departures from the State code or the applicable American safety standard, as the case may be.
SAFETY EQUIPMENT	The operations, processes, and activities for which safety equipment might be required, such as goggles, respirators, protective clothing, safety shoes, etc., should be studied with care. In each case the entire cycle of activities should be studied. If this is done, it is frequently found that operations which appear safe will include, at some point in

	the cycle, or in servicing and repair work, some exposure where personal protective equipment is advisable or essential.
OVERHEAD EQUIPMENT	Means of access to overhead equipment and other places where men must go should be checked for safety and convenience.
OTHER PHYSICAL CONDITIONS	Such matters as housekeeping, the safety of tools and portable equipment, maintenance, lighting, temperature extremes, excessive noise, and the like should be appraised in the light of accepted standards of good practice.
EXPLOSION AND FIRE	The consultant should be on the alert for high-hazard possibilities such as overpressures, the release of combustible gases or dust, chemical reactions that might get out of control, breakouts of hazardous liquids and gases, and the like. The safeguards for these possible occurrences should be carefully considered.
HEALTH HAZARDS	A survey of occupational health hazards should be a part of this appraisal.
SAFETY ACTIVITIES	
SAFETY COMMITTEES	Each element of the safety program (if any) should be investigated as thoroughly as may be necessary to get a clear picture. At least, the following aspects should be covered: The activities of the safety committees, if any. The scope and value of safety meetings, if any.
PARTICIPATION BY EMPLOYEES	To what extent do the employees actually participate in the safety program? If there is indication of anything less than full participation, the reason should be determined, if possible.
MANAGEMENT'S ATTITUDE	Management's attitude and policy toward safety should include supervisory personnel.
INSPECTION	The adequacy and effectiveness of the plant safety inspection work.
ACCIDENT INVESTIGATION	The extent and thoroughness with which accidents are investigated.
SAFE PRACTICES	The attention given to the development of safe practices.
SAFETY ORGANIZATION	The adequacy of the safety organization.
STANDARDS	Provisions for job hazard analysis and job training standards, as well as equipment and material standards.

ORIENTATION	The safety indoctrination and training of new or transferred employees.
CORRECTIVE ACTION	Provisions for suitable corrective action where needed.

PREPARING RECOMMENDATIONS

A. DURING SURVEY



B. BEFORE PRESENTING RECOMMENDATIONS TO TOP MANAGEMENT

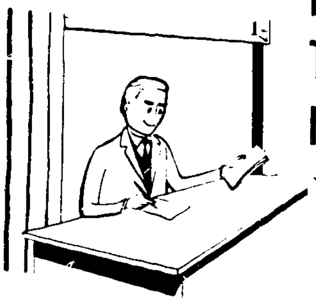


CHART 43—H

DURING SURVEY	
TAKE NOTES	While the consultant is in the plant, he should make notes and discuss all matters freely with the foreman, guide, or other key member of plant personnel concerned.
ARRANGE FOR AN ESCORT	In each department, the foreman or someone assigned by him should always be along not only to learn how the appraisal is made, but also to supply information as to practices and operations not directly apparent; for example, frequency and method of inspection of specified devices, extent to which specific operations are carried on, how maintenance and repairs are handled, etc. The foreman or other guide should take note of important items the safety consultant may find.
GET FACTS	The consultant should be thorough, getting all the pertinent facts.

GET DIFFERENT VIEWS	The consultant should try to draw out the viewpoints of the foreman or other key member of the plant personnel pertaining to matters under their direction or closely applicable to their work. He should be specific about definite insufficiencies, such as a substandard guard, a defective ladder, the need for eye protection, etc.
WEIGH EVIDENCE	It is important to weigh the evidence carefully on all controversial matters before giving an opinion, but there should be no hesitancy in giving an opinion warranted by evidence.
BE METHODICAL	The inspection of each machine, process, room or floor should be completed before going to the next. The exception to this would be in a plant in which processes are laid out in orderly sequence and, therefore, lend themselves well to the "follow the process" procedure. Before leaving a room, the consultant should take a general overall look for anything that he might have missed.
DISCUSS FINDINGS	Before leaving a foreman or supervisor, the consultant should briefly give him his findings and tentative recommendations, if any, pertaining to that area.
ORGANIZE NOTES	1. The consultant should carefully review his notes and refresh his memory as to details. 2. He should select the more important items to be discussed. 3. He should then outline his tentative recommendations. 4. He should select commendable conditions and practices he has noted, together with the names of the departments and/or supervisors. 5. He should diplomatically cite, in general, the defects and departures from good practice.

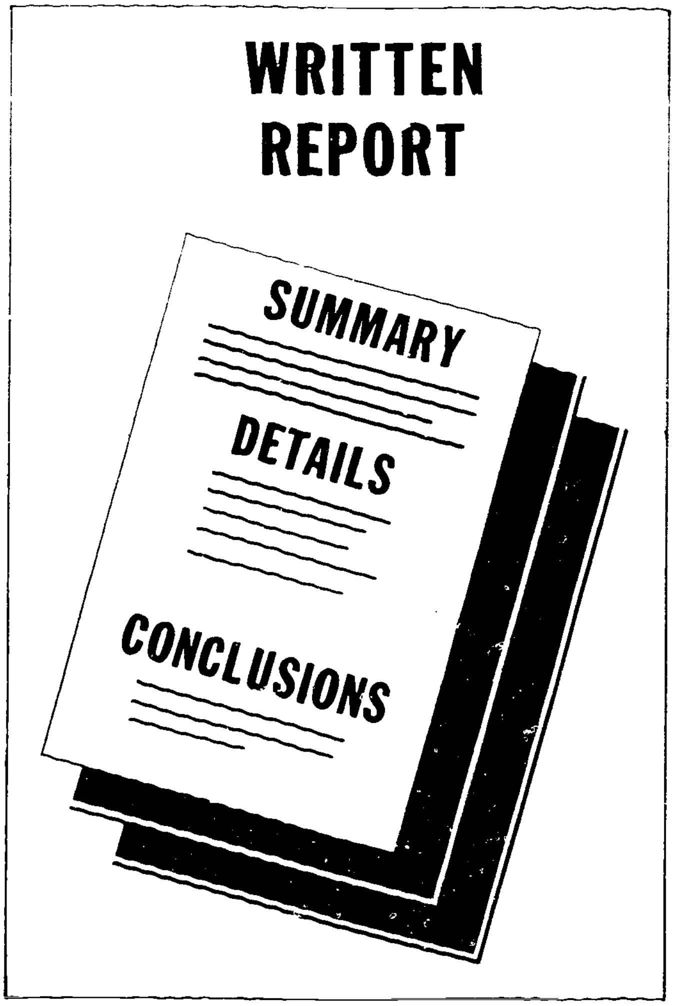


CHART 44—H

PREPARE REPORT	When the consultant has completed his plant survey and has held final conferences with the top management of the company visited, he should prepare a written report which confirms his appraisals and recommendations. The report should be sent to top management. and a copy sent to the consultant's supervisor.
INCLUDE SUMMARY	Include in the summary the major findings, in general, the overall plant safety attitude. Also the most important recommendations should be included, at least those agreed upon at the management conference. (It is not necessary to include detail here.) Include the action which had been agreed upon at the conference with management, and who is to do what.

INCLUDE DETAILED REPORT	1. Include in the report, in detail, specific findings. 2. Detailed recommendations (these will include necessary data and references) should also be included. 3. Outline a recommended safety program. 4. Discuss unsafe conditions vs. unsafe acts. 5. Discuss recommendation for a safety committee, or a director of safety.
REPORT CONCLUSIONS	This should be a final summary of expected action, including follow-up by consultant, including date of such a visit.
STATE FORMS	The regular State inspection and report forms may be used as a supplement to the written report, if necessary, but, for the "consultative approach," they do not replace the written report.
PROFESSIONAL REPORT	The consultant should always bear in mind that his is a consulting engineering function of appraisal and determination, presented to industrial management on a voluntary sales basis, supported by an executive type report of his conclusions.

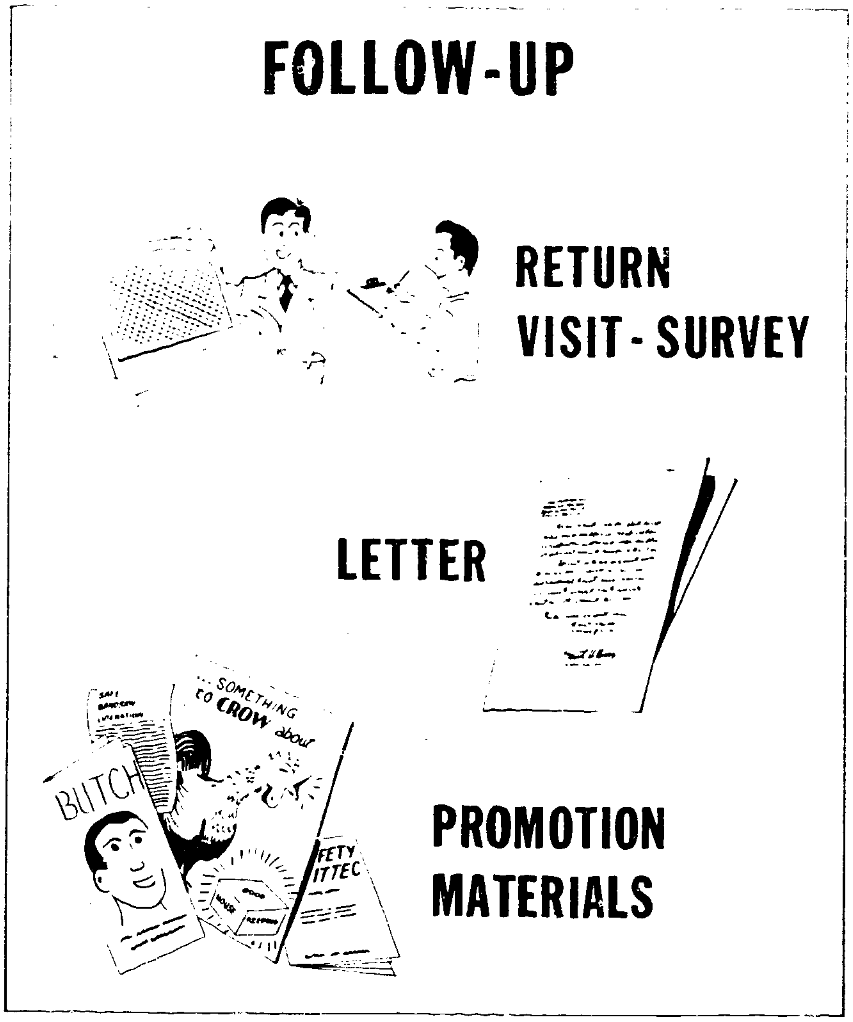


CHART 45—H

CONTINUITY OF SERVICE BY FOLLOWUP	Most top management executives who have to be sold on the importance of safety and then shown how to improve their own performance will almost inevitably lose interest in some degree unless the consultant keeps in touch with them. In all his contacts with top management, the consultant should emphasize that this service is a continuing one, and that an important part of his responsibility is to call back from time-to-time, or as the need may arise, to offer further advice or to look into matters which might require clarification.
DATE FOR RETURN VISIT	At the time of the final conference, a date should have been set for a followup visit by the consultant and he should make every effort to keep this appointment. Additional visits should be arranged as needed.

USE AS FOLLOWUP	These return visits should be used to determine what action has been taken, how recommendations have been applied, and what further recommendations or changes in procedures should be made.
PROCEDURE FOR RETURN VISIT	The procedure should be the same as for the initial visit, e.g., letter or phone call from the State labor commissioner to top management confirming the intended visit of the consultant. The consultant should review the recommendations, injury rates, and the progress of acceptance of the program in the plant. He should then visit the plant for verification and determine future needs.
FOLLOWUP LETTER	Upon returning to his office, the consultant should confirm his visit as a progress letter report, congratulating the officials of the company for the progress made. He should offer further personal assistance.
PROMOTIONAL MATERIALS	At any point in the consulting process, booklets, posters, guard specifications and drawings, State codes, rules or regulations may be given to top management, suggesting they will aid immeasurably in carrying out the recommendations.

Distribute Occupational Safety Aids, "Elements of a Safety Program," and "Safety Training Techniques."

☆ U.S. GOVERNMENT PRINTING OFFICE : 1967 O - 269-413

VT 016 640
PRACTICAL TEST GUIDE: AIRLINE TRANSPORT PILOT--AIRPLANE.

FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C. FLIGHT STANDARDS SERVICE.
MF AVAILABLE IN VT-ERIC SET.
AC-61-49
SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 20402 (S/N 5011-0054, $.25)
PUB DATE - 72 32P.

DESCRIPTORS - *AIRCRAFT PILOTS; MANUALS; *STUDY GUIDES; *TEST REVIEWS; *OCCUPATIONAL TESTS; PERFORMANCE TESTS

ABSTRACT - THIS GUIDE IS DESIGNED TO ACQUAINT APPLICANTS FOR AN AIRPLANE TRANSPORT PILOT CERTIFICATE WITH THE TEST REQUIREMENTS TO BE MET. A PREFACE AND STATEMENTS OF GENERAL INFORMATION ON THE SUBJECT PROVIDE SPECIFIC PROCEDURES, CONDITIONS, LEVELS OF COMPETENCE, AND FACTORS CONSIDERED BY THE EXAMINER IN DECIDING WHETHER THE APPLICANT HAS SATISFACTORILY ACCOMPLISHED THE MANEUVER OR PROCEDURE. THE TOPICS COVERED INCLUDE (1) PREFLIGHT, (2) TAKEOFFS, (3) INSTRUMENT PROCEDURES, (4) IN-FLIGHT MANEUVERS, (5) LANDINGS AND APPROACHES TO LANDINGS, (6) NORMAL AND ABNORMAL PROCEDURES, AND (7) EMERGENCY PROCEDURES. (SN)

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AIRLINE TRANSPORT PILOT

AIRPLANE

PRACTICAL TEST GUIDE

DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration

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AIRLINE TRANSPORT PILOT
AIRPLANE

PRACTICAL TEST GUIDE

1972

DEPARTMENT OF TRANSPORTATION

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For sale by the Superintendent of Documents
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Washington, D.C. 20402 - Price 25 cents
Stock Number 5011-0054

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PREFACE

This test Guide has been prepared by the Flight Standards Service of the Federal Aviation Administration and—

1. specifies those maneuvers and procedures required by Federal Aviation Regulations to be accomplished successfully by the Airline Transport Pilot applicant;

2. describes the maneuvers and procedures and stipulates the conditions and limitations under which they are to be performed; and

3. describes the level of competence and expresses the factors which are to be taken into account by the inspector/examiner in deciding whether the applicant has satisfactorily accomplished the maneuver or procedure.

Specific airplane configuration for any particular operation will be as specified in the airplane operating instructions for the airplane in use. Since this Guide may be used for aircraft ranging from a single-engine trainer to a four-engine jet transport, general terms such as approach speed, landing configuration, takeoff power, etc., will indicate that a condition/position/setting should be as specified in those operating instructions.

Descriptions of maneuvers are not of a "how-to-accomplish" nature since this is not intended as an instructional publication. How to perform a particular maneuver or procedure is explained in detail in one of several training publications such as the operating instructions for the airplane in use, the *Flight Training Handbook*, the *Instrument Flying Handbook*, and many commercial publications available. There are no maneuvers required for the ATP flight test that are not a part of the required training for previous flight tests for either private, commercial, instrument, or multiengine ratings. The difference is the level of skill required to be demonstrated in performing the maneuvers and procedures.

Comments regarding this publication should be directed to Department of Transportation, Federal Aviation Administration, Flight Standards Technical Division, P.O. Box 25082, Oklahoma City, Oklahoma 73125.

AIRLINE TRANSPORT PILOT (AIRPLANE) PRACTICAL TEST GUIDE

General Information.

This Guide describes the practical test requirements for Airline Transport Pilot Certificates (Airplane) and associated Class and Type ratings.

An applicant for an Airline Transport Pilot (Airplane) Certificate must meet the requirements prescribed in FAR §§ 61.141, 61.143, 61.145, and 61.147. The holder of an Airline Transport Pilot Certificate (Rotorcraft) who applies for an airplane rating must comply with §§ 61.143, 61.147, and 61.157(c). An applicant who does not already have an instrument rating must, in addition to the maneuvers and procedures described in this Guide, comply with § 61.37 (c)(1) as part of the oral, and, as part of the flight test, perform each additional maneuver required by § 61.37(c)(2) that is appropriate to the airplane type.

Each applicant is required to furnish an airworthy airplane in accordance with § 61.25. He should also furnish current charts or publications for departure, enroute, and approach operations in the National Airspace

System. Any system of aeronautical charts that accurately depicts the approved instrument procedures is acceptable.

Throughout the maneuvers described in this Guide, and those required by § 61.37(c), if appropriate, good judgment commensurate with a high level of safety must be demonstrated. In determining whether such judgment has been shown, the inspector/examiner* who conducts the check considers adherence to approved procedures, actions based on analysis of situations for which there is no prescribed procedure or recommended practice, and qualities of prudence and care in selecting a course of action.

Each maneuver or procedure must be performed in flight except to the extent that certain maneuvers or procedures may be performed in an airplane simulator with a visual system (visual simulator), or an airplane simulator without a visual system (non-visual simulator), or a training device, or may be waived. The current appendix A to FAR Part 61 should be consulted to identify the maneuvers which are affected by these provisions.

The airline transport pilot (airplane) practical test described in this Guide is arranged

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* The words "inspector/examiner" are used in this Guide to denote either an FAA Inspector or a Pilot Examiner who has been designated by the FAA to conduct flight tests for Airline Transport Pilot Certificates or Type Ratings.

in seven sections. Under each section are pertinent performance items. When the final performance of *any* item is unsatisfactory, the flight test will be unsatisfactory. A flight test may be discontinued at any time by the inspector/examiner or the applicant. However, once started, every effort should be made to complete the test. In the event of an unsatisfactory or incomplete test, credit will be allowed on subsequent reexamination for each satisfactorily completed item.

The items listed under each section outline the procedures and maneuvers and contain three divisions: *Objective*, *Description*, and *Acceptable Performance Guidelines*.

The *Objective* states briefly the reason the procedure or maneuver is required. It specifies the piloting operations which the applicant must perform properly to demonstrate that he has mastered this element of pilot qualifications.

The *Description* explains the procedure or maneuver and stipulates the conditions and limitations under which it is to be performed. These descriptions should not be confused with the objectives.

The *Acceptable Performance Guidelines* describe the factors which are taken into account by the inspector/examiner in deciding whether the applicant has accomplished the objectives of the maneuver or procedure at the required level of competence. The airspeed, altitude, and heading tolerances are not hard and fast, but represent the performance to be expected in good flying conditions.

In addition to specific factors to be considered for a particular item, the applicant's performance will be evaluated by the inspector/examiner on the basis of the judgment, knowledge, accuracy, and smoothness displayed on the test. The competent performance of a flight maneuver is a performance in which the pilot is obviously the master of the airplane.

Throughout the flight test, the applicant will be evaluated on his vigilance for other air traffic, and his adequate clearance of the area before performing any flight maneuver which might result in a hazard of collision with another aircraft.

The procedures and maneuvers set forth in this Guide must be performed in a manner that satisfactorily demonstrates knowledge and skill with respect to—

1. the airplane, its systems and components;

2. proper control of airspeed, configuration, direction, altitude, and attitude in accordance with procedures and limitations contained in the approved Airplane Flight Manual, check lists, or other approved material appropriate to the airplane type; and

3. compliance with approved en route, instrument approach, missed approach, ATC, or other applicable procedures.

I. PREFLIGHT

A. Equipment Examination (Oral).

1. ***Objective.*** To determine that the applicant has a practical knowledge of the airplane, its operation and limitations.

2. ***Description.*** As part of the practical test the equipment examination must be closely coordinated with, and related to, the flight maneuvers portion but may not be given during the flight maneuvers portion. Notwithstanding § 61.21, the equipment examination may be given to an applicant who has completed a ground school that is part of an approved training program under the Federal Aviation Regulations Part 121 for the airplane type involved and who is recommended by his instructor. The equipment examination must be repeated if the flight maneuvers portion is not satisfactorily completed within 60 days. The equipment examination must cover—

a. subjects requiring a practical knowledge of the airplane, its powerplants, systems, components, and operational and performance factors;

b. normal, abnormal, and emergency procedures and the operations and limitations related thereto; and

c. the appropriate provisions of the approved Airplane Flight Manual.

3. ***Acceptable Performance Guidelines.*** The applicant's performance will be evaluated on the basis of his knowledge of the appropriate flight manual and understanding of the airplane, its systems and components, and knowledge of weight and balance limitations.

B. Preflight Inspection.

1. ***Objective.*** To determine that the applicant possesses the necessary knowledge of the airplane to ascertain that it is safe for flight.

2. ***Description.*** The pilot must—

a. conduct an actual visual inspection of the exterior and interior of the airplane, locating each item and explaining briefly the purpose of inspecting it; and

b. demonstrate the use of the prestart check list, appropriate control system checks, starting procedures, radio and electronic equipment checks, and the selection of proper navigation and communications radio facilities and frequencies prior to flight.

If a flight engineer is a required crewmember for the particular type airplane, the actual visual inspection may either be waived or it may be replaced by using an approved pictorial means that realistically portrays the location and detail of inspection items.

3. ***Acceptable Performance Guidelines.*** The applicant will be expected to

explain the operational purposes of each item. If a flight engineer is a required flight crewmember for the airplane involved, the waiver provision of § 61.147(c) applies to the visual inspection.

C. Taxiing.

1. ***Objective.*** To determine that the applicant has the ability to maneuver the airplane expeditiously and safely on the surface.

2. ***Description.*** This maneuver includes taxiing, sailing, or docking procedures in compliance with instructions issued by the appropriate traffic control authority or by the inspector/examiner.

3. ***Acceptable Performance Guidelines.*** Evaluation will be made on the basis of the applicant's attention to safety; proficiency in handling the aircraft; consideration for other aircraft and personnel on ramps and taxiways; the use of power brakes and flight controls for directional control; and the proper use of nose wheel steering, tailwheel lock, or water rudder as applicable.

D. Powerplant Checks.

1. ***Objective.*** To determine that the applicant can make the necessary checks to assure the airplane's immediate readiness for flight.

2. ***Description.*** As appropriate to the airplane type.

3. ***Acceptable Performance Guidelines.*** The applicant will be evaluated on the basis of the proficiency and thoroughness with which the powerplant checks are accomplished and the knowledge displayed of the airplane engines, systems, and related operational checks.

II. TAKEOFFS

A. Normal.

B. Instrument.

C. Crosswind.

D. Powerplant Failure.

E. Rejected.

1. ***Objective.*** To determine that the applicant can make safe takeoffs under normal and emergency conditions and under various meteorological conditions, and can safely reject the takeoff when appropriate.

2. ***Description.***

a. *Normal.* One normal takeoff which, for the purpose of this maneuver, begins when the airplane is taxied into position on the runway to be used.

b. *Instrument.* One takeoff with instrument conditions simulated at or before reaching an altitude of 100 feet above the airport elevation.

c. *Crosswind.* One crosswind takeoff, if practicable under the existing meteorological, airport, and traffic conditions.

d. *Powerplant Failure.* One takeoff with a simulated failure of the most critical powerplant—

(i) at a point after V_1 and before V_2 that, in the judgment of the inspector/examiner, is appropriate to the airplane type under the prevailing conditions;

(ii) at a point as close as possible after V_1 when V_1 and V_2 (or V_1 and V_R) are identical; or

(iii) at the appropriate speed for nontransport category airplanes.

e. *Rejected.* A rejected takeoff performed in an airplane during a normal takeoff run after reaching a reasonable speed determined by giving due consideration to aircraft characteristics, runway length, surface conditions, wind direction and velocity, brake heat energy, and any other pertinent factors that may adversely affect safety or the airplane.

3. *Acceptable Performance Guidelines.* Performance will be evaluated on the basis of the takeoff and reject technique, judgment, observance of traffic patterns and control tower instructions, coordination, and smoothness. Airplane configuration, airspeed, and operational procedures should be in accordance with those recommended in the applicable operating instructions for the airplane being used.

III. INSTRUMENT PROCEDURES

A. Area Departure and Area Arrival.

1. ***Objective.*** To determine that the applicant can adhere to actual or simulated ATC clearances, including assigned radials and proper use of navigation facilities.

2. ***Description.*** During each of these maneuvers the applicant must—

a. adhere to actual or simulated ATC clearances (including assigned radials); and

b. properly use available navigation facilities. Either area arrival or area departure, but not both, may be waived under § 61.147 (c).

3. ***Acceptable Performance Guidelines.*** Evaluation will be made on the basis of the applicant's acceptance and knowledge of instructions and his knowledge of, and use of, available navigation facilities; also his knowledge of, and adherence to, airspeed limits relative to altitude and distance from the airport.

B. Holding.

1. ***Objective.*** To determine that the applicant can enter and fly a holding pattern properly.

2. ***Description.*** This maneuver includes entering, maintaining, and leaving holding patterns. It may be performed under either area departure or area arrival.

3. ***Acceptable Performance Guidelines.*** Evaluation will be made on the basis of compliance with the holding direction/radial, timing, and staying within the holding airspace. The applicant should maintain altitude within 100 feet of the assigned altitude. Holding airspeed should be maintained within 10 knots of that airspeed recommended for holding in the airplane being used.

C. ILS and Other Instrument Approaches.

1. ***Objective.*** To determine that the applicant can make safe and accurate instrument approaches under normal conditions and with a simulated powerplant failure.

2. ***Description.*** There must be the following:

a. At least one normal ILS approach.

b. At least one manually controlled ILS approach with a simulated failure of one powerplant. The simulated failure should occur before initiating the final approach course and must continue to touchdown or through the missed approach procedure.

c. At least one nonprecision approach procedure that is representative of the nonprecision approach procedures the applicant is likely to use.

d. Demonstration of at least one non-precision approach procedure on a letdown aid, other than the approach procedure performed under subparagraph (c) of this paragraph, that the applicant is likely to use. If performed in a synthetic instrument trainer, the procedures must be observed by the inspector/examiner, or, if the applicant has completed an approved training course under Part 121 of the Federal Aviation Regulations for the airplane type involved, the procedures may be observed by a person qualified to act as an instructor or check airman under the approved training program. Each instrument approach must be performed according to any procedures and limitations approved for the approach facility used. The instrument approach begins when the airplane is over the initial approach fix for the approach procedure being used (or turned over to the final approach controller in the case of PAR approach) and ends when the airplane touches down on the runway or when transition to a missed approach configuration is completed. Instrument conditions need not be simulated below 100 feet above touchdown zone elevation.

3. ***Acceptable Performance Guidelines.*** Airplane configuration and airspeeds should be in accordance with those recommended in the applicable operating instruc-

tions for the airplane being used. Arrival at authorized minimum in position for a straight-in landing is an acceptable performance for nonprecision instrument approaches. The ILS approach, to be considered acceptable, should be conducted so that glide slope and localizer indications do not exceed one dot deviation. Altitude should be maintained within 100 feet of prescribed altitude during initial approach, and within −0 to +50 feet of minimum descent altitude or decision height. Airspeed should be controlled within 10 knots of the recommended airspeed for the airplane configuration from the initial approach fix to the final fix inbound and within −0 to +10 knots of reference airspeed with appropriate wind/gust factor adjustment from the final fix to minimum descent altitude or decision height.

D. Circling Approaches.

1. ***Objective.*** To determine that the applicant can maneuver the airplane safely under conditions of low visibility to align with and land on a more favorable runway when a straight-in approach is not practicable.

2. ***Description.*** At least one circling approach must be made under the following conditions:

a. The portion of the circling approach to the authorized minimum circling approach altitude must be made under simulated instrument conditions.

b. The approach must be made to the authorized minimum circling approach altitude followed by a change in heading and the necessary maneuvering (by visual reference) to maintain a flight path that permits a normal landing on a runway at least 90° from the final approach course of the simulated instrument portion of the approach.

c. The circling approach must be performed without excessive maneuvering, and without exceeding the normal operating limits of the airplane. The angle of bank should not exceed 30°. When the maneuver is performed in an airplane, it may be waived as provided in § 61.147(c) if local conditions beyond the control of the pilot prohibit the maneuver or prevent it from being performed as required.

3. ***Acceptable Performance Guidelines.*** Angle of bank should not exceed 30°. Altitude should be maintained within −0 to +100 feet during flight at minimum descent altitude. MDA should be maintained until aircraft is in a position from which a normal approach to a landing can be accomplished, and preferably until turning final. Airspeed should be controlled within −0 to +10 knots of the recommended airspeed for the airplane configuration from the final fix inbound to the point where the transition is made from the approach configuration to the landing configuration, and within −0 to +10 knots of reference airspeed with appropriate wind/

gust factor adjustment after the landing configuration is established.

E. Missed Approaches.

1. ***Objective.*** To determine that the applicant can accurately and safely transition from approach and landing configuration to climb configuration, and can fly the airplane throughout the missed approach procedure from minimum approach altitude to the missed approach altitude under normal conditions and with a simulated powerplant failure.

2. ***Description.*** Each applicant must perform at least two missed approaches, with at least one from an ILS approach. A complete approved missed approach procedure must be accomplished at least once and, at the discretion of the inspector/examiner, a simulated powerplant failure may be required during any of the missed approaches. These maneuvers may be performed either independently or in conjunction with maneuvers required under Sections III or V of this Guide. At least one must be performed in flight.

3. ***Acceptable Performance Guidelines.*** Evaluation will be made on the basis of the applicant's judgment in deciding to execute the missed approach, the appropriateness of his communications and navigation procedures, his ability to maintain positive

airplane control and to operate all airplane systems in accordance with applicable operating instructions for the airplane being used. Descent below the Decision Height on ILS final prior to initiation of the missed approach procedure will be disqualifying except in those instances where the runway environment was in sight at DH.

IV. IN-FLIGHT MANEUVERS

A. Steep Turns.

1. ***Objective.*** To determine that the applicant can control an airplane in a steep bank under maneuvering load factors, and to maintain altitude and orientation.

2. ***Description.*** At least one steep turn in each direction must be performed. Each steep turn must involve a bank angle of 45° with a heading change of at least 180° but not more than 360°.

3. ***Acceptable Performance Guidelines.*** The applicant will be expected to maintain altitude within 100 feet of the entry altitude, and a bank angle of 45°, ±5°, after the turn is established, and recover within 10° of the assigned headings. Airspeed should be controlled within 10 knots of that recommended for the airplane being used. Special attention will be directed to the applicant's smoothness, coordination, and orientation.

B. Approaches to Stalls.

1. ***Objective.*** To determine that the applicant can recognize approaches to stalls in various airplane configurations, and can make prompt and effective recoveries.

2. ***Description.*** For the purpose of this maneuver, the required approach to a stall is reached when there is a perceptible buffet or other response to the initial stall entry. Except as provided below, there must be at least three approaches to stalls as follows:

a. One must be in the takeoff configuration (except where the airplane uses only a zero-flap takeoff configuration).

b. One in a clean configuration.

c. One in a landing configuration.

At the discretion of the inspector/examiner, one approach to a stall must be performed in one of the above configurations while in a turn with a bank angle between 15° and 30°. Two out of the three approaches required by this paragraph may be waived as provided in § 61.147(c).

3. ***Acceptable Performance Guidelines.*** The applicant should recognize the approach to a stall when there is a perceptible buffet or from activation of stall warning devices. Recoveries should be initiated at the first indication of an approaching stall.

The recoveries should be accomplished positively and smoothly, using appropriate and coordinated flight and power controls and with the least loss of altitude consistent with the recovery of full control effectiveness. After recovery, the applicant should make an expeditious return to the original altitude. Additional evaluation will be made on the basis of the applicant's prompt, smooth, and positive control application.

C. Specific Flight Characteristics.

1. ***Objective.*** To determine that the applicant can control and recover from specific flight characteristics that are peculiar to the airplane type.

2. ***Description.*** Recovery from specific flight characteristics that are peculiar to the airplane type.

3. ***Acceptable Performance Guidelines.*** Evaluation will be made on the basis of the applicant's demonstration of smooth, prompt, and positive recovery to normal flight, stressing minimum loss of altitude commensurate with safety. He should maintain positive aircraft control without exceeding the limitations of the aircraft being used.

D. Powerplant Failures.

1. ***Objective.*** To determine that the applicant can use the correct procedures for

feathering or shutting down an engine in flight, and that he can maneuver an airplane effectively and safely with an engine, or engines, inoperative.

2. ***Description.*** In addition to the specific requirements for maneuvers with simulated powerplant failures, the inspector/examiner may require a simulated powerplant failure at any time during the check.

3. ***Acceptable Performance Guidelines.*** Evaluation will be made on the basis of the applicant's ability to maintain heading within 20° of the original heading during the engine shutdown and restart procedures, and his altitude within 100 feet of the original altitude if it is within the capability of the airplane used. The applicant will be expected to promptly identify the inoperative engine after the engine is made inoperative by the inspector/examiner. Shut down and restart procedures should be as prescribed in the appropriate operating instructions for the airplane type. In an airplane not capable of maintaining altitude with an engine inoperative under existing conditions, the applicant will be expected to maintain an airspeed within 5 knots of the engine-out best rate-of-climb speed. The use of prescribed operating procedures, proper trim settings, and smoothness will be emphasized.

V. LANDINGS AND APPROACHES TO LANDINGS

A. Normal Landing.

B. Landing In Sequence from an ILS Approach.

C. Crosswind Landing.

D. Landing with Simulated Failure of 50% of Available Powerplants.

E. Landing from Circling Approach.

F. Rejected Landing.

G. No Flap Visual Approach to Landing.

H. Accuracy Approaches and Spot Landings (For Single Powerplant Rating Only).

1. ***Objective.*** To determine that the applicant can consistently make safe landings under normal, abnormal, and emergency conditions, and can reject a landing safely when required.

2. ***Description.*** Notwithstanding the authorizations for combining of maneuvers and for waiver of maneuvers, at least three actual landings (one to a full stop) must be made. These landings must include the types listed below but more than one type can be combined where appropriate:

a. Normal landing.

b. Landing in sequence from an ILS instrument approach except that, if circumstances beyond the control of the pilot prevent an actual landing, the inspector/examiner may accept an approach to a point where in his judgment a landing to a full stop could have been made.

c. Crosswind landing, if practical under existing meteorological, airport, and traffic conditions.

d. Maneuvering to a landing with a simulated failure of 50% of the available powerplants. The simulated loss of power must be on one side of the airplane (center and one outboard engine on three-engine airplanes), except that in turbojet powered airplanes, the following maneuvers may be substituted for this requirement.

(i) In the case of a four-engine turbojet powered airplane, maneuvering to a landing with simulated failure of the most critical powerplant, if a flight instructor in an approved training program under Part 121 of the Federal Aviation Regulations certifies to the Administrator that he has observed the applicant satisfactorily perform a landing in that type airplane with simulated failure of 50% of the available powerplants. However, these substitute maneuvers may not be used if the Administrator determines that training in the two-engine-out landing maneuver provided in the training program is unsatisfactory.

(ii) In the case of a three-engine airplane, maneuvering to a landing using an approved procedure that approximates the loss of two powerplants.

e. Landing under simulated circling approach conditions except that if circumstances beyond the control of the pilot prevent a landing, the inspector/examiner may accept an approach to a point where in his judgment a landing to a full stop could have been made.

f. A rejected landing, including a normal missed approach procedure, that is rejected approximately 50 feet over the runway and approximately over the runway threshold. This maneuver may be combined with instrument, circling, or missed approach procedures; but instrument conditions need not be simulated below 100 feet above the runway.

g. A no flap visual approach to a point where, in the judgment of the inspector/examiner a landing to a full stop on the appropriate runway could be made.

h. For a single powerplant rating only, unless the applicant holds a commercial pilot certificate, he must accomplish accuracy approaches and spot landings that include a series of three landings from an altitude of 1,000 feet or less, with the engine throttled and 180° of change in direction. The airplane must touch the ground in a normal landing attitude beyond and within 200 feet from a designated line. At least one landing must be from a forward slip. Although circular approaches are acceptable, 180° approaches using two 90° turns with a straight base leg are preferred.

3. *Acceptable Performance Guidelines.* Traffic pattern airspeeds should be controlled within −0 to +10 knots of that recommended for that type airplane and the appropriate airplane configuration until reaching final approach. Airspeed on the final approach should be controlled within −0 to +10 knots of reference speed with appropriate wind/gust factor adjustment as recommended by the operating instructions for the airplane being used. Threshold airspeeds, also, should be as recommended by these instructions with appropriate wind/gust factor adjustments.

VI. NORMAL AND ABNORMAL PROCEDURES

A. Anti-icing and Deicing Systems.

B. Autopilot Systems.

C. Automatic or Other Approach Aid Systems.

D. Stall Warning Devices, Stalling Avoidance Devices, Stability Augmentation Devices.

E. Airborne Radar Devices.

F. Any Other Systems, Devices, or Aids Available.

G. Hydraulic and Electrical System Failures and Malfunctions.

H. Landing Gear and Flap System Failures or Malfunctions.

I. Failure of Navigation or Communications Equipment.

1. ***Objective.*** To determine that the applicant has a practical knowledge of the systems and devices appropriate to the airplane type.

2. ***Description.*** Each applicant must demonstrate the proper use of as many of the systems and devices listed in test items A. through I. above as the inspector/examiner finds are necessary to determine that the person being checked has a practical knowledge of the use of the systems and devices appropriate to the aircraft type.

3. ***Acceptable Performance Guidelines.*** Performance will be evaluated on the basis of the applicant's demonstration of knowledge of the procedures for the airplane used and the judgment displayed.

VII. EMERGENCY PROCEDURES

A. Fire In Flight.

B. Smoke Control.

C. Rapid Decompression.

D. Emergency Descent.

E. Any Other Emergency Procedure Outlined in the Appropriate Approved Airplane Flight Manual.

1. ***Objectives.*** To determine that the applicant has an adequate knowledge of, and the ability to perform, emergency procedures appropriate to the airplane in use.

2. ***Description.*** Each applicant must demonstrate the proper emergency procedures for as many of the emergency situations listed in test items A. through E. above as the inspector/examiner finds are necessary to determine that the person being checked has an adequate knowledge of, and ability to perform, such procedures.

3. ***Acceptable Performance Guidelines.*** Performance will be evaluated on the basis of the applicant's demonstration of knowledge of the emergency procedures outlined above for the airplane used, the judgment displayed, and the accuracy of his operations.

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VT 016 643
TRAINING MANUAL FOR FERTILIZER PLANT
OPERATORS.

TENNESSEE VALLEY AUTHORITY, MUSCLE SHOALS,
ALA. NATIONAL FERTILIZER DEVELOPMENT CENTER.
MF AVAILABLE IN VT-ERIC SET.
CIRC-Z-17
PUB DATE - OCT70 247P.

DESCRIPTORS - *TEACHING GUIDES; MANUALS; AGRIBUSINESS; *SOIL SCIENCE; PLANT SCIENCE; *FERTILIZER; *AGRICULTURAL CHEMICAL OCCUPATIONS; AGRICULTURAL SUPPLIES; AGRICULTURAL ENGINEERING; *MANPOWER DEVELOPMENT

ABSTRACT - THIS TEACHING GUIDE, DESIGNED TO ASSIST INSTRUCTORS IN TRAINING CHEMICAL OPERATORS IN DEVELOPING NATIONS, PRESENTS THE CLASS MATERIALS NECESSARY FOR MAKING SIMPLE LESSON PLANS THAT WILL ALLOW OPERATORS WITH VARIOUS BACKGROUNDS TO BETTER UNDERSTAND THE CONCEPTS INTRODUCED. WORKING DRAWINGS ARE USED EXTENSIVELY. SPECIAL TIPS ON STRUCTURING LESSONS ARE PROVIDED FOR THE TEACHER AS WELL AS A 2-FOLD INSTRUCTIONAL FORMAT CONTAINING BOTH THINGS FOR HIM TO SAY AND DO. TOPICS RANGING FROM BASIC EQUIPMENT REQUIRED FOR PREVENTIVE MAINTENANCE, AND SAFETY ARE COVERED IN THIS MANUAL. (SN)

[illegible] MANUAL

FOR [illegible] OPERATORS

2955

TRAINING MANUAL

FOR FERTILIZER PLANT OPERATORS

Prepared for the
AGENCY FOR INTERNATIONAL DEVELOPMENT
By the
TENNESSEE VALLEY AUTHORITY
National Fertilizer Development Center
Muscle Shoals, Alabama

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TO ALL FERTILIZER PLANT INSTRUCTORS

The purpose of this operator training manual is to help in the training of chemical plant operators in the developing nations. It is an effort to share with the chemical industries in the LDC's experience that has been obtained over many years of operation at the National Fertilizer Development Center. Our goal is to present, in a very simple and concise form, materials that will improve fertilizer plant operation. It is hoped that by using these materials the trainers in the evolving fertilizer plants will be able to rapidly and effectively upgrade the operators and thus improve the operations of the plants that are and will be established to meet the fertilizer and food needs of the developing countries.

ANALYZE YOUR CLASS

In almost all cases, you will find that the education and background of the operators in your class vary widely. It will be almost impossible to set a pace that will be pleasing to all. After a session or two, you will be able to determine just how fast the material can be covered.

The pace should be slow at first. As the class becomes familiar with the material and your method of teaching, the pace can be accelerated. Watch for slow learners. Try to keep them from falling behind. Sometimes, a little extra help or encouragement from the teacher will give them the determination to keep up with the class and complete the course.

OUTLINE MATERIAL TO BE COVERED (LESSON PLANS)

It helps your students to have some idea as to how the course will be conducted. They should also have a clear conception of the purpose of the course and how it will help them.

Explain to the students that each chapter is arranged so that the instructor can give them a brief introduction of the material to be presented. The operation is next reviewed. The duties of the operator are covered in a general way for that particular operation. Suggestions and hints are given on how to obtain the best operation based on past experience in that particular field. Brief sketches are provided in the text so that the instructor can illustrate the subject on the blackboard or by other means. Suggestions are also given on preventive maintenance, lubrication, and safety. Explain to the students the importance of what is said. Several questions are provided on each subject to help stimulate interest and to emphasize key points.

The instructor should feel free to add to or modify the material provided in the text as warranted by time or situation. All of the material in the text should be presented so that the operator will have a basic foundation on these important subjects.

SPECIAL TIPS ON DEVELOPING LESSON PLANS

The most important assets of any instructor are sincerity, enthusiasm, and a knowledge of the subject. However, to really be effective, each instructor should have a lesson plan, preferably a written lesson plan. Lesson plans standardize training. They also help the instructor to:

1. Present material in the proper order.
2. Avoid omission of essential material.
3. Conduct classes according to a timetable.
4. Place proper emphasis on items covered.
5. Provide for student participation or involvement.
6. Gain confidence.

A lesson plan should contain the following:

1. *Title*––Indicates subject matter being taught. Should be clear and concise.
2. *Objectives*––Should indicate the purpose of the session or goals. Specifically, it should

indicate what the students are expected to know at the end of the session.

3. *Training Aids*—A list of all training aids such as actual equipment, charts, etc.
4. *Introduction*—Every lesson should be introduced to the class in a manner that will develop the interest of the group. It should give the students the scope and importance of the subject.
5. *Presentation*—This is really the meat of the whole lesson plan; this is the plan of action. It is the guide for putting across the ideas, information or skills the student should learn. It should indicate method of presentation, such as by lecture, demonstration, discussion, etc.
6. *Application*—A lesson plan should contain, if possible, some suggestions on how the information presented can be applied. Usually one or two students are experienced; have them tell the group how they apply such information to their work. In some cases, problems may be worked or exercises applied.
7. *Summary*—The summary restates the main points of the lesson and helps to strengthen the weak points in the instruction.

When students have a good background of experience, the discussion method of presenting information will be found to be most effective. In this method, the instructor gets the students to think and to talk. His best tools for promoting discussion are provocative questions, prepared in advance and inserted into the lesson plan. After such a discussion is started, the instructor leads and guides it and tries to get all students to participate.

When the information to be covered is new to the group, discussion accomplishes little, other than to pool ignorance. In such cases, the instructor must resort to other methods, such as lecture, controlled exercises, demonstrations, or some form of student involvement.

The above are just a few suggestions to help the instructor organize his presentation. The experienced instructor may have a good plan without much in writing, the less experienced instructor may need a detailed written plan. In any event, good teaching demands good planning.

USE OF VISUALS

When preparation of the training manual was begun it was intended that slides mentioned in the text would be provided. Due to the cost involved, however, they cannot be included in all manuals. The slides are being assembled and copies can be purchased from TVA (for about $50) when available. Instructors also may have substitute visuals. Slides or photographs taken locally and pictures from magazines or books can be used effectively, as can sketches on the blackboard. Good use of visuals helps people learn faster and retain more.

TRAINING AIDS—CHECK LIST

1. Check classroom
2. Check equipment
3. Introduction—class and self
4. Make objective clear
5. Use lesson plan and manual
6. Use visual aids
7. Vary presentation
8. Introduce each new subject and explain
9. Refrain from using sarcasm or profanity
10. Talk to class
11. Never use words not understood by class
12. Cover material in each lesson and if time permits, use anecdotes or personal experiences
13. Be sure to summarize high points
14. Make clear class assignments
15. Conduct verbal examinations to test effectiveness
16. Keep meeting place orderly
17. Start and stop on time
18. Make attempt to know students and learn names
19. Never show favoritism
20. Insist on order

WHAT TO DO	WHAT TO SAY

1

Introduction

Welcome to the first session of Operator Training for Fertilizer Plant Operations. We will meet for ___ hour(s) each ___. There will be ___ other ___ -hour sessions.

2

In order to process materials into fertilizer it is necessary to transport or move them from one location to another. If the material is a solid, the term *conveying* is used for this operation.

There are many forms of conveying equipment we can use, depending on the nature of the material—that is, the size, shape, and the amount to be moved. We also must take into account whether the material is to be transported horizontally, vertically, or on an incline.

The more important conveyors and elevators are:

1. Belt Conveyor
2. Screw Conveyor
3. Pneumatic Conveyor
4. Chain Conveyor
5. Oscillating and Vibrating Conveyor
6. Bucket Elevators

3

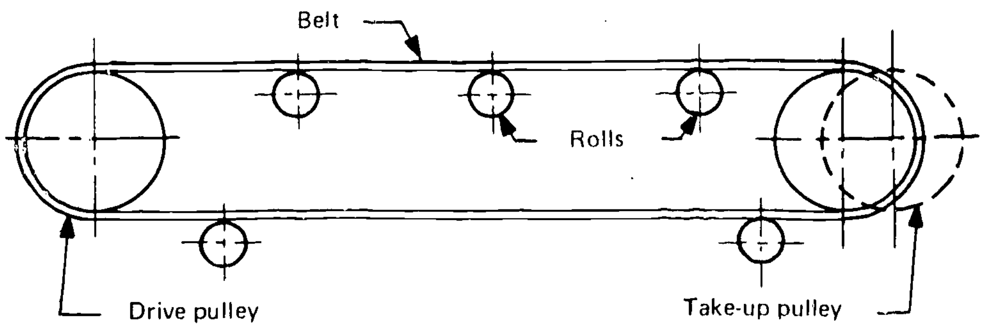
Belt Conveyors

The belt conveyor is a simple piece of equipment. It is ideally suited to handling a wide variety of materials. It has few moving parts, involves a minimum of friction, and requires less power than any other type of power-driven conveyor.

Belt conveyors are light in weight, and require little head-room. They can be operated either horizontally or up or down inclines. They can be operated either low or at high speeds to produce any desired capacity.

Sketch on blackboard

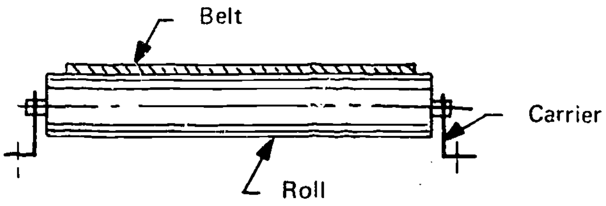
Component parts of the belt conveyor are: the belt (usually made of rubber), drive pulley, rolls, and the tightener or take-up pulley.



The simplest drive for the belt conveyor is a bare steel pulley actuated by a source of power, usually an electric motor.

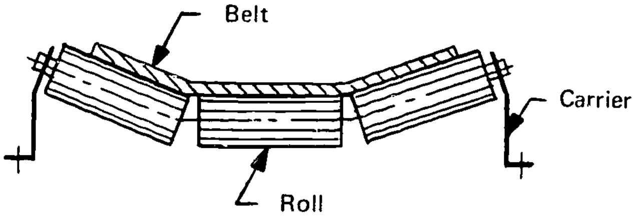
Sketch on blackboard

The rolls for the belt may be flat,



Sketch on blackboard

or, they may be troughed to prevent spillage of material.



Stress this

The roller supports are usually called carriers. The better ones are carried on roller bearings equipped for pressure grease-gun lubrication. To obtain satisfactory operation of the conveyor, these fittings must be lubricated and the rollers kept free of spillage material.

Due to changes in load, weather, temperature, and humidity, the length of the belt will vary. In order to keep the proper tension on the belt, it will be necessary to be able to move one of the belt pulleys. It is called the take-up pulley.

4

The simplest method of getting material on the belt conveyor is by means of a hopper or bin. The material should be discharged from the hopper to the belt in the same direction that the belt is traveling.

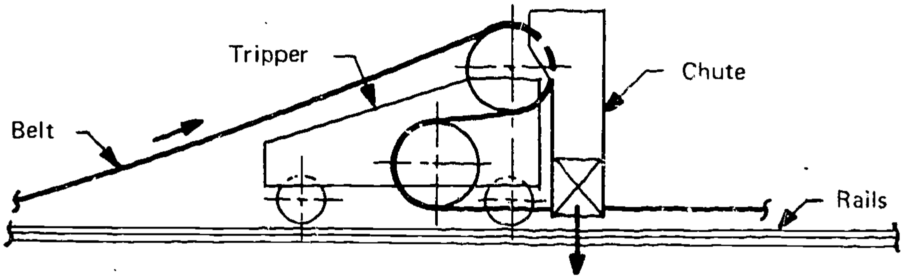
5

Discharging the material from the belt can be done several ways. If it is to be discharged at the end of the belt, the material will fall off.

The discharge of the material at some intermediate point may be obtained by using a scraper to scrape the material off. Another method is to arrange the roller supports in such a way that the belt is tilted at an angle and the material slides off of the belt.

When it is desirable to discharge the material at several points along the belt, a device called a tripper may be used. A tripper consists of two pulleys mounted in a frame that travels on rails with the belt. The pulleys are so arranged that the belt is doubled back for a short distance. This causes the material to fall free into a chute, which discharges to either side of the belt.

Sketch on blackboard



6

After starting the belt conveyor, check to see that it is not overloaded with too much material falling off the belt.

When in operation the belt should stay centered on its supports. If it shifts sideways, an adjustment of one of the pulleys may be necessary or some of the rolls may need cleaning.

Check the discharge from the belt often during operation; there is always the possibility of the chute plugging and causing a spillage of the material.

It is a good idea to check the belt several times a day for tears or wear. Also, check the point where the belt is joined together to make sure it is still in good repair.

All idle rolls should be inspected daily to see that they are free-turning and not blocked by material that has fallen from the belt.

Any wet material that may have become coated on the rolls should be removed. This will prevent further building up of material which may cause misalignment and injury to the belt.

7

Preventive maintenance

The belt conveyor should be i[illegible]d at least once each week for repairs. Check to see that:

1. All rolls are turning freely and are properly seated and held in brackets.
2. Material has not accumulated under rolls or rollers.
3. Bearings and bearing seals are lubricated.
4. Belt conveyor drive unit is in good condition and properly lubricated.

8

Lubrication

The belt conveyor speed reduction drives should be flushed after the first 100 hours of operation, and filled with new oil. In normal service, change oil every 2500 hours or at least semi-annually. In severe service change oil every one or three months. Make sure bearing-oil rings turn freely.

Lubricate plain bearings weekly and anti-friction bearings every three months with the proper lubricant. Every six months, flush grease lubricated anti-friction bearings with mineral spirits, dry, and repack (1/3 capacity).

Blow out motors with clean compressed air at reduced pressure. Lubricate motors every six months or 4000 hours of operations.

9

Safety

Never attempt to clean under rollers, head or tail pulley while belt conveyor is in operation. Do not service or lubricate any part of the belt conveyor while it is in operation.

Stress this

Many serious accidents have occurred in attempting to clean near the tail or take-up pulley while the belt is in operation and also while applying material to the drive pulley to prevent the belt from slipping.

Before working on or cleaning the belt conveyor or drive unit, pull the electrical switch that supplies power to the motor and place a hold tag on it.

Better still, also remove the fuses from the switch box. Be careful when operating a long inclined conveyor. If the power should fail, the material load on the belt will cause it to run backward.

10

Questions

What will cause material to spill from the belt? (Get random ideas of class. Write them on the blackboard.)

We can see that there are several reasons. The main ones are:

1. Belt overloaded.
2. Width or speed of belt not suitable for material being conveyed.
3. Incline of belt too great for material being conveyed.

Why should this material be cleaned up? (Get class reaction.)

For one thing, the material costs money. Second, the spilled material is a safety hazard; and third, it will cause greater wear on the belt, pulleys, and roller supports if they come in contact with the material.

Why is it dangerous to clean or service the belt conveyor or belt conveyor drive when it is in operation? (Get class reaction.)

Emphasize

The danger of injury to the operator and the possibility of damage to the equipment.

Why is this especially true of the drive pulley and take-up pulley? (Get answers from class.)

Experience has shown that numerous serious accidents have occurred when operators or maintenance men have had their hand or arm caught between the belt and pulley.

11

Show slides

We will now look at some slides showing belt conveyors. The first slide shows a flat belt conveyor. (Point out main parts.)

The second slide shows a belt conveyor in which the support rollers are troughed so that the belt can carry more material with less spillage. (Ask class why.)

The next slide shows a belt conveyor in wh [illegible] ed material has been allowed to build up under the belt. This causes excess wear and maintenance.

The last slide shows an inclined conveyor.

12

Questions

Are there any questions about the material covered on belt conveyors?

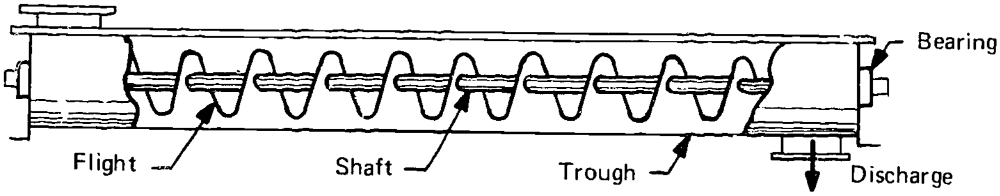
I have one question I would like to ask the class: At what angle can you convey material up an incline? (Get class reaction.) Of course, it will vary depending on the nature of the material. Some materials can be conveyed at an incline of 20 degrees or more.

13

Screw Conveyors

The screw conveyor is used to transport finely divided solids or pasty solids. It consists essentially of a spiral blade revolving around an axis in the bottom of a U-shaped trough.

Sketch on blackboard

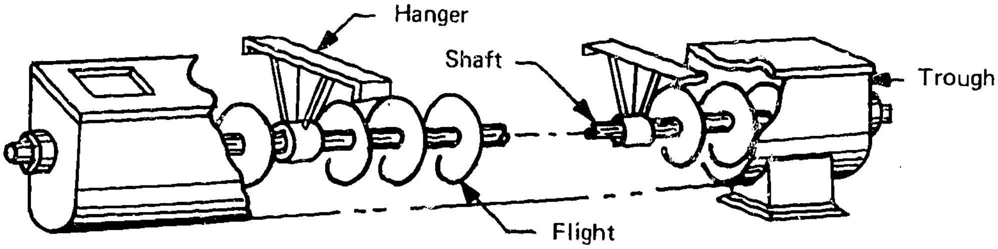


The screw element is called a flight. It may be sectional, helicoid, or special.

The screw-conveyor trough may be made of wood with a steel liner or of all steel construction.

It is necessary that the shaft which supports the spiral blade be suspended by suitable hangers. This is to keep it in alignment in the trough.

Sketch



The screw conveyor can be used as a mixer as well as for conveying.

14

When in operation, care must be taken not to overload the screw conveyor. When this occurs, the motor will "kick off" due to overload or the pin that connects one section of the shaft to another will shear.

When the screw conveyor stops conveying and the drive unit is still operating, remove the covers from the conveyor and look for stoppage or a section of the screw that is not operating.

15

Preventive maintenance

The screw conveyor should be inspected at least once each week. Check to see that the casting is dust tight and that bearings are lubricated and are not running hot.

The drive unit should be inspected for proper operation and lubrication. Note if excessive material is piling up at loading point.

16

Lubrication

Change oil in speed reducer after first 100 hours of operation and every 2500 hours of operation or every six months after that.

Blow out motor with clean compressed air once each month. Lubricate motor every six months or 4000 hours of operation.

Every six months, flush grease-lubricated anti-friction bearings with mineral spirits, dry, and repack (1/3 capacity).

17

Safety

Do not leave cover off trough when the screw conveyor is operating. This prevents dust from escaping. Serious injuries have occurred when arms or legs have been caught in the screw.

Stress

Use hold tags and pull fuses when working on or cleaning the screw conveyor.

Question

Can the screw conveyor convey material to a higher elevation? (Get class reaction.) Yes.

18

Show slides

The first slide shows a screw conveyor with the cover removed. (Point out parts of screw conveyor.)

The second slide shows screw conveyor used to collect dust from dust collectors.

19

Pneumatic Conveyor

This method often is used to convey light, bulky materials. Several different types or systems are used.

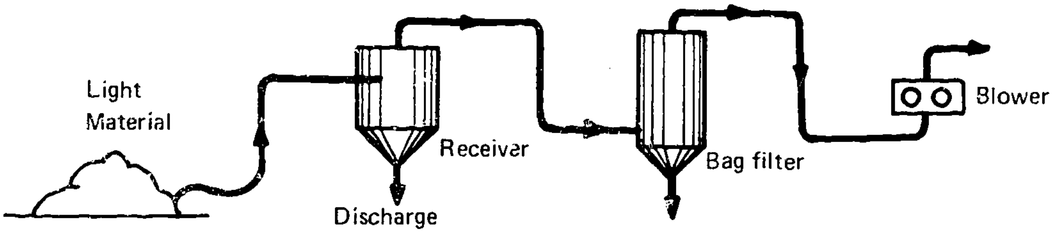
The nature of the material determines whether it can be conveyed by air. It must be able to pass through piping and equipment without clogging and without being damaged. The material must be readily separated from the conveying air.

Stress this

The pneumatic conveyor consists essentially of a pump or fan that mixes a stream of air with the material and blows or pulls it through a pipe.

The unloading point has a receiver that separates the material from the stream of air. The receiver may or may not have bag filters to catch the fine particles. The household vacuum cleaner operates on the same principle.

Sketch on blackboard



When in operation, care must be used not to overload the system. When this happens the material drops out of the flow of air and plugs the pipe.

Question

How do you unstop a system that has plugged? (Get answers from class.)

First, stop the feed. Then open ports of pipe joints in the line at the stoppage until [illegible] get the conveying air flowing again.

Sometimes hammering on the pipe will help locate the stoppage. If hammering will not unplug the pipe, try pulling as high a vacuum as possible and then releasing the vacuum. Do this several times.

If all of this fails, it may be necessary to cut holes in the pipe and rod or blow out the line with compressed air.

Always remember to start air flow first and then start the feed to the system. When shutting down, stop the feed first and allow time for the system to clear itself before stopping the air flow.

Emphasize

The principle is to start air flow first and stop it last so that no material is trapped in any part of the conveying line.

20

Preventive maintenance

The pneumatic conveyor should be inspected at least once each week. Inspect the air blower or vacuum pump for proper operation and lubrication.

Check equipment access doors, inspection ports, and flanged joints for tightness.

Check all weight- and spring-loaded relief valves for free movement.

Check rotary airlock feeders and gates for proper operation.

Inspect receivers and dust filters for proper operation.

21

Lubrication

All gear and oil cases should contain the prescribed lubricant and be filled to the proper level. Vent plugs should be open.

In normal service, change oil in oil cases every 2500 hours of operation or at least semi-annually. In severe service, change oil every one or three months. Make sure bearing-oil rings turn freely.

Lubricate plain bearings weekly and anti-friction bearings every three months.

Every six months, flush grease-lubricated anti-friction bearings with mineral spirits, dry, and repack (1/3 capacity).

Blow out motors with clean compressed air at reduced pressure every month. Lubricate motors every 6 months or 4000 hours of operation.

22

Safety Do not attempt to clean or repair any rotating equipment without first immobilizing the equipment so that it cannot be started.

The first slide shows the nozzle picking up the material.

Question What happens if the operator feeds too much material to the system? (The system will stop up.)

The second slide shows a pneumatic conveyor connected direct to the transport car.

Question Before starting to unload the car, what should the operator do? (Aerate the contents of the transport.)

23

Chain Conveyors

A large and very important type of conveyor depends on the chain and chain attachments for conveying.

The type of chain conveyors available are so varied that it is difficult to bring them into one simple classification.

When the distance is short, the load light or heavy, abrasive or non-abrasive, hot or cold, a chain drive conveyor suitable for the job can be obtained.

The scraper conveyor is simple to build and is suitable for a wide range of conditions. Its disadvantages are its high power requirement and degradation of the product to some extent.

The flight conveyor is somewhat similar to the drag conveyor and is widely used in coal plants. It also has a wide variety of miscellaneous uses.

The apron conveyor is used for heavy loads and short runs. It can handle hot material. It can be used either horizontally or at an incline without degradation of lump size.

24

The chain conveyors should be inspected at least once each week.

Preventive maintenance

All chain joints should [illegible] free.

See that excessive material is not piling up at loading point

Check sprockets for excess wear and replace if necessary.

Repair any bent flights or aprons. If not repaired this will cause excess wear on chain sprockets.

25

Lubrication

Lubricate bearings and other parts equipped for lubrication at least once each week. When a bearing runs warmer than 150° F., it should be washed and regreased.

Chain casings should have enough oil in them to allow clipping of the chain in the oil. At no time should dirty oil be allowed to remain in the casing.

All gear and oil cases should contain the prescribed lubricant and be filled to the proper level. Vent plugs should be open.

In normal service, change oil in oil cases every 2500 hours of operation or at least semi-annually. In severe service, change oil every one or three months. Make sure bearing oil rings turn freely.

Blow out motors with clean compressed air at reduced air pressure. Lubricate motors every six months or 4000 hours of operation.

26

Safety

Never attempt to clean, lubricate, or repair chain conveyors while they are in motion. Always immobilize the equipment before cleaning or making repair if there is any possibility at all of being injured if the equipment should move.

27

Show slides

The first slide shows a scraper conveyor.

Question

Why is its power requirement large? (Scrapes material along walls of container.)

2370

The second slide shows an apron conveyor.

Question What are its advantages? (Can convey heavy loads and large size material. Also, it can convey hot material.)

28

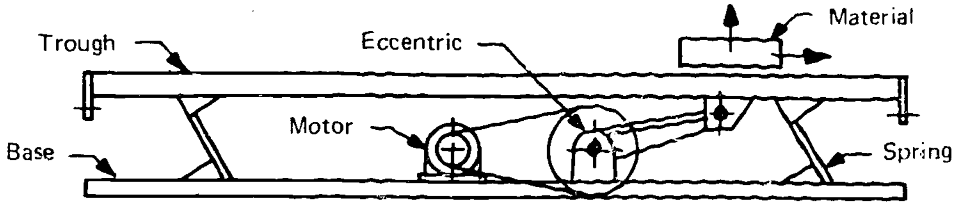
Oscillating and Vibrating Conveyors

Oscillating and vibrating conveyors are used to convey materials because of their versatility and low maintenance characteristics.

Material must be of such nature that it will not stick to pan.

The oscillating conveyor moves the material by moving it upward and in the direction it is to travel.

Sketch on blackboard



The vibrating conveyor may be electromagnetic, hydraulic, or mechanical. It operates in the same manner as the oscillating conveyor in that the material is moved by a series of throws and catches in the direction that it is to move.

During the upward and forward stroke, the conveyed material leaves the conveying trough. While it is in the air, the trough makes its backward and downward return. The trough is then ready for another stroke.

29

Since the vibrating conveyor has no moving parts, it gives very little trouble in operating.

Material should not be allowed to pile up against it since this would change the frequency of the vibrations and interfere with conveyor operation.

If material starts to build up or stick to the conveyor, it sometimes can be shaken loose by increasing the vibrations momentarily.

30

Preventive maintenance

Except for the vibrating trough, there are no moving parts, and hence very little maintenance for this type of conveyor.

The unit does need to be kept clean and material must not be allowed to pile up around it. This would change the natural frequency of the conveyor and decrease its capacity.

The system should be inspected at least once each week. Check to see that all of the springs are intact and in their proper place.

31

Lubrication

All fittings on the oscillating conveyor should be lubricated weekly and anti-friction bearings every three months.

Every six months, flush anti-friction bearings with mineral spirits, dry, and repack (1/3 capacity).

Blow out motors with clean compressed air at reduced pressure every month. Lubricate every six months or 4000 hours of operation.

32

Safety

Do not attempt to clean or repair the equipment without first immobilizing it.

33

Show slide

The slide shows a vibratory feeder.

Question

What advantage does it have over other type feeders? (Low maintenance, self cleaning, and ability to handle hot materials are a few.)

34

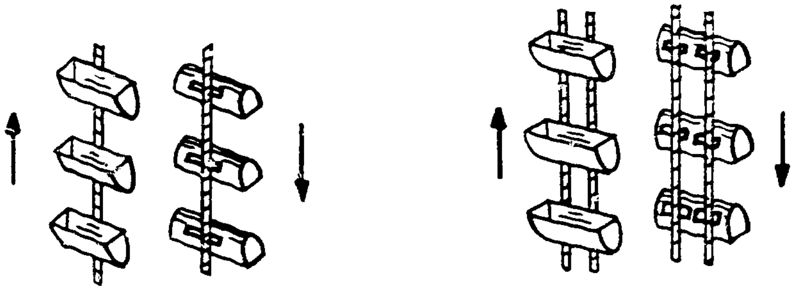
Bucket Elevators

If a straight vertical lift of the material is necessary, some form of elevator is used.

The most common type of an elevator for lifting material in a plant is called a bucket elevator. It consists of a series of buckets carried either on chains or on a belt.

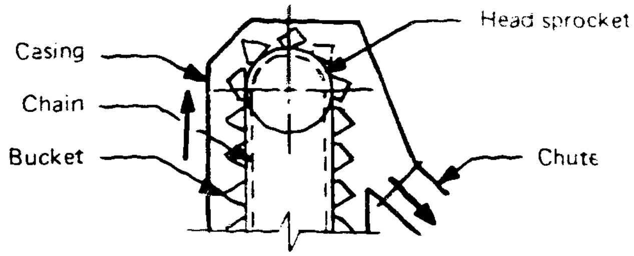
The most common practice is to fasten the buckets to a chain or, in some cases, to two chains.

Sketch on blackboard



Sketch on blackboard

The material being elevated is discharged from the bucket at the top of the elevator.



Elevators may be run without any casing around them. Most are enclosed, however, to prevent spillage of material and for dust control.

The buckets are filled at the bottom of the elevator from a chute or by digging into loose mat [illegible] the bottom of the elevator.

This part of the elevator is called the boot.

35

After starting the bucket elevator, the operator should listen to determine if everything sounds normal. The buckets will strike the housing if there is too much slack in the chain or if one of the buckets is bent.

If the elevator motor should "kick out" while operating, stop feed immediately and look for overload conditions or a blockage of material in the bottom of the elevator.

36

Preventive maintenance

Inspect the elevator at least once each week for damaged buckets and chain links. Replace if any are found. The chain should be tight enough so that buckets will not hit the housing.

If material tends to harden in the boot, it may be necessary to dig it out. It may be necessary to periodically clean out the buckets.

37

Lubrication

All gear and oil cases should contain the prescribed lubricant and be filled to the proper level. Vent plugs should be open. In normal service, change oil in oil cases every 2500 hours of operations or at least semiannually. In severe service, change oil every one or three months.

Chain cases should have enough oil in them to allow dipping of the chain in the oil. At no time should dirty oil be allowed to remain in the casing. Check to see that bearing oil rings turn freely.

Lubricate plain bearings every week and anti-friction bearings every three months.

Every six months, flush grease lubricated anti-friction bearings with mineral spirits, dry, and repack (1/3 capacity).

Blow out motors with clean compressed air at reduced pressure each month. Lubricate every six months or 4000 hours of operation.

38

Safety

Do not clean out or work on equipment without first immobilizing it.

When inspecting chains and buckets, be careful that chain and buckets do not "back up" and catch hands or clothing.

39

Show slide

The first slide shows a bucket elevator located in a sump.

Question

What is the disadvantage of this? (It is difficult to keep the sump clean.)

The second slide shows the buckets and chain at the inspection door.

WHAT TO DO

WHAT TO SAY

1

Introduction

In this session we are going to discuss crushers and screens. Crushing, the operation that subdivides solids mechanically, can be thought of as coarse, intermediate and fine crushing or grinding.

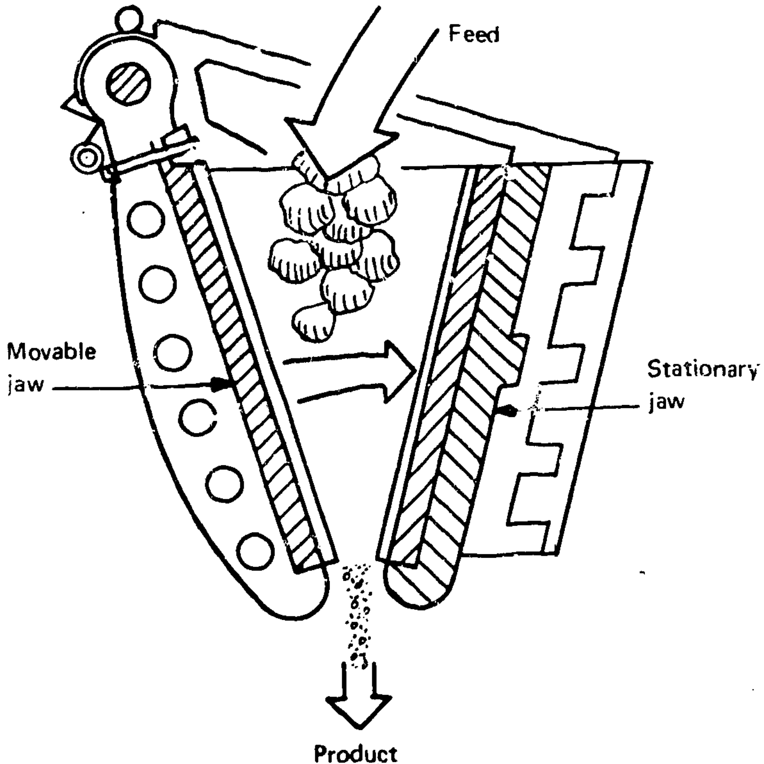
There are three types of coarse crushers jaw, cone, and impact. Intermediate crushers are roll, gyratory, and impact. Fine crushing or grinding is done by the various roll or ball mills.

2

The jaw crusher consists essentially of two plates or jaws – one stationary and the other movable. Material is crushed when the movable jaw compresses it against the stationary jaw.

On the back stroke, crushed material drops free from the jaws.

Sketch on blackboard

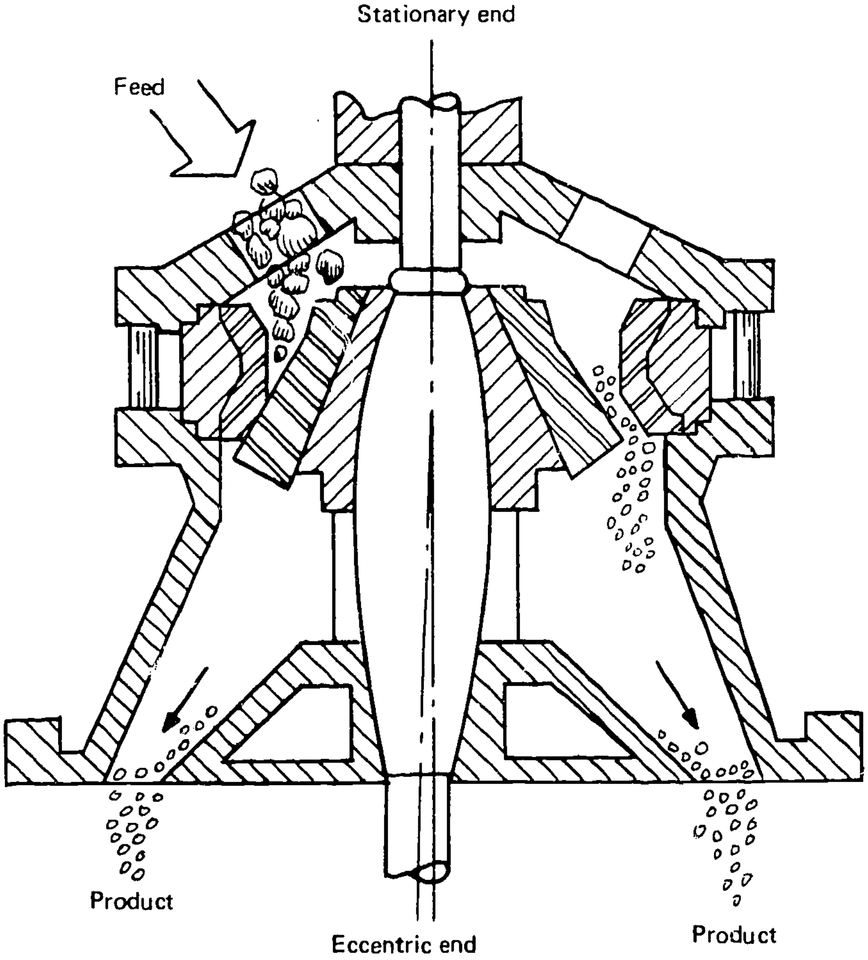


The cone or gyratory crusher consists of a shaft fitted with a conical crushing head inside of a bowl.

The lower end of the shaft moves in an eccentric fashion. Material feeding into the bowl by gravity is crushed when the shaft presses it against the sides of the bowl. Crushed material drops free when the shaft moves inside the bowl due to its eccentric motion.

The cone crusher is more efficient than the jaw crusher.

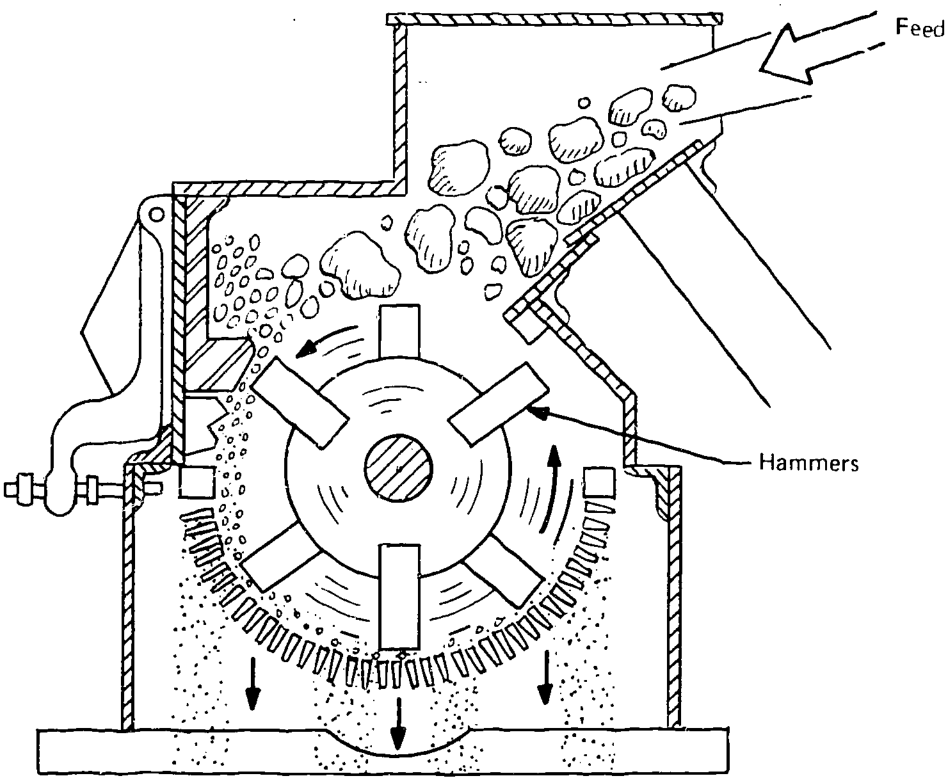
Sketch on blackboard



3

The impact crusher is the most important type used in the fertilizer industry. Material is fed in at the top or center, and is thrown out centrifugally and crushed by being beaten between the hammer bars or against breaker plates.

Sketch on blackboard



Fine material

The material is beaten until it is small enough to fall through the screen which forms the lower portion of the casing.

The impact crusher may be of the swing-hammer, chains, or squirrel cage disintegrator type.

Stress this

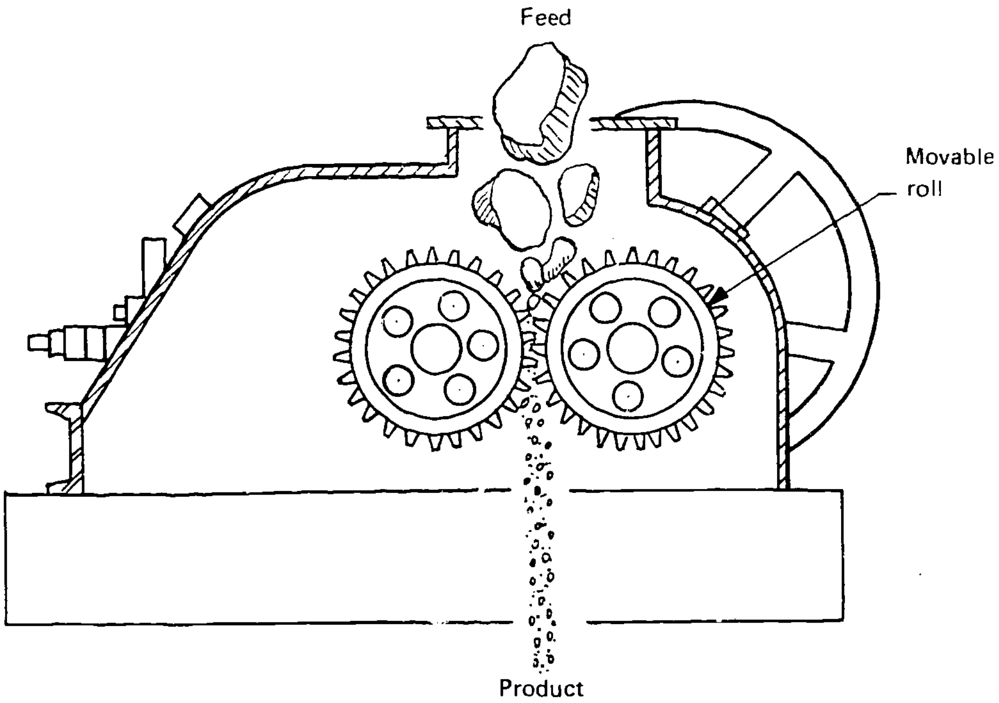
The impact or hammer mill type crusher is gaining in popularity; in some instances, it is even being used in place of the jaw or cone crusher as a coarse crusher. The reason is that more of the finished product can be obtained with the first crushing.

Stress this

The roll crusher may be of one or two roll designs. It crushes by wedging the material between the revolving roll and a breaker plate or between two revolving rolls.

The purpose of the movable roll is to permit the rolls to separate in case tramp iron gets into the feed.

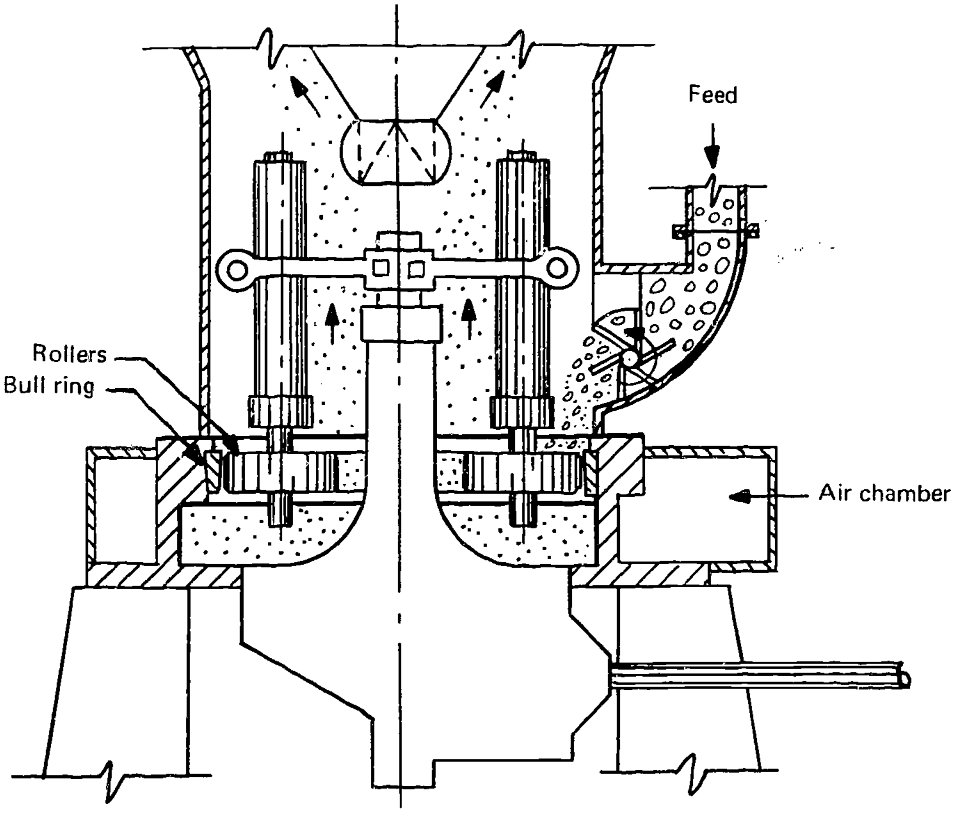
Sketch on blackboard



4

Fine crushing or grinding is done in several different ways. We will consider two types. One is the centrifugal attrition type mill that employs balls or rollers to roll over the material held in a bull ring. The rollers or balls held against the bull ring by centrifugal force do the grinding.

Sketch on blackboard



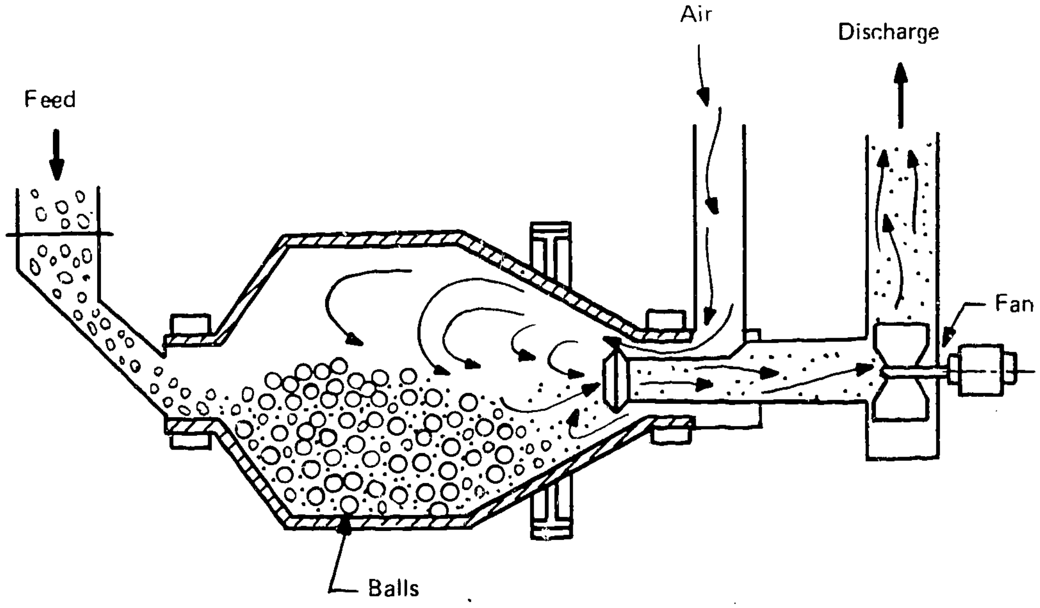
Note

An upward stream of air continuously removes the ground material. The fineness of the product is controlled by the rate of feeding and the air velocity.

The Ball Mill is the second type of fine grinding that we will consider. In its simplest form it is a rotating hollow cylinder partially filled with balls.

The feed enters at one end and the fine material leaves through the other end.

Sketch on blackboard



Emphasize

The load of balls, size of the balls, speed of rotation, and rate of feed are factors that control output and size of the product.

Ball Mills have a low cost of installation. Power costs are also low. They can grind wet or dry material.

5

Preventive maintenance

Make periodic inspections of the crushers. It is important that all nuts and bolts be tight and that wearing parts are in good condition.

Always shut off the feed and allow crashers to empty themselves before shutting down.

Also start the crusher and allow it to come to operating speed before starting feed.

Do not operate crusher if excessive vibration or unusual noise should develop without checking to see what is causing it. It may be necessary to take the crusher out of service for repairs.

6

Check points for operators

The operator on duty should check to see that:

1. There is no accumulation of material around any vital part that will cause excessive wear or vibration.
2. The bearings and bearing seals are properly lubricated, and are not running hot.
3. The drive unit is in good condition and properly lubricated.
4. The feed to the crusher is properly distributed; uneven wear and excessive vibration may result if it is not.
5. The crusher is operating properly; an occasional check of crusher product by hand screening will show the results.
6. The working area is kept as clean as possible.
7. The ventilation system is working properly.
8. There is no buildup in chutes that would lead to a stoppage.
9. The ventilation system is operating by keeping the covers on screens, chutes and other equipment. It may be necessary to plug some holes or place temporary covers over openings until permanent repairs can be made.

7

Lubrication

Follow the manufacturer's recommendation on lubrication. Most of these will be covered in Chapter 24–LUBRICATION

If any equipment part starts running hot or makes an unusual sound, check immediately for the cause.

8

Safety

Never attempt to clean or service a crusher while it is in operation.

Stress this

Pull the switch that supplies power and place a hold tag on it. It is a good idea to also remove the fuses from the switch box.

Be sure that the rotating element is not off center, and thus, likely to rotate slightly when you start to work, catching a finger or hand.

9

Questions

Why does the gyratory crusher have a greater capacity than the jaw crusher? (The gyratory is crushing continuously, whereas the jaw crusher is working intermittently.)

What is the disadvantage of crushing material that is highly abrasive? (It wears out parts of the crusher that come in contact with the material.)

Name three factors that affect the operation of a ball mill? (They are the speed of the mill, the amount of grinding media, and the amount of the material.)

Why should you always start a crusher under "no load" conditions? (It prevents an undue load from being placed on the crusher parts, drive unit, and power unit.)

10

Show slides

The first slide shows a jaw crusher. What are its main parts? (Frame. Stationary jaw. Movable jaw. Pulley and fly wheel. Journal boxes.)

The second slide shows a gyratory crusher.

The next slide shows a roll crusher.

The fourth slide shows an impact type crusher.

Question

Are there any questions from the class on crushers?

11

Introduction

Screening, or screen sizing, is the separation of a mixture of various sizes of grains into two or more portions, by means of a screen.

Many factors affect the rate at which undersize material may pass through a screening surface. The most important are:

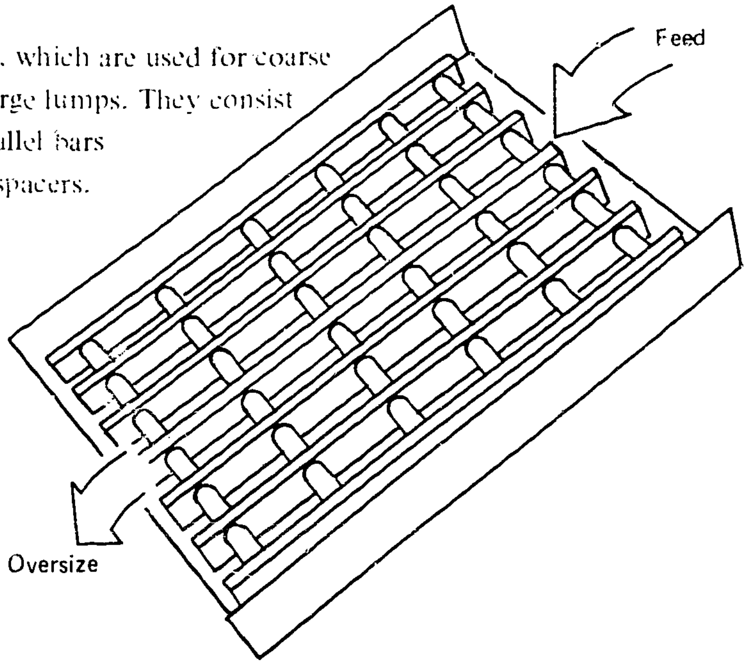
1. The size of the openings.
2. The percentage of openings to total surface in the screen.
3. The angle at which the particles strike the screening surface.
4. The speed at which the particle strikes the screening surface.
5. The moisture content of the material that is being screened.

12

Different type of screens are:

Sketch and describe

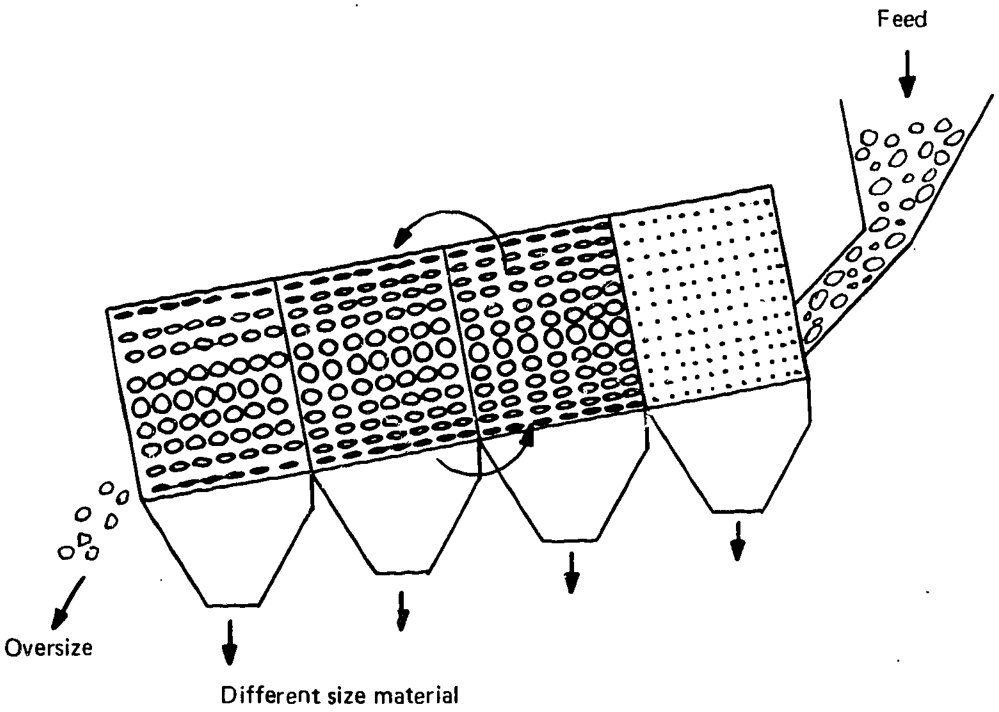
1. Grizzlies, which are used for coarse screening of large lumps. They consist of a set of parallel bars held apart by spacers.



13

Sketch and describe

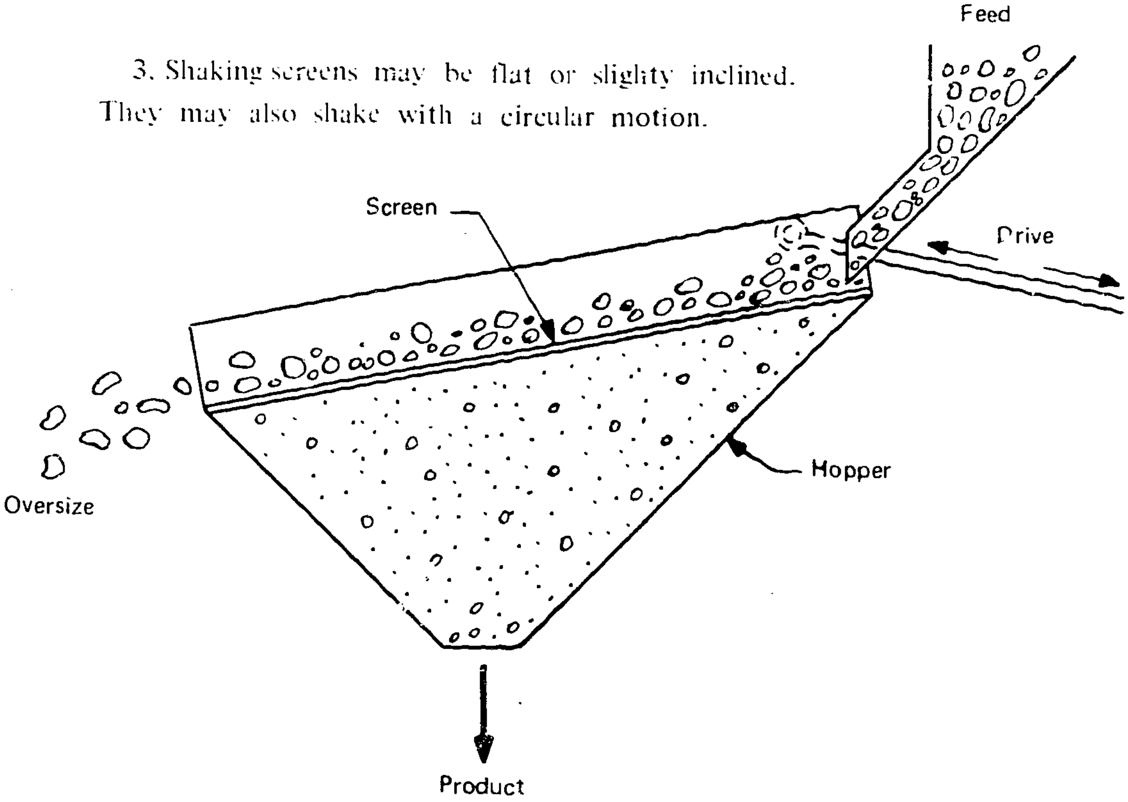
2. Trommels are rotating screens for fairly large particles.



14

Sketch and describe

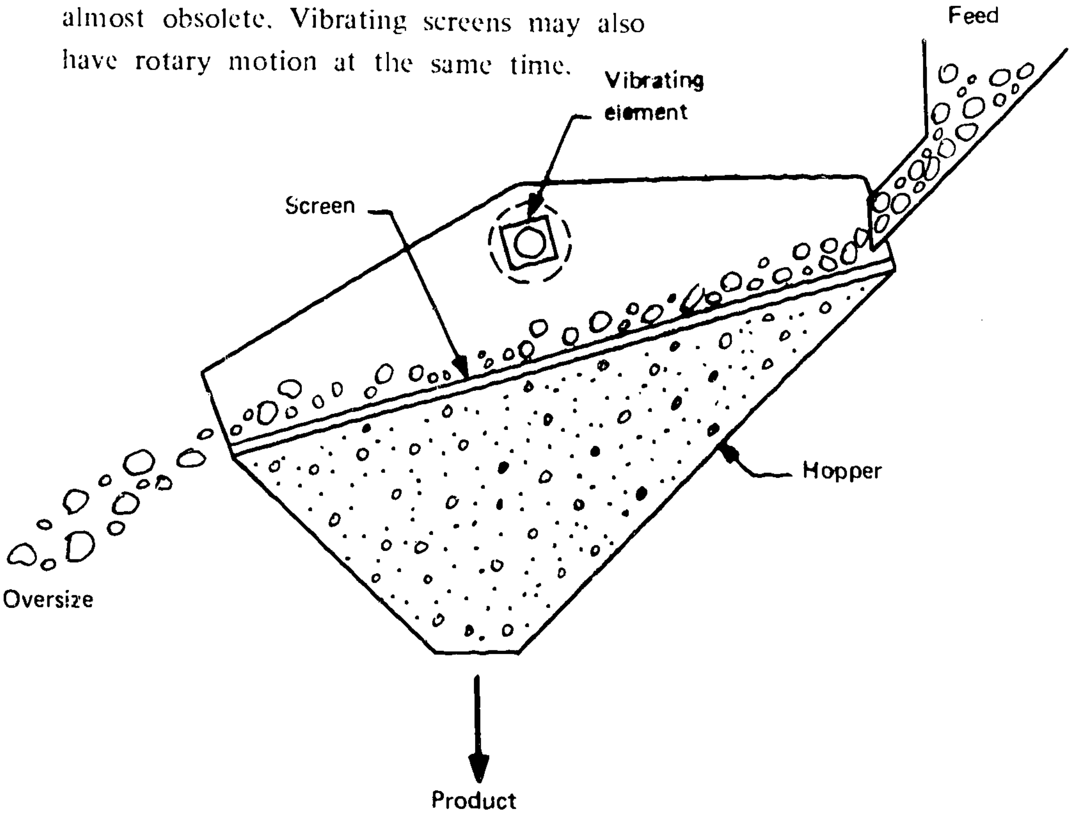
3. Shaking screens may be flat or slighty inclined. They may also shake with a circular motion.



15

Sketch and describe

4. Vibrating screens have developed to the point where other types of screens are almost obsolete. Vibrating screens may also have rotary motion at the same time.



16

Questions Why would you install a grizzly screen? (When you wanted a coarse separation.)

Why would you install a trommel screen? (When you wanted to screen coarse material into several different sizes.)

What advantage does a vibrating screen have over a shaking screen? (Larger capacity and higher efficiency.)

Why does it have a greater capacity? (The vibrations of the screen reduces the blinding, or stoppage, effect to a minimum.)

Why is it hard to screen damp or wet material? (Material clings to the wire screen and plugs openings.)

What do we mean when we refer to "mesh?" (The number of openings in the screen per linear inch.)

17

Preventive maintenance The grizzly and trommel screens, by nature of their construction, give very little trouble.

Vibrating and shaking screens, however, require maintenance to operate properly.

Stress A constant, systematic inspection of the screen will result in less down time and fewer repair bills.

Daily:

1. Check oil level, or grease mechanism and seals per instruction.
2. Check for loose bolts in mechanism.
3. Check mechanism when running for indication of excessive operating temperature.
4. Check V-belt drive and drive unit.
5. Check tension spring assembly.
6. Check for interference between screen body and surrounding structures.
7. Check screen surface for looseness or wire breakage.
8. Check flow of material over screen to see that it is evenly distributed.

Weekly:

1. Check oil or grease for contamination.
2. Check mechanism while running for noise or excessive operating temperature.
3. Check side plates for loose bolts, excessive wear or cracking.
4. Check clamping bars for looseness and excessive wear.
5. Check support frames for wear, cracking or breakage.

18

Lubrication

Details of equipment lubrication will be covered in Chapter 24 LUBRICATION.

Some vibrating and shaking screen mechanisms are grease-lubricated while others rely on oil.

Grease lubrication

Those that use grease should have the bearings lubricated every eight hours of operation. For a dusty installation, they should be greased every four hours.

Dust seals should be lubricated frequently so that a small amount of grease works out during operation to keep dust out of the mechanism. In a dusty atmosphere, lubricate about once every four hours.

Once each year, dismantle grease-lubricated mechanisms on screens and clean throughly and inspect all parts.

Oil lubrication

Check oil level at least once each 24 hours of operation on screen mechanisms that are oil-lubricated. Be careful not to get any dust into the oil when checking.

Initial oil change should be made after first 80 hours of operation. After that change oil every 300 hours of operation.

Bearings should be flushed periodically with an approved flushing compound and refilled with fresh oil.

19

The operator on duty should:

1. Check the operation of the screen at the start of the shift to see that material being screened is distributed over the entire width of the screen.
2. Check to see that the screen is screening properly.

3. Note product and oversize from the screen several times during the shift for any change of size of the material.

4. If the material being screened is hygroscopic by nature, watch for plugging of the screen when starting up after a delay.

5. Keep area around screen clean.

6. When cleaning the screen, the operator should not, under any conditions, beat on the screen in such a way as to deform or beat in the wire. This only compounds the problem.

20

Safety

Do not attempt to repair or lubricate the screen mechanism while it is in operation. Before doing so, pull the switch that supplies power and place a hold tag on it.

Some screens have a long shaft that operates the screen mechanism from the source of power. Avoid contact with the shaft, as a rough place on it might catch the operator's clothing and pull him into the shaft.

Questions

What is "blinding" of a screen? (Particles being screened plugs the openings in the screen.)

Are all screen cloths square mesh? (No. One type has long openings or rectangular slots.)

What is the advantage of this? (The open area is much larger, therefore, the screen has greater capacity. There is only a slight drop in the accuracy of separation.

Are there any further questions on screens?

WHAT TO DO

WHAT TO SAY

1

Introduction

It would be nice in a Fertilizer Plant if you could receive the raw material, process it into fertilizer, and move it on out wthout stopping Unfortunately, it can't be done that way and material, both solids and liquids, must be stored from time to time during the processing.

Storage is necessary because of:

1. The intermittent reception of raw material.
2. Intermittent disposal of products.
3. Intermittent operations.
4. Desirability of providing against interruption in the flow of raw materials to the plant or products from the plant.

Storage can be accomplished by the use of stock piles, bins, tanks, or ponds.

In our discussion, we are going to cover bins and tanks, since this is the storage used within the plant for liquids and solids.

2

Bins are used for storage of solid material where the storage period is short.

Bins may be made of wood, concrete, or steel. They are designed in such a way that they can be discharged by gravity through a suitable gate, or by a feeder.

Sloping-bottomed bins can be built to discharge on one side, two sides, or from below.

The capacity of the bin depends on the service expected of it.

A surge bin placed between two pieces of equipment does not need the capacity of a bin that is supposed to hold a 24-hour or a 3-day supply.

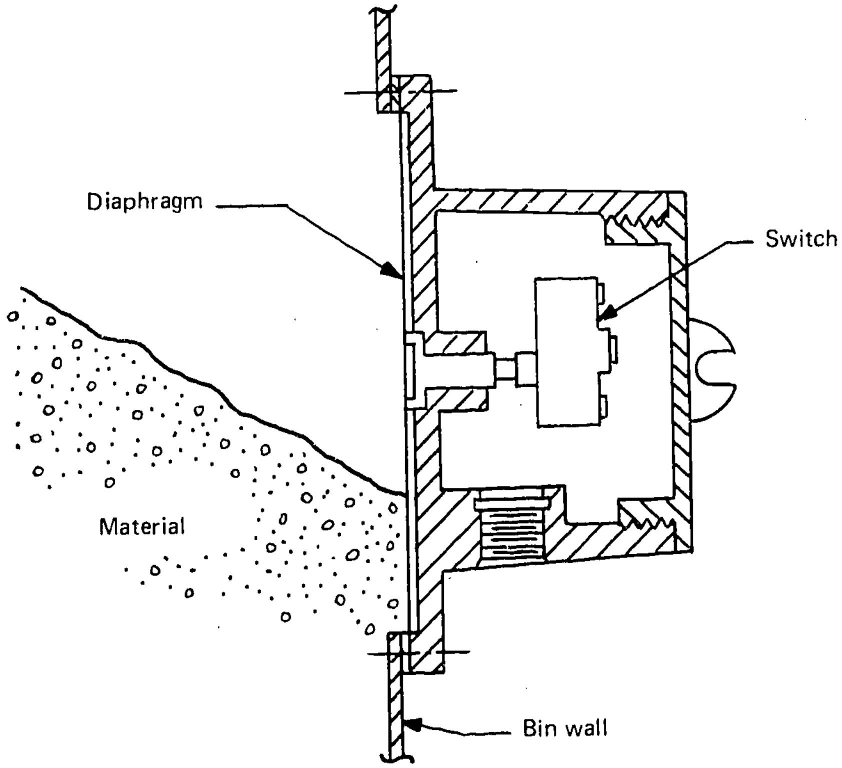
Bin operation

The bins are filled through an open top, or through gates in a closed top.

Some bins are equipped with level indicating instruments to signal the operator when the bin is full or empty. One type of level instrument has a diaphragm mounted in the wall of the bin.

When the material pushes against the diaphragm, a contact is made, and a signal indicates the material is to that point.

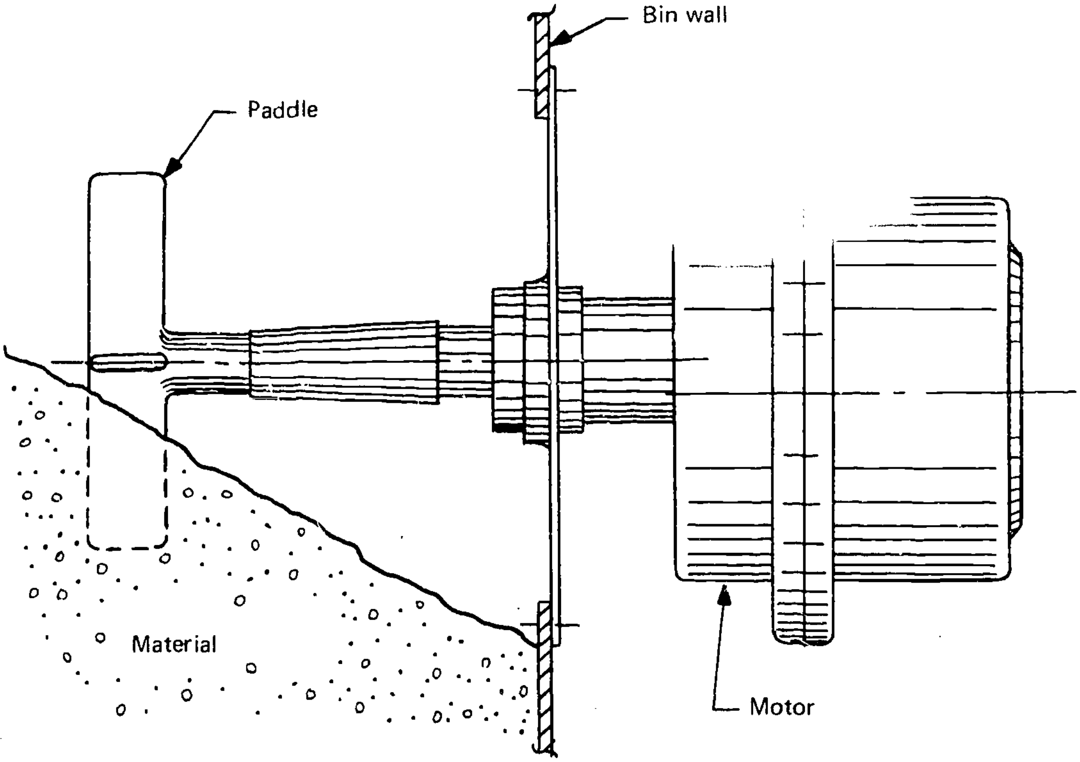
Sketch on blackboard



Another type has a small motor mounted outside the bin, turning a shaft that runs into the bin. A small paddle wheel is on the end of the shaft. When material rises to the paddle wheel and the wheel stops turning, a signal from the motor indicates the material is to that point.

In most cases, material feeds by gravity from the bin. With some materials, it is necessary to install mechanical or air agitators to keep the material loose and free flowing.

Sketch on blackboard



Sometimes it is necessary to install vibrators or mechanical knockers on The sides of the bins to shake the material loose when it sticks.

The vibrators should only be used to shake the material loose. Otherwise they would cause the material to pack and become fast in the bin.

If it should become necessary for the operator to hammer on the bins or chutes, thick metal plates should be welded to the bin or chutes at convenient points.

This will prevent the bins or chutes from being beaten out of shape by the hammer blows.

Wooden mauls are preferred for jarring the bins in place of steel hammers. If at all possible, the use of either one should be avoided so as to prevent damage to the equipment.

4

Operating duties

The operator on duty should check on the supply of material on rounds to and from the bins. He should not depend altogether on the instrument level control. Their malfunction could cause him to overfill a bin or run out of material.

When you overfill a bin, there is danger of damage to the conveying equipment.

When you run out of material, the manufacturing process is upset and sometimes a shutdown is necessary.

Experience will tell the operator just how often to check or measure the bin level.

Another method—which is not very accurate but it can be used on metal bins—is to strike the side of the bin with a hard object. The sound will tell the operator approximately where the level is.

If the material is dusty or gives off gases, all openings to the bin should be kept closed.

Stress this

The operator should keep a constant watch on the flows of material. Sometimes a stoppage in the bins or chutes will stop the flow.

The operator will learn how often he should rod certain bins, or which chutes should be cleaned periodically.

Any spills that do occur, should be cleaned up as soon as possible.

Any leakes or defects in the equipment that contributes to the spillage should be reported.

5

Safety

Many serious accidents have occured to operators who have gone inside of bins.

In some cases the operator went into the bin to free "hung up" material only to be buried alive when it broke loose. In other cases he has been overcome by the lack of oxygen or by fumes or other gases that he did not know were present.

If it should become necessary to enter a bin, do so only after:

1. The air in the bin has been sampled and found free of harmful gases.
2. The operator is equipped with a fresh air mask or the air in the bin has been sampled for oxygen.
3. He has on a safety harness with a lifeline extending to an attendant standing by outside the bin.

Do not enter a bin equipped with an arch breaker unless the drive mechanism has been immobilized and hold tags are in place.

Care should be used to see that material is not run to a bin when anyone is inside of the bin.

The conveying system to the bin must be immobilized and hold tags applied.

Blank all connections to the bin where there is a possibility of dangerous chemicals or gases entering while the operator is in the bin.

6

Questions

Why should openings in the material storage system be kept closed? (To prevent dust from escaping.)

Why should you avoid hammering on bins and chutes if at all possible? (Hammering distorts the shape of the bin or chute and quite often adds to the stoppage problem.)

Why should a wooden maul be used in place of a metal hammer? (Because it will not distort the metal as bad as a hammer.)

What is the danger of running out of material? (It will cause a shutdown of the process.)

If the area is dusty, should the operator wear a dust respirator? (Yes. Some dusts are quite harmful.)

7

Introduction

Storage of liquid materials used in the fertilizer plant is usually accomplished by the use of tanks.

Illustrate on blackboard

They may be vertical, horizontal, rectangular, or spherical. They may be constructed of metal, wood, concrete, rubber or plastic.

Ask class why

The nature of the material stored determines the construction of the tank. A tank that will store water may be unsatisfactory for the storage of acid.

Filling and drawing from liquid storage tanks are usually done with pumps. In some cases, gravity flow may be used. In other, gas pressure may

Illustrate on blackboard

be used to force the liquid from one tank to another, or from tank to process.

Quantities stored in the tank can be determined by the depth of liquid and the diameter of the tank. Quite often charts or tables are prepared that will tell the operator at a glance the amount of material in the tank from its height.

A float in the tank connecte e outside of the tank by a cable is one of the most common gages. Other use purge tubes, or diaphragms or more complicated equipment.

8

Operation

When filling a tank with liquid, the air space above the liquid will be displaced, or vented.

If the liquid is corrosive or toxic, care will have to be used as to where the fumes are vented. It may be necessary to pass the fumes through an equipment scrubber where they will be absorbed in a liquid.

Some materials will react with air and it may be necessary to shield the material in the tank with water or inert gas.

For instance, when storing phosphorus in a tank, it is necessary to keep it under a layer of water to keep it from coming into contact with air. Phosphorus will burn violently when it comes into contact with the oxygen in air.

Actually, it is the practice to keep the phosphorus storage tank filled with water. When phosphorus is pumped into the tank, due to its gravity, it stays in the bottom of the tank and forces water out the top.

When you want to remove phosphorus, water is pumped into the top of the tank and displaces the heavy phosphorus through a dip pipe from the bottom.

Very important

Remember, when you pump into, or remove liquid from a tank, it must be vented. There is danger of rupturing a tank when you pump into it, or collapsing one when pumping from it, unless it is vented.

If you clean a tank by steaming, always vent the tank at the end of the steaming period. This is to prevent the steam from condensing after the tank cools down and collapsing the tank.

9

Operating duties

During the shift when filling or emptying a tank, don't rely entirely on the level gages. Overflowing a tank not only is a waste of material but creates a housekeeping mess.

Sometimes it can be quite hazardous if the material is corrosive or toxic. Also, if the tank runs empty, it may shut down the process.

Occasionally, verify the accuracy of the level instrument if it is possible to do so. This can be done visually or by measuring with a stick or rod. Sometimes you can tell by the temperature on the side of the tank or by sounding.

Quite often it is necessary to maintain a specific temperature range of liquids in storage. The operator should check often enough to maintain the temperature specified.

10

Safety

Extreme caution should be used in entering a tank or vessel. Do not do so until:

1. The air in the tank has been sampled and found free of harmful gases.
2. The operator is equipped with a fresh air mask, or the air inside the tank has been sampled for oxygen.
3. He has on a safety harness with a lifeline extending to an attendant standing by outside of the tank.
4. Blank all connections to the tank where there is a possibility of dangerous chemicals or gases entering while the operator is in the tank.

Note

Care should be demonstrated about valves that are next to tanks filled with liquid. If valves should leak there is danger of spraying the operator or loosing the contents of the tanks.

Such valves should be equipped with face shields to protect the operator; that is, in case they should leak at the packing while being opened or closed.

11

Show slides

The first slide shows the storage of bulk material in an outdoor storage pile.

Point out main features of each slide

The second slide shows the storage of bulk material indoors. The overhead crane is used to take the material to and from storage.

The next slide shows an indoor storage bin.

This slide shows an outdoor storage tank farm of horizontal storage tanks constructed of steel.

An outdoor storage tank farm of vertical wooden tanks is shown in the next slide.

The last slide shows an indoor storage tank constructed of steel.

Are there any questions on bins and tanks?

WHAT TO DO

WHAT TO SAY

1

Introduction

Dust control is becoming one of the most critical problems in the fertilizer plant.

Air quality standards are being prescribed for different areas. Fertilizer plants that exceed these levels are in for trouble.

The fertilizer plant can benefit from the control of dust and fumes, since this does represent a loss. In most cases, the collected particles can be recycled into the process to improve the yields.

2

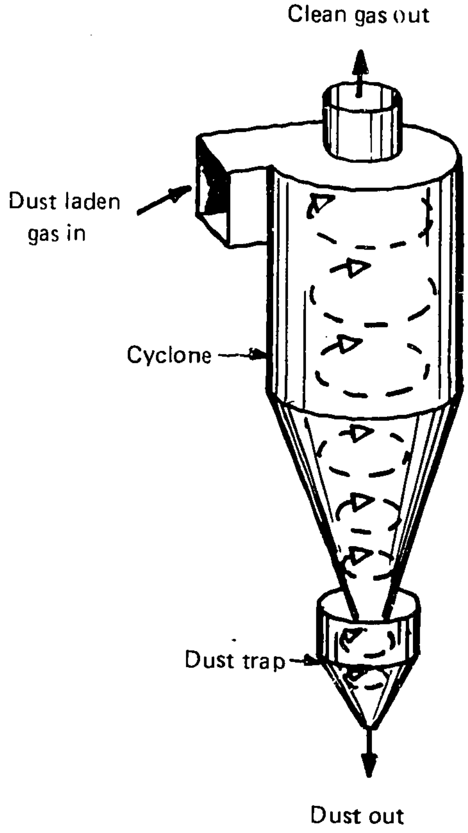
Methods of dust collection

The methods utilized for dust collection are many.

Sketch on blackboard

One type of dust collector is the dry inertial type. It is best suited for medium or coarse particles. Its big advantage is that the dust is recovered in a form that can be blended back into the process.

Such collectors as the gravity settling chamber, louver type collector, impingement, cyclones, and multiclone collectors fall into this classification.



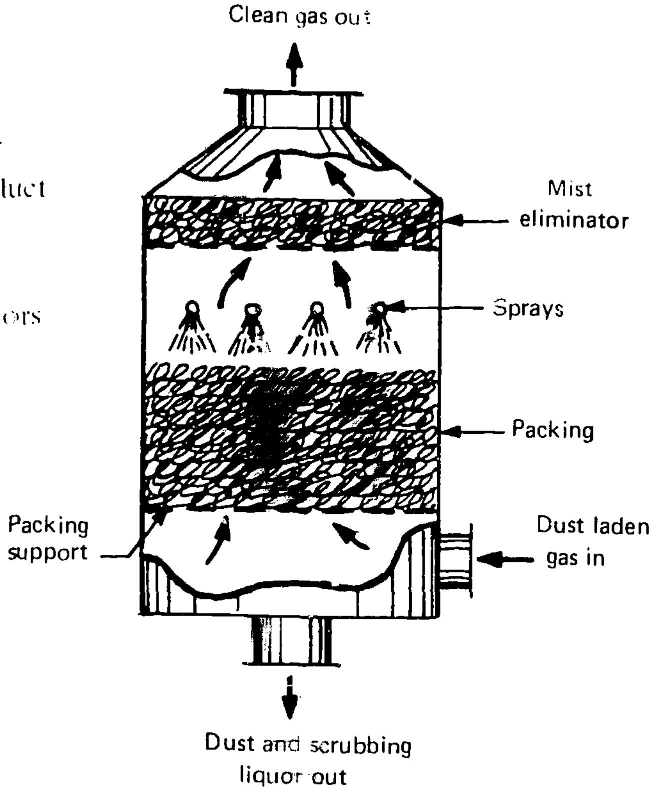
3

Another type would be the wet scrubbers. They not only wash the gas stream, but cool it as well.

Sketch on blackboard

Dust is recovered as a slurry that requires further processing to obtain a product or to dispose of as waste.

Some of the dust collectors or scrubbers of this type would be the centrifugal, impingement, packed-bed, jet and venturi.

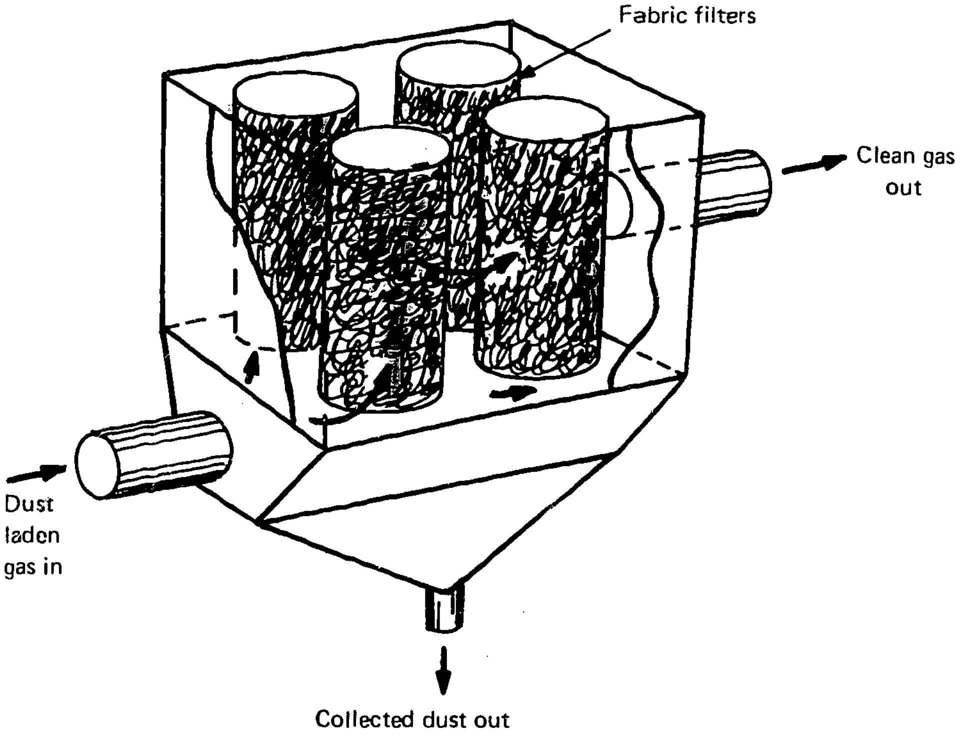


4

Fabric filters are used when the dust particles are very small. They have a high efficiency, but the temperature is limited to what the fabric can stand.

One advantage is that the product is collected in a usuable condition.

Sketch on blackboard



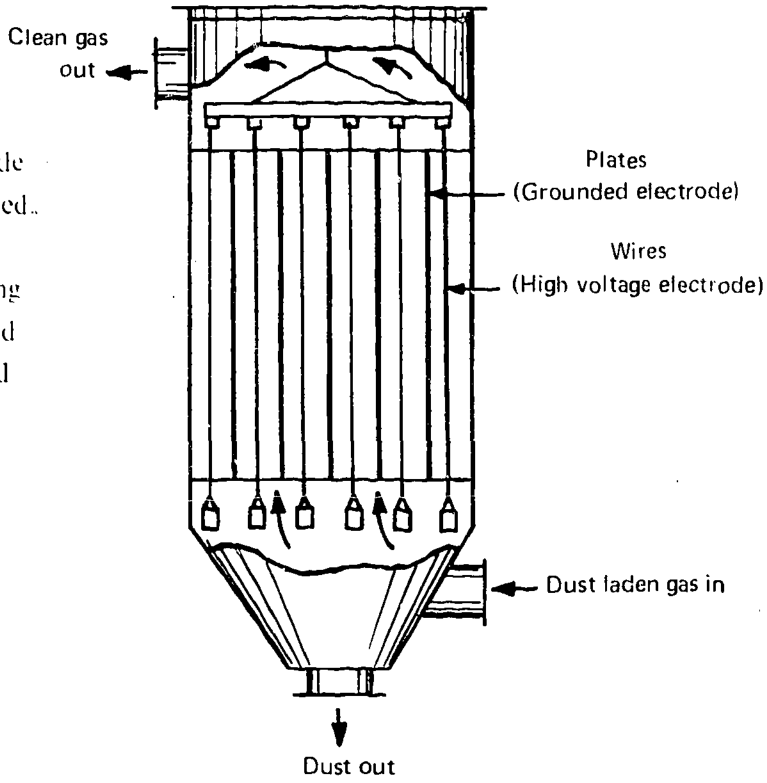
5

Another type of dust collector is the electrostatic precipitators. They also permit dry collection and are very efficient on small particles.

High installation and maintenance costs tend to restrict their use.

Sketch on blackboard

The gas between a high-voltage electrode (in this case, the wire) and a grounded electrode (the steel plate) is ionized.



Explain

Dust particles entering this area are charged and migrate to the grounded steel plates.

6

Operation

Dust collectors, in order to function properly, require attention. As soon as possible after the operator starts his shift, he should check the equipment that is under his care. The dust collecting system should be part of this check.

Thereafter, he should make rounds in his area at least once an hour to see that the dust collecting systems continue to function properly. He should make sure that the dust collection system is keeping the equipment free of dust.

Specific items to check are temperatures and suction pressure at different places in the dust collection system. This will tell him if the dust collector is operating properly of if trouble is developing.

During each inspection round, he should investigate anything that appears abnormal. In this way, he may be able to stop trouble before it develops.

Stoppage in the dust discharge outlet of the system will cause a dust loss. The dust hopper, star valve, flap gates, rubber tube, or whatever device is used to discharge dust from the system should be checked to see that it is operating properly.

The failure of the dust collecting system to remove the dust should be looked into right away. Such a failure can usually be seen as dust in the stack or discharge of the system. It may mean excess air leaking into the system, stoppage, or failure to discharge the dust collected.

Straightening vanes in the duct work sometime act as unwanted collecting points for dust.

Dust discharge pipes that have a water seal or a water removal (slurry or solution) system sometime cake and plug.

Rod out ports or openings at trouble spots are desirable and should be provided.

The scrubbing liquor on wet type scrubbers should have enough fresh liquor added to prevent the sprays from plugging.

The centrifugal fan type dust collectors must be checked for dust buildup on the rotating element that would cause it to become unbalanced.

The discharge gas from the bag filters should be checked several times during the shift. Check for a torn bag if discharge gas should become dusty.

If pressure drop across bag filter increases much, check for fabric voids becomming plugged due to moisture or filters not emptying the collected dust properly.

Successful operation of the electrical precipitator type dust collector depends on two things:

Explain

1. Ionization of the gas. (Dust particles are charged by the gas ions and migrate to the grounded collecting electrode.)

2. Particle collection. This is the more difficult problem in precipator operation.

If the dust builds up in the bottom of the precipator until it comes into contact with the high-voltage electrode (wire and wire weights and weight frame), it will cause an electrical ground and the system will kick off. The dust will have to be removed before the precipitator can be brought back on the line.

If one of the wires breaks, it will come into contact with the grounded plates or tubes and also upset the operation of the precipitator.

A short across the electrical insulators on the precipitator will also cause a shutdown until they can be cleaned.

7

Preventive maintenance

Dust collecting systems must be tight. That is, openings must be kept closed or the velocity through the system will not be sufficient to carry the dust.

In some collectors, such as the cyclone, sufficient velocity is necessary in order to separate the dust from the gas stream.

Sprays must be kept clean in those that have scrubbing sprays.

In the pack-bed scrubbers, the bed must be kept free of solids buildup to prevent stoppage of the gas flow or channeling.

Scrubbers that have rotating elements, such as fans, must be kept free of solids buildup on the blades. Otherwise, the rotating element becomes unbalanced with possible damage to the equipment.

The collected solids in electrostatic precipitators must not be allowed to accumulate until they come into contact with the high voltage wire weights and frame. If necessary, shut the unit down in order to remove the solids.

Broken high-voltage precipitator wires must be replaced.

It is a good idea to periodically clean the electrical insulators so as to avoid arcing across them.

8

Lubrication

Lubrication of dust collectors auxiliary equipment will be covered in a later chapter.

9

Safety

Care must be used when welding on dust collecting equipment so as not to have a dust explosion. Equipment must be clean and well ventilated before welding repairs.

Some dusts containing ammonium nitrate or other chemicals will burn when heated. Furthermore, the fire will spread through the system where there is dust present to support it.

Stress this

Due to the high-voltage involved, care must be taken to see that the current is off and everything grounded before starting work on electrical precipitators.

The electrical supply to the precipitator should be made inoperable and hold tags applied before work is started.

In some cases it may be necessary for the worker to wear protective clothing, depending on the nature of the material that is being collected.

If necessary, suitable blanks should be installed to isolate the scrubber from connecting equipment while work is being done inside.

10

Show slide

The first slide shows a gravity settling type of dust collector.

Question

How does it collect dust? (It is a chamber in which gas velocity is reduced to enable dust to settle out.)

Show slide

The second slide shows a cyclone type of collector.

Question

Explain how the cyclone separator works. (The gas enters the cyclone tangentially and spirals around the wall. Dust particles, which have a greater applied centrifugal force than the gas molecules, accumulate at the wall and work their way to the bottom of the cyclone, where they are discharged.)

Show slide

The next slide shows a mechanical centrifugal dust collector.

Question

What advantage does it have over the cyclone type collector? (It is more compact.)

Show slide

A packed-bed scrubber is shown in the next slide.

Question Does this type of scrubber usually have a mist eliminator? (Yes.)

Show slide A bag filter is shown in this slide.

Question Can you operate this filter on high temperature gases? (No. Temperature is limited by the fabric.)

Show slide The last slide shows an electrostatic precipitator.

Question What is its main advantage? (It is highly efficient on small particles.)

Question What is a micron? (It is a unit of particle size defined as 1/1000 mm or 1/25,000 inch.)

WHAT TO DO WHAT TO SAY

1

Introduction

For thousands of years man has been concerned about the fairness of trade dealings. Weighing has been the most important means of achieving this end. This is why almost all countries have an enforcement system in respect to weights and measures.

The earliest known weighing machine was in Egypt 7000 years ago.

The need for accurate weighing in a fertilizer plant can be seen from the fact that any given raw material will be weighed on an average of five times between entering the plant as a raw material and leaving as a finished product.

Usually, when a piece of equipment in the plant goes bad, it will stop production.

Why weighing is important

A poorly maintained scale is different. It will simply go ahead turning out bad weight determinations, which can lead to a host of evils.

This can result in inferior or overly expensive end products in batching or blending (putting in too much of one ingredient and not enough of another).

It can foul up internal accounting and inventories as well as overfilling or underfilling product containers.

It can give away the company's money or bring to the company bad publicity and loss of the customary goodwill with short weights or bad products.

We can see that the success of most chemical plants depend on how accurate the various raw materials are weighed that go to make the finished product. The fertilizer plant is no exception.

2

Components of a scale

A scale is an instrument for measuring and balancing forces. Its essential components are:

1. A means by which the load can be detached and supported during weighing. This could be a platform, platter, hook, or other convenient means for supporting the load.

2. A means for transmitting the load force to the counterbalancing force. This usually takes the form of a lever system which reduces the load force to a value where it can be counterbalanced.

3. A means for producing a known counterbalancing force sufficient to balance the load and to indicate that balance.

Write the two forces on blackboard

It is clear that in a scale there are two principal forces acting: (1) The load, and (2) the power or counterbalancing force.

3

Types of weighing equipment

In the fertilizer plant weighing equipment may be divided into three groups. The first group would be that which weighs the incoming raw material. These may be motor truck scales, railroad scales, or conveyor scales.

4

Operation

Truck and railroad scales come in different sizes and shapes.

Truck and railroad scales

This type of scale quite often suffers from neglect and abuse. They should be checked periodically for obstructing materials beneath the platform, and cleaned and balanced.

Do not lubricate scales unless specified by the manufacturer. When used, the grease serves more as a protection against corrosion than as a lubricant.

When using truck scales, it is more accurate to weigh the entire truck at one weighing than to use a sum of axle weights.

Inspect scales and scale pits weekly to see that the pits are dry and no spilled material is interfering with the operation of the scale.

Once each month check the scale accuracy and every six months the scales should be tested with accurate test weights.

5

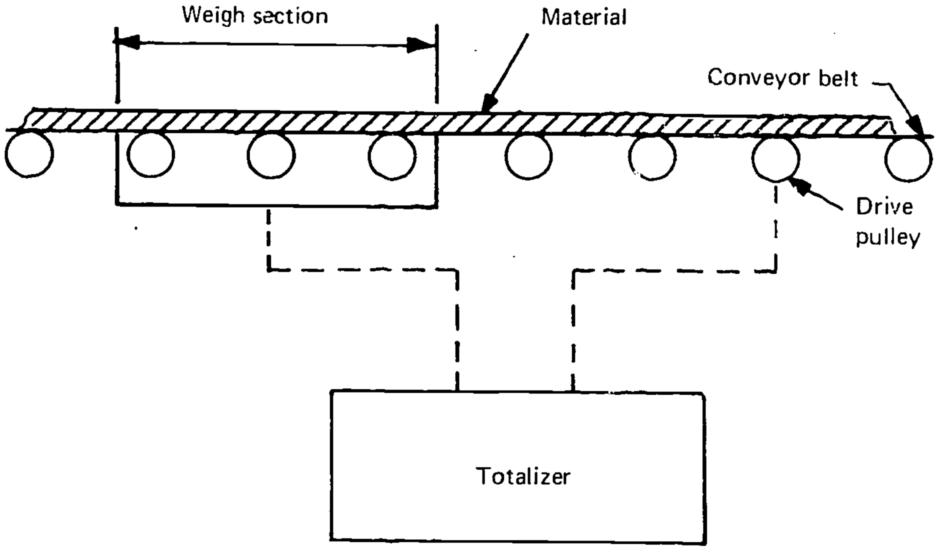
Conveyor scales

Some plants receive their raw material in bulk form. Quite often conveyor scales are used to record the amount.

A section of the belt conveyor is a scale which weighs the material passing over it. A totalizer mechanism keeps track of the amount.

The totalizer is driven by a drum that is rotated by the belt. Thus, the rate of the totalizer operation is directly proportional to the belt speed.

Sketch on blackboard



The section of the belt conveyor that does the weighing must be kept clean. Material buildup on the conveyor belt or the totalizer drive pulley will also cause an error.

Check weighing of the conveyor belt scale should be done often to assure its accuracy.

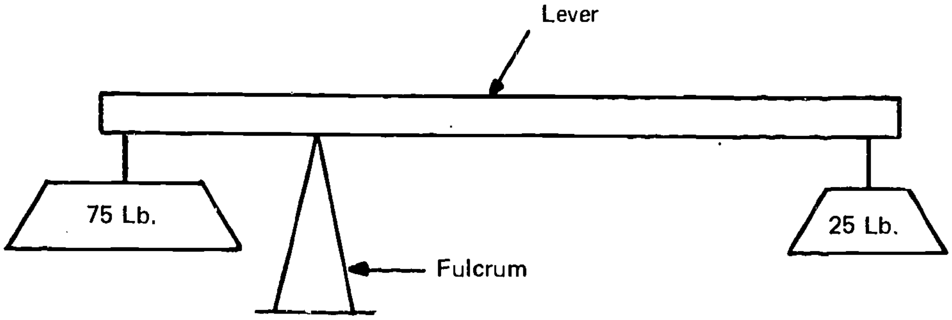
6

Process weighing would be the second type of weighing operation in the fertilizer plant.

Platform scales

The first scale we will consider in this group is the platform scale. In this type of scale, the force or weight being measured is counterbalanced by another force or weight.

Sketch on blackboard



Before using the platform scale, see that it is clean, level, and adjusted for zero. Then test with check weights to see that it is accurate.

For protection of the scale, keep the weight lever locked except when you are actually weighing.

7

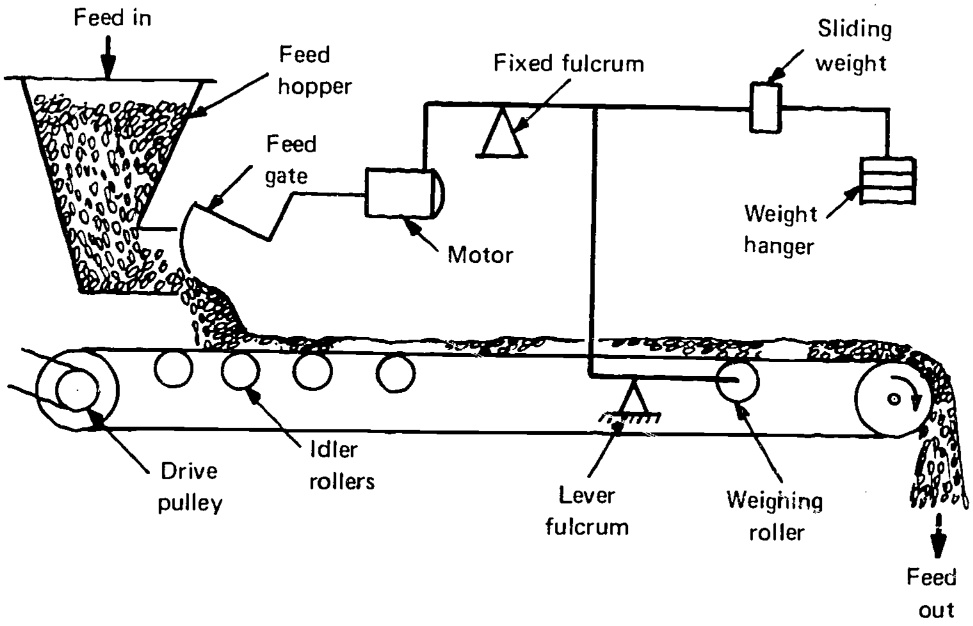
Weigh feeders

Continuous weigh feeders are used to feed a given raw material to a production unit. Several of these may be used for continuous proportioning of a number of raw materials to process.

The feeders consist of a short conveyor belt running over idler rollers, one roller being a scale which is balanced by the load of material on the belt.

If the load is greater or less than the required amount, the scale rises or falls, which in turn operates a motor to open or close the feed gate.

Sketch on blackboard



The weigh feeder should be tested at least once each day by diverting the feed to a test scale and weighing the material diverted.

The feeder must be kept clean, particularly the weigh section in order to avoid errors.

8

Some plants have manually operated batch weighing equipment. In this system, material is fed to a weigh hopper.

One or two raw materials may be weighed per batch in each machine, or one large scale for weighing all raw materials in succession may be used. After weighing, the material is discharged to process and another batch is weighed.

The accuracy of the weighing depends on the skill of the operator, and keeping the equipment cleaned and in good condition.

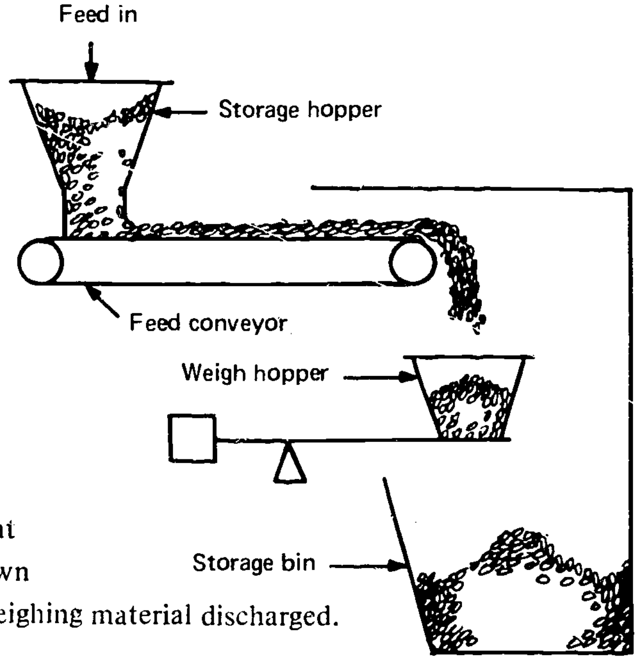
The weight scale should be checked at least once each shift with test weights.

9

Automatic batch weighing equipment does not require an operator. It consists of:

1. A storage space for the material to be weighed and means of feeding this material to the scale.
2. A device to start the feed to the scale hopper and to stop it when the capacity of the hopper is reached.
3. Means for discharge of the material from the scale hopper.
4. A counter or recording device to keep track of the amount.

Sketch on blackboard



The accuracy of each weigher should be checked at least daily by feeding a known amount of material or by weighing material discharged.

The machine must be kept clean and in good operating order.

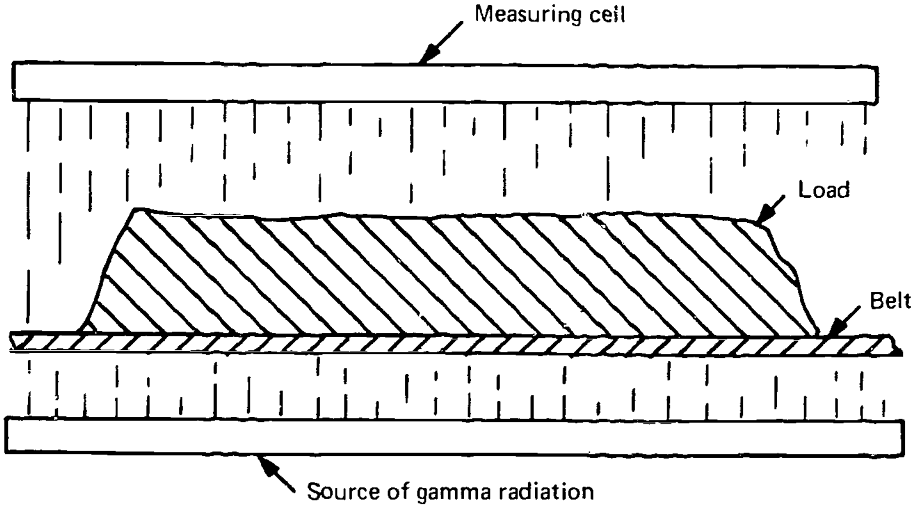
Disadvantages of the automatic batch weigher are its high cost and the fact that each raw material must be weighed on a separate machine.

10

Another type of conveyor belt scale that is becoming more popular is the nuclear meter. This type of scale depends on the fact that gamma radiation is absorbed as it passes through various materials.

The source of the gamma radiation is placed under the belt and the measuring cell above the load on the belt. A measuring cell converts radioactive energy directly into electrical energy.

Sketch on blackboard



Indicating or recording instruments can be installed to give the weight of the material.

Emphasize

The advantage of this type of scale is that there are no moving parts. The disadvantage of this scale is that it is difficult to calibrate for the different materials.

11

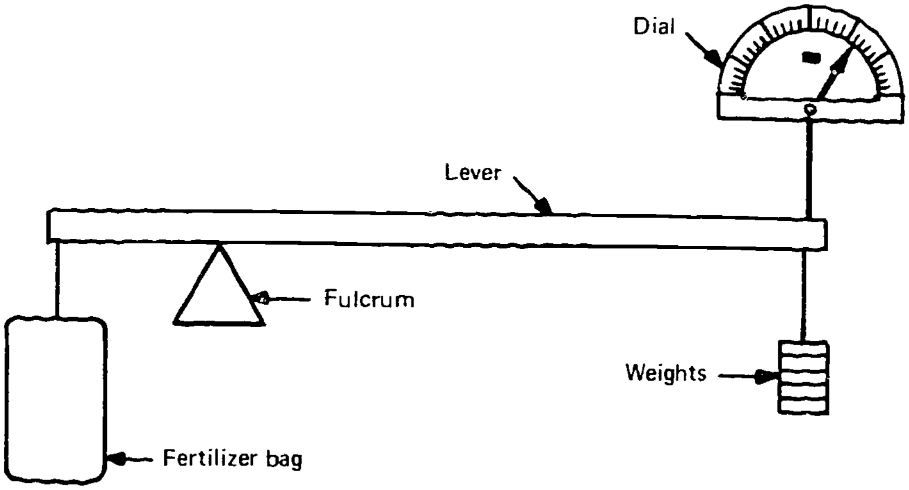
Before the product leaves the fertilizer plant it must be weighed. This is the third weighing in the fertilizer plant.

Since we have already covered truck and track scales for bulk loads, we will review the weighing for automatic or semi-automatic bag packaging.

One type of semiautomatic bag weighing scale is where the bag is attached by clamps to one end of the scale lever.

When the weight of fertilizer in the bag balances the weights set on the scale lever, it will rise and will be indicated on a pointer.

Sketch on blackboard



12

The automatic bag weighing scale works on the principle of a continuous flow of fertilizer to the weighing pan or bucket.

The weighing pan or bucket is suspended from the scale on knife points. When the weight of fertilizer in the pan balances the weight set on the scale, the bucket dumps, and the cycle is repeated.

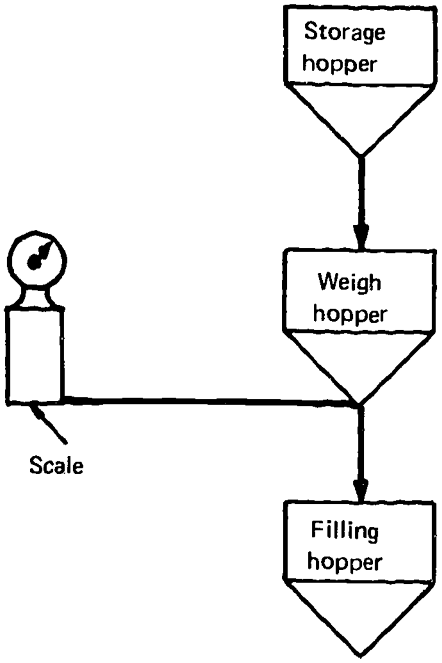
The principle of rapid feed of the bulk of the load to the weigh-pan followed by a trickle feed to complete the weighing is well established in automatic weighing.

Factors influencing weights obtained with the automatic weigher are:

Stress this

1. Bulk density of material being bagged.
2. Accumulation of dust on knife edges, bearings, and other scale parts.

Sketch on blackboard



Feed to the weigh hopper may be by gravity or governed feed flow.

The scale can be operated automatically on a pace-setting basis, or it can be operated manually, calling for the charges as needed.

Such machines can weigh accurately 10 to 15 50-pound charges, or 8 to 10 100-pound charges per minute.

13

Emphasize importance

At the start of the shift, the operator should check weigh the first 2 or 3 weighings to make sure the scale is weighing correctly.

Every 30 to 40 minutes during the shift, he should check weigh a bag or two to make sure the scale is functioning properly.

Clean the scales at the end of each shift.

14

Preventive maintenance

Neglect, dirt, and indifference combine to make scales inaccurate.

There is little or no wear on a scale at any point including the pivot and bearing sections.

Most trouble comes from obstructing materials gathering beneath the platform and preventing proper balance.

Keep scales clean, particularly at pivots, and bearing parts and underneath the platforms.

Important

Occasionally, at least once a month, if the scale is subject to a lot of use, have the repairman check the scale for worn and defective parts.

Check for any product buildup on parts that would cause inaccurate weights.

The nuclear type scale should have a preventive maintenance check for every 1000 hours of operation.

The amplifier should be visually inspected for loose and broken connections, damaged insulation on cables and wires, overheated components, and for corroded contacts and connectors. The remedy is apparent for most troubles located visually.

When heat has caused damage, the trouble must be located and steps taken to remove and replace faulty components in order to prevent further damage.

After the visual inspection has been performed, an operational check should be made to see that all controls are serviceable and working properly.

15

Lubrication

Unless called for by the manufacturer, avoid greasing or oiling scale pivots and bearings. This tends to cause inaccurate weighings since spilled fertilizer or dust will stick to the oil.

Grease ball bearings every week and other points every day as conditions require. Do not overgrease.

16

Safety

Do not try to inspect or adjust belt scales while the conveyor is in operation.

When using the nuclear scale, remember that radioactive energy is harmful to the human body if it is absorbed at an excessive rate. In the United States, the U. S. Atomic Energy Commission, issues a license to users and manufacturers of radioactive materials. Specified safety rules must be obeyed or the license will be withdrawn.

In most installations of this type, the radioactive source is contained in a lead-filled holder.

Stress this

Long experience with hundreds of gages, where the source is contained in a source holder, indicates that the dose received by operators, maintenance personnel, and supervisors is less than the average necessary to provide personnel with monitors, such as a film badge or a dosimeter. However, no one should expose any part of his body between the source and the measuring cell for more than a few minutes. If such exposure is necessary, technicians can rotate shields in the meter to make such exposure safe.

Show slide	The first slide shows a track scale.
Question	Is it possible to weigh railroad cars on a track scale without stopping the car? (Yes.)
Show slide	The second slide shows a conveyor belt scale.
Question	How does it work. (The load on the conveyor belt is weighed as it passes over a scale section of the conveyor.)
Show slide	The next slide shows a weigh feeder.
Question	What is its main use? (For proportioning materials used in manufacturing plants.)
Question	Why should you keep the scale clean? (Material on the scale or against the moving parts will make the scale inaccurate.)
Question	Why is it necessary to weigh the materials accurately during the manufacturing process? (Better yields can be obtained and the cost held down only if the correct amounts of the materials are used.)

Chapter 6: FORKLIFTS AND FRONT-END LOADERS

WHAT TO DO — WHAT TO SAY

1

Introduction

The use of mechanical equipment instead of men for the movement of packaged or bulk materials is effective and usually economical. Packaged materials may be handled most effectively with forklifts while front-end loaders are used in the handling of bulk materials.

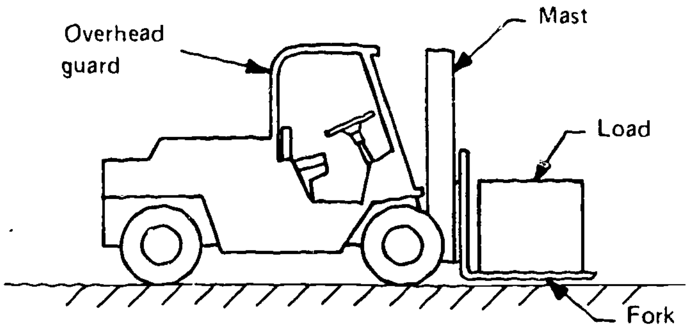
2

Forklifts

Packaged materials received from vendors are often palletized and unitized. For in-plant movement or storage, packages may be merely stacked on pallets.

Palleted materials are handled with forklifts which have parallel forks that enter the pallets, a lift mechanism to elevate the load and a truck which allows movement.

Sketch on blackboard



FORKLIFT

Lift capacity

Forklifts may be obtained in many sizes depending on the job for which they are to be used. Common sizes have lifting capacities of 1,000-10,000 pounds. The lifting capacity of the lifts is usually referred to by their lifting capacity in pounds at a 24-inch load center. The truck can lift and balance only that weight which is counterbalanced by the weight of the truck behind the front wheels. Under full loads about 90-95% of the total weight is on the front wheels. To increase the load carrying capacity of the forklifts counter weights are added to the rear of the truck. Under some circumstances more than the rated load can be lifted, provided the load is close to the mast.

Steering

Since forklifts are steered by the rear wheels, manuevering the vehicle is sometimes quite difficult for new operators. With most of the weight distributed on the front wheels when loaded, steering can be a problem when slowing down and simultaneously making a turn. When slowing down rapidly, the rear wheels have a tendency to raise off the floor; a complete loss of steering may result from rapid stops.

Small forklifts generally have manual steering while larger trucks may have power steering. It is advantegeous to use power steering on small trucks where considerable manuevering is required.

Tires

Forklifts may have cushion tires (non-inflatable) or pneumatic. Cushion-tired trucks are lighter, smaller, cost less, and are more manueverable than comparable pneumatic-tired models.

Cushion tires are the least expensive and are used where trucks operate exclusively over hard floors, where sharp objects would cut pneumatic tires, or where aisle space is limited.

3

Pneumatic tires should be used for application involving towing or where a high degree of traction is required, such as outdoor ramps.

Dual wheels may be used on the front axle of the pneumatic tired vehicles. Dual wheels are excellent for traveling over soft ground. Dual wheels tend to carry mud and rock between the tires which can be a problem when the vehicle operates from an unpaved yard into a building.

4

Masts

The masts are avilable in a wide range of retracted heights, amount of lift, and "free lift". "Free lift" is the height above ground to which the fork can move before the fully retracted mast starts to increase in height. This can be important when stacking materials close to the ceiling in low roof buildings.

Masts have tilt angles of about 6 degrees forward and 12 degrees backward. Once the load has been picked up by the forks the mast can be tilted backward to stabilize the load and prevent spillage in transit.

5

Forks

Manual sideways adjustment of the forks is standard. The forks are adjusted to fit and stabilize the load being carried.

6

Controls

Controls should be directional: that is when a lever is moved forward, the controlled mechanism should go forward. Very few forklifts have fully directional controls. On some vehicles, the driver is confused by the identical levers side by side, one for tilting the mast, the other for raising or lowering the forks.

7

Overhead guards

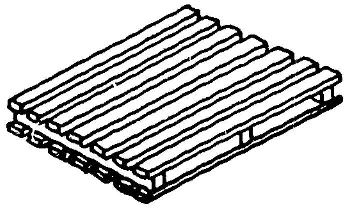
Forklifts should be provided with overhead guards if the loads lifted are high enough to fall back on the operator. These guards protect the operator from falling objects and prevent backing into overhanging objects and pinning the driver against the steering wheel. In cases where the vehicle backs off a platform, the guards provide protection if designed right. Where desirable, seat belts may be utilized to prevent an operator from falling from the forklift and being pinned under it.

8

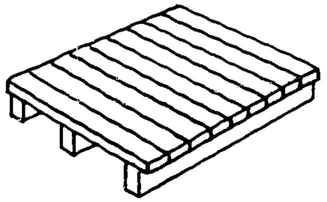
Pallets

Pallets used with forklifts may be of wood, metal, paper or other materials. Most commonly used are the two-way entry wooden pallets. The two-way entry pallets may be entered by the forks from either end. Four-way entry pallets may be entered from any of four directions.

Sketch on blackboard



DOUBLE DECK PALLET



SINGLE DECK PALLET

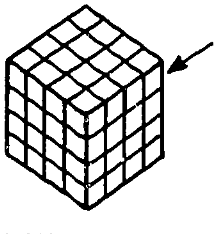
9

Loading pallets

When stacking material on a pallet, the material should be stacked to give the most stable load. If possible each layer should be stacked to lock the previous layer into position.

Sketch on blackboard

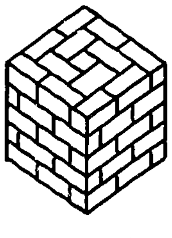
Unstable



Taping top rows stabilizes pallet

ONE BOX STACKED ON TOP OF ANOTHER

Very stable



LOCK STACKING PATTERN

With an unstable load, the driver may take several times as long to move a pallet than if the material had been stacked right on the pallet.

Operation of forklifts on grades over 10% should be avoided due to stability problems, particularly if loads are lifted or lowered while on grade. Normally, the maximum grade for trucks is about 25%.

10

Fuels

Gasoline is the most commonly used lift-truck fuel. Gasoline is a dirty fuel and requires an excellent ventilation system if the truck is operated inside a building for any length of time.

Propane is a much cleaner fuel and causes much less pollution of the atmosphere. Engines adapted for propane are more costly.

Diesel engines are handicapped by dirty exhaust, a higher noise level and non-availability in small sizes.

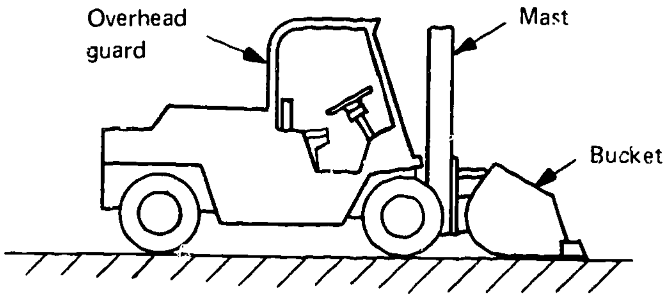
Electric forklifts are available where internal combustion engines may not be permitted.

11

Attachments

Many attachments are available to increase the usage of the forklift. Some of the attachments are shown below:

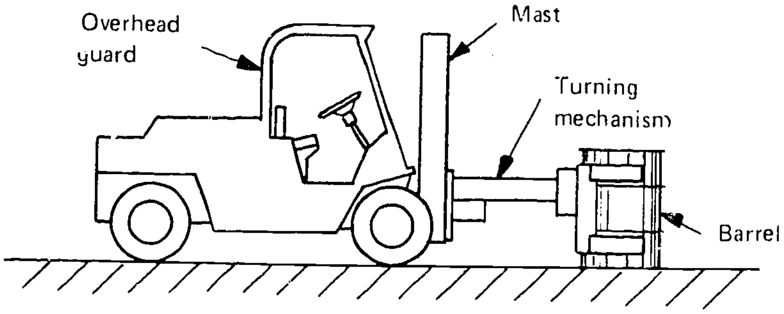
Sketch on blackboard



HYDRAULIC SHOVEL

The addition of a loader bucket turns a fork truck into a bulk loader. The bucket mounts on the fork bars and can be quickly interchanged with standard forks. The bucket can be dumped at any height, at any rate of dumping for measurement or weighing.

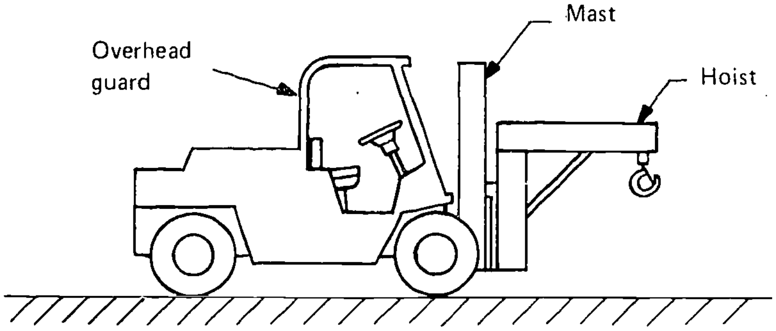
Sketch on blackboard



BARREL UPENDER

Barrels of liquids or any flowable materials can be poured from barrels or drums. This mechanism allows the drums to be turned completely upside down.

Sketch on blackboard



CRANE

Cranes handle bundles of large bulky items, such as conduit, pipe, steel fabricated sections. Material can be removed from trailers and gondola cars. Crane-equipped lift trucks can serve as a general purpose maintenance vehicle.

A lifted pallet can be used as a work platform.

12

Maintenance

The following are some danger signs which, if corrected, can save costly repairs and downtime:

Decrease in normal speed
Lack of power
Apparent lack of lubrication at any point
Worn or damaged tires
Missing parts
Worn chains, rods and other mechanical linkages
Hydraulic oil leakage from cylinders, lines and fittings
Difficult steering
Overheating of motors and controls
Erratic operation of controls

The crankcase oil level and the hydraulic oil level should be checked frequently. Where the operator lubricates the equipment, a regular schedule should be followed.

13

Safety

Most forklifts are designed so that gasoline cannot be spilled on a hot exhaust or manifold when refueling. If the equipment is not so designed, extreme care should be exercised when refueling.

Compared with other mobile equipment, forklifts provide the least visibility for the driver. A truck with a standard mast will give much better visibility than a triplex mast with high free lift. Other factors affecting visibility are the height of the forks above ground, whether the forklift has a load back-rest and the design of the overhead guard.

To reduce inside atmospheric pollution, a special catalytic muffler can be installed on gas, propane, or diesel engines. With this muffler, a virtually clean exhaust will result, enabling an engine-driven truck to be used in buildings that would otherwise require an electric truck.

To prevent injuries from forks, the forks should be lowered to the floor when not in use.

When lifting pallets with the forks, care should be exercised to avoid ramming the mast into overhead or wall-mounted lights.

14

Questions

Under full load condition, which set of wheels carry about 90% of the load? (Front wheels)

With a full load being carried, what can happen to the steering when slowing the vehicle down? (If the vehicle is slowed too rapidly the rear wheels will raise completely off the floor resulting in complete loss of steering.)

For hauling extra heavy loads, where should the load be concentrated? (As close to the mast as possible)

How can a load be stabilized? (By correct stacking of material on the pallet; when traveling the mast may be tilted back to allow the load to be against the back rest)

Why should a gasoline-powered forklift not be operated in a closed building? (Exhaust fumes can cause death)

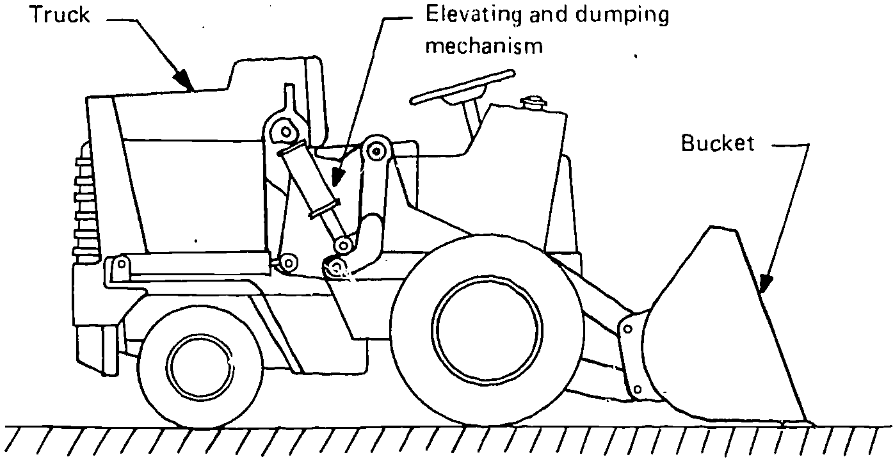
Why lower the forks to the floor when not in use? (To prevent injuries)

15

Front-end loaders

Bulk materials are handled by front-end loaders in many cases where permanent handling equipment is not feasible, as for example, box car loading. The front-end loader has a bucket that can be tilted to scoop up a load, an elevating mechanism to allow the load to be lifted and dumped and a truck which allows movement.

Sketch on blackboard



FRONT-END LOADER

16

Operation

The size of the loader will of course be determined by the job it is to perform. One large loader can out produce two or more smaller loaders of equal capacity, especially in loading and carrying operations, where small loaders must be used in quantity and are subject to traffic congestion.

Plant layout may be a production limiting factor. The placement of rail lines, posts and columns, power lines and fixtures, location of stock piles and hoppers exert a great influence on the manueverability of a loader.

Much time can be wasted due to mismatch of equipment. A narrow hopper and a large bucket can cause excessive cycle time because precise positioning is necessary to prevent spillage.

Where necessary to match the equipment with the job, side dumping buckets can be used for dumping material into narrow pans.

Other uses

To obtain maximum usage of the front-end loader, one of sufficient size may be used for loading, road construction, pulling railcars and light dozing operations. Special attachments include forks, winches, and sidebooms.

Many of the newer loaders have been designed to eliminate some of the hazards of older type loaders. The hoisting and dumping mechanisms have been relocated to avoid some of the pinch points.

Riders should not be permitted as they may get caught in the pinch points or steering mechanism.

When loading trucks the loader operator should have an agreement with the truck driver to stay in the cab of the truck. This can avoid an accident from spilling material on the truck driver.

Undercutting piles

When removing bulk material from the bottom edge of a high pile, extreme care should be exercised. The top of the pile could cave in, burying the loader and operator.

Bucket position

When traveling, the bucket should not be left in a high position; this causes instability and there is a possibility of turning the vehicle over.

Where it is necessary to descend grades, the vehicle speed should be lowered, the engine engaged and the transmission in low range. The bucket should be carried low and tilted back to minimize bouncing.

To further stabilize the vehicle, it may be desirable to add ballast to the tires.

Side or rear view mirrors aid in backing.

17

Maintenance

Most of the danger signs mentioned for forklifts also apply to front-end loaders, i.e., poor brakes, missing parts, hydraulic oil leakage, etc.

The hydraulic oil and crankcase oil levels should be maintained. The vehicle should be adequately greased.

18

Safety

The loader should be provided with an overhead guard to stop falling objects and to prevent injuries to the operator from backing under overhanging objects.

Safety belts and hard hats also will help prevent injuries to the operator.

Safety glasses can prevent accidents where operators may get foreign matter in their eyes while operating the loader.

Never permit anyone to stand under a bucket. Hydraulic failures can cause the bucket to fall.

When the equipment is idle, the bucket should be lowered to the ground.

When operating a loader in an explosive atmosphere a special muffler, wiring and enclosed fuses and circuit breakers can be used.

The maximum safety is obtained when operators are not permitted to back loaders toward a drop-off.

Adequate ventilation must be provided when operating in a closed building.

19

Questions

Why should the bucket be kept in a low position when traveling? (To add stability and keep the vehicle from turning over)

What jobs other than loading can the loader perform? (Sideboom attachments can be obtained and the vehicle can move railroad cars.)

Why should riders not be permitted? (They can easily be caught in the pinch points and be injured.)

Why is ballast sometimes added to the loader tires? (To provide additional stability)

Why should safety glasses or goggles be worn by the driver? (To keep foreign materials from the operator's eyes)

20

Slides

Forklift with overhead guard in operation.

Front-end loader in operation.

Chapter 7: SAMPLING IN A FERTILIZER PLANT

WHAT TO DO	WHAT TO SAY
	1
Introduction	The sampling and analysis of materials purchased by or made in our fertilizer plant play a very important part in its operation.
	Most of these materials are bought or sold on the basis of their "grade"; that is, how much plant food they contain. Sampling and analysis are necessary to determine this. It affects the money that we take in or pay out and therefore *your paycheck.*
	Analyses are also required to control the many chemical reactions involved in making modern fertilizers.
	Many factors must be considered in determining exactly how a sample should be taken in order to be sure of getting the correct analyses. The engineers who designed the plant have provided the proper equipment to take adequate samples.
	Your supervisors will instruct you on exactly what samples to take, when to take them, and how to take them.
	What we want to do here is give you a basic understanding of the importance and purpose of sampling, and of the principles of correct sampling in a fertilizer plant. With this knowledge you will perform your job better.
	2
Purpose of sampling	To be sure you and I understand words the same way let's define the term "to sample."
Write on blackboard	*To sample* a batch of material (such as a carload of fertilizer or a tankfull of liquid) means to remove a small part of the material in such a manner that the part removed (the sample) will have the same characteristics, such as particle size distribution and chemical composition, as the whole lot. Such a sample is said to be "representative" of the lot.

Let's repeat that. (Repeat above)

Why do we need samples? Suppose we have bought a 100-ton carload of 93% sulfuric acid at \$50/ton of H_2SO_4. We would expect to get and pay for 100 x 93% = 93 tons H_2SO_4. But when we sample this acid and analyzed the sample, it only contained 90% H_2SO_4. So we received only 90 tons of H_2SO_4 instead of 93 and would therefore only pay for 90 tons and thus save \$150.

Of equal importance is the fact that the analysis of the sample showed us this acid was weaker than usual and that we would have to use more of it in order to make fertilizer of the proper grade.

Likewise, it is very important to know the exact grade or analysis of the fertilizer we produce and sell; sampling and analysis is the only way of getting this information.

If the fertilizer contains more nutrients (N or P_2O_5) than our price allows for, the company may lose money; if it contains less nutrients that we say it does on the label, the customer loses money and will no longer buy our fertilizer. The state may also assess penalties on us.

The purpose of sampling is to obtain a small amount which is representative of the lot so that it can be analyzed.

In the laboratory the initial sample you take (let's say 100 lbs. from a carload) will be very carefully mixed, crushed, and gradually reduced in volume by standardized procedures until it is half a cupful (which is still representative of the whole carload). The chemist takes a half teaspoon of this to be analyzed.

It should be emphasized that an improper or non-representative sample is worse than no sample at all as it misleads the user of the analysis.

Questions

Why do we sample and analyze materials? (To control chemical processes in the plant; to make sure we get what we pay for; to be sure the customer gets what he pays for)

What is a simple definition of a sample? (A small amount that is just like the whole lot it came from.)

3022

Basic principles of sampling - theoretical considerations

To "take a sample" sounds pretty simple; it's the requirement that the sample be *representative of the entire lot* that requires the use of careful and proven sampling procedures. Of course, if the carload or tank full of material was *all exactly the same*, sampling it would not be a problem since *any part* you took would be representative. However, even if the material *looks* the same there are probably wide differences in particle size distribution and chemical composition in different parts of it.

You have to *assume* that wide variations exist and use a sampling procedure that will give a representative sample under *any condition*.

Instructor should have 2 1/2 gal. jars with white beans in one and black beans in the other. other. (Beans don't have to be counted but the volume of the black ones should be about 1/3 of the white ones. Other contrasting materials could be used.)

Let's illustrate the problem of sampling. I have here about 250 black beans which we will say represent the P_2O_5 in a fertilizer. Here are 750 white beans which represent the other materials in the fertilizer. Now I pour the black ones into the white jar and shake it up to mix them well. Now we know this "fertilizer" contains ¼ or 25% P_2O_5 (black beans). But you can see that they are not equally distributed throughout the mass of beans. We would say the quality of this fertilizer varies or it is *not* homogeneous. (Homogeneous means that all parts are the same.)

How would you sample this fertilizer to be sure to get a sample that represents the whole lot? This is the *fundamental problem we face in all sampling situations.*

For a sample to be representative of this lot it would have to contain 3 white beans for each black bean. Suppose we take a sample of this batch by withdrawing 100 beans, one bean at a time while blindfolded.

It would seem that with 100 beans we would have a good chance of getting 25 black and 75 white beans, a representative sample. Yet, the laws of probability or chance, which apply to such sampling, show that such a 100-bean sample would have only *1* chance in *10* of being representative. (A good discussion of the theoretical aspects of sampling as well as many illustrations of automatic samplers is given in chapter 19 of *Handbook of Mineral Dressing* by A. F. Taggart, John Wiley and Sons, 1945.)

The purpose of this illustration is to show that proper sampling is not simple. Many factors such as homogeneity of the material, particle size, value and grade of the material, and accuracy desired must be taken into consideration.

This will be done by the plant engineers or your supervisors in setting up the sampling instructions they will give you. This is why it is very important that you follow sampling instructions exactly; but if you notice a change in flow conditions that you think may affect the sampling, call it to the attention of your supervisor.

4

Basic principles of sampling - practical sampling

A sample taken to represent the sampling unit such as one carload, one shift, or perhaps a day's operation, is usually called the *gross sample*.

This gross sample is collected by removing many small amounts (about ½ lb.) from the material being sampled; these are called *sample increments*.

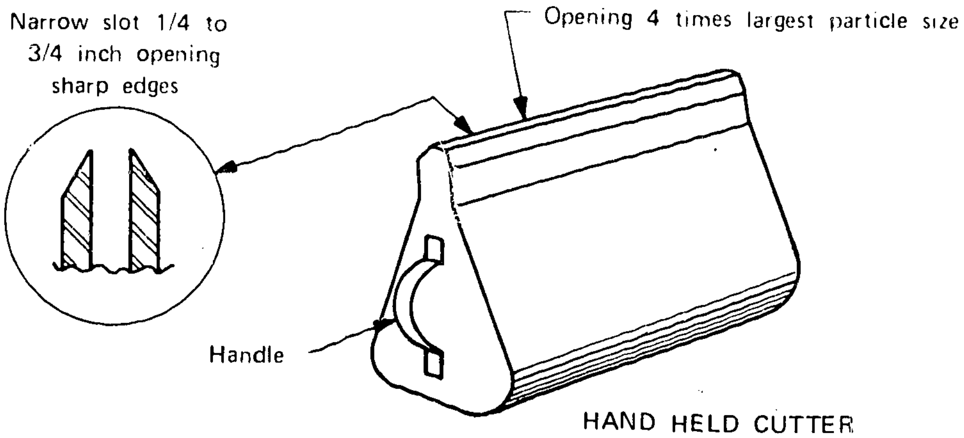
Most solid materials sampled in a fertilizer plant will be less than 1/8 inch in particle size. For this type of material, a gross sample of 80 to 100 lbs. is usually sufficient since many increments can be taken of such fine material.

Coarser materials would require a larger sample since each increment must be larger in order to include enough of each particle size.

Generally, the larger the number of increments that can be included in a gross sample, the better the sample will be. This means it is better to take many small (½ lb.) increments rather than a few large ones (5 lbs.).

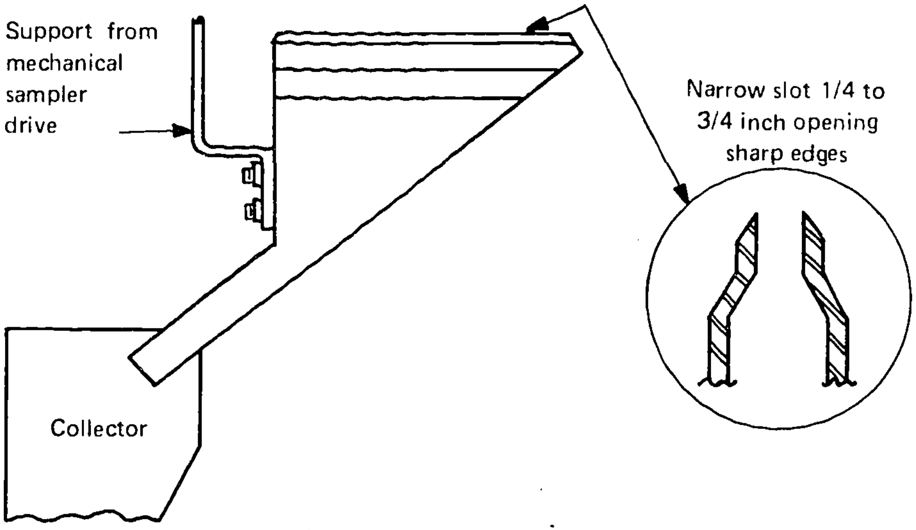
The sample increments are usually collected from the stream of material where it is falling from the discharge of a belt conveyor or a chute.

For best results the sample increments should be taken with a sample cutter which may be held by hand or be part of an automatic or mechanical sampler. This device is used to "cut" across the stream and looks like this:



Sketch on blackboard

HAND HELD CUTTER



CUTTER ON AUTOMATIC SAMPLER

In use the cutter is moved *completely across* the falling stream of material at a *constant speed*. The speed and width of slot determine the amount collected for a given material flow rate: the speed is usually adjusted so as to get the size increment desired (but speed must be *constant* during the cut). The narrow slot on the cutter permits a relatively small amount to be taken for each cut and thus more increments can be taken.

The following principles must be followed with either hand or mechanical sampling to obtain an accurate sample:

1. The sampler must take the *whole stream part of the time*. (This does not mean *all* the stream *at once*. The above cutters take *all parts* of the stream but they do it ½ inch or so at a time as the cutter moves across the stream in one cut.)

2. A sample must *never* be taken by taking *part of the stream all of the time*. An example of this would be leaving a cutter at one part of the stream all the time. Due to segregation, etc. one side of a stream might be quite different from the other side.

3. The cutter must move into, across, and completely out of the stream at each cut. Covers should prevent any chance of material entering the cutter between cuts when it is at rest out of the stream.

4. The speed of the cutter must be constant so that an equal percentage is taken from all parts of the stream.

5. The cuts must be made at *regular* intervals. The number of cuts taken is one way of controlling the size of the gross sample (one cut every 2 to 5 minutes is desirable with a mechanical sampler).

6. The cutter should never be filled during the cut. Overfilling would exclude material that should be part of the sample.

7. During and after collection, all samples must be protected from contamination by other materials. Special steps may be necessary to assure accurate samples for moisture determination since the sample increments may lose or absorb moisture quite readily.

Questions

What is the basic principle of sampling moving streams of materials? (Take all of the stream part of the time. This means take a thin slice all the way across a stream.)

Why will taking part of the stream all the time give an inaccurate sample? (A given part of a stream is quite likely to be different from the rest of the stream.)

Why should the speed of the cut be constant? (So that the amount taken is proportional to the amount present at different points in the stream.)

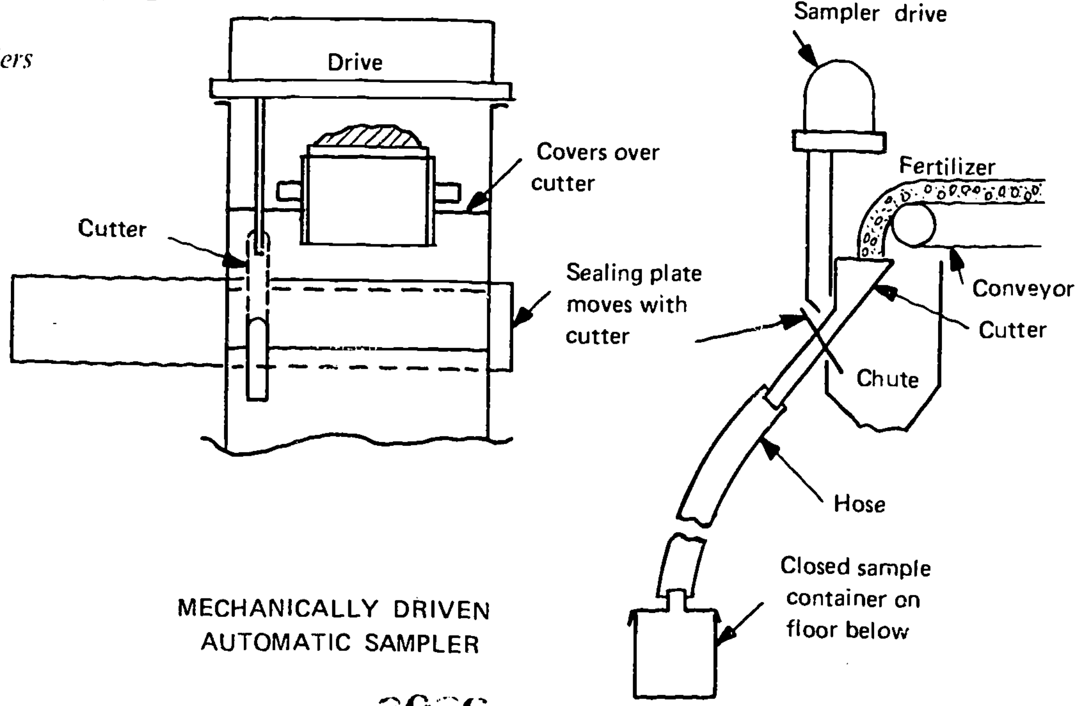
5

Equipment and procedures
Sampling of solids - mechanical or automatic samplers

Usually incoming solid raw materials such as phosphate rock and solid fertilizers produced will be sampled. Modern fertilizer plants install automatic mechanical samplers to take the required samples. A typical sampling installation looks like this:

Describe parts and how they work

Sketch on blackboard



MECHANICALLY DRIVEN AUTOMATIC SAMPLER

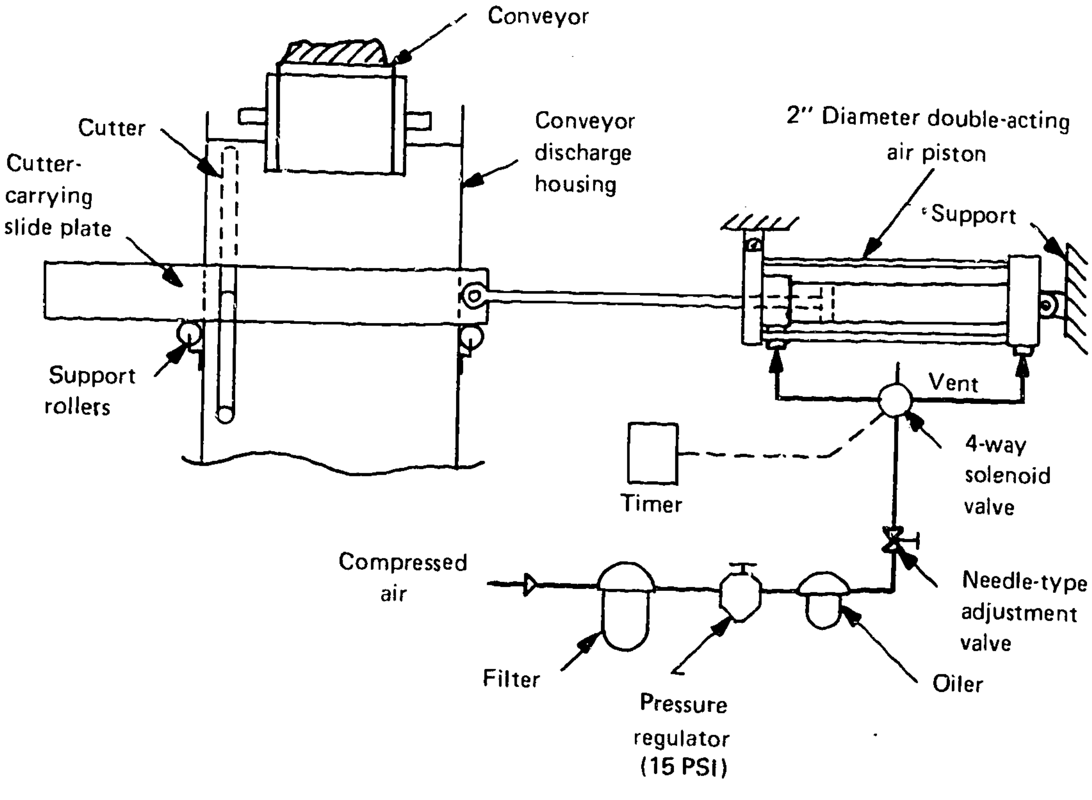
A timer actuates the drive mechanism which moves the cutter across the stream of material. The material entering the cutter flows to a closed sample container. The timer can be set for any sampling interval desired.

Various types of drive mechanisms are used. Since they must move the cutter both forward on one cut and backward on the next cut, the mechanical arrangement is quite complicated and frequently gives considerable trouble if it gets out of adjustment. The cutter discharge pipe must pass through a slot in the side of the housing: it is difficult to prevent spillage of material out this opening.

Any scraping or binding of the discharge pipe at this point will put a severe strain on the drive because of the leverage involved. As indicated, the cutter should be under a cover when at rest to prevent dust from entering. The covers should open to permit inspection and cleaning of the cutter. For fertilizers the cutter should be made of stainless steel to prevent corrosion and adherence of material.

The sketch below shows a sampler driven by a double-acting air piston powered by compressed air.

Sketch on blackboard



AIR–POWERED AUTOMATIC SAMPLER

3027

Since the plate carrying the cutter is in line with the air piston, it is not as subject to binding as the previous type. The simplicity of the air cylinder makes this type of sampler nearly trouble-free.

Since the compressed air is not a positive drive (as compared to the mechanical-type drive) care must be taken to see that the cutter-carrying slide moves easily and does not bind; any binding will cause jerky movement and an inaccurate sample.

6

Operating duties

The mechanical (automatic) samplers should be inspected twice a shift. Watch it make a cut and look for any uneven motion, hanging, or rubbing of the moving parts which would indicate potential trouble.

Keep the drive mechanism covered. Keep dust and spillage brushed off.

Check the cutter slot and chute to be sure they are clean. The cutter edges must stay parallel and sharp. [One exception is a sampling device (a vezin) which rotates on an axis perpendicular to the cutter slot. On this type, the cutter edges must be radial; the slot will therefore be shaped like a piece of pie.]

Caution

Before doing any cleaning of the parts be sure the sampler *is turned off* to prevent an accident. Also be sure to turn it on again.

Grease appropriate parts according to the schedule set up. If an air-operated piston is used, be sure the oil container is filled and that it is feeding properly.

Check the sample container and see that is contains about the right quantity of sample.

Some samplers are equipped with a counter which counts the number of cuts; see if this count agrees with the number the sampler should have made since the last time you read it.

Properly operating mechanical samplers take a constant percentage of the gross material that they sample. The completed sample should be weighed when it is removed. Generally the tonnage of material from which the sample was taken will be known (for example the shift's production or daily production).

Division of the sample weight by the material tonnage will therefore give a ratio which should be nearly constant. The laboratory should check this ratio as variations in it indicate improper operation of the sampler.

Question

Name some of the advantages of automatic samplers. (They are able to take many small increments; the increments are proportional to the material flow, they are reliable; they can do a much better job than a man.)

7

Hand sampling

In the absence of automatic samplers, samples must be taken by hand. Sometimes the material can not be samples automatically.

The best point to sample is where the material discharges from a chute or belt conveyor. The hand-held sample cutter described earlier should be used to cut completely across the stream at a constant speed.

Such increments should be taken at regular intervals throughout the day or established sampling period. The size of the slot must suit the size of the material sample. It should be four times the largest particle in the material sampled.

It is frequently necessary to sample carloads of material. If at all possible, this should be done from a conveyor as the car is being unloaded.

This is the easiest and most practical way of being able to get material from *all* parts of the carload which you *must do* if the sample is to be representative.

Sometimes a carload must be sampled before it is unloaded. You must suit the method used to the material to be sampled.

You should try to obtain cores of the material from top to bottom at 6 or 8 locations evenly spaced around the car. Sometimes a posthole digger can be used to remove cores (which are the sample).

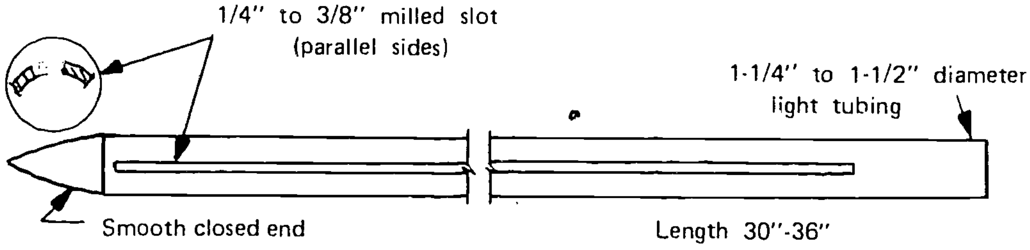
Sometimes a deep hole can be shoveled out; then a shovel is used to collect a narrow strip of material (1 inch deep by 8 inches wide) from the undisturbed vertical surface of the pile (hole). This is repeated in many holes.

Sometimes a chamshell bucket on a crane can be used to dig the holes and expose a vertical face of the material.

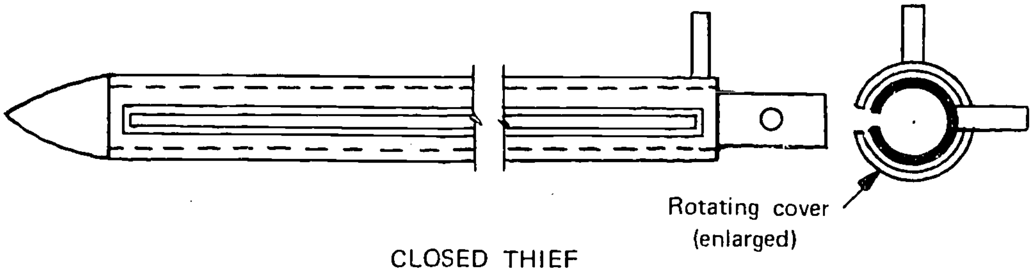
Special care must be taken not to *select* the material sampled: remember you should obtain representative amounts of all types of material present.

A device called a *thief* or *tube sampler* is sometimes used to take a sample from a pile or from bagged material. Two types of thief samplers are shown below:

Sketch on blackboard



OPEN THIEF



CLOSED THIEF

The open thief is simply a smooth tube about 1" to 1¼" in diameter and 30"-36" long; one end is closed as a smooth tapered point. A smooth uniform slot 1/4" to 3/8" in width is milled in the tube for nearly its entire length. The metal should be light and resistant to corrosion; 1" thin walled electrical conduit is suitable.

In use the thief is inserted into a horizontal bag of material the full length of the bag on a diagonal *with the slot turned down*. The thief is then turned over so the slot is on top. This permits the fertilizer to fill thy tube; a little tapping helps insure this. The thief is then withdrawn carefully and its contents poured into a jar or can through the open end.

As many increments as needed are taken from the different bags making up the lot.

The closed thief operates on the same principle except the slotted tube is surrounded by another tube which has a wider slot cut in it. This cover or shutter is turned to cover the slot before the thief is inserted with the slot in the thief on top. Then the cover is rotated to uncover the slot and thus permit the sample to enter.

This type can be used to take samples while in the vertical position whereas the open thief cannot.

8

Operating duties

Since much of the sampling may be by hand, you should understand the sampling principles involved and apply them conscientiously while carrying out your sampling duties. You should follow any instructions your supervisor gives you.

9

Sampling of liquids

The same basic principles of sampling that apply to solids also apply to liquids. Even though a liquid may appear to be homogeneous the liquid should always be mixed before sampling.

Automatic sampling

Liquids discharging from a pipeline or flowing over a weir are frequently sampled automatically. The same types of samplers described for solids are used. If the stream does not contain solids, the slot in the cutter can be narrow–about 1/8" wide.

The gross sample from the cutter should be 20-40 gallons per day and go into a container. At the end of the sample period this sample will be mixed by stirring and a gallon or so dipped out of it as the final sample.

If it contains solids, special care is necessary to be sure the solids don't segregate due to stirring or settle out to the bottom. It is best to drain the container while stirring it and take frequent cuts of the liquid (and solids) draining out.

Hand Sampling

Frequently samples are withdrawn from pipelines carrying liquids. If the liquid contains solids or the flow is slow, the solids or heavier parts of the liquid may settle and flow along the bottom of a horizontal pipe. A sample withdrawn through an outlet at the bottom of the pipe would therefore have more solids than it should.

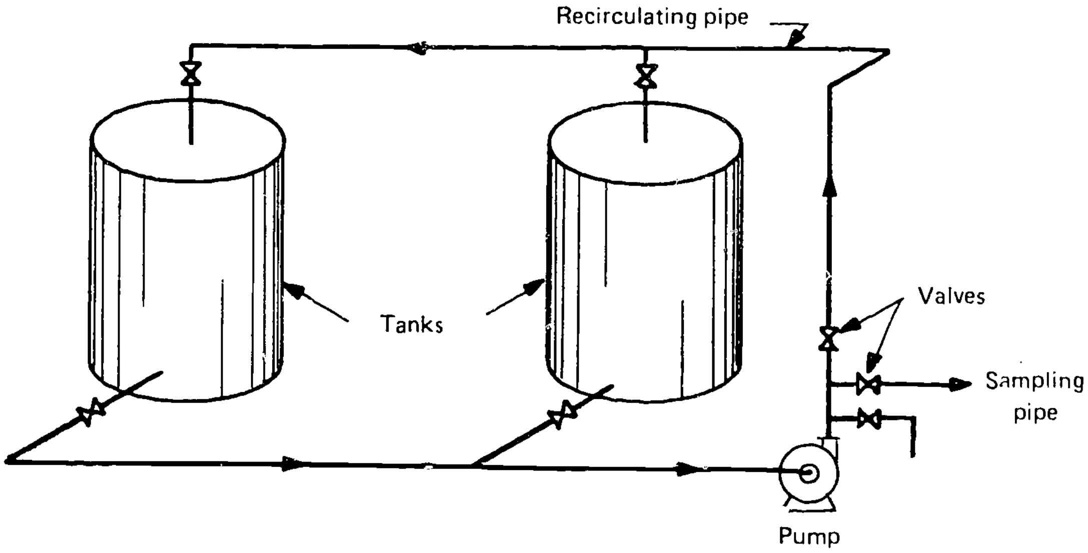
An elbow will also cause solids to go to the outer part of the bend due to centrifugal force.

The point on the pipeline from which a sample is taken must be selected with care. If possible, flow through a sample line should be continuous so that the liquid in it is always representative of the liquid flowing in the main pipeline. If flow is not continuous, the sample line should always be flushed out before the sample is taken.

It is frequently necessary to sample the contents of a tank or tank car. If possible, the contents should always be mixed before they are sampled. This is frequently done by putting a compressed air pipe or sparger in the tank and letting the air stir the contents.

The contents of some tanks can be mixed by recirculating a stream of the liquid to it as shown below. The recirculating flow must be great enough to give a mixing action however.

Sketch on blackboard



After mixing, the sample should be taken over a period of time while the liquid is still circulating.

Caution

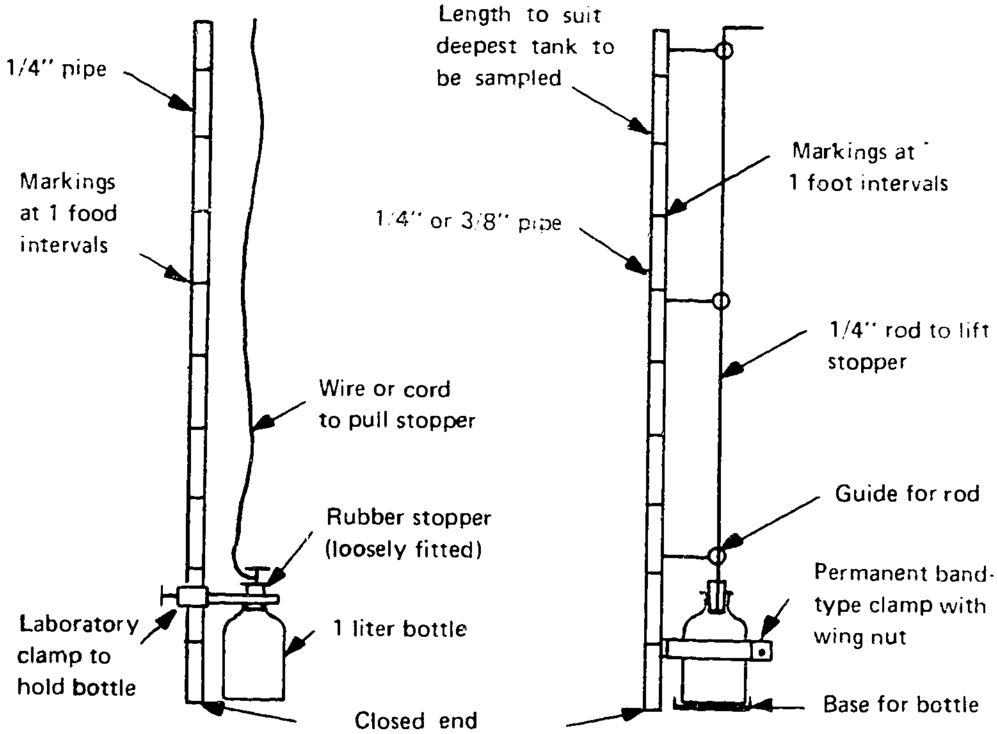
Remember that the material in a pipeline that is not in use may not be the same as the material in a tank. (The tank may have been refilled with a different material; the liquid in the pipeline may have come from another tank, etc.)

All pipelines should therefore be well flushed before a sample is taken.

Usually tank cars cannot be mixed or recirculated before sampling and samples must be dipped out rather than taken from a pipeline.

A stoppered bottle attached to a pipe as shown below is used to take such samples.

Sketch on blackboard



EMERGENCY TYPE PERMANENT TYPE

DEVICES FOR SAMPLING LIQUIDS IN TANKS

For very deep tanks a weighted bottle is lowered on a cord or a chain instead of using the pipe. It is customary to take a sample at least at the bottom, middle, and top of a vertical tank.

The bottle on the pipe is pushed down to the desired depth, the stopper is removed, and the bottle given time to fill before it is withdrawn.

The sample is then poured into another clean bottle which is labeled with car number and depth. It is best to send all three samples to the laboratory, but in some cases the three individual samples can be poured into one larger bottle, thus getting a composite sample.

In large tanks, more than three samples should be taken. In horizontal cylindrical tanks (like a tank car) the quantity of sample taken at each location should be proportional to the volume at that level.

For a full car this would be about three parts from near the top, four parts from the middle, and three parts from near the bottom. If the tank is only partly full, more should come from the middle, say two, five, and three.

Common sampling procedures

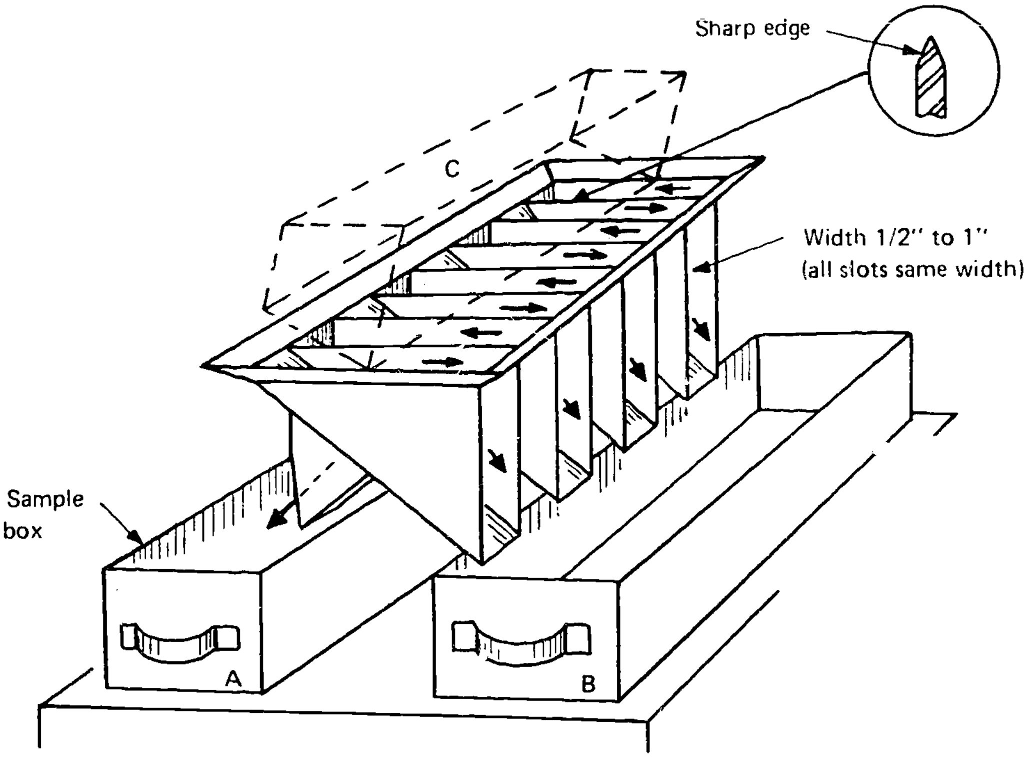
As you have learned from the foregoing, the initial sample you will have taken of a solid material will be from about 80 to 1000 or more lbs. depending on the type material and time covered. This must be reduced to a quantity that is practical to handle and taken to the lab.

But this must be done in a manner which will assure that the smaller amount will still be representative of the original material, otherwise all the care you exercised to get a representative sample will be wasted.

There are several standardized and proven methods of making this reduction, but they must be followed exactly.

The best method is to use a riffle which is shown below:

Sketch on blackboard



JONES–TYPE RIFFLE
(Support stand not shown)

The riffle consists of a series of sloping chutes assembled side by side. Adjacent chutes discharge in opposite directions. There must be the same number on each side.

There are also three steel pans which are the same length as the riffle section and fit under the chutes. The gross sample is poured into one box (C) and spread to a uniform depth. With boxes A and B under the chutes, box C is *centered* on the riffle and its contents poured through.

Thus the riffle divides the sample into two equal parts in boxes A and B. For further reduction box C is placed under the chute and the contents of box A are mixed by tilting it from end to end several times.

After leveling its contents, box A is poured through the riffle. The sample in box C is then ¼ of the original sample. This can be repeated.

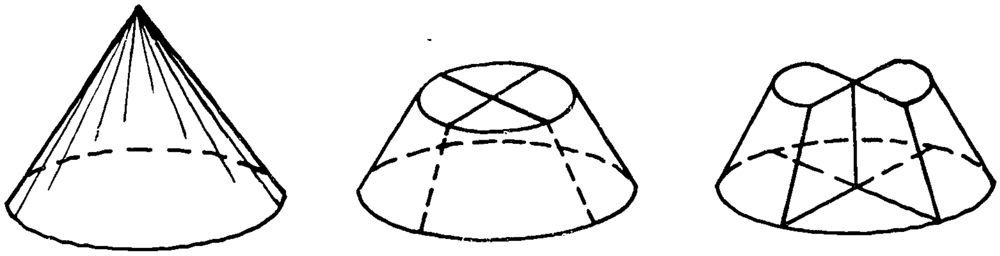
The material in box B is termed *rejects* and is discarded or it can be used to obtain additional samples, such as one for screen analysis, by riffling. Properly used, the riffle gives very accurate division of the sample.

11

Coning and quartering

Another standard method of sample reduction is called "coning and quartering." It is usually used when the quantity of material is large (+500 lbs.) or it is wet and sticky and won't go through a riffle. As the name implies, a right, vertical cone is formed on a flat surface and then quartered. In this method as each sample increment is taken. (usually with a shovel)it is carefully poured onto the apex (top) of the conical pile which is being formed. As material is added it rolls or slides down the surface of the pile. Great care must be taken to keep the top centered on a vertical axis; it is best to go to different positions around the pile when depositing the increments on top.

Sketch on blackboard


Initial cone

Flattened and marked

Opposite quarters removed

STEPS IN SAMPLE REDUCTION BY CONING AND QUARTERING

Put steps on board as they are discussed

When sampling is completed, shovels are used to drag material out *radially* starting near the base of the pile so as to form a flat top cone or a disc. A board is then used to mark two diameters across the pile at right angles to each other.

This divides or *quarters* the pile (disc) into 4 equal segments. Opposite quarters are then shovelled out and discarded. The other two quarters are the sample.

The whole procedure can be repeated with these two quarters to obtain further reduction.

Questions

What are two important points to watch when using a riffle? (The material should be evenly *distributed* throughout the length of the box and the end of the box should be *even* with the riffle section before dumping it.)

What is the most important requirement in coning and quartering? (That the material be poured on the *apex* (top) so that it will run down *all sides* of the cone. Going around the pile while forming it helps to assure even distribution.)

12

General operating instructions

Keep all sampling containers, equipment, etc., clean and in proper mechanical condition.

Keep them in a cabinet or covered when not in use to keep them clean and from being lost.

Be sure sample containers are clean and dry before they are used.

Keep all sample containers closed tightly to prevent moisture loss and dust contamination.

Tag or label each sample container *when it is started* with the proper description (name) of the sample, date, starting and ending time (when completed), etc. Sign your name to show that you are willing to accept responsibility for the accuracy of the sample.

13

Safety

You will frequently be taking samples around moving equipment such as belt conveyors. Handle and use the sampling devices so that they will not come in contact with the belt. Be sure the handle on the sampler is long enough to keep *your hands* out of a danger zone.

Remember the automatic samplers will *start without warning*. A warning sign stating this should be posted. *Always* cut off the power to the sampler *before* cleaning the cutter or working on the mechanism.

When sampling acids and similar liquids always wear a face shield and rubber gloves. Some sampling points may require more protection. Watch out for spray or splatter when sampling liquids.

Carry glass bottles containing acid samples in rubber buckets or other protective containers. This helps avoid danger to you in case of a fall, breakage, etc.

Do not carry heavy samples up or down long stairways. Reduce them to a safe size: make several trips if necessary. Lower filled sample buckets with a rope when required.

After sparging a tank to mix it, remove the sparger pipe with a *little* air on it so that all the liquid is blown out of the pipe.

Do not attempt to handle overweight samples. Lift with your legs and not with your back muscles.

Slides

This slide shows a riffle (with boxes).

This is an automatic solid material sampler (air powered) · B&S Sampler.

This shows an automatic liquid sampler (GCFU sump).

WHAT TO DO — WHAT TO SAY

1

Introduction

Bulk handling of dry fertilizers has become an accepted practice for farmers in many parts of the world. Due to its lower cost, bulk distribution of fertilizer will undoubtedly continue to grow. In the United States today, more fertilizer is used in bulk than as bagged material.

Also, in many parts of the world the growth of the use of liquid and suspension fertilizers has been amazing. Fluid fertilizers accounted for about 22% of all fertilizer used in the United States in 1968.

Much fertilizer, however, still is distributed in the package form. The most common package is the multiwall paper and the plastic sack.

The idea of using "a bag" for storing and transporting products has been around a long time. Prehistoric man used animal skins. There is some evidence that the Egyptians glued together a package made from leaves as early as the year 2,000 B. C. About 1850, the paper bag began to make its appearance in the United States.

Prior to introduction of granulated fertilizers, use of burlap and cotton bags and wooden barrels prevailed almost universally. It was common to package fertilizer in 200-, 167-, 125-lb. bags. Hand sewing was the general practice.

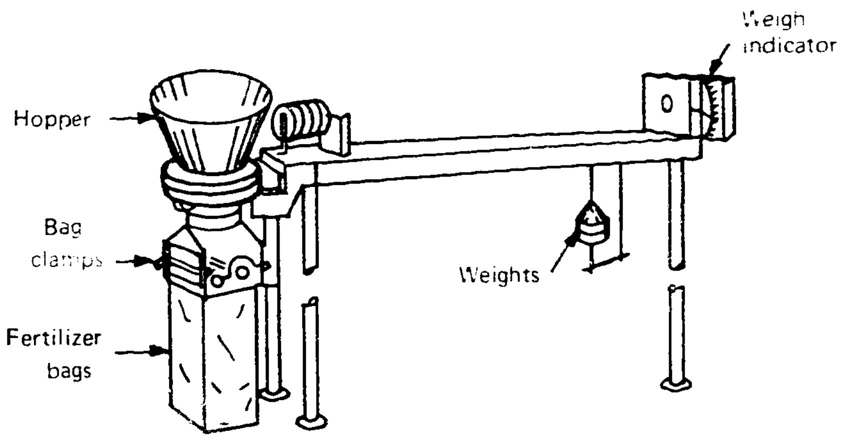
Fiber bags gave way to the multiwall paper sack in the 1950s, and they in turn are giving way to the plastic sack.

2

Operation

Semi-automatic bag filling machines are used in some of the smaller fertilizer plants. In this type of a filling operation, the bag chute and bag clamps are part of the scale weighing beam. The empty bag is attached to the chute and the bag is filled to the correct weight by the operator.

Sketch on blackboard



Please note

The bag is filled rapidly for about 90% of its weight and then the filling rate tapers off so the feed can be stopped when desired weight is obtained.

3

Operating duties

At the start of the shift, the first thing that the operator should do is to clamp an empty bag to the filling bell. The tare weight of the bag is then set off on the tare bar, bringing the indicator to zero. The scale is then set for the desired weight.

Important

After filling the first bag or so, the operator check weighs them to make sure the scale is working properly. Every 30 minutes or so during the shift, he should check weigh a bag to make sure the scales are still accurate.

Be careful not to bag the fertilizer if it is too hot. This could cause it to "set up" in the bag as it cools; also, the heat might damage the bag.

Stress

After filling the bag to the desired weight, about 4 inches of free space should remain so that the bag will handle better. Not only will the bag stack better but there is less damage done to the bag in handling.

Sealing is the most critical item in the bagging operation. If it is not done properly, material will leak out in transit or moisture will leak into the bag causing further damage.

Bag conveying equipment can also cause damage to the sacks of fertilizer and should be watched with care.

Proper truck or car preparation for transit cannot be over emphasized. All extraneous material must be removed from the floor and sides of the vehicle.

Pad well any rough spots found in the floor or walls of the transit vehicle so that the bags will not be damaged in transit. The stacking or loading pattern should be in such a way so as to minimize damage to the bags in transit.

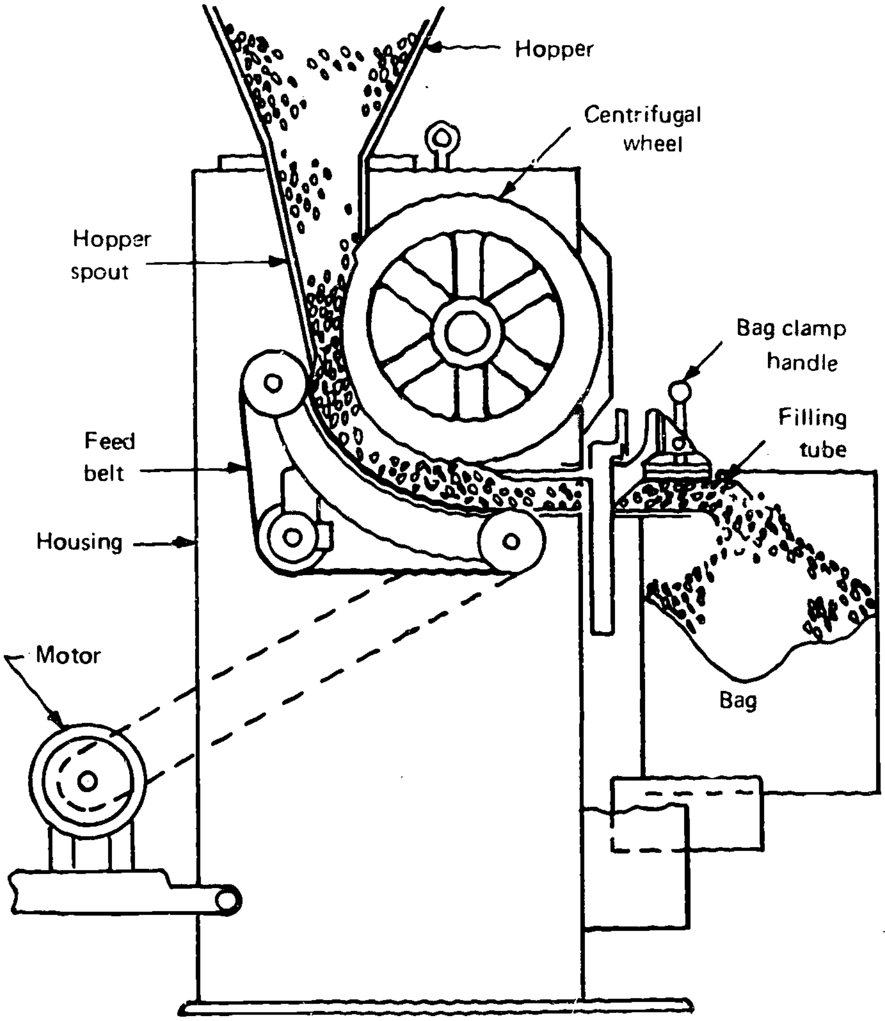
Operati

Automatic fertilizer bagging machines are available for just about any type of bag. Some will operate automatically on a pacesetting basis, or they can be operated manually, calling for the charges as needed. Open-mouth or valve-type plastic or paper bags are available.

The following sketch shows how a valve packer works:

Sketch on blackboard

Explain



Tell class why

At the start of the shift, the operator should check weigh the first 2 or 3 weighings to make sure the machine is weighing correctly.

Every 30 to 40 minutes during the shift he should check weigh a bag or two to make sure the machine is still weighing accurately.

Leave the weigh hopper, filling hopper, and bagging machine empty during any long recess to prevent material caking in the hopper.

Clean the scales and filling machines at the end of each shift.

5

Preventive maintenance

Neglect is the main reason that bagging machines fail to give satisfactory operation.

Clean the machines at the end of each shift.

At least once each month have the repairman to check the bagger for worn or defective parts.

If the bagging operation is suspended a few days, run the machine idle for a short period each day to keep all parts in good working order.

At the end of the fertilizer season, clean and grease all necessary parts to avoid rusting.

6

Lubrication

Lubricate ball bearings every week and other points each day as conditions require, but do not over grease.

Those plants that sew bags sometimes make it a practice of storing the sewing heads in a bath of clean lubricating oil until the next shift.

7

Safety

It is recommended that the operator wear protective eyewear when working with packaging equipment for fertilizer.

The worker should wear respiratory equipment if the area is very dusty.

When check weighing bags of fertilizer, care should be taken to see that employees lift with their legs, not with their backs.

8

Show slide The first slide shows an automatic bag filling machine of valve bag type.

Question Does this machine use paper or plastic bags? (It can use either one.)

Show slide The second slide shows a filling line using open mouth bags.

Question How is the bag closed after it is filled? (Open mouth paper bags are sewed. Some are taped after sewing. Some are closed with adhesive. Plastic bags are usually closed with a heat seal.)

Show slide The next slide shows palletized bags in storage.

Question Why is it important that the bags not spill fertilizer while in storage?

There are several reasons. One, it represents a loss of material. Second, some fertilizers are hygroscopic; material will absorb moisture until an entire stack of fertilizer could be ruined.

Are there any other questions on the packaging of fertilizers?

WHAT TO DO WHAT TO SAY

1

Introduction

Many fertilizer plant operations depend on the movements of liquids or gases. The equipment used to move fluids are pumps for liquids and compressors for gases.

Compressors are similar to pumps and function according to the same theoretical principles. They cannot be interchanged because of special features such as seals, cooling, etc. The term "fan" is used to designate low-pressure, high-volume gas moving equipment.

There are many kinds of compressors and pumps such as:

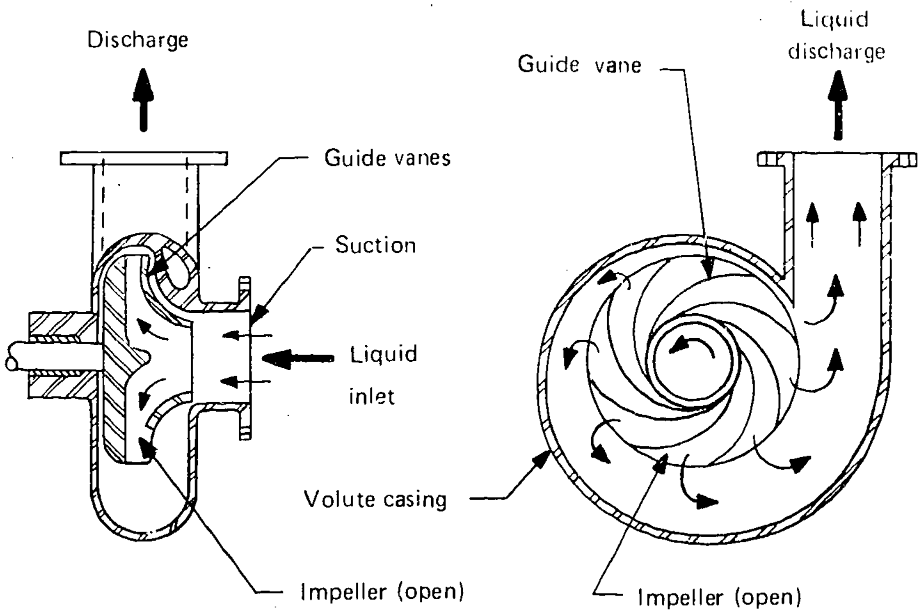
1. Piston pump	Piston compressor
2. Diaphragm pump	————
3. Gear pump	Lobe compressor
4. Vane pump	Vane compressor
5. Screw pump	Screw compressor
6. Propeller pump	Axial flow fan
7. Centrifugal pump	Centrifugal fan
8. Turbine pump	Axial compressor

2

Centrifugal pump and fan

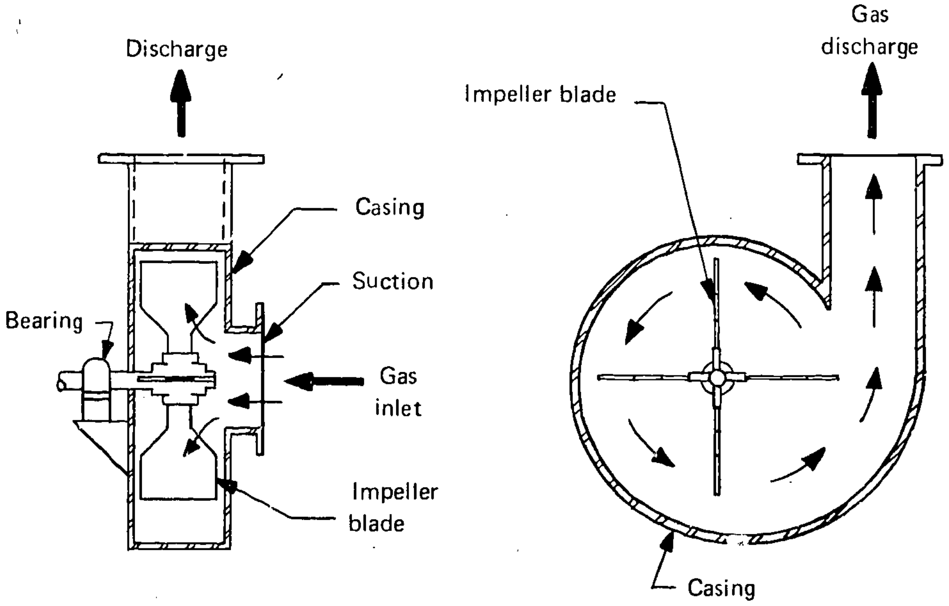
The most common equipment used for fluid movement is a centrifugal fan for gases and a centrifugal pump for liquids. They are driven by rotary motion using drivers such as electric motors or steam turbines. They give continuous flow at a constant pressure.

Sketch on blackboard



CENTRIFUGAL PUMP

Sketch on blackboard



CENTRIFUGAL FAN

The fans can handle dusty gases while the pumps can handle liquids that contain finely divided solids (slurry). Fans are only one stage while pumps can be multistage. The pressure developed in one stage is limited but usually sufficient for normal fertilizer plant usages.

3

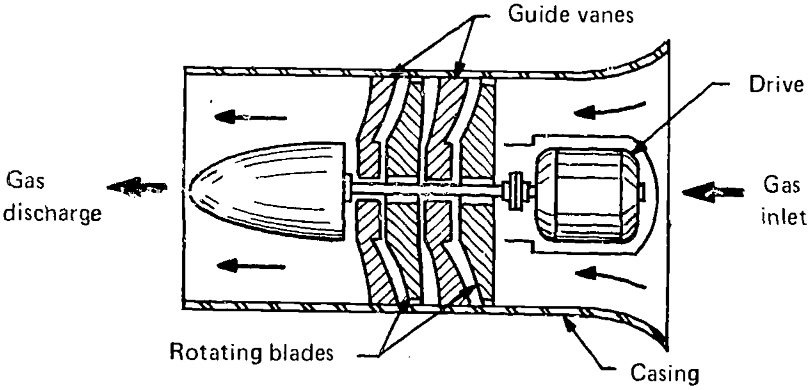
Turbine pump
Axial compressor

Turbine pumps and axial compressors are similar to the centrifugal equipment just described with the addition of guide vanes on the fan and a diffuser ring on the pump. These additions give more efficient operation and higher pressures, especially when the units are multistaged.

Propeller pumps
Axial flow fans

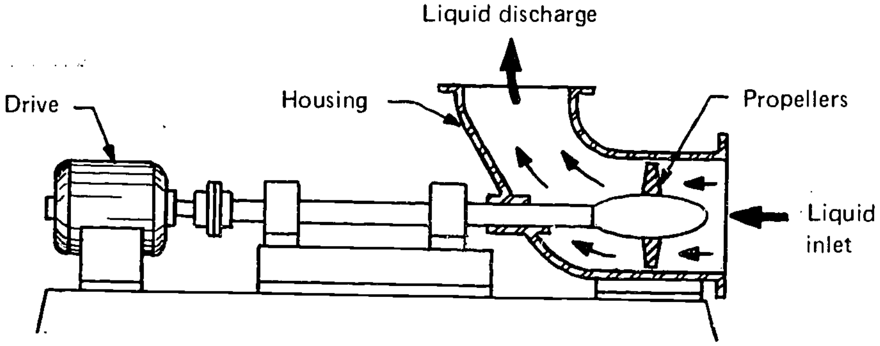
Propeller pumps and axial flow fans are used to move large volumes of fluid against small heads. Each has a rotating propeller element to induce fluid flow.

Sketch on blackboard



TWO STAGE AXIAL FAN

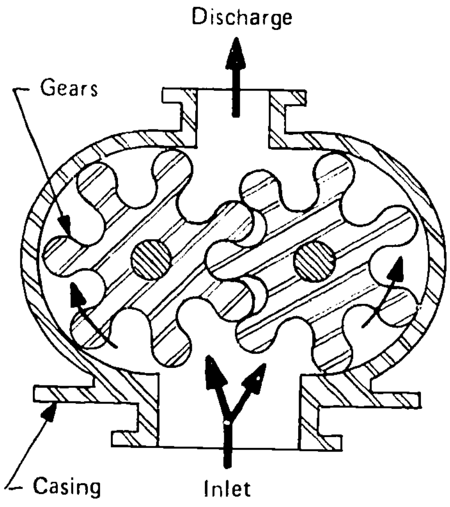
Sketch on blackboard



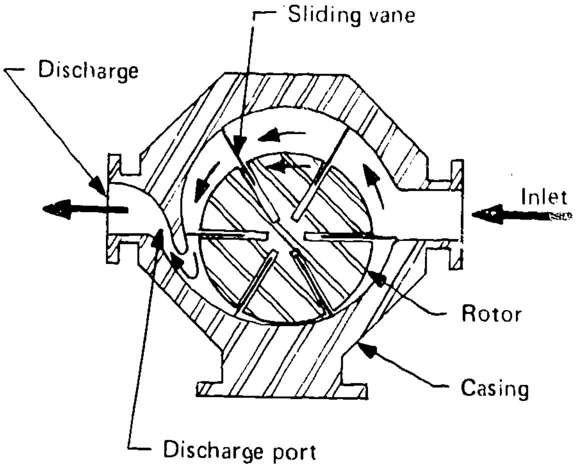
ELBOW–TYPE PROPELLER PUMP

Gear, vane, screw pumps and compressors are positive displacement machines that are driven by rotary motion. These types of pumps are useful for handling semi-viscous materials. Both pumps and compressors are useful where positive displacement is needed.

Sketch on blackboard

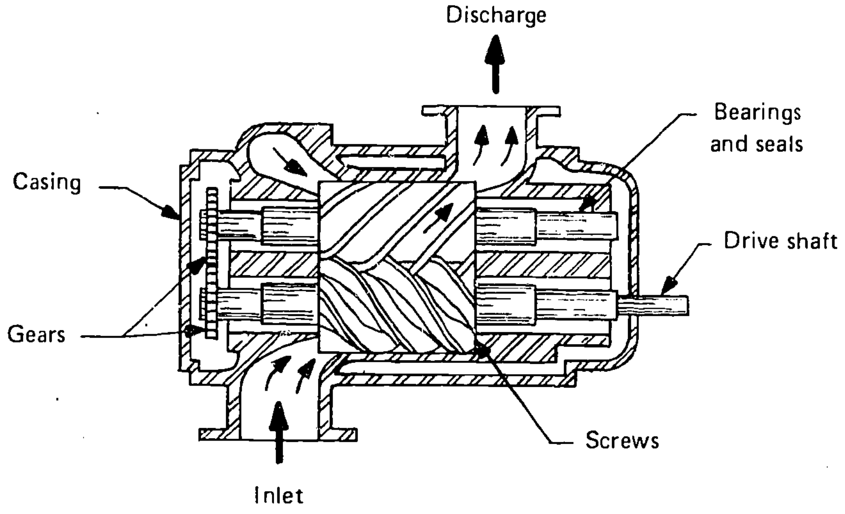


GEAR PUMP



VANE PUMP

Sketch on blackboard

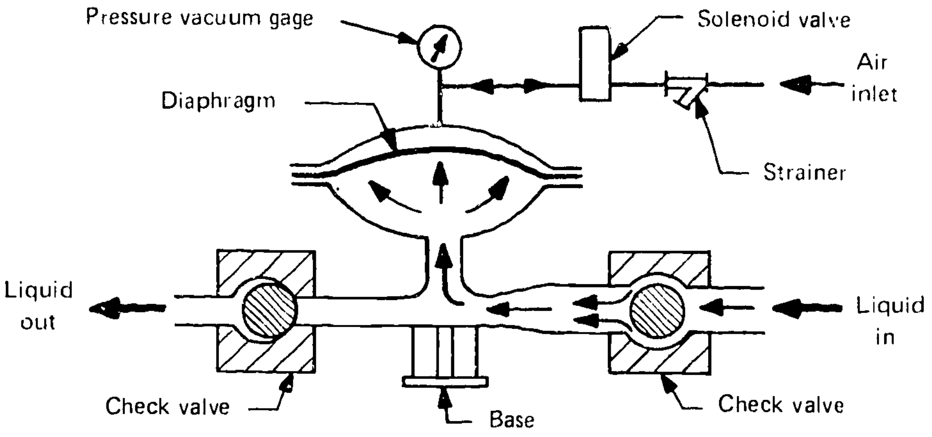


SCREW COMPRESSOR

These pumps are self-priming.

Diaphragm pumps do not have a comparable gas handling compressor or fan. Many diaphragm type pumps are used for metering devices; some are also used as sump pumps. This pump has a pulsed output and can be driven by mechanical motion, air pressure or hydraulic pressure. The volume output can be varied by the stroke length. This pump can handle liquids that contain vapor or gases or liquids that contain substantial amounts of solids.

Sketch on blackboard

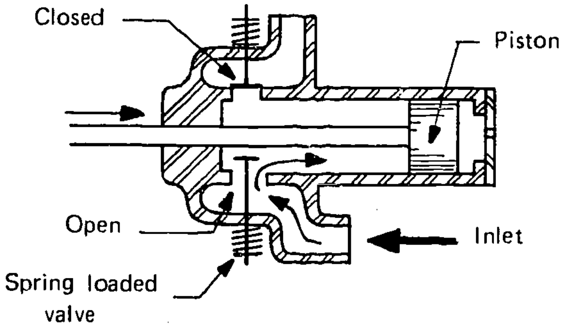


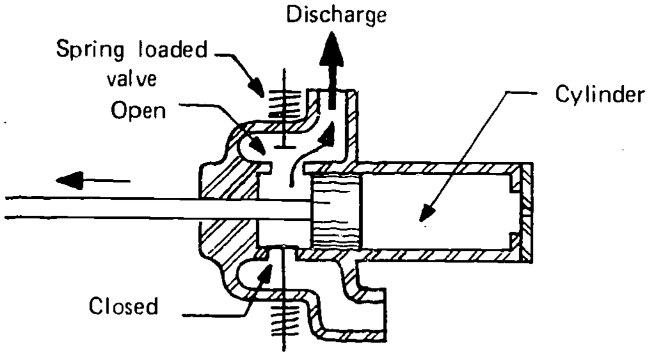
DIAPHRAGM PUMP

4

Piston pumps and compressors are reciprocating machines. These machines have a pulsed output. They can develop fairly high pressure (pumps in a single stage while compressors require multistages). These machines can handle liquids containing gases and are self-priming.

Sketch on blackboard





5

Operation

Pumps require attention and periodic adjustment. Indication of improper pump operation is evidenced by falling rate or non-flow, failure to fill or empty a vessel, or observing the discharge stream. The line pressure after the pump is another indicator of pump performance. Pumps should be observed several times each shift. Seal water should be adjusted to a slow drip, packing should be tightened as necessary to prevent excess leakage. Excessive leakage can mean the packing is worn out.

Bearings require lubrication and the reservoir needs checking daily. Noisy bearings in the drive motor or pump is an indication of impending failure.

Pumps may be hard to rotate because of solidification in the casing. This is especially true when trying to start a spare pump that was inadequately flushed when shut down. The same trouble occurs when the impeller drags on the casing. All pumps should be rotated by hand before applying power.

Fans also require attention. Abnormalities are noted by inadequate flows, dusting, or low pressure. These can be caused by ducts, equipment or the fan filling with dust.

Fans often are belt driven. Belts slip and soon burn up if not tightened. The odor of burning rubber or the squeal of the slipping belt are symptoms of this trouble.

Bearings require daily lubrication and should be checked several times a shift for excessive temperature.

Positive displacement pumps and compressors require special startup and shutdown procedures. While this class of equipment is usually provided with pressure relief valves, correct valving at startup is desirable as the force generated in a sealed piston can cause severe mechanical damage. To reduce the starting motor load, many machines are started "unloaded." This term means the inlet and outlet valves on reciprocating machines are blocked open so no pressure is generated. On rotary machines, such as gear or vane pumps, the discharge flow is bypassed to the suction at startup. At shutdown the machines should be "unloaded."

6

Preventive maintenance

The packing or mechanical seal fluid must be kept flowing or early failure will occur. The packing should be adjusted as needed and replaced when worn. Improper packing adjustment will cause roughening of the shaft. The adjusting bolts should be moved equally to keep the packing follower square with the shaft. Overheating of the packing gland is an indication of improper adjustment—too tight or misaligned. When pumping hot solution, the gland will naturally be hot. Packing life can be extended by flowing a stream of water over the gland in this circumstance. There are many types of packing available the best is usually found by trying several types.

The bearings require lubricant and periodic replacement. Noisy bearings is a sign of impending failure.

Head gaskets also require replacement. Early signs of failure are drip leaks although sudden failure can also occur.

Under unusual corrosive or erosive conditions the impeller may corrode away in a few hours while casing failure usually occurs over a longer period.

Leakage on the pump base plate will cause the plate to corrode away. This can cause misalignment of the pump and drive and result in coupling failures.

7

Safety

Gloves, face shield and hard hats should be used to protect against leaks or sprays at the pumps and piping. The moving parts of the exposed drive should be guarded.

8

Questions

What is the purpose of a pump or compressor?

What are three types of pumps?

What are three types of compressors?

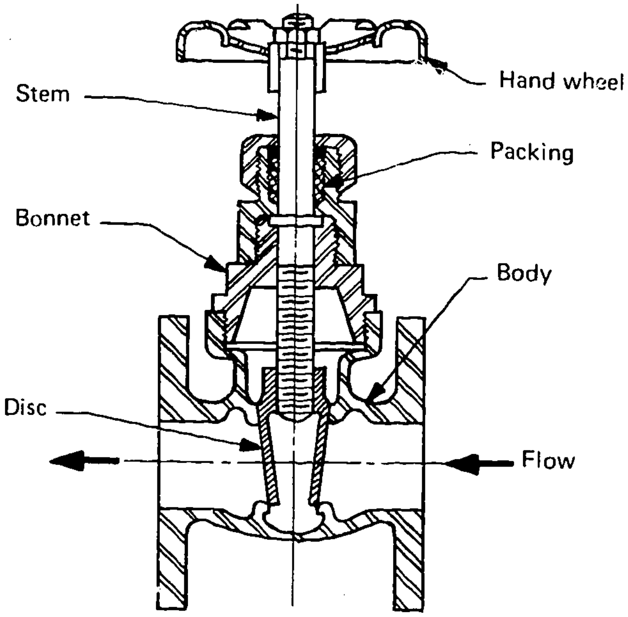
Outline steps for starting a centrifugal pump.

What types of drives are used for pumps?

What common adjustment is required on a centrifugal pump?

Why is seal water used on a centrifugal pump packing?

WHAT TO DO	WHAT TO SAY
	1
Introduction	This chapter covers piping systems with the exception of pumps which are discussed in chapter 9 and storage tanks in chapter 3, and process vessels. A piping system is made up of pipelines, valves, pumps and storage tanks or process vessels. Its purpose is to move a fluid (a liquid or gas) from one place to another.
	Pipe is made of many materials. The material is selected to safely contain the fluid handled. The pipe size is chosen to handle the maximum flow rate expected.
	2
	Valves are used to block flow. Valves are also used to regulate flow rates. Sometimes the same valve serves both purposes. Valves may be operated either manually or by instruments.
Types of valves	There are many kinds of valves. Each has a particular advantage.
	Gate valves are usually used for on-off service. They have a guided sliding gate that is operated by a threaded or sliding stem. These valves give unrestricted flow with low pressure loss.
Sketch on blackboard	

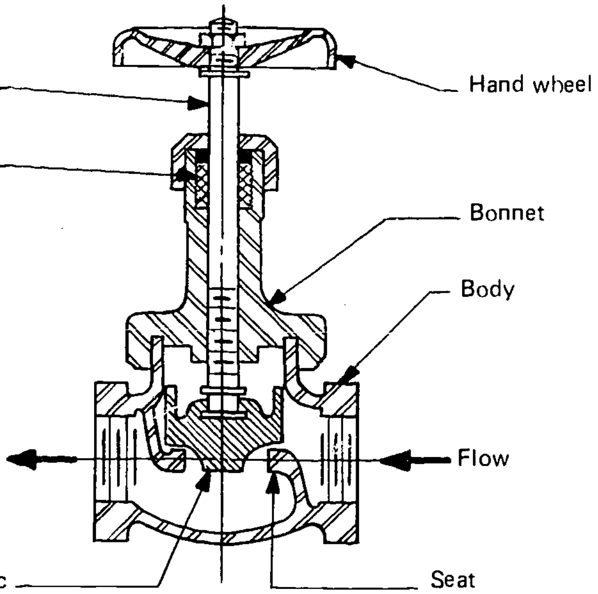


GATE VALVE

3050

Globe valves are generally used for controlling the flow rate. They have a circular opening in the center of the body. A disc or tapered plug partially fills the opening to control the flow. The disc or plug is moved by a threaded or sliding stem. These valves are called *Throttling* if hand operated. Many automatic control valves are sliding stem globe valves.

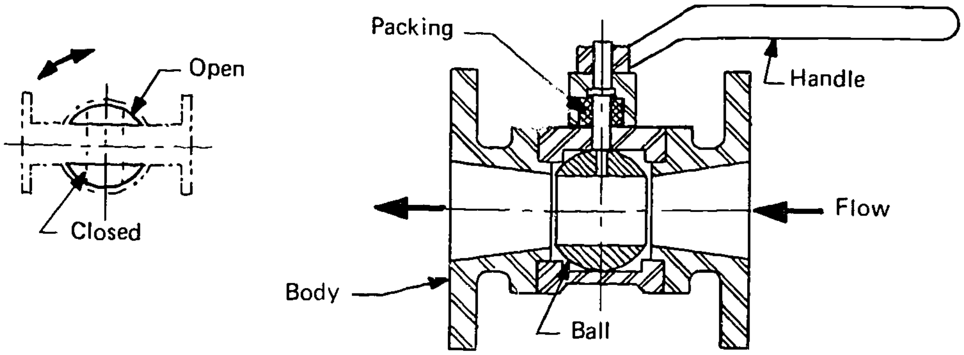
Sketch on blackboard



GLOBE VALVE

Ball valves are used for both on-off service and for flow rate control. A full pipe opening through a sphere is the operating element. The sphere is sealed with seat rings. A stem extends through packing to an operating lever handle.

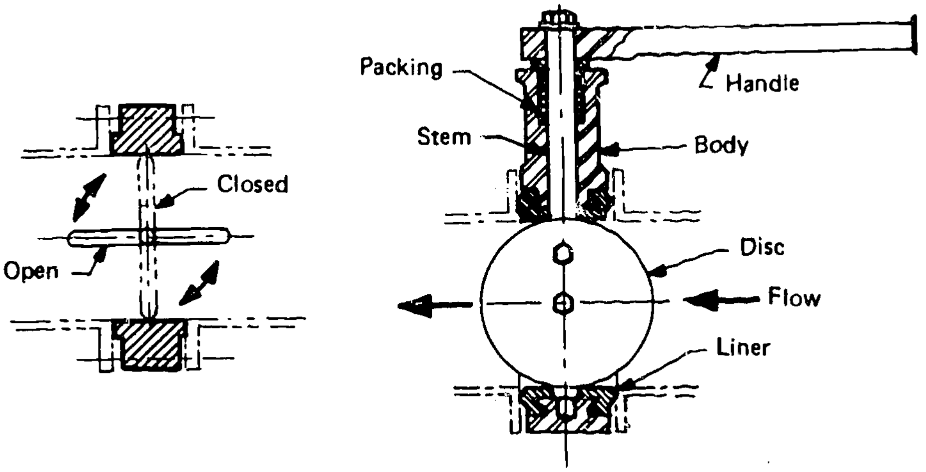
Sketch on blackboard



BALL VALVE

Butterfly valves have a flat plate that rotates from the edge parallel to the flow when open to blocking the flow when closed.

Sketch on blackboard



BUTTERFLY VALVE

Valve operation

They are operated by rotating the stem. These valves are compact and simple. They have low pressure drop and are used for both on-off service and for flow rate control.

There are many other types of valves. Some are flush bottom, pinch, needle and weir-diaphragm valves.

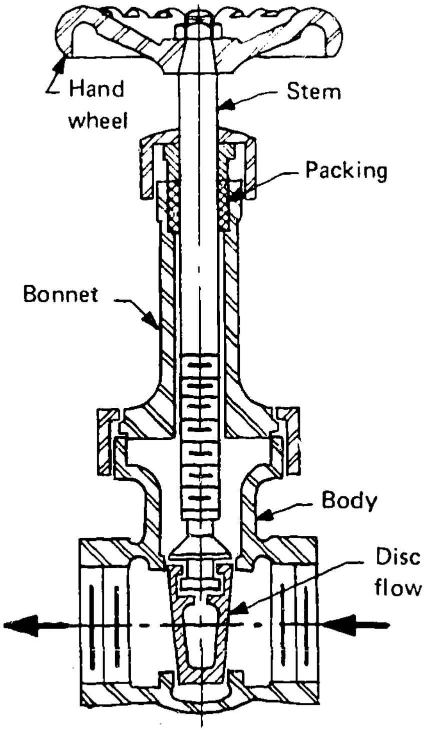
3

Valves are generally hand or manually operated, hydraulic or pneumatic operated or motor driven.

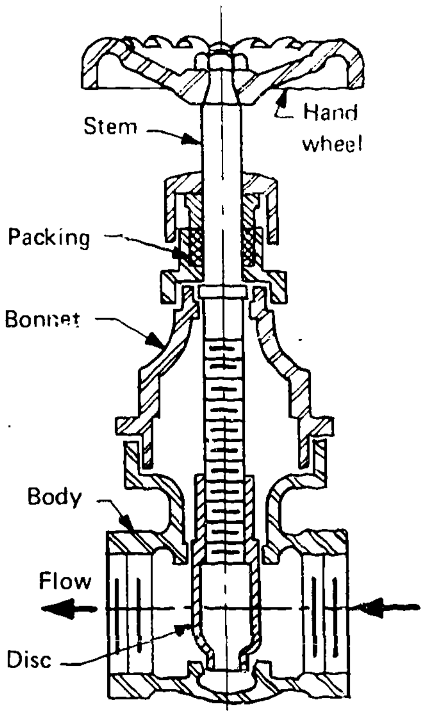
Hand-operated valves have a hand wheel or lever for operating. Some valves in inaccessible places have a chain loop around a notched wheel. These valves are operated by pulling the chain.

Hand-wheel valves can have either rising or non-rising stems. The stem threads of a non-rising steam valve match with threads in the gate or disc.

Sketch on blackboard



RISING STEM GATE VALVE



NON-RISING STEM GATE VALVE

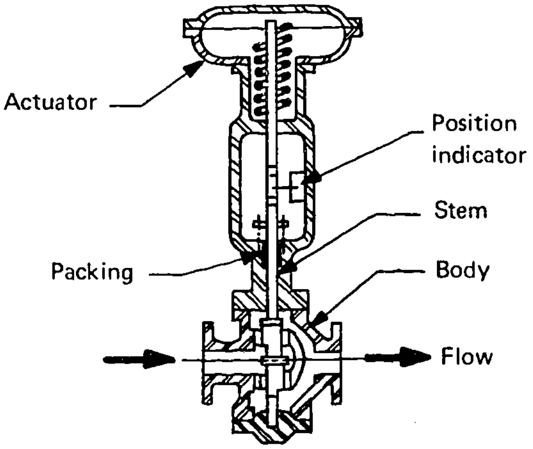
4

Automatic control

When the changes in a process variable (that is flow, temperature, pressure, etc.) are measured and the proper action is some type of valve movement, automatic control is possible. The valve movement is caused by a hydraulic, pneumatic or motor operated device.

These types of controls can be operated from locations away from the actual valve. They usually can be operated manually where the valve position is set by the operator or automatically where the process variable and the instrument set point determine the valve position.

Sketch on blackboard



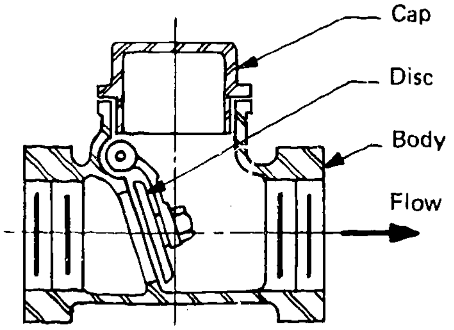
CONTROL VALVE

5

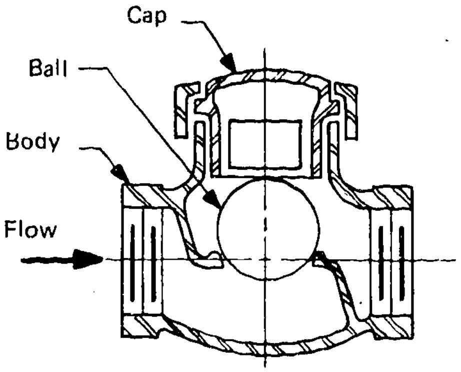
Special valves

Check valves are often found in piping systems. There is no operation of this class of valves. The function of these devices is to allow flow in only one direction. A caged ball or swing gate in the stream are common forms of these valves.

Sketch on blackboard



SWING CHECK VALVE



BALL CHECK VALVE

Safety valves are also found in piping systems. Again there is no operation of these valves. They are installed to relieve excess conditions, usually pressure. Many safety valves are spring loaded plugs that open when their set conditions are exceeded.

6

Piping systems are connected to storage tanks or process vessels. The system may also have pumps, meters, strainers, vents or drains, and washout connections.

7

Operations

Flow in pipe systems may be either continuous or intermittent. The flow rate may be continuous and closely controlled as in a process operation. Intermittent flow, as when filling a tank, is usually at the system flow capacity.

Most hand-wheel valves have a clockwise rotation to close. Counter-clockwise rotation opens the valve. Resistance is felt as the valve comes either completely open or closed. The position of a rising stem valve can be checked by the extension of the stem beyond the hand wheel. Valve positions can be reproduced by counting the number of complete wheel rotations ("turns") from the closed position to the normal operating position. This is most effective with globe valves because the flow is near linear. Gate valves are poor because after they are about 1/3 open, further opening gives little additional flow.

The position of ball and butterfly valves is usually indicated by the lever position or a mark on the end of the stem.

Automatic valves with sliding stems usually have indicator scales with a pointer on the exposed portion of the stem.

8

Operating duties

Before starting a fluid flow, the pipe system must be inspected. The valves in the system are set to properly direct the flow. Drains and vents are closed to prevent loss or hazard from spills.

During operation, the proper flow rates must be maintained by observing meters and adjusting valves. The source vessel levels should be checked to make sure of an adequate supply of material. The pipe system should be inspected for leakage, excessive vibration or unusual sounds.

Gaskets can fail without warning. Vibration can wear or break pipe. Noise is an indication of abnormal flow conditions. Sometimes the valve element comes off its stem. This condition can be recognized as the handwheel turns easily and no change in flow rate occurs.

Proper shutdown of a piping system can save much time and trouble. Some fluids require that the system be emptied. The usual steps are to drain or flush the system and then close block valves to keep the lines empty.

9

Preventive maintenance

Leaky gaskets or joints should be promptly repaired by either tightening or replacement.

Pipe vibration or unusual noise should be reported. Flow control valves that operate completely open or require use of bypass valves should also be reported.

A frequent problem encountered are valves that fail to completely shut off flow. Valves should not be forced closed but only tightened moderately. Excessive closing force will twist off the stem or ruin the valve internals. These conditions mean the valve needs repair.

The packing on valves should be tightened only enough to stop leakage. Too much tightening makes the valve hard to operate. Valves should be repacked when two-thirds of the adjustment is used.

10

Lubrication

A piping system requires little lubrication. Many automatic control valves have stick lubrication of the stem. Coating the threaded stem of manually operated valves with grease eases their operation and prevents corrosion.

11

Many materials handled in piping systems are hazardous. Knowledge of the fluid in each line is necessary for safe operation.

Leakage of fluids can spray acids or hot solutions. Good eye and hand protection is needed when operating valves as the stem packing may leak. Valves should be opened and closed slowly to avoid pressure surges.

Some liquids, such as ammonia, create high pressures when trapped between block valves. Never close such materials between valves without releasing the pressure.

Cleaning open end pipes should be done from the side in case flow comes out the pipe end.

Hoses and their connections are a source of danger. Use only good hose that is designed for the intended use.

Never disconnect a hose that is under pressure.

WHAT TO DO | WHAT TO SAY

1

Introduction

Filtration involves separating solid particles from a fluid. In the broadest sense, the fluid may be a liquid, gas, or mixture of the two. We will take up the separation of solid particles from a gas first.

2

There is a great variety of equipment for the treatment of process dusts which were covered in chapter 4. We will talk about equipment here for the elimination of atmospheric dust.

Air filters are employed in the elimination of atmospheric dust.

Process dust concentrations may run quite high, while atmospheric dust concentrations are generally below five grains per 1,000 cubic feet. Such dust, however, can do a great deal of damage and has a nuisance factor unless it is removed.

3

Write on blackboard Viscous filters

Air filters may be classified in three groups: viscous, dry or automatic.

Viscous filters are so called because the filter medium is coated with a viscous material to retain the dust. These units are usually made up of small cells fitted together to form a large unit.

Note material of construction

The filter pad may consist of such materials as glass fibers, animal hair, wood shavings, corrugated paper, split wire, or metal screening. The cell may be removed, cleaned, reoiled, and then placed back in service.

Other types are discarded once the maximum allowable dust load has accumulated.

4

Dry filters

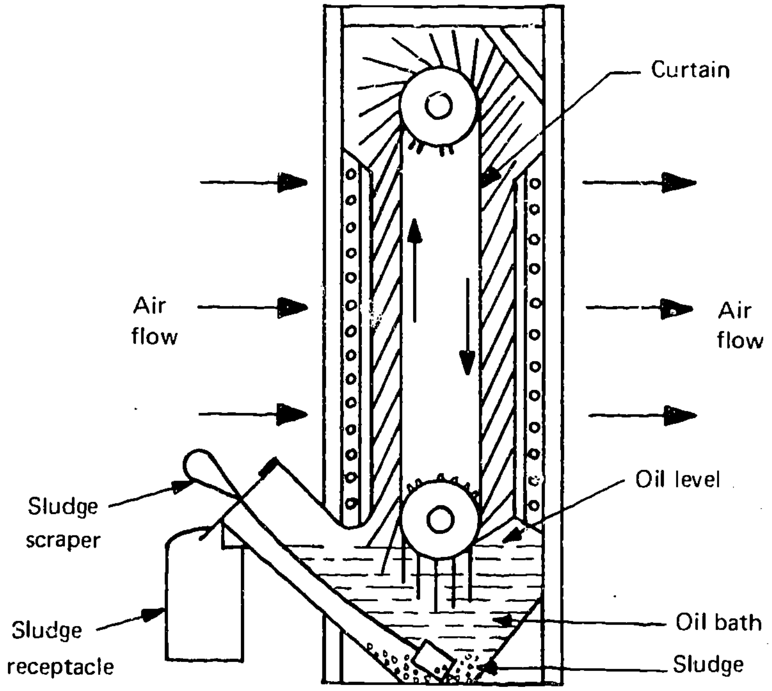
Dry filters are somewhat similar in size to viscous filters, except that the depth is greater. They generally are sheets of cellulose pulp, cotton, felt, or spun glass.

Some types, such as those made of felt, can be cleaned and used over. Most of the time, however, they are replaced with new filters.

5

Automatic filters, as the name implies, are those in which the cleaning operation is essentially continuous and automatic.

Sketch on blackboard



The oil bath serves to rinse out the dust and coat the screen with a fresh film of oil.

6

Operating duties

The matter of a proper schedule for servicing air filters cannot be over emphasized.

The pressure drop through the filter increases as dust accumulates. Of course, as the pressure drop increases, the air flow decreases and the cleanliness of the air suffers.

3058

The maximum allowable pressure drop would be from 0.20 to about 0.50 in water, depending on the type of filter medium.

7

Questions

What is the life of a dry filter handling average city air? (1 to 3 months)

What is its life in an average chemical plant? (2 to 4 weeks)

Why would you want to use an air filter on the air in[illegible] on an engine or compressor? (Would give clean air and cut down the wear on engine parts)

8

Introduction

One of the problems that we have in operating a fertilizer palnt is the separating of solids from liquids. When the amount of solid is relatively small as compared to the liquid, the process is usually called filtration.

Important types of filters are sand filters, filter presses, leaf, rotary, and pan-type filters.

9

Filter aid

For sludges that are difficult to filter, it is sometimes possible to increase filtration rate by adding a filter aid. This is a solid material, finely divided, but consisting of hard particles.

Filter aids can be made into a solution and used to coat the filter medium or mixed with the material to be filtered. They prevent the sludge from becoming so entangled in the filter medium that the resistance to flow becomes high.

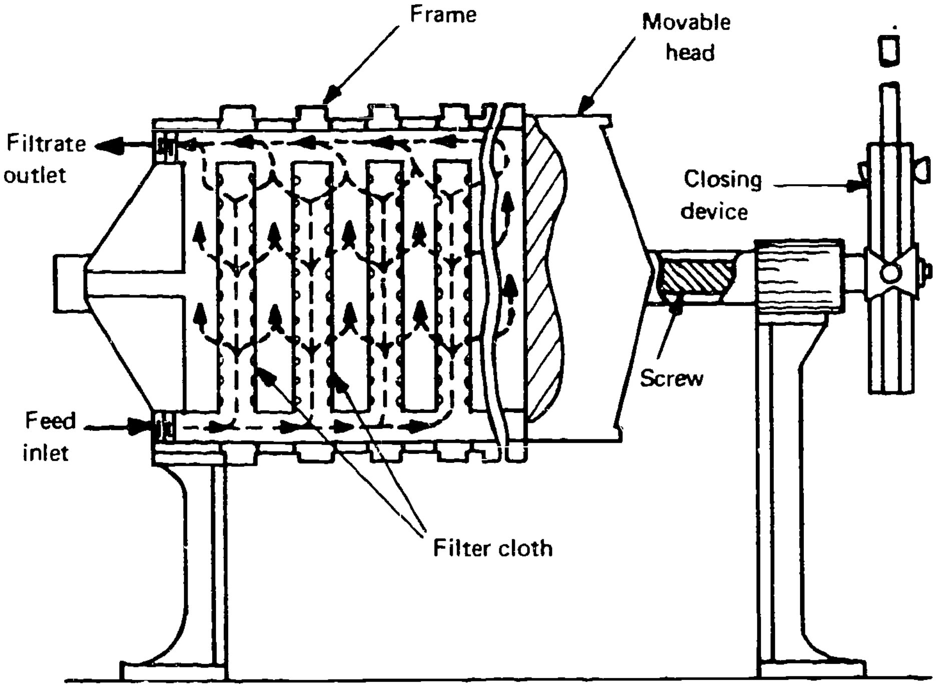
Diatomaceous earth, which is the fossil remains of sea plants, are widely used for this purpose.

10

Filter press

The traditional method of filtration is the filter press. In this method a filter cloth is placed between each plate.

Sketch on blackboard



The material is recovered by opening up the press and removing the cake from the filter cloth.

Filter aids may be used to coat the filter cloths or can be mixed with the material to be filtered.

Pressure leaf filters

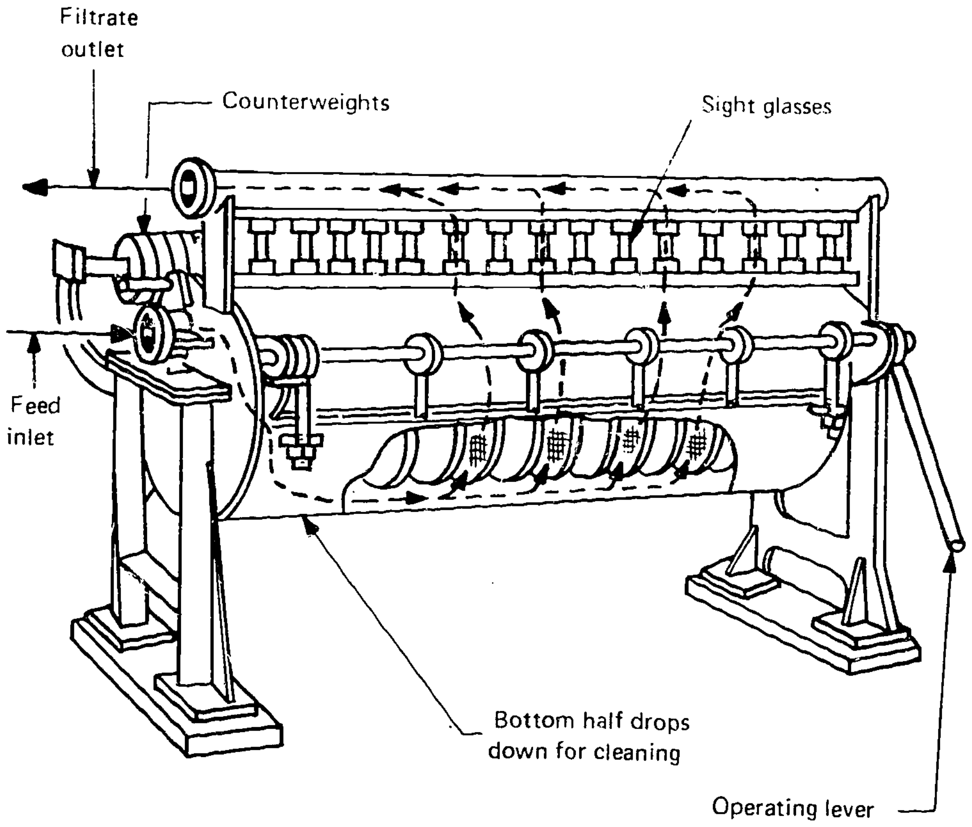
11

An improvement over the filter press is the pressure leaf type filter. The standard filter press of this type in most process industries is the Sweetland Pressure Filter. It consists of a split pressure shell with a hinged bottom.

Suspended inside is a series of circular filter leaves which drain through individual sight glass outlets.

Assuming that the cloth-covered filter leaves are in place, the filter aid solution is pumped into the leaves. When the leaves are coated, without losing pressure, the solution to be filtered is pumped to the filter.

Sketch on blackboard



Point this out

When the filtrate is clear, it is sent to the product tank. If one of the leaves does not clear up, it must have a hole in the cloth, and it is shut off.

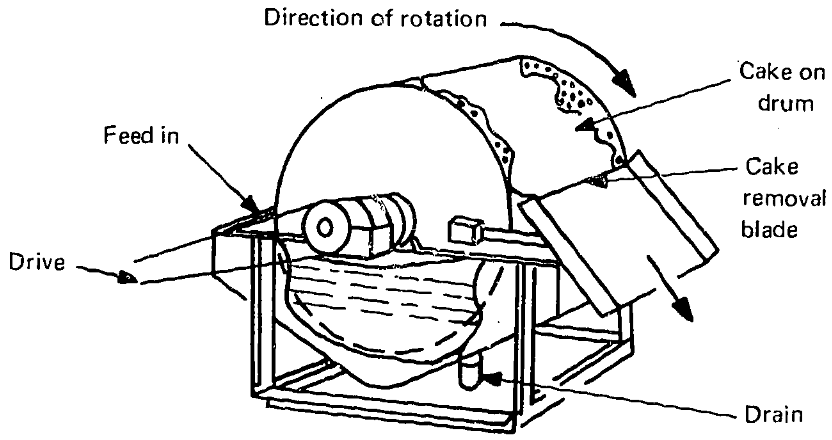
Filtering is continued until the pump pressure builds up and the flow rate of the clear solutions indicates that the filter needs cleaning.

12

Rotary filters

The oldest and most popular continuous vacuum filter is the conventional rotary drum. It consists essentially of a cylindrical drum supported in an open tank in such a manner as to allow rotation of the drum.

Sketch on blackboard



The lower portion of the drum is submerged in the material to be filtered.

As it rotates through the solution, the suction on the screen causes a cake to build up.

As the drum rotates, the cake dries.

A doctor blade removes the cake before that section of the drum is submerged again.

13

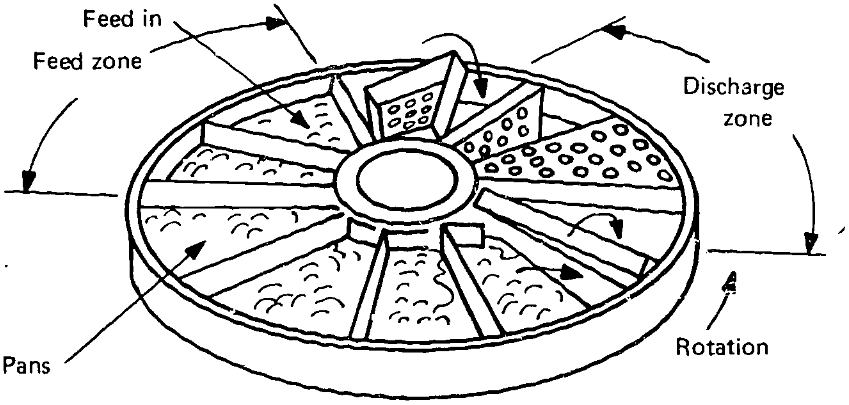
The majority of the rotary drum-type filters suffer in some respect when it comes to washing the cake.

Tilting pan filter

The horizontal table type filter gave good washing put poor cake removal. This problem was solved with the invention of the tilting-pan filter.

These filters consist of pie-shaped pans with the center portion connected to a vacuum distributor. As the unit rotate the pans are consecutively loaded with slurry, dewatered, washed and rewashed, until they are finally tilted to discharge the cake.

Sketch on blackboard



Tilting-pan filters have complete wash containment and good cake discharge. They are expensive, however, and have a lot of mechanical parts that can give trouble.

14

Operating duties

When operating a filter, watch the solution going through the filter. It is a clue as to how the filter is operating.

If it is dirty, it means that a portion of the filter is not operating properly. Locate and isolate that portion of the filter if possible.

Watch the pressure of the material going to the filter and the volume of liquid coming from the filter.

Explain how

These two items will tell you when the filter needs cleaning.

15

Preventive maintenance

Plate and frame filters and leaf filters require very little maintenance.

Depending on the material of construction, if they are going to be out of service any length of time, it might be desirable to spray the plates and frames with a preservative oil to keep them from rusting.

Filter cloths or metal screens must be changed when enough of them develop leaks so as to cut down seriously on the output of the filter.

Rotating filters should be lubricated according to the manufacturer's recommendation.

16

Safety

Care should be used when filtering materials.

If the materials are toxic, proper ventilation and respirator equipment should be obtained before operating the filter.

When starting to clean a filter, shut off feeds, relieve the pressure, and drain before opening up the filter.

Be careful that you are not splattered with liquids when the filter is opened up for cleaning.

17

Questions

What is the purpose of filter aids? (They make it possible to [illegible] the filtration rate.)

What is the advantage of a plate and frame filter? (Simplicity, inexpensiveness, flexibility, and ability to operate as either a cake filter or clarifying filter.)

About 40% submergence of the drum in a rotary drum filter is standard. Why is it not more than this? (That is about the maximum without resorting to trunnion stuffing boxes.)

18

Slides The first slide shows a plate and frame filter. Explain details

The second slide shows a Sweetland Filter. How does it differ from the Plate and Frame Filter. (The bottom half swings down to open up the filter.)

The third slide shows a rotary drum filter.

The fourth slide shows a tilting-pan filter. What are its advantages? (Good washing of the cake and good cake discharge.)

What are its disadvantages? (High cost and complicated makeup.)

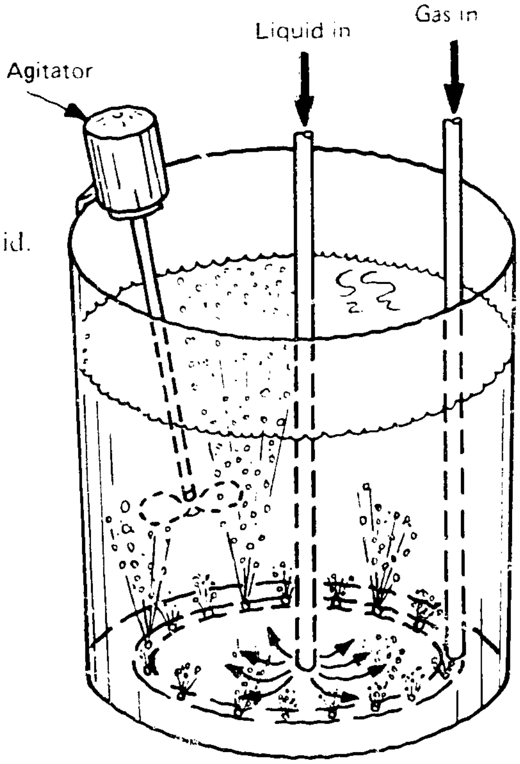
WHAT TO DO	WHAT TO SAY
	1
Introduction	The absorption of gases is an important process in many chemical plants. It is the process in which one constituent is removed or absorbed by another.
	In some processes the gas is treated with a finely divided solid. An example would be TVA's process for removing sulfur dioxide from steam plant waste gases by treating with finely divided limestone. We will confine our discussion of absoprtion to the removal of the constituent with a liquid.
Very important	In most cases the rate at which the soluble constituent passes into the liquid is rather slow. For this reason the largest possible surface must be provided for the gas to come into contact with the liquid.
	It is sometimes necessary to free a liquid from dissolved gases. This process is called stripping. An example would be the removal of carbon dioxide from solution in water.
	2
	The function of absorption equipment is to bring the gas and the liquid into direct contact so that the abscrption can take place. In most cases, when this occurs, there will be a rise in temperature. The removal of the heat evolved is an important part of the process.

3

Different types of absorption equipment are:

List on blackboard and describe each

1. Agitated vessels. These are vessels in which the gas is introduced directly into the liquid. More than likely the vessel will be equipped with an agitator in order to get sufficient contact between the gas and the liquid.



Sketch on blackboard

Sufficient time must be allowed for the reaction and absorption between the liquid and the gas.

The agitated vessel can be operated for batch or continuous operation. In almost all cases, continuous operation is preferred. It can also operate under pressure or at atmospheric pressure.

4

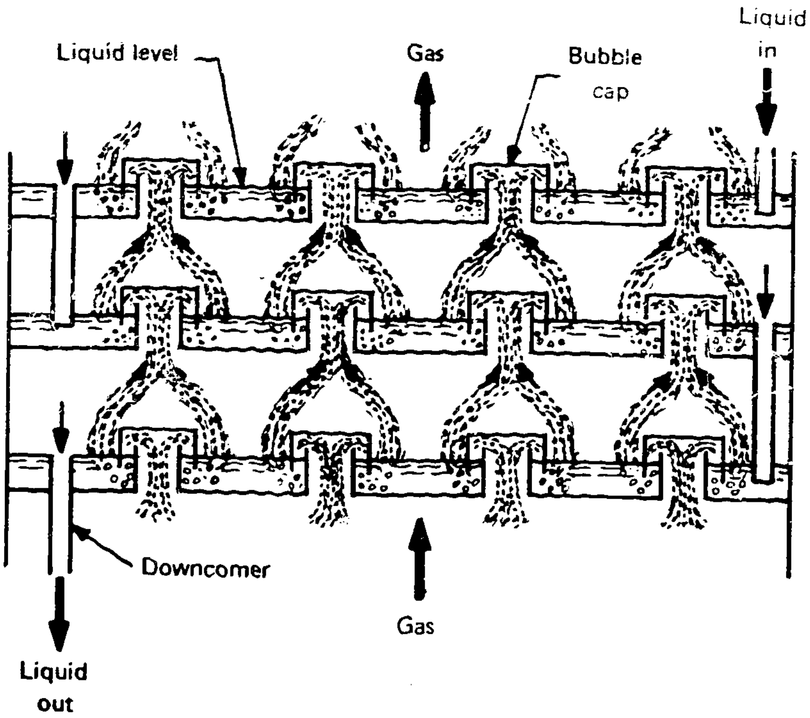
2. Bubble-plate towers. They consist of a number of shallow plates or trays over each of which the liquid flows, in turn, on its way down the tower.

The gas enters at the bottom of the tower and is made to flow through a number of bubble caps on each plate. These caps may be of various shapes. They usually take the form of inverted cups, and their edges are slotted so that the gas escapes from them into the liquid in the form of bubbles.

The absorption of a gas is accompanied by the evolution of large quantities of heat. In order to have good absorption it is necessary to dispose of this heat. Each bubble plate may have a cooling coil or pipe, or every few plates the liquid may be pumped to a heat exchanger to be cooled before returning to the tower.

The bubble-plate tower can operate under pressure or vacuum as well as atmospheric pressure.

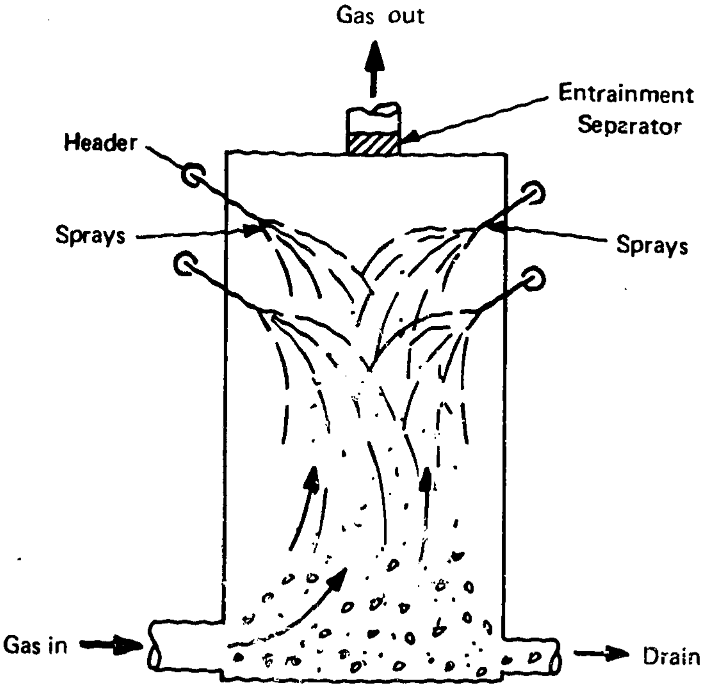
Sketch on blackboard



5

3. Spray Towers. A spray tower consists of an empty shell into the top of which the liquid is sprayed by means of nozzles of various kinds. The droplets formed are then allowed to fall to the bottom of the tower through a stream of gas flowing upward.

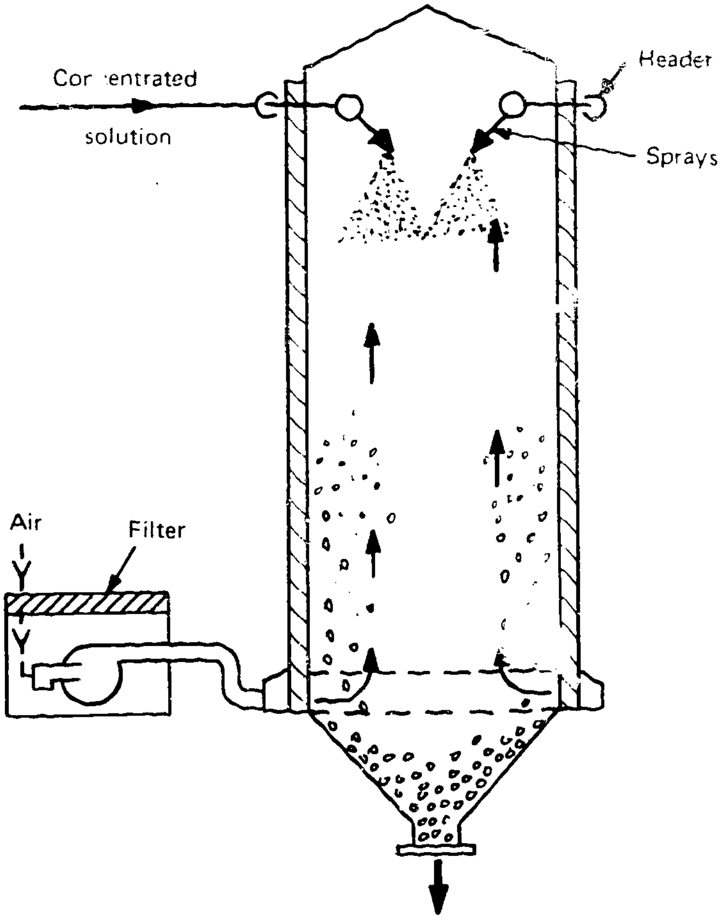
Sketch on blackboard



The small droplets tend to come together and form larger droplets, which cuts down on the efficiency of absorption in the spray tower.

The spray tower is now widely used by the fertilizer industry for ration and formation of solid ammonium nitrate and other fertilizers. Fertilizers made from the spray tower are called "prills."

Sketch on blackboard



To drying & screening

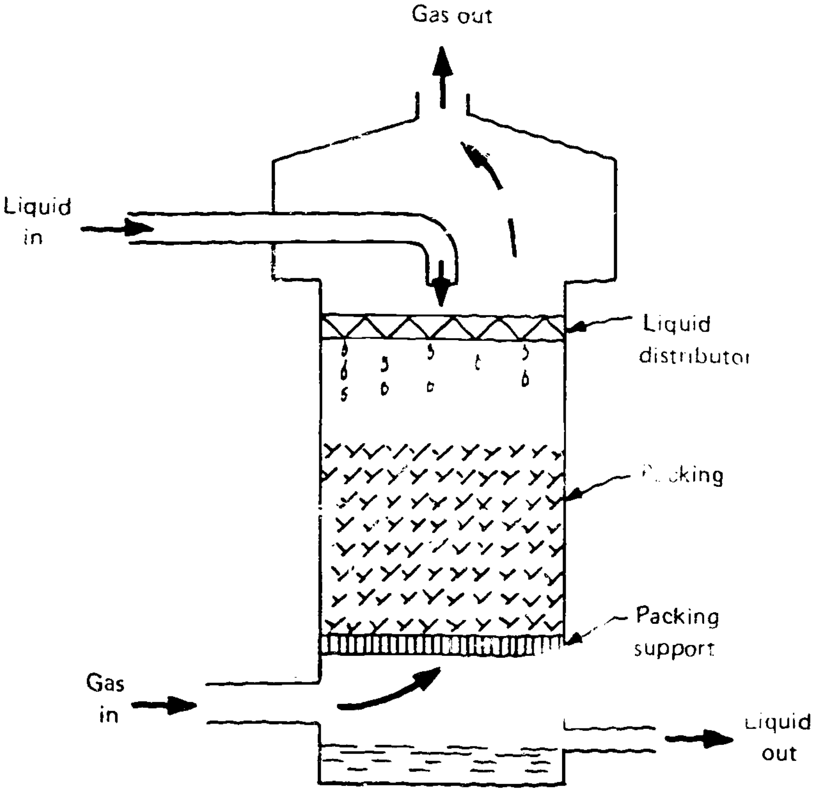
The solutions are concentrated to 95%, or higher, and sprayed under pressure from the top of the tower into a rising stream of air. The solution solidifies in the form of small spheres or "prills" which fall to the base of the tower. They are then dried, screened, coated, and shipped in bulk or as bagged material.

6

4. Packed Towers. A packed tower consists of a shell filled with a suitable material. The liquid is introduced at the top of the tower and flows down over the packing to the bottom. In this manner a large surface area is made available for the gas to come into contact with the liquid.

The gas is generally introduced at the bottom where it flows up through the tower coming into contact with the large surface area which is wet by the liquid. It is on this surface area where the gas is absorbed by the liquid film.

Sketch on blackboard



The packed tower is often operated under pressure.

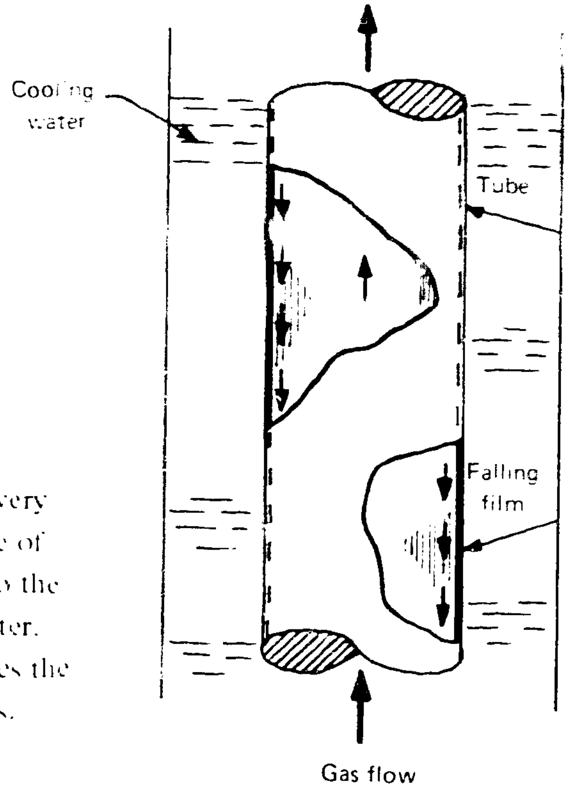
7

5. Cooler-absorber or Falling-film Absorber. When the absorption of the gas is accompanied by the evolution of large quantities of heat, an important function of the absorption equipment is to remove this heat.

This may be done by removing the liquid from the tower and cooling it with an external cooler, or using equipment in which the liquid is cooled within the unit, as in the falling-film absorber.

The gas passes up through tubes and is absorbed by a film of liquid falling down the inside wall of the tube. The cooling medium encases the tube and absorbes the heat.

Sketch on blackboard



The falling-film absorber is very compact, with the temperature of the acid produced very close to the temperature of the cooling water. One-pass gravity flow eliminates the expense of recirculating pumps.

8

Operating duties - absorbers

When operating absorption equipment, the operator coming on a shift needs to obtain information from the crew on duty as to operating rates, special conditions, or other necessary information.

He should make a round of the equipment under his care as soon as possible checking pressures, temperatures, flows, levels, and concentrations.

He should especially check the output material from his area to see that it is up to specifications. He should keep a close watch of equipment in his area. Quite often a minor correction early will prevent a major one later.

Also, if a product starts to get off specifications, a minor early correction can prevent ending up with material that has to be reworked or possibly discarded.

If there are filters in the system, watch for pressure drop across the filter and clean or replace filters before the pressure drop becomes excessive.

The skillful operator does not let conditions get out of hand. If the pressure, temperature, flow, or lack of flow, vibration, or even the sound of the equipment changes and he does not know why, he starts [illegible] to find out what is wrong.

Good absorption operation cannot be obtained unless there is adequate cooling. The operator should keep this in mind and should check to see that there is sufficient flow to the coolers and that the coolers are operating properly.

When the equipment is off the line, this is an excellent time to inspect areas for repairs that are not accessible when it is operating. A good operator never lets up on his housekeeping. A clean and orderly area is one of the very best clues as to the type of operator in charge of that area.

9

Operating duties - spray tower

When operating a spray tower, the operator must keep a close watch on the concentration and temperature of the liquid being sprayed in the tower. This, of course, means watching the neutralizer and evaporation and concentration systems.

He should keep a close check on the sprays for proper operation. If they are partly stopped up, good drying will not be obtained in the tower. This, in turn, will give a product that will cake.

It is also important that the flow of air up through the tower be maintained. When this is done, firm "prills" will be formed that can be removed and dried without the product breaking down to fines.

The good operator, after obtaining information from the operator that he relieves, makes a tour of his area to see that conditions are satisfactory. He learns from experi[illegible]t what to check and what he can pass by. If something is not n[illegible] he takes steps to correct it and not let it go.

He should never let leaks in steam, air, water, or process lines go unrepaired. Such leaks, if allowed to continue indefinitely, will cost many times what it will take to repair them.

The operator should keep his operating area clean and orderly. A little housekeeping effort each day will usually be sufficient to maintain a clean area.

3071

10

Preventive maintenance

Good preventive maintenance depends a lot on good inspections.

Take advantage of down time to make repairs. This could save you a shutdown for repairs later.

Some reactions are very corrosive. Watch these areas and replace or repair as often as necessary.

Do not hesitate to call for help if some special technique is necessary, such as special instruments, in order to determine what might be wrong with a piece of equipment.

11

Lubrication

One of the most important duties that the operator has is the lubrication of the equipment in his area. If not watched carefully there is the tendency to assume that the other shift is doing the lubrication, and, as a result, no one does it.

Regardless of who is assigned the lubricating duties, the operator should make sure that the equipment has proper lubrication during his shift.

He should check oil levels, oil pressure, and oil temperatures, and bearing temperatures during his shift.

He should pay close attention to the sound of the equipment operating. Sometimes this will give evidence of poor lubrication.

12

Safety

The thought of safety should ever be present in the operator's mind. Never take shortcuts that might endanger you or one of your fellow employees.

The fertilizer plant operator must always remember that fires and explosions happen every day, and this can happen to him.

He must keep in mind that he is working with chemicals which are toxic, will explode, and will injure him should they come in contact with his body.

He must remember that when repairs are being made quite often the safety of the repair crews is in his hands.

It is up to the operator to see that safety devices are working properly in his area by following instructions in checking them. He should follow safety regulations prescribed for his area and see that others who come into his area do the same.

13

Questions

What is absorption? (It is the process in which one constituent is removed by another.)

Is stripping the opposite of absorption? (Yes)

What is the function of the absorption equipment? (To bring the gas and the liquid into direct contact)

Generally, what happens to the temperature when absorption takes place? (It rises)

When absorption takes place in a vessel being agitated, the temperature rises. True or false? (True)

Is the pressure drop through a bubble-plate tower higher than through a packed tower? (Yes)

Why? (Because the gas has to force its way from under each cap through the pool of liquid on each tray)

What is the main purpose of the spray tower in the fertilizer plants? (For the formation of solid fertilizer particles called "prills")

If the liquid rate for circulating through an absorption tower were low, would you use a packed tower or bubble-plate tower? (Bubble-plate tower)

Why? (Because a low liquid rate probably would not wet the packing in a packed tower)

14

Show slides

The first slide shows a packed tower constructed of brick.

Point out main features of each tower

The second slide shows a bubble-plate tower on a pressure nitric acid unit.

The third slide shows a spray tower.

The fourth slide shows a falling-film type of absorber.

Chapter 13: AGITATION AND ITS IMPORTANCE

WHAT TO DO

WHAT TO SAY

1

Introduction

Agitators are used in the process industries to produce irregular disturbances or turbulent motion within a fluid. Agitators find widespread use as a means of promoting operations such as:

1. Extraction
2. Mixing
3. Absorption
4. Heat transfer
5. Chemical reactions

2

Agitation in extraction process

Wet-process phosphoric acid may be produced from phosphate rock and sulfuric acid. The almost complete extraction of P_2O_5 from the rock would be impossible without adequate agitation.

In the reactors, agitation keeps the slurry essentially homogeneous. The sulfate concentration is kept low so that complete reaction will occur. With low sulfate concentrations the acid will react with the rock, produce phosphoric acid and gypsum, and the two products go into the liquid phase.

Without agitation there would be areas in the reactor where the sulfate concentration would be zero. Others areas in the reactor would contain extremely high sulfate concentrations. Of course if the metered rates of rock and sulfuric acid are correct, the average sulfate concentration in the vessel will be what is desired.

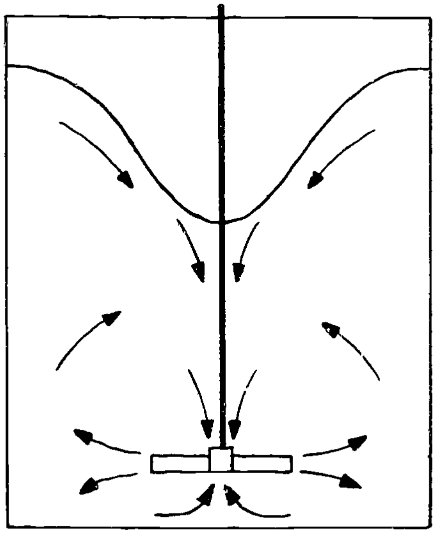
The results of such an operation would be highly undesirable. In the areas in the reactor containing the high sulfate concentrations, virtually no extraction would occur. The reaction is so rapid that the gypsum formed coats the rock particles. Once the particles are coated with the insoluble gypsum, no further reaction occurs. Therefore, this unextracted rock is lost with the byproduct gypsum.

Another adverse effect of the high sulfate concentration concerns the crystal size of the gypsum. High sulfate concentrations tend to produce an excessive number of small crystals instead of a small number of large crystals. The small crystals are difficult to filter and wash because they can hang in the filter cloth openings and blind the cloth.

Sketch on blackboard

To overcome these difficulties agitators are employed. Most commonly used are the turbine agitators. In the simplest form, the turbine agitator consists of a shaft with straight blades welded to the shaft. The shaft may be rotated at high or low speed. The speed depends on the nature of the material being mixed and on the shape and size of the vessel.

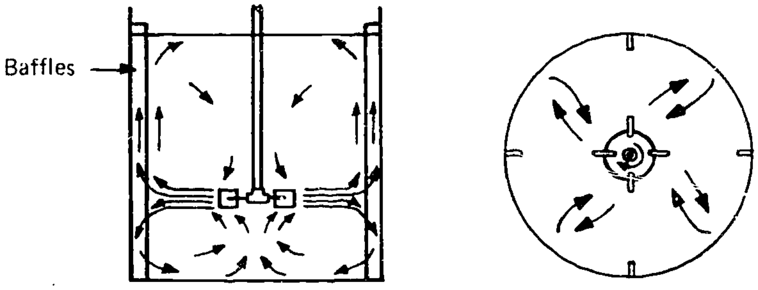
A turbine agitator in a tank would produce a pattern in the tank as shown in the sketch:



FLOW PATTERNS WITH AN UNBAFFLED TURBINE IMPELLER

Sketch on blackboard

At the tank wall the fluid moves in a circular motion. To provide additional agitation baffles are fixed to the tank wall producing patterns as below:



SIDE VIEW BOTTOM VIEW

FLUID FLOW PATTERN FOR TURBINES WITH BAFFLES

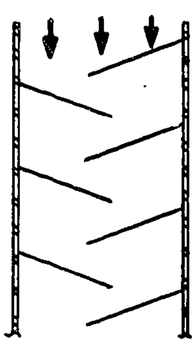
3

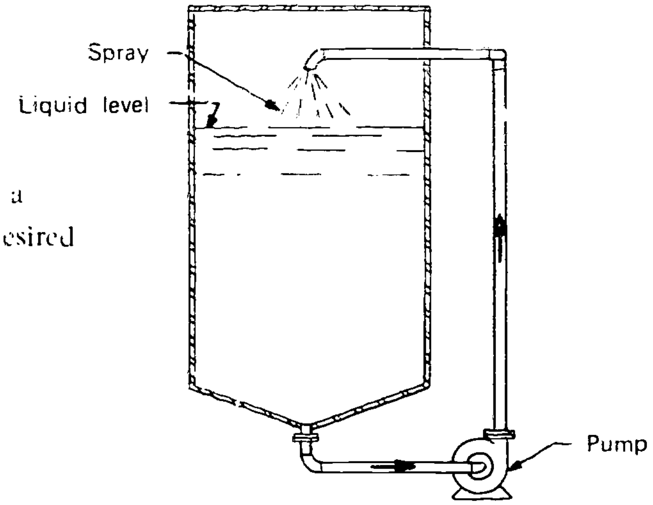
Agitation in mixing process

The mixing of liquids with solids, solids with solids, or gases with liquids would be most difficult without agitation.

Sketch on blackboard

The mixing of solids requires agitation of the various solids. Mixing may be accomplished in a vessel with paddles or in a pug mill. Solids may be mixed by passing the material through a blending tower. The agitation of the solids is caused by their flow together across and around baffles in the tower.





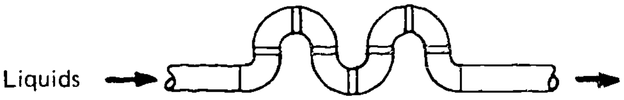
PUMP AGITATION

Sketch on blackboard

For mixing two liquids, a pump might provide the desired degree of agitation.

For liquid of low viscosity, a series of 90° bends in the pipe line are sometimes sufficient.

Sketch on blackboard



PIPE AGITATION

For mixing gases and liquids, pumps, turbine agitators, and propeller agitators are sometimes used.

4

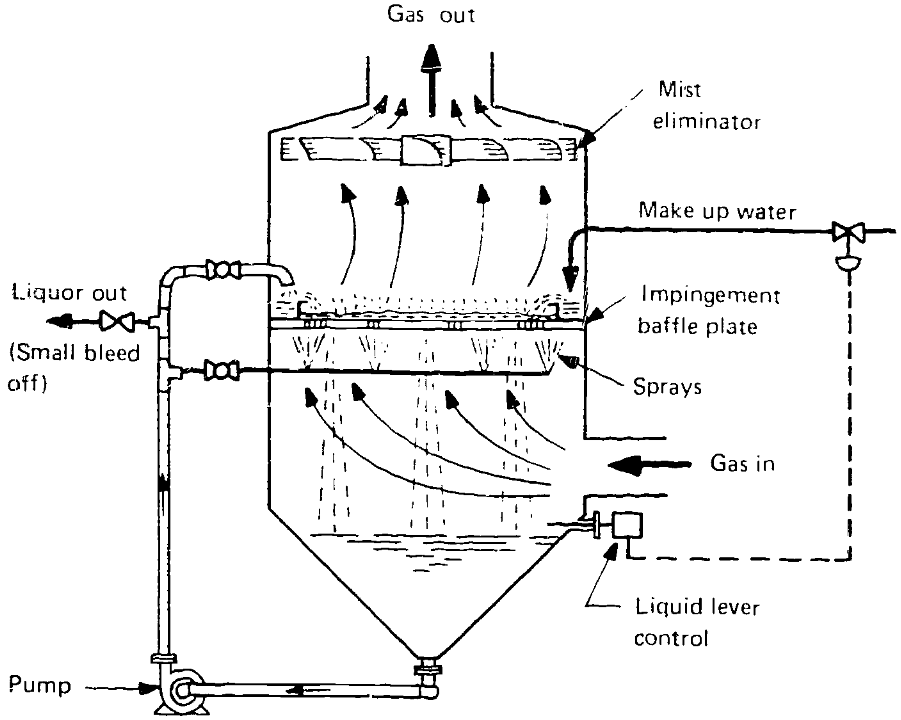
Agitation in absorption processes

A good example of absorption in fertilizer plants is in removing fertilizer dust from air streams. For this operation, wet scrubbers are often used. The dust-laden air stream is blown through a wet scrubber. In the scrubber the dust is dissolved in the solution as the air is blown through the solution.

The air bubbling through the solution provides agitation to increase the rate at which the fertilizer dust is dissolved. Without agitation, the fertilizer dust would dissolve very slowly leaving the dust in suspension. The suspended matter would have a tendency to settle out and plug up the scrubber.

3076

Sketch on blackboard



Of course, in wet scrubbers, some of the agitation necessary is provided by recirculating the scrubber solution through pumps.

In many cases absorption is also accompanied by chemical reaction as in the production of nitric acid. The oxides of nitrogen produced in the converter are absorbed in packed towers or bubble cap towers. As the nitrogen oxides are absorbed, they react with the water present to form nitric acid. The unabsorbed gases passing through the liquid provide agitation of the liquid producing a homogeneous liquid on the tray.

5

Agitation in heat transfer

Without agitation the transfer of heat would be seriously affected. By placing a steam coil in a tank of solution very little heat is transferred from the coil to the solution. The liquid next to the coil is heated to the approximate coil temperature. As the liquid approaches the coil temperature, heat transfer decreases as there is no longer any driving force.

Coil in tank

If, however, there is some means of replacing the hot liquid next to the coil with cold liquid, there then will be a driving force for the transfer of more heat. This is the purpose of using an agitator. The agitator continually replaces the heated liquid next to the coil with cooler liquid so that heat will be transferred.

In the case of an open tank, agitation may be provided by a turbine, propeller, air lance, or circulation with a pump.

Shell and tube exchanger

For shell and tube exchangers, the agitation is provided by pumping the liquids through the exchanger at adequate velocities. Particles in liquids flowing at low velocities tend to flow in straight lines parallel to each other and to the pipe wall. This is called Laminar Flow. There is no vertical or horizontal mixing of the liquid in the pipe.

If heat transfer is attempted, with this type flow, only the liquid adjacent to the tube wall is heated. Essentially the same conditions exist here as in the heating coil immersed in the tank without agitation.

By raising the liquid flow rate in the tube above a certain minimum, the nature of the flow is completely changed. No longer do the liquid particles travel in straight lines parallel to the tube wall. Particles now travel in random directions in the tube and the total contents of the tube are completely mixed. The hot layer next to the tube wall is continually being replaced with a cooler layer.

Sufficient agitation for efficient heat transfer then is provided by using a pump of adequate size to stay above the desired minimum velocity. When above this minimum rate, the flow is called "viscous" flow.

Gas - liquid

When transferring heat from a gas stream directly to a liquid stream, the gas may be bubbled through the liquid. The agitation necessary for good heat transfer is provided by bubbling the gas from a distributor, such as a drilled pipe. In general, the smaller the bubbles produced the better the heat transfer. This is because many small bubbles have much more surface area than a few larger bubbles. Heat transfer is dependent on the area of contact.

6

Agitation in chemical reactors

Chemical reactions in liquid or solid phases depend on agitation. To react, two materials must be brought into contact with each other. Nitric acid cannot react with phosphate rock until the two are brought together. If phosphate rock is placed in a beaker and nitric acid is poured into the beaker only the acid in direct contact with the rock will react. The reaction products will then remain in the vicinity of the rock to prevent further contact between acid and rock. If, however, the contents of the beaker are stirred the reaction products are continually washed away so that the rock and acid can again get together.

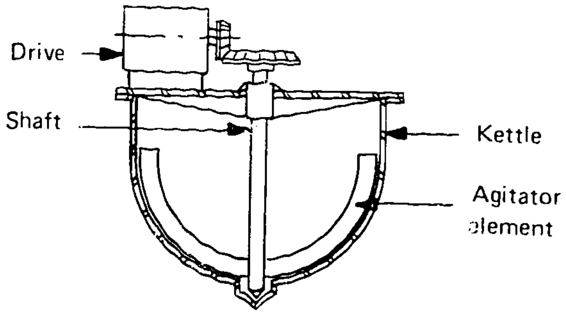
Only some types of agitators have been mentioned in connection with the various operations discussed. Many other types are available; some are listed below.

7

Horseshoe agitator

The horseshoe mixer is used in "kettles" usually for heavy duty such as grease mixing, cake dough, etc. The agitator element conforms to the container wall and keeps the wall scraped clean.

Sketch on blackboard

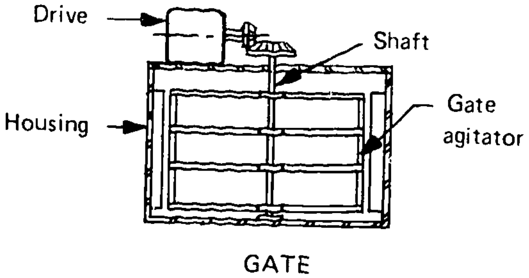


HORSESHOE

Gate agitator

The gate type agitator consists of a shaft with what looks like a gate attached. This type agitator is generally revolved slowly and may be used for mild agitation such as keeping solids in suspension.

Sketch on blackboard

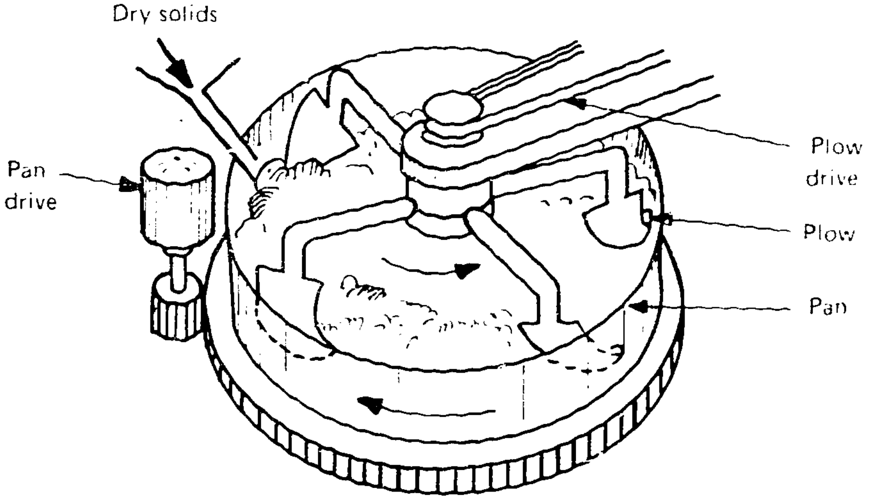


GATE

Pan mixer

Pan mixers consist of a rotating pan and rotating plows. The plows continually turn the solids over and mix them. It is good for mixing dry powders or granular solids.

Sketch on blackboard



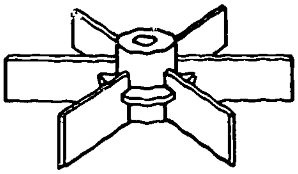
8

Turbine and propeller agitators

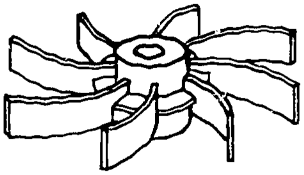
Of the various agitators mentioned the most commonly found ones are the propeller or turbine agitators.

The turbine agitators may have blades which are straight, angled, backswept or shrouded.

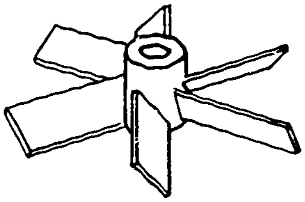
Sketch on blackboard



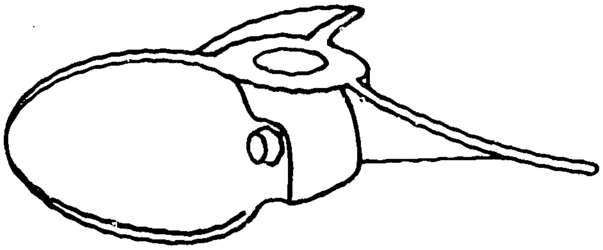
STRAIGHT BLADE



CURVED BLADE



PITCHED BLADE



PROPELLER

Due to its simplicity and ease of construction, the straight-bladed turbine is the most common.

3080

9

Agitator operation

Agitators may be provided with ampmeters to determine the consistency of the material being mixed by observing the load on the agitator motor. one can sometimes tell if the level in the vessel is above or below the agitator. If the impeller should come loose from the shaft the motor loading will drop.

If the blades become bent. excessive vibration may cause damage to the motor and speed reducer.

When using a sparger for agitation observance of pressure change in the sparger will tell you when one sparger is stopped up.

For movable propeller-type agitators the agitator can be moved within the vessel for best mixing.

An agitator motor should be kept clean to prevent overheating.

Agitator shafts and blades should be frequently checked for both erosion and corrosion.

Lamps or buildup on the agitator can cause unbalance. seriously damaging equipment.

Starting an agitator in an over-filled tank can cause spillage.

Starting an agitator in a cake of solids can break the agitator or burn up the motor.

Changes in process conditions can indicate a loss of agitation. When using a pump for agitation, stoppage in the line will lower the degree of agitation. Loss of agitation when using a sparger may indicate corrosion of the sparger holes.

When pumping from an agitated tank containing solids. stoppage in the pump suction line may indicate loss of agitation in the tank.

When using temporary spargers, it may be best to remove them from a vessel before cutting them off to avoid plugging.

Buildup on pan mixers may indicate the scraper blades need replacing.

Permanent spargers that enter the tops of tanks should have bleed-off valves where there is a possibility of backing material up in the line and stopping it up.

10

Preventive maintenance

The equipment should be kept well lubricated. Oil levels in speed reducers should be maintained.

If mechanical seals are used on pressure vessels they should be adequately lubricated.

Checking the agitator impellers for tightness on the shaft can prevent serious damage to the equipment.

Noisy bearings on motors or speed reducers indicate a need for repair to prevent equipment damage.

11

Safety

Prior to entering a vessel with an agitator, the agitator switch should be pulled and a hold tag placed on the switch.

Avoid wearing loose clothing near an agitator shaft that is moving. Shaft keys can rip off clothing or cause serious accidents.

In open tanks, care should be taken to avoid splashing when the tank level is being raised or lowered. Impellers near the liquid surface can cause serious splashing.

Never rod into a tank with a moving agitator.

Watch for buildup of solids on tank walls. Solids may completely fill the space between baffles. This will lower the degree of mixing in the tank. It may be necessary to dig out the solids.

Steam or air spargers in tanks with agitators can hang in the blades if moved about. Temporary sparges should be fixed in the tank.

12

Questions

In heat transfer operations, why is agitation necessary? (To replace the hot layer of material next to the coil with cooler material)

In reacting chemicals why is it best to agitate the mixture? (Increase the speed and efficiency of the reaction)

Why should agitator motors be kept clean? (Prevent overheating)

If an ampmeter on an agitator suddenly drops, what could this indicate? [(1) Shaft broken, (2) Impeller loose on shaft, (3) Speed reducer damaged, (4) Tank level below impeller, (5) Ampmeter bad]

If agitator ampmeter fluctuates wildly, what could this indicate? [(1) Motor damages, (2) Speed reducer damaged, (3) Buildup on shaft or impeller causing imbalance, (4) Bent shaft or blades, (5) Buildup in tank being struck by agitator]

What are the most common types of agitators? (Turbines and propellers)

In baffled tanks, why should solids between the baffles be removed? (Better agitation)

A pressure drop in a gas sparger may indicate what conditions? (Enlargement of the outlet holes due to corrosion)

A pressure increase in a gas sparger may indicate what condition? (Plugging of the sparger holes)

13

Slides

This slide shows a turbine agitator used in production of ammonium polyphosphate.

This shows a pumping arrangement used to agitate solution in a storage tank.

This is a lighting mixer. It is a small portable agitator used for many mixing jobs.

Chapter 14: OVERHEAD CRANES

WHAT TO DO | WHAT TO SAY

1

Introduction

Overhead cranes are used to lift and move solid materials, supplies, and equipment from one location to another.

Their most frequent use in fertilizer plants are the unloading of raw materials to process, the moving or loading of solid intermediates and solid by-products in the process, and the moving or loading of solid fertilizers for storage or shipment. In each of these instances a clamshell bucket is used on the overhead crane to perform the job required.

Cranes are also frequently used to move equipment to allow repairs to be made and to move supplies to the point of use. Usually the clamshell bucket is replaced by a hook for these jobs. In a few instances magnets are used instead of hooks.

2

Overhead cranes are classified in numerous ways and are of several types. One way is by use—continuous, intermittent, or occasional.

Another is whether they are stationary or traveling. If traveling, they may have stationary or traversing lifting mechanisms.

Still another way to classify is by their speed of travel or by their ruggedness of construction. Probably the most common classification is by lifting capacity and span.

3

They come in many sizes and perform many functions, but most are made of the same basic components:

List on blackboard

1. Rails to support the crane and usually to allow movement.
2. A power supply to the moving crane.
3. A crane bridge to span the area to be serviced and to support the lifting mechanism.
4. Controls to allow operation of the crane.
5. Devices to move the crane and to hoist the load.

3084

4

Rails

Rails similar to railroad rails are provided on opposite sides of the area to be served to allow movement of the crane. These rails must have sufficient support to hold up the crane and its load and mu [illegible] low easy movement of the crane.

The travel of the crane is parallel to the rails an [illegible] ull length of the rails. Thus, placement of the rails determines the area to be serviced.

5

Power supply

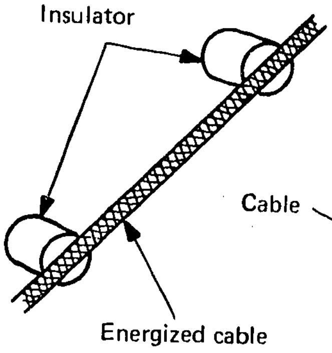
Supplying electric power to the crane in many cases is one of the difficult problems of crane design and one of the most frequent sources of needed maintenance.

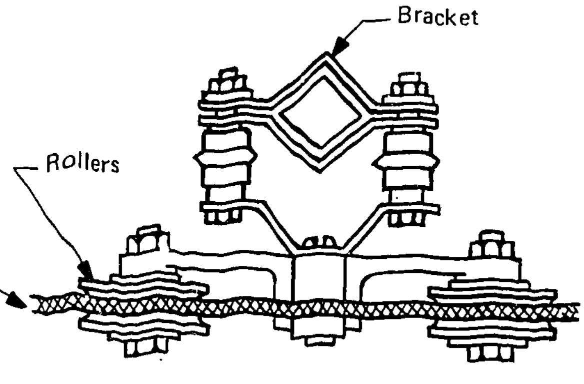
This is a problem because many cranes move over a large area at a rapid rate. Power is normally supplied in one of two ways.

In one method, stationary rails or cables extended the full length of the crane travel, are energized with electricity (a "hot" rail).

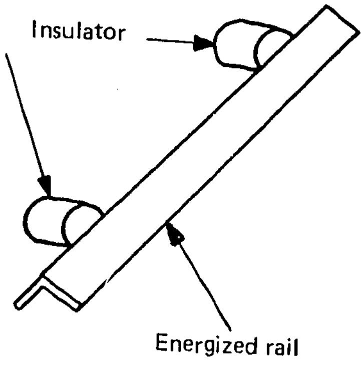
Contactors are then mounted on the traveling part of the crane. As the crane moves these contactors slide or roll along the hot rail and the electricity flows through the contactors to electric wiring on the moving part of the crane.

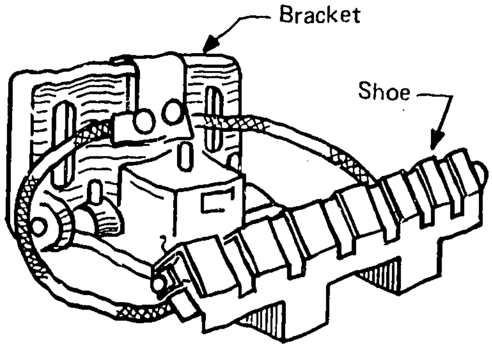
Sketch on blackboard





ROLLING CONTACTOR



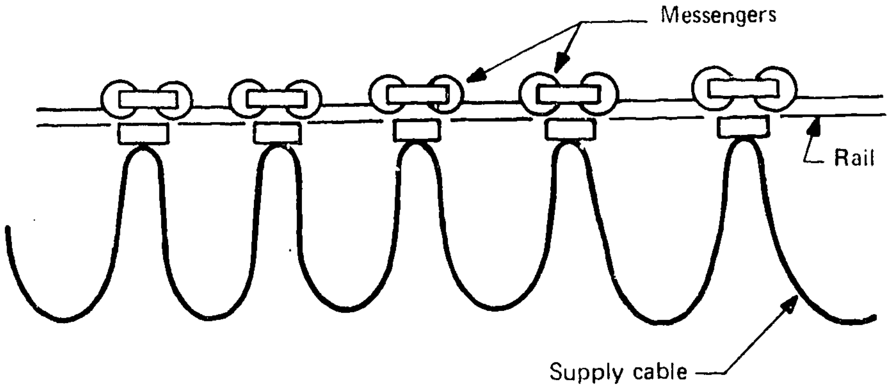


SLIDING CONTACTOR

The second method is a long supply cable attached to the moving part of the crane to supply power.

Attachments to take up or let out loops of this supply cable as the crane moves keep the long cable from hanging free and becoming a nuisance and source of danger.

Sketch on blackboard



6

A similar problem exists in transferring power to the hoisting mechanism when this mechanism also travels.

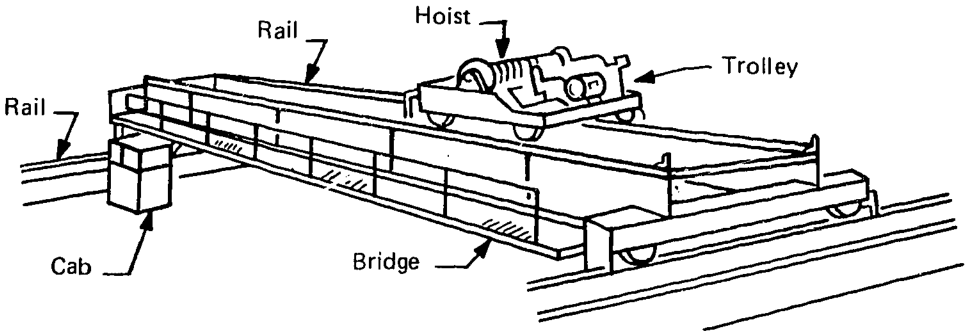
In many cases movement of the hoisting mechanism is perpendicular to the movement of the crane. The same two methods are used to transfer power to the hoist mechanism as are used to supply the crane with power.

7

Bridge

The crane bridge can span widths of as little as a few feet or widths of more than 100 feet. This bridge must support all moving parts of the crane and the load.

Sketch on blackboard



Wheels are attached to the bridge to allow it to roll on the crane rails. These wheels are similar to the wheels on railroad cars.

The wheels can be straight or tapered; tapered wheels have the advantage of keeping the crane bridge squared with the rails.

8

Frequently there are rails on the crane bridge to allow the lifting mechanism to traverse back and forth across the bridge. This movement gives much more complete coverage of the a[illegible] serviced.

9

Controls

Controls are for all movements of the crane and for the lifting and lowering of the load.

Normal control is maintained by regulating the speed of the motors driving the crane and of the motors lifting the load. However, brakes are provided on both systems to give more complete control when it is necessary to use them.

10

Frequently an enclosure (cab) for the operator and his controls is provided on the crane bridge. In this case, the operator moves with the crane.

These cabs can be heated and air conditioned to make them quite comfortable even in difficult working conditions. Of course, this also serves the purpose of protecting the operator from fumes and dust.

Sometimes radio communication is provided in the cab so that the operator can receive and give instructions.

11

Crane movement

Separate motors are used for crane movement and for lifting the load. The crane movement is provided by a drive shaft that connects a motor to some of the wheels (drive wheels), usually through a chain of gears in a speed reducer.

The shafts or axles through the drive wheels are more likely to break and cause a maintenance problem than the shafts or axles in the idler wheels that support the rest of the bridge.

When the hoisting mechanism has traverse motion, a separate motor provides power in an arrangement similar to the one just described for movement of the crane.

12

The load-lifting motors supply power to rotate drums that have steel cables attached. These cables wind around the rotating drums to raise or to lower the load.

Usually there are two drums and the cable will be fully wound on one drum when the load is in the up position. The reverse is true and the cable will be wound around the other drum when in the down position.

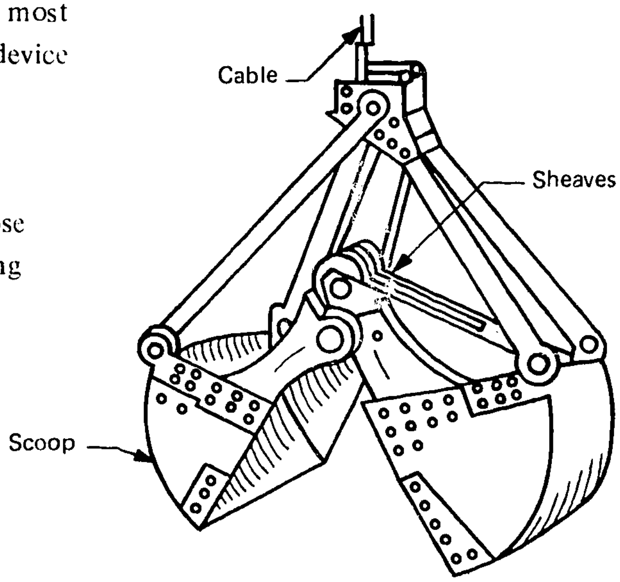
Normal drum design is to have a maximum of one layer of cable on a fully wound drum.

13

Sketch on blackboard

Clamsheel buckets are the most frequently used load-lifting device in fertilizer plants.

Cable arrangements allow the operator to open and close these buckets to allow picking up or discharging the load.



CLAMSHELL BUCKET

Hooks, slings, magnets, and other devices are used less frequently than clamshells in fertilizer plants.

14

[illegible]ting

The measure of a good overhead crane operator is the amount of material he can move safely without damaging his equipment.

Stress this

A characteristic of a good operator is a smooth uniform movement of the crane while doing the job. Jerks and jolts and excessive use of the brakes are indications of an inexperienced or a bad operaotr.

The operator should continually think ahead to anticipate what action will be needed next and develop his technique to give smooth operation with a minimum of lost motion.

Stress this

This is particularly true in cranes that traverse the bridge. The operator can save much valuable time if he traverses the hoist to where it will be needed next while the crane is traveling.

Another characteristic of a good operator is the development of his technique to where he can use a clamshell bucket to pick up solid materials within a few inches of the floor without bumping or damaging the floor.

Put on blackboard

The operator must always be alert to avoid striking other equipment, bins, and building supports with the crane bucket or hook.

Control of the load, particularly when the load is being lowered, is very important to avoid losing or dropping the load.

He also avoids dropping the bucket into a pile and then continuing the lowering operation. This will result in tangled cables.

Smooth operation—or avoiding fast acceleration or deceleration and swinging loads—will reduce the maintenance required for the crane.

Unnecessary rapid braking not only wears out the brakes, but also causes flat places on the wheels. These flat wheels jar the whole crane and cause unnecessary maintenance.

15

It is essential that the crane operator be thoroughly familiar with the materials he is to handle. Lack of this knowledge can result in mixing of valuable materials, storage in the wrong area or loading of the wrong material.

Crane operators must be sure they understand and confirm instructions to avoid such mistakes.

The operator's skill in storing and removing granular fertilizer has much to do with the uniformity of the fertilizer quality. If the operator stores the material in a cone-shaped pile, all of the fine fertilizer will be in the middle of the pile and all of the large granules will be on the outer edges of the pile.

Such undesirable segregation can be prevented by scattering the fertilizer over the entire area available and building the pile in layers instead of pouring on the peak of a cone. This not only keeps the different size fertilizers uniformily mixed, it also averages out variations in the chemical grade of fertilizers made during the time that the pile of fertilizer was produced.

It is just as important to remove the fertilizer by digging all the way from the top of the pile to the floor and expanding this hole. Removing the fertilizer in this manner cuts through the layers built during proper storage and will give the most uniform size and chemical analysis of the fertilizers shipped.

16

Swinging buckets are caused by starting the crane in motion before the bucket is clear of the pile. Such swings should be avoided since they cause unnecessary strains on the crane.

An occasional swing happens to most operators and can be stopped by traveling the crane in the direction the bucket is swinging.

The upper hoist limit switch is a safety device that keeps the bucket from being raised into the crane bridge and drums. It should not be used routinely to stop the lift.

When discharging fertilizers from the bucket, severe dusting can be avoided by lowering the bucket close to the pile or hopper that is receiving the fertilizer.

17

Daily duties

Where spillage is a problem, and it usually is, the operator should clean the lips of the crane bucket each shift to keep from dribbling material as the crane moves.

Beveling the lips of the bucket to give a sharp closing edge has been found to reduce dribble from the bucket.

Important

The operator can further reduce spillage by hesitating a brief period after closing and raising the bucket to allow excess material to fall from the bucket. Incidentally this also prevents bucket swings.

At the same time he cleans the bucket, the operator should inspect the cables for wear at the points of connection with the bucket.

During the shift the operator should always be attentive for unusual noises or unusual jerks and bumps as he operates his crane. Any excessive sparking from the electric supply cables or contactors should be observed.

These are indicators of something wrong with the crane and should be corrected or reported to his supervisor.

18

Occasional duties

Once per month the operator should either have checked or check the crane rails for any misalignment of rails, chipped or broken places (wheels also), and loosening of the bolts holding the rail.

Particular attention should be paid during seasonal weather changes since temperature differentials can make considerable differences in long lengths of rail.

Some rails are designed to "float" to allow for expansion and contraction.

During the monthly inspection, the crane stops on the ends of the rails should be checked to make sure they are undamaged. The full length of the lifting cables should be inspected.

19

At the end of the shift, or at any time the crane is parked, the bucket should be lowered to the floor.

Put on blackboard

A good operator leaves his job in such a shape that the on-coming shift is not behind when it starts.

20

Preventive maintenance

Following the lubrications schedules on overhead cranes is very important. Since most cranes are in almost continuous motion and since the cranes usually represent a large cash investment, it is risky not to follow these schedules.

Every six months qualified structual people should inspect the crane bridge and the rail supports to insure there are no defects.

It is advisable to have electrical people make a thorough inspection of all electrical equipment on the crane bridge once a year.

They should inspect sliding or rolling contactors weekly to allow them to be replaced before they are worn excessively.

21

Safety

The crane operator has a safety responsibility to his fellow workers that is greater than most employees.

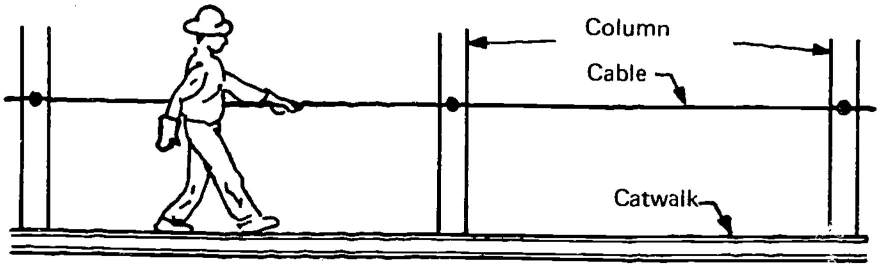
Important

He must at all times be certain as to the location of other people in the area, since the load he is carrying or releasing can be fatal if it strikes or covers another employee in the work area.

In many cases the operator must climb to gain access to the crane. Climbing is always hazardous and the operator must be alert and conscious of the dangers involved when he climbs.

The installation of a cable on the building steel about four feet above one of the rails for the full length of the rail is a good safety feature.

Sketch on blackboard



Should the crane quit operating the operator uses this cable as a hand rail while "walking the rail" to get help.

The "hot rails" on cranes are exposed high voltage current carriers and no one except qualified electrical people should be allowed in an area where they might come into contact with them.

Loose material should not be allowed on the crane when it is in use.

Pull the main electrical switch and place a hold tag when cleaning or maintaining the crane.

22

Questions

1. What is the major functions of an overhead crane? (Lift and move loads)

2. How is the electric power supplied to the moving crane? (Sliding contactors or looped cables)

3. What is the support span of the crane called? (Bridge)

4. What is the most frequently used lifting device for granular solids? (Clamshell bucket)

5. What is frequently used to lift supplies? (Hook)

6. Does frequent use of the brakes on the crane indicate a good operator? (No)

7. A good operator should be able to lower his bucket within inches of the floor without bumping the floor. (True)

8. The crane operator has more or less responsibility for the safety of fellow workers than most employees? (More)

9. How should stockpiles be built when storing granular fertilizers? (In layers)

10. Why should cone-shaped piles of granular fertilizer be avoided? (To avoid segregation of different size particles)

11. How can you prevent dribble from a clamshell bucket? (Hesitate after lifting the load and keep the bucket lips clean)

12. When dumping fertilizer into a loading hopper should the bucket be held high or low? (Low) Why? (To avoid dusting)

13. Where should the crane bucket be positioned when the operator leaves the crane? (Resting on floor)

14. What is the purpose of the hoist limit switch? (Keep the bucket out of the bridge and drums)

15. What causes the load to swing? (Moving the crane with the bucket still in the pile or rapid acceleration)

23

Slides

The first slide is an overhead crane using a clamshell bucket to handle granular fertilizer.

This slide shows a crane using a hook to handle equipment an electrode to be placed in an electric furnace. Notice the safety hazard caused by people working in the area.

The third and fourth slides show the same crane a few seconds later. Note the hoisting mechanism (bucket) has traversed along the crane bridge.

WHAT TO DO	WHAT TO SAY
	1
Introduction	Instruments and control systems have proven so useful to operations that almost all fertilizer plants use them extensively. They serve three basic functions:
Put on blackboard	1. Provide the operator with more information than he would have without them.
	2. Make it easier for the operator to do his job (i.e. he can close a valve from the control room that he would otherwise have to walk 100 feet and climb four flights of stairs to close).
	3. Make it possible for an operator to do more. This, of course, means that fewer operators are required to run a plant.
	2
	Instruments represent a costly investment in most fertilizer plants. They also represent a rapidly changing science. New instrument developments continue to occur frequently.
	Instrument complexity is illustrated by the use of radioactive source materials in some prime measuring elements in fertilizer plants. Some such applications can even measure the amount of crystals present in a flowing liquid-crystal slurry.
	Such complexity is enough to frighten most operators during their initial studies of instruments and instrument systems. Fortunately, we in operations have long since discovered that we can control and use machinery and equipment—even though we do not totally understand the principles that make them work.
	Of course we have also found that the more we do understand about this equipment and machinery the better we can make it produce for us.
	Operators are usually quite relieved when they find out that most instruments are used in the same simple basic instrument system. This makes it much easier to study and to understand instruments.

3

Important

The basic instrument system is made up of the following parts:

1. A primary element capable of measuring some variation in the process.
2. A transmitter that takes the signal from the primary element, converts it to a stronger signal, and sends the signal to where it is used.
3. An indicator or recorder which converts the signal to useful information for the operator of for other instruments.
4. A controller that determines what adjustments are needed to maintain the process conditions that the operator sets.
5. A control device that actually changes the process condition as directed by the controller (in many cases this is a valve).

This basic instrument system (or parts of it) is repeated many times in the modern fertilizer plant. Very few instrument systems are more complex than this basic system.

In this chapter we will study the five parts of the basic instrument system. We will go into considerable detail about primary measuring elements and the process variables that they measure.

4

Primary elements

The most common process variables to be measured by primary elements are pressure, temperature, flow, and level.

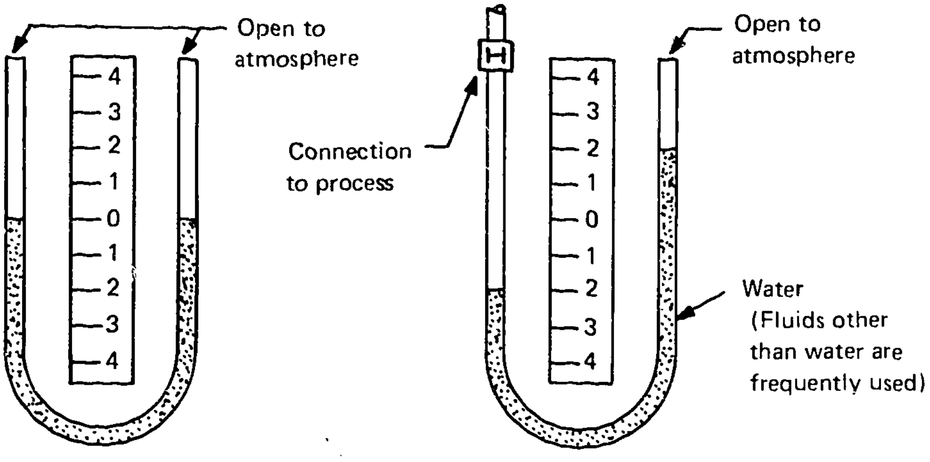
Some other process variable measured are pH, specific gravity, slurry densities, and mechanical vibration.

5

Pressure

The most basic and one of the most accurate means of measuring low pressure is the manometer. U-tube manometers are widely used where only local indications of pressure are needed or where infrequent pressure checks are needed (to determine where a line stoppage is located is an example).

Sketch on blackboard

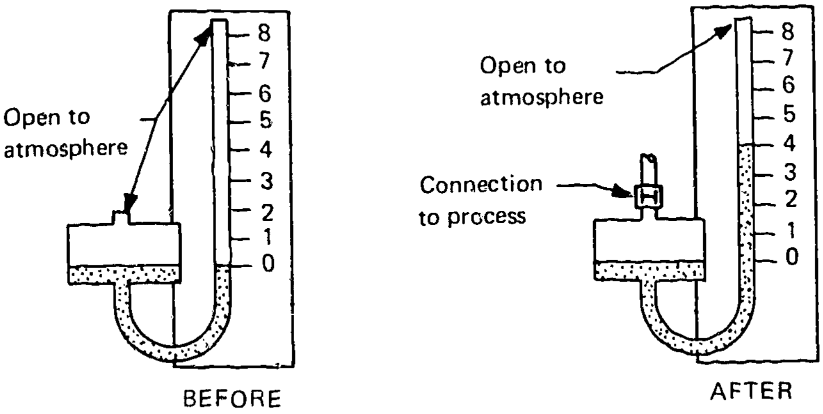


BEFORE AFTER

Study of the sketch shows that the process pressure is used to support a column of liquid whose height is proportional to the pressure applied. The column of water is something an operator can read and compare to the desired process operating pressure. In the sketch the process pressure equals four inches of water.

A second type manometer is frequently used by instrument people to check or calibrate other instruments. This is a reservoir manometer.

Sketch on blackboard

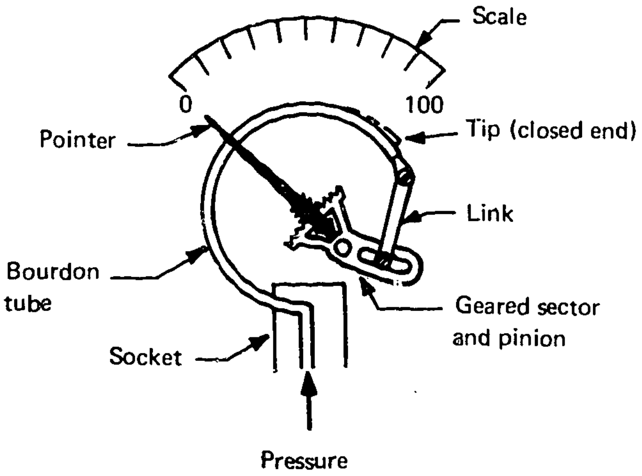


Point out less chance of error

The reservoir manometer is designed so that a small change in the level of the large reservoir results in a large change in the tube. This principle allows a direct reading from the scale instead of making two readings and adding them together as is done with the U-tube manometer.

Other types of pressure measuring devices are more satisfactory when signals are to be transmitted; the Bourdon tube is the one most frequently used. Pressure gages using Bourdon tubes are the most frequently used device for reading high pressures.

Sketch on blackboard



The tip of the Bourdon tube acts as a spring when pressure is applied. As the tip attempts to straighten it moves a pointer (as on most of the pressure gages we see in the plant) or activates a transmitter to send a signal to remote locations.

Pressure is expressed in many ways and the good operator must be able to relate these different expressions to each other. The following table is useful for this purpose.

1 atmosphere = 14.7 pounds per square inch
1 atmosphere = 760 mm of mercury
1 atmosphere = 29.92 inches of mercury
1 pound per sq. in. = 27.7 inches of water

6

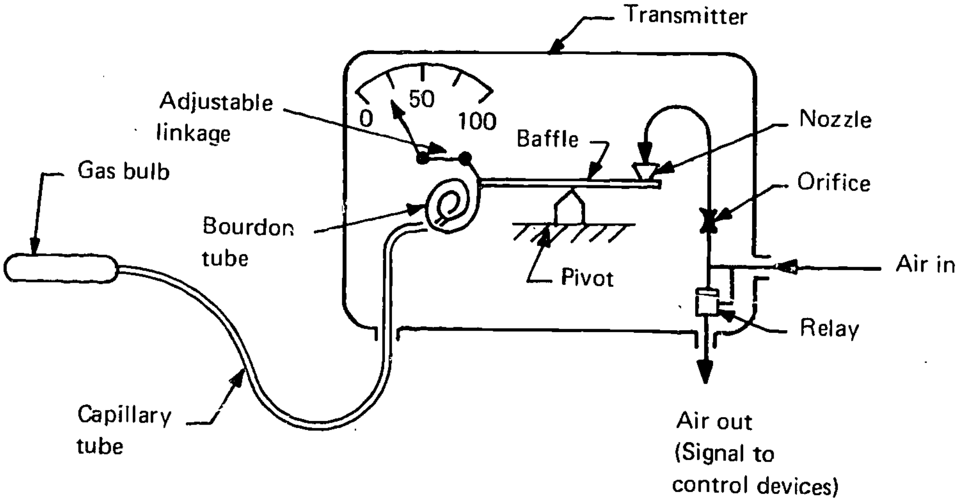
Temperature

The most common device for measuring temperature is the familiar glass thermometer. It has a capillary that is calibrated to indicate temperature when a column of mercury rises in the capillary.

Such thermometers are widely used in fertilizer plants but not in instrument systems. They (like the manometer) cannot transmit a signal.

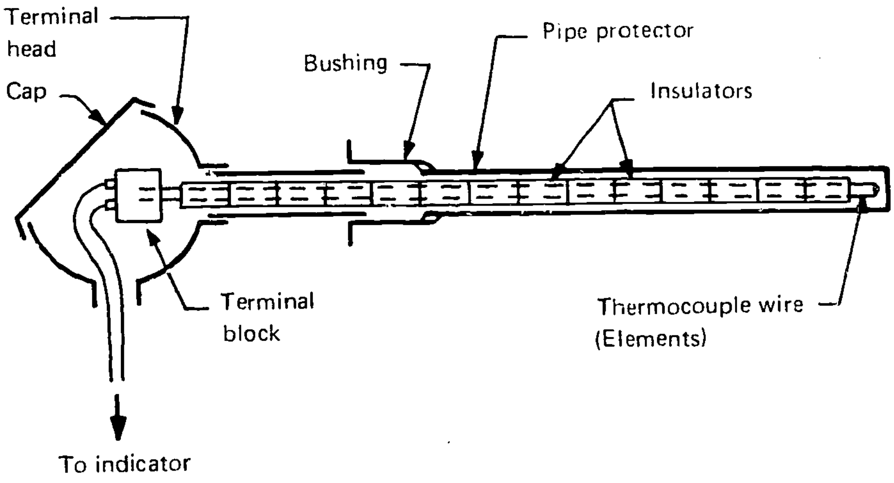
A variation of the glass thermometer is usually used to transmit temperatures to control devices. This variation is a gas-filled thermometer. Changes in pressure of the gas trapped in the thermometer are directly proportional to changes in the process temperature.

Sketch on blackboard.



The principle that a small electric current flow will result from heating two different metals that are connected together is widely used to measure temperatures in fertilizer plants. Such devices are called thermocouples.

Sketch on blackboard



Optical pyrometers, contact pyrometers, and other sophisticated instruments are used on occasions to measure process temperatures. Use of these devices is not yet widespread in fertilizer plants.

7

Flows

Flow is another process variable that is frequently measured. A rotameter is one of the basic flow measuring devices and has wide usage.

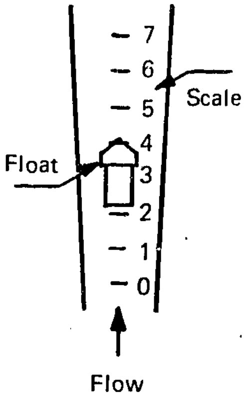
Sketch on blackboard

The rotameter has a tapered glass tube through which the medium (liquid or gas) being measured flows. This flow supports a weighted float.

Various positions of the float in the tube are calibrated to indicate different flows.

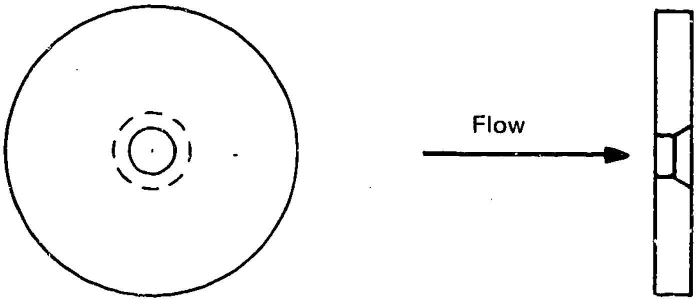
Caution

(A correction factor must be applied when the gravity or the flowing fluid is different from the fluid used for the calibration. This is also true of other flow measuring devices.)



Orifices are another common primary element for measuring process flows. They consist of a thin plate inserted between flanges in a pipe. The plate has a precision hole cut in its center. This hole is considerably smaller than the inner diameter of the pipe.

Sketch on blackboard



The pressure drop that results when the medium flows through the orifice hole can be calibrated to indicate the existing flow.

Not used on gases

Magnetic flow meters have recently become widely used in the fertilizer industry, particularly for measuring acid flows.

These flow meters are somewhat similar to thermocouples. The small electric current that passes from one electrode to another through the flowing medium also can be calibrated to indicate a known flow.

Other flow measuring devices–such as weir plates, venturi tubes, pitot tubes, and turbine meters–are used to a lesser extent than rotameters, orifices, and magnetic flow meters.

Measurement of the flow of a solid is usually done with a weighing device. These were discussed in detail in chapter 5.

8

Levels

Level measurements are made of both liquids and solids, with liquid levels being the most common.

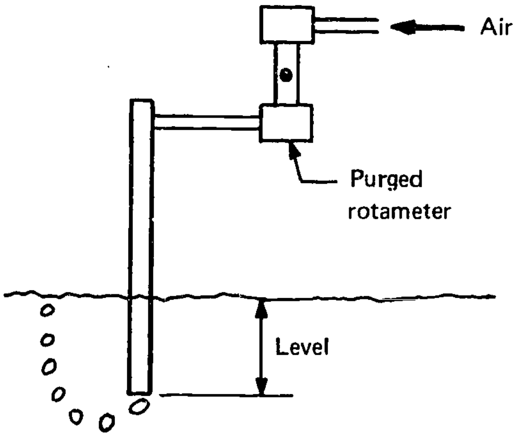
A sight glass is probably the simplest device to indicate liquid level. This is simply a glass tube or glass plate which lets the operator see the level.

Floats are probably the next most common primary element for measuring liquid levels. If a signal is to be transmitted, the floats are frequently relatively long, heavy cylinders. The buoyancy force exerted as the float is submerged is actually measured instead of measuring movement of the float.

Of course, there are many plant uses where the float does move with the liquid level and does pull a pointer on a calibrated board or raises (or lowers) a rod to show level changes. Such uses are normally for local indicators, not for transmitted signals.

Sketch on blackboard

Purged dip tubes are widely accepted for measuring liquid levels.



The pressure exerted on the column of air in the dip tube is proportional to the liquid level above the end of the dip tube and also to the density of the liquid.

Adaptations are available to allow the use of dip tubes when the tank is under pressure or when the fluid being measured is highly corrosive.

Diaphragm-type pressure transmitters are becoming widely accepted. They use the same principle as dip tubes – the force exerted by the height of the liquid.

Solid levels are commonly measured by rotating paddles. The increased resistance caused by the paddle hitting the solid material is used to indicate when the solids level is up to the paddle. These devices cannot indicate actual level, but can tell when the level reaches one point.

9

pH and specific gravity

As with thermocouples and magnetic flow meters, pH instruments are based on the flow of a small current of electricity through the solution being measured. The electrodes used in these instruments are very fragile and must be protected from rough handling or temperatures beyond their normal operating range.

pH can be thought of as an arbitrary scale that is used to indicate whether a solution is acid or base.

Put on blackboard

pH Scale

Strong ← Acids → Weak   Weak ← Base → Strong

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

^

Neutral

Litmus paper or specially prepared indicator tapes are also frequently used to determine pH in the plant. Instruments are usually more accurate than this tape.

Specific gravity is an expression of the density of the fluid being measured compared to the density of water at 4° C. It is frequently measured with a hydrometer by the operator.

Instruments that work on the same principle as purged dip tubes used for level measurements can also be used to measure specific gravity.

10

Transmitters Important

The second part of the basic instrument system is the transmitter. This is an important part of the system since it makes remote operation possible.

The primary measuring element seldom gives a signal strong enough to transmit more than a short distance. Transmitters take the weak signals from the primary elements and convert them to a strong signal that can be transmitted over a distance.

Transmitters normally have either an electric or a pneumatic output signal. Occasionally transmitters with hydraulic output signals are used.

11

Indicators and recorders

Operators are vitally concerned with indicators and recorders since this is the part of the basic instrument system that tells him what is going on.

Indicators may be located close (local) to the primary element or at a distance (remote) such as in the control room. In many instances both local and remote indicators are provided.

Smooth lines mean good operation

A recorder has several advantages over an indicator. It makes a permanent record that can be reviewed at a later date, it gives an operaotr an indication of the way his shift has run simply by glancing at the recording charts, and it reduces the number of readings that an operator is required to log.

12

Controllers

Controllers are the part of the basic instrument system that save the operator work. They allow him to take actions (such as closing a valve) from a distance.

It has become commonplace in fertilizer plants for the controller to do much more than allow the operator to take remote action. In most cases the operator sets a desired control value and the controller compares the actual instrument reading to the desired reading and automatically takes action to bring the two together.

Alarms (either noise or light) are frequently used to alert the operator when controllers are having difficulties maintaining the conditions the operator has set.

13

Control devices

The control device is the last part of the basic instrument system. It is the device that actually makes an adjustment to change the process variable being controlled.

Control valves are by far the most common such device in fertilizer plants. However, there are many others - variable speed motors, motor-driven gates, damper position controls, feeder controls, vibrators or shakers, ect.

In present day fertilizer plants there are a few instances of instrument systems more complex than the basic instrument system. One is where two feeds to the same vessel are ratioed; another is where an acid temperature and gravity are measured and converted by instruments to pounds per minute of fluid.

Most present day systems are covered by the basic instrument system. Even the more complex systems are only variations of this system.

Of course, there are many instances where only a part of the basic system is used. Any primary element with only a local indicator is an example of such a partial system.

14

Operating duties

There are two basic truths that all operators must accept about instruments.

First, an instrument can only do what it is instructed to do. If it is doing this, there is no reason to call in instrument technician, even though you are not getting the desired results.

An illustration of this is when a basic instrument system controls the supply of water to a cooler. If the control valve for the water supply is wide open and the cooler still is not cooling enough, the instrument has done its job or all it can do. (Frequently, the instrument technician is called before the valve position is checked.) The operator must look elsewhere to correct the problem. Possibly the water supply pump has stopped running or the water line has broken.

The second truth is that instruments *are not* infallible. False readings or bad control are possible when the instrument needs repairs or adjustment. Because of this possibility, the good operator cross-checks an instrument that gives a reading that is suspect.

1. He looks in a tank to check when the instrument indicates a level and yet he is pumping no fluid.
2. He looks at other nearby temperatures when one temperature seems suspicious.

3. He looks to see if there is a flow if an instrument shows flow after a hand valve has been closed in the line.

15

Protecting his instruments is a duty of the operator. Illustrations are:

1. Shield parts of the instrument system (particularly the transmitters) from acid or other solution leaks.

2. Provide a non-freezing fluid or heat for manometers exposed to freezing temperatures. (The glass tube will break if the liquid freezes.)

3. Be careful not to damage primary elements when cleaning equipment. Capillary tubes on gas-filled thermometers can be crimped and cause a failure; dip tubes can be broken or bent; glass covers on pressure gages and sight glasses are easily broken, etc.

4. Clean dials on indicators and recorders so they can be read easily.

5. Do not use high pressure steam in a line that has magnetic flow meters. The teflon sleeve in the meter will fail.

6. Do not allow the limits of a temperature or pressure indicator to be exceeded greatly or it will fail.

Very important-emphasize

7. Handle recorder pins with care—they are easily damaged.

8. Keep the instrument air dryer working. Wet or oily instrument air has fouled many instruments.

Important

9. Keep control rooms pressurized and dust-free to protect the sensitive exposed parts of controllers and recorders.

10. Keep purge rotameters properly set (3/4 open) on primary elements that use a purge flow.

11. Plastic sacks frequently are placed over transmitters and other instrument parts exposed to corrosive atmosphere. These sacks must be kept intact and in place to do any good.

16

The good operator makes other instrument checks. He checks the instrument when it is not in use to see if it returns to zero. Instrument technicians can adjust the zero setting and save many errors if alerted by the operator.

He checks the instrument air supply to instrument locations in the plant to see that the desired pressure is maintained.

He occasionally checks the indicated valve opening at the valve to see that it is the same as indicated in the control room.

He occasionally checks local indicators to see if they read the same as the recorder or indicator in the control room.

Once per shift he will check alarm lights and horns to see that they are functioning (operators are not always provided a means to do this).

He changes recording charts on schedule, marks time indications and dates on charts, and keeps recorder pins well inked.

He closes hand valves when taking a process system out of service because he knows that control valves often do not give a positive shutoff.

He also checks his valve alighnment before trying to control his system with instruments, since he knows that the instrument will not function if block valves are closed.

Use an instrument chart and teach how to read

He uses proper conversion factors when reading instruments and records the actual readings as they are, not as he wishes they were. False readings help no one. An operator must know how to read the lines between the figures on indicators and charts.

He knows how to recognize the difference between an instrument that indicates zero and one that is over ranged (or wrapped around the peg).

Important

Probably most important of all the control board operator stays alert and continually observes control board readings. A good operator can spot and prevent trouble when it is coming, rather than after it has happened.

17

Preventive maintenance

The preventive maintenance that an operator can give instruments has been covered under "protecting instruments" in the operating duties section.

An operator can help the instrument technician properly maintain the instruments by reporting suspicious readings or actions of the instrument systems.

18

Safety

Seldom is anyone injured by instruments; however, failures of instruments installed for safety purposes can cause injuries. Examples are pressure relief valves that do not relieve, high temperature alarms that do not alarm, or high level devices on an open top tank that allow the tank to overflow.

Operating questions

1. If you do not get the desired process control, the first thing to do is call for an instrument tehcnician. (False - Check to see if the instrument system is doing what it has been directed to do.)

2. Instrument readings are always correct. (False - They normally give the operator more information than he otherwise would have, but sometimes they give false readings.)

3. Operators have little responsibility for instruments. (False - The instrument is an important part of the process and just as much the operator's responsibility as any other part of the process.)

4. Name the parts of a basic instrument system. (Primary element, transmitter, indicator-recorder, controller and control device.)

5. Manometers measure temperature or pressures. (Pressures)

6. All undesirable process conditions cause an alarm and relieve the operator of continuously checking the control board. (False - In most plants only the most critical control points have alarms.)

7. Any type of compressed air will operate pneumatic instruments satisfactorily. (False - Air must be dry, oil free, and of sufficient pressure.)

8. Instruments make an operator's job easier or harder. (Easier)

9. Closing a control valve will insure that a flow is stopped. (False - Many an operator has sadly found a full tank that should have been empty. Control valves are not reliable block valves.)

10. Recorder charts are for the front office, not for operator use. (False - A good operator can tell much about how well the process is running by the roughness or smoothness of the charts the recorders are drawing.)

11. A pH of 14 is a very strong acid. (False - It is a very strong base.)

12. One atmosphere of pressure equals 14.7 psi or 29.92 inches of mercury. (Both)

13. Magnetic flow meters have not been in use as long as orifice plates to measure flows of liquids. (True - Magnetic flow meters have come into widespread use in the last 10 years.)

14. Thermocouples signal through a pneumatic system. (False - They are used in electrical indicating systems and seldom are used with controllers.)

15. Specific gravity compares the density of the fluid being measured to what? (The density of water at 4° C.)

16. The most common control device in fertilizer plants is what? (Control valves)

17. Instrument drift to a false zero setting is one of the most common instrument errors. (True - Also one of the easiest to correct.)

20

Slides

1. This slide shows a primary element (magnetic flow meter), a transmitter, an indicator, a controller, and a control device. These are the five parts of a basic instrument system.

2. This slide shows an instrument control room. Many recorders and controllers are located here. The operator can operate much of the plant from this location.

3. This slide shows a group of primany elements -
    - A thermocouple
    - A gas-filled thermometer
    - An orifice
    - A rotameter
    - A manometer

WHAT TO DO

WHAT TO SAY

1

Introduction

Burners must exist in a wide range and assortment of sizes due to their many and varied usages.

Some of the smaller burners may be no more than an open end piece of tubing serving as a pilot light and emitting only a small quantity of heat. Other burners will be more complex because of the demands placed on them. A single burner often must be capable of supplying a large quantity of heat using a variety of fuels such as coal, oil, or gas.

2

Burner locations

Burners usually are located outside of the process to which they supply heat. They may be located in the floor, walls, or ceiling of a furnace. Heat then is applied to the process by radiation and convection.

In some instances, however, heat may be supplied by combustion within the process. The fuel may be present in the process gas stream, making it necessary only to add air for combustion to take place.

3

Combustion requirements

Two requirements must be met before combustion can take place. First, a fuel must be supplied in a form suitable for burning; and second, oxygen must be available to combine with the fuel.

4

Fuels

Fuels that exist naturally in a gaseous state are the most convenient form in which a fuel can be supplied to a burner. Gaseous fuels can be supplied directly from high pressure lines or they can be stored in vessels as liquids under pressure or at reduced temperature.

Other fuels must be conditioned before they will burn satisfactorily. Coal must be pulverized and blown into the burner and oil must be vaporized with heat or atomized with a jet of air, gas, or steam.

5

Oxygen

Air is usually the source of the oxygen required to support combustion. the oxygen content of air is approximately 21% with most of the remaining 79% being nitrogen.

It is important to have the proper fuel-air ratio recommended by the manufacturer of the burner. For burners designed to use more than one fuel this ratio will vary according to the fuel used.

If air is used to supply the oxygen, an excess amount is usually supplied to insure complete combustion of the fuel.

If insufficient oxygen is present, smoking or the formation of soot will occur which indicates a loss of fuel from incomplete combustion.

On the other hand if too much air is used, an unnecessary heating burden is placed on the furnace because of the large volume of nitrogen that necessarily accompanies the oxygen.

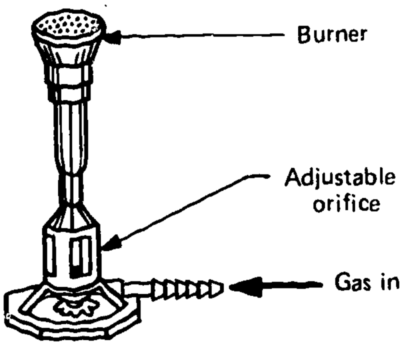
Considering the fact that approximately one-third of the total amount of natural gas used in an ammonia plant is used for fuel, the loss due to a bad fuel-air ratio could be quite large.

6

Gas burners

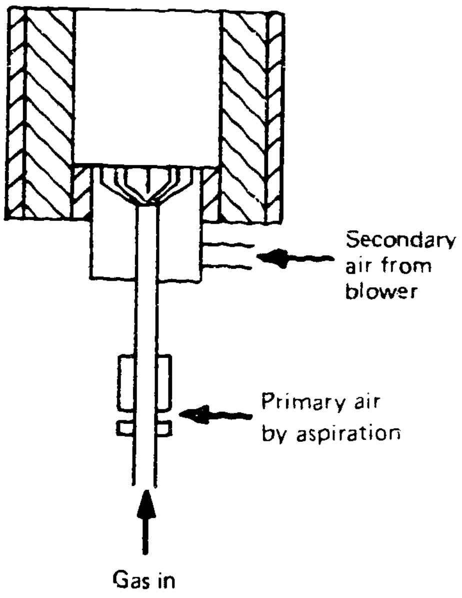
Sketch on blackboard

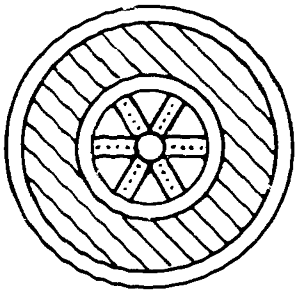
Small gas burners may have no provisions for fuel-air mixing other than aspiration caused by the fuel as it enters the burner. The quantity of air entering can be adjusted by a movable cylinder at the base of the burner which controls the orifice size.



A larger burner operates on the same principle but may also have a secondary air supply at the burner under a slight pressure from an air blower.

Sketch on blackboard





A second blower is sometimes placed in the flue gas line leaving the furnace. The purpose of this blower is to cause better distribution of heat by keeping a slight negative pressure on the furnace.

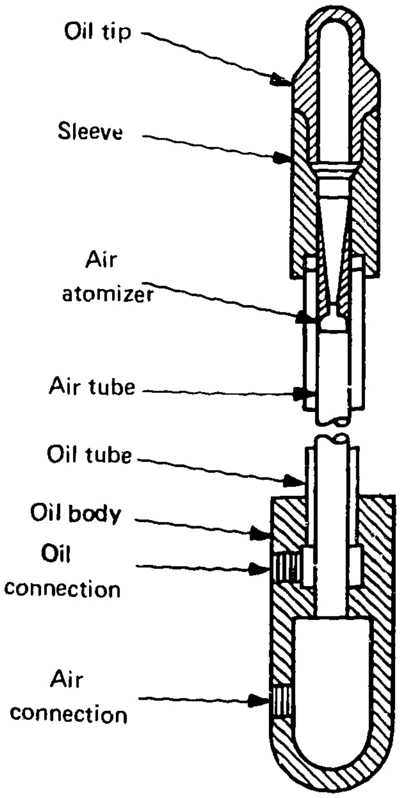
7

Oil burners

Oil must be atomized or vaporized and mixed with air before burning will progress satisfactorily.

Sketch on blackboard

Steam, air, or gas can be used as the atomizing agent. Secondary air is generally supplied by a blower to an area surrounding the burner where turbulence caused by the atomized oil will cause adequate mixing of air and fuel.



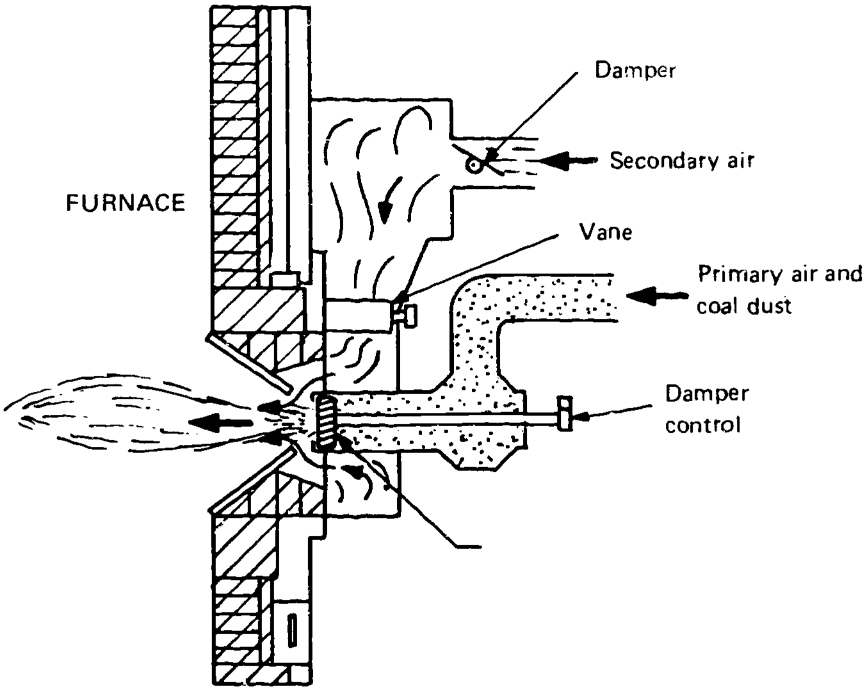
8

Coal burner

Before coal is admitted to the burner it is crushed into a fine dust by a pulverizer. a stream of air then entrains the dust and carries it to the burner. A secondary supply of air is blown into the area surrounding the burner nozzle.

Vanes or adjustable dampers are attached to the fuel nozzle and the secondary air supply to give a rotation to the streams as they enter the furnace. These adjustable dampers control the pattern of the flame in the furnace and also the amount of air from the secondary blower.

Sketch on blackboard



9

Uses

Burners of these types are used in many areas of fertilizer production. Some examples of their uses include:

1. The supplying of heat for the reforming process in the ammonia plant.
2. Steam production.
3. Supplying the heat necessary for nodule preparation at kiln sites.
4. The drying of raw materials and finished products in driers.
5. Flame incineration of waste gases.
6. Purge gas generation.
7. Concentration of phosphoric acid and liquid wastes. Specially constructed burners are often located below the surface of a liquid for this purpose.

10

Phosphorus burner

Most burners are designed primarily for the purpose of supplying heat to a process. One exception in the fertilizer industry is the phosphorus burner.

This burner is designed to cause a controlled reaction to occur between elemental phosphorus and oxygen, one of the first steps in the production of phosphoric acid.

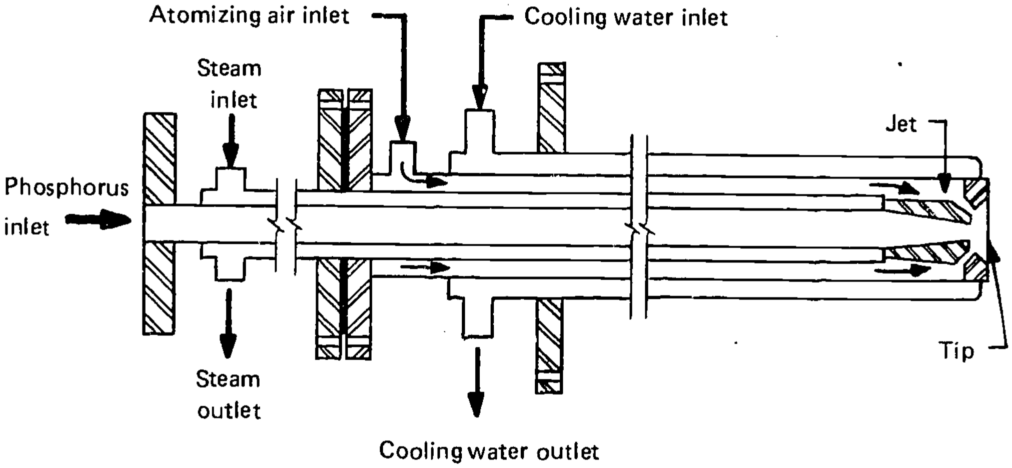
This burner is very similar to an oil burner in that the phosphorus is a liquid also.

Phosphorus flows through a center pipe which has a jet at its outlet that restricts the flow and increases the velocity of the phosphorus.

This pipe is surrounded by a steam jacket which keeps the phosphorus molten.

The steam jacket is surrounded by a pipe which supplies the air for atomizing the phosphorus. The outside pipe provides a cooling water jacket around the lower part of the assembly to prevent damage by the high burning temperature.

Sketch on blackboard



11

Operating duties

The duties of the operator are similar regardless of the type of burner used. Some of his responsibilities will include:

1. Paying close attention to the flows and pressure of the fuel and air supply.
2. Visually checking the flame for optimum heating conditions.
3. Observing the furnace off-gas for "tell-tale" signs of improper fuel-air mixtures.

4. Watching temperatures closely when a cold furnace is brought on or a hot furnace is shut down. Too rapid a change in temperature can damage refractory or tubes. The recommended temperature change probably should not exceed 100° F. per hour.

5. Keeping all damper bearings lubricated to prevent them from becoming inoperative.

12

Operating suggestions

There are many flame characteristics to which an operator should be alert. These characteristics will often indicate the cause of inefficient burner operation. For example:

1. A lengthening of the flame indicates insufficient air.
2. A reddish "dusty" looking oil flame with flecks of smoke over the bright part of the flame means there is not enough air to burn the fuel.
3. A "smoky" condition will exist for a few minutes in a cold furnace using coal as fuel when first placed in operation.
4. A high rate of fuel consumption with less than usual heat indicates an unbalanced fuel-air mixture.

13

Safety

A few rules or precautions will minimize the dangers that exist when dealing with flamable materials.

1. Do not attempt to light burners in a furnace while looking through a peephole. A small explosion could occur which would injure one's eyes.
2. If a burner in an enclosed area does not light after a few seconds, close off the fuel line quickly. Purge the vessel for 2 or 3 minutes before attempting to light the burner again. Continued addition of fuel and air into a closed area creates an explosion hazard.
3. Do not attempt to light a burner from the hot walls of the vessel.
4. When first lighting a burner use a fuel-air mixture that is rich in fuel then correct the ratio after the flame becomes stable.

14

Questions

What are some of the common fuels used in burners? (Coal, oil and natural gas)

Can a single burner use more than one kind of fuel? (Yes)

In relation to the process which requires heat, where may the burners be located? (Inside the process supplying the heat by combustion or outside the process supplying heat by radiation and convection)

What are two requirements that must be met before combustion can occur? (There must be fuel and oxygen present.)

What is the usual source of oxygen? (Air)

Give the approximate percent of oxygen and nitrogen in air. (21% oxygen; 79% nitrogen)

In what state is a fuel most easily used? Solid, liquid, or gas? (Gas)

What conditioning must often be done to coal and oil fuels before they will burn satisfactorily? (Coal must be pulverized; oil must be atomized or vaporized.)

Why is the proper fuel-air ratio desirable? (The burning will be more efficient. Less fuel will be required to supply a given amount of heat.)

Why should the temperature of a furnace not be changed too rapidly? (Stresses caused by uneven expansion or contraction could damage the internals of the furnace.)

What would the lengthening of a flame indicate? (Probably an insufficient amount of air for complete combustion of the fuel.)

Why should you not look directly through a peep hole in a furnace while lighting a burner? (There is the possibility of a small explosion if the burner does not light immediately. If this happened, a person's eyes might be injured.)

15

Slides

The first slide shows the layout of burners in the primary reformer of an ammonia plant.

The second slide shows a burner in a large kiln which is used in nodule preparation in a phosphate plant.

Next is a slide that shows the external installation of a phosphorus burner.

WHAT TO DO | WHAT TO SAY

1

Introduction

Equipment that is designed to use centrifugal force to rapidly separate solids from liquids (or two liquids of markedly different densities) are called centrifuges. Some make two separations at the same time. Centrifuges do the same job as settling or filtering equipment (described in chapter 11). Their use is not widespread in the fertilizer industry.

Do this in class

Centrifugal force is developed by rapid rotation or by movement in a curved path. It can be readily illustrated by swinging a bucket that is partially filled with water in a vertical circle.

If the bucket is swung slowly, the water will spill at the top of the circle. If is is swung rapidly, no water will spill. Centrifugal force holds the water to the bottom of the bucket even when it is upside down.

Very rapid rotation of the moving parts of the centrifuge very often causes forces that are several thousand times as strong as the pull of gravity. Of course, centrifugal force pulls harder on heavier solids or heavier fluids than it does on light fluids. This difference in pull is what causes the separation in most centrifuges.

Other types of equipment also use the principle of centrifugal force. (1) Cyclone separators to separate dust from gas streams, (2) Centrifugal compressors that increase the pressure and move gases are replacing reciprocating compressors in many uses, (3) Centrifugal-type pumps and fans are very common in fertilizer plants.

2

List on blackboard

Several uses of centrifuges are:

1. Separation (and washing sometimes) of fertilizer crystals from liquids.
2. Removal of some of the solid impurities from wet-process phosphoric acid.
3. Recovery of phosphorus from electric furnace sludge.
4. Reclaiming of prilling oil from oil-prilled solids.

Classifications

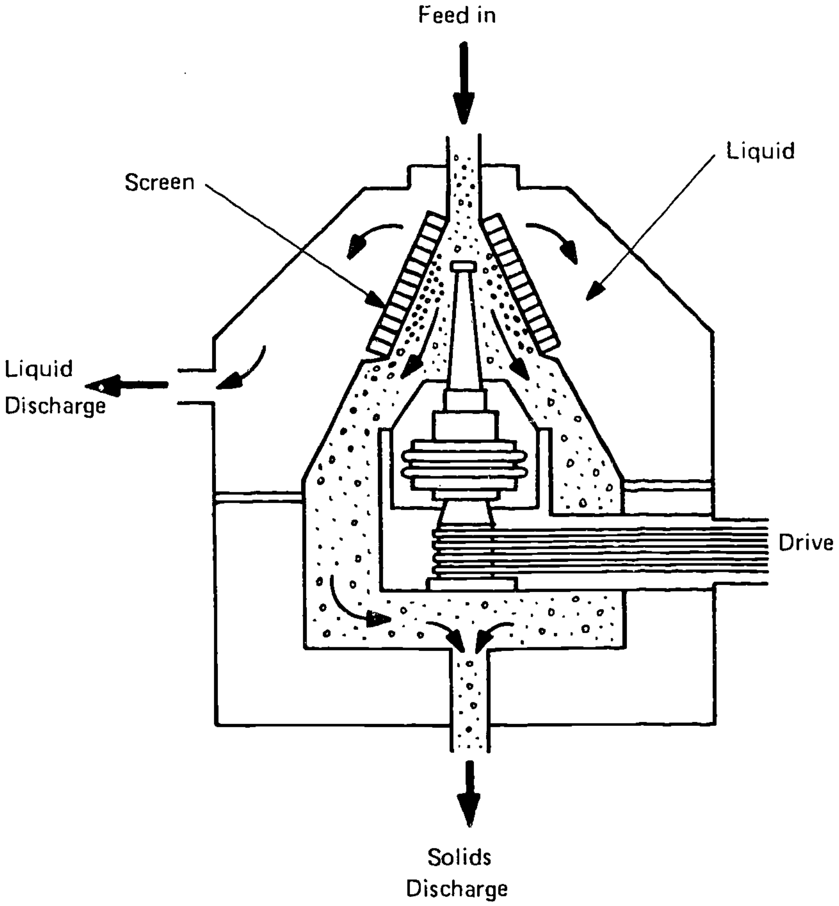
One means of classifying centrifuges is as batch or continuous. The feed to batch centrifuges is interrupted on a regular cycle to allow removal of solids. This interruption is not necessary with continuous centrifuges.

Another method of classification is whether the shaft supporting the rotating parts is vertical or horizontal. Probably the most significant classification is by the type of construction used in the moving part of the centrifuge.

Solid bowl centrifuges throw the solids (or dense liquid) to the outer wall of the bowl. After the materials are separated they are discharged from the centrifuge. Liquids usually overflow to escape the rotating bowl. Solids are either scraped out or removed by internal conveyors that are inside the rotating bowl.

Perforated basket (bowl) or slotted screen centrifuges work a lot like pressure filters. The solids again are thrown to the outer wall, but the openings are too small for it to escape. Thus these solids form a cake through which the lighter liquid is forced as it escapes through the basket openings.

Sketch on blackboard



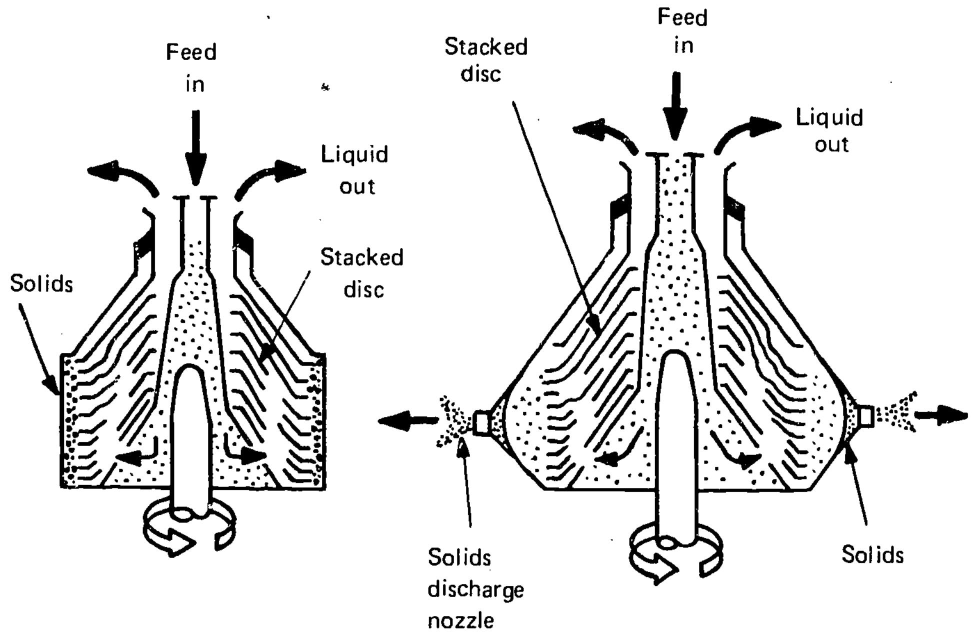
A third general classification is stacked disc centrifuges. This type has many discs which are located inside the rotating bowl. These discs rotate with the bowl.

The purpose of the discs is to shorten the distance a solid moves before it contacts a metal surface. When the solid makes this contact it is separated form the liquid.

Heavier solids or liquids move down through the discs while lighter liquids move up through the discs. Stacked discs are frequently used to make the final removal of small particles to give a very clear liquid discharge.

Stacked discs are used in centrifuges that have solid bowls and also in centrifuges which have a few discharge nozzles in the wall of the bowl. These nozzles are used as a method of discharging solids.

Sketch on blackboard



SOLID BOWL

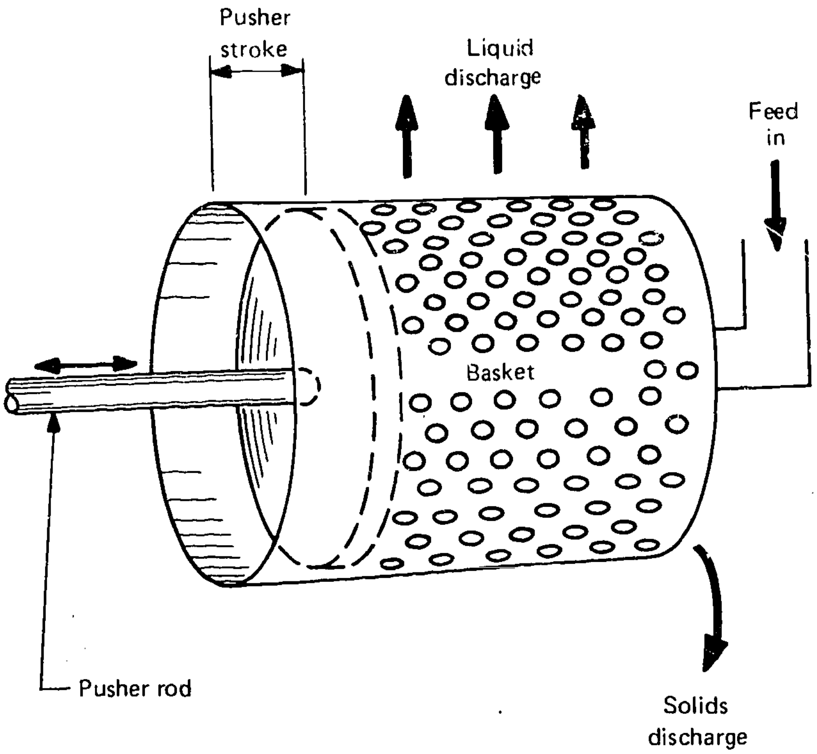
WITH DISCHARGE NOZZLES

4

Removal of the solids from the rotating centrifuge is one of the design problems encountered. As indicated earlier, nozzles are used for this purpose. Scrapers (plows or doctor blades) are used frequently also. Another method is internal conveyors; these are usually adaptions of screw conveyors.

A fourth method is a pusher-type discharge for use on horizontal-type centrifuges. A system (normally hydraulic) is used to slowly reciprocate a pusher in the basket in a horizontal direction. This action of the pusher causes one of the separated materials to overflow the lip of the basket.

Sketch on blackboard



Important

The most difficult problem in centrifuge design is to maintain the balance of the rotary part of the centrifuge. Rotational speeds of several thousand revolutions per minute are not uncommon. Faulty balance can cause great damage at such high speeds.

Many centrifuges are now enclosed in housings that prevent loss of materials and fuming in the working area.

5

Operating duties

Centrifuges usually require less attention than most process equipment. However, the good operator appreciates equipment that operates trouble-free and he gives it the attention it requires to keep it operating in this manner.

The operator should check for unusual noise or heat since these are more critical than with most equipment, because of the high rotational speeds. He maintains proper levels of lubricant for the same reason.

Any uncommon noise or vibration is sufficient reason to shut down the centrifuge for inspection. A stoppage in a solids discharge nozzle or solids buildup on the bowl can cause vibrations that will cause damage. The operator can correct both of these by changing nozzles or by washing.

Some types of centrifuges are subject to flooding. This condition means there is too much unseparated liquid with the solids. Some common causes of flooding that the operator should check are: (1) too high a feed rate, (2) stoppage or buildup on the bowl, or (3) too low a rotational speed.

The operator should make sure the bowl is clean before starting those model centrifuges that allow observation of the bowl without taking the centrifuge apart. If the bowl cannot be inspected, it is a good practice to quickly start and stop (bump) the centrifuge to see if there are any unusual vibrations.

6

Several times during the shift, the operator should check the feed material to the centrifuge to see that it is of the proper composition. Often this composition determines how much can be fed. He also keeps the feed material at the proper temperature, when this is important.

Shift duties

Observations should be made frequently of the materials being discharged from the centrifuge. These observations (such as described in flooding) tell the operator how to regulate his feed and when to clean the centrifuge.

If the discharge materials are not properly separated, and normal adjustments or cleaning by the operator do not correct the situation, he should report that maintenance inspections are needed to find if there are worn or faulty parts.

Oil feed, level, or pressure, should be checked several times per shift.

A strainer in the feed line is necessary in all high-speed centrifuges to protect the machine from lumps or scrap metal that could cause damage. The operator should blow-down or back-flush the strainer several times per shift to keep a proper flow to the centrifuge.

If he should find lumps or metal scrap when cleaning the centrifuge, the operator should have the strainer changed or repaired.

Some centrifuges are equipped with amp- or voltmeters, which will indicate stopped nozzles or buildup of solids on the bowl. An increase in amps indicates to the operator that he needs to clean his equipment. Visible vibration or noise are other indicators of the same trouble.

Tension of the V-belts on the drive should be checked once per shift. Loose or stretched belts are a hazard at high speed. This condition may also permit slippage that results in the centrifuge turning too slow and not working properly. Overly tight belts can misalign the centrifuge and cause vibration or bearing wear.

7

Occasional duties

If the operator finds crystals in the liquor discharge when operating a slotted basket or perforated bowl centrifuge, he should clean the basket and inspect for wear. It probably will be necessary for maintenance to repair or replace the basket or bowl.

Some centrifuges are washed by adding water and spinning the centrifuge. When this is done on nozzle machines, a nozzle is sometimes left out to improve cleaning. The operator must be careful, run the centrifuge in brief spurts, and avoid reaching speeds where vibrations are large.

8

Safety

The greatest danger in operating centrifuges is unbalance and the resulting heavy vibrations. The machine can tear up and injure people in the area. Such accidents are very rare, because of operator attention and the rugged construction of the centrifuges. Some centrifuges are equipped with shutdown devices that will stop the centrifuge if overloads or excessive vibrations occur.

Hazards of rapidly moving equipment are present, particularly at the drive. Reaching inside or poking into centrifuges is extremely dangerous and should not be done.

Some materials that are centrifuged are hazardous and call for special precautions when sampling and when opening valves.

9

Preventive maintenance

Proper lubrication is a must because of the high rotational speeds.

Routine inspections for wear while cleaning the centrifuge often disclose worn parts that should be replaced.

Questions

Centrifugal force can be used to separate two liquids of different densities. (True)

Which material will go to the bowl wall in a centrifuge the heavier or the lighter? (Heavier)

Centrifugal forces of 10 times or 10,000 times the pull of gravity are developed in centrifuges? (10,000 times both really, but 10 times is a very low centrifugal force for centrifuges.)

Name four fertilizer uses of the centrifuge. (Crystal-liquid separation, solids removal from wet acid, phosphorus separation from sludge, and oil removal from oil-prilling product)

Batch centrifuges have fewer feed interruptions than continuous centrifuges. (False--feed must be stopped on a regular cycle to operate batch centrifuges.)

Slotted screen centrifuges work like what? (Pressure filters)

Stacked discs can be used to give a very clear, lighter liquid discharge. (True)

What is the most difficult problem in centrifuge design? (Proper balance of rotary parts)

What, other than noise, warns the operator of stoppages or buildup in the bowl? (High amps, slow discharge of solids, or poor separations)

What is the term for too much liquid in the solids? (Flooding—usually caused by too much feed or a dirty bowl)

What precaution should be taken before starting the centrifuge? (Clean the bowl or bump the centrifuge if you cannot check the bowl.)

Strainers are often or seldom used in the feed line to the centrifuge? (Often—the centrifuge must be protected from lumps or scrap metal.)

Can the operator tell anything by observing the product discharged from the centrifuge? (Yes—can tell flooding as mentioned in an earlier question. The operator should continue to increase the feeds until separation is not so good as desired. He then reduces the feed a little to get quality. In this manner he gets maximum production.)

What is the greatest danger in centrifuge operation? (Unbalance of the bowl and the resulting vibration)

11

Slides

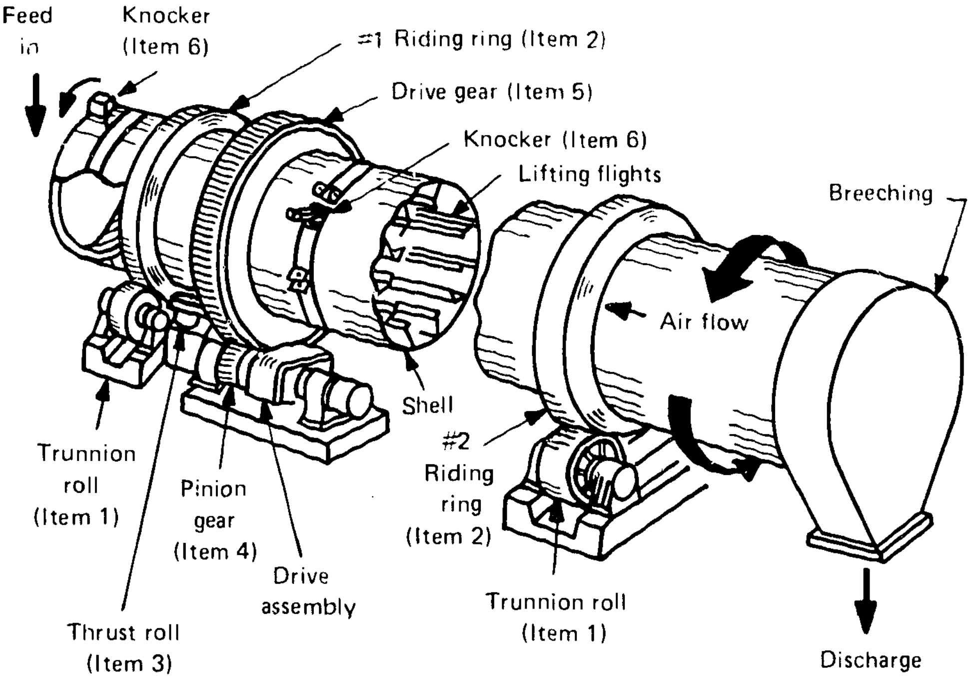
Slide No. 1 is a slotted basket for use in a horizontal pusher-type centrifuge. It is used to separate fertilizer crystals from a solution.

Slide No. 2 is a stacked-disc (vertical) centrifuge that has nozzles in the bowl for solids discharge. This centrifuge is open for inspection. It is used to separate phosphorus from sludge.

Chapter 18: HEATING AND COOLING EQUIPMENT

WHAT TO DO	WHAT TO SAY
	1
Introduction	Both heating and cooling are common operations in fertilizer plants. Probably because they are so common, there are many ways of doing both operations. These "ways of doing" fall into two major groupings: (1) those for solids, and (2) those for liquids or gases. We will discuss each grouping in detail.
Make a list of these by asking students for examples	The reasons for heating or cooling are also fairly numerous. Some of these are: 1. Heating to dry (to drive off moisture). 2. Heating to drive off impurities other than moisture. 3. Heating to recover process heat that would be wasted. 4. Cooling to avoid plasticizing and lumping. 5. Cooling for safety. 6. Cooling to protect equipment (corrosion or heat damage). 7. Heating or cooling to change the physical character of the material. (This covers many operations—nodulizing, condensing, vaporizing, crystallization, etc.) 8. Heating or cooling to improve the mechanics of the process.
	2
Solids	By far the most frequently used equipment in a fertilizer plant for heating or cooling solids is a rotating cylindrical vessel whose long dimension is horizontal rather than vertical. The material to be heated or cooled flows through the cylinder.

Sketch on blackboard



Air is forced through these vessels to do the heating or cooling. Cooling is frequently done with ambient air, but refrigeration is sometimes used to lower the temperature of the air. Usually, in order to supply heat it is necessary to use steam or a direct flame to raise the temperature of the air.

As the material moves through the vessel it comes into contact with the air and is either heated or cooled by this contact, depending on the relative temperature of the material and the air.

Temperature changes in these vessels can vary from only a few degrees to several hundred degrees Fahrenheit. This depends on the process use for which the equipment is designed.

3

Common parts of the system

There are many parts commonly used in this system of heating and cooling solids. Some are used in practically all such systems while others are for specialized use only.

First, the cylindrical vessel must be supported so that it can be rotated. This is done by using trunnion rolls. These trunnion rolls (item 1 of sketch) are sheels and shafts that rotate in stationary stands that have bearings in contact with the shaft.

The trunnion roll is in contact with a riding ring (item 2) which is attached to the cylindrical vessel. Riding rings and trunnion rolls have machined surfaces to insure a smooth rotation.

Usually two riding rings and four trunnion rolls are used. The cylindrical vessel is mounted on a slope of a few degrees to help move the material through it as it rotates. This slope makes it necessary to use a thrust roller (item 3) to make sure the kiln stays in the desired position.

Secondly, the cylindrical vessel must be rotated. Energy from a drive motor is passed to the vessel through a small pinion gear (item 4) to a large drive gear (item 5) which is attached to the shell of the vessel. Usually rotation of the vessel is slow (5 to 15 revolutions per minute).

Thirdly, the air must be forced through the cylindrical vessel. Fans (often several) are used for this purpose. If the air flows the same direction as the material, it is called cocurrent. If the air flows opposite to the material, it is called countercurrent.

Lastly the material must be fed to and discharged from the cylindrical vessel. Chutes, conveyor belts and mechanical feeders are used for these purposes.

4

Specialized parts

Frequently lifting flights are installed on the inner surface of the cylinder. Many shapes of flights are used, but they all do the same job. They lift the material from the bottom of the cylinder to the top and drop it through the stream of air back to the bottom.

The material is raised and dropped many times as it goes through the cylinder. This, of course, improves the heating or cooling by giving good contact between the air and the material.

Sticky materials sometime fill the flights and will not fall out. Knockers or rappers (item 6) are attached to the outside of the cylinder in a manner that gives a sharp blow as the cylinder rotates. This helps dislodge sticky materials and helps to keep an even flow of material.

Usually the used air from these systems is dusty. Many times either the value of the product lost as dust or the pollution that such a loss causes makes it desirable to use dust recovery equipment. Cyclones, scrubbers, and filtering system (discussed in other chapters) are used.

5

There are other systems for the drying or cooling or solid materials. However, they are used less frequently in fertilizer plants than the rotating cylinder just described.

One such system is a fluidized bed system. In this system the air which cools or heats is used to support (or support and move) the material. One such example is a sloped conveyor that has an air compartment in the bottom. The air escapes this compartment through many holes. As it escapes it supports and moves the material.

Another system is the traveling grate. In this case a metal conveyor belt moves the material. The conveyor has slots or openings that allow air to be forced through the material as it travels on the conveyor.

6

Liquids or gases

Heating and cooling of liquids or gases probably is done in more different ways than heating and cooling of solids. Some of them are not very efficient but are worthwhile because they are simple.

Occasionally heating or cooling of liquids or gases is done by bringing them in direct contact with the medium. Spraying cooling water into a hot gas duct is one example. Live steam in contact with a process liquid stream is another example.

Much more frequent is the indirect heat exchange which occurs when the heating or cooling medium is in contact with one side of a metal surface and the liquid or gas to be heated or cooled is in contact with the other side of the metal surface.

7

Methods

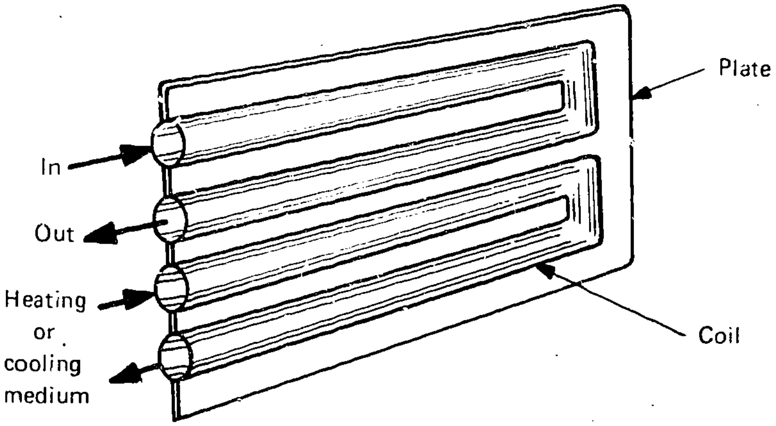
Heating or cooling occurs in all process vessels because of their contact with ambient air. (In many cases we insulate to reduce this effect if heating or cooling is not desirable.)

One of the simplest cooling systems is the spraying or dripping of water on the outer surface of process vessels, pipes, or tanks. This is not a very efficient method because of poor contact of the process material with the cooled surface. Many times such an application causes housekeeping problems.

A better method that is frequently used is inserting (usually submerging) pipes into a process vessel or tank. The heating or cooling medium flows through the pipes. A coil rolled from pipes gives more contact surface for heat transfer than does a straight pipe.

Hollow passages fabricated between metal plates is a commercial adaptation of this type of heating or cooling. These plates are more efficient than pipe coils.

Sketch on blackboard



Another similar adaptation is the cascade cooler. The material to be cooled flows through a series of horizontal pipes that are connected on the end by U-bends. A distributor trough feeds a uniform curtain of water over the outside of the pipes.

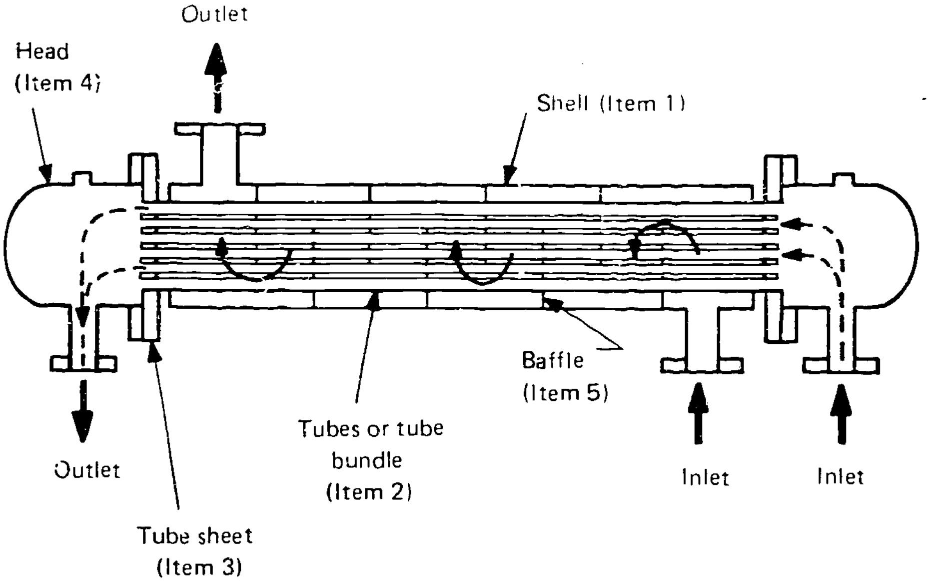
Pipes within a pipe are another method. These are often called double pipe or jacketed systems. The material to be heated or cooled flows in one pipe (usually the inner pipe) and the heating or cooling medium in the other pipe.

8

Shell and tubes are important

The most efficient adaptation is the shell and tube heat exchanger. It is also the most expensive and the most difficult to maintain. This system is more efficient because it divides one of the streams (process material or heat transfer medium) into many small streams to improve the contact with the metal surface.

Sketch on blackboard



Shell and tube heat exchangers are made up of several parts. The shell (item 1) is a pressure container with an inlet and outlet opening (nozzle). Frequently several hundred tubes make up the tube bundle (item 2) which the shell encases.

Tube sheets (item 3) are used on both ends of the tube bundle to keep the materials in the tubes and in the shell separated. One of the most frequent leak points is between the tubes and the tube sheet.

Heads connect to the tube sheets on both ends (item 4) to collect the flow to and from the tube bundle. Baffles (item 5) are used outside the tube bundle, but inside the shell, to insure better contact with the outside of the tube bundle.

The material to be heated or cooled can flow through the tube bundle, or through the shell if preferred. Of course, the heating or cooling medium must flow through whichever route is not used by the material.

Note

Usually flowing streams which contain solids or are likely to solidify are directed through the tubes. This is because the tubes are easier to clear of stoppages than the shell.

Shell and tube exchangers are referred to as single pass, double pass, triple pass, etc. A single pass means that there are no baffles in the heads and all of the fluid enters the tubes on one end and discharges from the other end. Double pass, triple pass, etc. only means that the heads are baffled to use only a part of the tubes in each direction, and that the flowing fluid goes back and forth through the tubes the designated number of times.

3128

Operating duties

The most important single factor for the proper operation of heating and cooling equipment is for the operator to know what the process temperature should be and to check for troubles when they are not what they should be.

For solids

The temperature of the air to the heater or cooler must be right. If it isn't, look for trouble in the heating system or the refrigeration system. Of course, if the process uses ambient air you can do nothing about this temperature.

Improper air temperature coming from the heater or cooler means improper air flow or improper contact in the cylinder. Dampers set in the wrong position, inleakage of air, or buildup in lifting flights can cause this trouble.

Proper temperature of the material from the heater or cooler is the reason for having the equipment. Improper temperature here can result from the feed material being the wrong temperature or wrong composition (too much water for instance), improper air flow, or improper contact in the cylinder.

Many good operators develop the sense of feel to the point that they can handle solids from the heating or cooling equipment and can tell if the equipment is performing properly. (Note: This can't be done with materials hotter than 130° F.)

During his shift the operator should be alert for unusual noises or equipment temperatures, particularly at the drive for the cylindrical vessel and at the fans. He should be alert for vibration at the fans. A vibrating fan should be shut down. Sometimes washing the fan will remove buildups and restore good operation.

He should inspect to see that the drive gear is coated with lubricant. At the same time he should watch for any shaking of the drive gear. Loose bolts will cause this.

Slipping or jerking in the kiln rotation indicate worn teeth on the drive gear or its pinion. This should be reported. Buildup in the flights can do the same thing.

Shift duties (solids)

Knockers or wrappers should be observed to see that they are working and also to see that they are secure (for safety).

The operator looks for and clears any buildup in the air ducts and cyclones. Rodding or jarring the cyclone discharge is often necessary. Pressure measurements are sometimes necessary to locate stoppages in ducts.

The flow of scrubber liquor should be checked and sprays cleaned when necessary on dust-collecting scrubbers. The good operator frequently looks at the stack discharge from the dust-collecting systems to see that they are not letting dust escape.

Important

One of the things that the operator has to watch for is stoppages in the feed to or the discharge from the heating and cooling equipment. Frequently he can avoid equipment delays by clearing the stoppages *fast*.

When the equipment is off the operator should look for excessive wear on drive gear teeth and trunnion rolls. He should look inside the cylinder for damaged or stopped up flights. Loose or missing bolts in the drive gear or shell should be reported.

10

For liquids and gases

Heating and cooling equipment for liquid and gases are fairly trouble-free. Fairly trouble-free should not mean they get no attention.

As with solids, the temperature of the heating or cooling fluid in and out are important. Even more important is the temperature in and out of the material to be heated or cooled.

Improper temperatures of the heating or cooling fluid frequently result from valves not being opened to the right position or valve failure (such as the seat being off the stem).

Improper temperature of the process material discharged from the heating or cooling equipment can be caused by improper temperature of the feed material, insufficient flow of the heating or cooling fluid, or fouling on either side of the metal surface.

During his shift the operator should frequently observe temperatures in and out of both the heating or cooling fluid and the process fluid. Flows of both these streams should be checked. Sometimes pressures are used to indicate if the desired flow is present. Note: Sometimes excessive heating or cooling fluid can be used with very little benefit. This is expensive and the good operator controls to use the minimum fluid that gets the desired results.

Shift duties (liquids and gases)

The operator should see that sprays or drip pipes are properly directed to keep the outer surfaces wet when surface cooling is used. At the same time, he looks for and clears stoppages in sprays and troughs.

Important

He should look for leaks, drips, or spills since these can represent losses of valuable products. These also frequently cause damage to equipment and foundations. Catch these fluids in buckets; report the leaks for repair.

Visible film or buildup on the metal surface should be cleaned off if possible. Strong vibrations of heating or cooling equipment should be reported since the equipment is sometimes damaged in this manner.

The good operator knows on which side of the metal surface there is the highest pressure. This means that this fluid will mix with the other fluid if there is a leak in the metal surface (or through a gasket.)

He can then detect leaks that might otherwise be unobserved. An example is checking the pH of cooling water used in an acid cooler. Any acidic pH indicates the cooler is leaking.

If the cooling water is at a higher pressure than the acid, a leak would allow dilution (weakening) of the acid. Specific gravity checks of the acid before and after the cooler will indicate a water leak into the acid.

When the equipment is off it should be inspected for visible damage (corrosion, cracks, or breaks). Buildups on the metal surface that cannot be removed during operation frequently can be removed when off.

11

Safety

Sampling at the heating and cooling equipment is one of the most frequent dangers. Some samples require the use of protective clothing such as eye protection and rubber gloves.

Cylindrical vessels for heating and cooling of solids require the same attention as all moving equipment, particularly at the drive gears and trunnion rolls. Falling knockers or rappers which have come loose are an additional danger.

Leaks or sprays under pressure are possible dangers around some heating and cooling equipment.

12

Preventive maintenance

Most of these items were covered under operator duties.

Lubrication is important on cylindrical vessels for solids because of the usually heavy loads at the drive gear and trunnion rolls.

Stopping vibration on fans and on liquid and gas heating and cooling equipment gives them a longer life.

13

Questions

What is a trunnion roll? (The support for cylindrical heaters or coolers for solids. They allow rotating movement.)

What do rappers (knockers) do? (Dislodge buildup in flights by the shock of impact)

What is commonly used as the heating or cooling medium in cylindrical heaters or coolers? (Air)

What do lifting flights do? (Pick up the material and drop it through the air to give better contact.)

Traveling grates are never used for cooling solids. (False - They are used in both heaters and coolers for solids.)

The most important single factor in heating or cooling solids is to know when process temperatures are not right and to look for the trouble. (True)

Too much moisture in the feed material can affect the temperature of the dry solids discharged from a cylindrical heater. (True - It will reduce the temperature of the product.)

Feeling of the material from cylindrical heaters of coolers is seldom of any help to an operator. (False - Many times it can be a good guide to an experienced operator.)

What one point tells an operator whether a dust-collecting system is working? (The discharge from the stack. This is not the only point to watch.)

Wear on gears or trunnion rolls is the responsibility of maintenance and of no concern of the operator. (False - Frequently the operator is the first to note and report this wear.)

Spraying water on the outside of a tank is a *very* efficient or *not very* efficient means of cooling? (Not very efficient - but still often worthwhile because it is easy to do and can be done quickly.)

Air is the most frequently used heating or cooling medium for liquids and gases. (False - Steam and water are used more frequently.)

Do straight pipes or rolled coils give the most contact surface? (Rolled coils)

What are the most efficient types of liquid or gas heaters and coolers that were discussed? (Shell and tube heat exchangers)

Heating or cooling medium is only used in the shells of shell and tube exchangers. (False - The design can be for this medium to be either in the shell or in the tube.)

Flowing the acid to be cooled through the tubes can reduce the price of a shell and tube heat exchanger. (True - The tubes may have to be stainless steel to resist corrosion, but the shell can be mild steel if water is being used as the cooling medium.)

Which is easier to flush out or clean, shells or tubes? (Tubes)

Does this sound confusing? Why is it true?

Will fouling of the metal surface increase or decrease the temperature of a liquid being heated? (Decrease) Of a liquid being cooled? (Increase)

What is a possible pollution source in liquid or gas heaters or coolers? (Leaks)

Do dry metal surfaces indicate good or bad heating or cooling? (Bad - You can get no heating or cooling where the heating or cooling medium is not in contact with the metal surface.)

Pressure gages can be used as an indication of flow? (True - They will not tell what the flow is, but if you have no pressure you also have no flow.)

More flow of heating or cooling medium always means better heating or cooling. (False - Usually there is a flow beyond which you get very little improvement by increasing the flow.)

Can you determine which direction a leak will go in a shell and tube heat exchanger? (Yes - It will go from the high pressure fluid to the low pressure fluid.)

When sampling acids you need rubber gloves but no eye protection. (False - Your eyes are one of the easiest parts of the body to be damaged with acid. Wear eye protection.)

Fan vibration can be stopped only by balancing by maintenance people. (False - Sometimes an operator can wash a buildup of material off a fan and stop its vibrations.)

14

Slides

This slide shows both a rotating cylindrical heater and a traveling grate heater.

This shows the inside of a traveling grate heater.

This is the inside of a cylindrical cooler. Note the lifting flights. This cooler is in motion and in operation.

This slide shows a shell and tube heat exchanger being taken apart.

This slide shows surface cooling on the outside of a tank.

WHAT TO DO

WHAT TO SAY

1

Introduction

Granulation is the manufacture of sized, solid spherical particles from fine solid particles and a melt or slurry. The sized, solid spherical particles are called granules. Granules are formed by the softening, melting, or crystallization of the solid particles in the liquid. This causes the small particles to stick together or become coated with a fresh layer of material.

The small particles can be either returned fines or a new feed, or a combination of new feed and recycled fines.

2

The equipment usually used to granulate fertilizers is the drum (ammoniator granulator), pug mill (blunger), and the pan granulator. Each kind of granulator has special operational advantages and disadvantages.

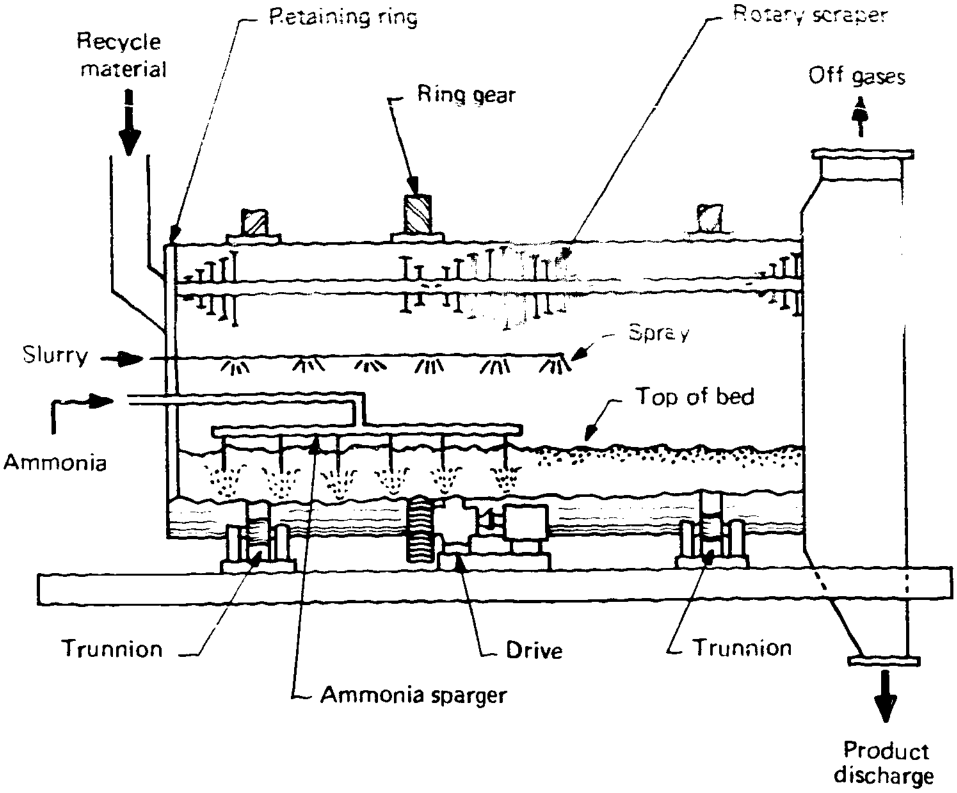
In the following descriptions and discussions of granulators, a feed solution or slurry containing 15 to 5% water is normal. The recycle material is dry, minus 12-mesh material. The granulated material leaving the granulator is hot and moist. It usually requires drying, sizing, and cooling before leaving the plant.

3

Drum granulator

The drum granulator is a cylinder mounted on rollers (trunnions) so that the drum is rolled by a drive motor. The drive power is transmitted by a ring gear and pinion or a chain drive that encircles the drum.

Sketch on blackboard



DRUM GRANULATOR

A chute delivers the recycled material to one end of the drum. The feed end of the drum has a retaining ring to keep the materials in the drum. The discharge end of the drum may vary in the manner of size and type of discharge ring. Some drums have no ring.

A beam usually runs through the drum. This beam is used to support the spargers, distributors, sprays, and associated piping. Because of the beam length and force, the beam is usually of large pipe or heavy H-beam construction.

4

Spargers are drilled or slotted pipes that are submerged in the rolling bed of material being granulated. Most commonly a sparger distributes ammonia under the bed. Spargers are also used to distribute ammoniating solutions, acids, or other liquids or gases.

Distributors are used to spread a solution or slurry on the bed. The rolling action in the drum then tends to mix and spread the liquid to all particles. Distributors can be simple open-ended pipes, slotted pipes, a series of spray nozzles, or a trough with serrated discharge edge.

Drum granulators also have some type of scraper to remove the hot, wet layer that sticks to the drum walls. The scrapers vary from fixed blades to reciprocating or rotating arms.

Some drum granulators are also fitted with rappers that dislodge the shell coating by impact on the outer surface of the drum.

Now to put all of these items together. The recycle feed enters the revolving drum and is wetted by an acid slurry. The slurry is coated onto the recycle particles. It is also neutralized by ammonia from the under bed sparger.

The neutralization reaction heats and drys the particles. The rolling action causes the particles to stay separate and become rounded. The scrapers keep the wall clean to allow good rolling action.

5

Operating duties

Good granulation is dependent on the operator. No matter how good the control devices, close observation by the operator is essential. He must make changes in the variables to continuously maintain good granulation. To do this properly, he must know the effect of each variable on granulation. General guides can be given, but experience is an invaluable asset.

6

The operator must match the recycle rate to the slurry feed rate. Usually the slurry rate is changed as the recycle rate is maintained at a maximum. Ammonia or ammoniating solution is added to give a desired neutralization or temperature. Steam or water may be added from sprays or spargers to increase the bed moisture and make the particles grow larger. Air may be sparged under the bed to reduce the bed moisture and reduce particle growth.

The sparger openings need periodic cleaning. This is often done by steaming. The sparger outer surfaces and supports also require cleaning. Rodding during operation is effective. Reversing the drum rotation is also effective. At about 3-day intervals, it is necessary to shut down, enter the drum and break the caking off the sparger, its supports, and the drum head ring.

7

The shell scrapers must be maintained in good condition to give good granulation. Frequent observation of the scraper is required. Not only must the scraper mechanism work, but the cutters must be scraping. It is often difficult to see the scraper in a dusty or smoky drum. Sometimes it is necessary to interrupt the feeds for a minute to get a good view.

It is helpful to rap the shell with a wooden maul once or twice a shift to remove the hard caked layer on the shell. (Steel hammers should not be used: they bend the drum.) This helps the scraper do a more effective job.

8

The material leaving the drum often tends to be sticky or plastic. This sticky material will build up on the lump grid and also build up in the discharge chute.

This buildup must be removed to prevent stoppages. If cleaned hourly, few problems occur; but, if neglected, a shutdown to clear a stopped up chute will occur. Usually rodding the chute will be enough.

A lump grid to catch the lumps from the sparger and other drum internals is placed between the drum discharge and the dryer chute. This is to prevent large lumps from wedging in the chute. The captured lumps are broken with bars or hammers so that they pass the grid.

Important

The drum has a tendency to discharge many lumps at one time (as when the sparger is rodded), and quick action must be taken to prevent the lump grid from stopping up. If the lump grid stops up, a heavy spill or shutdown will occur.

Fume ducts need periodic cleaning to allow good venting of the drum.

It is important to clean up spillage to protect drives, bearings, etc.

9

Preventive maintenance and lubrication

Lubrication of the granulator is usually prescribed by the manufacturer. The drive train requires periodic lubrication. If a speed reducer is used, filtering, cooling, and adequate oil pressure must be maintained. The drive pinion and ring gear or chain and sprocket should be treated weekly with a stiff, adhesive grease (Crater compound).

Drive train couplings should be lubricated every 6 months. The drum support trunnion bearings should be lubricated weekly. A high quality, "extreme pressure" grease has been found to be very satisfactory.

Grease buttons should be cleaned before connecting the grease gun. The bearing should not be filled too full. The seals will fail when grease pressure is applied to a full bearing. Protection of bearings from solution and solid spills will help to prevent accidental intrusion into the bearings which causes early failure.

The scraper operating mechanism requires frequent lubrication. The frequency depends on the type used.

10

Spargers should be inspected at least monthly for hole enlargement which will cause poor distribution of the sparged material. The sparger itself and its supports should also be inspected for bending or damage. An improperly located sparger will give poor operation.

Liquid distributors also need frequent inspection. Spray stoppages, worn holes, and improper slope or location will occur and must be corrected.

Worn or damaged scrapers can also cause trouble. They cause uneven material flow and can actually cause material to back out the head end of the drum.

11

Safety

Hot acid solutions are used in the drum. Splash goggles and rubber gloves are the minimum protection needed when handling the solutions.

Hard hats should be worn in all operating areas. Dust and falling fertilizer particles cause the need for safety glasses in the granulator area.

At times, escaping fumes or dust require that chemical and dust masks be used.

There is the hazard of lumps falling in the granulator from the beam or scraper. Caution is advised even when just looking in the granulator or when breaking lumps on the lump grid.

12

Much care must be used when rodding the sparger. The bar may become hung and moved violently by the drum rotation.

When it is necessary to enter the drum, the power to the drum drive and scraper drive must be pulled. Solutions and ammonia must also be valved off.

Lumps on the beam and scraper should be knocked off. They may fall if this is not done.

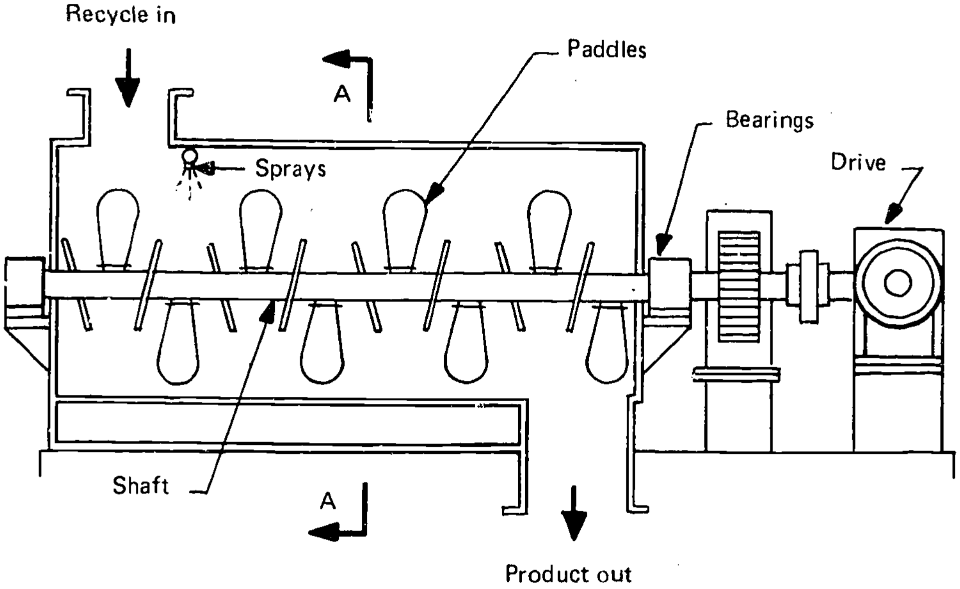
The temptation to enter the drum to clean the sparger without taking the above precautions must be resisted.

13

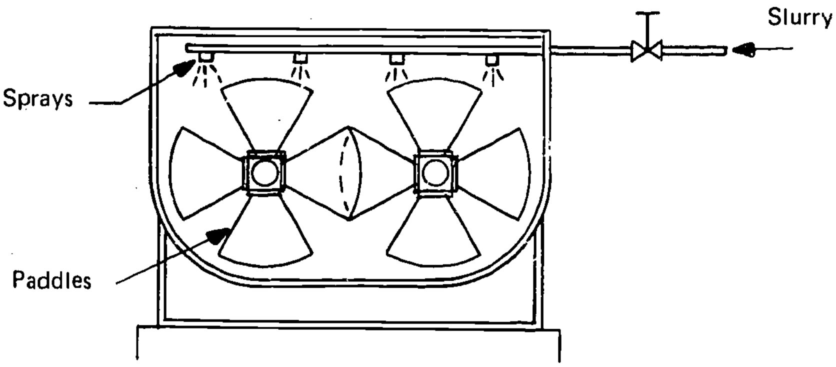
Pugmill

The pug mill is a U-shaped trough with twin shafts equipped with paddles. The drive power is applied to rotate the shafts.

Sketch on blackboard



SECTIONAL ELEVATION



SECTION A-A

PUG MILL

A chute delivers recycle to one end of the mill. The slurry is distributed onto the recycle bed through open end, drilled pipes, or spray nozzles. The mixing action of the paddles thoroughly mixes the recycle and slurry. In this way the recycle material is agglomerated or coated with the slurry salts.

The mill tends to be self-cleaning by the paddles. The granulated material discharges through an opening in the bottom of the trough at the end of the mill.

14

Operating duties

The operator controls the granulation by changing the proportions of slurry and recycle. Close observation of the mill product and material action in the mill is needed. These observations usually indicate when and what corrective action is needed.

A lump grid to catch "shell-out" of the mill is used to protect chutes from stoppage. This oversize must be broken as it occurs to prevent stoppage of the grid.

The chute from the grid to the dryer must be rodded or cleaned frequently as the hot, moist granular material sticks in a chute. Fume and dust ducts must be kept in service by frequent cleaning. Cleaning is done by rodding and rapping to loosen deposits at pickup points, bends, etc.

The shaft bearings and drive unit of the pug mill require frequent cleaning to prevent fertilizer from getting into and ruining the bearings.

Fume ducts need periodic cleaning to allow good venting of the mill.

It is important to clean up spillage to protect drives, bearings, etc.

15

Safety

The slurries entering the mill are hot and often acidic. The mill action tends to splash those liquids. Splash goggles and rubber gloves should always be used around such liquids. A transparent shield at the feed end of the mill helps to protect the operators.

Hard hats should be worn in all operating areas.

Dust and falling fertilizer particles cause a need for safety glasses in all operating areas.

Fumes and dust can cause the need for a chemical and dust mask for operators.

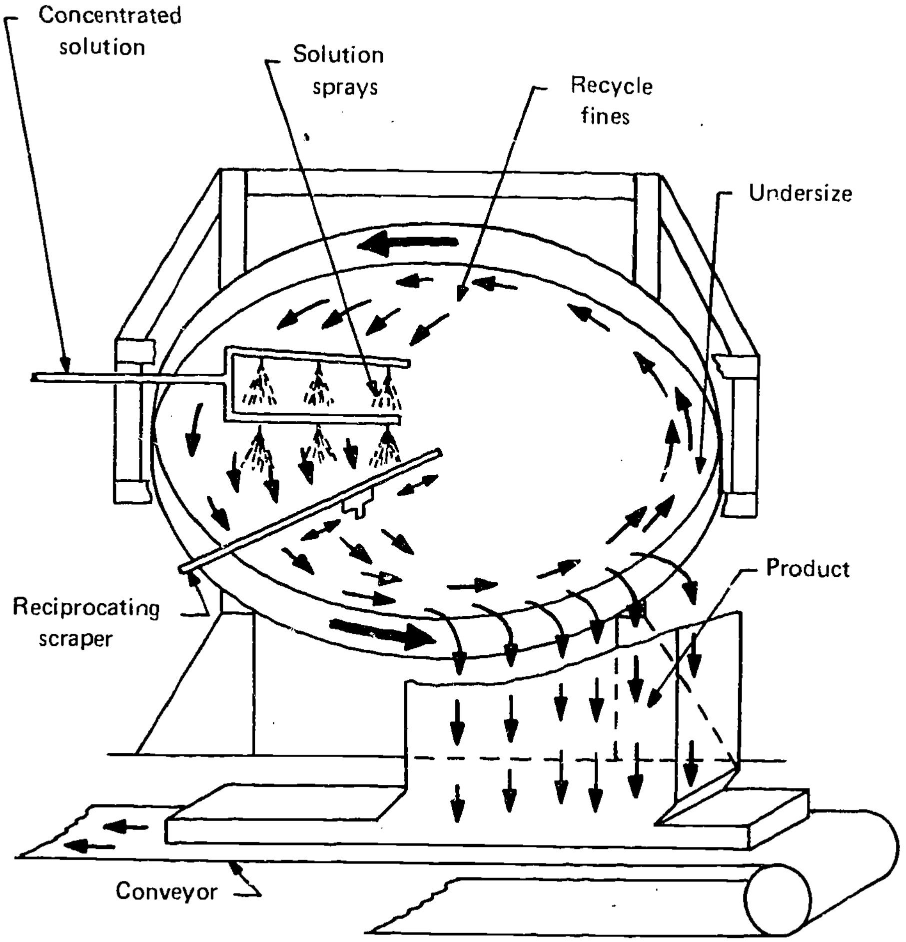
The pug mill will need cleaning. It must not be rodded when operating as the paddles may catch the bar and hurt the operator. Do not put your hands in the mill when it is operating. When the mill must be entered, the power to the drive must be pulled. The solution piping must be valved off.

16

Pan granulator

The pan granulator is a disc with sidewalls; its bottom is inclined at an angle. The disc is rotated on a central stem. The stem is driven by a motor-gear reducer drive train.

Sketch on blackboard

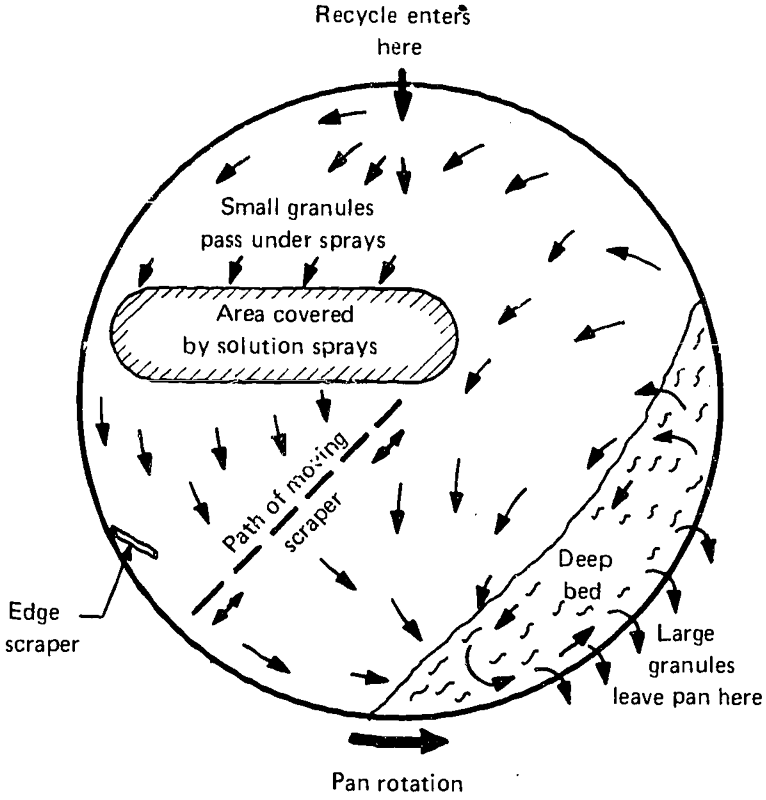


PAN GRANULATOR

Recycle is fed to the pan at the topmost part of the disc. Slurry is usually distributed through spray nozzles on headers over part of the disc.

The pan tends to retain the finest granules in the bed. These fines are carried upward in the corner of the pan until gravity overcomes the centrifugal force. The fines (and the recycle) then fall in a thin layer across the face of the pan. The falling layer passes under the sprays where the sprayed slurry coats the particles. The rolling action afterward tends to round the particle.

Sketch on blackboard



PAN GRANULATOR

A scraper (fixed or reciprocating) is needed to clean the bottom of the disc as some spray passes through the falling layer of fines. Wall scrapers are also needed to continuously clean crust off the side-walls.

The material that discharges from the pan falls through a lump grid onto a belt conveyor or into a chute. The lump grid protects chutes from large lumps such as occasionally scale-out of the pan.

No spargers are used in pan granulators as their presence disrupts the bed action.

In early operation of the pan, variation in the pan inclination or speed may be advisable. Once good granulation is obtained, the angle and speed can be fixed.

17

Operating duties

The operator must match the recycle rate and slurry feed rate to get good granulation. The spray nozzles must be observed frequently to maintain a good spray pattern. Stoppages or poor spray patterns must be cleared by one of several means, such as stopping the feed and steaming out the system or inserting a steam lance in the offending spray nozzle. If these steps do not work, the nozzle should be changed.

The pan should be observed for buildup on the surface or side-walls. When buildup occurs which the scrapers do not remove, a shutdown and manual removal is required.

The discharge lump grid and chute must be cleaned periodically to prevent stoppages. The captured lumps must be broken frequently.

Fume ducts must be periodically cleaned to give continuous dust and fume removal.

18

Lubrication and preventive maintenance

The drive train of the pan requires lubrication which will be specified by the manufacturer. The gear reducers in the train should be checked for oil levels each week. The main bearing must be lubricated frequently.

If a reciprocating scraper is used, lubrication at daily intervals will be needed.

Keeping the bearing and drive train clean of dust and spilled fertilizer will stop fertilizer from getting into the bearings.

The spray nozzles must be cleaned at intervals to remove trash and accumulated solids.

Worn or displaced scrapers will give poor granulation. They should be checked each week.

19

Safety

The hot slurries fed to the pan can cause severe burns. Face shields or splash goggles are needed for eye protection. Rubber gloves are needed for hand protection when handling these slurries.

Hard hats and safety glasses are required in all plant areas. Dust masks are helpful, especially during startups.

The rotating pan and moving scraper are hazardous to anyone contacting them. Power to the drives of these elements should be pulled before working on or close to them.

Lumps can fall from the pans, especially during cleaning. Always work from a safe location.

20

Questions

What are the two feed materials used to produce granules? (Fine solid particles and melt)

Is particle size *increased* or *decreased* during the granulation process? (Increased)

Name three types of granulators. (Drum, pug mill, and pan)

What is the main purpose of the support beam in a drum granulator? (To support spargers, distributors, sprays, and their piping)

Which is usually distributed through the sparger in a drum granulator–*ammonia* or *solution*? (Ammonia as a gas)

Does the production rate from a granulation system depend on the *solution feed* or the *recycle solids feed*? (Solution feed– in the long run production rates are equal to solution feeds minus losses in dust systems and spills.)

Does good granulation depend more on the operator's observing *the granulation* or observing *instruments*? (Both are important, but observing granulation and operator experience in granulation is the most important.)

Name two ways of cleaning buildup off the sparger in a drum. (Rodding. Reverse the drum rotation.)

Why is quick action necessary when lumps are discharged? (To prevent a shutdown. Lumps usually come in bunches and will cause spills and shutdowns if not quickly broken into smaller lumps.)

Why are gloves and goggles necessary when working with solutions? (These solutions are usually hot and acidic. Gloves and goggles are good safety protection.)

The mixing or agitation in a pug mill is usually more vigorous than in other granulators? (True)

Why should you not rod in a pug mill when it is in operation? (The rotating paddles fill most of the pug mill and make rodding very dangerous.)

Are *fines* or *large* particles most likely to be discharged from a pan granulator? (Large particles. This is good because the small particles go back under the spray to be coated and form larger particles.)

In which of the following are spargers not used: *pan granulator, drum granulator*, or *pug mill*? (Pan)

Keeping sprays clean is an important operator duty with pan granulators? (True. The spraying pattern is important to the granulation achieved in pans. Some solutions require much attention to keep the sprays clean: other solutions require very little attention.)

21

Slides

This is a slide of a pan granulator. Note the position of the solids feed chute and the solution sprays. Four different fertilizers have been made in this pan. Also, note the fume hood for better working conditions and pollution control.

A drum granulator is used to produce nitric phosphate. Drums are probably the most versatile and widely used of the granulators. Note the lumps at the discharge grate. They should be broken promptly. These were allowed to remain for the slide to be made.

Slide three is a pug mill producing ammonium polyphosphate (a very high analysis fertilizer, 15-62-0). Note the solution feed is an open-end pipe. Also, note the protective shield.

Chapter 20: NEUTRALIZATION AND REACTION EQUIPMENT

WHAT TO DO | WHAT TO SAY

1

Introduction

Reaction equipment is the heart or most important part of many fertilizer processes. In these processes this is the equipment which controls the chemical composition of the fertilizer produced.

Neutralization is a reaction, but is so widely used in the fertilizer industry that it will be given special treatment in this chapter. This combining of various acids with ammonia is the basis for the produciton of numerous fertilizers.

Reaction equipment is the container or vessel where two or more chemicals are brought together under conditions that will cause them to react to give the desired fertilizer compounds or mixtures. The reaction product may be either a liquid, a slurry, or a solid.

Many times there are numerous processing steps that must follow the reaction to get the fertilizer to the desired condition. However, the reaction determines the chemical composition.

Reaction conditions in many cases are very important. In fact, some reactions will not happen just because the reactants are brought together. Certain conditions of temperature or pressure or contact of the reactants may be necessary. A few very special reactions will not occur without the presence of a material that promotes, but does not enter the reaction. Such materials are called catalysts.

2

Reactors are usually designed to do the following:

1. Proportion the reactants to get the maximum reaction (frequently this means having a small excess of one reactant).
2. Provide intimate contact of the reactants (the amount of contact normally controls the speed of reaction).
3. Keep reactants in contact long enough (retention time) for the reaction to be completed. In a few cases contact for too long a time causes the product to degrade.

4. Cause temperature and pressure conditions that are most favorable to the reaction.

5. Give space for separation of fumes or gases from the liquids or solids.

There is very little uniformity in reactors as to size or type of enclosure. They are specially designed to give the desired reaction conditions for the particular process. Frequently specialized materials are necessary because of corrosive conditions, high temperatures, or high pressure.

Some examples are urea reactors which will withstand the high pressures (200 atmospheres) necessary to get the desired reaction. These reactors are relatively large to provide sufficient retention time to complete the reaction.

A nitric acid converter (reactor) on the other hand is very little more than an enlargement in the line. However, it must be of special materials to withstand temperatures in excess of 1700° F. It must also support and protect the expensive platinum catalyst required to cause the reaction.

Digestion reactions in which acids dissolve phosphate rock are basic to the production of superphosphates and nitric phosphates. The materials of construction must be corrosive resistant because of the acids present. The TVA cone mixer for production of superphosphate is an example of how compact a reactor can be in some instances. A cone 18 inches in diameter and 27 inches high can produce 40 tons per hour.

On the other hand the combustion chamber (reactor) for the calcium metaphosphate process is 11 feet in diameter and 40 feet long for a production rate of 10 tons per hour.

The burning of phosphorus under controlled conditions is the reaction step in the production of electric furnace phosphoric acid. High temperatures and corrosive conditions are present. At one time it was considered necessary to construct these vessels of acid-resistant masonry; now water-jacketed stainless steel is widely used.

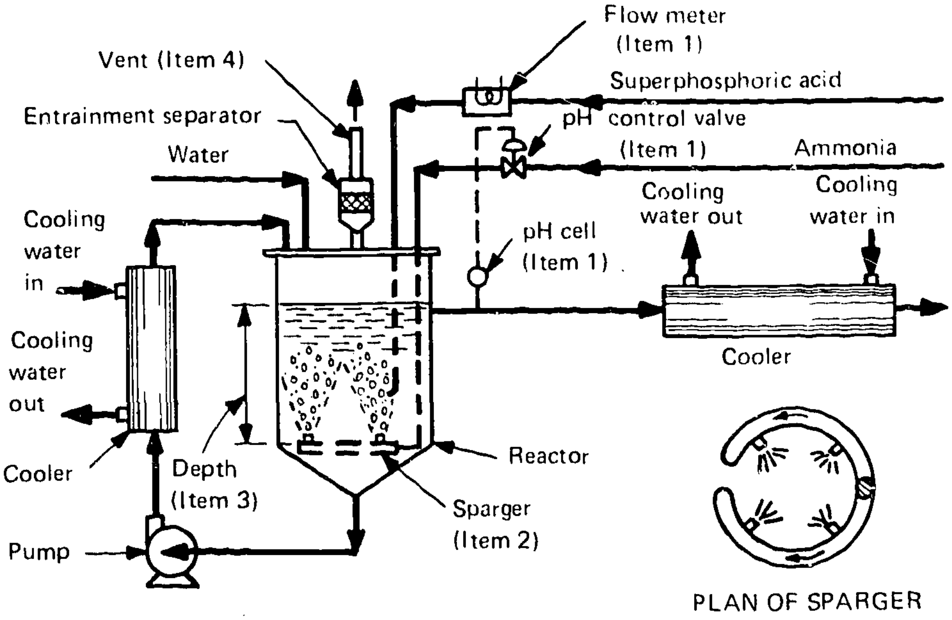
3

Neutralization

Neutralization reactions can be controlled to produce numerous fertilizers—such liquids as nitrogen solutions, clear ammonium phosphate solutions and even higher concentration ammonium phosphate slurries. Also, solids are produced, such as ammonium polyphosphate and ammonium phosphates.

Two things make the control of neutralization reactions relatively easy: (1) Bubbling gaseous ammonia through a pool of acid is an easy way to get good contact between these reactants; and (2) Measuring the pH of the resulting solution is an excellent guide to controlling the proportioning of the reactants.

Sketch on blackboard



If more than one acid is used, it is necessary to provide flow measurements and controls for proper proportioning (item 1). As previously mentioned, if only one acid and ammonia are used, pH measurements can be used to control (usually automatic) the ammonia additions. Temperature can also be used as the control measurement.

Intimate contact of the reactants is usually obtained by sparging (item 2) ammonia into a pool of acid. In some cases an open end pipe is an adequate sparger. However, the most common sparger is one or more pipe loops which have numerous small (usually about 1/8-inch) holes drilled in the pipe. This allows many small bubbles of ammonia to rise through the entire volume of acid.

Retention time is determined by the depth (item 3) of acid. Normally this is not much of a problem since acid and ammonia react very quickly.

Cooling is frequently included in the reaction system since much heat is released when neutralization takes place (both temperature and pressure can affect the degree of ammoniation that occurs). In some cases the heat resulting from the neutralization reaction is utilized to concentrate the solution that is produced by the reaction.

The cooling can be provided in several ways:

1. By using liquid ammonia as a feed and utilizing the cooling from the vaporization of the ammonia.
2. By circulating water or other cooling medium through cooling coils installed inside the reactor.
3. By applying surface cooling to the reaction vessel.
4. By pumping the reactor fluid through an external cooler and back to the reactor.
5. By adding water directly into the reacting liquid.

Most neutralizers are constructed to operate at approximately atmospheric pressure. However, in a few instances these reactors are designed to operate under appreciable pressure. Water from the acid is normally given off and this water plus the inerts usually present in ammonia will build pressure in the neutralizer if they are not vented (item 4).

Neutralizers are usually relatively large. This is to allow separation of the steam and inerts from the reaction solution. Entrainment separators or scrubbers often are used on the gases vented from neutralizers to reduce pollution or to recover valuable product (usually ammonia).

4

Some neutralizers are staged. This means there are several reaction vessels with a part of the reaction taking place in each vessel.

A peculiarity of ammoniating some acids is that much ammonia is needed to change the pH of the acid only a small amount in the lower pH ranges. However, as the pH increases much less ammonia is required to change the pH. Staged neutralization can reduce the loss of ammonia in such a reaction.

5

Operating duties

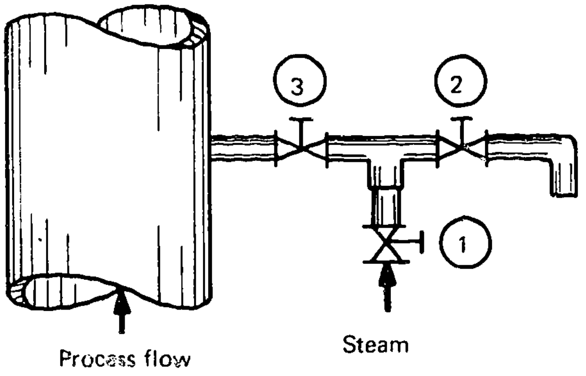
Close attention to instruments is important to the reactor operator. He must know the desired process conditions and use his instruments to maintain these conditions. His mistakes are usually expensive in either downtime or bad product.

Even though he places much dependence on instruments, the good reactor operator knows there are crosschecks to insure against instrument errors. An example is that a faulty pH reading can be detected by watching reaction temperatures (a low pH should be accompanied by a low temperature). Pump pressures and valve positions are good crosschecks on flow instruments.

A neutralizer operator should check several samples per shift with a laboratory type pH instrument. This will allow him to have confidence in the pH meter installed in the process. These meters are subject to frequent failure. Specific gravities of samples are often used to determine concentrations of the reacted fluid.

Sampling of many reacted materials calls for special precautions because the reaction solution solidifies in the sample lines. Usually these sample points are supplied with two valves with a steam connection between the valves. The operator opens valve No. 1 and No. 2 to steam through the sample point discharge. He then shuts valve No. 2 and opens valve No. 3 to allow steaming into the process line. Closing valve No. 1 and opening valve No. 2 allows the sample to flow.

Sketch on blackboard



Of course the good operator observes normal sampling precautions of allowing sufficient flow to flush out the sample line before he catches the sample. Also he wears eye protection and protective gloves.

6

Shift duties

Always look for leaks when checking the reaction equipment. Pump packings, valve stems and sample points are frequent leak points.

Many times pump packings are water cooled. Failure to keep the water flowing can burn the packing out within a few hours of operation. Too much water will leak into the process fluid and dilute it. Pump seals (used in place of packing) also are often water cooled and need attention.

Neutralizers often have a water seal on the gas vent. The operator must restore this water seal when pressure surges cause it to blow. Observation of the vent stack will tell an operator when the seal is blown; so will the reactor pressure.

The operator should check the flow of coolant to and from the cooling system associated with the reactor several times during the shift.

Vibration of the reactor during operation can indicate a broken ammonia sparger. The reactor should be shut down for repairs when this happens.

The operator should be alert for ammonia leaks as he makes trips through the plant. Ammonia's distinct odor makes its detection easy.

Pressure drops across entrainment separators and flows of fluid from the separator should be checked each shift (if the entrainment separator is inside the top of the reaction vessel the fluid flow cannot be checked). Increased pressure drop indicates stoppages and decreased pressure drop indicates a damaged separator.

Some fluids from reactors solidify easily. Control valves often become stopped with these fluids. Provisions to steam the line are usually supplied, but even playing steam on the outside of the valve may clear the stoppage.

The operator usually becomes aware of these stoppages when his reactor level begins to rise even though the valve is open to a position that should prevent this from happening (sometimes the level instrument can be faulty).

Reactor operators (like all other operators) should leave their area clean at the end of the shift.

Startup is a time when any good operator's skill is most apparent. This is particularly true of the neutralizer operator. The violence of the neutralization reaction can become dangerous if the operator tries to add ammonia rapidly to a large quantity of acid. Heavy vibration of the neutralizer and building steel certainly indicates poor operation.

The necessity of having enough liquid pool to cover the openings in the ammonia sparger causes this problem. One answer is to start the reaction with an ammonia water solution in the reactor. Another answer is to add ammonia very slowly.

Another start-up problem occurs in neutralizers if a steam purge is not applied to the ammonia sparger when the neutralizer is shut down and again when it is started up. Solution will back up into the sparger and cause stoppages.

7

Periodic inspections

When the reactor is off all instruments should be checked to see they zero properly.

Occasionally the reaction vessel should be checked for corrosive damage. The sparger in a neutralizer is particularly vulnerable to corrosion (special materials of construction are often used for sparger fabrication).

Protection of catalyst, especially when not in operation, is important in those reactors that require catalyst. Catalyst may become ineffective (catalyst poisoning) if dirt or some metals come in contact with it. It is the operator's duty to keep this from happening.

8

Safety

The major danger with reactors is losing control of the process and allowing reactions to become dangerously violent. Stopping the flow of reactants will stop the reaction if this should happen.

Sprays and drips of acid are possible hazards. Sampling must be done with proper care and using protective equipment.

Dangers of moving equipment are present at pumps, control valves, and agitators.

Surface temperatures of reaction vessels are sometimes hot enough to cause injury if touched.

Explosive mixtures of air and ammonia must be avoided in some reactors during startup. The nitric acid converter is an example.

9

Preventive maintenance

Replacement of the pump packing when it is needed prevents lost operating time. The experienced operator can tell by the position of a packing gland when the packing should be replaced.

Regular corrosion inspections of spargers and of the interior of reaction vessels by both operators and maintenance people is desirable. Pressure reactors should be hydrostatically tested on a predetermined schedule.

Operating questions

Chemical composition of the fertilizers are often determined where? (In the reactor)

What two feed materials are brought together in a neutralization reaction? (Acids and ammonia)

A catalyst promotes reaction but does not enter into the reaction. (True)

Spargers are used to give intimate contact or provide retention time? (Contact)

All reactors operate under high pressures. (False - Some do and some don't)

A nitric acid converter can be considered to be a reactor. (True)

Digestion reactions, where acids dissolve phosphate rock, are not very common in the fertilizer industry. (False - Superphosphate and nitric phosphate processes use digestion reactions.)

Neutralization reactions are used to produce one kind or numerous kinds of fertilizers? (Numerous kinds)

What is the most common method of control used in neutralization reactors? (pH)

Heat is taken up or released by neutralization reactions? (Released)

The term staged reactors refers to several reactors each doing a part of the reaction. (True)

Instruments are important or not very important to reactor operators? (Important)

Instruments are always correct. (False)

Neutralizer operators often sample to check what? (pH - Also specific gravities less frequently)

If the seal on the vent stack of a reactor is blown there will be a dense stack discharge or very little stack discharge? (Dense)

Lack of vibration of the neutralizer during the startup is a mark of a good operator. (True)

If the entrainment separator is corroded away, the pressure drop will increase or decrease? (Decrease)

You should turn purge steam into the ammonia sparger for what reason? (To keep solution from backing up in the sparger and solidifying)

The major danger with reactors is losing control of the reaction. (True)

How can you regain control of the reaction? (Stop the flow of reactants)

11

Slides

This slide shows an ammonia sparger in place in a neutralizer.

This shows a combustion chamber (reactor) of a phosphoric acid unit. (Approximately 10 tons per hour production)

This slide shows a liquid fertilizer reactor. (4 different fertilizers—approximately 20 tons per hour production)

WHAT TO DO — WHAT TO SAY

1

Introduction

Usually concentrators are considered to be equipment which is designed to remove water from a liquid. The resulting liquor is considered to be more concentrated. It has the same amount of the desired material, but less water to dilute or weaken the desired material.

Equipment that concentrates solids is not normally classified as concentrators. However, filters (chapter 11) and centrifuges (chapter 17) are concentrators when the solids are the desirable material in the separation. Removal of the liquid increases the concentration of the solids. Increased concentration of the liquid is negligible since normally the amount of solids in the original solution is small.

Settling devices or clarifiers also act as concentrators of solids when the solids are the desirable product. Since these devices are not discussed elsewhere in this course, they will be discussed briefly in this session.

Concentrators that remove water from liquor usually do the job by evaporation. A s[illegible]d or lake can be used to illustrate evaporation. Over a period of time the air which is in contact with the surface of the pond will take up water. This reduces the size of the pond and makes the water saltier and saltier (more concentrated). Hot sunshine or wind speeds this evaporation procedure.

A pond can also be used to concentrate when it holds a liquid long enough to let solids settle out, and the settled solids are then reclaimed for use.

Many chemical operations actually concentrate; for example, drying makes the fertilizer slightly more concentrated. Nodulizing concentrates the furnace feed material slightly by driving off volatile materials. However, a process is considered to concentrate only when large quantities of the material to be removed are present in the feed material.

2

Blackboard

Some examples of concentrating in the fertilizer industry:

1. Concentration of fertilizer solutions for sale or for feed to granulation processes.
2. Washing of phosphate sand to increase the phosphate content.
3. Flotation to concentrate powdery Florida pebble.
4. Concentrating wet process phosphoric acid to wet process superphosphoric acid.
5. Settling of phosphorus from sludge.
6. Pollution recovery systems such as clarification to recover phosphate solids from cooling water.

3

Liquid concentrators

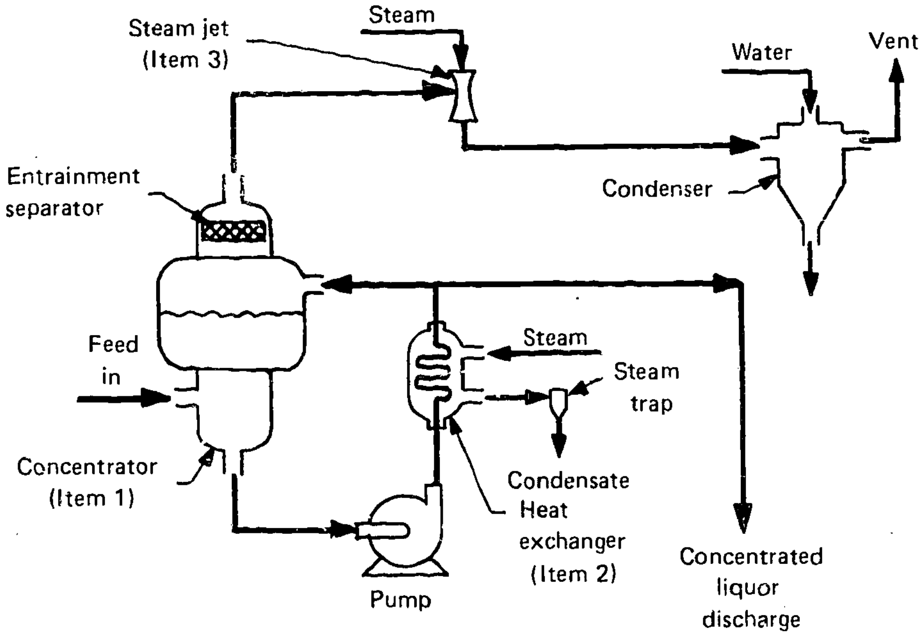
Concentrators for removing water from liquids do the job by vaporizing the water. The liquor is heated to change the water to a vapor and some means of removing the water is supplied.

Two primary reasons for concentrating are: (1) to make the process work or to reduce the size of process equipment required; and (2) to reduce the requirement for drying solids since this is an expensive process.

Frequently the concentrator is operated at a vacuum because the water can be changed to a vapor at a lower temperature when it is in a vacuum. As an example, this change takes place at 212°F. at atmospheric pressure as compared to only 161° F. at 9.9 inches of mercury absolute pressure (20 inches of mercury vacuum).

This is one typical concentrator for fertiizer solutions.

Sketch on blackboard



The concentrator vessel (item 1) contains a pool of the liquor to be concentrated. Evaporation (water removal) from the pool is related to the surface area of the liquid pool. More evaporation is obtained with a bigger surface area.

Steam in the shell of a shell and tube heat exchanger (item 2) located on the circulation leg supplies the heat required. A pump is used for circulation to give more uniform heating of the liquor and better heat transfer in the heat exchanger.

Vacuum is applied to the liquid surface to reduce the temperature needed. Water that has been vaporized is removed by the steam jet vacuum ejector (item 3) that creates the vacuum in the evaporator.

Blackboard

The concentration of the product liquor depends on five things:

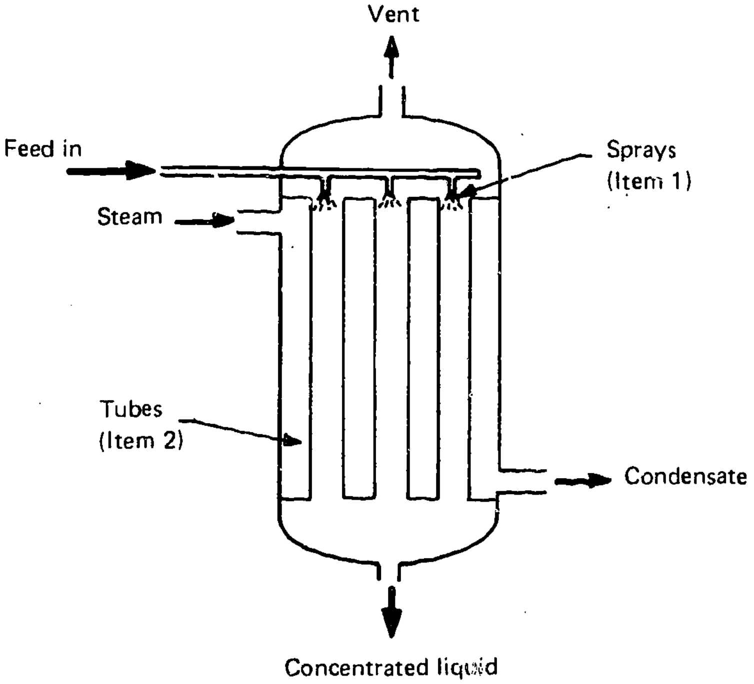
1. Concentration of the feed liquor.
2. Temperature of the liquid pool.
3. Vacuum above the liquid pool.
4. Feed rate to the concentrator.
5. Draw-off rate from the concentrator.

4

Other types of concentrators take advantage of the principle that liquids evaporate faster when a thin film of the liquid is spread over a hot metal surface.

One concentrator of this type is the falling film evaporator.

Sketch on blackboard

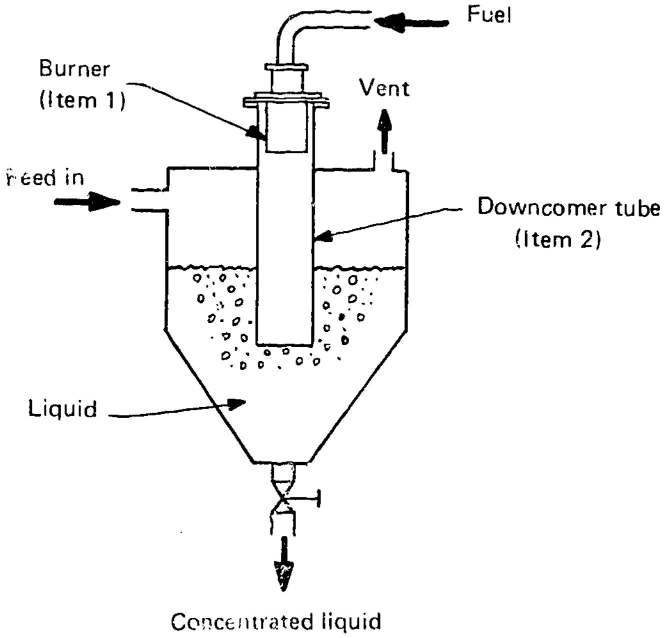


This type evaporator has a spray system (item 1) or a distributor that causes the liquor to flow down the walls of the tubes (item 2). Such a flow gives a thin layer of the liquor on a large area of metal surface. Heat (steam) in the shell is supplied to the outer surface of the tubes.

Wiped film evaporators apply the same principle [illegible] falling film evaporators. The major difference is that the wiping action supplies a thinner film than the flowing liquid in the tubes of the falling film evaporator. These thin film evaporators have an advantage with those products which degrade rapidly when they are heated.

One use of submerged combustion evaporators is the concentration of wet-process acids.

Sketch on blackboard



These evaporators have a gas burner (item 1) to supply heat. The hot combustion gases from the burner are directed below the surface of the liquid pool by a tube (item 2).

The hot gases bubble through and heat the pool of liquid. Fans are normally used to remove the hot g[illegible] and the water that is evaporated.

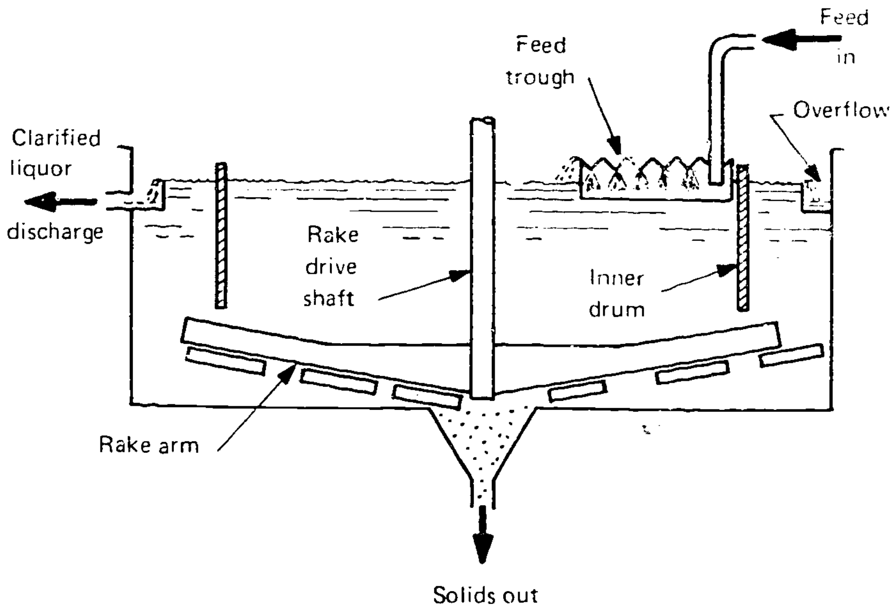
5

Solid concentrators

Settling devices for the concentration of solids may be nothing more than a tank or pond where the liquid is allowed to stay long enough for the solids to settle. The solids are then recovered for reuse.

Clarifiers are an adaptation of settling tanks. They are large diameter vertical cylinders. Every effort is made to avoid agitation of the solids.

Sketch on blackboard



A large rotating rake and paddle device gently moves the collected solids to a central discharge. The rake rotates very slowly to avoid resuspending the solids.

The feed to the clarifier is distributed to avoid any stirring action. Also the clear liquid discharges through many saw-toothed openings around the outer edge of the clarifier. These many small discharge openings keep light solids from being carried out in the liquid discharge.

Quite often materials (flocculants) which speed up the rate of solids settling are added to the liquid being clarified. These settling agents usually work by sticking several particles together. The larger, heavier particles formed in this manner settle faster.

6

Operating duties

The operator has to depend on instruments to control most concentration processes. He must know the desired operating conditions (temperature, pressure, level, flow, etc.) and use his instruments to maintain these conditions. As usual, the good operator knows what conditions to crosscheck to confirm that instrument readings are right. (For instance two temperatures in the liquid pool should be the same.)

Steam is usually used at a high rate to provide the heat required to evaporate water to concentrate the liquor. The good operator keeps a close.

watch on the operation of the steam traps since much money can be wasted by blowing live steam through the traps.

Since evaporators are such large users of steam, a measurement of the steam flow is often provided. Of course, watching this flow is the best indication of whether the steam traps are doing their job.

Concentrated liquor results in many stoppages and for this reason the operator must be alert for changes in level or loss of flow or other indicators of stoppage.

Many times stoppages result from cooling of the concentrated liquor. To prevent this the operator heats the lines before starting a solution flow, and he blows the lines clear with air or steam after they have been used. He also has steam tracers or steam jackets kept in good operating condition.

7

Shift duties

All operating conditions must be checked frequently throughout the shift. The formation of crystals (salting) in the evaporator can occur when the proper operating conditions are not maintained. A product of the wrong concentration is another result of poor operation.

Cooling water flow to pump packings or seals is important because of the hot solutions handled. Proper packing adjustment should be checked each shift to see that any solution leaks are stopped.

Solution circulation must be maintained. In some cases sight glasses are provided so the operator can actually see the circulation. Temperatures, flows, or pump pressures are other circulation indicators.

If the entrainment separator is outside the evaporator vessel, the operator should check the entrainment drainage several times each shift. He should also check the vent to see there is no rain from the vent (loss of liquid entrainment).

Sampling of feed and product solution is sometimes desirable to insure proper operation. Maintaining proper conditions is sufficient assurance in many processes.

An alert operator keeps a close watch on solution levels because of the possibility of stoppages in solution lines. Many times the good operator sees a steady change in the level that should not be occurring. Quick action in steaming out line stoppages can avoid plant delays.

Clarifier operators should pump solids on a regular schedule to avoid overloads on the rake arms. Some solids should be left in the clarifier at each pumping to insure that the solids pumped are as dry as possible.

Vacuum ejectors must be checked several times per shift to be sure the proper steam and water pressure is being applied.

8

Occasionally a leak occurs on vacuum equipment and makes it impossible to keep the proper pressure. Vacuum leaks are difficult to find. However, a persistent operator with masking tape and a soap solution will check flanges, pipe connections, and welds until he finds the leak.

Another occasional problem is weak solution even when all operating conditions are right including the proper strength feed solution. This can happen if there is a steam leak into the liquor. Usually the equipment has to be shut down and the heat exchanger pressure tested to determine if this is the trouble.

9

Safety

Some nitrogen solutions are explosive at elevated temperatures and high concentrations. Pools of such liquids are usually kept to very small volumes.

Concentrating in general is not very hazardous. Pumps or agitators present slight moving equipment hazards. Steam or solution leaks can cause burns.

Sampling many concentrated solutions requires protective equipment and care.

10

Preventive maintenance

Distributors and spray equipment should be checked whenever the evaporator is open. Pump packings and mechanical seals should be inspected during down times. Experienced operators can tell by looking when a pump packing should be repacked.

11

Questions

What is usually removed from the liquid to increase its concentration? (Water)

This removal is called *neutralization* or *evaporation*? (Evaporation)

Clarifiers act as concentrators when the solids are recovered for use. (True)

Use of concentrated solution in a granulation process will reduce the size of the dryer required. (True - It will also usually reduce the amount of recycle required. This allows the use of smaller, cheaper equipment.)

Vacuum increases or decreases the temperature required for evaporation (Decreases)

More surface area of the liquid pool gives *more* or *less* evaporation? (More)

Falling film and wiped film evaporators both take advantage of increased evaporation from a thin layer of liquid. (True)

What is an evaporator called that discharges hot air from a burner underneath the surface of a liquid pool? (Submerged combustion)

What do flocculants do? (Speed up settling by sticking several small particles together)

Use of too much *what* is probably the most costly operator error in evaporation? (Steam)

Concentrated solution lines are often steam traced. Why? (True - To prevent cooling which solidifies the solution)

What is usually indicated by a rapid increase in the concentrator level? (A stoppage in the discharge line)

12

Slides

Slide No. 1 is a picture of the circulation inside a vacuum evaporator.

Slide No. 2 is a steam ejector and its condenser. They are used to pull the vacuum on an evaporator. Water removed from the liquor is condensed in this system.

Slide No. 3 is a clarifier in operation to settle phosphorus containing solids from cooling water used in phosphorus condensers. This recovery system is primarily to prevent stream pollution, but the solids recovered are valuable.

WHAT TO DO

WHAT TO SAY

1

Introduction

Actually many definitions of refrigeration could be given, but specifically it is the process of removing heat from a space or substance to reduce its temperature and transfer that heat to another space or substance.

Before the advent of mechanical refrigeration, water was cooled by storing it in semiporous earthenware jugs so water could seep through and evaporate. The evaporation carried away the heat and cooled the water.

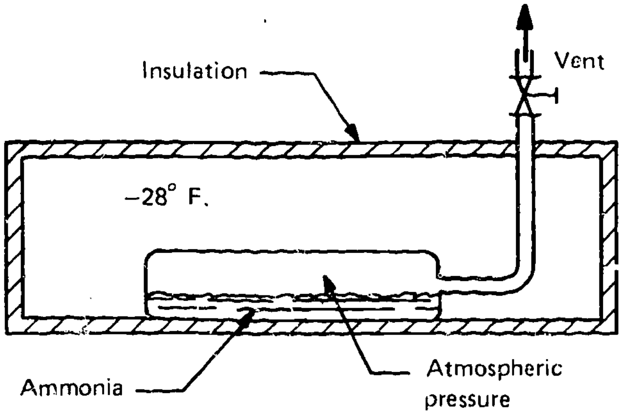
Also, heat was removed by the use of ice in or around the substance to be cooled. The heat of the substance was absorbed by the melting ice.

As technology improved in many areas of manufacturing, increasing demands were made on the ability to remove or eliminate large quantities of heat. Hence, a mechanical means of refrigeration evolved.

2

Mechanical refrigeration is possible because of volatile liquids which under certain conditions will boil at low temperatures and in the process absorb heat from surrounding objects.

Sketch on blackboard



Liquid ammonia (boiling point of -28° F. at atmospheric pressure) in a metal flask with a valved vent line is placed inside an insulated box.

At a temperature of 80° F. the pressure in the flask would be 138.3 psig and no boiling would occur.

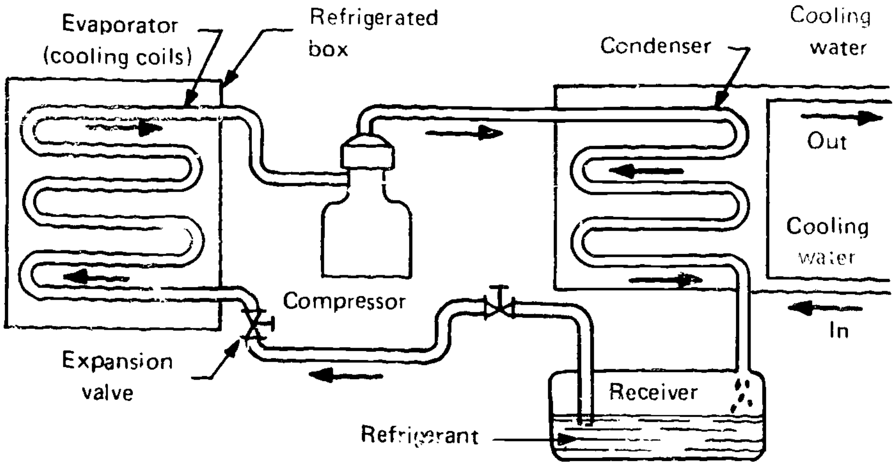
If the vent line is opened, reducing the pressure in the flask to atmospheric, boiling will commence which will lower the temperature of the liquid ammonia to -28° F. Thus, the temperature of the interior of the box will approach this temperature also.

This application of refrigeration is utilized in several areas of fertilizer production, particularly in the ammonia plant, but not to the extent of reducing temperatures to -28° F. By the use of accurate pressure control instrumentation, temperatures can be adjusted to any temperature desired.

3

Since there is a limit on the amount of refrigeration available by this method, other methods of obtaining refrigeration must be utilized. By the addition of a compressor, a condenser, and an evaporator, a closed system is formed in which the refrigerant can be reused.

Sketch on blackboard



The refrigerant flows from the expansion valve through the evaporator (cooling coil) where it absorbs heat and becomes a gas. From the evaporator the gas flows to the compressor where the pressure on the system is increased.

The compressor discharges into the condenser coils which are usually air- or water-cooled and serve to remove the heat accumulated in the evaporator. As the heat is removed, the gas returns to the liquid state and is collected in the receiver.

From the receiver it flows to the expansion valve to repeat the cycle.

4

Operations

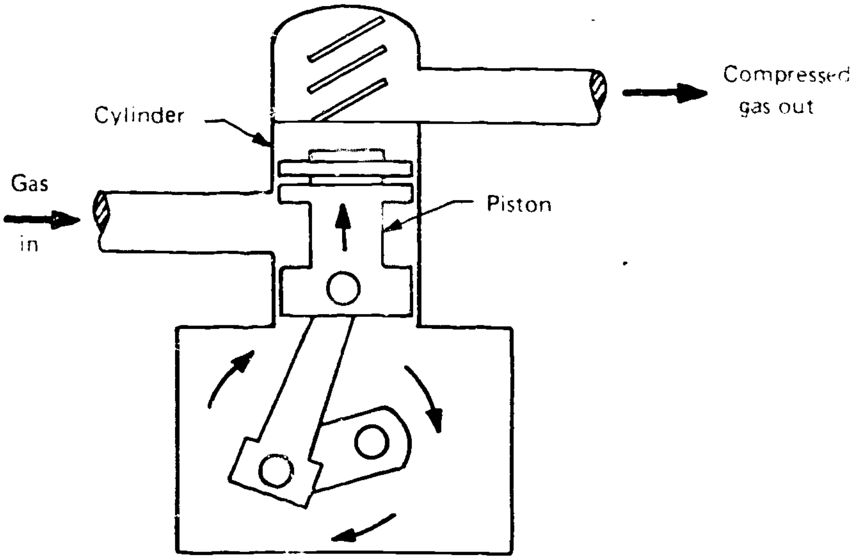
Compressors are used for one reason only—to save the expanded liquid for reuse.

Explain different types of compressors

Many types of compressors are used for this purpose. Most common are the reciprocating and the centrifugal types.

5

Sketch on blackboard



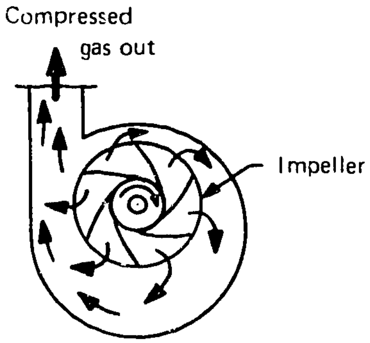
Reciprocating

A reciprocating compressor consists of one or more piston and cylinder combinations. The piston moves in a back and forth motion to draw gas into the cylinder on one stroke and to compress and discharge it to the condenser on the return stroke.

6

Sketch on blackboard

A centrifugal compressor has a single or multistage high-speed impeller to set up enough centrifugal force within a circular casing to raise the pressure to the point where condensation takes place.



Centrifugal

7

Any type of driver (gas engine, gas turbine, electric motor, steam turbine, etc.) can be used on all types of compressors.

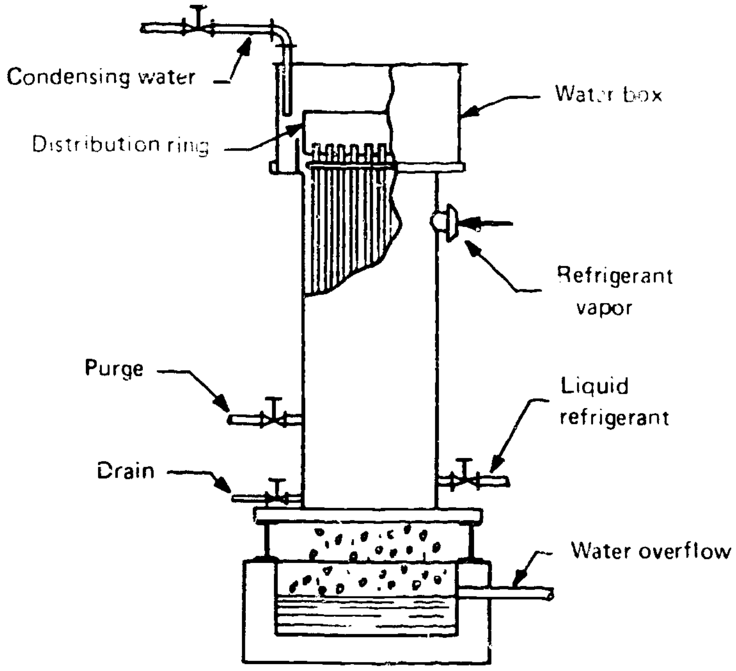
8

Condenser

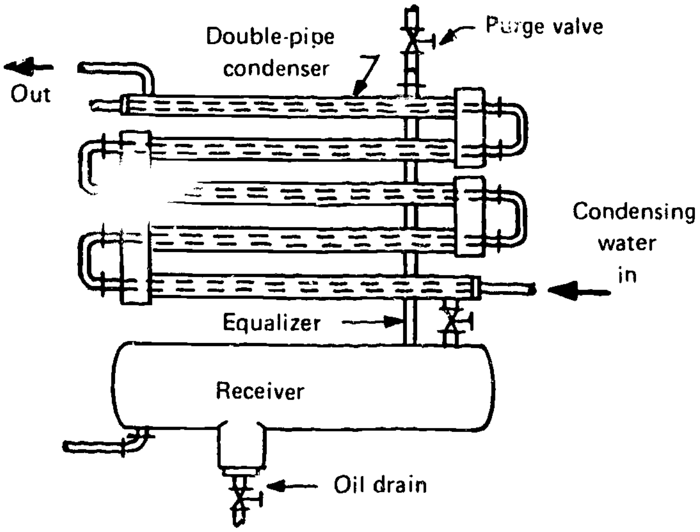
The purpose of the condenser is two-fold: first to remove the evaporator heat plus the heat of compression from the refrigerant; and second, to convert to liquid all the refrigerant vapor delivered by the compressor.

Refrigeration condensers may be air-cooled or water-cooled. In the latter type many variations will be found. The shell and tube, the shell and coil, and the double pipe are the most common examples.

Sketch on blackboard



Vertical shell-and-tube condenser



Double-pipe condenser has one continuous loop, with refrigerant on outside, cooling water on inside.

9

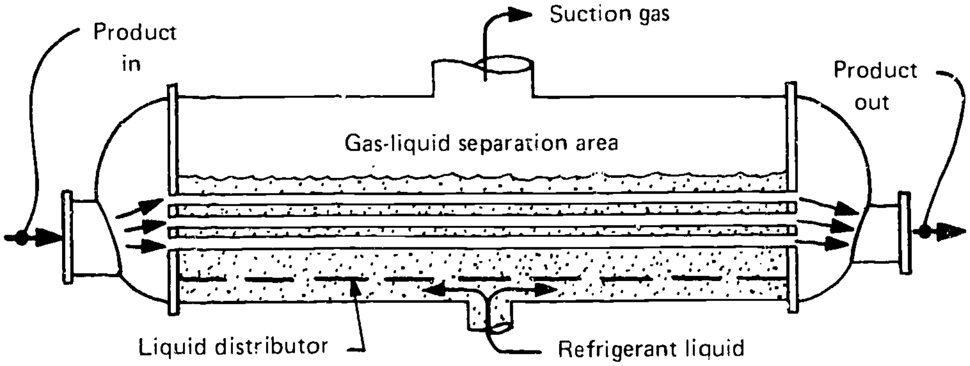
Evaporators

The evaporator is that part of the system where the liquid refrigerant is changed into a gas by the absorption of heat.

Evaporators are classified according to the type liquid feed as "dry" or "flooded" evaporators.

A flooded evaporator is arranged with a tank or large space above the coil so that the coil is submerged in the refrigerant.

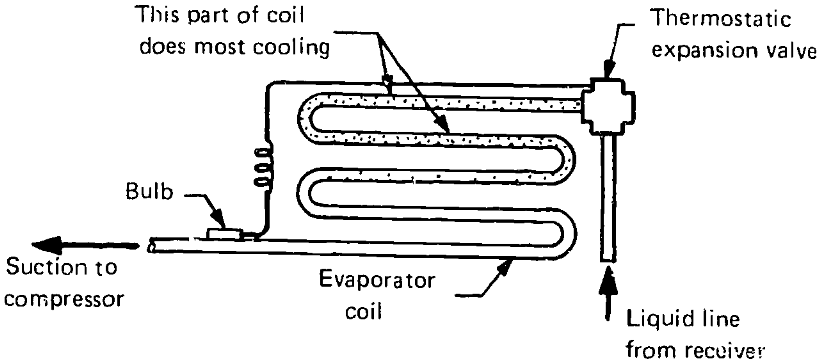
Sketch on blackboard



Typical flooded-shell and tube evaporator

The dry evaporator has a control device that admits only enough liquid refrigerant to be completely evaporated by the time it reaches the outlet coil.

Sketch on blackboard



Prime-surface evaporator coil is bare pipe or tubing

10

The uses of refrigeration in the fertilizer industry are many and varied. Some of these include:

1. The removal of heat from solids by using refrigerated air instead of air at ambient temperature to increase the capacity of the cooling vessel.

2. The addition of liquid ammonia direct to a reaction vessel to supply nitrogen for the product and cooling by the excess ammonia flashed off.

3. Dehumidification purposes in fertilizer storage areas.

4. Storage of gaseous raw materials as liquids by lowering the temperature to the condensation point. Examples methane, propane, butane and ammonia.

5. Electric motors are often cooled to increase power and prevent overloads.

6. Removal of moisture to provide dry air for instrumentation.

11

Operating duties

Refrigeration equipment in a fertilizer plant must be kept under close observation. Erratic operation or varying production rates in areas where refrigeration is required can alter stable operating conditions quickly.

Some points at which changes in pressure or temperature might be indicative of potential upsets in the system are:

List points on blackboard

1. *Compressor suction*— A high temperature expands the gas and reduces the amount of gas sent to the condenser, thus reducing the cooling capacity of the system. If the temperature were sufficiently high, damage to the compressor could result.

Low suction pressure could allow liquid refrigerant to reach the compressor where it could also do damage. Frost on the suction line may indicate low suction pressure.

2. *Compressor discharge*— Excessively high temperature could indicate insufficient cooling water through the cylinder jackets.

Pressure above the normal range indicates inefficient operating conditions such as lack of cooling water, water that is too warm or excessive amounts of non-condensable gases in the system. It also shows when condensing surfaces are scaly or dirty.

12

If filters are used in the system, inspect them frequently and replace before they become obstructed with dust.

The coils of the condenser and evaporator occasionally need cleaning. Use a soft brush or vacuum cleaner on the finned-type coil.

Sometimes pressurized air or water in the opposite direction of the system flow can be used. Wire brushes are suitable for cleaning water-cooled condensers.

Note unusual noises or vibrations in operating equipment.

Be familiar with how the temperature of a critical area feels to the hand. Potential trouble can often be located this way; for example, a leaking suction valve will cause the cylinder head to be hotter than normal.

13

Frequent checks should be made on the compressor for any indication of overheating of bearings and cylinders, particularly after maintenance or repair work.

Lubrication

The proper oil level should be maintained in the crankcase at all times. Any unusual accumulation or consumption of oil should be reported immediately.

Be sure the forced-feed lubricating system is operating satisfactorily and oil pressure is sufficiently high.

Control oil temperature to the recommendations of the manufacturer.

Maintain the proper level in the receiver (refrigerant reservoir).

Purge inerts (non-condensable gases) from the condenser and receiver as necessary.

14

Some of the dangers to be concerned with are (1) explosions, (2) fires, and (3) toxic effects from the gases used in refrigeration system.

These hazards can result from ruptured lines, leaking connections, or damaged compressors.

If such an event occurs, it is the operator's responsibility to shut down the equipment and isolate the damaged area by closing valves as rapidly as possible.

Stress this fact

The operator should wear an appropriate gas mask while performing these operations.

15

Safety
List on
blackboard

Precautions to be taken before making any repairs in the system:

1. Tag switch or control valve of electric motor-driven or power-operated equipment so it will not be started while repairs are being made.

2. Before any part of the system is opened, be sure the pressure has been relieved.

3. If in question, test atmosphere for explosive conditons.

4. Wear or at least have available the proper type of gas mask.

5. Purge that part of the system which has been opened to the atmosphere before placing in service again.

6. When closing valves or installing blanks, don't trap liquids in an isolated line or vessel. Pressure can increase to the point where the line or vessel will rupture.

16

Questions

What is mechanical refrigeration? (Cooling or transfer of heat by means of equipment such as compressors, condensers, evaporators, etc.)

What type of liquids are used for refrigerants? (Volatile liquids liquids with low boiling points)

Name one way to control the temperature of a substance being cooled. (By adjusting the pressure of the refrigerant to produce the desired temperature)

What is the purpose of the compressor in the refrigeration system? (To save the expanded gas for reuse by increasing the pressure on the gas to make condensation possible)

What is the dual purpose of the condenser? (To remove the heat from the system and convert the refrigerant vapor to a liquid)

What is the purpose of the evaporator? (To absorb the heat in the area where cooling is required)

17

Slides

This slide shows a complete refrigeration unit.

The second slide shows frosting on the compressor suction line. Frosting usually indicates low suction pressure.

WHAT TO DO | WHAT TO SAY

1

Introduction

The cost of industrial maintenance is an increasingly important one in fertilizer plant operations.

In many companies maintenance has been and still is considered a necessary evil that must be tolerated.

This attitude causes a downgrading of maintenance functions leading to:

List on blackboard

1. Excessive machine breakdowns
2. Frequent emergency work
3. Domination of maintenance by production
4. Lack of an equipment replacement program
5. Insufficient preventive maintenance
6. No planned selection of maintenance supervisors and managers
7. Inadequate training of maintenance personnel
8. Poor shop facilities

The principles and practices which have been used and proved in production have not often been extended to maintenance.

The fact that few or none of the following procedures are regularly employed in fertilizer plants indicate the lack of management techniques in maintenance:

List on blackboard

1. Organization planning
2. Written procedures
3. Performance measurement
4. Planning and scheduling
5. Training programs
6. Motivation techniques
7. Cost controls

2

Recent years have witnessed an increasing awareness of the large contribution which maintenance labor makes to the total cost of doing business.

As plants become more automatic, there is a continued shift of workload from the direct labor force to the maintenance labor force.

In order to stay competitive, plants have to place more and more effort on controlling these costs.

One method of doing this is the preventive maintenance program.

3

Emphasize to class

Preventive maintenance is the planned maintenance of plant and equipment resulting from periodic inspections.

Its purpose is to minimize breakdowns and excessive wear and tear resulting from neglect.

In a way, we could call preventive maintenance, productive maintenance since its purpose is to avoid breakdowns and prevent excessive wear of equipment.

Properly conducted preventive maintenance is a cost-reduction tool.

4

Objectives of preventive maintenance

List on blackboard

The objectives of a preventive maintenance program are:

1. Reduce production downtime
2. Better conservation of machinery and equipment
3. Reduced overtime cost
4. Fewer large-scale repairs
5. Reduced cost of repairs
6. Reduced products that do not meet specification
7. Identification and replacement of equipment with excessive maintenance costs
8. Improved safety conditions

5

Operating a program

Starting a successful preventive maintenance program may require from several months to several years.

First there must be an accumulation of historical repair data for machinery and equipment.

An analysis of past troubles will reveal whether corrective maintenance is needed.

It will also give an indication of the inspection frequency required to minimize repair.

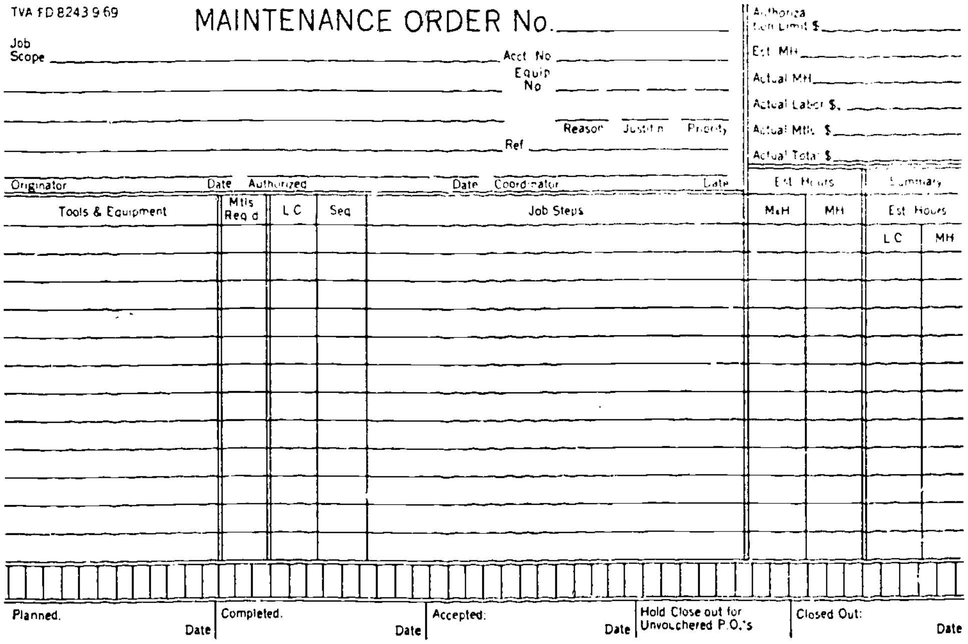
6

Work order

For a preventive maintenance program to work, a maintenance request or work order must be written to cover all repair work.

It is from this work order that records are kept, schedules are made, and priorities are established.

The greatest amount of these orders should come from maintenance control activity as a result of scheduled maintenance inspections.



TVA FD 8243 9 69

MAINTENANCE ORDER No.__________

Job Scope __________ Acct No __________
Equip No __________
Reason Justif'n Priority
Ref __________

Authorization Limit $__________
Est MH __________
Actual MH __________
Actual Labor $__________
Actual Mtls $__________
Actual Total $__________

Originator Date Authorized Date Coordinator Date

Tools & Equipment	Mtls Req'd	LC	Seq	Job Steps	Est Hours		Summary	
					MxH	MH	Est Hours	
							LC	MH

Planned: Date
Completed: Date
Accepted: Date
Hold Close out for Unvouchered P.O.'s
Closed Out: Date

SAMPLE OF A MAINTENANCE WORK ORDER

7

Prior to starting the preventive maintenance program each item of equipment and machinery should be surveyed to determine the inspection and lubrication requirements on a daily, weekly, monthly, quarterly, semi-annual, or annual basis. The survey should also include an estimate of the frequency for complete overhauls.

8

Types of inspections

Equipment inspections may be of a general or specialized nature.

A general inspection is usually made of basic equipment using a pre-established check list.

The inspection cycle is determined by the part that is most likely to give trouble. The inspection is scheduled so that the part will be repaired to avoid shutting down the machine.

Establishing proper inspection frequencies is a matter of experience.

A small amount of production downtime may prove to be the economic level. This may be better than over maintaining with high maintenance costs.

9

Specialized inspection is used in larger plants.

Parts of the equipment which have long life are inspected less frequently. With special diagnostic equipment, the exact condition of the machinery by means of on-stream test are made and the equipment is shut down for repairs only when it is necessary.

10

Explain the inspection check sheet

Outline briefly on blackboard

One of the most important aids to a good preventive maintenance program is the inspection check sheet or report.

This sheet will list the important features of the equipment which requires inspection.

From this sheet the maintenance control section will issue the necessary maintenance requests or shop orders.

The check sheet also provides a reminder to the inspector on what to check so that nothing will be overlooked.

BELT CONVEYOR WEEKLY
INSPECTION REPORT

DATE ____________________________

CONVEYOR NUMBER ____________

______ LOAD FALLING CENTRAL ON BELT

ALL ROLLS TURNING FREELY

______ ALL ROLLS PROPERLY SEATED AND HELD IN BRACKETS

______ ACCUMULATION OF MATERIAL UNDER ROLLS

______ BUILDUP OF MATERIAL ON RETURN BELT ROLLS

______ LUBRICATION LINES AND FITTINGS

______ BEARINGS AND SEALS LUBRICATED

______ BEARINGS RUNNING HOT

______ CHECK SPEED REDUCER FOR PROPER OIL LEVEL. DO NOT CHECK OIL LEVEL WHEN UNIT IS RUNNING

______ CHECK SPEED REDUCER AND SEALS FOR OIL LEAKAGE--BREATHER PLUG OPEN?

______ CHECK SPEED REDUCER FOR OVERHEATING

______ CHECK V-BELTS AND SHEAVES FOR PROPER SLACK AND ALIGNMENT

______ SKIRT BOARDS PROPERLY ADJUSTED

______ TAIL SKIRTS PROPERLY CUT AND ADJUSTED

______ CHECK BELT SCRAPER FOR WEAR

REMARKS: ____

____

____

____

____

____

____

____

INSPECTOR ______________

11

Scheduling preventive maintenance

Scheduling the preventive maintenance inspections and repairs can be done manually or with electronic data processing.

Preparation of the preventive maintenance schedule for any given week, as you can see, requires close coordination with production scheduling.

The selection of the preventive maintenance inspector is an important part of the program.

While the inspector will not make the repairs he notes as being required, it is helpful if he has the ability, for then he will recognize the need and what is involved in making the repair.

The number of inspectors will change from plant to plant depending on the frequency of inspections, size of the plant, and equipment coming under the plan.

In some cases, critical items will want to be verified by re-inspection.

12

Very important

Lubrication is an integral part of the preventive maintenance program. It will be covered in more detail in chapter 24.

In many plants, this important work is assumed by no one.

In some cases the major emphasis has been placed on using fewer kinds of oils and greases, rather than on determining the proper lubricants, and seeing that they are regularly applied.

Most of the major oil companies will assist in setting up a lubrication program.

13

As soon as the preventive maintenance program is in operation, steps should be undertaken to obtain maximum benefit from it.

Substantial savings can be made by concentrating maintenance and design on, say the top five to ten machines, that cost the greatest amount of money to keep in repair.

The preventive maintenance program will also show repeated failures of some equipment.

Such repeated failures should be analysed for a change in the method of repair, or replacement with new equipment.

In some cases the preventive maintenance data may show that it would be desirable to overhaul certain equipment on a regular basis

14

Maintenance prevention

An important part of the preventive maintenance program, which some do not take advantage of, is the planned procurement of buildings, machinery, and equipment that has been designed to minimize maintenance, and have maximum operating life.

At least once each year the preventive maintenance program should be reviewed and deficiencies noted and corrected.

The necessity for continuous observation and alertness will ever be present with or without the annual review.

While preventive maintenance is not a cure-all, the timely repair of equipment and machinery will prevent many costly breakdowns.

15

Safety

Safety should never be neglected in the preventive maintenance program. This should apply to the inspection as well as repairs.

The maintenance inspection report and work order can be used to caution repairmen if some defect is known that might cause an injury during repair.

16

Questions

Why have a preventive maintenance program? (Purpose is to prevent breakdowns and to reduce cost)

Why should an equipment and machinery survey be made before starting the preventive maintenance program? (To determine the condition of the equipment and how often the inspection and lubrication should be done)

What determines the frequency of inspections? (It is determined by how long the equipment will last. Equipment having a long life does not have to be inspected as often as an item with a short life.)

WHAT TO DO	WHAT TO SAY
	1
Introduction	Lubrication is the reducing of frictional resistance that occurs at the surface of two solids when they are forced to slide over each other. Lubrication is an essential feature of all modern machinery and has been throughout the ages.
	The first authenticated use of lubricants is found in the relics of ancient Egypt. The science of lubrication, as we understand it today, is less than one hundred years old.
Stress this	The lubricant separates the two solids with a thin film so that their resistance to motion is much less. In a properly lubricated system, the resistance to motion comes mainly from the shearing action of the lubricant film itself, and not from the two solid surfaces rubbing against each other. This is why it is important that the correct lubricant be used for the specific condition.
List on blackboard	A good lubricant must: 1. Have a high oiliness (even as a thin film due to low speed, heavy load, or intermittent action). 2. Be chemically stable in the presence of heat and moisture. 3. Have a minimum tendency to foam. 4. Be near neutral so that oil will not attack highly polished metal surfaces.
	2
How to set up a program	In establishing a lubrication program, it is necessary to survey the equipment to determine the proper lubricants and lubrication frequency. Most major oil companies will cooperate in making such a survey and will provide a lubrication manual for the plant.
	After the survey, their recommendations will help in determining the number of different lubricants to be used. Usually eight or ten types will be sufficient for most plant needs.

3

After the survey is completed, the lubricant number specified by the oil company and the plant number should be shown so that there will be no mistakes.

Write on blackboard

Plant Number	Manufacturer's Number
1	Pacemaker Oil #3
2	Pacemaker Oil #5
3	Pacemaker Oil #7
4	Pacemaker Oil #8

If the plant should get a new supplier, the list would have to be changed to show his products.

4

From the recommendations of the oil company, or the manufacturer, a lubrication manual can be developed which will include all the information as to when to lubricate and what lubricant to use.

(Review the major points of the attached sheets for lubrication of a belt conveyor.)

5

The lubricating schedule can be accomplished by means of a daily, weekly, or monthly lubrication check sheet.

The most convenient way to analyze work associated with the schedule is by the number of minutes required to perform each lubrication. From these standards, a lubrication check sheet can be assembled.

(Review the attached lubrication check sheet with the class.)

ATTACHMENT-BELT CONVEYORS

SHAFT-KING SPEED REDUCTION DRIVES

Oil Leakage

Improper lubrication or loosening of housing screws may result in oil leakage. Leakage may normally be eliminated without disassembly of the unit or removal of the drive shaft. A few simple rules for correction of leakage should be followed.

For Oil Leakage Through Seals: See chart and service manual.

For Oil Leakage From Housing: Leakage at housing screw locations is usually caused by loosening of the machine vibration or reversing conditions. Periodic tigh ews will relieve this condition.

Operating Temperature

See chart and service manual.

Repairs

See chart and read service manual before dismounting reduction unit from shaft and starting repairs.

CAUTION: DO NOT LOOSEN SLOTTED-HEAD SCREW IN LOCKING NUT

Lubrication

All Shaft-King Units have been designed for splash lubrication of gears, pinions and anti-friction bearings. Therefore, grease or other non-fluid lubricants must not be used.

Fill to lowest overflow plug with specified oil.

	Surrounding Temperature	
Oil Company	AGMA #2 15-60° F	AGMA #3 50-125° F
Pure Oil Company	Purepale (C) Hvy. Med.	Purepale (G) Hvy.
Shell Oil Company	Vitrea Oil 38 (J)	Vitrea Oil 41 (J)
Texaco, Inc.	Regal PC (G) R&O	Regal F (F) R&O
TVA Code	LEPRG-2	LEPRG-3

Flush after first 100 operating hours. Fill with new oil. In normal service change oil every 2500 hours or at least semi-annually. In severe service change oil every 1 or 3 months.

Bearings

Lubricate plain bearings weekly and anti-friction bearings every three months. Use TVA GP-1 Grease.

FALK SPEED REDUCER

After First Month's Service

Drain all oil and thoroughly flush out unit. Add fresh oil.

Periodically

Check oil level when gears are at rest. Add oil if needed. Do not fill above mark indicated on the dip stick for leakage or undue heating may occur.

Every Six Months--Service as Follows:

Reducer–Change oil every six months or every 2400 hours of operation, whichever occurs first. It is not necessary to dismantle the reducer; just drain, flush and refill.

	Ambient Temperature	
Oil Company	15-60° F	50-125° F
Shell Oil Company	Tellus Oil 41	Tellus Oil 72
Pure Oil Company	Purepale Heavy	Purepale Special Heavy
Texaco, Inc.	Regal Oil PE (R&O)	Regal Oil G (R&0)
TVA Code No.	LEPRG-3	LEPRG-4

Couplings–Lubricate Falk Steelflex coupling when servicing the reducer, or at least once a year as explained in the coupling manual.

Use one of the following greases:

Pure Oil Company	Paco Fibre Grease No. 2
Shell Oil Company	Alvania Grease No. 2
Texaco, Inc.	Marfax Heavy Duty No. 2
TVA Code	GP-1

Seals–Periodically or at least every six months or 2500 hours of operation, purge contaminated grease from seals by pumping fresh grease through the seal until it flows out of the bottom pipe plug hole. (Remove plug before purging.)

Use one of the following greases:

Pure Oil Company	Paco Fibre Grease No. 2
Shell Oil Company	Alvania Grease No. 2
Texaco, Inc.	Marfax Heavy Duty No. 2
TVA Code	GP-1

Roller Chain–Keep oil up to mark with TVA Code MO-4. Change oil every six months.

3182

ATTACHMENT-LUBRICATION CHECK SHEET

Equip. No.	Equip. Name	Std. Min.	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.
1006	Belt Conveyor	20.00						
1030	Flake Screen	12.00						
1032	Speed Reducer	4.50						
	Direct	36.50						
	Indirect (20%)	7.30						
	Total in Minutes							

After estimates have been made and the oilers have become familiar with their work, the route should be checked for adjustment before final assignments are made.

In this manner, you can be sure that each oiler has a fair work load.

6

Some plants make the mistake of assigning their less competent employees to the job of oiling. The oiler should be an intelligent and capable employee. The machinery entrusted to their care is too valuable to do otherwise.

Some plants assigned this work to skilled craftsmen so as to assure themselves of superior work. Regardless of who is assigned the work, it is a good procedure to verify the accuracy of the lubrication check sheet by occasionally spot checking an item or two.

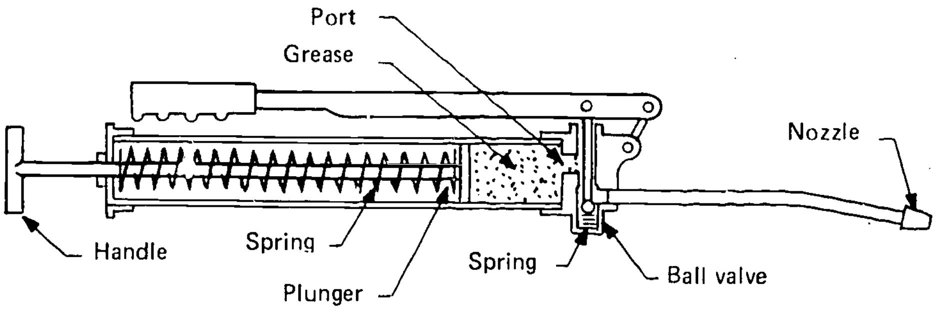
Good lubricating practice does not stop. When equipment breaks down or is pulled for repairs, the equipment should be checked over. Excess wear can be evident if it has not been lubricated often enough with the proper lubricant.

7

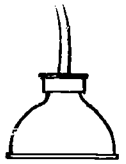
Lubricant dispensing

The person responsible for lubrication should be supplied with a lubrication cart or buggy of suitable size. The cart should carry an adequate supply of the required lubricants and the proper lubrication appliances.

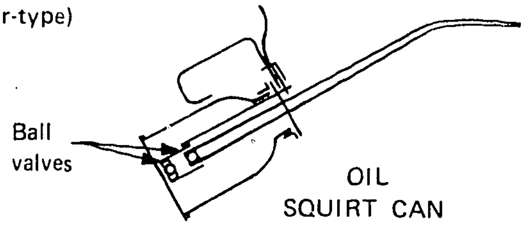
Sketch on blackboard



GREASE GUN
(Lever-type)



OIL
SQUIRT CAN



OIL
SQUIRT CAN
(Pump-type)

The oiler should also have available the lubrication charts and check sheets for the machines that he intended to cover during that work period.

8

Why automatic lubrication?

The proper lubrication of complicated and expensive equipment has become more and more of a problem.

This is particularly true in some fertilizer plants on such application as ball mills, crushers, and kilns where total enclosure of the gearing is impractical. Also there is always the danger that foreign substances may contaminate the lubricant and cause excessive wear.

Some machines such as moving grates and conveyors have a large number of bearings. Since they operate under very dusty conditions, it is desirable to lubricate the bearings often with a small amount of grease.

This has brought about automatic lubrication. A small line is run to each bearing from a central reservoir. With the aid of a pump and a timing device, a small amount of lubricant is supplied to the bearing at regular intervals.

In some cases, such as kiln, a liquid lubricant is sprayed on the gearing.

9

A good lubricating program starts with storage. Care must be exercised in the manner in which lubricants are stored, handled, and dispensed.

Stress this

Unless properly controlled, experience has shown that the lubricant storage area can become the eyesore of the plant.

List on blackboard

1. Always store drums inside a building.
2. Keep covers on drums and pails when not in use.
3. Keep bungs closed tight. The best lubricant can be made ineffective by contamination.
4. Oil storage space should be weather-tight and of fireproof construction.
5. Proper racks for storage of lubricant containers should be provided together with means for handling and placing containers on the racks.
6. Lubricant containers should be kept clean on the outside and lubricant pumps, measures, and lubrication appliances should be stored away from open doors and windows.

Question

Why? (So that these items won't be contaminated by trash blown in from the outside.)

10

Operating duties

The oiler should check with operations so that he will know what equipment will be down and when.

Before starting on his rounds, he should review the latest inspection sheets on the equipment he intends to lubricate to see if there are any special items that need his attention.

He should also make sure that he has a supply of lubricants on the cart that he will need that day.

As he makes his rounds he should keep his check sheet posted. If he finds anything that requires attention he should report it to the operating foreman.

The oiler must realize the importance of keeping the lubricants free of contamination. Also clean the fittings with a cloth and make sure the grease gun nozzle is clean before grease is applied.

On an automatic lubrication system, be careful when replacing the lubricant container with a full one to see that no dirt or trash gets into the lubricant.

11

Preventive maintenance

Lubrication is an integral part of any preventive maintenance program. Time and time again substantial results have been noted in less downtime and decreased maintenance cost when an effective lubrication program was started.

Some points to keep in mind in a good preventive maintenance program are:

List on blackboard

1. When shutting down a machine for a long delay, bearings should be lubricated in order to seal the bearing and keep out dirt and other contaminants.
2. Do not use kerosene to clean bearings as it will not evaporate. When the lubricant is applied, it will be diluted by the kersene. Use mineral spirits for this purpose.
3. Do not start or run a piece of equipment until you are sure all operating parts are lubricated with the proper grade of lubricant.
4. Always use lubricants specified and establish a regular system of lubrication of all plant equipment.
5. Make it a practice to maintain oil cups, grease guns and fittings and all other lubrication appliances in a clean condition.
6. Never permit oil hole covers, bearing caps and other lubrication devices to remain open.
7. Before checking a piece of machinery to see if it needs oil by lifting an oil cap or pulling up on the oil dip stick, wipe away any dirt present so that it won't get into the oil.
8. After applying the lubricant, wipe off any excess so that dirt will not accumulate at that point.

12

The manufacturer of the equipment will recommend as to how often the equipment should be lubricated and what lubricant to use.

Keep in mind that you might want to lubricate more often than he recommends if the conditions are very severe.

For example, the manufacturers recommend this frequency for the following equipment:

Review with class

1. Motors. Lubricate every six months or 4000 hours of operation.
2. Speed Reducer. Drain oil after first month of operation, flush, and refill with new oil. Change oil thereafter every 2400 hours of operation.
3. Check couplings (Falk) once each year and lubricate if necessary.

4. Bearings. Lubricate plain bearings weekly and anti-friction bearings every three months. Every six months, flush grease lubricated anti-friction bearings with mineral spirits, dry, and repack (1/3 capacity).

5. Seals. Periodically or at least every six months or 2500 hours of operation, remove bottom plug and purge contaminated grease from seals by pumping in fresh grease. (Until it flows out of the hole.)

13

Safety

The oiler must not try to oil or service a piece of equipment while it is in operation. The danger of being caught in the equipment is too great.

Before lubricating any equipment in which there is danger of his being injured, he should see to it that the electircal switch that supplies power is pulled and locked. He should also place a hold tag on the switch stating that the equipment is being serviced.

When he is finished, he should, by all means, remove his hold tag so that the equipment can be placed back in operation.

The importance of the oiler keeping the oil storage area clean cannot be emphasized enough from the safety point of view. This is to prevent fires and injuries from falls. When changing lubricant containers in an automatic lubricating system, use caution in removing the reservoir cover plate and follower plate. They are under 200 pounds spring tension.

14

Questions

Quite often in lubricating literature we see the abbreviations SAE and AGMA. What do they mean? (SAE is the Society of Automobile Engineers. AGMA is the American Gear Manufacturers Association.)

What is the viscosity of an oil? (The internal fluid resistance of a substance which makes it resist a tendency to flow)

Why should the oiler do a good job? (Because of the expensive machinery entrusted to his care)

What is the danger of servicing equipment while it is operating? (It is a dangerous practice for the one doing the servicing, besides the possibility of damage to the equipment.)

Why would plant management want to assign a less competent employee to the job of oiling? (Job is not as strenuous physically as some of the others, and possibly the management does not fully realize the responsibility placed upon the oiler.)

15

The first slide shows how the grease fittings have been brought to a central point to make the job of lubricating easier and quicker.

The second slide shows an automatic centralized lubricating system.

The third slide shows a storeroom for lubricants.

WHAT TO DO

WHAT TO SAY

1

Introduction

Safety program objectives

The objective of any safety program is to stimulate a basic philosophy in safety thinking and through the application of this program develop and promote safe work practices, reduce unsafe acts of persons, control inherent hazards, and provide a working environment reasonably free from unsafe physical conditions.

2

Policy

Safety policy is based on a conviction that the well-being of employees must be one of the major considerations in all operations. People are our most important asset; their safety is one of our greatest responsibilities. The goals of a safety program are both humanitarian and economic. Since industrial accidents which result in injury or death and loss of property are preventable, it is our duty to send each employee home to his family each day whole and healthy.

Good safety performance is clear evidence of good management. Thus, safety must be an integral part of every managerial and supervisory position.

It is the policy to incorporate accident prevention principles and techniques as an integral phase of all operations. Management is sincerely interested in preventing accidents and each employee is expected to report to his foreman unsafe conditions which he encounters in his work. The foreman will give job instructions and no employee is expected to undertake a job until he has learned how to do it and is authorized to do it by his foreman.

No employee should undertake a job that appears to him to be unsafe without first discussing the job with his foreman. If any employee suffers an injury, even a slight one, he is required to report it at once to his foreman or proper plant medical authorities.

3

The supervisor will provide all personnel under his jurisdiction an opportunity to periodically hear and discuss safety aspects of their jobs because he is responsible for the protection of personnel and equipment in his area. Any, or a combination of the following methods may be used.

Methods for creating safety consciousness

1. Periodic discussions of safety items in meetings normally scheduled for review of production and administration.
2. Regularly scheduled safety meetings.
3. Small group meetings with assigned personnel.
4. Discussion between supervisors and individual members of a group.

4

Specific requirements Important

It is impractical to attempt a complete discussion of safety rules for all activities within a plant but one of the more general rules is:

The wearing of hard hats and spectable type safety glasses should be a job requirement and condition of employment in all shops and operational areas of the plant.

5

Personal protective equipment

1. Protective equipment such as hard hats, gas masks, chemical goggles, safety glasses and rubber clothing should be provided at no cost to the employee.
2. Employees are expected to use protective equipment appropriate to the hazards encountered.
3. Personal protective equipment must be inspected and cleaned by the user.
4. Other safety equipment that should be available to employees in many plants:
    - (a) Air supplied masks
    - (b) Air supplied suits
    - (c) Chemox masks (self-contained breathing apparatus)
    - (d) Chemical respirators
    - (e) Chemical hoods
    - (f) Dust respirators
    - (g) Ear protectors (ear muffs and plugs)
    - (h) Face shields
    - (i) Safety hats and caps
    - (j) Safety belts
    - (k) Safety goggles (including chemical goggles, welding goggles, and chippers' goggles)
    - (l) Protective clothing (neoprene rubber, and aluminized asbestos as well as welders' leathers)

(m) Gloves (leather, hot mill, and rubber)
(n) Sandblasters' hoods

6

Other emergency equipment

Adequate safety showers and air mask stations should be in the operating areas.

1. Safety showers and air mask stations should be inspected regularly and maintained in condition for immediate use in case of emergency. (Inspections usually done by the foreman)

2. Air mask stations should be provided with activated charcoal filters which are to be inspected regularly. The air lines should be blown down at regular intervals to reduce the oil and water present.

Fire Extinguisher Stations

1. The fire extinguisher locations should be identifiable by a red background of reflectorized paint.

2. Fire extinguishers should be checked and serviced regularly.

3. If an extinguisher has been used, do not hang it back in the bracket at the station. Leave it on the floor near the station to signify that it needs to be serviced.

7

Fire and ambulance service

(If this service is not provided OMIT)

Fire and ambulance service should be provided. In case of emergency call (   ) and give the following information:

1. Type of emergency (fire or injury)
2. Number of persons hurt
3. Type of injury and cause if known
4. Fire or ambulance station number where equipment is needed, and any other directions helpful to the driver.
5. If possible, assign someone to intercept the emergency vehicle and give directions to the driver.

Stress this

6. The family of an accident victim should be promptly notified by a designated person in a position to know the facts of the case.

8

(Fill in the blank with emergency telephone number to call)

1. All buildings should have fire and ambulance station numbers posted in a prominent place, usually at the corners of the building. You should memorize this number at your individual work locations.

2. All telephones in the plant should be equipped with a "stick on" sign listing the Fire and Ambulance number (   ) as well as the station number where the emergency equipment is needed. This information is there to assist you in properly reporting an emergency.

9

Injury from Inhalation

First-aid technique

1. Remove victim to fresh air; keep him warm and quiet.
2. If breathing has stopped, apply mouth-to-mouth resuscitation or artificial respiration immediately.

10

Chemical Spills on Skin

First-aid technique

1. Flood with water, using safety showers or hose.
2. Remove contaminated clothing while flooding is being done.

11

Chemical Contamination in Eyes

First-aid technique

Flush eyes with water. Use gentle flow of water from hose, safety shower, or use hard hat as a pan.

12

Electric Shock

First-aid technique

1. Break contact with electrical conductor; turn off switch if possible but do not waste time hunting the switch. Stand on a folded dry coat, newspapers, or a dry board, and with one hand protected with several thicknesses of dry cloth, newspaper, a dry stick or pole, grasp a dry part of the victim's clothing and drag him away from the conductor. It might be possible to push a live wire off the victim with a dry wooden stick or to pull the victim off a live wire with a piece of dry rope or a handkerchief looped over the foot or hand.

(Demonstrate various methods of artificial respiration and closed chest heart massage)

2. If the victim is not breathing start mouth-to-mouth resuscitation or artificial respiration immediately. Check for pulse because in many cases of electric shock, ventricular fibrillation has occurred and if this is the case, close chest heart massage is necessary to maintain blood supply to the brain. This should be continued until breathing is restored, rigor mortis sets in, or a physician indicates no further need.

13

Physical Shock

1. Shock follows any injury. Control bleeding by digital pressure if present. Keep victim warm but not hot. Remove all foreign bodies from his mouth.
2. Use ammonia inhalant if available but do not give a stimulant.

3. Loosen tight clothing.

4. Place in a lying down position with feet higher than the head, except in cases of chest injury.

5. Relieve pain as much as possible and reassure and encourage the victim.

First-aid technique

6. Give artificial respiration if needed. *Remember artificial respiration should be started any time the patient is not breathing.* Bleeding should be controlled. Treatment for control or prevention of shock should be started. Major injuries should be reported immediately as previously covered and employees with minor injuries should be referred to qualified personnel for treatment.

14

Special Notes

First-aid technique

Do not move a seriously injured patient unless there is immediate danger of further harm. Too often serious damage is done by unnecessary handling. Generally, it is much better to make the patient as comfortable as possible and wait for the ambulance.

15

First-aid technique

Fellow employees should not alarm the family with incomplete and often erroneous information. In most cases the victim should be allowed to talk to his family on the telephone.

16

Entering tanks or vessels

The procedure for entering any tank or vessel is as follows:

1. The vessel will be thoroughly washed and purged.
2. All lines to and from the vessel will be valved and blanked off at flanged connections nearest the vessel.
3. The interior of the tank or vessel will be tested for
   - (a) Explosive vapors
   - (b) Toxic concentration
   - (c) Oxygen deficiency
4. It is the foreman's responsibility to see that any person entering a tank or vessel is fully acquainted with his duties and is properly outfitted with the necessary protective equipment.
5. Another person equipped with the proper protective clothing should stand by the manhole tending the air hose and safety lines. In the event of an emergency, he will be in position to render immediate assistance.
6. At least one other person must be in the immediate area to back up the operation and if for any reason the "look out" or backup man has to leave the area he must get the man out of the vessel.

7. This procedure provides the maximum safety coverage. Entry into some vessels will not require as much coverage. Deviation from the maximum coverage will be left up to the discretion of the foreman involved and it will be his responsibility. In no case should any employee enter a vessel without the approval of the foreman. The Safety Engineer should be consulted if there is any doubt concerning the procedure to be followed.

17

Opening lines and equipment

Preparation for opening lines and equipment must necessarily be tailored to the hazards involved. Generally, effort should be directed toward isolation and decontamination. Appropriate protective equipment must be worn, and emergency equipment or supplies, water hose, slag, wet burlap, etc. must be made available prior to commencing the work.

18

Hold tags

When an employee is required to do work of any description on any electrical equipment or mechanical equipment, he shall for his complete protection see that the main switch controlling the line or energizing the equipment is open. Pushbottons are not adequate for this purpose.

When an employee is required to work on pipelines, he shall when necessary for his complete protection see that the proper valves are closed and that a hold tag is placed on these valves. The hold tag should be dated and signed by the employee placing the tag. A reason for use of the hold tag should be also written on the tag.

19

Show to class various hold tags

Substitute the coding used in your plant

Each craft engaged on the above work should place and leave its own hold tag on the apparatus until completion of its part of the job. A coding for hold tags can be as follows:

Red Hold Tags – Electricians
Green Hold Tags – Maintenance workers other than electricians
White Hold Tags – All other employees

As a further safeguard, any employee may request that an electrician remove fuses from a circuit or disconnect leads (in the case of a thermal breaker) so as to positively render equipment inoperative. In this case the electrician and each of the other crafts involved in the work must place their own hold tags. The green and white hold tags must be removed before the red hold tag.

Shift men leaving equipment tagged out at the end of their shift should, in all cases, notify their relief, who will then have the authority to remove the tag when work is completed. All facts should be entered in a log book.

Hold tags

Employees responsible for work under control of a hold tag should see that tags are removed when work is completed. Hold tags may be removed only by the person signing the tag, or with his consent, except that the foreman in charge of the employee performing the work under protection of a hold tag and in case of a white hold tag, the operations supervisor, after thoroughly checking, may authorize removal of the hold tag. Any employee who fails to place a proper hold tag or fails to honor a valid hold tag is subject to severe disciplinary action.

The primary reason for hold tag regulations is to prevent injury to persons. The regulation is written in general terms so that it can be applied to almost all situations, knowing that no regulation of reasonable length and acceptable complexity can be written to cover each specific situation which might arise over the years. This is a good time to take a good look at the regulation and the way we carry it out. Here are our responsibilities on hold tags.

1. We must use them for the protection of ourselves, our fellow workers, and equipment.

2. We must date, sign, and indicate why the hold tag is used. If it is permissible for someone else to remove the tag, this should be indicated. If no such provision is made then the man who signed the tag, or appropriate foreman, must be contacted before the tag is removed.

Hold tags

3. Each craft or operator working on the job must use their own hold tag. *DO NOT* depend on the hold tag of another craft or operator. Place the tag where you will be certain to get the required protection.

4. Hold tags should be removed when they are no longer needed to protect people or prevent damage to equipment. We should not delay the use of equipment because of premature placing or failure to promptly remove hold tags. Tags other than hold tags should be used to convey information regarding the condition of equipment.

5. While not required by the hold tag regulation, it is always a good idea to check your hold tag after any break in your work or even once in a while during the day. Even though hold tags may be honored to the letter, it is conceivable that due to acid spills, moving equipment, or other unforeseen circumstances, the hold tag might be destroyed. So, go that extra step and check your hold tag periodically.

20

Standard color codes

Substitute the coding used in your plant

1. The color code is intended as a supplement to an exact identification system with written titles. It is based in general on hazards or classes rather than on separate colors for specific materials. The color warning is usually in the form of a band or bands, completely encircling the pipe at strategic points, although the entire line may be colored.

2. A piping system possessing two major hazards will have a band for each hazard.

3.

Color	Hazard or Class
Yellow	Flammable materials
Orange	Materials hazardous for reasons other than flammability.
Green	Air and other nonflammable materials under pressure.
Blue	Water
Red	Fire protection materials.
Brown	Vacuum

21

Compressed gas cylinders

1. All cylinders should be chained or tied securely to columns or buildings walls in an upright position.

2. When cylinder is not in use it should be capped.

3. All empty cylinders should be capped, marked empty or MT and returned to the warehouse.

4. At pressures above 15 pounds per square inch gauge, acetylene is unstable and will explode at the slightest shock unless it is dissolved in acetone in an approved cylinder. *For this reason acetylene cylinders must be stored and used in a vertical position to avoid loss of acetone.* Under no circumstance should acetylene be used at a pressure above 15 pounds per square inch gauge.

5. Acetylene cylinders have two rupture plugs at the top. These plugs will rupture at a temperature of 210° F. It is most important that hot slag or metal not fall on these cylinders. Therefore these cylinders should not be located directly below welding or burning operations.

6. Oxyacetylene equipment should be kept clean, free of oil and in good condition at all times.

7. Hazards associated with the handling and use of oxygen stem from its ability to support combustion. Most materials that burn in air will burn much more vigorously in oxygen. Some combustible substances, such as oil, will burn with explosive violence in oxygen. For this reason it is essential that sources of oil contamination be avoided where oxygen equipment is concerned.

22

Mechanized equipment (cranes, hoists, draglines, power shovels, forklifts, and payloaders)

1. Manufacturer's load rating plates are attached to all load hoisting equipment in full view of the operator and load limits must not be exceeded.

2. Periodic inspections should be made to assure safe operating condition and proper maintenance.

3. Equipment must not be operated in close proximity to high voltage (440 volts or over) lines until the general electrical foreman has been notified.

   (a) Work must not be conducted unless power has been shut off or determination has been made that the boom cannot reach within 15 feet of the high voltage line.

4. Payloaders and forklift trucks should be equipped with adequate overhead guards.

23

Portable hand lamps and hand tools

We all have respect for high-voltage electricity, but most people are inclined to treat 110-volt power rather casually, even with contempt. This attitude is easy to understand because we all have handled 110-volt electricity. Extention cords, lights, power tools, and most household appliances are 110-volt current. Considering the amount of 110-volt power used in the world it is amazing that more people are not hurt. Under some conditions the amount of electricity that passes through the body when it comes in contact with 110-volts does little damage, but these conditions can change rapidly.

Three factors which determine the severity of low-voltage electrical shock are: magnitude of current, path of current, and the duration of current flow. The conditions which affect these factors change rapidly. One time you may get a "tingle," the next time you could be knocked down, but with the right conditions you could be killed. Your hands may be sweaty or you may be standing on damp ground or floor; if so you may be one of the fatalities.

There are several precautions that may be followed to prevent electrical shock. They may seem unimportant, but to ignore them is to ask for trouble:

1. Before you plug in an extension cord, drop light, or any piece of electrical equipment, look it over closely. Make sure that the wires are not frayed.

2. Grounded circuits are provided in the plant. Electrical equipment should never be used on an ungrounded circuit. Normally, the grounded circuits are not available at home, but the time spent in grounding electric drills, and standing on a rubber mat for protection is well worthwhile.

3. Twelve-volt extension lights are provided in the plant and should always be used. Remember, by use of grounded circuits and by use of 12-volt extension lights, we have not eliminated all the hazards of low-voltage electricity, but we have reduced the hazards considerably.

24

Safeguarding equipment

Basically, if an employee's job is to operate a piece of mechanical equipment, he should be instructed in all the safety precautions connected with the safe operation of the machine before being permitted to run it. This applies as well to experienced operators, at least until the supervisor is certain that the operators know the hazards involved.

If an employee does not operate a machine but does work around mechanical equipment, the same applies. Procedures should be established positively so that there is no misunderstanding, and supervision should be such that no deviation from the following safe work practices is tolerated.

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Safeguarding equipment

1. No guard should be adjusted or removed for any reason by anyone, unless (1) specific permission is given by the supervisor, (2) the person concerned is specifically trained, and (3) machine adjustment is considered a normal part of his job.
2. No machine should be started unless the guards are in place and in good condition. Defective or missing guards should be reported to the foreman immediately.
3. Whenever safeguards or devices are removed to make repairs or adjustments or to service equipment (lubrication and maintenance), the power for the equipment should be turned off and the main switch "hold tagged."
4. V-belt, round belt, or rope drivers running on grooved pulleys should be enclosed. Pulleys should be enclosed at least to the inrunning nip point.

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Conclusion

Safety on every job is essential and is the responsibility of every employee. Accidents may occur, but it is possible to prevent them. Most are caused by unsafe actions. Freedom from the pain, suffering and cost of injuries and property damage is worth striving for—on the job and off—because everyone loses when you are hurt in an accident—you, your family, and your employer.

There is plenty of time to perform every job the safe and secure way, which is the best way. Your supervisor, fellow workmen, and Management expect you to use safe work methods. There is a safe way to do any job. Your supervisor will explain how. Ask him whenever you have any questions about how a job is to be done.

Conclusion Remember, generally speaking, *YOU* are the last person who can prevent accidental injury to you. So, let's work together and report unsafe conditions or actions to your supervisor at once. Look out for the other fellow and help the new man. Safety is everybody's job.

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Questions Why should injuries seeming to be slight be reported and treated? (Many minor injuries not treated result in more serious ones if left untreated and could result in lost time from the job.)

Who is responsible for the protection of personnel and equipment in the plant? (Safety Engineer or *Supervisor*)

Who pays for protective equipment such as hard hats, respirators, chemical goggles, etc.? (*Company*, Employee)

Who is responsible for cleaning and inspecting protective equipment? (The user)

What information should be given when reporting an emergency by telephone?

What is the emergency telephone number at this plant?

What should be done first if the victim is not breathing? (Apply mouth-to-mouth resuscitation or artificial respiration immediately.)

Are spectacle-type safety glasses adequate for wear when handling acids? (No, chemical splash goggles)

What is ventricular fibrillation? (It is a condition usually occuring after electrical shock where the heart is pulsating but not pumping blood. Artificial respiration is useless if this condition is present in the victim and closed chest heart massage is a necessity if life is to be sustained.)

Whose responsibility is it to insure a person's safety when entering a tank or vessel? (Foreman)

For work involving entry into equipment such as granulat the main switch or pushbutton should be tagged out. (Main swtich)

If five crafts are engaged in work requiring "hold tags," how many tags should be used? (Five, one by each craft)

Which color "hold tag" has the highest rank green, red, or white? (Neither, all have the same rank.)

Additional protection can be provided when doing work involving entry into equipment such as granulators by requesting what? (That the electricians remove fuses or disconnect leads)

What is the color for phosphorus in the color code? (Yellow) Carbon monoxide? (Orange) Water? (Blue)

When not in use acetylene tanks should be stored upright or lying down? (Upright)

Since pure oxygen is nonflammable, is it safe around oils and greases? (No, oxygen supports combustion and in the presence of oils and greases it burns with explosive violence.)

Generally speaking, who is the last person who can prevent accidental injury to you? (*You*)

VT 016 644

VT 016 644
THE LICENSED PRACTICAL NURSE AS CHARGE NURSE.
INSTRUCTOR'S GUIDE.

HEALTH SERVICES AND MENTAL HEALTH
ADMINISTRATION (DHEW), ROCKVILLE, MD. DIV. OF
HEALTH RESOURCES.
MF AVAILABLE IN VT-ERIC SET.
DHEW-PUB-HSM-72-6702
PUB DATE - MAY72 146P.

DESCRIPTORS - HUMAN SERVICES; PHOTOGRAPHS; *PROFESSIONAL CONTINUING EDUCATION; ADULT VOCATIONAL EDUCATION; VOCATIONAL DEVELOPMENT; PERSONAL CARE HOMES; HEALTH FACILITIES; *PRACTICAL NURSES; *STUDY GUIDES; TEXTBOOKS; QUESTIONING TECHNIQUES; HEALTH SERVICES; *NURSES AIDES; RESOURCE MATERIALS; *HEALTH OCCUPATIONS EDUCATION
IDENTIFIERS - ATTITUDES APPRECIATIONS; EMPLOYMENT SKILLS

ABSTRACT - THIS STUDY GUIDE CONTAINS THREE SECTIONS: (1) THE LICENSED PRACTICAL NURSE AND LONG-TERM CARE, (2) THE LICENSED PRACTICAL NURSE AS CHARGE NURSE, AND (3) A LIST OF EDUCATIONAL RESOURCES. ILLUSTRATED BY A WIDE RANGE OF PHOTOGRAPHS, THE TEXT INCLUDES BASIC INFORMATION ABOUT THE FUNCTIONS AND QUALIFICATIONS OF THE LICENSED PRACTICAL NURSE AND STUDY QUESTIONS FOR EACH TOPIC. DESIGNED FOR USE IN CONJUNCTION WITH A CONTINUING EDUCATION COURSE TO PREPARE LPN'S FOR CHARGE NURSE ROLES, THIS GUIDE WAS DEVELOPED AS PART OF A FEDERALLY FUNDED PROJECT BY AN ASSISTANT PROFESSOR AT A SCHOOL OF NURSING. DESCRIBING IN DETAIL THE VARIOUS RESPONSIBILITIES OF PATIENT CARE AND COORDINATION OF STAFF ACTIVITIES, THE TEXTBOOK PROVIDES CURRENT INFORMATION ABOUT MEDICARE, MEDICAID, AND HEALTH FACILITIES FOR LONG-TERM CARE. (AG)

THE LICENSED PRACTICAL NURSE AS CHARGE NURSE

Trainee Text and Study Guide

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Health Services and Mental Health Administration

THE LICENSED PRACTICAL NURSE AS CHARGE NURSE

Instructor's Guide

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Health Services and Mental Health Administration
Community Health Service
Division of Health Resources
Rockville, Maryland 20852
May 1972

DHEW Publication No. HSM-72-6702

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The project upon which this publication is based was performed by the National Licensed Practical Nurses Educational Foundation, Incorporated, pursuant to contract No. HSM 110-69-395 with the Public Health Service.

PREFACE

CONTINUING EDUCATION

Practical nursing education is conditioned greatly by the changing and expanding complexity of health care. No program of basic preparation, whatever its type or quality, could possibly encompass all a practical nurse needs to maintain currency and relevancy to the developments in health care.

Education for practical nurses must be a continuing process. Acceptance of this fact imposes obligations upon individual practical nurses, their employers, the health professions, and practical nursing educators. Practical nurses must continue to increase and enrich their competencies by whatever means are most appropriate.

The National Licensed Practical Nurses Educational Foundation, Inc., the nursing education and research arm of the National Federation of Licensed Practical Nurses, defines continuing education as follows:

> Continuing education includes those organized educational experiences which are planned to help practical nurses achieve more productive and satisfying fulfillment of their roles as health workers. Such fulfillment should be of mutual benefit to both the practical nurse and society, but should not be limited to preparing the practical nurse to meet the unique service needs of a single agency. Improved patient care is the primary goal of all continuing education of the LPN/LVN.

This text is a result of a continuing education project between the Foundation and the U.S. Public Health Service.

THE PROJECT

Since the passage of Public Law 89-97, Title XVIII "Medicare" and Title XIX "Medicaid," and the subsequent conditions of participation and policy regulations, there has been considerable interest in the licensed practical nurse who works as a charge nurse in nursing homes, extended care, and related facilities.

In June, 1967 the Public Health Service awarded a grant to the University of Maryland School of Nursing to study the problem of preparing the LPN for these responsibilities. Project activities included review of the literature; survey of the functions of the charge nurse in an ECF; design, test, and evaluation of the curriculum; and the development of an Instructor's Guide. Mrs. Dorothy Justice, Assistant Professor and Chairman of the Practical Nurse Program at the University of Maryland School of Nursing, served as project director. The Instructor's Guide, *Fundamentals of Nursing Management Skills for Licensed Practical Nurses Who Serve As Assistants to Registered Nurses in Extended Care Facilities* was prepared by Linda A. Tarr, R.N., M.S.

In June, 1969 the National Licensed Practical Nurses Education Foundation, Inc. received a contract from the Public Health Service to test, review, and revise the Instructor's Guide and to develop a textbook for use by LPN trainees. Major project activities included (1) review and testing of materials, and (2) revision and preparation of the publications.

A ten-member team of instructors from practical nurse education programs critiqued Guide materials prior to curriculum field test and following preparation of the Guide and Text drafts. Four schools used Guide materials to plan, conduct, and evaluate a continuing education program: "Preparation of Licensed Practical Nurses for Charge Nurse Responsibilities in Nursing Homes, Extended Care, and Related Facilities:

Midwest City Public Schools
Midwest City, Oklahoma

Mount Sinai Hospital School of Practical Nursing
Miami Beach, Florida

New Orleans Public Schools
New Orleans, Louisiana

Southern Illinois University
Division of Technical and Adult Education
Carbondale, Illinois

Constant in each program were common objectives and quality of teaching faculty; hours of instruction and course format varied. Participating faculty included:

Mrs. Ruth Killough and Mrs. Sandy Mitchell
Midwest City Public Schools

Mrs. Carmen Ross and Mrs. Alice Gutterman
Mount Sinai Hospital School of Practical Nursing

Dr. Edwina Frank and Mrs. Anna Goldman
New Orleans Public Schools

Mrs. Beatrice Chiodini
Southern Illinois University

Nelly B. Oles of Community Health Service of the U.S. Public Health Service was Project Officer; Teresa M. Crowley, Executive Director of NLPNEF, served as Project Coordinator. Sandra Rasmussen directed the project and prepared the Instructor's Guide and Trainee Text.

INTRODUCTION

This book is for you to read, study, and enjoy. It contains information, study activities, and a listing of educational resources that should help you prepare for charge nurse responsibilities in nursing homes, extended care, and related facilities.

Each chapter of the book has two sections. The first section offers basic information about the topic. The second section is a study and work section. In most cases this text will be used in conjunction with a continuing education course to prepare LPNs for charge nurse roles. However, the book is valuable by itself as a text and study guide.

Part I contains background information about the LPN and long-term care. This may be a review for you if you have been employed for some time in a long-term care setting. It may offer new and current information about (1) the LPN Today, (2) Medicare and Medicaid, (3) Patients, and (4) Settings for Long-term Care.

Part II introduces you to the LPN charge role. Chapter 5 contains a Statement of Functions for the LPN Charge Nurse. Subsequent chapters describe in detail each function: (6) Planning Patient Care, (7) Coordinating Staff Activities, (8) Implementing Patient Care, and (9) Evaluating Patient Care.

A listing of related books and articles will be found in Part III. Audo-visual materials that might prove useful to you and your staff for inservice education programs have been included.

Many LPN-patient photos supplement the printed material. Photo credits go to Donald Bulucos of Chicago, Joel M. Snyder of Chicago, and the Holy Ghost Hospital of Cambridge, Massachusetts.

The author acknowledges Mrs. Etta B. Schmidt, Executive Director of the National Federation of Licensed Practical Nurses, and many others for their assistance and encouragement throughout this project.

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CONTENTS

Part I THE LICENSED PRACTICAL NURSE AND LONG-TERM CARE

Chapter 1

THE LICENSED PRACTICAL NURSE

NURSING

Every individual must satisfy certain basic human needs to live, to maintain health, and to affirm his being. The acting, thinking, feeling, relating, believing individual is the healthy person.

Nursing is the act of assisting a healthy, handicapped, ill, or dying person to meet his basic needs for life, health, and being. A nurse is a man or woman who is willing and able to provide a direct health service of helping to people.

Nurses help people in the home, at school, at work, and throughout the community plan, promote, and maintain health. Sometimes illness interferes with a person's ability to care for himself; nurses care for sick people at home and in a variety of institutions such as hospitals, nursing homes, extended care facilities, physicians' offices, and clinics.

Figure 1–1. Nursing.

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FUNCTIONS AND QUALIFICATIONS OF THE LPN

The following *Statement of Functions and Qualifications of the Licensed Practical Nurse* was prepared and approved by the Executive Board of the National Federation of Licensed Practical Nurses in June 1970. The National Federation of Licensed Practical Nurses is the membership organization for licensed practical/vocational nurses and is the recognized policy-making body for LPN/LVNs.

The Statement reflects the expanding role of the LPN in today's health care system. It provides flexibility in the functions of the LPN who has obtained additional knowledge and skills through continuing education and nursing experience. The Statement will serve as a guide for nursing service directors for maximum utilization of LPNs and for nurse educators for the development of curriculum in schools of practical nursing as well as the design of continuing education programs for the LPN.

PURPOSE

The identification of the role of the Licensed Practical Nurse[1] which is intended to serve as a guide to:

—The maximum utilization of the licensed practical nurse in nursing services.

—Self-evaluation of nursing practice by the licensed practical nurse.

—Development and evaluation of educational standards for the professional preparation of the licensed practical nurse, and

—The interpretation of licensing legislation.

ROLE AND RATIONALE

The work of the licensed practical nurse (LPN/LVN) is an integral part of nursing. Under the direction of a qualified autonomous health professional, the licensed practical nurse is a recognized member of the health-care team and performs nursing functions commensurate with her education and demonstrated competencies. On a selective basis, this will include the performance of a wide range of nursing activities.

For purposes of this Statement, nursing activities encompass situations ranging from:

—providing direct patient care at the bedside in relatively stable nursing situations such as hospitals, extended care units, nursing homes, private homes, and other health care facilities and agencies.

—to performing nursing functions in semi-complex situations, such as hospital nursing service units, recovery rooms and labor rooms;

—to more complex situations, such as hospital nursing service units, intensive or coronary care units and emergency rooms;

—to the promotion of personal and community health—an important function of all well prepared members of the health-care team;

—to promoting and carrying out preventive measures in community health facilities such as well-baby clinics, out-patient clinics and services.

In semi-complex and complex nursing situations a greater depth of knowledge and a higher level of judgment is required of the LPN; and a closer working relationship with, and the greater the degree of direction by, an autonomous health professional.

The determination of the capabilities of the LPN in complex nursing situations should be arrived at through:

—an evaluation of the nursing needs of the patient;
—a realistic appraisal of the elements within the situation (e.g. the complexity of scientific principles underlying the functions and techniques to be carried out);
—the ability of the LPN to perform in the situation based on his knowledge, skills and previous experience;
—the amount and character of the direction needed by, and available to the LPN, in the performance of the functions and procedures.

EDUCATION

The LPN should be qualified for nursing practice through:

---

[1] The title LPN is the same as LVN in California and Texas.

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1. Preparation in a formal educational program in practical nursing approved by the appropriate nursing authority in a State.
2. Initial orientation within the employing institution.
3. Inservice and continuing education for all nursing practitioners to maintain competencies; and, for those who qualify, to gain additional competencies which will enable them to broaden their scope of nursing practice within the employing agency by the performance of specialized activities.

LEGAL STATUS

1. The LPN must be currently licensed to practice practical nursing according to State law, and
2. Must perform within the limits of preparation and experience.

PERSONAL QUALIFICATIONS

1. Recognizes and has a commitment to meet the ethical, moral and legal obligations of the practice of practical nursing.
2. Maintains and promotes good health practices.
3. Actively promotes and participates in nursing organizations, inservice education programs, workshops, institutes and other educational and community activities.

FUNCTIONS

The LPN is prepared to function as a member of the health-care team by exercising sound nursing judgment based on preparation, knowledge, skills, understandings and past experiences in nursing situations.

The LPN participates in the planning, implementation and evaluation of nursing care in all settings where nursing takes place. The following illustrate the types of activities performed:

1. *Direct Patient Care*

   (in hospitals, extended care units, nursing homes, private homes and other related health facilities)

   a. Provides for the emotional and physical comfort and safety of patients through:
      (1) The understanding of human relationships between and among patients, families and other health-care personnel.
      (2) Participation in the development, revision, and implementation of policies and procedures designed to insure comfort and safety of patients and other health-care personnel.
      (3) Assisting the patient with activities of daily living and encouraging appropriate self-care.
      (4) Recognizing and understanding the effects of social and economic problems upon patients.
      (5) Protecting patients from behavior that would damage their self-esteem or relationship with families, other patients, or persons.
      (6) Recognizing and understanding cultural backgrounds and spiritual needs, respecting and religious beliefs of individual patients.
      (7) Considering needs of the patient for an attractive, comfortable and safe environment.

   b. Observes, records and reports to the appropriate persons:
      (1) General and specific physical and mental conditions of patients, and signs and symptoms which may be indicative of change.
      (2) Stresses in human relationships between patients, patients' families, visitors and health care personnel.

   c. Performs more specialized nursing functions for which the LPN is prepared, such as:
      (1) Administration of medications and therapeutic treatments prescribed for the patient.
      (2) Preparation and care of patients receiving specialized treatments.
      (3) Carrying out first aid, emergency and disaster measures.

   d. Assists with rehabilitation of patients, according to the patient care plan, through:

(1) Knowledge and application of the principles of prevention of deformities, (e.g. the normal range of motion exercises, body mechanics and body alignments).

(2) Encouragement of patients to help themselves within their own capabilities.

(3) Awareness of and encouraging the fulfillment of the special aptitudes and interests of patients.

(4) Utilizing community resources and facilities for continuing patient care.

2. *Patient Care Management*

   The licensed practical nurse, with additional preparation in specialized areas and under direction of autonomous health professionals is qualified to:

   a. Supervise other nursing and health-related personnel.

   b. Coordinate and make assignments of other nursing and health-related personnel and patients.

   c. Serve as team leader.

   d. Serve as charge nurse.

3. *Community Health*

   The licensed practical nurse contributes to community health through nursing activities performed outside patient-care institutions, e.g. visiting nurse associations, well-child and other public health clinics, and industrial nursing units.

4. *Individual Citizens of the Community*

   The licensed practical nurse participates in activities which promote the community's attitudes and welfare in health care. As a private citizen, the LPN,

   a. Utilizes community resources to promote a better understanding of the health services among the general public, and

   b. Promotes and participates in community health projects and other health oriented activities.

THE LPN AND LONG-TERM CARE

Licensed practical nurses *are prepared* to nurse patients effectively in nursing homes, extended care, and related facilities. LPNs qualify through education and experience to meet the needs of long-term care patients: *the majority of stated functions of the LPN relate to direct patient care.*

EDUCATION

Learning to meet the nursing needs of older persons and individuals who need long-term care is an integral part of the curriculum of most State-approved schools of practical nursing. All practical nursing students study Medical Nursing and care for a variety of patients with long-term care conditions.

In addition to Medical Nursing, most LPN students study Geriatric Nursing. The Geriatric Nursing Course typically includes learnings about (1) physical, mental, emotional, social, and spiritual characteristics of older adults, (2) the aging process, and (3) conditions of illness of older persons. Most of these students have nursing experience with older persons in general hospitals; approximately one-half of the practical nursing programs in the country provide opportunity for student learning in nursing homes and extended care facilities.

An increasing number of practical nursing schools are including a unit on long-term care in their curricula. Topics for study emphasize chronic disease, the characteristics and needs of patients with long-term illnesses, and patient rehabilitation.

ROLE AND FUNCTIONS

A re-examination of the *Statement of Functions and Qualifications of the Licensed Practical Nurse* documents the competencies of the LPN for care of the long-term patient. The first nursing activity states:

> providing direct patient care at the bedside in relatively stable nursing situations such as hospitals, extended care units, nursing homes, private homes, and other health care facilities and agencies;

Figure 1–3. Most students have nursing experience with older persons.

The Statement describes the major activity of the LPN as *direct patient care.* The LPN

- —provides for the emotional and physical comfort and safety of patients;
- —observes, records and reports to the appropriate persons;
- —performs specialized nursing functions;
- —assists with rehabilitation of patients, according to the patient care plan.

The second function explained in the Statement is patient care management. By role and functions, the LPN *is qualified* to work competently with long-term care patients.

The 1969 *Facts About Nursing* reports:

(1) LPNs in Nongovernmental Nursing Homes & Related Facilities

(April 1968)
23,532 full-time 11,291 part-time

(2) Nonsupervisory RNs in Nongovernmental Nursing Homes & Related Facilities

(April 1968)
13,123 full-time 14,949 part-time

Figure 1-4. The major activity of the LPN is direct patient care.

The hospital is the largest employer of LPNs; approximately two-thirds of all employed LPNs work in hospitals. Some 14% of employed LPNs are private duty nurses; 13% of employed LPNs work in nursing homes and related facilities. This last figure compares with some 4% staff or general duty RNs. Only 2% of all employed staff or general duty RNs are full-time employees in nursing homes and related facilities; 9% LPNs are full-time.

A significant number of licensed practical nurses *are working* in nursing homes, extended care, and related facilities, and the number is increasing annually.

STUDY ACTIVITIES

NURSING

1. What *is* nursing? Write your own definition of nursing.

2. Who is a nurse? Describe yourself as a nurse.

3. What do nurses do? Describe the general functions of nurses. What do you do as a nurse?

4. Read the following 1887 job description of a bedside nurse. Compare the description with the general functions of nurses today.

1887 Job Description

In addition to caring for your 50 patients, each bedside nurse will follow these regulations: 1. Daily sweep and mop the floors of your ward, dust the patient's furniture and window sills. 2. Maintain an even temperature in your ward by bringing in a scuttle of coal for the day's business. 3. Light is important to observe the patient's condition. Therefore, each day fill kerosene lamps, clean chimneys, and trim wicks. Wash the windows once a week. 4. The nurse's notes are important in aiding your physician's work. Make your pens carefully, you may whittle nibs to your individual taste. 5. Each nurse on day duty will report every day at 7 A.M. and leave at 8 P.M., except on the Sabbath on which day she will be off from 12 noon to 2 P.M. 6. Graduate nurses in good standing with the director of nurses will be given an evening off each week for courting purposes, or two evenings a week if you go regularly to church. 7. Each nurse should lay aside from each pay day a goodly sum of her earnings for her benefits during her declining years, so that she will not become a burden. For example, if you earn $30 a month you should set aside $15. 8. Any nurse who smokes, uses liquor in any form, gets her hair done at a beauty shop or frequents dance halls will give the director of nurses good reason to suspect her worth, intentions and integrity. 9. The nurse who performs her labors, serves her patients and doctors faithfully and without fault for a period of five years will be given an increase by the hospital administration of five cents a day.

(From "Bright Corridors," a publication of Cleveland Lutheran Hospital)

FUNCTIONS AND QUALIFICATIONS OF THE LPN

1. What is the general value of a *Statement of Functions and Qualifications of the Licensed Practical Nurse*?

2. "The work of the licensed practical nurse is an integral part of nursing." What does this mean? Why is it important?

3. Describe the *range* of nursing activities of licensed practical nurses.

4. In a complex nursing situation, the LPN may work closely with an autonomous health professional. In these situations, how are the capabilities of the LPN determined?

5. How did you become an LPN? (If you completed a formal education program in practical nursing, describe the program briefly.)

6. What additional learnings have you acquired through (a) orientation to the job, (b) inservice programs, and (c) continuing education?

7. In what State(s) do you hold a current license?

8. What legal responsibilities do you have as an LPN?

9. The LPN "recognizes and has a commitment to meet the ethical, moral and legal obligations of the practice of practical nursing." What does this mean? Why is it important?

10. The LPN "maintains and promotes good health practices." What does this mean? Why is it important?

11. The LPN "actively promotes and participates in nursing organizations, inservice education programs, workshops, institutes and other educational and community activities." What does this mean? Why is it important?

12. Describe a patient situation in which the major function of the LPN is *direct patient care.*

13. Describe a patient situation in which the major function of the LPN is *patient care management.*

14. Describe a patient situation in which the major function of the LPN is *community health.*

15. What special functions does the *LPN citizen* have *in the community?*

16. Describe a "typical" tour of duty for yourself.

17. Using the functions described in the *Statement*, compare and contrast your "functions" with stated functions.

THE LPN AND LONG-TERM CARE

1. Support or document the statement: licensed practical nurses *are prepared* to nurse patients effectively in nursing homes, extended care, and related facilities.

Chapter 2

MEDICARE AND MEDICAID

In 1965 Congress added to the Social Security program begun in 1935 two significant amendments on health care and services. One, Title XVIII, established MEDICARE—a Federal program of hospital and medical insurance for nearly all people 65 and over. The other, Title XIX, established MEDICAID—a Federal-State program to help provide medical services for the needy and the medically indigent.

The following remarks were made by President Johnson upon signing the Social Security Amendments of 1965 in Independence, Missouri, July 30, 1965:

> It was a generation ago that Harry Truman said, "Millions of our citizens do not now have a full measure of opportunity to achieve and to enjoy good health. Millions do not now have protection or security against the economic effects of sickness. And the time has now arrived for action to help them attain that opportunity and to help them get that protection.
>
> . . . today, . . . we are taking such action 20 years later. . . . The need for this action is plain . . .
>
> There are more than 18 million Americans over the age of 65. Most of them are threatened by illness and medical expenses that they cannot afford . . .
>
> This insurance will help pay for care in hospitals, in skilled nursing homes, or in the home. And under a separate plan it will meet the fees of the doctors . . .
>
> No longer will older Americans be denied the healing miracle of modern medicine. No longer will illness crush and destroy the savings that they have so carefully put away over a life-time so that they might enjoy dignity in their later years. No longer will young families see their own incomes, and their own hopes eaten away simply because they are carrying out their deep moral obligations to their parents, and to their uncles, and their aunts.

In the Federal Government both programs are administered by the Department of Health, Education, and Welfare. The Social Security Administration directs Medicare; Social and Rehabilitation Service directs Medicaid.

Both Medicare and Medicaid help pay medical bills. Both are part of the Social Security act. *They work together but they are not the same.*

Both Medicare and Medicaid insist on high standards, support expansion of facilities, encourage innovation in medical care delivery and require review of care. Medicaid requires that medical services be available everywhere in a State. It is also beginning a program to train and employ neighborhood people as community health workers.

Together Medicare and Medicaid are significant programs striving to benefit everybody by improving the quality, the quantity, the efficiency, the distribution, and the effectiveness of medical services in the United States.

Both Medicare and Medicaid must be operated in compliance with Title VI of the Civil Rights Act of 1964 which prohibits discrimination:

> No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefit of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.

The following comparison may help you identify similarities and differences between the two programs:

	MEDICARE	MEDICAID
(1)	—is for people 65 or older. —almost everybody 65 or older, rich or poor can have Medicare. —some people 65 or older can have both Medicare and Medicaid.	—is for *certain kinds* of needy and low-income people: . . . the aged . . . the blind . . . the disabled . . . members of families with dependent children . . . some other children. —some States also include (at State expense) other needy and low-income people.
(2)	—is an *insurance* program. —money from trust funds pays medical bills for *insured* people.	—is an *assistance* program. —money from Federal, State, and local taxes pays medical bills for *eligible* people.
(3)	—is a *Federal* program. —Medicare is the same all over the United States.	—is a *Federal-State* partnership. —States design their own Medicaid programs with Federal guidelines. —Medicaid varies from State to State.
(4)	—Medicare is everywhere in the United States.	—Medicaid is now in most States, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands.
(5)	—Medicare Hospital Insurance provides basic protection against costs of . . . inpatient hospital care . . . post-hospital extended care . . . post-hospital home health care. —Medicare Medical Insurance provides supplemental protection against costs of physicians' services, medical services and supplies, home health care services, outpatient hospital services and therapy, and other services.	—Medicaid pays for at least these five services: . . . inpatient hospital care . . . outpatient hospital services . . . other laboratory and X-ray services . . . skilled nursing home services . . . physicians' services. —in many States Medicaid pays for such additional services as dental care, prescribed drugs, home health care, eye glasses, clinic services, and other diagnostic, screening, preventive, and rehabilitative services.
(6)	—Medicare pays most but not all hospital and medical costs for people who are insured.	—Medicaid can pay what Medicare does not pay for people who are eligible for both programs.
	—Hospital Insurance pays inpatient hospital bills except for the first $52 in benefit period.	—Medicaid can pay the $52 Medicare does not pay in each benefit period for eligible people.
	—Medical Insurance pays $4 out of $5 (80%) of reasonable medical costs *except* for the first $50 in each calendar year.	—Medicaid can pay the first $50 per year of medical care costs and can pay what Medicare does not pay of the remaining reasonable charges for eligible people.
	—insured people pay $5.80 a month for Medical Insurance (rates differ slightly depending on time of enrollment; premium rates are reviewed annually).	—Medicaid can pay the $5.80 a month for eligible people.

MEDICARE	MEDICAID
(7) —Medicare Hospital Insurance is financed by a separate payroll contribution. —Medicare Medical Insurance is financed by monthly premiums. The Federal Government pays half and the insured person pays half.	—Medicaid is financed by Federal and State governments. —The Federal Government contributes from 50% (to the richest States) to 83% (to the State with the lowest per-capita income) of medical care costs for needy and low-income people who are aged, blind, disabled, or members of families with dependent children. —States pay the remainder, [illegible] governments.

STUDY ACTIVITIES

The Senior Citizens Club of Jeffersonville has invited several health practitioners to participate in a panel discussion of Medicare: Dr. Joseph McCartney, a local physician; Mrs. Ruth Ziegler, RN, Director of Nursing at Lake Valley Memorial Hospital; Mrs. Ida Mae Washington, LPN Charge Nurse, and Miss Ellen Higgins, LPN Charge Nurse at Elk Manor Nursing Home and Extended Care Facility.

Mrs. Ziegler described the Hospital Insurance part of Medicare briefly:

> Your hospital insurance helps pay for medically necessary services provided by health facilities participating in Medicare when you are a bed patient in a hospital. And if you need further care after a hospital stay, payments are made when you are a bed patient in an extended care facility or a patient at home receiving services from a home health agency. The services hospital insurance helps pay for are called *covered services*. Your hospital insurance covers almost all of the services you would ordinarily receive as a bed patient in a participating hospital or extended care facility or as a patient at home receiving services from a participating home health agency. Your hospital insurance will also, in some cases, help pay for care in certain hospitals that do not participate in Medicare. When you receive covered services from a participating hospital, extended care facility, or home health agency, you do not need to make any claim for your hospital insurance benefits. These institutions or agencies make the claims and receive the Medicare payment. They have agreed to charge you only for services which are not covered by Medicare. You will always receive a notice from the Social Security Administration when a payment has been made on your behalf.

The men and women senior citizens asked the following general questions of the panel: try to answer them in an accurate, explanatory way.

1. How is the hospital insurance part of Medicare financed?

2. How often can I use my hospital insurance?

3. Can I renew my hospital insurance?

4. How do I keep a record of how much insurance, how many "days" or "visits" I have used?

5. What *does* hospital insurance pay for when I am a hospital bed patient?

6. How does a person get admitted to an extended care facility?

7. What benefits am I entitled to in an extended care facility?

8. How does a person qualify for home health benefits?

9. What home health benefits can a Medicare patient receive?

Dr. McCartney described the Medical Insurance part of Medicare briefly:

> Your medical insurance helps pay for doctors' services, outpatient hospital services, medical services and supplies, home health services, outpatient physical therapy, and other health care services. The kinds of services medical insurance can help pay for are called *covered services.* For each calendar year, medical insurance does not pay any of the first $50 of reasonable charges for covered services. Reasonable charges are determined by the Medicare carriers—the organizations selected in each State by the Social Security Administration to handle medical insurance claims—and take into account the customary charges of your doctor as well as the charges made by other doctors in your locality for similar services. After Medicare records show that your bills for covered services are over $50 for a calendar year, medical insurance will pay 80% of the reasonable charges for covered services for the rest of the year. (There are a few exceptions to this rule.) Be sure to send in a claim as soon as your bills reach $50 so the Medicare records will show the first $50 as well as the rest of your bills.

The group asked the following questions of the panel about Medical Insurance; try to answer tl in an accurate, explanatory way.

1. What are some of the doctor bills medical insurance helps pay?

2. What kinds of dental services will medical insurance cover?

3. When I am a patient in a hospital, what kinds of laboratory and X-ray services are paid for by medical insurance?

4. Will medical insurance pay for ambulance services?

5. What kinds of outpatient hospital services does medical insurance help pay for?

6. Would you explain the home health benefits that are covered by medical insurance?

7. What are some of the different medical services and supplies that are paid for by medical insurance?

8. How does a person make a claim for medical insurance?

The local district of the State Association of Licensed Practical Nurses has invited a represent of the State Office of Social and Rehabilitation Service to discuss the Medical Assistance (Medi Program. Try to find answers to some of the following general questions.

1. Just what *is* Medical Assistance (Medicaid)?

2. Who administers the Medicaid program?

3. What kinds of people in this State can benefit from the Medicaid Program?

4. Who is eligible for Medicaid?

5. What kinds of medical care and services are covered by the Medicaid Program?

6. How do hospitals and nursing homes meet institutional requirements to participate in Medicaid?

7. How is payment for Medicaid care and services handled?

8. Are any social services available under Medicaid?

9. Can a person qualify for both Medicare and Medicaid? Please explain.

Chapter 3

PATIENTS ARE PEOPLE

It is important to remind yourself again and again that *patients are people*. Each patient is a multi-dimensional person. At the same time he or she may be a worker, a mate, a parent, a homemaker; your patient may be a son or daughter, citizen, friend, organization member, religious affiliate, and user of leisure time.

Your patients require skilled long-term care because of chronic disease or disabilities, or because of dependencies associated with aging. We all have different concepts of health, illness, life and death, and each patient's reaction to illness and his subsequent need for care is conditioned greatly by his individual and cultural perceptions of life and death.

Many patients requiring long-term care experience intense feelings of guilt and disappointment. "How can my family afford to keep me in this nursing home; it would be better if I died." "What good am I to my wife and boys; I am only half a man, I have no legs." Occasionally patients obtain secondary gains, such as absence from work, because of a long-term illness.

Patients are people—very special, complex people.

OLDER PEOPLE

Many of your patients are older adults and you already know a great deal about older people and their characteristics. The following review may prove helpful.

PHYSICAL CHARACTERISTICS

—loses speed and flexibility in movement
—performs simple, repetitive tasks best
—more susceptible to respiratory infections
—circulatory diseases more common
—less able to maintain normal body temperature
—sensory processes decline
—male sex drive decreases
—hypertrophy of prostate gland

MENTAL CHARACTERISTICS

—poorer short-term memory
—rate of learning declines but not necessarily the capacity to learn

EMOTIONAL CHARACTERISTICS

—possibility of shelved obsolescence or life of esteem and achievement
—timid, uncertain, easily discouraged, sensitive, suspicious
—kind, gracious, gentle, loving, wise, and possesses the inner security and peace which youth cannot achieve

SOCIAL CHARACTERISTICS

—20 million persons 65 and over in United States
—lives in urban industrialized society and retires at fixed age; government-employer-union pension and/or social security
—inability of children to care for aging parents; tendency toward public responsibility
—fewer places for older adult in local civic and political affairs

SPIRITUAL CHARACTERISTICS

—may be time of spiritual growth and quiet contemplation
—reflects about beliefs and practices
—capable participator

Many conditions of illness afflict the older adult. Arteriosclerosis, cerebral vascular accidents, and pneumonia are common diseases among older adults. Diseases of the heart cause most deaths in individuals over 65. Rarely does an older person die of "natural causes" or just old age.

Psoriasis is a skin disease found in the older person. Such musculo-skeletal conditions as bursitis, osteoarthritis, fractures, and paralysis are common.

Lung and heart diseases greatly afflict the older adult and cause many deaths. Pleurisy, pulmonary emphysema, pneumonia, the common cold, and influenza are typical respiratory diseases. Congestive heart disease, arteriosclerosis, anemia, and gangrene are diseases of the circulatory system.

Sordes is an unpleasant mounth condition associated with chronic illness and characteristically found in many older adults. Atonic constipation is a common disorder in the age group over 65.

Cerebral vascular accidents are frequent in the older adult. Parkinson's disease occurs. A variety of changes occur in the special senses; and hearing difficulties, vision changes, as well as cataracts develop.

Many older people have diabetes. Senile vaginitis occurs in the older woman, and benign prostatic hypertrophy is common in the older man.

Emotional problems and mental illness may persist into older adulthood. Depression may occur after 65. Symptoms of senility develop with varying severity. The older person may be slightly confused at times or may be completely out of touch with reality and need to be institutionalized.

The older adult is a difficult but interesting patient because he poses so many challenging nursing problems. So many negative changes in body structure and functions accompany aging. Several disease entities are frequently present at the same time. A 75-year old man with diabetes, hypertension, and arithritis may be transferred to an extended care facility following a cerebral vascular accident.

Despite these many physical impairments and the fact that at times the older adult may be confused, he is still capable and able to assist with his personal care and with many of the activities of daily living.

Institutionalization may be a new and strange experience for the older adult and he may be afraid. Institutionalization for many adults is not voluntary. If the older adult can help make plans for his health care he seems to adjust to the situation better.

CHILDREN AND ADULTS WITH CHRONIC CONDITIONS

Today a great number of children, youth and young adults have chronic diseases and disabilities and need long-term care. Deaths from communicable disease are fewer in the United States than 60 years ago. Improved diagnostic practice makes it possible to identify and detect chronic disease (pathological processes) in children, youth, and adults earlier than in former years.

Many long-term care patients are accident victims. Accidents are a leading cause of disability in the United States among children and young adults. Thousands of disabled veterans from former and present wards need skilled long-term care and rehabilitation.

Heart disease and cancer affect people throughout the age span and cause many chronic conditions and disabilities.

For these reasons the number of persons with chronic disabilities is increasing. However, new treatment modalities, progressive health legislation, and a concern on the part of the health profession for long-term care patients makes rehabilitation a possibility and reality for many persons with chronic conditions.

STUDY ACTIVITIES

1. Please ask and answer the question "who am I?" twenty times.
   1.
   2.
   3.
   4.
   5.
   6.
   7.
   8.
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   10.
   11.
   12.
   13.
   14.
   15.
   16.
   17.
   18.
   19.
   20.

2. Think of a specific patient: an older adult, a child or adult with a long-term illness. Ask and answer the question "who is my patient?" twenty times.

   1.

   2.

   3.

   4.

   5.

   6.

   7.

   8.

   9.

   10.

   11.

   12.

   13.

   14.

   15.

   16.

   17.

   18.

   19.

   20.

3. Each patient is a multi-dimensional person. What does this mean?

4. Describe a "typical" older adult. Mention physical, mental, emotional, social, and spiritual characteristics.

5. Why is aging so often associated with illness?

6. Explain the following statement: The older adult is a difficult patient; the older adult is a challenging patient.

7. Why does an *increasing* number of children, youth and young adults need long-term care?

Chapter 4

SETTINGS FOR LONG-TERM CARE

"The right person, in the right place, at the right time, with the right service, at the right cost," is basic to the concept of progressive patient care and the idea of comprehensive health planning. Patients who require skilled long-term care because of chronic disease or disabilities, or because of dependencies associated with aging receive care in a variety of settings: hospitals, extended care facilities, nursing homes, residential facilities, and at home.

The LPN charge nurse may function in several different institutional settings: hospitals, extended care facilities, intermediate care facilities, and nursing homes.

HOSPITALS

The daily census of most general hospitals reveals a large number of medical (long-term) patients as well as a significant number of patients over the age of 65. Today hospitals participate and provide services in the Health Insurance for the Aged Program (Medicare) and the Medical Assistance Program (Medicaid). *Conditions of Participation* have been established and procedures to determine eligibility stated. Specific conditions of participation have been developed for the following hospital functions and situations:

—Compliance with State and Local Laws
—Governing Body
—Physical Environment
—Medical Staff
—Nursing Department
—Dietary Department
—Medical Record Department
—Pharmacy or Drug Room
—Laboratories
—Radiology Department
—Medical Library
—Complementary Departments
—Outpatient Department
—Emergency Service or Department
—Social Work Department
—Utilization Review Plan

The conditions of participation for the nursing department are included for study. Because so many nursing responsibilities entail cooperation and collaboration with other hospital departments, it is suggested that the LPN obtain and read the entire *Conditions of Participation; Hospitals.*

> 405.1024 *Condition of Participation—Nursing Department*
>
> The hospital has an organized nursing department. A licensed registered professional nurse is on duty at all times and professional nursing service is available for all patients at all times.
>
> (a) *Standard; Organization.*—There is a well-organized departmental plan of administrative authority with delineation of responsibilities and duties of each category of nursing personnel. The factor explaining the standard is as follows: The delineation of responsibilities and duties for each category of the nursing staff may be in the form of a written job description for each category.
>
> (b) *Standard; Licensed Registered Professional Nurse.*—There is an adequate number of licensed registered professional nurses to meet the following minimum staff requirements: Director of the department; Assistants to the director for evening and night services; Supervisory and staff personnel for each

department or nursing unit to insure the immediate availability of a registered professional nurse for bedside care of any patient when needed: and registered professional nurse on duty at all times and available for all patients on a 24-hour basis. The factors explaining the standard are as follows: (1) The staffing pattern insures the availability of registered professional nursing care for all patients on a 24-hour basis every day. (2) If a licensed practical nurse or nursing aide is on duty during the evening and night hours in a ward with patients who do not generally need skilled nursing care, there is a registered professional nurse supervisor who makes frequent rounds and is immediately available to give skilled nursing care when needed. She is free to render bedside care and is not occupied in the operating room, delivery room, or emergency room for long periods of time. (3) The ratio of registered professional nurses to patients together with the ratio of registered professional nurses to other nursing personnel is adequate to provide proper supervision of patient care and staff performance, taking into consideration the characteristics of the patient load. (4) A registered professional nurse assigns the nursing care of each patient to other nursing personnel in accordance with the patient's needs and the preparation and competence of the nursing staff available.

(c) *Standard; Other Nursing Personnel.*—There are other nursing personnel in sufficient numbers to provide nursing care not requiring the service of a registered professional nurse. The training and supervision of these personnel are continually planned and carried out to enable them to perform effectively the duties which are assigned to them.

(d) *Standard; Non-floor Services.*—There are adequate nursing personnel for the surgical suite, clinics, and other services of the hospital in keeping with their size and degree of activity. The factors explaining the standard are as follows: (1) A registered professional nurse is in charge of the operating rooms (2) Surgical technicians and licensed practical nurses may be permitted to serve as "scrub nurses" under the direct supervision of a registered professional nurse; they are not permitted to function as circulating nurses in the operating rooms.

(e) *Standard; Qualifications.*—Individuals selected for the nursing staff are qualified by education, experience, and demonstrated ability for the positions to which they are appointed. The factors explaining the standard are as follows: (1) The director of nursing makes decisions relative to the selection and promotion of nursing personnel based on their qualifications and capabilities and recommends the termination of employment when this is necessary. (2) The educational and experiential qualifications of the director of nursing, her assistants, and supervisors are commensurate with the size and complexity of the hospital. (3) The functions and qualifications of nursing personnel are clearly defined in relation to the duties and responsibilities delegated to them. (4) There is a procedure to insure that hospital nursing personnel, for whom licensure is required, do have valid and current licensure. (5) Personnel records including application forms and verification of credentials are on file. (6) New employees are oriented to the hospital nursing service, and their jobs.

(f) *Standard; Working Relationships.*—There are well established working relationships with other services of the hospital, both administrative and professional. The factors explaining the standard are as follows: (1) Registered professional nurses confer with the physicians relative to patient care. (2) Interdepartmental policies affecting nursing service and nursing care to patients are made jointly with the director of nursing. (3) There are established procedures for scheduling laboratory and X-ray examinations, for ordering, securing, and maintaining supplies and equipment needed for patient care, for ordering diets, etc.

(g) *Standard; Evaluation and Review of Nursing Care.*—There is constant review and evaluation of the nursing care provided for patients and there are written nursing care procedures and written nursing care plans for patients. The factors explaining the standard are as follows: (1) Nursing care policies and procedures are written and consistent with generally accepted practice and are reviewed and revised as necessary to keep pace with best practice and new knowledge. (2) A registered professional nurse plans, supervises, and evaluates the nursing care for each patient. (3) Nursing care plans are kept current daily. Plans indicate nursing care needed, how it is to be accomplished, and methods, and approaches and modifications necessary to insure best results for the patient. (4) Nursing notes are informative and descriptive of the nursing care given and include information and observations of significance so that they contribute to the continuity of patient care. (5) Only (i) a licensed physician or a registered professional nurse or (ii) a licensed practical nurse, a student nurse in an approved school of nursing, or a psychiatric technician, when these classes of personnel are under the direct supervision of a registered professional nurse, is permitted to administer medications, and in all instances, in accordance with the Nurse Practice Act of the State. (6) All medical orders are in writing and signed by the physician. Telephone orders are used sparingly, are given only to the registered professional nurse, and are signed or initialed by the physician as soon as possible. (7) Blood transfusions and intravenous medications are administered in accordance with State law. If administered by registered professional nurses, they are administered only by those who have been specially trained for this duty. (8) There is an effective hospital procedure for reporting transfusion reactions and adverse drug reactions.

(a) *Standard Staff Meetings.*—Meetings of the registered professional nursing staff are held at least monthly to discuss patient care, nursing service problems, and administrative policies. The pattern for meetings may be by clinical departments, by categories of the staff, or by the staff as a whole. Minutes of all meetings are kept. The factors explaining the standard are as follows: (1) Minutes reflect the purpose of the staff meetings; e.g., review and evaluation of nursing care, ways of improving nursing service, discussion of nursing care plans for individual patients, consideration of specific nursing techniques and procedures, establishment and/or interpretation of nursing department policies, interpretation of administrative and medical staff policies, reports of meetings, etc. (2) Minutes are available to staff members either individually or are maintained in a central place.

EXTENDED CARE FACILITIES

Sometimes a patient no longer needs the intensive care which hospitals provide, but still needs full-time skilled nursing care and other health services which cannot be furnished in his home. In these cases, the doctor may transfer the patient from the hospital to an extended care facility. This is a specially qualified facility which is staffed and equipped to furnish full-time skilled nursing care and many important related health services. An extended care facility may be an institution or a distinct part of an institution which qualifies to participate in the health insurance program for the aged. All extended care facilities must have transfer agreements with one or more hospitals.

The extended care benefit provided by the health insurance program for the aged is intended to be a benefit for those persons who, though they no longer require the level of intensive care ordinarily furnished in a general hospital, continue to need for medical reasons a level of care entailing medically supervised skilled nursing and related services on a continuing basis in an institutional setting. The extended care benefit covers not only postacute hospitalization where the individual is convalescing or being rehabilitated but also those types of cases where the patient may continue to be severely ill and indeed have little or no prospect of recovery. A physician certifies that the extended care facility services are required because the patient needs "skilled nursing care on a continuing basis" for any of the conditions for which he had just been previously hospitalized. Thus, a terminal cancer patient who may receive only palliative treatment but whose condition requires skilled nursing services available at all times would qualify for extended care benefits. The underlying purpose of the extended care benefit is to encourage the most effective and economical utilization of available medical care resources and facilities. Since it will be necessary for many aged patients who are hospitalized for intensive treatment of an acute phase of illness to undergo a period of medically supervised convalescence or care in a facility which is staffed and equipped to provide skilled nursing and other restorative services, the extended care benefit was provided to enable physicians to transfer patients to such facilities rather than allowing patients to continue unnecessarily to occupy high-cost hospital beds.

Accordingly, an extended care facility, whether it is a distinct part of an institution or a separate institution, is a facility which provides a level of care distinguishable from the level of intensive care ordinarily furnished by a general hospital. This level of care is reflected in the conditions of participation. While the conditions call for a wide range of specialized medical services and the employment by the facility in adequate numbers of a variety of paramedical and skilled nursing personnel, the emphasis is on the provision of skilled nursing and related care rather than the type of care and treatment required in the acute phase of an illness. Similarly, although the legislative language concerning rehabilitation services is the same with respect to hospitals and extended care facilities, the general concept of an extended care facility is that of an intermediate institution which provides post-hospital, subacute services. Hence, a rehabilitation hospital would be equipped and staffed to diagnose and evaluate the patient's disability and to initiate a rehabilitation regime. A rehabilitation extended care facility, on the other hand, would be staffed and equipped to continue and modify such a regime during the patient's convalescence.

In general, a hospital is designed to initiate care, including diagnosis and treatment. The extended care facility is designed to continue care, with appropriate modifications as the patient's condition changes.

Specific conditions of participation have been developed for the following extended care facility functions and situations:

—Compliance with State and Local Laws
—Administrative Management
—Patient Care Policies
—Physician Services
—Nursing Services
—Dietary Services
—Restorative Services
—Pharmaceutical Services
—Diagnostic Services
—Dental Services
—Social Services
—Patient Activities
—Clinical Records
—Transfer Agreement
—Physical Envir[illegible]
—Housekeeping Services
—Disaster Plan
—Utilization Review Plan

The following overview explains these conditions of participation in a little more detail. An extended care facility is engaged primarily in providing to inpatients (1) skilled nursing care and related services for patients who require medical or nursing care, or (2) rehabilitation services for the rehabilitation of injured, disabled, or sick persons. The facility must have policies which are developed and reviewed by a group of professional personnel, including one or more physicians and one or more registered professional nurses; policies relate to skilled nursing care and other medical services provided by the facility. An extended care facility or ECF, must have a physician, a registered professional nurse, or a medical staff responsible for the execution of such policies. The health care of every patient must be under the supervision of a physician and a physician must be available to furnish necessary medical care in case of an emergency. An ECF must maintain clinical records on all patients.

An extended care facility must provide 24-hour nursing service which is sufficient to meet nursing needs in accordance with the policies developed; at least one registered professional nurse must be employed full time. The ECF must provide appropriate methods and procedures for the dispensing and administering of drugs and biologicals. It must have in effect a utilization review plan. Other conditions relating to the health and safety of patients who receive services in an extended care facility may be required by State, local, and Federal officials as deemed necessary.

The conditions of participation—nursing services are included for study. Because so many charge nurse responsibilities require cooperation and collaboration with all departments, it is suggested that the LPN [illegible] and read the entire booklet *Conditions of Participation; Extended Care Facilities.*

> 405.1124 *Condition of Participation—Nursing Services.*—The extended care facility provides 24-hour nursing service which is

sufficient to meet the nursing needs of all patients. There is at least one registered professional nurse employed full time and responsible for the total nursing service. There is a registered professional nurse or licensed practical nurse who is a graduate of a State approved school of practical nursing in charge of nursing activities during each tour of duty. The terms "licensed practical nurse(s)" and "practical nursing" as used in this section are synonymous with "licensed vocational nurse(s)" and "vocational nursing."

(a) *Standard; Full-time Nurse.*—There is at least one registered professional nurse employed full time. If there is only one registered professional nurse, she serves as director of the nursing service, works full time during the day, and devotes full time to the nursing service of the facility. If the director of nursing has administrative responsibility for the facility, she has a professional nurse assistant so that there is the equivalent of a full-time director of nursing service. The director of nursing service is trained or experienced in areas such as nursing service administration, rehabilitation nursing, psychiatric or geriatric nursing.

(b) *Standard; Director of Nursing Service.*—The director of the nursing service is responsible for: (1) Developing and/or maintaining nursing service objectives, standards or nursing practice, nursing procedure manuals, and written job descriptions for each level of nursing personnel; (2) Recommending to the administrator the number and levels of nursing personnel to be employed, participating in their recruitment and selec-

Figure 4–2. Patient care in an extended care facility

tion, and recommending termination of employment when necessary: (3) Assigning and supervising all levels of nursing personnel; (4) Participating in planning and budgeting for nursing care; (5) Participating in the development and implementation of patient care policies and bringing patient care problems requiring changes in policy to the attention of the professional policy advisory groups; (6) Coordinating nursing services with other patient care services such as physician, physical therapy, occupational therapy, and dietary; (7) Planning and conducting orientation programs for new nursing personnel, and continuing inservice education for all nursing personnel; (8) Participating in the selection of prospective patients in terms of nursing services they need and nursing competencies available; (9) Assuring that a nursing care plan is established for each patient and that his plan is reviewed and modified as necessary.

(c) *Standard; Supervising Nurse.*—Nursing care is provided by or under the supervision of a full-time registered professional nurse currently licensed to practice in the State. The factors explaining the standard are as follows: (1) The supervising nurse is trained or experienced in areas such as nursing administration and supervision, rehabilitation nursing, psychiatric or geriatric nursing. (2) The supervising nurse makes daily rounds to all nursing units performing such functions as visiting each patient, reviewing clinical records, medication cards, patient care plans and staff assignments, and to the greatest degree possible accompanying physicians when visiting patients.

(d) *Standard; Charge Nurse.*—There is at least one registered professional nurse or qualified licensed practical nurse who is a graduate of a State approved school of practical nursing on duty at all times and in charge of the nursing activities during each tour of duty. The factors explaining the standard are as follows: (1) A State-approved school of practical nursing is one whose standards of education meet those set by the appropriate State nurse licensing authority. (2) Some State laws grant practical nurse licensure (nonwaivered) to certain individuals who have an educational background considered to be equivalent to graduation from a State-approved school of practical nursing. Such licensure determination is made by the appropriate State nurse licensing authority on the basis of evaluation of the individual's educational achievements, as well as on successful completion of the appropriate State licensing examination. Licensure under such conditions may be accepted as meeting the requirement of graduation from a State-approved school of practical nursing. (3) It is desirable that the nurse in charge of each tour of duty be trained or experienced in areas such as nursing administration and supervision, rehabilitation nursing, psychiatric or geriatric nursing. (4) The charge nurse has the ability to recognize significant changes in the condition of patients and to take necessary action. (5) The charge nurse is responsible for the total nursing care of patients during her tour of duty.

(e) *Standard; 24-hour Nursing Service.*—There is 24-hour nursing service with a sufficient number of nursing personnel on duty at all times to meet the total needs of patients. The factors explaining the standard are as follows: (1) Nursing personnel include registered professional nurses, licensed practical nurses, aides and orderlies. (2) The amount of nursing time available for patient care is exclusive of nonnursing duties. (3) Sufficient nursing time is available to assure that each patient: (i) Receives treatments, medications and diet as prescribed; (ii) Receives proper care to prevent decubiti and is kept comfortable, clean, and well-groomed; (iii) Is protected from accident and injury by the adoption of indicated safety measures; (iv) Is treated with kindness and respect. (4) Licensed practical nurses, nurses' aides and orderlies are assigned duties consistent with their training and experience.

(f) *Standard; Restorative Nursing Care.*—There is an active program of restorative nursing care directed toward assisting each patient to achieve and maintain his highest level of self care and independence. The factors explaining the standard are as follows: (1) Restorative nursing care initiated in the hospital is continued immediately upon admission to the extended care facility. (2) Nursing personnel are taught restorative nursing measures and practice them in their daily care of patients. These measures include: (i) Maintaining good body alignment and proper positioning of bedfast patients: (ii) Encouraging and assisting bedfast patients to change positions at least every 2 hours day and night to stimulate circulation, and prevent decubiti and deformities; (iii) Making every effort to keep patients active and out of bed for reasonable periods of time, except when contraindicated by physicians' orders, and encouraging patients to achieve independence in activities of daily living by teaching self care, transfer and ambulation activities; (iv) Assisting patients to adjust to their disabilities, to use their prosthetic devices, and to redirect their interests if necessary; (v) Assisting patients to carry out prescribed physical therapy exercises between visits of the physical therapist. (3) Consultation and instruction in restorative nursing available from State or local agencies are utilized.

(g) *Standard; Dietary Supervision.*—Nursing personnel are aware of the dietary needs and food and fluid intake of patients. The factors explaining the standard are as follows: (1) Nursing personnel observe that patients are served diets as prescribed. (2) Patients needing help in eating are assigned promptly upon receipt of meals. (3) Adaptive self-help devices are provided to contribute to the patient's independence in eating. (4) Food and fluid intake of patients is observed and deviations from normal are reported to the charge nurse. Persistent unresolved problems are reported to the physician.

(h) *Standard; Nursing Care Plan.*—There is a written nursing care plan for each patient based on the nature of illness, treatment prescribed, long- and short-term goals and other pertinent information. The factors explaining the standard are as follows: (1) The nursing care plan is a personalized daily plan for individual patients. It indicates what nursing care is needed, how it can best be accomplished for each patient, how the patient likes things done, what methods and approaches are most successful, and what modifications are necessary to insure best results. (2) Nursing care plans are available for use by all nursing personnel. (3) Nursing care plans are reviewed and revised as needed. (4) Relevant nursing information from the nursing care plan is included with other medical information when patients are transferred.

(i) *Standard; Inservice Education Program.*—There is a continuing inservice educational program in effect for all nursing personnel in addition to a thorough job orientation for new personnel. Skill training for nonprofessional nursing personnel begins during the orientation period. The factors explaining the standard are as follows: (1) Planned inservice programs are conducted at regular intervals for all nursing personnel. (2) All patient care personnel are instructed and supervised in the care of emotionally disturbed and confused patients, and are helped to understand the social aspects of patient care. (3) Skill training includes demonstration, practice, and supervision of simple nursing procedures applicable in the individual facility. It also includes simple restorative nursing procedures. (4) Orientation of new personnel includes a review of the procedures to be followed in emergencies. (5) Opportunities are provided for nursing personnel to attend training courses in restorative nursing and other educational programs related to the care of long-term patients.

INTERMEDIATE CARE FACILITIES

Many people, because of their physical or mental limitations or both, require living accommodations and care, which as a practical matter, can be made available to them only through institutional facilities. These people do not have an illness, disease, injury, or condition that requires the degree of care and treatment which a hospital or skilled nursing home provides. An intermediate care facility is an institution or a distinct part of an institution which is licensed under State law to provide its residents with such a defined range and level of care and services on a regular basis. Many State plans include benefits in the form of institutional services in intermediate care facilities.

The following pages describe the minimum range or level of care and services suitable to the needs of individuals in intermediate care facilities.

(i) *Admission, transfer, and discharge of residents.* The admission, transfer, and discharge of residents of the facility are conducted in accordance with written policies of the institution that include at least the following provisions. (a) Only those persons are accepted into the facility whose needs can be met within the accommodations and services the facility provides; (b) As changes occur in their physical or mental condition, necessitating service or care not regularly provided by the facility, residents are transferred promptly to hospitals, skilled nursing homes, or other appropriate facilities; (c) The resident, his next of kin, and the responsible agency if any, are consulted in advance of the discharge of any resident, and casework services or other means are utilized to assure that adequate arrangements exist for meeting his needs through other resources.

(ii) *Personal care and protective services.* The types and amounts of protection and personal service needed by each resident of the facility are a matter of record and are known to all staff members having personal contact with the resident. At least the following services are provided. (a) There is, at all times, a responsible staff member actively on duty in the facility, and immediately accessible to all residents, to whom residents can report injuries, symptoms of illness, or emergencies, and who is immediately responsible for assuring that appropriate action is taken promptly. (b) Assistance is provided, as needed by individual residents, with routine activities of daily living including such services as help in bathing, dressing, grooming, and management of personal affairs such as shopping. (c) Continuous supervision is provided for residents whose mental condition is such that their personal safety requires such supervision.

(iii) *Social services.* Services to assist residents in dealing with social and related problems are available to all residents through one or more caseworkers on the staff of the facility; and or, in the case of recipients of assistance, through caseworkers on the staff of the assistance agency; or through other arrangements.

(iv) *Activities.* Activities are regularly available for all residents, including social and recreational activities involving active participation by the residents, entertainment of appropriate frequency and character, and opportunities for participation in community activities as possible and appropriate.

(v) *Food service.* At least three meals a day, constituting a nutritionally adequate diet, are served in one or more dining areas separate from sleeping quarters, and tray service is provided for residents temporarily unable to leave their rooms.

(vi) *Special diets.* If the facility accepts or retains individuals in need of medically prescribed special diets, the menus for such diets are planned by a professionally qualified dietician, or are reviewed and approved by the attending physician, and the facility provides supervision of the preparation and serving of the meals and their acceptance by the resident.

(vii) *Health services.* Whether provided by the facility or from other sources, at least the following services are available to all residents: (a) Immediate supervision of the facility's health services by a registered professional nurse or a licensed practical nurse employed full-time in the facility and on duty during the day shift. In some States there are two or more classifications of intermediate care facilities, and the employment of a nurse is not required of institutions in classifications serving only residents determined by their physicians not to need supervision by a licensed nurse. (b) Continuing supervision by a physician who sees the resident as needed and, in no case, less often than quarterly; (c) Under direction by the resident's physician and general supervision by the nurse in charge of the facility's health services, guidance and assistance for each resident in carrying out his personal health program to assure that preventive measures, treatments, and medications prescribed by the physician are properly carried out and recorded; (d) Arrangements for services of

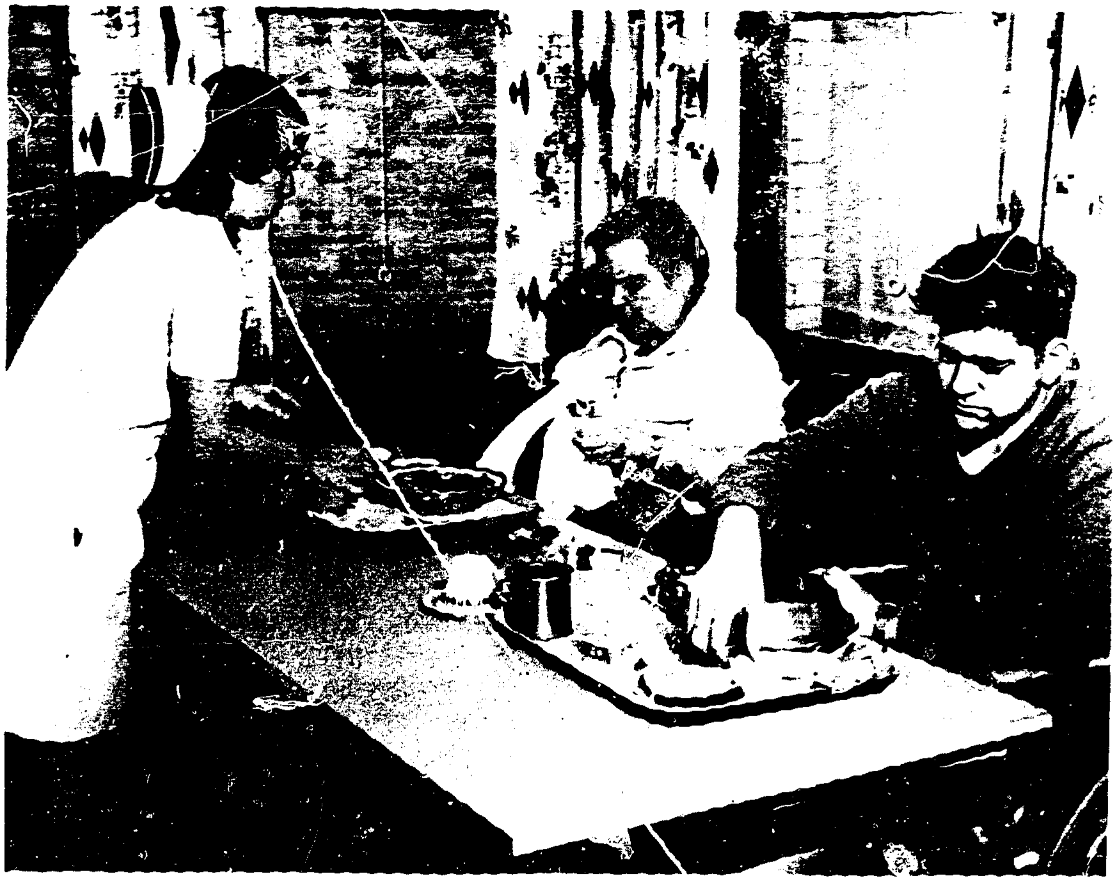

Figure 4-3. Resident care in an intermediate care facility.

a physician in the event of an emergency when the resident's own physician cannot be reached; (d) In the presence of minor illness and for temporary periods, bedside care under direction of the resident's physician including nursing services provided by, or supervised by, a registered professional nurse or a licensed practical nurse; (f) An individual health record for each resident including (1) the name, address, and telephone number of his physician; (2) a record of the physician's findings and recommendations in the pre-admission evaluation of the individual's condition and in subsequent reevaluations and all orders and recommendations of the physician for care of the resident; (3) all symptoms and other indications of illness or injury brought to the attention of the staff by the resident or from other sources, including the date, time, and action taken regarding each.

(viii) *Living accommodations.* Space and furnishings provide each resident clean, comfortable and reasonably private living accommodations with no more than four residents occupying a room, with individual storage facilities for clothing and personal articles, and with lounge, recreation and dining areas provided apart from sleeping quarters.

(ix) *Administration and management.* The direction and management of the facility are such as to assure that the services required by the residents are so organized and administered that they are, in fact, available to the residents on a regular basis and that this is accomplished efficiently and with consideration for the objective of providing necessary care within a homelike atmosphere. Staff are employed by the facility in sufficient number and competence, as determined by the appropriate State agency, to meet the requirements of the residents.

NURSING HOMES

Almost one million Americans are in 24,000 nursing homes. In recent years an increasing number of people have entered the "nursing-home-business-for-profit." According to Florence McQuillan, nurse and authority on nursing home administration, a modern nursing home has the following objectives:

1. To provide continuing care for those recovering from surgical or medical disorders.
2. To assist patients in reaching optimal physical and emotional health.
3. To provide for the total needs of patients—physical, emotional, and spiritual.
4. To assist the aging toward an active participation in life.
5. To provide for rehabilitative services when the need exists.
6. To work cooperatively with other community and social agencies.

On the other hand, David Pryor, Congressman from Arkansas, believes a nursing home is "a halfway house somewhere between society and the cemetery." "American nursing homes for the elderly are divided into three general categories: expensive, bad, and terrible."

Who is correct? Perhaps both descriptions are accurate. We know that "less than good conditions" exist in many nursing homes. We know also that high quality care exists in many homes and can and will exist in even more. Most of our discussion will focus on nursing homes providing "skilled nursing care" as defined in the Medicaid provisions.

Just a word or so in general about nursing homes. A nursing home may be a private home, an institution, building, or residence which provides through its ownership or management maintenance, personal care, nursing, to three or more persons. Because of some illness or physical infirmity these people require such care. Nursing home management may be public (Federal, State, county, or community), religious, fraternal, charitable, non-profit, or private (individual or corporate) for profit. A "home for the aged" is similar, yet it provides sheltered care simply because people are older people and unable to maintain an independent way of life except for institutionalization.

States and most large cities have minimum standards, that is, rules and regulations for nursing homes. When a nursing home meets these standards, it is licensed. Standards relate to administration: general policies, medical supervision of patients; nursing; records; medications, treatments, narcotics and dangerous drugs; food service; plant maintenance, housekeeping, and sanitation; water supply and sewage disposal; furnishing, equipment, and supplies; buildings and grounds of the existing home; buildings and grounds of new construction or conversions; fire protection in the existing home; fire protection of new buildings and conversions; additions and alterations; building plans; as well as special standards for infants and children under 18 years of age.

To qualify as a skilled nursing home and receive Medicaid payments, an institution must supply the licensing agency of the State full and complete information as to the identity of each person having an ownership interest of 10% or more in the nursing home. If the nursing home is organized as a corporation or a partnership, officers, directors, and/or partners must be identified.

The nursing home must have and maintain an organized nursing service for its patients, which is under the direction of a professional registered nurse who is employed full-time by the home; other nursing and auxiliary personnel must be sufficient in number to provide adequate and properly supervised nursing services for all patients during all hours of each day and all days of each week. There must be at least one professional registered nurse or licensed practical (or vocational) nurse on duty at all times and in charge of the nursing activities during each tour of duty. The LPN should be a graduate of a State-approved school of practical nursing or be a person who is found by the appropriate State licensing authority on the basis of the individual's education and formal training to have background considered to be equivalent to graduation from a State-approved school of practical nursing.

To qualify as a skilled nursing home, an institu-

Figure 4-4. Patient care in a nursing home.

tion must make satisfactory arrangements for professional planning and supervision of menus and meal service for patients for whom special diets or dietary restrictions are medically prescribed.

The nursing home must have satisfactory policies and procedures relating to the maintenance of medical records on each patient of the nursing home, dispensing and administering of drugs and biologicals, and assuring that each patient is under the care of a physician and that adequate provisions are made for medical attention to any patient during emergencies.

The nursing home must have arrangements with one or more general hospitals under which such hospital or hospitals will provide needed diagnostic and other services to patients of the nursing home. The hospitals agree to accept acutely ill patients from the nursing home who need hospital care.

To qualify as a skilled nursing home, institutions must meet the requisite provisions of the Life Safety Code of the National Fire Protection Association for nursing homes.

STUDY ACTIVITIES

"The right person, in the right place, at the right time, with the right service, at the right cost," is basic to the concept of progressive patient care and the idea of comprehensive health planning.

Complete the following chart by describing the kind of patient that *should* be in each of the following institutional settings: a hospital, an extended care facility, an intermediate care facility, and a nursing home. Identify major nursing needs of each patient and delineate the role of the LPN in meeting these needs.

When you have finished each chart, compare and contrast (1) patients, (2) patient nursing needs, and (3) the role of the LPN in meeting patient needs in the different institutional settings.

HOSPITAL

Patient Description	*Nursing Needs*	*Role of the LPN*

EXTENDED CARE FACILITY

Patient Description	*Nursing Needs*	*Role of the LPN*

INTERMEDIATE CARE FACILITY

Patient Description	*Nursing Needs*	*Role of the LPN*

NURSING HOME

Patient Description	*Nursing Needs*	*Role of the LPN*

Part II THE LICENSED PRACTICAL NURSE AS CHARGE NURSE

Chapter 5

INTRODUCTION

With the advent of Medicare and Medicaid, and the acknowledged shortage of prepared health practitioners in the areas of gerontology and long-term care, the LPN, because of her education, her role and functions, and her experience, emerged as one of the most qualified members of the health team to move into a leadership role in the management of skilled nursing care for patients in nursing homes, extended care and related facilities.

The government publications, *Conditions of Participation; Hospitals* and *Conditions of Participation; Extended Care Facilities* (Title XVIII—Medicare), as well as *Institutional Services in Intermediate Care Facilities* and *Standards for Payment for Skilled Nursing Home Care* (Title XIX—Medicaid) document well the need and the plan for utilization of the LPN in a patient management role.

> *Hospitals*: If a licensed practical nurse or nursing aide is on duty during the evening and night in a ward with patients who do not generally need skilled nursing care, there is a registered professional nurse supervisor who makes frequent rounds and is immediately available to give skilled nursing care when needed.
>
> *Extended Care Facilities*: There is at least one registered professional nurse or qualified licensed practical nurse . . . on duty at all times and in charge of the nursing activities during each tour of duty.
>
> *Intermediate Care Facilities*: Immediate supervision of the facility's health services is by a registered professional nurse or a licensed practical nurse employed full-time in the facility and on duty during the day shift.[1]
>
> *Skilled Nursing Home*: There must be at least one professional registered nurse or licensed practical (or vocational) nurse on duty at all times and in charge of the nursing activities during each tour of duty.

Consistent with national health needs and Federal legislation, is the Patient Care Management section of the revised *Statement of Functions and Qualifications of the Licensed Practical Nurse.*

> The licensed practical nurse, with additional preparation in specialized areas and under direction of autonomous health professionals is qualified to:
>
> a. Supervise other nursing and health-related personnel.
>
> b. Coordinate and make assignments of other nursing and health-related personnel and patients.
>
> c. Serve as team leader.
>
> d. Serve as charge nurse.

One of the first projects of the National Licensed Practical Nurses Educational Foundation, Inc. (the education and research arm of the National Federation of Licensed Practical Nurses) was the development of *Guidelines for Continuing Education Programs for LPNs.* and *Criteria for Continuing Education of the LPN/LVN.* The contract between the Federation and the U.S. Public Health Service which resulted in

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[1] In some States the employment of a nurse is not required if a physician determines the residents do not need supervision by a licensed nurse.

Figure 5-1. The LPN charge nurse.

the publication of this text is another example of LPN readiness and willingness to prepare for key nursing roles in patient care management.

The term charge nurse, as used in this text, means the immediate nursing supervisor, administrator or director of an individual unit or ward. In general, the charge nurse has a dual responsibility: (1) patient care, and (2) staff effectiveness.

The charge nurse is responsible for the nursing care of all patients on her unit for a specific tour of duty. This includes planning, implementation, and evaluation of the nursing care of all patients.

The charge nurse is responsible for staff effectiveness, because in large part, it is through her staff that she nurses her patients. Because she is in a leadership role, she is also responsible for guiding her staff toward personal and group satisfaction and achievement in their work.

Charge nurse functions vary from institution to institution, from unit to unit, and from shift to shift. In general, however, the following list of functions is characteristic and typical of the LPN charge nurse.

THE LICENSED PRACTICAL NURSE AS A CHARGE NURSE

A Statement of Functions

The qualified licensed practical nurse who functions as charge nurse on certain tours of duty in nursing homes, extended care, and related facilities performs the following functions:

1. PLANS PATIENT CARE

- —demonstrates awareness of the comprehensive nature of long-term care
- —understands the condition, needs, and therapeutic goals of each patient
- —receives and interprets verbal and written reports about patient care
- —makes nursing rounds to observe and determine patient needs
- —assists the physician with examinations and treatments
- —discusses patient care goals with physician, nursing supervisor, and staff
- —develops nursing care plans for individual patients.

2. COORDINATES STAFF ACTIVITIES

- —exhibits an understanding of basic human behavior
- —demonstrates fundamental leadership techniques
- —uses management principles and procedures
- —communicates; listens, speaks, reads, writes, gestures effectively
- —motivates staff to give skilled nursing care to all patients.

3. IMPLEMENTS PATIENT CARE

- —develops plans to meet on-going needs of all patients
- —develops plans for common types of emergency situations
- —assigns personnel in terms of patient needs and staff proficiencies
- —helps staff care for patients with special needs, the patient with mental illness, the dying patient
- —coordinates work with that of other departments such as dietary, housekeeping, physical and occupational therapy, social service
- —seeks guidance and assistance when problems are beyond scope
- —prepared and gives verbal and written reports about patients: conferences, nurses' notes, tour of duty and special reports.

4. EVALUATES PATIENT CARE

- —applies basic principles of evaluation
- —makes nursing rounds to observe and assess patient care and needs
- —assesses patient care plans and modifies as necessary
- —assesses patient care given by staff and guides appropriate changes
- —appraises self-performance and plans improvement.

STUDY ACTIVITIES

1. Study the job description for charge nurse at your institution. Compare and contrast the description with *The Licensed Practical Nurse as Charge Nurse: A Statement of Functions*. What is similar? What is different?

Similarities:

Differences:

Chapter 6

PLANNING PATIENT CARE

The LPN charge nurse *plans patient care* for a specific tour of duty. To do this, she:

- —demonstrates awareness of the comprehensive nature of long-term care
- —understands the condition, needs, and therapeutic goals of each patient
- —receives and interprets verbal and written reports about patient care
- —makes nursing rounds to observe and determine patient needs
- —assists the physician with examinations and treatments
- —discusses patient care goals with physician, nursing supervisor, and staff
- —develops nursing care plans for individual patients.

Demonstrates Awareness of the Comprehensive Nature of Long-Term Care

In the United States today, nursing homes, extended care, and related facilities assume a major responsibility for giving skilled long-term care. The nursing needs of your patients have many dimensions: physical, mental, emotional, social, and spiritual. It is necessary to meet these comprehensive patient needs on a planned, on-going basis over a long (extended) period of time, perhaps for the entire life of the person. It is equally important to encourage patient independence and prevent dependency.

Understands the Condition, Needs, and Therapeutic Goals of Each Patient

Patients are people and each patient is an individual. A disease, disability, or dependency is *specific* for a person. All people have similar basic human needs. The degree of wellness or illness determines greatly how each need can be met and to what extent nursing is necessary to help the patient meet his needs. The physician works closely with the charge nurse and other members of the health team to establish a therapeutic goal for each patient and plan care. A goal may be curative, rehabilitative, or palliative.

Receives and Interprets Oral and Written Reports About Patient Care

Oral and written reports about patients between personnel on different tours of duty promote continuity of patient care. The charge nurse obtains a complete report on the condition of each patient from the nurse she is relieving. She discusses special conditions and needs such as abnormal vital signs, pain, changes in general condition. The charge nurse makes special note of patients receiving inhalation therapy, patients with indwelling catheters, patients receiving parenteral fluids. Treatments, medications, and specific plans for the day are discussed. Anything unusual in terms of physical environment of the ward, personnel changes for the tour of duty, or special events for the institution are reviewed.

Makes Nursing Rounds to Observe and Determine Patient Needs

The LPN charge nurse, as well as team leaders and nursing supervisors, make "rounds" on patients. Nursing rounds are made at the change of shifts, with physicians, with students and staff, during visiting hours, and whenever patient needs necessitate a visit by the charge nurse.

Nursing rounds at the beginning of a tour of duty is an organized way for the charge nurse to observe patients and determine needs. The LPN charge nurse should observe each patient in an organized manner; a planned "general to specific, head to toe" observation plan is recommended:

- —Make general observation
- —Note and feel skin

—Note head: eyes, nose, ears, hair, scalp, beard, lips, gums, teeth, tongue, breath
—Talk with patient; listen
—Check chest: abdomen, back, genitals
—Have patient move; lift covers
—Examine extremities
—Discuss appetite, activity, elimination
—Discuss desires, likes, dislikes, complaints
—Note mental/emotional condition, reaction to institutionalization, treatments, nursing care.

Nursing rounds permit the charge nurse opportunity to secure and give information to patients and staff. Often she interprets policies pertinent to patient care and institution management while on rounds. Observation of nursing ethics in principle and practice is possible through nursing rounds. Rounds offer an opportunity for guidance, teaching, and on-the-spot teaching between the charge nurse and staff; personnel development on the job is enhanced through rounds. Orientation to the job, follow-up learning, and staff development continue with the help of the charge nurse as she makes rounds. Establishing rapport, good will, and personal interest in the job of the staff is often accomplished as the charge nurse makes rounds and talks with staff and their patients. A sense of togetherness is fostered when the charge nurse is "with" her staff and patients at the bedside.

Through rounds the charge nurse can assess the physical environment of her unit, as well as the availability, use, and maintenance of supplies and equipment. She can elicit and discuss suggestions for improving working conditions. Patient care and the multiple factors in the environment that affect care are observed.

Nursing rounds are very important for the development of good public relations with the patient, his family, and visitors. The opportunity to meet and talk with people about health, health care, and a particular patient and his needs is possible when the charge nurse makes rounds. Often the charge nurse uses rounds as a way to discuss referral plans with the patient, his family, and the physician.

Assists the Physician with Examinations and Treatments

The physician assumes responsibility for initial examination and diagnosis; he prescribes treatment. The effective charge nurse shares observations of the patient with the physician; she interprets and explains treatment measures to the patient and his family. In most cases the charge nurse knows the patient best and she should try in every way possible to assist the physician as they plan patient care together.

Discuss Patient Care Goals with Physician, Nursing Supervisor, and Staff

Communication with the physician, nursing supervisor and staff about patients, their problems, needs, as well as therapeutic goals and approaches, promotes quality patient care. Patient care is planned and implemented by a team of people. The charge nurse evaluates the patient's condition, his needs and therapeutic goal. She finds out what the physician is trying to accomplish in his care of the patient. She asks the nursing supervisor for guidance about nursing care; she involves allied health personnel in planning care: the dietician, the physical and occupational therapists, the clergy, the social worker, and the administrator.

Develops Nursing Care Plans for Individual Patients

A nursing care plan is an organized program to provide individualized nursing care based upon the medical therapeutic plan and nursing assessment of patient needs, goals, and approaches. According to Little and Carnevali[1] the rationale for care plans is as follows:

—Nursing care plans are needed to individualize care
—Nursing care plans help in setting priorities
—Nursing care plans help in systematic communication
—Planning is essential to continuity of nursing care
—Planning is needed to coordinate care
—Nursing care plans assist in the evaluation of care
—Nursing care plans contribute to staff development.

Dolores E. Little and Doris L. Carnevali, both professors at the University of Washington and experienced nurses in planning nursing care write:

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[1] Every LPN charge nurse should purchase, read, and study the book *Nursing Care Planning* by Dolores E. Little and Doris L. Carnevali, a 1969 Lippincott of Philadelphia publication.

> The current concept of planning patient care hinges on the belief in the individuality of each patient, hence the need for systematic tailoring of his nursing care to his specific requirements. This planned individualization is carried out in the ordered diagnostic studies, the physicians' therapeutic plan of care, and in the general aspects of nursing activities. It can be done consistently and methodically through the use of written care plans. The written statements of patient problems, goals, and nursing approaches offer a common basis of information to all who read them or who give an oral report from them. In this way nursing care plans contribute to continuity of care—the even progression of care during the stages of illness. They also contribute to, and are influenced by, efforts in coordinating tests, therapy and other non-nursing aspects of care. Plans and progress reports make possible more accurate assessment of nursing care and also contribute to staff development in areas of both knowledge and skill.
>
> In any work setting, the responsibility for creating nursing care plans rests with the nurses who direct or give patient care. There may be total or selective coverage of the patient population in the use of written care plans.
>
> The climate of experimentation, of tentativeness, of alternate solutions, of changing perspectives on problems and priorities, tends to foster a flexible, creative, challenging, patient-centered work milieu; one well suited to the constancy of change in the individual patient and the total patient population.[1]

There are certain common steps and components in the process of planning care, whether it be thought through in a moment at the patient's bedside or carefully drafted in advance. According to Little and Carnevali the basic steps in the process are:

1. Identifying the patient factors that will influence nursing care.
2. Ruling in or ruling out problems and setting current priorities of attention and care.
3. Stating the nursing care problems[2] that have been given current priority of attention.
    a. Setting of the desired patient goals or objectives in the problem area.
    b. Prescribing the nursing actions to be undertaken that will assist the patient in achieving his goal.
    c. Determining what cues will enable the nurse to assess the patient response and the effectiveness of the nursing actions.
4. Revising any or all components of the nursing care plan as necessary in terms of patient response or changes in his situation.[3]

The nursing history is the first component in planning a patient's nursing care. It is a necessary part of both continuity and individualization. If one considers that continuity must begin with the patient in his home environment and continue throughout the illness experience, then it becomes obvious that the gap between non-patient and patient status, or between home and institution, must be bridged smoothly. The nursing history may make this possible.

The history is the cord of individualization also. It provides the data from the patient to show where discrepancies exist between his previous patterns and those which may be expected of him in his patient role. It also gives beginning data on cues to patient response. The information obtained in this initial contact forms the basis for immediate priority setting and statement of current and potential problems of concern as well as selection and modification of nursing approaches that meet his needs, values and desires.

The exact content areas of the nursing history should prove useful in terms of economy of time and appropriateness to patient care in particular institutional settings. To obtain information that is not used in planning patient care is not justified.

The exact format of a nursing care plan will vary from institution to institution. In most cases the plan will be an integral part of the Kardex. If an institution does not have a particular form for a nursing care plan, several variations are

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[1] Little and Carnevali, *Nursing Care Planning*, p. 16.

[2] A nursing care problem is a situation in which the patient requires or would benefit from the assistance of the nurse in attaining the desired goal or solution.

[3] *Ibid.*, p. 47.

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suggested: divide a card in half and label the two sides as follows:

(1) GOALS APPROACHES
or
(2) PROBLEMS APPROACHES
or
(3) GOALS ACTIONS

The following sample plan will give an idea of content for a nursing care plan for a long-term care patient.

GOAL	ACTION
1. Encourage further independence and responsibility for self.	a. Accept offers of help from patient or request his help, especially on his good mood days. b. Praise his efforts to keep his room neat and his help to others as well as himself.
2. Encourage interest in repair of prothesis	a. Help him to consider situations where being able to walk with prothesis would simplify his life and make it more pleasant. b. Ask if he wishes to set aside any of his pay for prothesis repair.
3. Continue to assist patient in becoming oriented to time and place.	a. Identify care setting and time when it can be introduced without threatening him or making him seem in error.

Figure 6–1. Planning patient care.

STUDY ACTIVITIES

1. Obtain a nursing care history on one of your patients. Use the following form or any modification of the form that seems appropriate.

NURSING CARE HISTORY

Patient's Name ______________________________ Diagnosis ____________________

Admitting Date ______________________________ Date of History ________________

History obtained by ____

General Information

I. Previous nursing home and/or hospital experience. Yes____ No____

Date of last nursing home/hospital experience________________

II. Previous experience in *this* nursing home. Yes____ No____

Date______________________ Diagnosis________________________________

III. Kinds of activities carried out by nurses that were helpful.

IV. Kinds of activities carried out by nurses that bothered you.

V. Visitor and family contact during hospitalization. Yes____ No____

Desire for any restrictions of visits. Yes____ No____

If restriction, please indicate desires.

VI. Goal expectations from nursing home experience.

Habits of Daily Living

I. Food Habits:

A. Meal patterns:

	Time	*Usual Foods*
Breakfast		
Lunch		
Dinner		
Snacks		

B. Food dislikes

C. Food allergies

II. Fluid Habits:

A. Fluid preferences

B. Fluid dislikes

III. Sleep Habits:

A. Usual bedtime? ______________

B. Usual number of hours of sleep? ______________

C. Get up at night? ______________

D. Nap habits

Time

E. Number of pillows desired? ______________

F. Number of blankets desired? ______________

G. Windows open? ______ Curtains drawn? ______

H. If unable to sleep at home, what things do you do that help you fall asleep?

IV. General Hygiene:

A. Bathing preference:	*Usual Time*
Tub ____________	________
Shower ____________	________

B. Care of teeth:

Type:	*Usual Time of Cleaning*
Natural ________	________________
Dentures ________	________________

V. Elimination:

A. Usual bowel habits:

Frequence__________________ Time__________________

B. Bowel irregularities:

Constipation? Yes_____ No_____

C. Bladder irregularities:

Yes_____ No_____

Other Specific Information

Any Specific Questions You Wish to Ask Me?

Observations Made During History Taking:

2. Every individual must satisfy certain [illegible] human needs to live, to maintain health, and to affirm his being. These needs relate to the following:

   —Environment
   —Social class
   —The family
   —Marriage
   —Religion
   —Vocational development
   —Recreation
   —Love
   —Sex
   —Water
   —Food
   —Elimination
   —Personal cleanliness
   —Clothing
   —Activity
   —Rest and sleep
   —Oxygen

   Nursing is the act of assisting a healthy, handicapped, ill or dying person to meet his basic needs for life, health, and being. Use the information you have obtained from the nursing care history and complete the following NEED/ACTION PLAN. Basic needs and concept statements explaining the needs are listed on the left-hand side of the page. On the right-hand side, indicate the approach or action you as a nurse would take to help the patient meet this particular need.

3. Use the nursing care history and make out a nursing care plan. If possible obtain several other nursing care histories and make out additional nursing care plans. In addition to the history, use personal knowledge of the patients and information available from the charts; try to involve other staff in the activity.

GOAL	ACTION

GOAL **ACTION**

GOAL **ACTION**

GOAL **ACTION**

PATIENT NEED **NURSING ACTION**

Environment

- —The total well-being of an individual is influenced by his surroundings (environment).
- —Surroundings, belongings, possessions, and valuables are necessary, accepted, and cherished parts of a person's life.
- —A healthful environment is pleasant, comfortable, safe, and convenient.
- —The readiness of a person to return to the community and the process of recovery is influenced directly by environment.

Social class

- —Income, occupation, education, and ethnic status are some of the indices of social class.
- —An individual's behavior in part reflects his social class and style of life.

The family

- —The immediate family includes the father, mother, and children.
- —The extended family includes such relatives as grandparents, uncles, aunts, and cousins.
- —There are many significant people in the life of a patient: neighbor, minister, sweetheart.
- —The need for long-term care by any member of the immediate or extended family affects family roles, relationships, responsibilities, and economics.
- —Readiness to return to the family is conditioned by behavior and characteristics of the specific family constellation.

Marriage

- —Most adults of all societies are married.
- —People may live together in other arrangements than licensed marriage.
- —Divorce is recognized, although with degrees of disapproval, in nearly every world society.
- —Feelings of frustration, loneliness, bereavement, and desertion may arise when a husband and wife are separated because of a long-term illness.

Religion

- —Most people believe in something spiritual or sacred.
- —Long-term disease or disability may be a contributing factor to some people "becoming more religious" and influence others to "forsake" or question former beliefs or practices.

PATIENT NEED **NURSING ACTION**

Vocational Development

- —Problems might arise when youth and young adults interrupt education and career development because of long-term disability.
- —Vocational rehabilitation is necessary for many people with chronic disabilities.
- —Money is required in an industrial society to purchase the necessities and luxuries for healthful living.
- —Most people work to earn money.
- —Personal satisfaction and achievement are possible through work.
- —The desire for economic security is normal for an individual and family.
- —Most persons who need long-term care have inadequate financial resources to pay for necessary care.
- —Stopping work because of a disability or because of retirement may have both psychological and economic crisis consequences for an individual and his family.

Recreation

- —Play and recreation are important for personal health of people of all ages.
- —Creative use of leisure time contributes to positive feelings of identity and worth.
- —Play and recreation are socially acceptable outlets for pent-up energy.
- —People, well or ill, need to have fun, relax, socialize with other people, and "take one's mind off troubles."

Love

- —People need love.
- —An individual needs to love, to cherish, and to aid others.
- —An individual needs to be beloved, cherished, and aided by others.
- —Some people are unable or unwilling to love and receive love.
- —Some people are unable to express hostility openly and state that they "hate."
- —People may face difficulties and stresses because of separation from loved ones because of long-term illness.

Sex

- —Sex is an aspect of psychic energy present and manifested by a person throughout human life.

PATIENT NEED **NURSING ACTION**

—A sexual relationship is a dynamic and creative phase of living.

—Men and women can live without sexual experiences, but their lives will lack much warmth and richness of living closely associated with love.

—A long-term disease or disability may bring a person problems and stress and the feeling of being unfulfilled sexually.

—People have individual rights in choosing sexual modalities.

Water

—Water is necessary for human life.

—Fluids and water from foods supply the body with water necessary for bodily processes.

—Daily fluid intake balances daily fluid output.

Food

—Food is necessary for life.

—Carbohydrates, fats, proteins, vitamins, minerals, and water are vital nutrients.

—The body needs food for energy, to build and repair tissues, and to regulate many bodily processes.

—The Basic Four is a daily food plan to assure necessary amounts of food nutrients.

—People have individual differences and food patterns because of cultural, religious, and traditional reasons.

—Over or undereating may have nutritional and psychological significance.

Elimination

—Elimination is necessary for life.

—Urine is the waste eliminated by the urinary system; feces is the waste material eliminated by the gastrointestinal tract.

—Psychological feelings of guilt and dependency may arise when the patient needs assistance with elimination.

Personal cleanliness

—All body surfaces harbor microörganisms and cleanliness is basic to healthful living.

—People have different concepts or levels of cleanliness.

Clothing

—Clothing is an accepted necessity for healthful living.

PATIENT NEED **NURSING ACTION**

—People have varying ideas about nudity and modesty.
—Clothing helps regulate body temperature.
—Clothing is one component of good grooming.

Activity

—Activity is characteristic of life.
—Activity depends upon proper functioning of bones and muscles and the coordination of the nervous and encodrine systems.
—Rehabilitation means the restoration of the patient to his maximum physical, social, and economic capacity.
—Rehabilitation begins at the *onset* of any illness or disorder.
—Disability or disuse phenomena may be caused by inactivity or activity in a faulty position, or because of weakness or pain.

Rest and sleep

—Rest and sleep are necessary to replenish energy.
—People can rest without sleeping.
—Older persons do not need extensive sleep.
—Sleep may be a symptom of withdrawl.

Oxygen

—Oxygen is necessary for human life.
—Breathing (normal pulmonary ventilation) provides adequate oxygen for body use.
—Air pollution contributes to chronic lung disease.

Chapter 7

COORDINATING STAFF ACTIVITIES

The LPN charge nurse *coordinates staff activities* for a specific tour of duty. To do this, she:

- —exhibits an understanding of basic human behavior
- —demonstrates fundamental leadership techniques
- —uses management principles and procedures
- —communicates; listens, speaks, reads, writes, gestures effectively
- —motivates staff to give skilled nursing care to all patients.

EXHIBITS AN UNDERSTANDING OF BASIC HUMAN BEHAVIOR

The whole person, including his physical, mental, emotional, social, and spiritual characteristics and needs, constitutes the realm of human behavior. Basic human behavior reflects an interaction of both hereditary and environmental influences. Hereditary factors refer to those physical and psychical (mental) traits transmitted from parents to child; they are genetically determined. Environment is the aggregate of external emotional, social and spiritual factors affecting the person.

People behave in consistent predictable ways; they also behave in unique different ways. People behave in both similar and different ways. Personality is the sum total of what is most typical and deeply characteristic about a person. Within each society there are ranges in physical and sensory characteristics, in intelligence and educational achievement, in behavior and social relationships. It is important to remember that most people behave in ways which make sense to them. A person's view of himself, his self-concept, influences greatly what he does. His previous experiences (be they good or bad) influence his perception of any new situation and this in turn influences his behavior. Behavior is influenced to a great extent by a person's basic needs and the manner and degree to which they are met.

DEMONSTRATES FUNDAMENTAL LEADERSHIP TECHNIQUES

Leadership techniques include the ability to involve people in a common effort toward a specific goal. It is fairly well accepted today that leaders are not born, nor do they possess specific personality traits. But what a leader does and how he does it are very important, that is, his leadership behavior. Many studies have examined the results of autocratic, democratic, and laissez faire styles of leadership. There is much current interest in leader and group situations in terms of achievement, affiliation, and power motivation.

In general, if you want to be an effective leader you will be flexible rather than rigid. You can choose from a range or combination of leader styles (autocratic, democratic, or laissez faire), as well as a variety of leader behaviors (tell, persuade, consult, join, or delegate). A good leader is aware of her own characteristics, needs and problems. She also knows the characteristics, needs, and problems of her staff and unit. The leader should assess the many dimensions of the situation and then choose the appropriate style of leadership behavior. The LPN charge nurse may *tell* staff what they are to do. You might try to *persuade* staff to accept a decision you have made. Another time you may elect to *consult* with staff about a decision. You might *join* staff as "just another member" to work on a problem and reach a decision together. You might *delegate* a problem to staff for solution; you would define the problem and boundaries within which the problem must be solved and indicate your agreement to support the solution. Study the following examples:

TELL	Helen, would you take Mrs. Hines in 234 off the bed pan. Mary, her aide, cut her finger and is having it dressed.
PERSUADE	Fluid intake on too many of our patients is low. Please try to offer fluids at least once each hour for each patient.
CONSULT	Ethel, do you think Mr. Hargraves and Mr. Palmer would be compatible roommates?
JOIN	Let's decide together the kind of staff party we want.
DELEGATE	We want to show our appreciation to Gertrude. Her husband is being transferred and she will leave us in two weeks. Usually we spend between $5.00 and $8.00 on a gift or little party. Would you three ladies plan something appropriate?

As an effective leader, you must be honest in dealing with your staff; let them know how much influence they have and how you will use your authority. Sometimes in an attempt to be democratic or fair, it may be tempting to avoid responsibility by involving others in decision-making in which the responsibility is clearly that of yours. Do not try to avoid responsibility by the simple expedient of involving others in a decision. Allow staff to participate in decision-making whenever it is feasible; but make necessary decisions yourself when the situation requires this.

By virtue of your position as charge nurse, you are an authority figure. *You* are responsible for the total nursing care of every patient on the unit for a particular tour of duty. Tasks number in the hundreds. A wise leader will keep in mind both the immediate problems and tasks as well as the long-range patient care goals and unit objectives. Whatever your individual style of leadership or the particular behavior you select, person-centered leadership as over against task-centered leadership usually proves most effective for everyone involved.

USES MANAGEMENT PRINCIPLES AND PROCEDURES

Patient care is a group effort and the LPN charge nurse is the leader of the group. The effective charge nurse will implement a variety of management principles and procedures. Management principles and procedures include the ability to plan, coordinate, guide, and evaluate the activities of others.

The effective charge nurse will view her unit as an organism not a machine. The unit is a living, flexible, changing, complex network of relationships among people who are trying to achieve individual and group goals. The wise charge nurse involves staff in as many decision-making situations as possible especially decisions which they will implement. She strives to establish mutual confidence as the basis for cooperation rather than an authoritarian-obedience basis. Whenever possible the charge nurse relates to staff in a face-to-face manner. Person-centered leadership as over against task-centered leadership is more effective in meeting personal and group goals.

A good charge nurse strives to establish a two-way flow of communication; "feedback" opportunities should be many. The nurse works with her staff to develop unit objectives and individual nursing care plans so that patient care standards can be relevant to staff tasks. The charge nurse develops a collaborative relationship with supervisors, peers, and subordinates.

As a leader the charge nurse tries to increase her own awareness of personal behavior and its effect on others. She examines her own attitudes and assumptions as they affect job performance and relationships. She strives ever to increase her knowledge of staff as individuals, a group, and a unit. She tries to increase her skill in diagnosing human situations, that is, just what is going on. She tries to increase her own understanding and skill relative to change and the process of change. She strives to create a unit in which individuals may obtain optimum personal and work satisfaction and unit objectives may be achieved.

The effective charge nurse tries to maintain face-to-face work groups at all levels. She involves people together to solve problems and face issues. She is aware of individual, group and unit needs. She works to establish and maintain a supportive communications climate. Whenever possible staff are involved in decision-making that affects group norms and goals. The charge nurse fosters individual initiative through group cohesion. She is flexible in establishing group goals and procedures.

COMMUNICATES

Good comunication means that persons concerned with communication understand what each is trying to communicate. It in no way guarantees that people will do what we want them to do, believe what we want them to believe. We can understand perfectly well the position of another person and still refuse to do what the communication attempts to get us to do. What you mean to say, what you actually say, and what the other person hears may differ. In general, however, realistic understanding and effective increase where there is clear communication.

Communication is the way one person conveys, imparts, or shares feelings, acts, and thoughts with another person. Communication is a fusion of impressions and expressions. An impression is what the person takes in. Listening and reading may be considered the intake or impressions. An expression is what the person gives out. Acting, speaking, and writing are output or expressions.

The LPN charge nurse communicates with the patient, his family and visitors. She may ascertain an important subjective symptom, reassure a crying child, teach an older gentleman how to clean his dentures properly, chat about the mideast crisis, or listen while a lady prays.

Because patient care is shared by many people round-the-clock, communication between the LPN charge nurse and other members of the health team is vital. She must be able to follow and implement written and oral directions from the physician. Through "report," "rounds," team conferences and patient care assignments she communicates with the nursing staff. The patient's medical record is an example of a very important written form of communication. The ability of the LPN charge nurse to report and record in an accurate and meaningful manner is an important function.

Communication with the patient and about the patient is one of the most necessary aspects of modern health care.

LISTENING

Purposeful, interpretive "hearing" is listening. Listening conveys feelings, facts, and thoughts from one person to another. Hearing is mere recognition of sounds; listening is reaction to and interpretation of significant sounds. A person learns to listen, but he also listens to learn. Listening therefore is active, not passive. It is purposeful and very basic for learning. A person listens to acquire information and to see the relationships among ideas. Listening brings pure auditory pleasure; it lets one appreciate the moods, the meanings, the humor, and the pathos of another individual. Never be too busy or too lazy to listen properly. A patient may confide in the housekeeper simply because she took the time to listen to him attentively. Suggestions for effective listening include the following:

1. Listen for a purpose.
2. Be attentive and courteous:
   —look at the speaker
   —give the speaker your attention
   —respect the speaker's opinions.
3. Think critically while listening:
   —recall
   —analyze
   —comment
   —question.
4. Appreciate and enjoy what you hear.
5. Discriminate fact from fancy; recognize "propaganda."
6. Evaluate the worth of what was said.

READING

Recognition, comprehension, and interpretation of written symbols are reading. Reading conveys feelings, facts, and thoughts from one person to another. Reading is a necessary communication medium for the LPN charge nurse. Written orders and directives about the patient must be read with interest, perviewed accurately, understood correctly, and interpreted therapeutically. Through the printed word, the nurse as well as the patient gains pleasure and emotional satisfaction as they learn more about the physical world, other lands and cultures. Through reading a person gains further understanding of self and is able to extend and develop special interests. Suggestions for effective reading include the following:

1. Identify the purpose of written communication.
2. Perceive and study the words.
3. Understand and comprehend phrases, sentences, ideas, and the theme.
4. Interpret the meaning of written communication:
   —recognize relationships of purpose, ideas, and viewpoint
   —recognize emotions, motive, mood, and tone
   —develop a sensory image
   —relate to personal experience
   —make judgments and draw conclusions.

ACTING

Communicating by gesture, facial expression, and touch is acting. Acting conveys feelings and emotions from one person to another. The newborn infant communicates as he reacts with his whole body. He cries to express discomfort and demands, and he quiets down from fussing when his needs are met. Reflex activity is acting or communication. Overt and covert gestures are ways children and adults communicate. Facial expression, with or without language, is a powerful mode of communication. Touching is communicating. Recently, many articles and books have appeared about body language. Suggestions for effective "acting" include the following:

1. Gesture in a free, natural manner.
2. Parallel conversation with appropriate facial expression.
3. Handle the patient in a gentle, confident manner.

SPEAKING

A system of vocal symbols or sounds is speaking. Speaking conveys feelings, facts, and thoughts from one person to another. Language is a system of vocal symbols or sounds. A meaning exists for each sound or combination of sounds in a particular language. Language is a means of communication, a source of pleasure, and an outlet for emotions. The infant makes a few throaty sounds; he learns to babble, coo, gurgle, chortle, and eventually to speak. Speech is very important in the total development of the child. The ability to make friends, to acquire a sense of security, and to instill self-respect and mutual respect is, to a considerable extent, dependent upon a child's ability to speak easily and well. Language is important in maintaining good mental health in the adult. Speaking is a key communication medium. The saying "It's not so much what you say but how you say it," is very true. Practice the following variations in voice flexibility with the single word "Oh."

Say	*with*	*to express*
Oh-h-h-h	rising inflection	surprise or excitement
Oh-h-h-h	falling inflection	disappointment
Oh-h-h-h	no inflection	boredom

Study the following examples of variation in voice stress:

DID Mr. Harris refuse his shower?
(Meaning—I am surprise that he refused.)

Did MR. HARRIS refuse his shower?
(Meaning—Are you sure it was Mr. Harris?)

Did Mr. Harris REFUSE his shower?
(Meaning—Are you sure he refused? Perhaps he misunderstood.)

Did Mr. Harris refuse his SHOWER?
(Meaning—Are you sure it was his shower he refused?)

Conversing, discussing, interviewing, and reporting are the forms of speaking most frequently practiced by the LPN charge nurse with the patient and staff. Friendly, spontaneous expression is conversation; the charge nurse visits with the patient about his grandchildren. In a discussion, remarks center around a topic, and all contributing comments bear upon the subject; the charge nurse shares observations about the patient at the 10:30 A.M. team conference. When the charge nurse admits a new patient to the unit, she asks certain preplanned questions, she listens attentively; this is a form of interview. Giving information in an accurate, brief, clear manner is reporting; the LPN charge nurse reports to the nursing supervisor that George Armstrong, Bed 2, Room 364 has a blood pressure of 80/40 at 2:00 P.M.; bleeding from the rectal area is increasing. Effective oral communication—conversing, discussion, interviewing, and reporting—is a requisite for the LPN charge nurse. Suggestions for good speaking include the following:

1. Converse and discuss in a spontaneous, friendly, poised, self-confident manner.
2. Practice social courtesies when speaking:
   —listen attentively to others
   —wait until another has finished before beginning to speak
   —refrain from conversing when someone is talking to a group
   —respect private conversations of others.
3. Interview in a planned, orderly, sequential manner.
4. Report information in an acurate, brief, clear manner: who, what, when, where, why.
5. Enunciate clearly and pronounce words correctly:
   —use speech organs properly—lips, teeth, tongue, jaw, nose, roof of mouth, and larynx—to produce clear sounds
   —maintain good posture, deep breathing, and slow steady exhalation
   —learn standard acceptable English
   —produce vowel and consonant sounds properly and clearly
   —practice acceptable pronunciation of words; use a dictionary
   —recognize differences in volume
   —achieve vocal flexibility through variations in stress, pitch, inflection, and rate.

WRITING

Formation and placement of word symbols on paper constitute writing. Writing conveys feelings, facts, and thoughts from one person to another. Writing is a necessary communication medium for the LPN charge nurse. The patient's medical record or chart is a written, legal record of the history and progress of the patient. The medical record is utilized by the institution for therapeutic, education, research, and administrative purposes. The LPN charge nurse communicates to others through various tour of duty and special written reports. Observing precedes all recording, and reporting frequently accompanies it. Written communication must be accurate, brief, and clear. Accuracy means factual evidence, understanding, and interpretation of observations. Brevity means presentation of essential ideas only and omission of unnecessary details, using as few words as possible. Clarity means presentation of all important ideas in a complete, sequential, legible manner. Many institutions request that nurses print. All entries on the medical record and written reports should be in ink; erasing is not permitted. Letters should be consistent in size, slant, spacing, and formation. The LPN charge nurse *signs* for each entry, her name and title. Suggestions for effective writing include the following:

1. Understand the function of words and phrases.
2. Identify subject and predicate of simple sentences.
3. Recognize and compose declarative, interrogative, imperative, and exclamatory sentences.
4. Spell words correctly—both ordinary words and medical terms.
5. Capitalize and punctuate correctly.
6. Print or write legibly.
7. Strive continuously to improve content and mechanics of written communication.

MOTIVATES STAFF TO GIVE SKILLED NURSING CARE TO ALL PATIENTS

The LPN charge nurse is responsible for staff effectiveness, because in large part, it is through her staff that she nurses her patients. Because she is in a leadership role, she is also responsible for guiding her staff toward personal and group satisfaction and achievement in their work.

First, the LPN charge nurse motivates her staff to give skilled nursing care to all patients *through example*. She *is* a good nurse. Second, she communicates to her staff the belief that skilled nursing care makes a difference—a difference for the patient and his family, a difference for the individual staff member, as well as a difference for the unit and total institution. Third, the LPN charge nurse "helps staff help themselves" establish and meet patient care and job satisfaction goals.

STUDY ACTIVITIES

1. Describe your own personality.

2. Describe the personality of a "subordinate," for example, a nurses' aide.

3. Describe the personality of a "superior," for example, the director of nursing or the administrator.

4. Describe a ward situation in which you would TELL a nurses' aide what to do. Why did you choose this kind of leadership behavior?

5. Describe a ward situation in which you would PERSUADE a nurses' aide to accept a decision you have already made. Why did you choose this kind of leadership behavior?

6. Describe a ward situation in which you would CONSULT with a nurses' aide about a problem. Why did you choose this kind of leadership behavior?

7. Describe a ward situation in which you would JOIN your staff and work on a problem and reach a solution together. Why did you choose this kind of leadership behavior?

8. Describe a patient care situation in which you would DELEGATE a responsibility to a nurses' aide. Why did you choose this kind of leadership behavior?

9. In what ways do you communicate *most* effectively? Why?

10. In what ways do you communicate *least* effectively? Why? How can you change this?

11. The LPN charge nurse motivates staff to give skilled nursing care to all patients. Try out the following goal setting exercise on yourself and adapt it for use with staff.
   a. Identify patient care and/or job satisfaction goals that are important to you. Describe as clearly as possible (3) three patient care and/or job satisfaction goals that are meaningful to you and give the dates when you expect to reach them. These goals may be nursing, career, personal, ward, or institution goals. Don't just dream them up. They should be real goals or ambitions that you have.

      (i) My first goal is

      I intend to reach it by

      (ii) My second goal is

      I intend to reach it by

      (iii) My third goal is

      I intend to reach it by

b. Team up with a colleague and discuss the goals you have set. Ask and answer the following questions.

(i) *The Need*: How important is this goal to you? What will it mean in your life?

(ii) *Activity*: What things are you presently doing to achieve this goal? What things are you planning to do in the near future to achieve it, i.e. three to six months?

(iii) *Anticipation of Success*: How confident are you of reaching this goal? Why? What will you do after you have achieved it?

(iv) *Anticipation of Failure*: What are the possibilities of your failing to reach this goal? If you do fail, what will you do next?

(v) *Personal Blocks*: What hang-ups in your own personality or "self" could keep you from reaching your goal. How do you plan to overcome them?

(vi) *Environmental Blocks*: What situations or circumstances exist in the "world" (the ward and the institution) that could hinder you in reaching these goals? How do you plan to overcome them?

(vii) *Help*: What other people (in the ward or institution) or things will you use to help you achieve your goals? How will you use them?

c. Restate your first goal.

(i) My first goal is

I intend to reach it by

d. Plan the action steps to achieve this goal. These steps should be specific steps that you actually intend to take. For each action step, you should include how it will be measured, a date on which you will review your progress, and the final accomplishment date. (See next page.)

PLANNING ACTION STEPS TO REACH FIRST GOAL

Action Steps To Be Taken	*How I Will Measure My Progress*	*Specific Dates For Progress Review*	*Specific Accomplishment Dates*

e. List what you believe are personal strengths that could help you reach your first goal.

	Personal Strength	*How I Can Use This Strength To Reach My Goal*
1.		
2.		
3.		
4.		
5.		

f. List personal obstacles that might keep you from reaching your first goal. (For example, I do not listen well enough; I am impatient with other people.)

	Personal Obstacle	*What I Can Do About It* (Do I Need Help?)
1.		
2.		
3.		
4.		
5.		

g. List environmental or world obstacles (the ward or institution) that might keep you from reaching your first goal. (For example, staff turnover is high; employees seem concerned with salary only.)

	World Obstacle	*What I Can Do About It* (Do I Need Help?)
1.		
2.		
3.		
4.		
5.		

h. Review your goal-setting achievement plan individually or with a colleague. Ask and answer the following questions.

(i) Is the goal specific, measurable, and time-phased?

(ii) Is the goal realistic and attainable, or am I just doing some wishful thinking? What results do I expect?

(iii) Is the action plan too general? How will it be tested?

(iv) Are the dates realistic for the goal and action steps?

(v) Are there any strengths that I have not planned to use for attaining this goal?

(vi) Are there any obstacles or blocks which I have not anticipated?

(vii) When is the first progress review? How will information be gathered for this review?

(viii) Will I be able to take the action steps?

(ix) Do I really want to?

Chapter 8

IMPLEMENTING PATIENT CARE

The LPN charge nurse *implements patient care* for a specific tour of duty. To do this, she:

- —develops plans to meet on-going needs of all patients
- —develops plans for common types of emergency situations
- —assigns personnel in terms of patient needs and staff proficiencies
- —helps staff care for patients with special needs, the patient with mental illness, the dying patient
- —coordinates work with that of other departments such as dietary, housekeeping, physical and occupational therapy, social service
- —seeks guidance and assistance when problems are beyond scope
- —prepares and gives oral and written reports about patients: conferences, nurses' notes, tour of duty and special reports.

DEVELOPS PLANS TO MEET ON-GOING NEEDS OF ALL PATIENTS

A plan is an organized way to try to do something well. For example, ward plans or routines are guides to help staff give the best nursing care possible in the existing facilities with the present personnel.

Every health care institution has policies and procedures that govern and guide its operation. Every ward has a policy manual and/or nursing procedure book. These are plans to help meet the on-going needs of all patients in the most effective, efficient way. These policies or procedures relate to patient care in general as well as such events as admission, transfer, discharge, and death. Policies guide relationships with physicians, the laboratory, the kitchen, social service, the maintenance department, the laundry, the pharmacy, and administration.

The LPN charge nurse utilizes plans or routine ways of doing things when she requisitions a diet, orders drugs, or requests laboratory work. Routine plans are helpful in ordering linen and maintaining necessary equipment and supplies. Tour of duty reports, the narcotic record, interdepartment and interagency correspondence are examples of plans or routines. Plans are used to work out weekly staff assignments, vacation time, coffee breaks and meal time. Plans and routines have been developed for emergency situations. The patient's medical record is a planned or routine way to record observations in an efficient, meaningful way.

Plans and routines are most useful when they are developed by the people or groups who will implement them. Plans are less effective when they are superimposed down on a group from administration. Every plan or routine should be clear in terms of goal (purpose) and approach (action). Plans and routines should be reviewed periodically to assure currency. Written plans and routines facilitate accessibility by the entire staff at all times. Misunderstandings and misinterpretations of intentions are fewer when plans are written.

DEVELOPS PLANS FOR COMMON TYPES OF EMERGENCY SITUATIONS

Emergency or disaster situations may occur on an individual or mass basis. Shock, hemorrhage, or acute respiratory distress are individual emergency situations requiring immediate lifesaving measures. Fires, explosions, storms, earthquakes, as well as thermonuclear attacks, are mass disaster situations. In general, all patients are in dependent situations—dependent on staff for assistance. Plans for common individual and mass emergency situations are required for licensure of any institution for patient care. For example, *Conditions of Participation; Extended Care Facilities* requires the following:

> 405.1136 *Condition of Participation—Disaster Plan.*—The extended care facility has a written procedures to be followed in case of fire or other disaster.
>
> (a) *Standard; Disaster Plan.*—The facility has a written procedures to be followed in case of fire, explosion or other emergency. It specifies persons to be notified, locations of alarm signals and fire extinguishers, evacuation routes, procedures for evacuating helpless patients, frequency of fire drills, and assignment of specific tasks and responsibilities to personnel of each shift.
>
> (b) The factors explaining the standard are as follows: (1) The plan is developed with the assistance of qualified fire and safety experts. (2) All personnel are trained to perform assigned tasks. (3) Simulated drills testing the effectiveness of the plan are conducted on each shift at least three times a year. (4) The plan is posted throughout the facility.

The Red Cross First Aid Course or the Medical Self-help Course is included in the curricula of some practical/vocational nursing programs. First Aid is the immediate and temporary care given the victim of an accident or sudden illness until the services of a physician can be obtained; it may save the life of the individual, or a group of people; it fosters safety consciousness. Medical Self-help is a program to prepare a person to maintain health and alleviate suffering during any period of disaster when professional care and normal services might not be available. If you did not receive either course as a student, please enroll in a class as a post-graduate. You might suggest that such a class become an inservice activity at the institution for other nurses and aides. A local vocational school or college might offer the course as part of its continuing education or adult education program if it knows the need exists.

The LPN charge nurse constantly reminds her staff of the accident-prone nature of older people and persons who are handicapped. Preventing an accident or emergency is always best. The charge nurse practices safety consciousness in terms of ward environment; she notes spilled water, side rails that are down, litter. She assumes responsibility for a safe and comfortable environment for patients and staff; this includes general cleanliness, lighting, storage, noise, air control, odor, and insects.

ASSIGNS PERSONNEL IN TERMS OF PATIENT NEEDS AND STAFF PROFICIENCIES

The LPN charge nurse is responsible for nursing care of all patients; in addition, she coordinate the activities of all staff. This means matching individual patient care needs with individual staff proficiencies.

Satisfactory patient care assignments result from assessment and evaluation of individual patient needs and knowledge of preparedness and proficiency of each staff member. The LPN charge nurse must be familiar and understand job descriptions for various staff; she must know the experience and education background of her staff; she must be aware of the personality of her people.

If the LPN charge nurse is an effective leader, that is, if she (1) exhibits an understanding of basic human behavior, (2) demonstrates fundamental leadership techniques, (3) uses management principles and procedures, (4) communicates orally and non-orally, and (5) motivates staff to give skilled nursing care to all patients, patient care assignments rarely will be questioned. Behind her back griping and complaints will be few.

Sometimes the charge nurse may utilize multiple assignments, that is, two or more staff to care for certain patients. This kind of patient care assignment might prove effective for difficult cases.

Skill at patient care assignment comes through knowledge of the patient, the staff, and with experience.

HELPS STAFF CARE FOR PATIENTS WITH SPECIAL NEEDS

GERIATRIC NURSING[1]

I. *Adequate Self-Concept and Security*:

Personal needs become paramount to the chronically ill person. The aim of nursing care is to give a feeling of self esteem and self accomplishment to the elderly patient, therefore, nursing care is directed towards assisting the patient to maintain the functions of daily living to the best of his ability. A lack of motivation on the part of the patient is a major problem in the nursing care of the geriatric patient; this is due to this lack of self esteem. Patients tend to relax and allow things to develop as they will; they take the path of least resistance.

Nurses may teach new skills or patterns to patients only if motivation is present and time is made available. Every motivating device available must be employed.

1. Praise and recognition
2. Keep material in the context of the familiar as much as possible, relate new learning to old
3. Provide time, never appear to push
4. Help the learner to understand the task
5. Keep the stimulus and response together when demonstrating or explaining.

The nurse must consider the loss of speed and the need for motivation. The greatest difficulty comes in attempting to organize old familiar material in new and strange ways. Memory deteriorates and new material is readily lost while old material is retained. The patient develops rigidity of thinking and follows patterns even if he knows they are not working. This major difficulty in altering patterns results in failure of logical thinking. The individual retreats into extraneous discussion when faced with difficult problems.

The current level of functioning is relative to the original peak of earlier functioning. If familiar tasks are maintained and exercised, these skills will remain—hence the emphasis upon activities of daily living. The greater his ability to care for himself the greater the self esteem of the elderly patient.

Problems in motivation arise because the elderly person has lived longer and has some actual loss of capacity to function, and also because he has lost many of his peer groups and persons who were important and close to him, they are no longer living or within close contact to give meaning to his life. At times he does not always accept his differences from other age groups.

There is a general slowing down of responses based on slowness of decision as to how to respond, especially in complex and unfamiliar tasks. The stimuli come too rapidly or in irregular fashion, with a result of jerky, piecemeal performance, due to an overlap of activity with the previous response. The nurse should try to structure the situation for the older adult so his central nervous system will have time to make the appropriate response. Instructions should be presented slowly, using rhythmic stimuli—avoiding hurried, confused or emotion-laden orders.

To maintain feelings of self worth, call the patient by his or her preferred name rather than "Grandma," etc. Give explanations to patients. Avoid opportunity for your patient to make mistakes, anticipate his needs, thereby preventing him from constantly asking for service which tends to increasingly point up his limitations. Recognize that creativity and productiveness are still the right of old age—provide opportunity for the

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[1] This section, Geriatric Nursing, was prepared by Mrs. Carmen F. Ross, R.N., M.A., Director of the Mount Sinai Hospital School of Practical Nursing in Miami Beach, Florida. The LPN charge nurse curriculum was field tested at this school; Mrs. Ross served as project director and main instructor.

elderly to be engaged in growing things and creative experiences.

II. *Stress and Adjustment*:

Adjustment is related to earlier behavior. Stress is associated with a loss of life enjoyment, loss of feelings of self confidence and usefulness, a general loss of zest and a loss of resiliency. Stress of any kind yields increased anxiety, recovery is usually slower. Anxiety is demonstrated by the magnifying of normal aches and pains producing a hypochrondriasis with excessive attention to digestive and eliminative functioning and exaggerated reports of sleeplessness. Psychiatry offers an approach to stress in the elderly by focusing upon recognition of the patient's patterns of dealing with stress—determined by his constitutional makeup, his temperament, biologic hereditary makeup, organic assets and deficits, his environment, emotional motivation and dynamics.

While youth is normally optimistic and looks forward, age recognizes failings and tends to look backward. All patients regress during periods of stress or illness, elderly patients more so. The nurse's role in anxiety is to:

1. Focus the energy from anxiety into useful channels of activity and purpose to alleviate stress
2. To identify the cause of externally produced anxiety and lessen these if possible
3. To recognize clues to the patient's buildup of anxiety and his patterns of response
4. Supply thereness of the nurse in period of extreme panic and stress
5. Supply focus of disturbing hostility.

It becomes increasingly difficult to adjust to the lack of emotional resources. The tranquilizing drugs are useful as a supportive measure to control anger, frustration and upheaval. It is helpful to a patient's security if he can remain in familiar surroundings. Drugs are not a cure, but a supportive measure. In unfamiliar surroundings a patient is often deserted by those meaningful to him and feels surrounded by disinterested strangers.

Needs as seen by the elderly patient include:

1. Good health—a chance for a variety of experiences
2. Place to live and enough money to live comfortably
3. Recognition by others—a chance for participation with others.

III. *Activities of Daily Living*

In the very elderly and incapacitated patient it is extremely difficult sometimes to find ways of maintaining hope and purpose in the patient's life. But without hope and purpose one only exists, he does not truly live. In our efforts to help such patients we must avoid the extremes of doing too much and of doing too little. A variety of interests and projects that occupy the hands or the minds can be offered, but the nurse's activities should be aimed at motivating the patient toward appropriate activities of daily living and self-care.

A. Maintenance of Motor Skills:

Before any maintenance regime can be instigated, the nurse must first evaluate the patient's condition and identify the physical limitations if there are any. The extent to which any individual can perform day-to-day actions (ADL) is a good indication of his capacities. This should include the walking and non-walking activities such as, being able to sit alone in bed, roll from side to side, and the daily routines such as feeding himself, brushing teeth, combing hair, etc.

If this evaluation of the patient is to be of value, it must occur during each contact with the patient, not just during the initial nursing care given. The nurse must prevent further physical limitations, while attempting to correct those already present. Daily observation is the key here. This is a nursing responsibility to be sure that the auxiliary personnel know what they are doing and what factors must be included in their daily patient observations.

Protective positions to help keep the bed patient in good alignment:

Unless medical orders specify the restriction of motion of certain body areas, bed patients can be prevented from developing physical limitations by a variety of positions.

The protective back-lying (supine) position:

In the back-lying position, the two areas of the body that need particular attention are the feet and the neck. The greatest danger to the feet occurs when they are not held in the dorsal flexion position. The toes drop downward, the feet are in plantar flexion. If this occurs for extended periods of time, the complication of drop foot occurs. During the time the patient is in bed, pillows are always used to support the head. Caution should be used here to prevent flexion of the cervical spine. Both thorax and neck must be supported as well.

Suggested Action	*Complications to be Prevented*
—Provide a firm supportive mattress	—Exaggerated curvatures of the spine and flexion of the hips
—Use a bed board if necessary	
—Place pillow under upper shoulder, the neck and the head so that the head and neck are held in the correct position	—Flexion contractures of the neck
—Place pillows or arm supports under the forearms so that the upper arms are alongside the body and the forearms are pronated slightly	—Internal rotation of the shoulder and extension of the elbows
—Make hand rolls or use small towels for hands to grasp. If paralyzed, use thumb guides to hold the thumbs in adducted position	—Extension of the fingers and abduction of the thumbs (claw-hand deformation)
—Place sand bags along the hips and upper thighs	—External rotation of the femur
—Place small soft roll on sponge rubber under the knee, sufficient to fill the popliteal space but not to create pressure, and not to exceed 5 degree flexion	—Hypertension of the knees
—Use a foot block or make an improvised firm foot support to hold the feet in dorsal flexion	—Plantar flexion

The protective side-lying position:

This is a welcome relief from prolonged periods of lying on the back. Turning to the side rests certain muscle groups and brings others into use.

Suggested Action	*Complications to be Prevented*
—Place a pillow under the head and the neck	—Lateral flexion of the neck
—Place a pillow under the upper arm	—Inward rotation of the arm and interference with respiration
—Provide a hand roll for the fingers and thumbs	—Extension of the fingers and abduction of the thumbs
—Use one or two pillows as needed to support the leg from groin to the foot	—Internal rotation and adduction of the femur

The protective face-lying (supine) position:

Lying on the abdomen, face down, can be a valuable and relaxing position if the patient is comfortable in this position and enjoys it. The feet are the only area of real concern. Unless supported or allowed to go over the end of the mattress, they are forced into plantar flexion and the legs rotate inward and outward.

Suggested Action	*Complications to be Prevented*
—Move patient down in bed so that his feet are over the mattress; or support his lower legs on a pillow just high enough to keep the toes from touching the bed	—Plantar flexion
—Place sponge rubber pads under shoulders	—Forward hunching of the shoulders
—Place small pillow under the head	—Flexion of the cervical spine
—Place a small pillow or some other suitable support under the patient between the end of the rib cage and the upper abdomen if this facilitates breathing and there is a definite space there	—Hyper-extension of the spine; impaired respiration

Protective exercises for the bed patient:

When routine activity is omitted for several days or longer, it is more difficult for the muscles to resume their former task. Therefore efforts to assist patients to maintain good muscle tone must begin with the first day of confinement to bed. This must be continued on a regular daily basis. Maximum range of motion must be included:

Trunk:

- Hyper-extension
- Flexion
- Extension

Legs:

- Outward rotation
- Inward rotation

Arms:

- Flexion
- Extension
- Hyper-extension
- Adduction
- Abduction

Head:

- Flexion
- Extension
- Hyper-extension

Feet:

- Dorsal flexion
- Plantar flexion

These exercises must be done regularly to prevent the formation of contractures.

Getting the patient out of bed:

Remember that there is a loss of back strength in your older patients. Hand strength is retained, so let the patient help you assist him. Give your directions clearly and slowly, allowing the patient to respond to one direction at a time. See that his clothing is comfortable yet without dangling belts or strings that will catch on the furniture. The patient's shoes and slippers must provide the needed support without being heavy or cumbersome.

Sleep patterns:

Older patients usually change their sleeping habits. They must avoid fatigue and find the need for more frequent rest periods during the day. They are easily distracted by noise or bright lights, and they sleep intermittently throughout the night. If this is not too distressing to the patient, don't worry about it. The patient's not sleeping seems to distress the nurse more than it does the patient.

B. Nutrition and Oral Hygiene:

Nutrition is more than diet. Proper nutrition includes not only ingestion of adequate and balanced quantities of all necessary nutritive elements but also digestion of foods, their absorption, transport to the tissues and utilization by the cells. Impairment of cellular nutrition may result from any one or more of several factors:

1. inadequate nutritional supply (such as dietary deficiencies, digestive failure, oxygen lack due to anemia)
2. inefficient distribution (circulatory impairments)
3. ineffective utilization of food elements (hypoinsulinism, asphyxia, enzyme deficiencies)
4. accumulation of injurious metabolic debris (such as azotemia, uric acid deposition)

The rate of metabolism diminishes in man with the process of aging. This therefore affects nutrition in several ways. There must be a reduction in caloric requirements and in some cases eating habits must be altered. Habits are probably one of the greatest obstacles in the path toward obtaining an optimum diet by the majority of persons. Habits of eating play a most significant role in nutritional problems. Habits may last longer than life itself, for they may be transmitted from one generation to the next. The longer habits have been indulged in, the more rigidly they become fixed.

Water: The total intake of beverage fluids should be such that the 24-hour urinary volume is a minimum of 1500 ml. In hot weather this may mean fluid intake of 3 Liters or more, but in ordinary cool weather, with moderate activity, an intake of 2 Liters is optimal. In the older person it may be desirable to space the fluid intake. Small amounts at relatively frequent intervals rather than large quantities at one time. Water is vital, not only for urinary excretion but to avoid constipation and assist the weakened digestive process.

Calcium: With advancing age it becomes more difficult to maintain a positive calcium balance. Loss of calcium from bone leads to osteoporosis and serious fragility responsible for fractures, therefore the dietary calcium requirements of older persons will be much higher.

Protein: The elderly are prone to suffer from protein starvation more than other forms of deficiency. Insufficient protein is a significant factor in the pathogenesis of tissue wastage, anemia, bone atrophy and edema. Mild deficiencies may be manifested primarily by a sense of habitual fatigue. Unfortunately, the majority of older persons dislike or resent the prescription of milk. Milk is not only a valuable source of protein but a major source of calcium. Skim milk may be preferable to whole milk is one wants to avoid the increased fat intake. Other significant sources of protein are cheese and lean meats. The requirements of the older person are similar to those of a younger person, 1 Gram of protein per Kilogram of body weight per day.

Care of the Mouth and Teeth: General good health is as essential as cleanliness for maintaining a healthy mouth and teeth. Frequent cleansing of the mouth and the teeth aids in reducing dental caries.

Toothbrushing: It has been shown that bacteria in the mouth react with food particles to form an acid which predisposes to dental caries. Therefore, frequent cleansing of the teeth and mouth is a requisite for maintaining a healthy mouth and teeth. After using the toothbrush, the mouth should be rinsed thoroughly with clear water. Mouth washes may be used but never in lieu of the toothbrush. The toothbrush must be small enough to reach all teeth. If food is wedged between the teeth, dental floss may be used, provided care is taken so as not to injure the gums.

Dentures: The removable type are removed and cleaned with a brush, after each meal. Denture brushes are helpful but not necessary if only a regular brush is available. Some dentists recommend that removable dentures remain in place except for cleaning. If the patient has been instructed to remove his dentures while sleeping, a disposable denture cup is convenient and easy to use. Keeping dentures out for long periods permits the gum lines to change, thus affecting the fit of the dentures.

C. Bathing and Skin Care:

The skin of older patients is thin, delicate and very sensitive to trauma and pressure. The loss of subcutaneous fat leads to wrinkling and sagging, sweat glands atrophy and the general excretory function of the skin is decreased.

Bath: Daily bathing is unnecessary, in fact, may be harmful if too frequent. For the incontinent, a tub bath or thorough cleaning of the anterior and posterior pelvic region is sufficient. Use a mild soap and be sure that the skin is rinsed free of soap after cleansing. Avoid alcohol rubs or the use of any scented lotion or cream that may contain alcohol. Bathing should be followed by the application of lanolin or emollient creams which are gently massaged into the skin. Particular attention should be given to bony prominences and weight bearing areas. Powders may be used but sparingly. Avoid application in the body creases, to prevent caking or irritation.

Care of the Nails: Both toe and finger nail care is extremely important. Because of limitation in peripheral circulation, the nails become hard and thick. Before any specific care is given, the feet and the finger nails must be soaked in a mild soap solution to soften and make cutting of the nails and care of the cuticle easier. Nails should be cut straight across and the sharp edges smoothed with an emery board or nail file.

Care of the Hair: The hair becomes thin, dry and lifeless because of the diminished blood supply to the scalp. Daily massage to the scalp followed by brushing with a soft bristled brush will help to maintain the body and texture of the hair. Lanolin cream in small amounts, along with oil treatments preceding shampoo may also be given. Frequent shampoos are to be avoided because of the already decreased supply of natural oils. Attention should be given to the type of shampoo selected. Avoid the use of harsh soaps or shampoos which contain even a minimum amount of alcohol. The hair style should be designed to suit the desires of the patient. A simple style can be both comfortable and attractive. The distribution and quality of hair changes with age. The axillary and pubic areas become fine and scanty while the eyebrows become coarse and bristley. Hair on the face, particularly chin and upper lip area can cause distress. Shaving the area or using a pumice followed by the application of a cream will prevent drying. Plucking hair from the chin may be necessary. Do not pluck hair from a mole or other growth; just cut close to the skin surface as necessary.

D. Bladder and Bowel Control:

Patients tend to worry about bowel function, tending to forget that with less food intake (which is common in elderly patients) and lessened activity there is less bowel function. Regularity of going to the toilet is a helpful stimulus. Mild cathartics are useful. Lack of attention to signals leads to constipation. Attention to diet is necessary.

Frequent micturition—night frequency—is an early sign of kidney function impairment. Retention of urine and mild infection may be due to decreased muscle tone of the bladder. Observe for distention. Most elderly females complain of a troublesome discharge and may have a mild infection. A mild douche may be ordered.

The condition of incontinence causes embarrassment and discomfort to the conscious patient and leads to skin irritation and decubiti ulcers. The causes are: disorders of the central nervous system pathways, loss of conscious control of bladder and bowel, spinal cord damage, loss of bladder and bowel reflex action, actual tissue damage of bowel and bladder—sphincters or supportive tissue. Control is based upon normal voluntary and involuntary muscular action coordinated by normal urethra-bladder reflex.

Between voiding the bladder outlet is elevated by contracture of the levator ani muscle in the perineum and the muscular walls of the bladder relax. As the bladder fills with urine the involuntary nerve endings at the trigone are stimulated by the weight of the urine and increased muscle tone of the bladder. The internal sphincter relaxes releasing urine into the posterior urethra. Stimulated by this, the bladder muscles contract preparatory to emptying the bladder. As involuntary stimulus occurs some charges overflow to the pudenal nerve (voluntary nerve from the sacrospinal cord). This allows the central nervous system to send appropriate stimuli to the levator ani muscle which causes the muscle either to quickly and forcefully pull the outlet higher to prevent overflow or lower to allow outflow. If this mechanism is disturbed, incontinence results.

Frequently indwelling catheters are used to correct incontinence. There are some disadvantages of the catheters: (1) possibility of infection, (2) loss of bladder muscle power. The catheter should be clamped and opened at intervals of 2–4 hours, (3) stones may form due to irritation of a foreign body.

Toilet training of the incontinent adult may be helpful. Observe the patient's normal voiding pattern and adjust accordingly. Watch for frequent small amounts of voiding. This usually indicates that the muscles are not contracting strongly enough to empty the bladder completely and the patient is voiding overflow. This may be due to pressure of a distended bowel. This can be relieved by a flatus tube or enema.

External drainage for male patients should be available. Old age may cause relaxation of muscles and consequent incontinence. Most elderly males have hypertrophy of the prostate, making urination difficult. Practice in exercise of muscular control can tend to correct the relazation of the muscles, this is taught—contract abdominal, gluteal and perineal muscles while breathing normally.

E. Visual Care:

Adaptation is decreased and the visual field narrows, speed of focus is decreased. There is a great need for better lighting, light stairs, hallways, night lights at the bedside and in the bathroom areas. There is a need for special care at dusk.

Accumulation of secretions due to lower lid droop, with a decrease in conjunctival secretions which is followed by irritation and tearing occurs. These secretions should be washed from the inner to the outer canthus. Take care not to press upon the eye ball. Most persons over the age of 60 wear glasses at least for reading. Care of glasses is a major problem in nursing homes. Glasses should be clean and available at all times. If they are lost, confusion and the inability to cooperate may result.

F. Auditory:

There is an increasing incidence of deafness within the sound range of the human voice after the age of 75 (2 men out of 10 and 1 woman out of 10 have noticeable deafness).

The nurse should check to determine if she is being accurately understood. Many patients are unaware of this disability or are unwilling to admit it. Don't rely upon the presence of a hearing aid, it may not be turned on. Any noise or voice not clearly understood is annoying to a deaf person. Speak clearly and slowly in view of the patient (for lip reading).

G. Body Perception:

Some loss of pain sensitivity is present after the age of 50. This may be dangerous as the patient may fail to report injuries that he may have suffered. There is also a loss of the sense of movement of body parts, loss of the sense of balance (due to inner ear changes). Frequent falls occur due to a lack of balance. There is a need for stair and hallway railing, tub and bathroom grips, canes and supports. These self-help devices will aid the patient's self-respect.

H. Anatomical and Physiological Changes:

Slower cell division, healing is slowed, defenses respond to infection more slowly and less effectively, loss of elasticity of connective tissue, decreased speed of response and decreased strength with increased rigidity of body structure such as the rib cage occur. There is a lessened chest expansion which leads to lung congestion. This condition causes problems following anesthesia or during conditions such as pneumonia.

The bone is rarefied, causing easy fractures. Fatty infiltration of cells and loss of elasticity of blood cells cause poor circulation which results in poor adjustment to prolonged changes in position: such as lowering of the head or prolonging standing. The blood collects in the lower extremities and it causes dizziness, fainting and falling. A lack of essential nutrients in the blood is quickly felt. These people do not tolerate a lack of food easily. Any small change in the blood pressure is more significant for the older age group. There is gradual degeneration and atrophy of the nervous system in old age, with impaired sensation. The gag reflex is less acute, causing the patient to be more prone to aspiration.

Diminished chest expansion makes it imperative that oxygen content be normal in the available air supply, fresh air is necessary but one must avoid drafts. Arthritis and fibrositis are aggravated by chills, drafts, dampness and changes in baremetric readings. A decrease in adipose tissue and circulation to the small outer arteries makes it difficult to withstand chills. There is lowered skin temperature due to the lessened circulation. Clothing should be adapted to the needs of the patient. The wearing of their own clothes should be encouraged.

I. Reaction to Drugs:

As a rule the elderly patients require smaller dosages of sedatives and larger dosages of stimulants. The intramuscular drugs are slower to react due to the slowed circulation. Cumulative effects of the drug may occur due to kidney and liver function impairment, which slows excretion of the drug from the body, especially digitalis (causing heart block), bromides, and barbiturates.

There are many satisfactions in store for the nurse who chooses geriatric nursing. All the principles involved in nursing care of the acutely and chronically ill may be needed at various times. She will need to learn well the philosophy and psychology of caring for the chronically ill and aged. She will need experience in a wide variety of nursing skills and will find there is much for her to learn as she works in this particular field of nursing. Many of the points mentioned under rehabilitation and recreation will become more meaningful and useful when applied to patients living in "homes." They will need attention to clothing, meals, recreation, and companionship there as they would in their own homes. Arrangements should be made to assure them some privacy and a homelike atmosphere. Some effort and imagination may be necessary in providing a specific place for each individual to call his own, and into which others may not trespass unless asked. A corner of a ward may be all the patient has but everyone should respect his right to call it his domain and allow him to keep there the few personal belongings he may treasure.

THE PATIENT WITH MENTAL ILLNESS

No illness afflicts the whole person more than mental illness. When a person is unable to cope with the demands of his internal desires, the realities of daily living, and the dictates of his conscience, conflict develops and a mental illness may result. Hereditary factors are responsible for some kinds of mental illness. In most cases, however, factors within the environment cause mental illness. It is most prevalent in highly industrialized nations. There are more people in hospitals with mental illness at any one time, than with all other diseases combined. Many children in the United States are mentally ill and only a very small percentage of these are receiving any kind of psychiatric treatment. Overwork, fatigue, death of a loved one, financial difficulties, home problems, dissatisfaction with work, and a sudden change of living habits, or some romantic difficulty may precipitate a mental illness.

Neurosis and psychosis are the two major categories of mental illness. A neurotic reaction is a mental illness in which thinking and judgment are impaired to the degree that the individual tries to resolve the conflict in a manner that handicaps his effectiveness as a normal functioning person; loss of contact with reality is minimal in a neurotic reaction. There are the following types of neurotic reactions:

—Anxiety reaction: anxiety is the prominent feature

—Phobic reaction: pathological fear exists

—Conversion reaction: an unconscious conflict is disguised

—Dissociative reaction: certain functions or parts of the personality are detached

—Obsessive-compulsive reaction: ideas and acts recur despite their irrationality

—Depressive reaction: severe depression exists.

A psychotic reaction is a mental disturbance in which there is loss of contact with, or serious distortion of, reality. Organic psychoses result from impaired cerebral function. Arteriosclerosis, senility, alcoholism, and neurospyhilis are common causes of organic brain syndrome; infections, toxins, and head trauma may cause organic psychoses. Functional psychoses are psychogenic in origin; that is, there is no defined physical cause, and no apparent structural changes in the brain exist. Schizophrenic reaction includes a group of reactions characterized by apathetic, silly, or unexpected emotional responses. Many types and variations of thinking defects occur. Delusions and hallucinations may be apparent. Paranoia and paranoid reaction are syndromes characterized by overuse of the mechanism of projection. A complex system of delusions exists. Affective reactions are disorders in which there is a disturbance in mood (affect). For example, the person may be depressed or elated (manic). Changes in mood occur without apparent cause and vary in degree and duration from what is considered normal.

Emotional factors are presumed to cause such conditions as peptic ulcer, essential hypertension, bronchial asthma, and ulcerative colitis. These illnesses are called psychosomatic disorders or psycho-physiological reactions.

Personality disorders are characterized by defective behavior patterns. For example, the paranoid personality is undully sensitive and suspicious. The person with an emotionally unstable personality is immature and becomes very excited and ineffective under minimal stress. Individuals with socio-pathic personalities exhibit antisocial or asocial behavior. In most of the personality disorders, anxiety is minimal; however, the behavior patterns tend to be chronic.

Anxiety is a state of tension which tries to warn a person of impending danger. Anxiety is very important in the dynamics of normal and abnormal behavior. It may be the driving force behind the successful businessman. Anxiety may cause unreasonable emotional trauma, render the individual ineffective, and reduce him to a dependent state.

Anxiety has both psychic and somatic components. The anxious person perceives discomfort and feels apprehension. The anxious person may have sweating or flushing, rapid respiration, tachycardia, palpation, anorexia, nausea, vomiting, cramps, diarrhea, as well as urgency and frequency.

To deal with anxiety the person enlists certain defenses. *Suppression* is conscious purposeful forgetting. *Repression* is purposeful but unconscious forgetting. *Regression* is returning to a more satisfactory emotional level. *Rationalization* is ascribing acceptable motives to thoughts or behavior that has other motives. *Projection* is attributing one's own thoughts or actions to another person or object. *Introjection* is turning of unacceptable tendencies against one's self. *Compensation* is attempting to overcome feelings of inferiority. *Reaction formation* is manifesting a very unacceptable or dangerous impulse in the exact opposite direction. *Sublimation* is diverting instinctual drives into socially acceptable behavior. *Denial* is conscious negating fact or reality. *Identification* is adopting personality characteristics of another, especially one who is admired. *Isolation* is separating unacceptable conscious impulses from the rest of mental content and thus rendering them harmless.

A physician, hopefully, a psychiatrist, diagnoses a mental illness following a complete medical and psychiatric examination. A team of people—psychiatrist, psychologist, social worker, occupational therapist, recreational therapist, nurse, and clergy—help the patient with a mental illness recover.

Specific attitude therapy may be prescribed by the psychiatrist. When the staff takes the initiative and approaches the patient, this is an attitude of active friendliness. The patient must take the initiative when relating to the staff in passive friendliness. A matter-of-fact attitude is a neutral approach to the patient. Kind firmness is a positive, coaxing manner with the patient. Work therapy may be prescribed for the patient; a menial monotonous task may satisfy the need for punishment in a depressed person. Planned recreation is therapeutic; playing volleyball allows a patient to express hostility within a group setting in a socially acceptable manner.

The nurse is a key member of the therapeutic team. Observation and communication are two very important nursing (therapeutic) measures. Observation is purposeful, planned, and objective. The nurse observes the patient's general behavior —his appearance, speech, actions and attitudes. She notes his emotions (mood)—is the patient anxious, agitated, elated, or depressed? She is alert to the patient's thought content. An *illusion* is a misinterpretation of a real, external sensory experience. A *delusion* is a false belief that is maintained against logical argument and despite objective contradictory evidence; for example, a patient has delusions of grandeur when he imagines that he is the Secretary General of the United Nations and that he is guiding quarreling, disputing nations to world peace. A *hallucination* is a false sensory perception in the absence of an actual external stimulus. Observations indicative of the patient's insight, intelligence, orientation, and memory are important.

Communication with the mentally ill patient is therapy. To be therapeutic, the nurse accepts the patient as he is. She relates with the patient in a consistent manner and at his level of understanding. Communication that increases anxiety, fosters an intimate nurse-patient friendship, and is judgmental for the patient is untherapeutic.

In addition to observation and communication, the nurse helps the patient meet his basic physical needs for life and health. She sees that his nutrition is adequate. The patient needs exercise, recreation, rest, and sleep. The nurse institutes necessary safety measures to protect the patient from himself, to protect other patients and to protect herself. Special supervision might be needed for the aggressive patient or for the suicidal patient.

Treatment for the patient with mental illness may include establishing a therapeutic environment, psychotherapy, certain somatic techniques, and medications. Psychotherapy refers to regularly scheduled interviews between the patient and the therapist. This may be done on an inpatient or outpatient basis. Talking with the therapist may help the patient. For example, the therapist may help the patient understand his feelings and behavior patterns. He may reassure the mother that hostile feelings toward her three young children are not so abnormal. He may listen while the patient ventilates. This talking-it-out therapy is called catharsis. In some cases, the therapist may suggest that the patient modify his environment—for example, that the husband and wife send the children to the grandparents for a month and plan a vacation together. In psychoanalysis the therapist and patient strive to uncover unconscious conflicts and deal with them in such a way that the patient gains insight into his illness and recovers. In group therapy one therapist and several patients talk together. Group therapy is often used in conjunction with individual therapy. In recent years, many new kinds of encounter and sensitivity group sessions have been tried.

Certain somatic techniques are used, to a lesser extent today than in former times, to treat an individual with a mental illness. Electroshock therapy (EST), sometimes referred to as electroconvulsive therapy (ECT), is useful in relieving symptoms of depression. An electric current is passed through electrodes applied to both temporal areas, producing a grand mal seizure. Following 8 to 20 treatments, symptoms improve. The patient is up in 30 minutes. Narcoanalysis with intravenous injections of amobarbital (Sodium Amytal) or thiopental (Sodium Pentothal) makes some patients more accessible to therapy. Hydrotherapy using a cold wet sheet pack, a prolonged continuous bath, or a pool is used in some institutions to manage patients. Insulin coma therapy has been used successfully and produces remissions of symptoms in many cases of withdrawal. Regular insulin is injected, and following 25 or more comas improvement is seen. A skilled team of doctors, nurses, and attendants is necessary to give safe insulin therapy. Psychosurgery may be performed to relieve symptoms when other techniques fail. The association fibers between the frontal lobes and the thalamus are sectioned, presumably detaching the emotional component from the psyche.

Medications are being used with increasing frequency to treat mental illness. Such barbiturates as phenobarbital and pentobarbital (Nembutal) are useful sendative and hypnotic drugs. Chloral hydrate and paraldehyde help delirium. The "tranquilizing" or ataraxic drugs reduce psychic tension without a corresponding sedative or hypnotic effect. The patient thus remains accessible to psychotherapy. Serious toxicity problems accompany prolonged use of many of these drugs. Some of the major tranquilizing drugs in use today include:

—Chlorpromazine (Thorazine)
—Procloperazine (Compazine)
—Promazine (Sparine)
—Perphenazine (Trilafon)
—Thiopropazate (Dartal)
—Promethazine (Phenergan)
—Reserpine (Serpasil)
—Meprobamate (Miltown, Equanil)
—Mephenesin (Tolserol)
—Azacyclonol (Frenquel)
—Hydroxyzine (Atarax)
—Phenagycodol (Ultran)

A wide variety of stimulant and antidepressant drugs are being used to combat mental depression. The effectiveness of these drugs varies greatly from patient to patient. Amphetamine (Benzedrine), dextro-amphetamine (Dexedrine), and methamphetamine (Desoxyn) are used with patients with mild to severe depression. Imipramine (Tofranil), isocarboxazide (Marplan), nialamide (Niamid), and phenelzine (Nardil) are used in depressive reactions. When used discriminately drugs are of great value in adjunctive management of many psychogenic disorders. Medications should augment, never replace, a total program of psychotherapy.

THE DYING PATIENT

All people die. Death is a significant phenomenon in the growth and development process. Death is the cessation of life. Although the lifespan increases, the force of mortality remains. The LPN charge nurse working with long-term care patients encounters the dying patient and death frequently. She must help her staff cope with this difficulty in a supportive, positive way. Nursing includes helping a person die in a dignified and meaningful manner.

Death may be sudden. In most cases, however, a variety of changes in body structure and functions are associated with the process of dying. The skin becomes pale or mottled. The hands, ears, and nose may be cold. The person may prespire profusely. The body may lose muscle tone; the jaw may sag and the cheeks may become flaccid. The person may breathe through his mouth. Respirations may be rapid and shallow or abnormally slow. Breathing may be noisy and rattling. There seems to be an accumulation of mucus in the respiratory tract. There may be a general slowing of circulation. The person may be unable to swallow; he may be involuntary of stool and incontinent of urine. The person may lose his ability to speak. Hearing usually remains intact. The eyes may look sunken, the lids half-closed, and the eyeballs rolled up. The person may show evidence of anxiety, distress, and restlessness; he may moan.

Death is a significant factor that conditions the thoughts, feelings, and actions of all individuals living in the twentieth century. A great variety of attitudes about death exist.

—Death is mysterious and caused by evil spirits and demons.

—Life is a tedious preparation for the glorious hereafter.

—Death is the end of the good life on earth.

—Death offers the possibility of salvation or new birth.

—Rituals enhance the meaning of death.

—Learning "how to die" is important.

—Dying is an intensely romantic experience.

—Death is the inability of the biological organism to live.

A person develops a concept of death. The young child denies death as a natural and final process. To him, death is like sleep. You are dead, then you are alive again. Death is similar to a journey. You are gone and then you come back again. Consequently, young children may seem to be rather callous toward death. They may express immediate sorrow but soon forget about it. The older child accepts the idea that a particular person has died. He does not accept death as something that eventually happens to everyone—particularly to him. By the age of nine or ten most children recognize death as inevitable for all persons and as something that can come to them. Most children accept biological death.

Intense feelings are often associated with "dying" for the teen-ager. Popular songs and expressions depict dying as the utmost in romantic self-sacrifice. The adolescent, however, begins to think about death in religious and philosophical terms; he ponders an afterlife. Death is somewhat of a mystery to the adolescent. The young adult affirms life! Death is an unpleasant fact that may end everything. In times of disaster or war, death may be a factual reality for the young adult; he often views death with a sense of hostility. The increasing incidence of illness makes the middle-aged adult more aware of death. His thoughts about death are in part responsible for feelings of depression that characterize this developmental stage. The middle-aged adult often views death with a sense of futility. The older person recognizes the nearness of death. His attitudes toward death parallel his attitudes toward life. The older person who remains future-oriented seems best equipped to die. The older person often shares his feelings and concerns about death with the clergy. Death remains an ever present possibility for the healthy as well as the long-term ill person in this twentieth-century war-torn, nuclear age.

A PSYCHOLOGY OF GRIEF REACTIONS[1]

Introduction

Little Johnny's pet dog, Rags, was hit by a car three days ago and was "put to sleep" by the veterinarian. For the last two nights Johnny has cried himself to sleep with Mom or Dad sitting by.

In every instance of grief reaction deep emotional feelings dominate. These grieving emotions are caused by the experience of loss. It may be the loss of a loved pet, a parent, or a series of losses.

For Johnny, the natural expression of loss and "licking of the wounds" has begun and will be worked out. For another person the working through of the pain may be delayed, blocked or distorted. These varied reactions produce different appearances for the same experience of loss. We want to explore these very evident grief reactions and also some mild, everyday grief reactions.

Four facts are important in the psychology of grief. First, grieving is a natural life experience. Next, the characteristics and stages of grief reactions can be identified. Third, some kinds of grief reactions call for special attention. Finally, this emotional process can be helped by an alert community and prepared congregation.

Natural Origins of the Grief Reaction

Grief is a deep and moving sense of loss. Grief reaction is a person's response to the loss. The type of grief reaction varies according to the personality of the person, the kind of loss, and the en-

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[1] By Donald W. Manthei, presented to the Adult Forum at Second Church, Newton, Massachusetts, November 9, 1969.

vironment and social setting. For example, a flexible personality reacts differently to losses of varying degrees of severity while a less mature personality reacts the same way to all feelings of loss. In addition, the people or circumstances surrounding the grieving person may help or may block the grieving process.

The grief process is based in personality development. The basic nature of human personality development which provides the foundation for the experience of grief is the twofold process by which we *first* develop a sense of selfhood apart from other persons and physical objects and *then* invest ourself in other persons and objects. For example, the infant first gratifies his own needs only to discover as his senses of sight, touch, and smell develop that there is a dimly perceived other person, the mothering person, who is answering his cries and fussing. This is the first awareness of the difference between self and the world. It is a very necessary distinction which continues to develop. The child at age two is still working on this sense of selfhood when he proclaims, "I wanna do it!" "This is mine!" "give it to me!" And in adolescence, as he interacts with persons of uniquely different backgrounds and appearances, he is still refining his selfhood—his identity.

Along the way of development the person is also involved in a second natural process—that of investing himself in things, persons and patterns of behavior that interest him, satisfy his needs and provide him with new hopes or challenges. For example, the infant becomes attached to the bottle or breast, to mother, to a toy or blanket, to father, to pets, to friends and to his house.

But, life brings still another experience—the loss of some of these loved objects, persons and things. The bottle is taken away. A sitter sometimes replaces Mommy. Father goes to work. Pets get lost or die. Friends get interested in other children. The family moves to a new house and neighborhood.

Although we usually think of death as loss which causes grief and mourning, these other losses bring similar reactions. We need to recognize the natural place of investment and loss in the life process. The anxieties of separations and perceived loss arise in many day-to-day events and during a significant period of transition. Often the lonely and depressed college student is one who as a child moved frequently or during a crucial time of peer group adjustment and thus lost the important peer group interaction. College provides a new challenge to reinvest himself, but frightened of yet another loss he is now unable to do so. He needs help in recognizing the opportunity before him and help in removing barriers to using his new chance.

For *children*, death, family moves, and separations are crucial. In *adolescence* a previous feeling of loss may be reactivated at a time of transition from high school to college or a job. The drag of the past loss makes the unknown of the future more frightening. For *adults* accidents, ill health or aging may cause feelings of loss of opportunity, property and abilities.

A grief reaction may be caused by a single significant event, several minor connected events or an unconnected accumulation of losses. A single loss might be the death of a loved one. An example of connected events is the loss of one's health or ability which leads to loss of job and then loss of income and security. A grief reaction may result from unconnected events such as the move of a friend, loss of important sale, and simultaneous accidents which disable one's car, home or a family member.

Description of the Grief Experience

Characteristic signs of grief reactions are feelings of pain, shock, anxiety and anger. In normal grief reactions these are openly felt and expressed: one flinches with pain, stands stunned, wonders what has happened, worries what will be next, and demands: "Why has this happened to me?" "It isn't fair!"

The briefest way we can describe grief is in six common stages.[1] These stages may appear in any sequence. The first four stages appear for several days or even a few weeks. They are related to the painful process of *disengaging* oneself from the lost person or object.

1. Shock—disbelief, "This is unreal." The state of shock may be for twenty minutes to an hour. Physical signs of shock are deep sighing, choking, dryness in the mouth and

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[1] Erich Lindemann. "Symptomatology and Management of Acute Grief," *The American Journal of Psychiatry*. CI (1944), pp. 141–49.

throat, sensations of emptiness, lack of power, and chill.

2. Emotional release—crying, moaning, rapid talking, flailing.
3. Isolation—feelings of loneliness, desires for withdrawal, depression. Common behavior involves recurrent complaint of physical symptoms; identifying with the deceased; and idealizing the lost person.
4. Guilt and anger—for example Mrs. A's reaction. Her husband died in heart surgery. Recently they had had a disagreement which she now recalls and feels guilty. "Did that contribute to his heart condition and his death?" she worries. Now people are taking over the funeral arrangements and she strikes out with anger at their "intrusion." Another person in the same situation may react with anger toward the lost person.

The release of feelings—all kinds, are important for letting go of the relationship which death has ended. The last two stages involve *reinvestment* in life without the loved one.

5. Return to routine—with the necessary changes.
6. Reinvestment—in new relationships and interests; new life with others.

Grief Reactions Requiring Attention

Normal grief work is open and expressed, providing both disengagement and reinvestment. By contrast abnormal grief reactions are defensive and attempt to cover the emotions, pain and sense of loss. The attempts to cover or forget grief seem to arise from fears of our own death which we do not want to face. (Reports from the experiences of the dying person would help our understanding at this point, but that is another topic and an important area for future discussion.)

The common forms of abnormal brief reactions are those that involve delay and distortion. (See the Lindemann article.) In delayed grief there is little or no reaction at the time of loss because it is blocked. Sometimes circumstances prevent the reaction of grief from being expressed. A college girl whose mother lost emotional control at grandmother's funeral found that trying "to help Mother" prevented the student herself from normal release of emotions.

Or a young married man called from a distance to his parent's home to handle father's funeral arrangements rushed to leave work and family. From the time he arrived before the funeral until he left the day after, he was busy with details. Then he rushed back to work and his own family. He had no time or opportunity to react.

Delay of a grief reaction may also be caused by *personality factors* which block expression. A common example is a stoic silence which denies the pain while professing that the deceased "would want us to be strong" and "to carry on." Such rationalization can thwart a natural emotional release and lead to an otherwise unexplainable physical illness. This delayed grief reaction brings us to the second major group of abnormal grief reactions.

Distorted grief reactions involve *over-reaction* or *under-reaction* to loss at the time of the loss or during the next several weeks. Signs of distortion are seen in over-reactions through excessive physical complaints, continued weeping, extreme guilt and hostility. Under-reaction may appear in neglect of self or tasks, loss of feeling and later result in depression.

These conditions call for professional help by the trained clergyman or therapist. The grieving person needs help in searching for the earlier cause of delay or distortion in reaction. Assistance through understanding, clarification and possibly instruction may help to resume the grief work.

Two cautions are relevant to us when we are in the presence of a mourning person. First, too many people who require the mourner's attention and alertness may repress and delay the grieving process. Second, persons may force denial on the mourner or cause distortion in his grief rection. A young college girl reported her "Frustration" in attempts to "cheer" her boyfriend who had just had his arm permanently crippled in an auto accident. A young minister tried to cheer a young woman whose father had died of cancer at the age of forty-five. His comforting picture was "The joyful Christian funeral" he attended for his own aged grandmother. Both are examples of uninformed "helpers."

Constructive Considerations

We must recognize that the emotions and behavior involved in grief reactions are *normal.*

This knowledge can help us understand what we may already have experienced as well as help us to see the "natural" in what we could wrongly be inclined to see as bizarre and unmentionable.

There are at least three further concerns to consider. Those who grieve need *assistance*, time for quiet to "lick their wounds," and later opportunity to talk it out. To facilitate these conditions we may offer various types of support through provision of food services and other necessities, opportunities for reinvestment in new relationships and special care for those with delayed or distorted reactions.

We also need to be concerned for *social conditions* which create a climate for undue loss—poverty, divorce, the lonely adult, etc.

Finally, we need to become prepared for emergencies and disasters. We have gathered valuable knowledge about the intense care of victims of major disaster. We need to share this knowledge so that "potential" victims can seek and use such care in sudden need. And we need to train more personnel in these skills of intensive care.

The grief process is part of an intense and natural emotional experience. It follows life's natural development: differentiation and investment of ourselves, the experience of loss which requires subsequent reinvestment of self.

Descriptions of the characteristics and stages of grief reactions help us place our reactions and the reaction of others in perspective. Examples of delayed and distorted reactions can alert us. And constructive considerations lead us to issues beyond the individual into the congregation and community.

COORDINATES WORK WITH THAT OF OTHER DEPARTMENTS

The nursing department coordinates patient care, 24-hours per day, seven days a week. The efforts of many other departments within the institution are necessary and important for patient care: dietary, housekeeping, physical and occupational therapy, social service. At one time most of these services were an integral part of nursing. Today the nurse does not actually scrub the floor, but she is concerned that the floor is clean. She may not cook the meal, but she is concerned with diet as well as the attractiveness of the tray and the patient's interest in eating.

Because so many different people, so many different departments, share patient care, coordination of work is necessary. Because nurses are acquainted with so many functions of the other departments and because they care for patients around the clock, patient care coordination has become an important nursing function. With the great increase in allied health personnel at all levels—professional, technical, and aide/assistant—patient care coordination is a very complex task.

Guidelines and policies for inter-department working together must be established and well-understood by the supervisors and directors of the departments involved. It should not be left for a nurses' aide and dietary aide to figure out on the spot the procedure for passing trays. Doris A. Geitgey, professor at the University of Washington and nursing leader, offers some practical suggestions on how to coordinate work with that of other departments in her book, *A Handbook for Head Nurses.*

SOME HINTS ON HOW TO IMPROVE RELATIONS WITH OTHER SERVICE DEPARTMENTS

Doctors: How to work with the medical staff.

a. Take the initiative in establishing friendly relations and mutual understandings with the house staff.
   - —Welcome the new doctor to your ward.
   - —Ask the resident physician and the interne how you can be of most assistance to them and then do your best to follow their requests.
   - —Try to meet the idiosyncrasies of the individual physician.
   - —Learn the physician's plan for the care of his patients.
   - —Encourage mutual planning for patient care.

- —Talk over your ward problems with your physicians.
- —Explain the nursing situation to your doctors: they will be more cooperative if they know about unusual difficulties.
- —Do your part as planned when mutual decisions have been reached.
- —Ask for a conference with your medical staff when important problems arise.
- —Encourage the patient's confidence in his physician.
- —Show your loyalty to your medical staff.

b. Follow the doctors' orders in a meticulous manner.
- —Accept orders cheerfully and without complaints.
- —Don't let orders accumulate; carry them out as quickly as possible.
- —Report to the doctor any inability to carry out his orders, and explain the reasons.
- —Encourage the doctor to write his orders according to hospital policy.

c. Keep the doctor informed on his patient's condition.
- —Notify doctors immediately upon the admission of their patients.
- —Report and read accurately the results of treatments.
- —Report all symptoms and reactions of their patients.

d. Make ward rounds with your doctors.
- —Establish a mutually agreeable time for rounds.
- —Take notes of any significant comments made by the doctors or the patients.
- —Have charts and other needed equipment ready for the doctors' use during rounds.
- —If you are unable to make rounds, assign a member of your staff to attend the doctors.

Laboratory Workers: How to assist personnel employed in diagnostic and clinical facilities.

a. Familiarize yourself with the functions of laboratory facilities and the ward's relations with them.

b. Prepare the patient correctly for diagnostic procedures.

c. See that the patient arrives at the laboratory at the correct time.

d. Arrange for the return of the patient to your ward when the test is completed.

e. If laboratory work is done on the ward, help the technician as much as possible.
- —Greet the technician in a friendly manner.
- —Locate the patient for him.
- —Be sure that the patient is ready for the test.

Nutritionists: How to cooperate with the dietary service.

a. Become familiar with the services provided by the dietary division.

b. Prepare the patients for their meals.

c. Request the number and type of diets necessary for your ward, but don't over-order.

d. Have requests in the proper form and on time.

e. Avoid wasting foods.

f. Ask for conferences as necessary to meet special problems.

g. Instruct your personnel in the matter of your patients' dietary requirements.

Social Service Workers: How to work with the medical social service department.

a. Know and inform your staff about the functions of the social service department.

b. Maintain a friendly, cooperative attitude towards the department.
- —Know and use the name of your medical social service worker.
- —Introduce new workers to your personnel.
- —Take new workers on a tour of your ward.
- —Explain any special functions of your ward.
- —Hold frequent, informal conferences with your worker.
- —Arrange for privacy for the worker and patient during interviews.

c. Accept the help which the medical social service worker can give you in understanding your patients.

d. Encourage your patients to talk with the social worker.

Clinic Personnel: How to link the hospital care of the patient with his out-patient care.

a. Inform yourself and your personnel of the responsibilities of the out-patient department.

b. Make out out-patient referral forms according to the policy of your hospital.

c. Prepare your patient for his first clinic visit.
   - —Tell him where the clinic is located.
   - —Inform him of the date and time of his appointment.
   - —If the appointment is made by another division, tell the patient how he will be notified of his appointment.
   - —If any charge is made by the out-patient clinic, explain the cost to your patient so he will be prepared to pay the amount if possible.
   - —Stress the importance of keeping the appointment.

Engineers: How to correlate your work with that of the maintenance department.

a. Learn what services the maintenance department provides.

b. Report any mechanical difficulty promptly.

c. Inform the engineer of the location of the trouble.

d. Give the engineers a chance to get to your ward; remember that they have many wards to service.

e. Be courteous and considerate; thank the engineer for his help.

Laundry Workers: How to get along with the linen supply service.

a. Avoid wasting linen.
   - —Use linens for their intended purposes (don't use bath towels for polishing shoes; avoid using good linen for cleaning rags; impress upon staff the importance of correct usage of linen supplies).
   - —Encourage personnel to use only the necessary amount of linen.

b. Avoid hoarding linen for a "rainy day."

c. Get linen orders in on time and in proper form.

d. Avoid ordering excessive amount of linen.

e. Gain an awareness of the problems of the laundry department and give due consideration to these problems.

f. Check the linen delivered with the amount ordered.

Druggists: How to stay on good terms with the pharmacy department.

a. Turn in drug orders correctly and at the right time.

b. Avoid ordering large amounts for delivery on the week-end.

c. Order sufficient drugs to meet your ward requirements, but don't overstock.

d. Follow directions of the pharmacy for the care of empty drug and solution bottles.

e. Eliminate as many "emergency" drug orders as you can.

SEEKS GUIDANCE AND ASSISTANCE WHEN PROBLEMS ARE BEYOND SCOPE

It is imperative that the LPN charge nurse comprehend her functions and qualifications as an LPN and as a charge nurse. The ability and necessity to seek guidance and assistance when problems arise that are beyond her scope are indications of wisdom, maturity, and leadership ability.

The LPN charge nurse is not a lone practitioner; she is an integral part of nursing. According to the *Statement of Functions and Qualifications*, in semi-complex and complex nursing situations a greater depth of knowledge and a higher level of judgment is required of the LPN; and a closer working relationship with, and the greater the degree of direction by, the autonomous health professional.

In a complex patient care situation, the LPN charge nurse should ask herself the following questions before seeking guidance and assistance:

1. Do the nursing needs of this particular patient indicate assistance from a health professional?

2. What are the components of the patient care situation?
3. Do I have the knowledge, skills and previous experience to handle this patient care situation alone?
4. What kind and how much assistance (direction) do I need? Is it available?

When a ward situation involving staff becomes complex, the LPN charge nurse should ask herself similar questions before seeking guidance and assistance:

1. Does this particular ward situation indicate assistance from a health professional?
2. What are the components of the ward situation?
3. Do I have the knowledge, skills and previous experience to handle this ward situation alone?
4. What kind and how much assistance (direction) do I need? Is it available?

The capable LPN charge nurse does not bother her superiors with problems that are within her prerogative to solve. In an attempt to avoid looking inadequate, the charge nurse should not avoid seeking professional help. Ask and answer the above questions with a complex patient care or ward situation arises. Seek help from a health professional when the situation truly demands.

PREPARES AND GIVES ORAL AND WRITTEN REPORTS ABOUT PATIENTS

Oral and written reports about patients between personnel on different tours of duty promote continuity of patient care. The LPN charge nurse gives a complete report on the condition of each patient to the nurse who will relieve her. She mentions special conditions and needs such as abnormal vital signs, pain, changes in general condition. She mentions any special treatments, medications, or events of the day. She comments on anything unusual in terms of the physical environment of the ward, changes in personnel assignments for the coming tour of duty, and special institution events.

Reports should be useful. It is important that the LPN charge nurse understand the *purpose* of a report. Frequently, both oral and written reports become "busy work," and this exercise proves to be a gross misuse of skilled nursing time. A good report should be accurate, concise, useful, and interesting. The LPN charge nurse achieves skill at preparing and giving oral and written reports through knowledge, practice, and experience.

STUDY ACTIVITIES

1. Review staff assignments for a particular tour of duty. What is the purpose of the "plan" or assignment routine? Just how were staff assigned?

2. What one ward plan or routine seems to work best? Why?

3. What one ward plan or routine poses the most problems? Why? How could you help change this situation?

4. Henry Jacobs, an elderly patient in room 303, develops severe respiratory distress. What do you do?

5. What directions would you give your staff in case of a fire on the ward?

6. What knowledges, skills, and attitudes do you believe are most important in caring for older patients? How do you share these with your staff?

7. What knowledges, skills, and attitudes do you believe are most important in caring for the patient with mental illness? How do you share these with your staff?

8. What knowledges, skills, and attitudes do you believe are most important in caring for the dying patient? How do you share these with your staff?

9. How can you and your staff help a patient and his family through a grief process?

10. Review patient care assignments for a particular tour of duty. On what basis did you "match" specific patients with certain staff? Did you use multiple assignments? When? How does your plan for patient care assignments reflect both patient needs and staff proficiencies?

11. What is the most difficult aspect of working with personnel from other departments? Why? How could you help change this situation?

12. What is the most satisfying aspect of working with personnel from other departments? Why?

13. Describe a ward situation in which you would seek guidance and assistance from the director of nursing.

14. Describe a ward situation in which you would seek guidance and assistance from a physician.

15. Describe a ward situation in which you would seek guidance and assistance from administration.

16. A new LPN charge nurse questions the time involved in preparing and giving oral and written reports about patients. "This is important," you state. Explain your statement.

Chapter 9

EVALUATING PATIENT CARE

The LPN charge nurse *evaluates patient care* for a specific tour of duty. To do this, she:

—applies basic principles of evaluation

—makes nursing round to observe and assess patient care and needs

—assesses patient care plans and modifies as necessary

—assesses patient care given by staff and guides appropriate changes

—appraises self-performance and plans improvement.

APPLIES BASIC PRINCIPLES OF EVALUATION

To evaluate something is to assess, measure, or determine its value or worth. A major responsibility of the LPN charge nurse is to evaluate patient care. Unfortunately, evaluation often becomes a time-consuming, meaningless activity. To be useful, evaluation (1) must be done in terms of criteria or standards, (2) it must lead to action, and (3) it should be positive.

Criteria are established and/or accepted standards. For example, you know in an adult the pulse rate varies from 60 to 100 beats per minute; the rhythm is regular; and the intensity is "full." If you count a patient's pulse and note the rate is 120 beats per minute, irregular and weak, this observation has *use* only when compared to the known standard or criterion for a normal pulse.

Criteria or standards are both external and internal. Most patient observations are compared with established (external) standards of what is normal: normal temperature, normal skin, normal urine, normal behavior, normal blood sugar, etc. Nursing policies and procedures are another example of external standards or guides for performance and evaluation. Internal criteria are personal achievement goals you set for yourself in terms of performance. Setting personal achievement goals is very important in self-development and personal growth.

Second, evaluation should lead to action. For example, the nurse who observed the fast, irregular, weak pulse *did something*. She acted. Depending on the exact nature of the patient situation, she may have reported the observation, charted it, called the physician, or given the prescribed medication. But, in any case, her evaluation led to action.

Third, evaluation should be positive. It is so easy to say, "don't do this," "this is wrong." People tend to repress negations. The exasperated LPN charge nurse says, "how many times have I told you that is the *wrong* way to move this patient." Because of this negative evaluation, the aide repressed the comment and continues to move the patient in the wrong way. How much better if the charge nurse had said, "Mary, may I show you a good way to move Mr. Thompson." This interaction is positive. Chances are the aide will correct her performance because the evaluation is positive.

MAKES NURSING ROUNDS TO OBSERVE AND ASSESS PATIENT CARE AND NEEDS

Nursing rounds at the beginning of a tour of duty is an organized way for the LPN charge nurse to observe patients and determine needs. During the tour of duty and most certainly at the end of the tour, the charge nurse again makes rounds to observe and assess patient care and needs. Evaluation of patient care and needs must be in terms of criteria or standards, it must lead to action, and it should be positive.

The Kardex and nursing care plans (goals and actions) can serve as criteria or standards against which the charge nurse compares patient care observations. The nurse must determine just *how* she will measure or assess goals and when a goal should be reached. It might prove useful to design a companion part to the nursing care plan to include REVIEW and ACHIEVEMENT. For example,

GOAL	ACTION	REVIEW	ACHIEVEMENT

These activities may become unconscious and routine for the experienced charge nurse as she makes her rounds.

Evaluation, patient care observations, should lead to action. The charge nurse reports the difficulty her staff had ambulating Mrs. Daniels; she suggests that P.M. staff might try to walk her following her pain medication. The charge nurse reports that Mr. Gray ate most of his noon meal when the tray was left with him for an hour; she obtained this privilege from the kitchen. She suggests that P.M. staff try to let Mr. Gray feed himself slowly over a long period of time. In both these examples, evaluation (patient care observation) led to action and was useful.

In general, a positive, affirmative approach proves more successful than negation. With conscious practice and experience, the LPN charge nurse can learn to communicate observations in a positive manner and her evaluations of patient care will become more useful.

ASSESSES PATIENT CARE PLANS AND MODIFIES AS NECESSARY

Nursing care plans should be useful. To keep a care plan useful necessitates on-going and periodic evaluation of the plan; revisions may prove necessary because a goal or action was inappropriate or because a goal has been achieved. Little and Carnevali comment about revising nursing care plans as follows:

> All of us like to believe that we do things well. Revision implies that our original work was not good enough. This could, in turn, lead to rejection of the planned care concept, because it gives overt evidence of our lack of perfection. In learning to write nursing care plans, as in learning to walk, our early efforts may tend to be clumsy. The difference is that babies are not deterred by the clumsiness of their first efforts; but adults, including nurses, expect a great deal of themselves; we are chagrined when we do not measure up.
>
> The mental processes and activities involved in planning, giving, and assessing nursing care are infinitely complex. It is reasonable to expect that we will be a long time in achieving a high level of skill in these activities. Physicians who have been prescribing therapy for their entire professional lives continue to encounter patient responses to treatment that vary from their predictions; and they, too, must revise their orders accordingly. So, we nurses also must expect to have both failures and successes. We must study and learn from each of them. When we succeed, we need to know why; when we fail, we also need to know why. Support from clinical research should help us to become increasingly successful in our nursing intervention, just as it has similarly served the medical profession.
>
> Despite knowledge, innovation always involves some risk. When you commit your deci-

sions to writing, as one does in the nursing care plan, you lay your judgments open to the scrutiny of others, and you assume professional responsibility for them. This rather lonely aspect of the nurse's role can be made less threatening if those in authority will acknowledge that there is risk in professional growth and will support—even encourage—their staff to stretch more vigorously so as to achieve their full potential in providing planned nursing care.[1]

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[1] Little and Carnevali, *Nursing Care Planning*, pp. 166–67.

ASSESSES PATIENT CARE GIVEN BY STAFF AND GUIDES APPROPRIATE CHANGES

The LPN charge nurse coordinates staff activities; she nurses her patients through her staff and she is responsible for staff guidance and development.

Staff evaluation should be on-going and periodic. If possible, it should be a shared responsibility between the individual staff member and the charge nurse. Both should understand and agree on the purpose and principles of evaluation. The manner of evaluation, the tool or report, should be clear.

Staff evaluation should be in terms of established criteria that are accessible, understood, and used by both staff and the charge nurse. To be useful, the evaluation should be positive and lead to action.

APPRAISES SELF-PERFORMANCE AND PLANS IMPROVEMENT

The LPN charge nurse is a recognized leader. Leadership in nursing necessitates continuing personal and vocational growth and development.

Your work performance will be evaluated by a superior. More important, however, will be the self-evaluation and self-improvement program you plan and institute for yourself. You may choose to increase your ability to lead others. You may try to develop more sureness in yourself—self-confidence. You may try to improve your relations with others. A specific goal may be to gain an understanding of your personnel.

Self-improvement may mean taking advantage of inservice programs at the institution, enrolling in nursing courses at neighboring colleges, or attending special program meetings of nursing organizations.

Self-improvement also includes ways you strive to be a more effective person on and off duty. Set and strive for personal and vocational goals in terms of self, friends, family, and community.

STUDY ACTIVITIES

1. Evaluation must be in terms of stated criteria or standards. What does this mean? Why is it important?

2. Evaluation should lead to action. What does this mean? Why is it important?

3. Evaluation should be positive. What does this mean? Why is it important?

4. In what ways can you, the LPN charge nurse, make nursing rounds useful?

5. Use the four nursing care plans you developed in chapter 6 and plan a way to assess and modify the plan. Add the following dimensions to each plan: REVIEW and ACHIEVEMENT.

REVIEW **ACHIEVEMENT**

REVIEW **ACHIEVEMENT**

REVIEW | ACHIEVEMENT

REVIEW | ACHIEVEMENT

6. Use the following evaluation format to evaluate (1) a high school student enrolled in a health occupations assistants' program, (2) a nurses' aide who has been employed three months, and (3) yourself, the LPN charge nurse.

If possible, explain the purpose and principles of evaluation to the high school student and to the nurses' aide and encourage them to participate in a self-evaluation. See if your immediate nursing supervisor will evaluate you. Then, compare and contrast observations in a face-to-face conference. Evaluation is to be useful. To be useful, it must be done in terms of stated criteria or standards, it must lead to action, and it should be positive.

Directions for use of evaluation format:

—Read stated criterion/standard (usually a specific job function).
—Recall a specific behavior as an example of the criterion/standard.
—Using the behavior example, assess competency in terms of stated criterion.
—Identify and indicate "strength" or "weakness" in the area.
—Offer action suggestions for improvement and professional development.

(Example) LPN charge nurse

Criteria	*Behavior Example*	*Strength/Weakness*	*Action Suggestion*
Complies with ward safety policies.	Am reluctant to prevent staff from smoking in washrooms.	Weakness	Determine reasons for policy and rule; talk with superior if reluctance continues
Continues to improve practitioner abilities	Attended one-day institute on "Meeting the Special Needs of the Ambulatory Patient"	Strength	Keep posted on professional programs and conferences and try to attend

HEALTH OCCUPATIONS ASSISTANT

Criteria	*Behavior Example*	*Strength/Weakness*	*Action Suggestion*
—Escorts patients (especially those in wheelchairs or who have physical disabilities)			
—Feeds patients			
—Makes Beds			
—Writes letters and reads to patients			
—Encourages patients in various activities and interests			
—Runs errands			
—Assists patients with personal hygiene			
—Assists with care of patient environment			
—Assists with passing patient nourishments			

NURSES' AIDE

Criteria	*Behavior Example*	*Strength/Weakness*	*Action Suggestion*
—Bathes, feeds, shaves, and dresses patients			
—Makes beds			
—Takes temperatures, pulse, respiration, and blood pressure			
—Gives enema to selected patients			
—Applies heat and cold locally			
—Collects specimens			
—Tests diabetic urines			
—Weighs, measures, and positions patients			
—Applies simple dressings and ointments			
—Helps patients in and out of bed			
—Helps admit, discharge, and transfer patients			
—Escorts patients to meals, activities, and appointments			
—Understands needs of patients who need long-term care			
—Encourages and motivates patients toward meaningful activities			
—Observes and reports changes in patients' condition and behavior			

LPN CHARGE NURSE

Criteria	*Behavior Example*	*Strength/Weakness*	*Action Suggestion*
1. Plans patient care			
—demonstrates awareness of the comprehensive nature of long-term care			
—understands the condition, needs, and therapeutic goals of each patient			

LPN CHARGE NURSE—continued

Criteria	*Behavior Example*	*Strength/Weakness*	*Action Suggestion*
—receives and interprets oral and written reports about patient care			
—makes nursing rounds to observe and determine patient needs			
—assists the physician with examinations and treatments			
—discusses patient care goals with physician, nursing supervisor, and staff			
—develops nursing care plans for individual patients			
2. Coordinates staff activities			
—exhibits an understanding of basic human behavior			
—demonstrates fundamental leadership techniques			
—uses management principles and procedures			
—communicates orally and non-orally			
—motivates staff to give skilled nursing care to all patients			
3. Implements patient care			
—develops plans to meet on-going needs of all patients			
—develops plans for common types of emergency situations			
—assigns personnel in terms of patient needs and staff proficiencies			
—helps staff care for patients with special needs			

LPN CHARGE NURSE—continued

Criteria	*Behavior Example*	*Strength/Weakness*	*Action Suggestion*
—coordinates work with that of other departments			
—seeks guidance and assistance when problems are beyond scope			
—prepares and gives verbal and written reports about patients			
4. Evaluates patient care			
—applies basic principles of evaluation			
—makes nursing round to observe and assess patient care and needs			
—assesses patient care plans and modifies as necessary			
—assesses patient care given by staff and guides appropriate changes			
—appraises self-performance and plans improvement			

Part III EDUCATIONAL RESOURCES

THE LPN AND LONG-TERM CARE

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AUDIO-VISUAL MATERIALS

(Note: Production data are included if the resource is more likely to be purchased, for example, a filmstrip or transparency. Descriptions only are included if the resource is more likely to be rented or borrowed and if the sources are varied, for example, a film.)

Aging (1963, black and white, 28 minutes)
Shows two elderly gentlemen playing cards; they reveal their attitudes toward life, loneliness, and the younger generation.

Ambulation Training of the Hemiplegic Patient (8mm sound/color). New York, Modern Talking Picture Service
Shows beginning ambulation training of the hemiplegic patient using a handy standy or a pick-up strap, according to the particular needs of the patient.

Basic Nursing Procedures (16 color filmstrips of approximately 50 frames each, script, records). New York, Blakiston-McGraw
Introduces and demonstrates principles and procedures basic for nursing action.

Basic Wheelchair Features and Handling (8mm color/sound). New York, Modern Talking Picture Service
Describes basic features needed in wheelchair suitable for person who can stand when getting into and out of it.

Bed to Wheelchair Transfer (8mm color/sound). New York, Modern Talking Picture Service
Shows step-by-step procedure for hemiplegic transfer.

Better Up Than Sorry (color/sound cartoon filmstrip). Hollywood, Harris-Tuchman
Shows good bedrail practice; shows good judgment and encourages consistent bedrail practice among all nursing personnel.

Body Mechanics (8mm color/sound). New York, Modern Talking Picture Service
Shows "dos" and "don'ts" of lifting techniques; emphasizes proper body mechanics to protect patient and aide.

Chronic Bronchitis and Emphysema (1965, color, 32 minutes)
Explains anatomical and functional abnormalities related to emphysema and bronchitis.

Critical Decades (1965, black and white, 31 minutes)
Shows how the family doctor can foster preventive attitudes in his patients; uses case history of a 66-year old woman with severe heart disease to show problems that arise from lack of medical attention during middle age.

Diabetes and Its Long Range Control (1961, color, 35 minutes)
Emphasizes likelihood of diagnostic and therapeutic management of diabetes; discusses diet, exercise, insulin, and oral drugs.

Diabetes and You (1960, color, 21 minutes)
Discusses symptoms of diabetes and importance of early detection.

Diabetes Unknown (black and white, 25 minutes)
Interviews with a variety of individuals with diabetes show how symptoms and treatment vary from person to person.

Diabetes—What You Don't Know Can Hurt You (1964, color, 27 minutes)
Discusses body processes involved in diabetes, its diagnosis and control.

Emphysema (1962, color, 15 minutes)
Describes emphysema in detail, showing case history of actual patient.

Exercises to Mobilize the Shoulder (8mm color/sound) New York, Modern Talking Picture Service
Shows exercises to preserve and restore range of motions of shoulder.

Fundamental Nursing Principles (159 transparencies, 90 overlays). Philadelphia, Lippincott.
Introduces principles basic for nursing action.

Fundamental Nursing Series (12 color/sound 8mm motion picture cartridge film loops, 12 Student Study Manuals, 12 Instructor's Guides). New York, Balkiston-McGraw.
Offers complete "package" to learn basic nursing procedures.

Fundamentals of Nursing (22 color 8mm film loops with Student Guide and Instructor's Guide). Philadelphia, Lippincott.
Offers a total learning kit for basic nursing.

Growing Up, Growing Older (1968, color, 9 minutes)
Traces life of one person from infancy to old age.

A Halo For a Cap (color/sound cartoon filmstrip). Hollywood, Harris-Tuchman.
Describes "do's" and "don'ts" of auxiliary volunteer.

The Hemiplegic Patient; Bed Positioning of the Acute

Patient (8mm color/sound). New York. Modern Talking Picture Service
Demonstrates muscle testing techniques to evaluate hemiplegic's ability to stand.

The Hemiplegic Patient; Passive Range of Motion (8mm color/sound). New York. Modern Talking Picture Service

Home Management of Disability of Arthritis (1964. black and white. 30 minutes)
Shows rehabilitation procedures for arthritis and similar diseases.

Homes That Care (1958. black and white. 30 minut[illegible]
Describes nursing homes and homes for the a[illegible] stresses treating patients as individuals.

Independent Ambulation and Elevation Activities of the Hemiplegic Patient (8mm sound/color). New York. Modern Talking Picture Service
Illustrates proper teaching methods as patient progresses with cane to curb, ramp. and stair climbing.

Medicare and You (color/sound cartoon filmstrip). Hollywood. Harris-Tuchman
Answers essential questions on Medicare—what it is, who gets it. who pays for it, how it works, what it covers.

More Than Food (1965. color. 23 minutes)
Emphasizes scope of importance of food service in nursing homes.

Mrs. Reynolds Needs a Nurse (1963, black and white, 38 minutes)
Urges nurses to meet emotional as well as physical needs of patients; shows positive and negative patient-staff relationships.

Orientation to the Use of Crutches (8mm sound/color) New York. Modern Talking Picture Service
Shows fitting of underarm crutches, the tripod principle and crutch walking. including stairs.

The Patient and Circulatory Disorders (54 transparencies with 99 overlays, Instructor's Guide). Philadelphia. Lippincott.
Includes learnings about normal anatomy and physiology, special tests and procedures, and the patient and coronary disease.

The Patient and Fluid Balance (64 transparencies with 158 overlays. Instructor's Guide). Philadelphia, Lippincott.
Includes information about the state of equilibrium, disequilibrium. and fluid therapy.

Remotivation: A New Technique for the Psychiatric Aide (1958, black and white, 24 minutes)
Describes the remotivation technique for increasing a patient's meaningful appreciation of his environment and his heightened activity in it.

Still Going Places (1955. black and white. 40 minutes)
Describes active therapy program for older people.

Stroke: Early Restorative Measures in Your Hospital (1962. color. 20 minutes)
Motivates physicians. nurses and hospitals to employ early rehabilitation services for stroke patients.

Stroke Patient Comes Home (1964. series of six films. black and white. each 28 minutes)
Includes information about (1) getting around. (2) learning self-reliance. (3) physical well-being. (4) returning to the community. (5) understanding his illness.

Take 2 and See (color/sound cartoon filmstrip). Hollywood, Harris-Tuchman
Illustrates necessity of correlating patient's name and hospital number with orders.

Technique for Propelling Standard Wheelchair by Hemiplegic Patient (8mm color/sound). New York, Modern Talking Picture Service
Demonstrates manner to teach hemiplegic to use a wheelchair.

There is a Way (1960. black and white, 25 minutes)
Demonstrates patient training in bowel and bladder control following a stroke.

Three Grandmothers (1963. black and white, 28 minutes)
Compares and contrasts role of grandmothers in Nigeria. Brazil. and Canada.

TLC—Tend with Legal Care (color/sound cartoon filmstrip). Hollywood, Harris-Tuchman
Describes correct charting. safety precautions, handling orders. correct patient identification, unethical criticism.

To Live Till You Die (black and white. 60 minutes)
Contrasts western points of view concerning the aged; examples from Sweden and Italy.

Transferring From Wheelchair to Bed with Maximal Assistance (8mm sound/color). New York, Modern Talking Picture Service
Shows safest and easiest way to transfer from wheelchair to bed.

Within the Quiet Zone (color/sound cartoon filmstrip). Hollywood, Harris-Tuchman
Explains costs of hospital care in a frank and meaningful manner.

Yellow Leaf (1957, black and white, 27 minutes)
Depicts pressing problem of older people finding satisfactory living arrangements and adjusting to living in a home for the aged.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1972 720-594/790

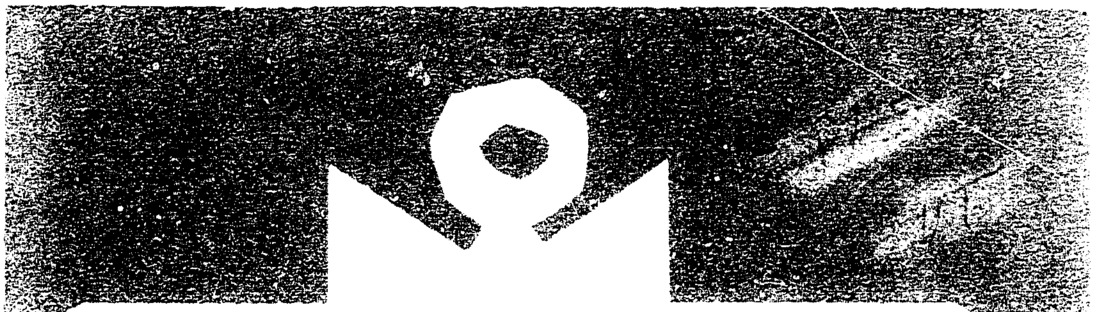
VT 016 645

NURSING CARE OF PATIENTS WITH INTERNAL OR EXTERNAL PACEMAKERS. A NURSING CLINICAL CONFERENCE.

PUBLIC HEALTH SERVICE (DHEW), ARLINGTON, VA.
DIV. OF NURSING.
MF AVAILABLE IN VT-ERIC SET.
DHEW-PUB-NIH-72-226
SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT
PRINTING OFFICE, WASHINGTON, D.C. 20402
($.15)
PUB DATE - MAR72 24P.

DESCRIPTORS - *CONFERENCE REPORTS; NURSES; *LABORATORY TECHNIQUES; *MEDICAL TREATMENT; SCIENTIFIC RESEARCH; *NURSING; *CLINICAL EXPERIENCE

ABSTRACT - PRESENTED ARE THE PROCEEDINGS OF A CLINICAL NURSING CONFERENCE HELD TO KEEP PERSONNEL IN THE FIELD ABREAST OF RECENT RESEARCH STUDIES ON PROBLEMS ENCOUNTERED IN NURSING CARE. ACQUAINTING MEMBERS WITH NEW TREATMENT TECHNIQUES BEING DEVELOPED IS ANOTHER FUNCTION OF THESE CONFERENCES. THIS PARTICULAR SERIES OF MEETINGS FOCUSED ON THE CARE OF PATIENTS WITH ARTIFICIAL CARDIAC PACEMAKERS. EXPLANATIONS OF THE PROCEDURE FOR USING THESE INSTRUMENTS AS WELL AS THE CONDITIONS UNDER WHICH THEY MIGHT BE USED WERE GIVEN. PHOTOGRAPHS ILLUSTRATE THE EQUIPMENT DISCUSSED AND A LIST OF REFERENCES ARE INCLUDED. (SN)



Nursing Care of Patients with Internal or External Pacemakers

A Nursing Clinical Conference
presented by
the Nursing Department
of the
Clinical Center
National Institutes of Health

Introduction

Clinical Nursing Conferences are an important part of the continuing education program at the Clinical Center, the research hospital of the National Institutes of Health.

During the year, each of the eight Nursing Services conducts a conference to describe significant nursing care cases and procedures. These conferences enable members of the Clinical Center's nursing staff to keep informed of many research studies and to study a wide range of nursing care problems. The edited proceedings of these conferences are now being published so they may be useful to a wide audience. This program was presented by the Heart Nursing Service, Jean Brotslow, R.N., B.S., Chief.

LOUISE C. ANDERSON, R.N., M. Ed.
Chief, Nursing Department
The Clinical Center

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NURSING CARE OF PATIENTS WITH INTERNAL OR EXTERNAL PACEMAKERS

BARBARA BOWMAN, R.N.
Head Nurse, Nursing Unit 6 West

Introduction

I would like to welcome you on behalf of the 6 West Nursing Staff to our nursing care conference on cardiac pacemakers. The world in which we live has a "catchword" to which we attribute most of what we characterize as progress and for which we blame most of our problems. That word is technology. To most of us it means a mixture of laboratories, computers and machines. overlaid with our emotional response to change. It is even difficult to remember that, ideally at least, technological advances may benefit people. The nursing staff on 6 West will discuss one medical advance which is the offspring of cooperation between medicine and technology and which requires new nursing skills that have been developed. We hope to clear up some of the mystery surrounding cardiac pacemakers.

Miss Elizabeth Ewing will present the history and development of pacemakers.

ELIZABETH EWING, R.N.
Clinical Nurse, Nursing Unit 6 West

Artificial Cardiac Pacemakers—History and Development

Today anyone picking up a copy of the daily newspaper may come across references to the cardiac pacemaker used to prolong the life of former President Eisenhower or to the battery change needed by one of the Supreme Court justices to maintain the functioning of his pacemaker. Articles in the popular press have made "pacemaker," meaning "artificial cardiac pacemaker," so common a word that it may be difficult to realize that artificial cardiac pacemakers have been used clinically for only 18 years.

Disorders of the heart beat, in particular the association of a very slow pulse with fainting attacks, were described by eighteenth century physicians, but significant work on the conduction system of the heart was not done until late in the nineteenth century. The sino-atrial node, the natural pacemaker or normal site of the initiation of the electrical stimulus to the heart, was named and described in 1907. Even though the conduction system of the heart was poorly understood at the time, electrical stimulation of the heart was attempted as early as 1819. In 1952 Paul M. Zoll successfully restarted an arrested human heart by means of electrical stimulation through the chest wall. While his method was subsequently used primarily for resuscitation, it was recognized as potentially useful for patients with heart block. Some patients with heart block suffer from Stokes-Adams attacks, a syndrome whose life-threatening nature was impetus to Zoll and other pioneers in the field of artificial pacemakers to develop practical methods of providing continuous pacing stimuli on a permanent basis.

Stokes-Adams seizures occur during transition from partial to complete atrio-ventricular heart block and during periods of complete atrio-ventricular (A-V) block. The seizures as originally described by Stokes in 1856 consist of intermittent transient episodes of unconsciousness and/or convulsions in patients with slow heart rates. "In a broad sense these seizures may result from any alteration in cardiac mechanism which results in a sudden drastic reduction in the cardiac output and consequently in the cerebral flow, e.g., following the sudden onset of a very slow heart rate or marked acceleration of the heart beat. Essentially, the fainting attacks and convulsive seizures which typify this syndrome are due to failure of the brain to receive an adequate blood supply for a period of three to nine seconds, or longer." (1)

Stokes-Adams seizures may occur spontaneously but they are frequently precipitated by emotion and excitement. Onset of acidosis and/or increase in serum potassium are some of the other factors that may bring on Stokes-Adams attacks. Medical therapy for these attacks is frequently inadequate and often ineffective. It is not surprising, then, that Zoll, two years after he restored circulation in patients with complete heart block by using externally applied electrical shocks, reported on the use of this method in several patients with acute Stokes-Adams attacks. It should be made clear that this early form of pacing was external, with the electrodes applied to the external surface of the chest wall.

"The incidence of heart block and Stokes-Adams seizures in this country has been estimated at 25,000 to 30,000 cases annually, or approximately equal to that of congenital heart defects. Coupled with this incidence is a high mortality rate which, in the pre-pacemaker era, probably exceeded 50% within a year of the first attack. Although the precise effect of long-term pacing on this formidable mortality is unknown, data from various series of patients suggests that, at the very least, average survival times have been doubled by artificial cardiac pacing despite the disappointing frequency of failures and imperfections in early pacing systems. Recent studies indicate that the one-year 50% mortality rate of medically managed acquired heart block has been reduced to about 12% through the application of pacemaker therapy. Of course, mortality data cannot communicate the anxiety and misery of the patient subject to unpredictable attacks of unconsciousness and convulsions." (2)

During the years following Zoll's initial efforts, open heart surgery became practical. As more complex problems were corrected it was apparent that surgical heart block was a serious and significant problem. In some instances surgical block was a transient problem, but the mortality of permanent surgical heart block was a compelling factor in the continued development of pacemakers.(3) Before Dr. Zoll's pioneering effort could be parlayed by other investigators into systems capable of providing pacing stimuli for prolonged periods of months and years, practical methods of placing pacer electrodes in direct contact with the heart had to be devised. Such a development would lower voltage requirements to between 1.5 and 15 volts (as compared to 75 to 150 volts required by Zoll's external pacer), a stimulus strength too weak to be detected by the patient, and it was a prerequisite to the development of highly portable and even completely implantable pacemakers.

In 1957, spurred by the impetus of surgically produced heart block, Dr. William L. Weirich, Dr. Vincent Gott, and Dr. C. Walton Lillehei at the University of Minnesota School of Medicine demonstrated the clinical feasibility of direct electrical stimulation of the myocardium, via wire leads inserted through the chest. Of course, electrodes could be inserted through the open chest if the need for them arose during surgery. But the Minnesota technique provided a practical method of inserting myocardial electrodes in post-surgical and non-surgical patients as well, by piercing the chest wall with a hollow needle through which an electrode is passed and the needle subsequently withdrawn. When later used with external or implantable pacers, myocardial electrode emplacement proved to be a highly valuable method and with many modifications, is still widely used.

However, early difficulties gave impetus to the exploration of other approaches to the heart. In 1959, Seymour Furman and co-workers at Montefiore Hospital and Medical Center, Bronx, New York, demonstrated the feasibility of long term stimulation of the right ventricular endocardial surface by a unipolar electrode catheter passed into the right ventricle by way of the jugular vein. Although the method leads to occasional perforation of the heart wall and carries the potential hazard of blood clot formation on the intravascular electrode, many medical teams are convinced that the transvenous method is safer and more reliable than the use of myocardial electrodes.

Electrode dislodgement or breakage, which occurred occasionally in earlier studies, was virtually eliminated by modification of technique and changes in electrode design. The long-term success of transvenous pacing is attributed largely to the fact that the electrode rests against the inside of the heart wall (endocardium) where it is apparently subjected to less stress from heart motion.(2) Other recent accomplishments in the field of electrode design and emplacement include the use of electrodes made of, or tipped by, platinum to avoid corrosion and tissue reaction: and the implantation in children who require permanent pacing of a plastic bag containing an extra length of electrode wire that uncoils as the child grows.(2)

In the same year (1957) that direct myocardial pacing electrodes were first inserted through the chest wall by University of Minnesota surgeons, the same research team collaborated with a group of electronics engineers to devise the first truly portable external pacemaker. Basically, the same type of pacemaker is still used for emergency and/or temporary pacing. The new portable device was, however, far from ideal for long-term pacing, although some patients were maintained successfully with it for a year or two. A major problem was the entry of infectious organisms via the exteriorized electrode lead wires. This problem was eliminated by a radio frequency pacemaker developed at Yale University and used clinically for the first time in 1959. Difficulties in maintaining proper alignment between the external antenna and implanted receiver, and problems with outside factors interfering with the radiosignal, together with the desire to eliminate all external components, led in 1960 to clinical use of the first completely implantable pacemaker system. This was the original Chardack-Greatbatch pacemaker.

One recently developed type of pacemaker being used clinically is the "demand" or "standby" pacemaker. This unit is designed to eliminate competition between spontaneous heart beats and pacemaker-induced beats that result in dangerous arrhythmias. Another advance is the design of a unit with two batteries. If one fails, the other will take over and maintain pacemaker function.

After a review of the conduction system of the heart, Miss Alexander will discuss several types of electrodes and pacemaker units.

MARY ALEXANDER, R.N.
Head Nurse, Surgical Nursing Service

Normal Conduction and Pacemakers

Pathway of conduction

The natural pacemaker of the heart is most commonly referred to as the S.A. or sino-atrial node. Grossly the sino-atrial node is located near the junction of the superior vena cava and the right atrium. This node is composed of specialized cells with the capability of rhythmic electrical excitation and impulse formation. It is uncertain whether the major conduction from the sino-atrial node to the atrioventricular (A-V) node occurs through special conducting fibers or bands, or whether it occurs generally through the atrial musculature. This node discharges at a rate of 60 to 100 pulsations per minute. As the S.A. node discharges, the electrical impulse gives rise to the P wave. Even though the S.A. node controls the heart rate, all areas of the myocardium have the potential to serve in this capacity but do so only under abnormal conditions.

The next structure in the pathway of conduction is the A-V node which is located at the base of the interatrial septum. The Bundle of His is a continuation of the specialized conduction system from the A-V node. It begins at the anterior margin of the A-V node and crosses the junction of the interatrial and interventricular septums. This divides into two bundle branches.

As the electrical wave crosses the A-V nodes and the Bundle of His and starts down the bundle branches, the first part of the QRS con[illegible] inscribed on the electrocardi[illegible] The QRS complex is completed as the electrical wave travels down the remaining bundle branches and spreads through the Purkinje's fibers, distributing the excitation throughout the subendocardium, endocardium, and myocardium. A period of relaxation or repolarization follows and the cells in the ventricles re-establish their membrane potential. In this period, the T wave is inscribed on the electrocardiograph.

Arrhythmias

Disease (congenital or acquired), trauma, degeneration, or drug toxicity may alter or interrupt the normal pathway of conduction. If this occurs a cardiac arrhythmia may exist. An arrhythmia describes disturbances in rate, rhythm, and/or conduction. In some instances a cardiac pacemaker may be used to correct an arrhythmia.

We'll start our discussion of arrhythmias with the atrial arrhythmias, discussing only those a pacemaker might be able to correct.

Sino-atrial bradycardia is an atrial arrhythmia of the sino-atrial node. The sinus impulses are slowed by disease or drug toxicity to a rate below 60 per minute. A slow rate will permit interruptions in the normal pathway of conduction by an ectopic focus known as a premature ventricular beat. If this

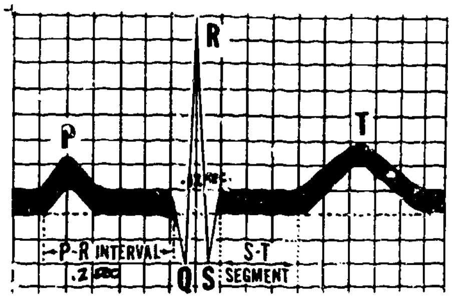

Figure 1, a rhythm strip of the electrocardiogram shows not only a normal sequence of events, but also a normal timing period for these events. The P-R interval which starts at the beginning of the P wave and continues until the beginning of the R wave takes approximately 0.2 seconds. The QRS complex following the P-R interval takes approximately 0.12 seconds.

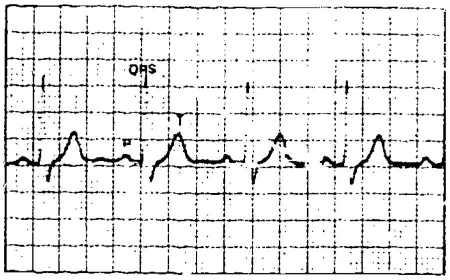

Figure 2 shows a strip of normal sinus rhythm. The P wave occurs at regular intervals and every P wave is followed by a QRS complex. All P waves and all QRS complexes have the same configurations and contours.

ectopic focus becomes strong enough ventricular tachycardia or ventricular fibrillation may occur. A pacemaker may be employed to prevent these undesirable arrhythmias. It should be noted that sinus bradycardia may be a perfectly normal state in some individuals and should not be treated. If it is not a normal state, drug therapy may be instituted to bring the rate back to normal. If drugs are ineffective, pacing may be instituted to sustain cardiac output until the drug effect wears off or until circulation improves. On the electrocardiogram the rhythm and conduction are normal, but the rate is slow.

Another atrial arrhythmia is sino-atrial arrest. This arrhythmia occurs because no impulses are formed in the S.A. node. The cause may be drug toxicity or an interruption of the blood flowing to the S.A. node. Although ectopic focus takes over the pacemaker function, it can lead to undesirable arrhythmia. The incidence of sino-atrial arrest is rare, but if it occurs frequently pacing may be instituted until the drug effect wears off or until circulation improves. As suggested by the title of this arrhythmia, sino-atrial arrest shows complete absence of atrial activity—the P wave is completely absent. The QRS may or may not be present depending upon the origin of the ventricular pacemaker impulses. S-T segment may or may not be present.

Next there are the arrhythmias caused by malfunction of the A-V node. Because the cells of the atrioventricular node function as tissue of transmission when disease, degeneration, or toxicity occur, these cells will transmit the impulses slowly or not at all. Thus, some degree of A-V block will occur.

There are three types or degrees of A-V block.

In first-degree A-V block, all sinus impulses reach the ventricles but take longer to get there. The electrocardiograph shows a prolonged P-R interval (longer than 0.2 seconds). This interval is constant.

In second-degree block, some sinus impulses reach the ventricles. Some have a fixed P-R interval and some have a changing P-R interval. Those having a fixed P-R interval may exhibit ratios of 2:1, 8:1, or 3:2, but the interval will be constant. Those having a changing P-R interval, known as the Wenckebach phenomenon, may exhibit a ratio of 2:1 for a period of time, then 3:1, then back to 2:1 This phenomenon occurs most frequently and is characterized as follows: Diseased nodal tissues fatigue quickly. Each impulse fatigues those tissues further and consequently each impulse is transmitted more slowly. The P-R interval becomes longer each time until the node ceases to transmit. This period of non-transmission rests the cells and they are ready to start all over again.

A pacing electrode is rarely inserted for a first- or second-degree A-V block. However, it may be considered if the patient has had a posterior myocardial infarction and a greater degree of block is anticipated.

Complete heart block, the third type of A-V block, is the ultimate stage of disease of the A-V node. The A-V node ceases to function. Life is maintained by an ectopic pacemaker in the Bundle of His or the ventricles. The EKG shows that the atrial and ventricular rates are different—the atrial rate is fast and the ventricular rate is slow and irregular. There is no consistent relationship between P waves and QRS complexes.

A complete heart block is a prime indication for pacing. It prevents retarded cardiac output and slow rates which allow interruption by premature ventricular contraction (PVC's), leading to ventricular tachycardia (VT) and ventricular fibrillation (VF).

In the bundle branch block, the block occurs below the A-V bundle and can progress to bilateral bundle branch block. Because the impulses cannot complete the normal pathway they must travel through the ventricles. On the EKG the ventricular complexes appear wide and bizarre. The indications for a pacemaker are the same as those for an A-V block.

I now direct your attention to the ventricular arrhythmias, first looking at PVC's. In this condition an irritable ventricular focus overtakes sinus impulses and causes a premature ventricular beat on the EKG. No P wave precedes them. The PVC's appear wide and bizarre on the EKG.

Ventricular beats arising from different foci have different contours. If a slow ventricular rate exists and PVC's occur, a pacemaker may be used to prevent ventricular tachycardia, a run of PVC's. The rate of these contractions is 150 per minute and regular on the [illegible] The ventricular complexes ap[illegible] wide and bizarre; no P waves are present. A pacing electrode may be used to pace at a greater rate, thereby preventing interruption by ectopic focus. This is a last measure type treatment and is not always effective.

Pacemakers may be used for patients with mild forms of heart block who are to undergo general anesthesia. This increases their predisposition to development of tachy-arrhythmias and ventricular asystole. The pacemaker maintains regular heart rhythm while the patient is anesthetized and may be removed within a few hours or, at the most, a few days following the procedure.

Because of the anatomical location of the conduction system, patients requiring surgery for low atrial septal defects, high ventricular septal defects, and aortic and mitral valvular surgery may be candidates for surgically induced block. Complications such as trauma or edema from sutures may create a temporary or permanent blockage of sinus impulses. Patients who have their mitral and tricuspid valves replaced have a pacing electrode placed on the ventricle during surgery because the poppettes of the prosthetic valves may injure the conduction system.

After the arrhythmia has been diagnosed and the need for pacing has been determined, a method of pacing must be selected.

Methods of pacing

The fixed-rate asynchronous pacing method stimulates the ventricle at a preset, constant rate. Patients having a sinus bradycardia or second- or third-degree block may be candidates for this method. The adjustable-rate asynchronous method has a range of rates which can be varied by the physician to meet the specific needs of the patient. It is unusual for patients with these types of pacemakers to convert to normal sinus rhythm. However, when this occurs, competition between the pacemaker and the patient's rhythm exists. The pacemaker may then be removed.

Synchronous pacing is designed to stimulate the ventricles in response to signals from the atria. It acts as the A-V conduction system, paces the ventricles continuously, and is responsive to the atrial stimulus in a pre-set range. This method can produce 10 to 20% increase in cardiac output. This pacemaker is often preferred for patients who are younger, are more active, and have a healthy S.A. rhythm, but have complete heart block.

A final method of pacing is "standby" or "demand" pacing. It is used for patients who do not have a fixed block, but develop bradycardia or asystole. When the patient does not trigger his own impulse, this unit discharges, thereby triggering an impulse.

Once the pacing method is determined, the next step is to determine if the patient needs a temporary (external) or permanent (internal) pacemaker. The types of electrodes and approach for insertion or placement of the electrodes must also be determined. There are many electrodes and pacemakers on the market, each having advantages and disadvantages.

Types of pacemakers and electrodes

I shall now discuss available electrodes and how they are used starting with the external units.

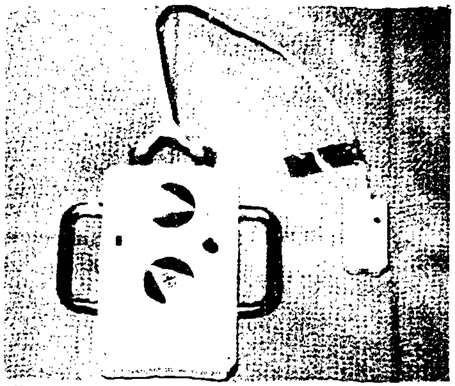

Figure 3. The Medtronic 5800 asynchronous adjustable rate pacemaker.

Figure 3 shows a Medtronic 5800 asynchronous adjustable rate pacemaker. If a patient has a temporary pacing electrode on the heart, this unit is used in the operating room and is returned to the nursing unit with him. If a temporary pacing electrode is inserted while on the unit, this pacemaker is used. It contains a connection for pacing cable, rate and amplitude control, on-off switch and signal light.

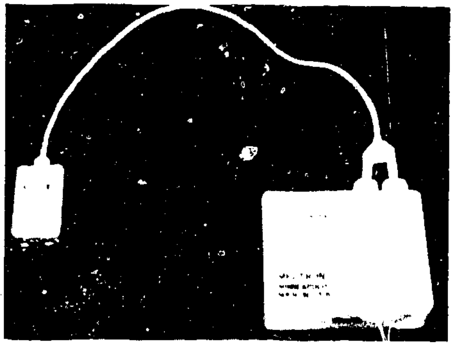

Figure 4. The Medtronic Pacett.

The Medtronic Pacette shown in Figure 4 works the same as the Medtronic 5800, but is lightweight and may be preferred for children. The Medtronic demand pacemaker is similar to the asynchronous adjustable rate pacemaker.

Several different types of electrodes can be used with these units.

The University of Minnesota myocardial electrode has a connecting end for the positive and negative attachments to the external unit and an atramatic needle attached. It is sewn to the heart with minimal trauma. (See Figure 5.)

Another type, the transvenous endocardial catheter electrode, is inserted through the brachial vein and passed to the right ventricle with the aid of fluoroscopy. With this type of electrode the patient can be paced temporarily without having a thoractomy.

The Chardack-Greatbatch pacemaker shown in Figure 6 may be used if the patient requires a permanent implantable pacemaker.

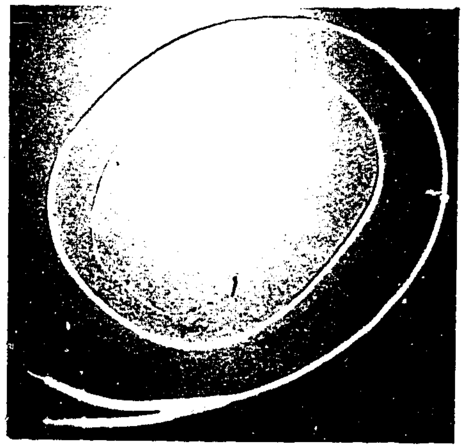

Figure 5. The University of Minnesota myocardial electrode.

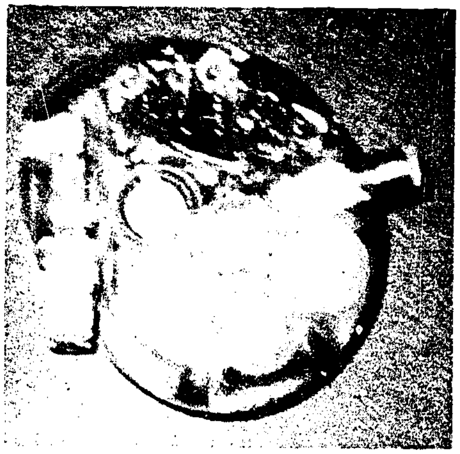

Figure 6. A pacemaker of this type (Chardack-Greatbatch) may be used if the patient requires a permanent implantable pacemaker.

There are several types of electrodes that may be selected to transmit the impulses from the generator. One is the helical spring electrode. To use this type, a thoractomy incision is made and the ends of the leads are placed into the heart muscle. The other ends are then passed through a tunnel to the implantation site (usually the abdomen) and connected to the implantable unit.

Another type of electrode, used with permanent pacemakers, is a transvenous endocardial electrode. (See Figure 7.) It is placed through the internal or external jugular vein and passed into the apex of the right ventricle. It catches in tuberculi so it doesn't float free in the ventricle. The ends are tunneled through subcutaneous tissue to the area under the clavicle and connected to the implantable unit.

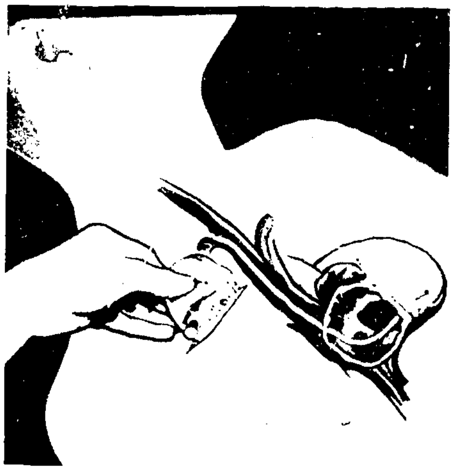

Figure 7. The transvenous endocardial electrode used with permanent pacemakers.

To review, we have touched on the natural pathway of conduction, the natural pacemaker (that is, the S.A. node) discharging electrical energy to the A-V node, the Bundle of His, bundle branches, and the Purkinje's fibers. Disease, injury, or drug toxicity can disturb this pathway causing alteration in rate, rhythm, and/or conduction. This disturbance can result in arrhythmias. For some of these arrhythmias a pacemaker may be used to sustain cardiac output. These arrhythmias are sinus bradycardia, sinus arrest, various degrees of A-V block or bundle branch block, PVC's, and ventricular tachycardia. The methods of pacing discussed were demand, synchronous, fixed-rate asynchronous, and adjustable-rate asynchronous. The last two are the most commonly used.

The type of pacemaker, method of pacing, and type of electrode are selected by the physician. The nurse should be familiar with the patient's diagnosis, methods of pacing, pacing equipment available at the institution, and which electrodes and leads should be used together. Patients are keenly aware that their life is dependent upon the pacemaker and require considerable support to maintain confidence in the pacing unit. The nurse can offer support more effectively if she is familiar with the equipment.

Miss Patricia McIntire will now discuss nursing care of a patient with a temporary pacing electrode and an external pacemaker.

PATRICIA MC INTIRE, R.N.
Clinical Nurse, Nursing Unit 6 West

Nursing Care of Patients With External Pacemakers

Alert, observant, and knowledgeable personnel are necessary in order to effectively care for patients who have or who might require pacing wires and external pacemakers. I would like to present the nurse's responsibility in caring for such patients on a nursing unit.

The patient may return to the unit following surgery where internal pacing wires have been inserted as a prophylactic measure. A pacemaker box always returns with the patient and is kept at the bedside easily accessible and in full view in case heart block occurs and attachment to the pacemaker box becomes necessary. The external portion of the myocardial wire is secured at the skin insertion site with a suture and covered with a dry sterile dressing leaving the electrode tips exposed in order that they might be quickly attached to the pacemaker box. It is wise to label the dressing "pacing wires" to prevent their being accidentally pulled out. Sometimes there may be a small amount of drainage around the wires. After consulting with the physician the nurse may be responsible for changing the dressing in which case she will use sterile technique to prevent the introduction of bacteria which could lead to infection. An antibiotic ointment is frequently applied at the skin insertion site. The prophylactic wires are left in place until such time that the physician is confident that heart block will not occur. He may then decide to remove the wire. This is rather easily accomplished by giving the wire a gentle tug. If heart block occurs in the operating room and persists the patient will return with the pacing wire attached to an external pacemaker box. The pacemaker has an off-on switch. The nurse should be cognizant of the fact that this is the off-on switch. A visual indicator of the pacemaker output is provided by the light meter. An apical pulse should be counted with the light rate on the box. When the count of the patient rate and the light rate are identical, the patient is pacing 1 to 1. This is the desired pattern.

There are two other possible ways of detecting whether or not the patient is pacing 1:1—either by cardiac monitor or EKG strip. On 6 West the nurses are permitted to run a lead II rhythm strip which is one lead of a possible 12 lead EKG. On the EKG strip the pacing artifact consistently appears as a fine broken line before each QRS complex. This picture would also appear on the slope of the cardiac monitor. The rate control sets the patient's pulse rate. For example, if the set rate is 80, then the patient's apical pulse should be 80. The upper dial labeled MA regulates the amplitude, the amount of electrical current the myocardium is receiving. A piece of clear plastic tape should be placed over both dials so that they will not be inadvertently moved. The electrode tips are attached to the positive and negative terminals located on top of the pacemaker box. The connection between the two should be snug to prevent the electrode tips from slipping. Handles are provided for securing the pacemaker to the patient or other support. The battery compartment contains a powerful mercury battery with a service life of more than 500 hours. An extra battery and screw driver should be kept at the patient's bedside in case of battery failure. The date of the battery change should be noted on the pacemaker box.

In the preceding discussion I have related the desirable approach in the treatment of heart block. Unfortunately, cardiac arrest and various blocks can occur on the nursing unit necessitating emergency bedside insertion of pacing wires. When a complete heart block occurs on the nursing unit, the nurse may observe that the patient exhibits syncope and convulsions which occur due to an inadequate cerebral circulation, characterizing the Stokes-Adams Syndrone. This may be followed by a slow rhythm having its origin in the A-V node or the ventricle, or no rate at all.

The responsibility of the nurse in this situation is to gather equipment, assist the physician, and reassure the patient if he is conscious. Therefore the nurse must know where to readily obtain the equipment. The heart wire, alligator clip, and 17 gauge needle are the items necessary to establish pacing at the bedside. Naturally the pacing wire is attached by way of the alligator clip to the pacemaker box itself.

In the nursing care of patients with external pacemakers it is very important to prevent pull on the pacing wires. If a patient is on bed rest the external box may be taped to the patient's arm or abdomen. Care should be taken not to excoriate the skin. This can be prevented by placing 4 x 4's under the box. Another way of securing the box when a patient is confined to bed is to put tapes through the handles of the box and pin it to the bed linen. If a patient is ambulatory he should be provided with belt or jacket. The belt holds the external box at the waist and can be obtained from the OR. The jacket has a pocket in which the box rests, is sleeveless, has a velcro closing in the front or back, and can be worn under outer garments. At NIH we are fortunate to have these jackets designed and made to fit each patient. This is done by a special section of the laundry.

Nursing staff members must be cognizant of complications that can arise in patients who have external pacemakers. If the apical pulse should decrease and the patient is not pacing 1:1 with the pacemaker, this could indicate either battery failure, dislodgement of the electrode from the heart, or breakage of the pacing wires. A lead II rhythm strip would be run. Absence of the pacing artifact can validate such problems. Improper pacing is also indicated when no QRS complex follows a pacing artifact.

If the apical pulse increases and is not the same when counted against the light meter there may be competition between the patient's own returning cardiac activity and the pacemaker. This may result in pacemaker stimuli falling in the vulnerable period of the conduction cycle, thus triggering ventricular fibrillation.

If the amplitude setting is set too high the patient may experience a slight shock at the site of the pacing wire. This should be brought to the attention of the physician who could lower the amperage in order to make the patient more comfortable. Hiccoughs may occasionally signal current leakage across the diaphragm. This phenomenon can also indicate too high an amplitude setting. Infection may occur at the site of the pacing wire. This might be demonstrated by increasing drainage, rise in temperature, redness and warmth, and pain around the site.

The patient with an external pacemaker requires a great deal of psychological support. One disadvantage of an external box is that the patient does not forget his disability. Fear of malfunction of equipment may produce marked anxiety. Personnel caring for him should be confident and secure in their approach so that they transmit these same feelings to him. The patient should be encouraged to express his fears and know that the nurse is concerned about him personally. Most important is that he realize that the nurse will be present when needed.

Most patients remain in the hospital with a temporary external pacemaker until some decision is made as to whether or not they require a permanent pacemaker.

BARBARA TEWELL, R.N.
Clinical Nurse, Nursing Unit 6 West

Nursing Care of Patients with Implanted Pacemakers

You have just heard a review of the conduction system of the heart, some of the causes of heart block, the various types of pacemakers and electrodes and their methods of placement. I would like now to discuss the nurse's responsibilities and the nursing care of the patient with an implanted permanent pacemaker. To give comprehensive care to patients of this type the nurse must assume the responsibility for knowing the methods of pacing, the indications for pacing, techniques and modes of pacing and some of the hazards involved.

As discussed, the pacemaker is used to increase ventricular rate by supplying a current pulse from an electrical source. The indications for use of a permanent pacemaker are usually Stokes-Adams and surgical trauma. There are two surgical approaches commonly used for implanting a pacemaker —the transvenous and the transthoracic approach. The emphasis of patients nursing care needs is dictated by the type of approach used in surgery.

In understanding the post-operative care of these patients I think it is particularly important to fully understand the type of pacemaker used in the patient and how it works. In the asynchronous fixed-rate and asynchronous adjustable-rate pacemakers, the rate is selected and set before implant.

They are more reliable than the other types of pacemaker mainly due to the fact that they are electronically simpler and at this time better perfected. However, there are also disadvantages to this type of pacing. The atrial and ventricular activity are not synchronized and the efficiency of atrium as a booster pump is lost. Another disadvantage is that the heart rate does not increase with the physiological needs of the patient as it would in a healthy individual who had just run up two flights of stairs. As mentioned earlier, another important disadvantage is that a fixed-rate pacemaker can compete with the patient's own rhythm.

A second type of pacemaker is the synchronous pacemaker. The ventricles are stimulated by the pacemaker so that they will contract after each atrial contraction. This is done by an atrial sensing device. The device perceives an electrical P wave, waits for a pre-set interval and then generates a current pulse which stimulates the ventricles to contract. This method is thought to enhance cardiac rhythm, thus improve cardiac output.

To insure safety an automatic AV node-like current is contained within the system so that a block will occur if a rapid atrial arrhythmia occurs. On the other hand if the atrium fails to stimulate, another automatic current in the system starts a pacing stimulus at a set rate.

Synchronous pacing, unfortunately, requires a thoracotomy for placement of the sensing and pacing electrodes. These units are more complex and therefore not as reliable as fixed rates.

The third mode of pacing is by demand pacemaker. This type has a special sensing device that recognizes the QRS that normally occurs with each ventricular contraction. Therefore, if a QRS does not occur within a pre-set time limit, the pacemaker discharges at at fixed rate. This type is becoming prevalent since it functions only when needed. This system is more complex than the fixed-rate and its reliability is not yet well established. The amplitude and rate can be changed on an implanted pacemaker by means of a skin needle called a "Keith" needle. This is inserted through the skin into the rate or amplitude control and adjustments made.

Complications can occur from implanting a pacemaker. One complication is infection or rejection of the pacemaker. This can occur any time from one week to one year. If this happens you must change the site of the pacemaker. One patient rejected two pacemakers in three months. This is a rare occurrence due to the fact that these units are covered with silastic. Perforation of the right ventricle by the catheter tip is another complication, fortunately a rare one, but it can occur usually in the first 48 hours.

Lead fractures, corrosion or dislodgement can be caused by gross sepsis and will result in pacing failure, but more frequently the cause is activity of the patient. There could be fractures along the wire with an absence of stimulus even though the unit is discharging normally. A transistor radio may be used to check that the pacemaker is transmitting impulses by turning up the volume and turning the selector between stations. The pacemaker's impulses may be heard and counted.

Hiccoughs may occur due to stimulus of the diaphragm by the pacing electrode in the right ventricle as is in the case of the temporary pacemaker as well as the implanted pacemaker. Stimulation of muscle adjacent to an indifferent electrode occasionally occurs. This is uncomfortable but usually tolerated. It is less prominent after the patient is fully mobilized. Increased threshold is another problem. The pacemaker is usually set with a high amplitude because fibrosis eventually occurs around the catheter tip and causes the energy to be dissipated.

Battery failure is another complication which can cause problems. A slow regular pulse may be due to complete cessation of pacing with a return to an idioventricular rhythm or may be due to an abnormally slow unit discharging as a manifestation of battery exhaustion. A slow ventricular rate is particularly apt to precipitate runs of V.T. or V.F. Some units were designed to speed up as the batteries ran out causing tachycardia, but this is now recognized as being even less desirable.

Other signs of battery failure are decreased amplitude in pacing artifact on the EKG and a loss of delineation of battery coils as seen by X-ray. Batteries for permanent pacemakers usually last 24–36 months. Any system of atrial pacing except atomic is dependent on a battery device and battery exhaustion is inevitable. Batteries can be replaced under local anesthesia.

On the EKG a small artifact representing the pacemaker stimulus should precede each QRS complex indicating that the pacemaker is stimulating each ventricular complex. With the fixed rate, competition is often a problem because electrical stimulus within the patient's own heart may sometimes compete with the pacemaker stimulus to the ventricles. This may or may not be significant, but it is important to note and report.

The stiff new catheter may produce injury to the myocardium and may result in PVC's. If the pacemaker stimulus hits in a particularly vulnerable period of the PVC, V.T. or V.F. may occur and cause death. It is usually 48 to 72 hours after implant that adequate fibrosis develops so this is a critical period and observations of these PVC's must be noted so the physician can take measures to suppress them.

Such a variety of possible complications makes immediate, constant, post-operative observation and EKG monitoring one of the most important nursing objectives.

Another responsibility of the nurse is to be sure the defibrillator is ready and nearby. Usually the patient will have an intravenous going and it should be kept patent for any such emergency. The extent of the nurse's involvement with the pacemaker depends on the mode of pacing. With the fixed rate pacemaker frequent pulse checks for [illegible] important [illegible] the patient's a- [illegible] is being [illegible] he will have an IV [illegible] and a considerable amount of discomfort at the operative site. Assistance with the bath, help to the bath room, and preparation of his meals and medication will be necessary frequently during that post-operative period. His monitor electrodes should be changed, cleaned and reapplied daily. Once the patient is separated from his monitoring equipment he usually progresses rapidly. He is able to care for himself after a few days with little assistance. The amount of physical exercise, exertion and type of work he will be able to do will be determined by the physician, usually in relationship to the patient's pre-pacemaker cardiac condition. The physician will carefully explain any limitations the patient will have. Patients with permanent transvenous pacers should be taught to do range of motion on the operative side to prevent frozen shoulder. This is better if the patient can be taught pre-operatively.

Careful sterile technique must be used in dressing changes for prevention of infections.

Probably one of the most important nursing responsibilities is recognition and understanding of the patient's emotional response to his pacemaker. These patients face immediate death, with enough awareness of their situation to appreciate what is happening to them. They realize that their arrythmias are dangerous, but that they have a reasonable chance for survival.

If they have a fixed rate pacemaker they are usually instructed to count their pulse daily and report any irregularities. However, each patient must be [illegible] may [illegible] They may become concerned about physical exertion or exercise and [illegible] cardiac invalids. It is important to help these patients recognize and handle their fears and allow self-expression. Their families will need your support, understanding, and information in regard to the patient's care.

All patients need to be instructed to report dizziness, loss of consciousness or rate changes.

Women in particular may have some adjustments to make in relationship to the cosmetic effect of the pacemaker. The suture line and pocket area are at first bruised and discolored. The pacemaker may cause a bulge. Women patients often need your advice as to what type of undergarments to pick which give adequate support but are not restricting in the area of the pacemaker.

As you can see there is little direct physical nursing care involved in caring for the patient after the implantation of a permanent pacemaker. The patient, however, does need a great deal of observing and a lot of support and understanding from the nurse. We must help the patient to create a positive attitude towards his pacemaker and help him return to society, as much as possible, a productive adjusted member of that society.

Miss Ewing will now discuss for you a new type of pacemaker which is undergoing research in animal trials here at NIH.

ELIZABETH EWING, R.N.

New Advances in Pacemakers

It is obvious that all of the pacemakers in clinical use today have some drawbacks. Research and development for more satisfactory units is an ongoing enterprise. One pacemaker of the future is the nuclear-powered pacemaker. A light, compact, nuclear-powered cardiac pacemaker has reached the stage of experimental trial in animals. In May, 1969, the device, which weighs about 3 ounces and is roughly about 1½" by 2" was successfully implanted in a dog at the NIH by surgeons of the National Heart and Lung Institute. The dog, and four others similarly implanted, have all remained healthy and their pacemakers have performed well.

Conventional pacemakers require battery replacement, and while this is a simple and minor surgical procedure, it involves inconvenience and expense to the patient. Battery failure can occur with little prior warning and can have serious consequences. Because the nuclear-powered pacemaker features a Plutonium-238 energy source designed to provide adequate and dependable power levels for 10 years, the unit is a major advance in pacemaker technology.

The pacemaker's nuclear power source is based on the principle of thermoelectricity—the direct conversion of heat to electrical energy. When certain metals that differ markedly in electrical conductivity are joined together they form a thermocouple which, when heated at one end, will generate an electrical current. The heat developed by the decay of the Plutonium is used to heat wires at one end. The electrical current thus generated in the wire is then fed into a conventional pulse generator which supplies the pacing pulses to the heart via conventional wire electrodes.

Plutonium-238 was selected as the energy source for several reasons. An important one is that it is an emitter of alpha particles which have high energy but very low penetrating power, thus eliminating the need for special radiation shielding materials. Stray radiation is no greater than from the radium dial of some wristwatches. (2) Other feasible power sources are being investigated by other research teams.

The story of artificial cardiac pacemakers and the projections for the future of these instruments are the magnificent results of the collaboration between medicine and technology for the benefit of mankind.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1971—432-630/3152

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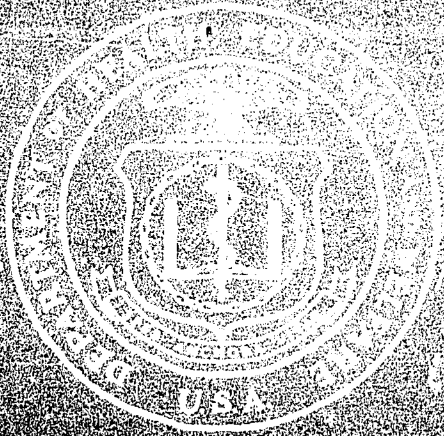

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE NATIONAL INSTITUTES OF HEALTH
DHEW Publication No. (NIH) 72-226
Reprinted March 1972

VT 016 646

GUIDES FOR PRIVATE VOCATIONAL AND HOME STUDY SCHOOLS.

FEDERAL TRADE COMMISSION, WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 16MAY72 15P.

DESCRIPTORS - GOVERNMENT PUBLICATIONS; VOCATIONAL DEVELOPMENT; *ADULT VOCATIONAL EDUCATION; GOVERNMENT (ADMINISTRATIVE BODY); *PRIVATE SCHOOLS; HOME STUDY; *CORRESPONDENCE SCHOOLS; *GUIDELINES; *FEDERAL LEGISLATION
IDENTIFIERS - EDUCATIONAL AWARENESS

ABSTRACT - THE TEN LATEST FEDERAL GUIDELINES FOR THE REGULATION OF PRIVATE VOCATIONAL AND HOME STUDY SCHOOLS, EFFECTIVE AS OF AUGUST 14, 1972, ARE PRESENTED IN THIS BROCHURE. ALTHOUGH THESE GUIDELINES MERELY INTERPRET LAWS ADMINISTERED BY THE FEDERAL TRADE COMMISSION, PROCEEDINGS TO ENFORCE LEGAL REQUIREMENTS CAN BE STARTED. THESE GUIDELINES PROSCRIBE THE USE OF UNFAIR AND DECEPTIVE BUSINESS PRACTICES IN THIS INDUSTRY. (AG)

3373

Federal Trade Commission

GUIDES FOR

PRIVATE VOCATIONAL AND HOME STUDY SCHOOLS

Promulgated May 16, 1972

3374

FEDERAL TRADE COMMISSION

ERAL TRADE COMMISSION
Washington

GUIDES FOR PRIVATE VOCATIONAL AND HOME STUDY SCHOOLS

INTRODUCTION

Guides for Private Vocational and Home Study Schools as hereinafter set forth have been adopted by the Commission to afford guidance as to the legal requirements applicable to the business practices of the members of this industry. The Guides proscribe the use of unfair and deceptive acts and practices which have been used in the past by members of this industry to obtain enrollments. The various forms of deception have frequently been characterized by misrepresentation of the nature and efficacy of the instruction offered by a school. Emphasis has been placed upon the necessity of providing the prospective student with accurate and truthful information in order that he may make an informed and intelligent decision whether or not to enroll.

The Guides should result in a more widespread and equitable observance of the laws administered by the Commission with a view to protecting the public and to provide a basis for the industrywide abandonment of unfair and deceptive acts and practices on the part of the proprietary schools.

Proposed Guides for Private Vocational and Home Study Schools were made public by the Commission on July 7, 1970, with an invitation for industry members and other interested parties to submit written comment and to present oral comments on the proposed guides at a public hearing. After full consideration of all of the information received in the course of these proceedings, the Commission adopted the Guides in their present form.

While the Guides are interpretive of laws administered by the Commission and thus are advisory in nature, proceedings to enforce the requirements of law as explained in the Guides may be brought under the Federal Trade Commission Act (15 U.S.C. Secs. 41-58).

Briefly stated, the Federal Trade Commission Act makes it illegal for one to engage in "unfair methods of competition in commerce and unfair or deceptive acts or practices in commerce", as commerce is defined therein.

In order to prevent deception the Commission may require the affirmative disclosure of material facts concerning a school or any of its courses, which if known to prospective students or students would influence their decision to purchase the course or to enroll. The failure to disclose such information as may be required is an unfair trade practice violative of the Federal Trade Commission Act. Virtually all of these Guides provide for affirmative disclosures. Unless otherwise specified such disclosures should be made in a clear and conspicuous manner so as to be likely to be perceived by the student or prospective student prior to enrollment.

Industry members are cautioned that should they fail to comply with the provisions of the Guides, proceedings may be initiated against them. Such proceedings might result in the issuance of an order imposing upon an industry member more stringent constraints or requirements than those described in the Guides, if in the judgment of the Commission such provisions are necessary to stop the use of unfair or deceptive acts or practices on the part of that industry member.

Industry members should endeavor to conform to the provisions of the Guides at the earliest practicable date. However, in order to provide a reasonable amount of time for industry members to make necessary revisions in their advertising, promotional materials and general business practices, the Guides, except as indicated below will become effective August 14, 1972, at which time they will supersede the trade practice rules for The Private Home Study Schools as promulgated November 2, 1936. Industry members will be allowed until November 13, 1972, to reprint publications such as school catalogs.

Industry members subject to outstanding Cease and Desist Orders pertaining to the subject matter of these Guides will be expected to comply with such orders and with those provisions of these Guides which impose additional requirements upon them.

Inquiries and requests for copies of the Guides should be directed to the Division of Rules and Guides, Bureau of Consumer Protection, Federal Trade Commission, Washington, D.C. 20580.

THE GUIDES

GUIDE 1 – DEFINITIONS.

(a) ***Industry member.*** Any person, firm, corporation, or organization engaged in the operation of a privately owned school which offers resident or correspondence courses or training or instruction purporting to prepare or qualify individuals for employment in any occupation or trade or in work requiring mechanical, technical, artistic, business, or clerical skills or which is for the purpose of enabling a person to improve his appearance, social aptitude, personality, or other attributes is considered to be an industry member. However, the term "industry member" shall not include resident primary or secondary schools or institutions of higher education which offer at least a two-year program of accredited college level studies for resident students which is generally acceptable for credit toward a bachelor's degree.

(b) ***Accredited.*** For the purpose of these Guides the term "accredited" means that a course or school to which the term is applied has been evaluated and found to meet established criteria by an accrediting agency or association recognized by the United States Commissioner of Education of the United States Department of Health, Education, and Welfare, as reliable authority as to the quality of the training offered.

(c) ***Approved.*** For the purpose of these Guides, the term "approved" means that a school or course has been recognized by a State or Federal agency as meeting educational standards or other related qualifications as prescribed by that agency for the school or course to which the term is applied. It is not and should not be used interchangeably with "accredited", and the term "approved" is not justified by the mere grant of a corporate charter to operate or license to do business as a school and should not be used unless the represented "approval" has in fact been affirmatively required or authorized by State or Federal law.

GUIDE 2 – DECEPTIVE TRADE OR BUSINESS NAMES.

(a) An industry member should not use any trade or business name, label, insignia, or designation which has the capacity and tendency or effect of misleading or deceiving prospective students or students with respect to the nature of the school, its accreditation, programs of instruction or methods of teaching, or any other material fact.

(b) An industry member should not falsely represent directly or indirectly by the use of a trade or business name or in any other manner that:

(1) it is a part of or connected with a branch, bureau, or agency of the United States Government, or of any State, or civil service commission;

(2) it is an employment agency or that it is an employment agent or authorized training facility for another industry or member of such industry, or otherwise deceptively conceal the fact that it is a school.

(c) If an industry member conducts its instruction wholly by correspondence or home study, a clear and conspicuous disclosure should be made in immediate conjunction with its trade or business name that it is a correspondence or home study school. An industry member which offers both resident and correspondence or home study instruction should clearly and conspicuously identify in all advertisements and promotional materials, except in those pertaining solely to its resident program, the programs or courses to be offered in whole or in part by correspondence or home study.

GUIDE 3 – MISREPRESENTATION OF EXTENT OR NATURE OF ACCREDITATION OR APPROVAL.

(a) An industry member should not misrepresent directly or indirectly the extent or nature of any approval its school may have received from a State agency or the extent or nature of its accreditation by a nationally recognized accrediting agency, or association. Illustratively, an industry member should not:

(1) Unqualifiedly represent that its school is accredited unless all of its programs of instruction have in fact been accredited by an accrediting agency recognized by the United States Commissioner of Education of the United States Depart-

ment of Health, Education and Welfare. If an accredited school offers courses or programs of instruction which have not been accredited, all advertisements or promotional materials pertaining to such courses or programs should contain a clear and conspicuous disclosure that they are not accredited if any reference is made in the advertisements or promotional materials to the accreditation of the school.

(2) Represent that its school or a course is approved, unless the nature, extent, and purpose of that approval are disclosed.

(3) Represent that students successfully completing a course or program of instruction may transfer credit therefor to an accredited institution of higher education unless such is the fact.

(b) An industry member should not represent that a course of instruction has been approved by a particular industry, or that successful completion thereof qualifies the student for admission to a labor union or similar organization, or for the receipt of a State or Federal license to perform certain functions, unless such is the fact.

(c) An industry member should not represent that its courses are recommended by vocational counselors, high schools, colleges, educational organizations, employment agencies, or members or officials of a particular industry, or that it has been the subject of unsolicited testimonials or endorsements from former students or anyone else unless such is the fact. Testimonials or endorsements which do not accurately reflect current practices of the school, or current conditions or employment opportunities in the industry or occupation to which the training pertains, should not be used.

GUIDE 4 – MISREPRESENTATION OF FACILITIES, SERVICES, QUALIFICATIONS OF INSTRUCTORS, AND STATUS.

(a) An industry member should not misrepresent directly or indirectly in its advertising, promotional materials, or in any manner the size, location, facilities or equipment of its school or the number or educational qualifications of its faculty and other personnel. Illustratively, an industry member should not:

(1) Use or refer to fictional organization divisions or position titles or make any representation which has the tendency or capacity to mislead or deceive students or prospective students, as to the size or importance of the school, its divisions, faculty, personnel, or officials, or in any other material respect.

(2) Misrepresent directly or indirectly the size, importance, location, facilities, or equipment of the school through use of photographs, illustrations, or any other depictions in catalogs, advertisements, or other promotional materials. For example, photographs or illustrations which purport to show school equipment should not be used if the school does not use such equipment in the conduct of its courses.

(3) Represent that the school owns, operates, or supervises a dormitory, eating, or other living accommodations unless such is the fact.

(4) Falsely or deceptively represent the location or locations at which its courses will be conducted.

(5) Misrepresent the nature, or efficacy, of its courses, training devices, methods or equipment or the number, qualifications, training, or experience of its faculty or personnel, whether by means of endorsements or otherwise.

(6) Falsely represent that it will provide or arrange for part or full-time employment while the student is undergoing instruction; or misrepresent in any manner, directly or by implication, the availability of such employment or any other form of financial assistance.

(7) Deceptively represent the nature of any relationship which the school or any of its officers, employees, or instructors may have with the United States Government or any of its agencies or any agency of a State or local government, or that by virtue of such a relationship or any prior relationship its students will receive preferred consideration in obtaining employment with such a government or any of its agencies.

(8) Represent directly or indirectly that certain individuals or classes of individuals are bona fide working members of its faculty, or are members of its advisory board, or have played an active part in the preparation of its instruction

materials, unless such is the fact, or misrepresent in any manner, directly or by implication, the extent or nature of the association of any person with the school or the courses offered.

(9) Misrepresent the nature and extent of any personal instruction, guidance, assistance, or other attention it will provide for its students either during a course or after completion of a course.

(b) An industry member should not represent directly or indirectly that it is a nonprofit organization unless such is the fact.

(c) An industry member should not falsely represent that it is affiliated with or otherwise connected with a public or private religious or charitable organization.

(d) An industry member should not falsely or deceptively represent that a course has been recently revised, or that it has a revision system or service, or misrepresent in any manner, its facilities, procedures, or ability to keep a course current.

GUIDE 5 – MISREPRESENTATION OF ENROLLMENT QUALIFICATIONS OR LIMITATIONS.

(a) An industry member should not misrepresent the nature or extent of any prerequisites it has established for enrollment in a course or program of instruction. For example, it should not:

(1) Represent that a course is available only to those having a high school diploma or other specific educational qualifications, unless the sale of such a course is limited to persons possessing generally acceptable evidence of such a diploma or educational qualifications.

(2) Represent that only those who make an acceptable grade or complete successfully a certain test or examination will be admitted, if in fact enrollments are not thus limited.

(3) Falsely represent that it will accept for enrollment only a limited number of persons or a limited number of persons from a certain geographical area.

(4) Falsely represent that applications for enrollment will be considered for only a limited period of time, or that they must be submitted by a certain date.

(b) An industry member should not falsely represent that the lack of a high school education or prior training or experience is not a handicap or impediment to successful completion of a course.

(c) An industry member should endeavor to establish the qualifications which an applicant should have to assimilate successfully the subject matter of the course. Applicants should be informed of these prerequisites, and those who are not so qualified should not be enrolled.

GUIDE 6 – DECEPTIVE USE OF DIPLOMAS, DEGREES, OR CERTIFICATES.

(a) An industry member should not issue a degree, diploma, certificate of completion, or any document of similar import, which misrepresents directly or indirectly the subject matter, substance or content of the course of study or any other material fact concerning the course for which it was awarded or the accomplishments of the student to whom it was awarded.

(b) An industry member should not offer or confer an academic, professional, or occupational degree, if the award of such degree has not been authorized by the appropriate State educational agency or approved by a nationally recognized accrediting agency, unless it clearly and conspicuously discloses in all advertising and promotional materials which contain a reference to such degree that its award has not been authorized or approved by such an agency.

(c) An industry member should not offer or confer a high school diploma unless the program of instruction to which it pertains is substantially equivalent to that offered by a resident secondary school, and unless the student is informed by means of a clear and conspicuous disclosure in writing prior to his enrollment, that the industry member cannot guarantee or otherwise control the recognition which will be accorded the diploma by institutions of higher education, other schools or by prospective employers, and that the degree to which it is recognized is a matter solely within the discretion of those agencies.

GUIDE 7 – DECEPTIVE SALES PRACTICES.

(a) In obtaining leads to prospective students, an industry member should not use advertisements or promotional material which is classified, designated or captioned, "Men wanted to train for . . . ", "Help Wanted", "Employment", "Business Opportunities" or by words or terms of similar import, so as to represent directly or by implication that employment is being offered.

(b) An industry member should not deceptively designate or refer to its sales representatives as "registrars", "counselors", "advisors", or by words of similar import or misrepresent in any other manner, the titles, qualifications, training, experience or status of its salesmen, agents, employees, or other representatives.

(c) The advertising or promotional materials of an industry member which are used to provide leads to prospective students should include the full name and address of the school (a local address is permissible in the case of a multi-locational school) and disclose the fact that it is a school if such is not apparent from its name. In addition, a person who responds to such an advertisement or promotional material should not be visited by a salesman unless the advertisement or material contains a clear and conspicuous disclosure that a salesman may call or unless consent to such a visit is first obtained by mail or telephone.

(d) In obtaining leads to prospective students, an industry member should not represent that it is conducting a talent hunt, contest, or similar test, unless such is the fact and such representation is accompanied by a clear and conspicuous disclosure of the industry member's name and address and the fact that it is a school if such is not apparent from its name. An industry member which conducts a talent hunt, contest, or similar test among prospective students should keep accurate records concerning the results thereof.

GUIDE 8 – DECEPTIVE PRICING AND MISUSE OF THE WORD "FREE".

(a) An industry member should not represent directly or indirectly in advertising or otherwise that a course or courses may be taken for a specified price, or at a saving, or at a reduced price, when such is not the fact; or otherwise deceive students or prospective students with respect to the cost of a course or any equipment, books or supplies associated therewith or furnish any means or instrumentality by which others engaged in obtaining enrollments may make such representations. Illustratively, an industry member should not represent:

(1) That veterans or other stated classes of persons may be enrolled at a reduced or special rate unless such is the fact;

(2) That a specific amount is its usual and customary price for a course unless such amount is the price at which the course has been usually and customarily sold in the recent regular course of business;

(3) That any saving is afforded in the price of a course from the member's regular price unless the price at which the course is offered constitutes a reduction from the price at which the course has been usually and customarily sold in the recent regular course of business;

(4) That books, training materials or training aids are furnished at reduced rates,

(i) unless the prices therefor have been reduced from the prices at which they were usually and customarily sold by the member in the recent and regular course of business; or

(ii) unless the prices therefor have been reduced from the prices at which they were usually and customarily sold at retail by principal outlets in the trade area.

(b) An industry member should not misrepresent the total cost of the course to a prospective student or falsely represent that it offers scholarships which pay for all or part of the course.

(Note: The Commission's Guides Against Deceptive Pricing afford further guidance in this area. Copies are available upon request.)

(c) An industry member which represents that any course material, training device, or service is free should comply with the provisions of the Commission's Guide Concerning Use of the Word "Free" and Similar Representations. Copies are available upon request.

GUIDE 9 – DECEPTIVE OR UNFAIR COLLECTION AND CREDIT PRACTICES.

(a) An industry member should not use any deceptive representations or deceptive means to collect or attempt to collect tuition or other charges from its students. For example, an industry member should not represent that a delinquent account has been or will be referred to an independent collection agency or to an attorney unless such is the fact.

(b) An industry member should not seek to enforce or obtain a judgment or otherwise attempt to collect on any contract or other instrument between itself and a student, or transfer or assign such contract or other instrument to a third party for the purpose of collection or of enforcing or obtaining a judgment on said contract or instrument, if the member or its employees or representatives misrepresented the nature or the terms of said contract or instrument at the time or prior to the time the contract or instrument was signed.

(Note: The Commission's Guides Against Debt Collection Deception afford further guidance in this area. Copies are available upon request.)

GUIDE 10 – AFFIRMATIVE DISCLOSURES PRIOR TO ENROLLMENT.

Before obtaining the signature of a prospective student or of his parent or guardian on an enrollment contract or contract of sale, an industry member should furnish in writing to that person or persons the following information:

(a) The member's policy and regulations relative to make-up work, delay or delinquency in meeting course requirements, and standards required of the student for achieving satisfactory progress, including class attendance if applicable.

(b) If the member recommends, suggests, or requires that the student have or secure any additional texts, equipment, or materials other than usual student supplies such as paper and pencils, or utilize any supplementary services offered by the member, and the cost thereof is not included in the contract price of the course, an itemized list of such items and services showing the price thereof.

(c) In the case of courses to be taught in residence, a description of the school's physical facilities, and equipment to be used in teaching the class, and the usual class size.

(d) If the member represents that it offers a placement service to its graduates or will otherwise secure or assist them to find employment, a detailed and explicit description of the extent and nature of this service or assistance.

(e) Any other material facts concerning the school and the program of instruction or course which are reasonably likely to affect the decision of the student to enroll therein.

Promulgated by the Federal Trade Commission May 16, 1972.

Chas. A. Tobin

Charles A. Tobin,
Secretary.

VT 016 649

VT 016 649
GUIDE FOR TRAINING SUPERVISORS IN SAFETY AND
FIRE PROTECTION.

VETERANS ADMINISTRATION, WASHINGTON, D.C.
DEPT. OF MEDICINE AND SURGERY.
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PUB DATE - 31DEC69 97P.

DESCRIPTORS - *TEACHING GUIDES; SHORT COURSES; *SUPERVISORY TRAINING; *FIRE PROTECTION; *SAFETY EDUCATION; ACCIDENT PREVENTION; *FIRE SCIENCE EDUCATION

ABSTRACT - THIS TEACHING GUIDE IS DESIGNED TO BE USED IN A VETERANS ADMINISTRATION TRAINING COURSE FOR SUPERVISORS IN SAFETY AND FIRE PROTECTION. THE INFORMATION IS BASED ON TRAINING OBJECTIVES AND SUBJECT MATTER DEVELOPED IN COLLABORATION WITH THE OFFICE OF THE ASSISTANT ADMINISTRATOR FOR CONSTRUCTION. INCLUDED IN THE INSTRUCTIONAL OUTLINE ARE THE FOLLOWING: (1) AN INTRODUCTION TO THE GUIDE AND ITS USE, (2) INSTRUCTIONAL PLANS FOR EACH OF THE THREE SESSIONS, AND (3) APPENDIXES A, B, AND C, WHICH DETAIL BLACKBOARD WORK, CHARTS FOR EACH SESSION, AND HANDOUTS FOR EACH MEETING. THE INSTRUCTION PLAN FOR THE SESSIONS INCLUDES OBJECTIVES THE REFERENCES REQUIRED, THE TRAINING AIDS NEEDED AND A CONDUCT OF THE SESSION WHICH IS GIVEN IN A 2-COLUMN FORMAT OF "WHAT TO DO" AND "WHAT TO SAY." (SN)

3389

G-1

MP-3, PART III
(FORMERLY TG 08-1)

DEPARTMENT OF MEDICINE AND SURGERY

GUIDE FOR TRAINING SUPERVISORS IN SAFETY AND FIRE PROTECTION

CONTENTS

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ABOUT THE GUIDE AND ITS USE

Nature and Format of the Guide

This is an instructor's guide for a three-session training course for supervisors in safety and fire protection. Its objectives are:

To help supervisors understand what causes accidents and fires,

To acquaint them better with their role in safety and fire protection, and

To give them some concrete suggestions on how to carry out their responsibilities for safety and fire protection.

The guide contains complete instruction plans for each of the three sessions, illustrations of the blackboard work, reproductions of the 14 charts, and copies of the 13 handouts.

The instruction plan for each of the sessions consists of four items:

I. TOPIC
II. OBJECTIVES
III. MATERIALS
IV. CONDUCT OF THE SESSION

Item III, "Materials," includes a list of references to help the instructor prepare himself for conducting the session and a list of the training aids which he will need to obtain and familiarize himself with in advance of the meeting.

Item IV, "Conduct of the Session," is a "blueprint" for conducting the training. It is arranged in two columns: on the right is a detailed outline of the subject matter of the session, expressed in the second person; on the left are notes for any activity there is other than "telling." The notes refer to such instructor activities as blackboard work, use of charts, distribution of handouts, and demonstrations; and such trainee activities as questions and answers and actual practice performance (of a skill, for example).

The "Conduct of the Session" provides for (a) an introduction--the motivating part of the session, which tells the trainee what he's to learn and how he can use what he learns; (b) presentation--the actual subject matter of the session; (c) a summary of the main points; and (d) the assignment, if any, in preparation for the next session. Sessions one and two provide for additional questions and answers on the subject matter which has been presented, for use just before the summary in case time is available for additional discussion.

A summary of the whole course is accomplished through a 15-question multiple-choice test exercise and discussion during the last half of the final session.

The Subject Matter

The subject matter is concerned primarily with principles of safety and fire protection, the application of which is an integral part of the VA supervisory job in any type of installation or work.

It treats of such matters as the point of attack in accident prevention, general principles of accident prevention, unsafe conditions and unsafe acts and how to eliminate them, what to do when an accident strikes, principles of fire protection, elements of fire, fire prevention, what to do when a fire is discovered, limiting the spread of fire, evacuation in case of fire, station organization for safety and fire protection, and how those with safety and fire protection responsibilities contribute to the objectives of the program.

While the course is devoted primarily to principles of general application, provision has been made for certain differences among installations and kinds of work. Examples of unsafe conditions and unsafe acts, for instance, will be related to the participants' own work environment. Also, each trainee will "tailor" the list of "Unsafe Conditions to Look For" to meet his own work environmental needs. The "handout" on the fire warning and alarm system ("When the Fire Alarm Sounds--") is to be completed and reproduced locally to reflect local facilities and local requirements. While all seven common types of portable fire extinguishers are mentioned briefly in the course, only those on the station are explained and demonstrated.

Flexibility of the Instruction Plans

The instruction plans are given in more than usual detail--not only with regard to the subject matter but also with respect to the instructional techniques to be used. This was done not to discourage the instructor from developing his own plans, but rather to make it easier and less costly for station management to discharge its responsibility for safety and fire protection training.

If the instructor doesn't feel comfortable about following the instruction plans as set out in the guide, he should feel free to revise them, or adjust them, or completely re-do them to fit his own particular instruction style.

Selecting the Instructor

The instructor should be well acquainted with the VA safety and fire protection program and the principles and policies on which it is based. He should be familiar with common accident and fire hazards--both unsafe conditions and unsafe acts, the special hazards of his own installation and its work, and appropriate preventive and corrective practices. He should be skilled in handling and demonstrating all of the types of portable fire extinguishers used on the station, unless a skilled fire marshal or fire fighter is available to conduct this part of the training. He should also, of course, be able to speak effectively before a group, lead a discussion, and phrase answers to questions intelligibly. He need not be a highly skilled instructor, but certainly this is desirable.

If it is necessary to select as instructor someone without an adequate background and competence in safety and fire protection as described above, a person who has such qualifications should be assigned as a "resource person" to attend all sessions, answer technical questions, perform the demonstrations, and otherwise assist the instructor.

For this particular course, a person technically qualified in the subject matter with average ability as an instructor is preferable to a highly skilled instructor lacking technical knowledge and skill in safety and fire protection.

Size and Arrangement of the Group; Arrangement of Facilities

Since the course provides for discussion, demonstrations, and, in session two, individual trainee performance, the group should be no larger than twelve. Ten is preferable. The trainees should be seated around a conference table with the instructor at one end and the resource person, if any, nearby. The charts, used in sessions two and three, have been kept small enough (21 by 32) to be placed right on the conference table and used comfortably in a position to the right or left (usually left, for a right-handed person) of the instructor's place. The blackboard should be placed on the other side as close to the table as is convenient.

Length of Sessions

Two-hour sessions are planned for. A ten-minute break is highly recommended at an appropriate point about half-way through the session.

Requisitioning the Training Materials

The Guide. The guide, TG 08-1, is for the use of the instructor only. It should not be distributed to the trainees. Should an extra copy or so be needed, it may be ordered through the regular requisitioning procedure.

The Charts. A set of fourteen 21 by 32-inch charts was supplied with the initial distribution of this guide. Additional sets are available only for replacement in case of wear, damage, etc. The regular requisitioning procedure may be used.

The "Handouts." Eleven of the thirteen handouts (materials distributed to each trainee individually during the course) have been assembled and stocked in sets. They may be procured through the regular requisitioning procedure by ordering, for example, "10 sets of the handouts for TG 08.1." Handout II-E, "When the Fire Alarm Sounds--," must be completed and reproduced locally. SF 92, "Supervisor's Report of Accident," is a standard form, which should be available at the station.

INSTRUCTION PLAN FOR SESSION ONE

I. TOPIC: Accident Prevention

II. OBJECTIVES:

- A. To point up the reasons for preventing accidents
- B. To identify a point of attack in accident prevention
- C. To suggest actions supervisors can take to prevent accidents

III. MATERIALS:

- A. References:
  - 1. VA Manual MP-3, Part III, "Safety, Fire Protection, and Disaster Relief" and Departmental Supplements Thereto
    - a. Chapter 1, "Introduction" (pp. 1-3)
    - b. Chapter 2, "Safety and Fire Protection," Sections I through IV (pp. 5-7); Section VII, par. 32.28 through 32.30 (pp. 11-13)
  - 2. (Optional) Heinrich, H. W., Industrial Accident Prevention, McGraw-Hill Book Co., New York, 1950, Chapter II, Sections 1 through 5 (pp. 10-37)
  - 3. (Optional) DeReamer, R., Modern Safety Practices, John Wiley & Sons, Inc., New York, 1958, Chapter 2 (pp. 15-27)
  - 4. (Optional) VA TG 5-10, Information for Supervisors about Accident Reporting and Employees' Compensation for Injury, December 1958
- B. Training Aids:
  - 1. Blackboard, chalk, and eraser
  - 2. Charts:
    - a. No. I-1, "The Accident Sequence"
    - b. No. I-2, "Inheritance and Social Environment"
    - c. No. I-3, "Personal Faults"
    - d. No. I-4, "The Hazard"
    - e. No. I-5, "The Accident"
    - f. No. I-6, "The Injury"
    - g. No. I-7, "Accident Factors"
    - h. No. I-8, "A Series of Events"
    - i. No. I-9, "The Central Factor"
    - j. No. I-10, "The Point of Attack"
  - 3. Individual training aids:
    - a. Handout I-A, "The Accident Sequence"
    - b. Handout I-B, "Unsafe Conditions to Look For"
    - c. Handout I-C, "When an Accident Strikes"

   d. SF 92, "Supervisor's Report of Accident"

   e. Handout I-D, "Preventing Accidents"

   f. Handout I-E, "Fire Extinguisher Facts"

IV. CONDUCT OF THE SESSION:

What to do	What to say
	(INTRODUCTION)

1. Remember the last time you or someone you know was involved in a fire or other kind of accident?

   a. If the accident resulted in injury, remember--

      (1) the pain and suffering?
      (2) the ruined plans?
      (3) the medical bills?
      (4) the time lost from the job?
      (5) perhaps, the permanent disfigurement left by a severe laceration or an extensive burn?

   b. If the accident resulted in damaged property, remember--

      (1) the inconvenience?
      (2) the time it took to get the material or equipment repaired or replaced?
      (3) the unnecessary expense?
      (4) the effect on your wife or your husband or your boss?

2. To help you prevent injury to yourself and others and damage to property from fire and other kinds of accidents, you are being asked to participate in a short training course on safety and fire protection.

   a. The course is in three sessions, two hours each.

   b. Its objectives are:

      (1) to help you understand what causes accidents and fires,
      (2) to acquaint you better with your supervisory role in safety and fire protection, and
      (3) to give you some concrete suggestions on how to carry out your responsibilities for safety and fire protection.

3. This course will be of value to you because in the VA safety and fire protection are an integral part of every supervisor's job.

4. What you learn during this training course, you will use--
    a. to safeguard yourself and others from personal injury, or even death, and property loss--
    b. not only here in the VA but also at home or wherever you may be--
    c. anytime.
5. You are expected to--
    a. participate in the discussions,
    b. study the materials handed out (these will cover the important points; you need not take notes, unless you wish), and
    c. take a short quiz during the latter half of the third session.

(PRESENTATION)

Put boxed material on BB.

1. Today's session is concerned with ACCIDENT PREVENTION.
2. The objectives of this session are:
    a. to point up the reasons why we want to prevent accidents,
    b. to identify a point of attack in accident prevention, and
    c. to suggest actions you can take to prevent accidents.
3. There are two fundamental reasons for accident prevention.
    a. These are:

Put boxed material on BB.

        (1) TO AVOID HUMAN SUFFERING

Put boxed material on BB.

        (2) TO AVOID ECONOMIC LOSS
    b. First and primarily the concern of the VA and of you as a VA supervisor is with the avoidance of human suffering. Accident prevention is for the benefit and welfare of people:
        (1) for the patient whose care is entrusted to us,
        (2) for the visitor during his stay, and
        (3) for the VA employee.
    c. In 1959 in the VA--
        (1) there were 1,658 injuries to VA patients--this is over 45 a day;

(2) there were 597 injuries to visitors, including beneficiaries--this is 1.6 a day;
(3) there were 1,433 totally disabling injuries to VA employees--this is 40 a day.

d. Besides causing human suffering, accidents can be costly.

Q: What are some costs of accidents?

A: [Underscored items] Add items not mentioned by the group.

(1) medical costs and employees' compensation benefits

(2) cost of sick leave

(3) delay in normal operations

(4) decreased efficiency

(5) securing of a replacement for the injured worker

(6) training the replacement

(7) lowering of morale and resulting poor production rate

Visualize how your employees would react (or remember how they did react) to the sight or news of a fellow worker sustaining a serious injury.

e. This will give you an idea of VA's economic loss caused by accidents: In one year--

(1) there were 104,801 man-days lost by VA employees; this is 290 a day;
(2) the direct cost of VA employee injuries was $1,700,000 this is $4,650 dollars a day!

f. Keep the two bases for accident prevention in proper relationship--

Point to "human suffering" on BB.

(1) first, the humanitarian,

Point to "economic loss" on BB.

(2) second, the economic.

g. For these two basic reasons--

(1) You as an individual are interested in accident prevention.
(2) You as a supervisor are interested in accident prevention.
(3) The Veterans Administration is interested in accident prevention.

4. And, now, where is our point of attack in this serious job of accident prevention?

Show Chart No. 1, "The Accident Sequence."

a. First, let's look at some of the basic philosophy in accident prevention--specifically, the accident sequence.*

(1) The accident sequence consists of a chronological series of five accident factors, one of which is the accident itself.

Show Chart No. 2, "Inheritance and Social Environment."

(2) The first factor in the sequence, the one which precedes the other four factors, is the individual's inheritance and social environment. It consists of such things as:

(a) physical abilities, such as--

eyesight
hearing
muscular strength and co-ordination
condition of heart, lungs, other organs

(b) mental abilities, such as--

reaction time
ability to remember
ability to reason

(c) temperament, such as--

emotional stability
curiosity
flexibility

(d) outside influences, such as--

home
school
job
church
community

Show Chart No. 3, "Personal Faults."

(3) Weaknesses stemming from the individual's inheritance and social environment--weaknesses such as defective hearing, poor memory, emotional instability--may result in certain personal faults. Personal faults is the second factor in the sequence. Some personal faults are:

(a) recklessness
(b) indifference
(c) inattention
(d) hostility
(e) laziness
(f) temper
(g) excitability
(h) inconsiderateness
(i) stubbornness

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*The concept of the accident sequence and accompanying charts have been adapted from H. W. Heinrich, Industrial Accident Prevention, McGraw-Hill Book Co., New York, 1950, Chapter II.

Show Chart No. 4, "The Hazard."

(4) Any of these faults may lead to the third accident factor, the hazard. Accident hazards are of three kinds:

(a) the unsafe condition,
(b) the unsafe act, and
(c) the unsafe condition and the unsafe act in combination.

Q: What are some unsafe conditions in the work environment?

(5) Unsafe conditions:

A: [Underscored items.] These are rather general. Much better are specific examples from the supervisors' own work environment. Bring out 4 or 5 such specific examples.

(a) poor housekeeping

(b) unsafe equipment

(c) unguarded machinery

(d) poor lighting--too much, too little

(e) poor ventilation

(f) absence of signs

(6) Unsafe acts are a greater accident hazard than unsafe conditions; they cause a greater number of accidents.

Q: What are some unsafe acts?

Some unsafe acts are:

A: [Underscored items.] These are rather general. Much better are specific examples from the supervisors' own work environment. Bring out 4 or 5 such specific examples.

(a) failing to recognize an unsafe condition

(b) using an incorrect method

(c) practicing faulty work habits

(d) removing safeguards

(e) failing to use safety devices such as handrails

(f) engaging in horseplay

Show Chart No. 5, "The Accident."

(7) A hazard results directly in an accident, the fourth factor in the sequence.

(a) Just what is an accident?

An accident is defined as an unexpected incident, including fire, which interrupts or interferes with the orderly progress of operations or activities and involves personal injury or property damage.

Repeat the definition

(b) Notice it's an incident, an unexpected incident. Some typical accidents are:

Falls

Falls are the most common accident in the VA.

Struck by a falling object

Slips

Slides

Striking against--

Caught in or between--

Fires

Collisions

Overexertion

Show Chart No. 6, "The Injury."

(8) The accident leads to personal injury or damage to property, our fifth factor in the accident sequence.

(a) Types of injuries are:
Cuts
Bruises
Fractures
Sprains
Fatalities
Burns

(b) Property damage can range from a broken glass in a book case to complete destruction of a building by fire.

Show Chart No. 7, "Accident Factors."

(9) These then are the factors in the accident sequence:

(a) Inheritance and social environment
(b) Personal faults
(c) The hazard
(d) The accident
(e) Injury or property damage

(10) The sequence of the factors is significant.

Point to factors on the chart as you mention them.

(a) The injury is invariably caused by an accident; the accident is always the result of an unsafe condition or an unsafe act.

Show Chart No. 8, "A Series of Events."

(b) The occurrence of a preventable injury is the natural culmination of a series of events or circumstances which invariably occur in a fixed and logical order.

(c) If we interrupt the series by eliminating even one of the several factors that comprise it, the injury cannot possibly occur.

Show Chart No. 9, "The Central Factor."

b. In accident prevention, the bull's-eye of the target is in the middle of the sequence, the hazard.

(1) This is the unsafe condition, the unsafe act, or the two in combination.

Show Chart No. 10, "The Point of Attack."

(2) Removing this factor makes the preceding factors ineffective.

(3) Our point of attack then is the elimination of the hazard--the elimination of the unsafe condition and the elimination of the unsafe act.

Distribute Handout I-A, "The Accident Sequence." Allow a few minutes for the group to look at the chart.

c. The accident sequence is illustrated for you on this chart which you may keep.

5. Before getting down to specifics on what we as supervisors can do to eliminate unsafe conditions and unsafe acts, we should acquaint ourselves with three generally recognized PRINCIPLES OF ACCIDENT PREVENTION. These are the principles on which not only supervisory but all accident prevention activities are based.

a. They are:

Put boxed material on BB.

(1) The creation and maintenance of active interest in accident prevention

Put boxed material on BB.

(2) Fact-finding

Put boxed material on BB.

(3) Corrective action based on the facts

Put boxed material on BB as a heading for items to be listed later.

b. Each of your responsibilities as a supervisor for PREVENTING ACCIDENTS is based on one or more of these principles. This we shall see as we discuss the specific things you can do to eliminate unsafe conditions and unsafe acts.

Put boxed material on BB as <u>first</u> item under "Preventing Accidents."

6. <u>What can the supervisor do to ELIMINATE UNSAFE CONDITIONS</u>?

   a. First, let's review the general kinds of unsafe conditions which are basic causes of accidents, shown on your accident sequence chart.

Read unsafe conditions from Handout I-A, "The Accident Sequence."

   b. To eliminate unsafe conditions a supervisor should first:

      (1) Look for them.

         (a) Conduct periodic safety inspections.

         (b) Ask your employees to watch for unsafe conditions and report them to you.

Distribute Handout I-B, "Unsafe Conditions to Look For."

         (c) Look for such things as shown on this list.

         Study the list and circle those items which you should look for in your own work area. Some of the items listed may be of no concern to you. Add items not listed which are peculiar to your work area.

Allow time for the group to adjust and complete their lists.

Q: What items have you added?

A: [5 or 6 items given by the group pertinent to the work supervised by them]

         (d) This adjusted list should help you in your search for unsafe conditions.

      (2) Correct the condition.

         (a) Correct those conditions which you can correct.

         for which you have authority, and

         which you can correct without hazard to yourself or others.

         (b) Report all others to higher authority-- <u>(state whoever this is locally)</u> .

Put boxed material on BB as <u>second</u> item under "Preventing Accidents."

7. <u>What can the supervisor do to ELIMINATE UNSAFE ACTS</u>?

   a. Let's review the unsafe acts which are typical basic causes of accidents, shown on your accident sequence chart.

Read unsafe acts from Handout I-A, "The Accident Sequence."

b. Unsafe acts are the principal cause of accidents.

Q: How can supervisors eliminate unsafe acts?

A: [Boxed items (1) through (6)] After most have been mentioned, put the boxed material on the BB, as items under "Eliminate Unsafe Acts"; follow the order listed, not as given by the group.

c. To eliminate unsafe acts, a supervisor should:

(1) Assign employees to jobs they are qualified to perform.

(a) Include special physical requirements in the position description; mention again in "Remarks" space of SF 52, Request for Personnel Action.

(b) Do not assign tasks to employees who are not physically or mentally able to perform them.

(2) Provide for personal protective equipment and enforce its use.

(3) Instruct employees in the safe way to do their work.

(a) when he first reports as a new employee.

(b) throughout his service with you when methods, procedures, machines, tools, or equipment change.

(4) Check regularly to see if employees are using proper and safe methods.

(5) Take appropriate corrective action at once if they are not.

(6) Above all, Set a good safety example.

Show by your own example that you are "sold" on safety.

What you think about accident prevention is what your employees think about accident prevention.

Read from the BB the list under "Eliminate Unsafe Acts."

d. These then are the things you can do to eliminate unsafe acts.

8. You have done all you can to eliminate unsafe conditions and eliminate unsafe acts. Yet an accident strikes.

Distribute Handout I-C, "When an Accident Strikes."

a. What do you do?

   (1) Go to the scene of the accident.
   (2) See that the injured gets medical care.
   (3) Notify your safety officer.
   (4) Get identifying information:
       (a) who?
       (b) when?
       (c) where?
       (d) what?
       (e) why?
   (5) Find the immediate cause.
   (6) Follow back to get the indirect cause.
   (7) Estimate injury to people and damage to materials and equipment.
   (8) List necessary action to remove the cause.
   (9) Follow through

b. All of the information gained through investigation is aimed at one goal--prevention of a similar accident.

c. Finding the cause--both immediate and indirect--is the key to the prevention of similar accidents.

d. Accident investigation is a significant supervisory responsibility in accident prevention.

Distribute SF 92.

e. Along with the responsibility of investigation is the responsibility for preparing the official accident report.

   (1) Notice the sequence of items on the SF 92. They are designed with prevention of future accidents as the primary objective.

   They lead from a report of the facts of the accident (items 1 through 7) to a report of correction of conditions causing the accident--what has been done (item 8) and what remains to be done (item 9).

   Items 10 through 23 are more facts. But notice that the last substantive item (item 24) stresses <u>again</u> corrective action. Here, corrective action gets the attention of your safety and fire protection officer.

Put boxed material on BB, as third item under "Preventing Accidents."

Put boxed material on BB, as last item under "Preventing Accidents."

Distribute Handout I-D, "Preventing Accidents." Allow a few minutes for the group to look at the list.

TEN MINUTES should be allowed for summary and assignment. If more than ten minutes remain at this point, some of the following questions can be used:

Q: Which of the two reasons for having a safety program is the most important?

A: To avoid human suffering.

Q: Accident prevention in VA is for the benefit of people as well as for the reduction of costs. What relative importance is placed on the three classes of people covered under the program?

A: First, the patients and beneficiaries; second, the visiting public; and third, the employees.

Q: What is an accident?

A: An accident is defined as an unexpected incident, including fire, which interrupts or interferes with the orderly progress of operations or activities and involves personal injury or property damage.

(2) This form serves two accident prevention purposes:

(a) It helps you to carry out your responsibility for accident prevention.

(b) It supplies information for analysis and necessary action at your station, and in Central Office for the agency as a whole.

(3) You may obtain the form (state the source on the station) .

f. Injured employees should be advised of their right to compensation benefits. This is also your responsibility. If you need more information on this particular responsibility including instructions on preparing the CA Forms, (tell them how to get it--training session on the subject, see personnel officer, etc.)

9. Two more responsibilities should be added to our list of supervisory responsibilities for accident prevention.

a. INVESTIGATE ACCIDENTS THOROUGHLY.

b. REPORT ACCIDENTS COMPLETELY AND PROMPTLY.

10. The actions, then, that you can take to prevent accidents are summarized for you on this sheet which you may keep.

Q: What is the difference between an accident and an injury?

A: An injury is a bodily hurt, an accident is the unplanned for event which caused it.

Q: In the accident sequence, what factor is the "point of attack"?

A: The hazard.

Q: What are the two purposes in preparing the Supervisor's Report of Accident, SF 92?

A: To help supervisors carry out their responsibility for accident prevention; to supply information to management for analysis and necessary action.

(SUMMARY)

1. The VA and you as a supervisor want to prevent accidents to avoid economic loss and, more important, to avoid human suffering.

2. The point of attack in accident prevention is the accident hazard which can be--

   a. an unsafe condition, or
   b. an unsafe act, or
   c. an unsafe condition and an unsafe act combined.

3. To eliminate unsafe conditions the supervisor should look for them and correct them.

4. To eliminate unsafe acts, the supervisor should consider physical and mental qualifications when assigning work; provide for the use of personal protective equipment; instruct employees in the safe way; check regularly; take appropriate action to correct unsafe acts; and, above all, set a good safety example.

5. When an accident strikes, the supervisor follows a carefully planned step-by-step procedure designed with the immediate objective of care for the injured and the ultimate objective of preventing future accidents. Basic to the procedure are the supervisor's responsibility for--

   a. investigating the accident thoroughly, and

   b. reporting the accident completely and promptly.

(ASSIGNMENT)

1. On today's topic, "Accident Prevention":

   a. Study the materials you have received--

      (1) "The Accident Sequence"
      (2) "Unsafe Conditions to Look For"
      (3) "When an Accident Strikes"
      (4) SF 92, "Supervisor's Report of Accident"
      (5) "Preventing Accidents."

   b. This will help you retain what we have discussed today and prepare you for the brief quiz at the last meeting.

2. In preparation for our next meeting on the topic of fire protection to be held in (where) on (when) ,

Distribute Handout I-E, "Fire Extinguisher Facts."

   a. Study this chart on first aid fire extinguishers. Bring it with you to the next meeting.

   b. Also, see where the fire extinguisher nearest your work area is located and notice what type it is.

INSTRUCTION PLAN FOR SESSION TWO

I. TOPIC: Fire Protection

II. OBJECTIVES:

- A. To provide an understanding of some of the principles of fire protection
- B. To outline the supervisor's role in fire protection and suggestions for carrying out his responsibilities for fire protection
- C. To demonstrate the handling of those portable fire extinguishers in use at the station

III. MATERIALS:

- A. References:
    - 1. VA Manual MP-3, Part III, "Safety, Fire Protection, and Disaster Relief"
        - a. Chapter 2, "Safety and Fire Protection," Sections V and VI (pp. 8-11)
        - b. Chapter 3, "Standards and Codes," Sections II through IV (pp. 20 and 21)
    - 2. National Fire Protection Association, Pamphlet No. 10, "Portable Fire Extinguishers"
- B. Training Aids:
    - 1. Blackboard, chalk, eraser, heavy black pencil
    - 2. Charts
        - a. No. II-1, "Number of Fires in the VA"
        - b. No. II-2, "The Chemistry of Fire"
        - c. No. II-3, "Causes of VA Fires"
        - d. No. II-4, "Fire Extinguisher Facts" (NSC Poster No. 8414B)
    - 3. Portable Fire Extinguishers: one of each kind available for first-aid fire fighting at the station (empty)
    - 4. Individual training aids:
        - a. Handout I-E, "Fire Extinguisher Facts"

          This was distributed at the last session.
        - b. Handout II-A, "Number of Fires in the VA"
        - c. Handout II-B, "The Chemistry of Fire"
        - d. Handout II-C, "Causes of VA Fires"
        - e. Handout II-D, "Fire Prevention--Some Things YOU Can Do"
        - f. Handout II-E, "When the Fire Alarm Sounds--"
        - g. Handout II-F, "The Organization for Safety and Fire Protection at a VA Field Installation"

IV. CONDUCT OF THE SESSION:

What to do

What to say

(INTRODUCTION)

1. At our last meeting we concerned ourselves with things we as supervisors can do to prevent accidents and avoid the human suffering and economic loss which accidents cause.

Put boxed material on BB.

2. Today we are still concerned with accidents, but we shall concentrate on a special kind--the accident of fire. Our topic is FIRE PROTECTION. The objectives of this session are:
    a. to provide you with an understanding of some of the principles of fire protection,
    b. to outline your role in fire protection and suggestions for carrying out your responsibilities for fire protection, and
    c. to demonstrate to you how to handle the portable fire extinguishers for use at this station.
3. This session will be of value to you because you will learn some ways to reduce the hazard of fire, how to limit the spread of fire, how to control it in its incipient stages, and how to promote human safety once a fire has broken out.
4. What you learn today you can use--
    a. to protect yourself and others--
    b. wherever you are--
    c. anytime.
5. You are expected, as we mentioned at our last meeting, to--
    a. participate in the discussions, and
    b. study the materials given out.
6. Today, also, you will be given an opportunity to handle correctly a portable fire extinguisher. We would like each of you to have a try at it.

(PRESENTATION)

1. Why is the Veterans Administration investing time, money, and effort in this training for you?
    a. For one thing, fire is a very dangerous hazard to life and limb.

(1) Last year over lives were lost in the U. S. because of fire.

(2) In the Federal government, the yearly average (over a ten-year period) of lives lost because of fire was 29. (As reported by the Federal Fire Council.)

b. Fire is waste. Last year fire waste cost--

(1) over $1\frac{1}{4}$ billion dollars in the United States,

(2) over 6 million dollars in the Federal government, and

(3) over 36 thousand dollars in the Veterans Administration.

c. The number of fires is large and is increasing. Last year--

(1) in the United States there were over 2 million;

(2) in the Federal government there were over 12 thousand;

Show Chart No. II-1, "Number of Fires in the VA."

(3) in the Veterans Administration in 1958, 1507 fires were reported--this is over 4 every 24 hours. The figures for the past five years are shown on this chart.

Distribute Handout No. II-A, "Number of Fires in the VA."

Here is a copy of the chart which you may keep.

d. Each fire, however small, is a potential disaster.

e. According to the National Board of Fire Underwriters the majority of the fires in the past 10 years could have been prevented through education and training.

f. For these reasons--the hazard to life, the waste of fire, the increase in the number of fires, and the recognized value of training--we are providing this training in fire protection VA-wide.

Put boxed material on BB.

Point to chart.

2. There are certain fundamental PRINCIPLES OF FIRE PROTECTION. Knowing the principles, knowing what you as a supervisor can do to further them, and actually doing it will help us reduce the figures of 1,507 fires in the VA in one year, 1958, at a cost of 17 lives and over 36 thousand dollars.

The fundamental principles of fire protection are:

a. first and basically, diligent fire prevention--the preventing of fires from starting,

b. prompt discovery, giving the alarm, and extinguishing,

c. limiting the spread of fire, and

d. adequate provision for evacuation.

Put boxed material on the BB as the first item under "Principles of Fire Protection."

3. FIRE PREVENTION is the principle which you as a supervisor can do most to further.

   a. The point of attack in the accident of fire is the same as the point of attack we identified at our last meeting on accident prevention--the hazard. We must eliminate the unsafe condition and the unsafe act.

   b. A basic knowledge of the chemistry of fire will help us to know what is unsafe with respect to fire hazards.

      (1) Fire burns because there are three elements present:

         (a) fuel
         (b) heat
         (c) oxygen

      (2) Fuel is any combustible material.

Q: What are some fuels?
A: [Underscored items]

         (a) wood
         (b) paper
         (c) oils
         (d) fabric
         (e) various compounds, such as lighter fluid, alcohol, plastics, rubber.

      (3) The degree of heat necessary for ignition depends upon the type of fuel. But practically any fuel can be ignited by the heat of a burning match.

         (a) Wood and paper can be ignited at 300° F.
         (b) Ether ignites at 356° F.
         (c) Lighter fluid (Naphtha) ignites at 450° F.

      (4) Air normally contains 21% oxygen; less than 16% is usually not enough for the average flame.

      (5) All three elements must be present to have a fire. If any one of the three basic elements is not present, the fire cannot start; if any one of the three is removed, the fire goes out.

Show Chart No. II-2, "The Chemistry of Fire."

         (a) "Fire is not possible without fuel."
         (b) "Fire is not possible without heat."
         (c) "Fire is not possible without oxygen."

Distribute Handout No. II-B, "The Chemistry of Fire."

You may have a copy of this chart to keep.

c. Since all three elements must be present to have a fire, one way to prevent fire is to Control fuel.

Put boxed material on the BB as the first item under "Fire Prevention."

Q: What can a supervisor do to control fuel in the interest of fire prevention?

To help control fuel, a supervisor can:

A: [Items numbered (1) through (6)]

(1) Practice good housekeeping.

(2) Require the prompt and proper disposal of waste paper, trash, wood shavings, etc.

(3) Obtain metal containers with snug covers for collecting easily combustible waste such as cartons, wrapping material, used paper cups, etc.

(4) Properly store volatile flammable liquids such as gasoline, alcohol, ether, paint and other combustible materials such as matches, bottled gases, stocks of papers, etc.

(5) Substitute non-hazardous materials for hazardous ones where possible, such as approved typewriter cleaning fluid for alcohol.

(6) Keep combustible stocks at a minimum.

d. Another way to prevent fire is to Control heat.

Put boxed material on the BB as the second item under "Fire Prevention."

(1) Some sources of heat are:

(a) matches, lighters, lighted cigars, cigarettes, pipes.

Smoking and matches cause 73% of the fires in the VA.

Show Chart No. II-3, "Causes of VA Fires."

This chart shows the major causes of VA fires.

Distribute Handout No. II-C, "Causes of VA Fires."

Here is a copy of the chart which you may keep.

Of the fires caused by smoking and matches--

39% were due to smoking in bed.

29% were due to fires in waste baskets.

32% were due to "other" smoking and matches causes.

(b) direct flame other than matches and lighters (welders' torches, gas burners)

(c) electrical defects and misuse of electrical appliances. Electricity causes 10% of the fires in the VA.

(d) high-temperature steam pipes.

(e) sparks (welding)

(f) chemical action. This is spontaneous heating.

This is important in laundries.

(2) Spontaneous heating. Certain combustible materials in combination with each other will cause a heat-producing chemical action which builds up in temperature without exposure to external sources of heat. The process is usually very slow and ignition may occur after a period of days or weeks during which the temperature is slowly rising.

Q: What can you as a supervisor do to control heat in the interest of fire prevention?

(3) To help control heat, a supervisor can

A: [Items numbered (a) through (f)]

(a) Enforce smoking regulations.

(b) Set a good example in your smoking habits.

(c) Insure that areas where flammables are stored, used, or disposed of carry the necessary "no smoking" signs and warnings.

(d) Eliminate the storage of--

Oily rags in dark, unventilated corners or closets.

Work clothes liberally spotted with oil, grease, or paint in unventilated lockers.

Bundles of paper in quantity and spotted with oil or paint.

(e) Report worn, broken, frayed electric wire coverings; loose sockets, faulty plugs; broken or missing switch plates.

(f) Order replacements for faulty electrical equipment and fixtures.

Q: What can we do to prevent fire through the control of oxygen?

A: Little or nothing since oxygen is ever-present in the air.

e. Since oxygen is ever-present in the air, little can be done to prevent fire through the control of oxygen; much can be done, we shall see later, to extinguish a fire, once started, by cutting off the supply of oxygen.

Distribute Handout II-D, "Fire Prevention--Some Things YOU Can Do."

f. This handout should serve as a handy reference for some things you can do to prevent fire.

Put boxed material on the BB as the second item under "Principles of Fire Protection."

4. PROMPT DISCOVERY, GIVING THE ALARM, AND EXTINGUISHING is the second of our fundamental fire protection principles.

Put boxed material on the BB as the first item under "Prompt Discovery, etc."

a. You and your employees certainly have the responsibility to Investigate immediately any signs or evidences of fire especially in your own work areas.

b. When you discover a fire, your responsibility is to give the alarm and facilitate putting it out.

You have a responsibility as does every VA employee, to do three things:

Put boxed material on the BB as the second item under "Prompt Discovery, etc."

(1) Give the alarm at once.

Q: How do we give an alarm at this station?

A: [Underscored material] Be sure that all steps are included in the precise order listed on the right.

To give the alarm at this station:

(Give your station procedure in elementary, step-by-step order, stressing the key points, if any.)

These instructions are posted at all of our station fire alarm boxes.

Put boxed material on the BB as the third item under "Prompt Discovery, etc."

(2) Use the right type of extinguisher--correctly.

(3) Protect or assist patients or other helpless persons.

c. Fires can be extinguished by eliminating any one of the three elements which must be present to have a fire.

d. Which element you eliminate depends upon the class of fire to be extinguished.

(1) Class A fires

(a) These are fires in ordinary combustible materials such as wood, bedding, clothing, canvas, paper rubbish, etc.

Turn back to Chart II-2, "The Chemistry of Fire," and point to the third triangle.

(b) For these we reduce the heat. We do this by cooling.

(2) Class B fires

(a) These are fires in flammable liquids, such as oil, gasoline, grease, paint, etc.

Point to fourth triangle on Chart II-2, "The Chemistry of Fire."

(b) For these we eliminate the oxygen. We cut off the oxygen by smothering or blanketing.

(3) Class C fires

(a) These are fires in live electrical equipment.

Point to fourth triangle on Chart II-2, "The Chemistry of Fire."

(b) For these, also, we attack the oxygen supply primarily; we reduce the oxygen content in the surrounding air.

(c) But the significant thing about fires in live electrical equipment is that we must use an extinguishing agent which is a <u>non-conductor</u> of electricity.

(d) Have electricity turned off as quickly as possible.

Show Chart No. II-4, "Fire Extinguisher Facts" (NSC Poster No. 8414B).

e. As you saw from studying your reference sheet on "Fire Extinguisher Facts," which is a reproduction of this chart, there are seven common kinds of fire extinguishers. Which one to use depends upon the <u>class</u> of fire.

You must know:

(1) what class of fire you have, and

(2) what type of extinguisher is used on it.

Using the wrong type of extinguisher may spread the fire or be harmful to the user.

"X" out the vaporizing liquid type of fire extinguisher on the chart.

VA has banned use of the vaporizing liquid type extinguisher because the vapor of carbon tetrachloride is harmful if inhaled.

At some stations having the necessary facilities, the station fire department may be brought in at this point to conduct the demonstrations with fire extinguishers.

f. At this station, we have (<u>give the number</u>) different kinds of first aid portable fire extinguishers.

(1) For Class A fires--

Q: What are Class A fires?

A: Fires in wood, paper, bedding, trash.

we have:

(a) (Name: soda-acid, pump etc.)

On Chart No. II-4, "Fire Extinguisher Facts," circle with heavy pencil the picture of the extinguisher named.

Circle the picture of this on your "Fire Extinguisher Facts" sheet.

Place the actual extinguisher in full view of the group.

This is (give physical characteristics). The extinguishing charge is composed of (give composition of extinguishing agent) and is expelled by (give means of expelling the charge).

Demonstrate the handling of the extinguisher.

To operate the (give name) extinguisher (give step-by-step method of operation).

(b) (name)

On Chart No. II-4, "Fire Extinguisher Facts," circle with heavy pencil the picture of the extinguisher named.

Circle the picture of this on your "Fire Extinguisher Facts" sheet.

For each additional Class A extinguisher in use at your station, follow the same procedure as you did for the first one: Circle picture on the chart; place the extinguisher in full view of the group; give its physical characteristics, extinguishing agent, and means of expelling the charge; and demonstrate the handling of it.

(Physical characteristics, composition of extinguishing agent, means of expelling the charge.)

(Step-by-step method of operation.)

(2) For Class B fires--

Q. What are Class B fires?

A: Fires in grease, oil, paint.

(a) [If one of the types already demonstrated is used on Class B fires] We use the (give name) which I have just demonstrated.

(b) [If one of the types already demonstrated is not used for Class B fires] We use (give name: carbon dioxide, dry chem., etc.)

On Chart No. II-4, "Fire Extinguisher Facts," circle with heavy pencil the picture of the extinguisher named.

Circle the picture of this on your "Fire Extinguisher Facts" sheet.

For each Class B extinguisher in use at your station, follow the same procedure as you did for the Class A types: Circle the picture on the chart; place the extinguisher in full view of the group; give its physical characteristics, extinguishing agent, and means of expelling the charge; and demonstrate the handling of it.

Q: What are Class C fires?

A: Fires in live electrical equipment.

On Chart No. II-4, "Fire Extinguisher Facts," circle with heavy pencil the picture of the extinguisher named.

For each Class C extinguisher in use at your station, follow the same procedure as you did for the Class A types: Circle the picture on the chart; place the extinguisher in full view of the group; give its physical characteristics, extinguishing agent, and means of expelling the charge; and demonstrate the handling of it.

(Physical characteristics, composition of extinguishing agent, means of expelling the charge.)

(Step-by-step method of operation).

(3) For Class C fires--

(a) [If one of the types already demonstrated is used on Class C fires] We use the (give name) which I have just demonstrated.

(b) [If one of the types already demonstrated is not used for Class C fires] We use (give name: dry chemical, etc.).

Circle the picture of this on your "Fire Extinguisher Facts" sheet.

(Physical characteristics, composition of extinguishing agent, means of expelling the charge.)

(Step-by-step method of operation).

g. Knowing which extinguisher is used for which class of fire is not of much value unless you know how to handle the extinguisher.

(1) It's too late to learn after the fire starts.

(2) We urge you to learn now--within the next few days--how to handle each of the portable fire extinguishers we have on this station.

(a) Study your reference sheet, "Fire Extinguisher Facts"; study the instructions on the actual extinguisher (or on the decal adjacent to it).

(b) When you pass a fire extinguisher in the building, try to recall the step-by-step procedure for handling it.

(3) We shall take time right now for each of you to practice, at least once, picking up a fire extinguisher properly, carrying it to the scene of the fire, and playing it on the fire.

We shall use this (give name) extinguisher, the type we have most of at this station.

The extinguisher is empty, so you won't experience its weight when full or get the feel of actually expelling the charge. But you will have the experience of handling the extinguisher properly.

Demonstrate the handling of the extinguisher.

Have each member of the group try it out. Ask for volunteers first. If the manner in which the trainee handles the extinguisher is incorrect in any way, show him what he has done wrong, and have him repeat the performance correcting his error--the whole performance; do it before going on to the next person.

If two extinguishers are available and another skilled handler is present, divide the group, and have both groups trying out at the same time.

h. As we leave the second principle, prompt discovery, giving the alarm, and extinguishing, I'd like to repeat:

Read (1), (2), and (3), on the right, from the BB.

   (1) Investigate immediately any signs or evidence of fire.

   (2) Give the alarm at once.

   (3) Use the right type of extinguisher--correctly.

Put boxed material on the BB as the third item under "Principles of Fire Protection."

5. Our third principle of fire protection is LIMITING THE SPREAD OF FIRE.

   a. Activities in this area are mostly out of your hands as supervisors; they are primarily the concern of the fire protection engineers.

   b. There are, though, some things which you can do, or at least request, as a supervisor.

Put boxed material on the BB as the first item under "Limiting the Spread."

      (1) Know what to do about DOORS and do it

         (a) Fire Doors (other than stairway enclosure doors)
         Don't obstruct or wedge open.
         Keep free to operate.

         (b) Fire Doors (Stairway Enclosure Doors)

         Keep closed at all times.

         (c) Smoke Barrier Doors

         Close at time of fire.

(d) Room Doors

Close at time of fire.

(e) Vertical Openings

Keep laundry chute doors closed.

Put boxed material on the BB as the <u>second</u> item under "Limiting the Spread."

(2) Avoid storage of large concentrations of combustible materials.

Put boxed material on the BB as the <u>third</u> item under "Limiting the Spread."

(3) Practice good housekeeping.

Put boxed material on the BB as the <u>fourth</u> item under "Principles of Fire Protection."

6. ADEQUATE PROVISION FOR EVACUATION in case of fire is our fourth fundamental principle in fire protection.

a. Human safety in most fires depends upon adequate exit facilities and on their prompt and proper use. Training and drills are essential.

b. Exit facilities may not be under your control, but you can and should--

Put boxed material on the BB as the <u>first</u> item under "Adequate provision, etc."

(1) Keep exit routes in your work area clear so that exits are accessible at all times.

c. Prompt and proper use of exit facilities by yourself and your employees are to a large degree your responsibility.

(1) Know and be sure your employees know the sound of the fire alarm.

(2) Know and make sure your employees know what to do and where to go when the fire alarm sounds. At this station, when the fire alarm sounds--

(a) (give

(b) your station's

(c) procedure-fire bill)

(3) Make sure your employees react promptly and properly when the fire alarm sounds.

(4) Keep fire exit doors free from obstruction at all times. Stairway enclosure doors should be closed at all times.

Put boxed material on the BB as the <u>second</u> item under "Adequate provision, etc."

(5) In short, Respond promptly and properly to the fire alarm.

d. How you as a supervisor can further this fourth and final principle of fire protection, "Adequate provision for evacuation," is summed up in this list of questions.

Distribute Handout No. II-E, "When the Fire Alarm Sounds--."

TEN MINUTES should be allowed for summary and assignment. If more than ten minutes remain at this point, some of the following questions can be used:

Q: What are the four principles of fire protection?

A: Fire prevention; prompt discovery, giving the alarm, and extinguishing; limiting the spread; adequate provision for evacuation.

Q: The three elements necessary to have a fire are?

A: Oxygen, heat, fuel.

Q: Over which of these 3 elements do we have little control?

A: Oxygen.

Q: What is the first thing to do when a fire is discovered?

A: Turn in the alarm and evacuate helpless persons.

Q: Why has VA banned use of the vaporizing type fire extinguisher?

A: The vapor of carbon tetrachloride is harmful if inhaled.

Q: Besides adequate exit facilities, what else must we ensure for human safety in evacuation in case of fire?

A: Their prompt and proper use.

(SUMMARY)

1. Fire is danger; fire is waste; the number of fires is increasing.
2. The observance of four fundamental principles of fire protection can help reduce the hazard to life, the waste, and the number of fires.
3. As a supervisor, you can make important contributions to the furtherance of each of the fundamental principles.
    a. To prevent fires, you can--
        (1) Control fuel by such things as--
            (a) good housekeeping
            (b) prompt and proper disposal of waste,

        - (c) proper storage of volatile flammable liquids,
        - (d) substitution of non-hazardous materials for hazardous ones.
    - (2) Control heat by such things as--
        - (a) enforcing smoking regulations,
        - (b) setting a good example in your smoking habits,
        - (c) replacing worn electric wires, faulty plugs, broken switch plates, etc.
- b. Once a fire has started, you should--
    - (1) give the alarm at once.
    - (2) use the right type of extinguisher--correctly.
        - (a) Learn this now.
        - (b) Fire leaves no time to read.
- c. You can limit the spread of fire by practicing certain precautions--
    - (1) Know what to do about doors.
    - (2) Watch storage of combustibles.
    - (3) Practice good housekeeping.
- d. You can facilitate prompt and proper evacuation by--
    - (1) keeping exit routes in your work area unobstructed.
    - (2) knowing and making sure your employees know--
        - (a) the sound of the fire alarm, and
        - (b) what to do and where to go when the fire alarm sounds.
    - (3) making sure your employees react promptly and properly when the alarm sounds.

(ASSIGNMENT)

1. On today's topic, "Fire Protection"--
    - a. study the materials you have received:
        - (1) "Number of Fires in the VA"

(2) "The Chemistry of Fire"

(3) "Cause of VA fires"

(4) Fire Prevention--Some Things YOU can Do"

(5) "When the Fire Alarm Sounds--"

b This will help you retain what we have discussed today and prepare you for the brief quiz at our next meeting.

2. In preparation for our next meeting, which is to be held (where) on (when):

Distribute Handout II-F, "The Organization for Safety and Fire Protection at a VA Field Installation."

a. Read and study this material on "The VA Organization for Safety and Fire Protection."

b. Prepare for a brief quiz.

INSTRUCTION PLAN FOR SESSION THREE

I. TOPIC: Assistance in Safety and Fire Protection

II. OBJECTIVES:

A. To assure the supervisor that he has assistance in safety and fire protection

B. To illustrate the kind of assistance provided by others

C. To enable the supervisor to test for himself his knowledge of safety and fire protection and his role in accident prevention and fire protection

III. MATERIALS:

A. References:

1. VA Manual MP-3, Part III, "Safety, Fire Protection, and Disaster Relief," Chapters 1, 2, and 3

2. Handout II-F, "The Organization for Safety and Fire Protection at a VA Field Installation."

B. Training Aids:

1. Blackboard, chalk, eraser

2. Individual training aid:

Handout III-A, "Quiz for Supervisors on Safety and Fire Protection."

IV. CONDUCT OF THE SESSION:

A. Part One (first hour)

What to do	What to say
	(INTRODUCTION)
	1. Our first two meetings were concerned with the two broad areas of accident prevention and fire protection with particular reference to your role.
	2. During the first half of today's meeting, our concern is with both areas, but we shall place special emphasis on the role of others. We want:
	a. to assure you that you do have assistance in your safety and fire protection responsibilities, and
	b. to illustrate to you the kind of assistance provided by others.
	3. This will be of value to you because you will know what to expect from others in safety and fire protection and where to turn for help.
	4. You will use this knowledge--
	a. to help do your part to conserve human and material resources--
	b. in your supervisory job here on the station--
	c. every day.

5. You are expected, of course,

    a. to participate in the discussions, and

    b. to demonstrate in the quiz during the last half of the meeting a reasonable knowledge of what we discuss on assistance.

(PRESENTATION)

1. Every person employed by the Veterans Administration has a responsibility to conserve human and material resources. Each one is concerned to some degree with--

    a. the safety of patients and beneficiaries,

    b. the safety of the public visiting VA premises,

    c. the safety of employees, and

    d. the conservation of property.

2. The basic administrative framework--such as

    the authority,

    standards,

    requirements,

    incentives

    to assist all of us in carrying out this responsibility is established by the Administrator, our Chief Department Directors, and their staffs in Central Office.

    a. Some examples of minimum safety and fire protection standards and requirements which Central Office has set are:

        (1) New VA hospitals shall be of fire-resistive construction.

        (2) VA will provide necessary personal protective equipment.

        (3) All employees will be trained in the operation of the fire warning and alarm system.

        (4) The station will inspect all areas for detection of accident and fire hazards.

Q: What are some other basic safety and fire protection standards set VA-wide or Department-wide?

A: [Any of the items numbered (5) through (10) and any other standards or requirements given in MP-3, Part III, and its supplements.] Get 4 or 5 additional examples (from the list or the Manual) from the group.

(5) If adequate outside fire fighting services are not available, the station will have its own VA fire department.

(6) Appropriate first-aid fire extinguishers will be located throughout all buildings.

(7) Smoking will not be permitted in rooms where oxygen is being administered.

(8) Electrical equipment, appliances, and wiring will be kept in safe operating condition.

(9) Work methods and operating procedures will be adopted to assure that personnel will not be exposed unnecessarily to accident or occupational health hazards.

(10) Bedfast patients and domiciliary members in VA hospitals and domiciliaries will not be permitted to smoke in bed except when attended.

b. Two incentives, in the form of awards, have been established by Central Office:

(1) The Administrator's Annual Safety Award for stations which achieve certain standards in frequency and severity of disabling injuries. In 1958, 109 stations received the Administrator's Annual Safety Award.

(2) The Administrator's Special Safety Award for one field station in each Department which achieves certain additional standards in such things as its fire record, motor vehicle accidents, disaster relief and civil defense activities. In 1958, these stations won the Administrator's Special Safety Award:

VA Center, St. Paul (DI)

VAH, Columbia, S. C. (DMS)

VARO, Cleveland (DVB)

c. This administrative framework, which we have just touched on briefly, is intended to help you--and everyone else in the VA--to carry out our safety and fire protection responsibilities.

Put on the BB: "LOCALLY, ASSISTANCE IN SAFETY AND FIRE PROTECTION IS AVAILABLE TO YOU FROM:"

3. The administrative framework is important, but also of importance are the people available to you to help you with your safety and fire protection job.

Put boxed material on the BB.

Q: How can your higher level supervisors assist you?

A: [Items (1) through (4) on the right.] Supply any not mentioned by the group. Many mentioned which are not listed may be perfectly acceptable.

a. Your Manager and each supervisor between him and you can assist you--

by--

(1) providing strong leadership to the program--guiding, encouraging, assisting--showing unmistakable interest.

(2) letting you know what the station's standards and requirements are.

(3) seeing that you are trained in your safety and fire protection responsibilities.

(4) seeing that there is no unnecessary delay when you report safety and fire protection problems which are beyond your authority for action.

Put boxed material on the BB.

Q: How can your Safety and Fire Protection Officer assist you?

A: [Items (1) through (5) on the right.] Supply any not mentioned by the group. Many mentioned which are not listed may be perfectly acceptable.

b. Your Safety and Fire Protection Officer can assist you--

by--

(1) spearheading the station safety and fire protection programs.

(2) supplying advice, particularly on corrective actions--correcting unsafe conditions and unsafe acts.

(3) "going to bat" for you in getting action on justifiable safety and fire protection requests.

(4) suggesting training materials and aids which you can use in developing safety consciousness in your employees and motivating them to adopt safe practices.

(5) assisting you in the investigation of accidents and fires and analysis of causes.

Put boxed material on the BB.

c. The employees you supervise can also help.

(1) Besides applying all established safe practices and reporting

unsafe conditions or practices to you, as all employees are expected to do, and

(2) cooperating wholeheartedly in the safety and fire protection program and in any meetings you may hold,

Q: What special safety and fire protection assignments can individual employees you supervise take on?

A: [Items (a) through (c) on the right.] Supply any not mentioned by the group. Many mentioned which are not listed may be perfectly acceptable.

(3) they can take on special safety assignments at your specific request, such as--

  (a) making regular safety and fire protection inspections of specific things or specific areas.

  (b) instructing new employees in the proper use of safety devices and personal protective equipment.

  (c) keeping accident records.

4. Before we leave this brief discussion on assistance, we should give some attention to the assistance you as a supervisor can give to the total program of safety and fire protection.

  a. There are at least three ways you can help. They are:

    (1) assistance you can give to supervisors above you.

    (2) assistance you can give yourself.

    (3) assistance you can give those you supervise.

  b. What we have to suggest is not related to specific aspects of safety and fire protection but rather to the program as a whole.

  c. You can assist supervisors above you, both here and in Central Office, by keeping your immediate supervisor posted and letting him know:

    (1) how well the administrative framework--the standards, requirements, etc.--of the agency and of this station are working out.

    (2) how things can be improved.

Put on BB: "SAFETY IS AN INTEGRAL PART OF SUPERVISION."

  d. You can assist yourself by developing a particular way of viewing your safety and fire protection job. And that way is to view safety and fire protection as an integral part of supervision--not as a separate program, not as a separate compartment, separately planned, financed, and carried out.

(1) We don't set out to develop safe methods for doing a job; we set out to develop efficient methods, and one of the factors we consider is safety.

(2) We don't set out to train our employees in safe practices; we set out to train them in the best way to do each of their tasks, and one of the factors we consider is safety.

(3) Safety is not one of the things you do; safety is part of everything you do.

e. You can assist your employees--

(1) in their responsibility for applying all established safe practices by:

(a) being sure they are informed of all established safe practices, and

(b) showing them how to apply them;

(c) seeing that they do apply them--correcting, praising, etc.

(2) in their responsibility for reporting unsafe conditions or practices by:

(a) taking prompt action on their reports, and

(b) letting them know what you've done.

(SUMMARY)

1. You don't carry the responsibility for safety and fire protection without help--far from it.
2. The agency as a whole has specific standards and requirements designed to conserve human and material resources through safety and fire protection.
3. Here on this station you receive help from--
    a. Supervisors above you, including your Manager,
    b. The Safety and Fire Protection Officer, and
    c. Your employees.

4. You are also encouraged to give assistance to the total program by--

   a. sending information up the line,

   b. accepting your own responsibility for safety and fire protection as an integral part of supervision, and

   c. informing, training, and reporting to your employees.

B. Part Two (second hour)

What to do

What to say

(INTRODUCTION)

1. You have participated in five hours of group training and a certain amount of additional time on your own to get--

   a. an understanding of what causes accidents and fires,

   b. a better acquaintance with your supervisory role in safety and fire protection, and

   c. some concrete suggestions on how to carry out your safety and fire protection responsibilities.

2. The value of this experience can be measured only by what you do as a result of this investment in time and energy--by how your behavior changes and how you influence your employees.

3. But before "doing" comes "knowing." You must know before you can do.

4. To help you discover what you know about some of the things we set out to teach you, we have developed a short objective-type quiz--15 multiple-choice questions which touch on the main points of the course.

5. We expect the quiz and the discussion of the answers afterwards to serve as a summary of the course.

Erase the blackboard.

(PRESENTATION)

Distribute Handout III-A, "Quiz for Supervisors on Safety and Fire Protection."

1. Here is the quiz.

   a. Circle the letter in front of the one best answer.

   b. Do not put your name on the paper.

      (1) We do not want to check up on you or record your scores as individuals;

(2) We do, however, want some indication of what you as a group know about the things we wanted you to learn.

(3) So we shall take up the papers at the end of the meeting.

Allow enough time for everyone to finish the quiz. This should take 8 or 10 minutes. After 10 minutes, check to see if anyone has not finished. If so, allow more time; check with these people again later.

2. Let's discuss the answers.

Read the question.

Question 1. Nearly three-fourths of the fires in the VA are caused by--

- a. electricity.
- b. fires in waste baskets.
- c. lighted cigarettes.
- d. smoking and matches.

Q: Which is the best answer?
A: "d. smoking and matches."

Q: Of the fires caused by smoking and matches, most were due to what single unsafe act?
A: Smoking in bed.

Q: Under what conditions may patients smoke in bed?
A: Patients may smoke in bed only if bedfast and only when attended.

Read the question.

Question 2. The major point of attack in accident prevention is--

- a. the hazard.
- b. the accident.
- c. the injury.
- d. the personal fault.

Q: Which is the best answer?
A: "a. the hazard."

Q: What are the three kinds of hazards?
A: The unsafe condition, the unsafe act, and the two in combination.

Q: Do personal faults lead to unsafe conditions or unsafe acts?
A: Both.

Read the question.

Question 3. In the interest of prompt evacuation in case of fire, you as a supervisor should follow certain practices. Which of the following is not a good fire protection practice?

- a. Keep exit routes in your work area clear.
- b. Insure that your employees know what to do when the fire alarm sounds.

Q: Which is not a good fire protection practice?
A: "d. Keep fire doors at stairway enclosures open at all times."

Q: Why is this not a good practice?
A: Fire doors at stairway enclosures are to prevent the upward spread of smoke, hot gases, and fire and therefore should be kept closed.

Read the question.

Q: Which would you classify as an accident?
A: "c. fire."

Q: How would you classify the other three?
A: All as injuries.

Q: Why is it important to distinguish between an accident and an injury?
A: Knowing what the injury is will not be helpful in determining the cause of the accident; only the accident itself can lead us to the cause.

Read the question.

Q: Which is most acceptable?
A: "c. Fire doors should not be obstructed or wedged open. Stairway enclosure doors should always be closed."

Q: What's wrong with a?
A: Smoke barrier doors and room doors need be closed only at the time of fire.

c. Insure that your employees react promptly when the fire alarm sounds.
d. Keep fire doors at stairway enclosures open at all times.

Question 4. Considering the accident sequence, which of the following would you properly classify as an accident?

a. sprain
b. bruise
c. fire
d. burn

Question 5. Which of the following is the most acceptable statement on what to do about doors in limiting the spread of fire?

a. All doors should be kept closed at all times.
b. Stairway enclosure doors, smoke barrier doors, and room doors should be kept closed at all times.
c. Fire doors should not be obstructed or wedged open. Stairway enclosure doors should always be closed.
d. All fire exit doors, smoke barrier doors and room doors should be closed.

Q: What's wrong with b?
A: Smoke barrier doors and room doors need be closed only at the time of fire.

Q: What's wrong with d?
A: Certain fire exit doors can't be closed, as they are necessary for evacuation.

Read the question.

Question 6. Your Safety and Fire Protection Officer can be of help to you in many ways. Which of the following is not a proper activity for him to perform?

a. advising you on corrective action which may be taken to eliminate an unsafe condition.
b. supporting your request for justifiable safety equipment.
c. preparing SF 92.
d. suggesting materials for use in employee safety meetings.

Q: Which of these is not proper for your Safety and Fire Protection Officer to do?
A: "c. preparing SF 92."

Q: What is SF 92?
A: Supervisor's Report of Accident.

Read the question.

Question 7. Which of the following types of fire extinguishers may successfully be used on a fire in live electrical equipment?

a. soda-acid.
b. carbon-dioxide.
c. water pump.
d. foam.

Q: What do we use on a fire in live electrical equipment?

A: "b. carbon-dioxide."

Q: What class is fire in live electrical equipment?
A: Class C.

Q: Why shouldn't any of the other three types be used?
A: Their charge is a conductor of electricity. We must use a non-conductor.

Read the question.

Question 8. You as a supervisor can do most to further which of the following fundamental principles of fire protection?

a. prompt discovery, giving the alarm, and extinguishing of fire.
b. fire prevention.
c. limiting the spread of fire.
d. adequate provision for evacuation.

Q: Which can you do most to further?
A: "b. fire prevention."

Q: Over what two elements can you exert control in the prevention of fire?
A: Heat and fuel.

Q: Why not oxygen?
A: It's ever-present in the air.

Read the question without the answers.

Question 9. When an accident strikes, which of the following would be the best first four steps to take? Consider both what you would do and the sequence in which you would do it.

a. Go to the scene of the accident.
Notify your safety officer.
Find the immediate cause.
Get identifying information.

b. Go to the scene of the accident.
See that the injured gets medical care.
Notify your safety officer.
Get identifying information.

c. Go to the scene of the accident.
See that the injured gets medical care.
Notify your safety officer.
Find the immediate cause.

d. Go to the scene of the accident.
Notify your safety officer.
See that the injured gets medical care.
Get identifying information.

Q: Which is the best answer?
A: "b. Go to the scene of the accident.
See that the injured gets medical care.
Notify your safety officer.
Get identifying information.

Q: Why get identifying information; won't the safety officer do it when he arrives?
A: Reporting accidents is a supervisory responsibility.

Q: What's the fifth step?
A: Find the immediate cause.

Read the question.

Question 10. Which of the following has primarily an advisory rule in safety and fire protection?

a. the Manager.
b. the station's first-aid fire fighting organization.
c. the employee.
d. the safety and fire protection committee.

Q: Which does have primarily an advisory role?
A: "d. the safety and fire protection committee."

Q: Who has primarily an advisory and stimulative role?
A: The safety and fire protection officer.

Read the question.

Question 11. Once an accident has occurred, the key to prevention of similar accidents is--

a. taking appropriate corrective action.
b. conducting a training course in safety.
c. finding the cause of the accident.
d. providing personal protective equipment.

Q: What is the key?
A: "c. finding the cause of the accident."

Q: Why would not one of the other answers be correct since each is a thoroughly acceptable thing to do?
A: None of them is the key. The cause must be found before you can know what corrective action is appropriate, what training is needed, and whether or not protective equipment is needed.

Read the question.

Question 12. You would not use a soda-acid fire extinguisher on fire in which of the following--

a. waste paper basket.
b. bed clothes.
c. grease disposal can.
d. forms and publications storage room.

Q: Which is the best answer?
A: "c. grease disposal can."

Q: Why would you not use soda-acid on a grease fire?
A: Its charge could spread the fire;
It would not extinguish the fire.

Q: What kind would you use?
A: Dry chemical, carbon-dioxide, or foam.

Read the question.

Question 13. Which of the following is likely to make the least contribution in preventing accidents?

a. reporting the accident completely and promptly.
b. seeing that the injured gets medical care.
c. investigating the accident thoroughly.
d. enforcing safety regulations.

Q: What is the best answer?
A: "b. seeing that the injured gets medical care."

Q: How does reporting the accident completely and promptly help?
A: Part of the report itself provides for the supervisor to state what he has done to correct conditions causing the accident,

what remains to be done and why. Also the report helps station management in preventing similar accidents elsewhere on the station.

Q: How does investigating the accident thoroughly help?
A: It gets at the causes, which are necessary to determine before corrective action can be taken.

Q: How does enforcing safety regulations help?
A: It helps to insure that unsafe acts are not committed.

Read the question.

Question 14. Considering the major cause of fire in the VA, which of the following is the most important thing you as a supervisor can do to control heat in the prevention of fire?

a. insure that areas where flammables are stored carry the necessary "no smoking" signs and warnings.
b. enforce smoking regulations.
c. report worn, broken, frayed electric wire coverings; loose sockets, faulty plugs; broken or missing switch plates.
d. eliminate the storage of oily, greasy, paint-spotted rags, work clothes, or paper in dark, unventilated places.

Q: Which is the best answer?
A: "b. enforce smoking regulations."

Q: What are the smoking regulations of this station?
A: [To be supplied locally.]

Read the question.

Question 15. Which of the following would not be a proper safety and fire protection maxim for supervisors?

a. Eliminate the unsafe condition and the unsafe act.
b. Safety is an integral part of supervision.
c. Set a good safety example.
d. Report all unsafe conditions and fire hazards to higher authority for action.

Q: Which would not?
A: "d. Report all unsafe conditions and fire hazards to higher authority for action."

Q: Why not?
A: Some of them you can correct yourself.

Q: Are there any questions on any of the items we discussed?

3. That concludes the quiz.

a. Count the number of questions you did not answer correctly and write the number missed on the back of the last sheet. Be sure you have marked your incorrect answers.

b. Turn in your paper.

4. In concluding the course, I would like only to say that I hope we have learned a little more than we knew before about--

    a. what causes accidents and fires,
    b. what the supervisor's role is in safety and fire protection, and
    c. how to carry out your responsibilities for safety and fire protection.

    and that we actually put to use what we have learned.

Appendix A

BLACKBOARD WORK

For the convenience of the instructor, the completed blackboard work for each of the three sessions is illustrated here. The instructor's preparation for giving each session should include a "dry-run" of writing the items on the blackboard he will use during the sessions. This practice will help the instructor to gauge the size of writing to use and the most advantageous spacing and placement of the items.

Writing on the blackboard during a training session may take quite a bit of training time. Yet, to complete the blackboard work in advance of the meeting and have it all before the group from the start of the session is obviously out of the question. Some other alternatives, though, can be used to save time:

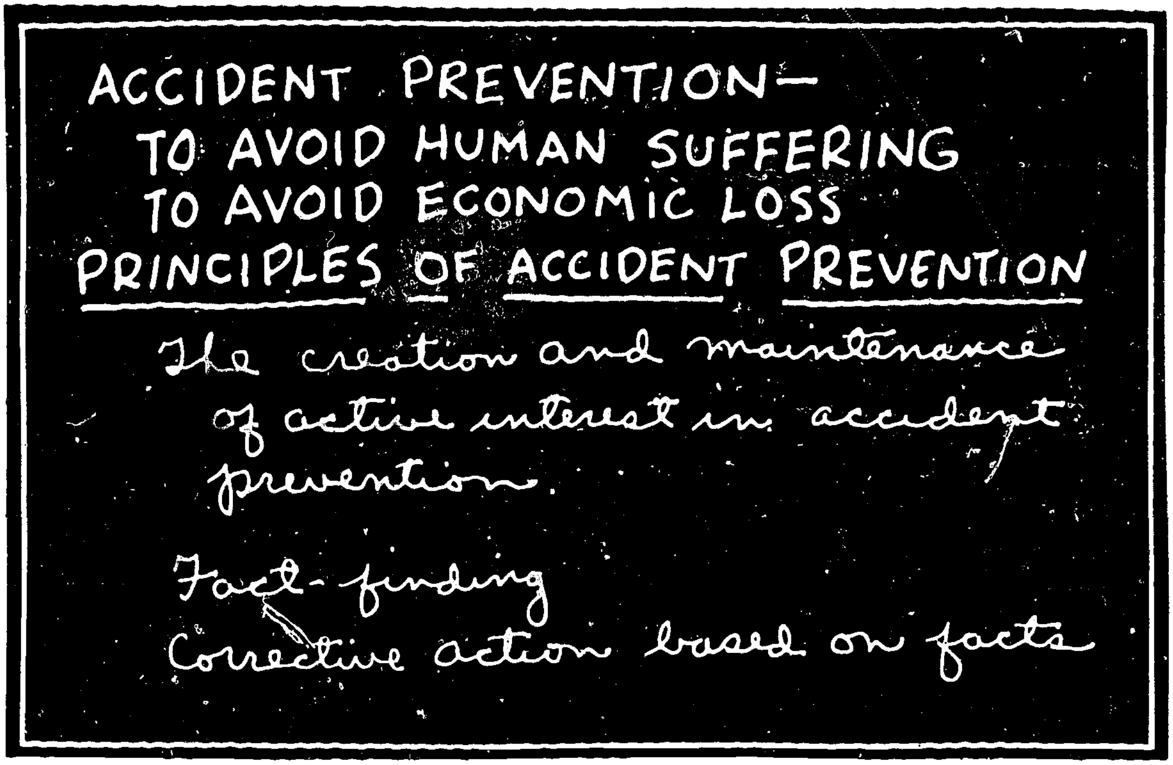
a. In advance of the session, write all of the items on a large, stiff paper board and cover each item with an individual strip of paper affixed so that it can be pulled off when the item is called for.

b. Instead of blackboard and chalk, use a chart pad and heavy crayon, with which writing can perhaps be done more rapidly.

c. Make flannel-board cutouts of each of the blackboard items and use a flannel board instead of the blackboard.

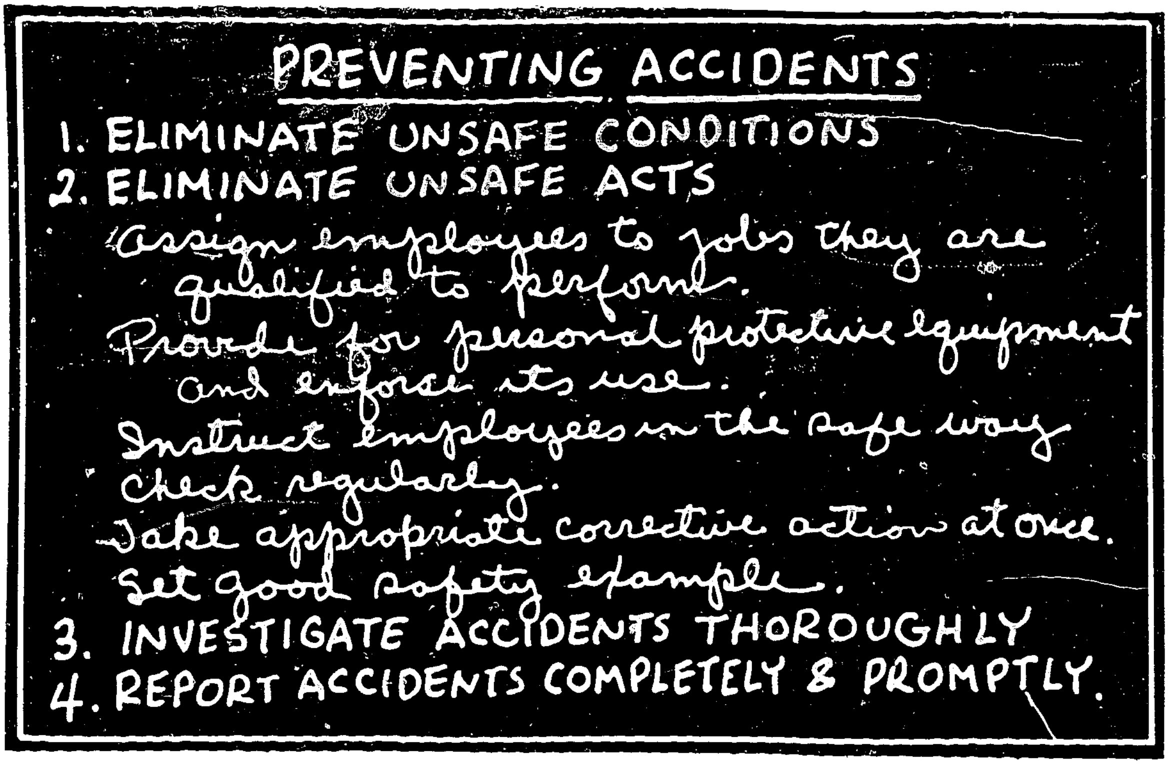
d. For each session, make a set of hinged overlaying transparencies (simply use a grease pencil on sheets of acetate or type over carbon paper on the acetate) of the blackboard items, and use an overhead projector.

The completed blackboard work for Session One should look like this:



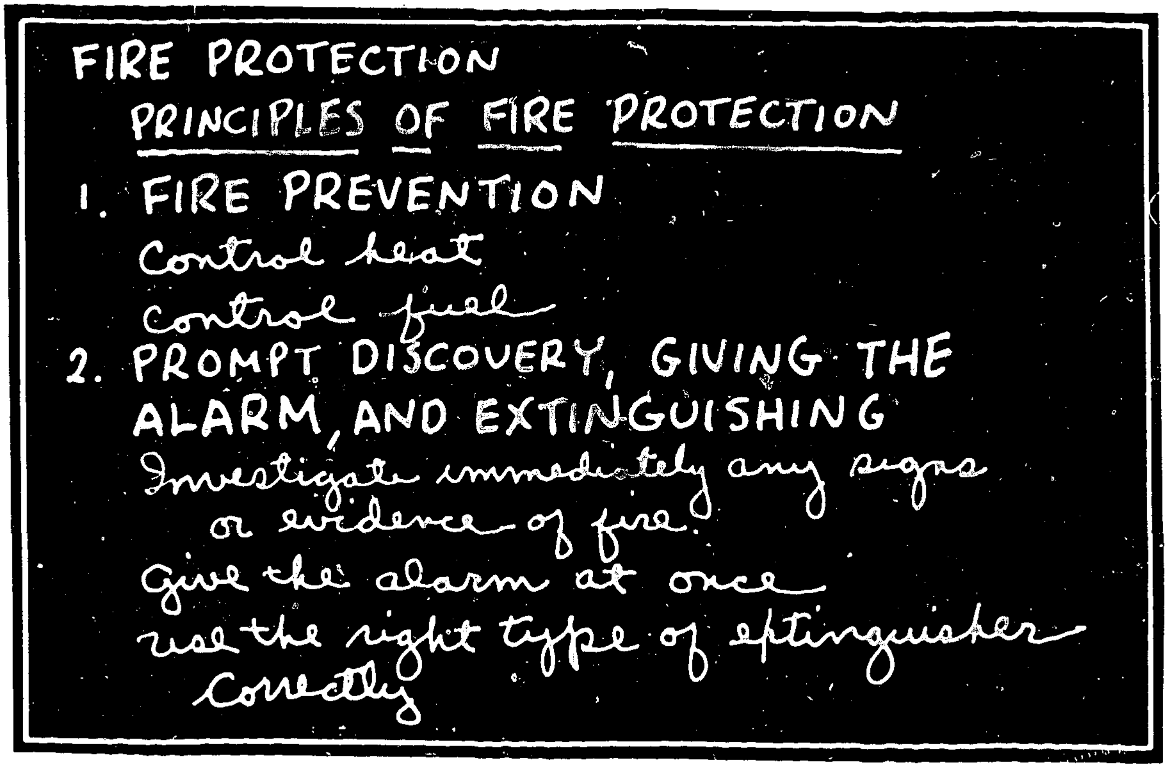
ACCIDENT PREVENTION—
TO AVOID HUMAN SUFFERING
TO AVOID ECONOMIC LOSS
PRINCIPLES OF ACCIDENT PREVENTION
The creation and maintenance
of active interest in accident
prevention.

Fact-finding
Corrective action based on facts



PREVENTING ACCIDENTS
1. ELIMINATE UNSAFE CONDITIONS
2. ELIMINATE UNSAFE ACTS
Assign employees to jobs they are
qualified to perform.
Provide for personal protective equipment
and enforce its use.
Instruct employees in the safe way
Check regularly.
Take appropriate corrective action at once.
Set good safety example.
3. INVESTIGATE ACCIDENTS THOROUGHLY
4. REPORT ACCIDENTS COMPLETELY & PROMPTLY.

The completed blackboard work for Session Two should look like this:



FIRE PROTECTION

PRINCIPLES OF FIRE PROTECTION

1. FIRE PREVENTION

Control heat

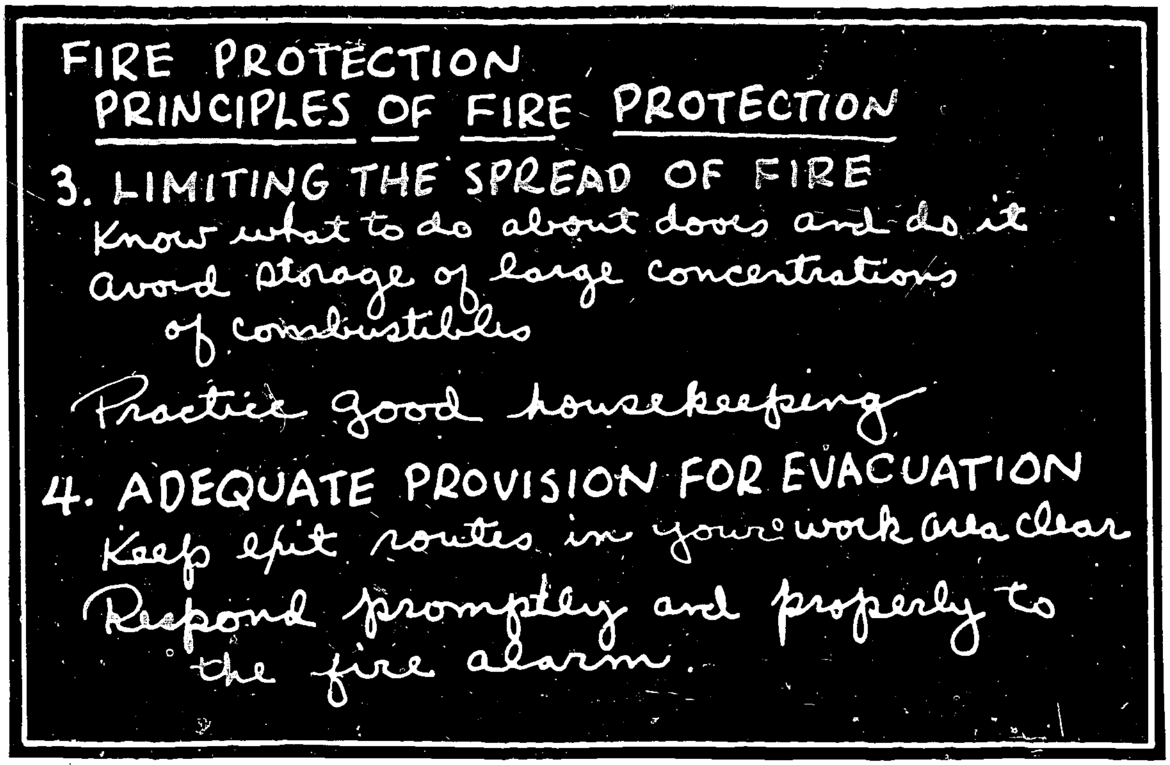
control fuel

2. PROMPT DISCOVERY, GIVING THE ALARM, AND EXTINGUISHING

Investigate immediately any signs or evidence of fire.

Give the alarm at once

use the right type of extinguisher correctly



FIRE PROTECTION

PRINCIPLES OF FIRE PROTECTION

3. LIMITING THE SPREAD OF FIRE

Know what to do about doors and do it

avoid storage of large concentrations of combustibles

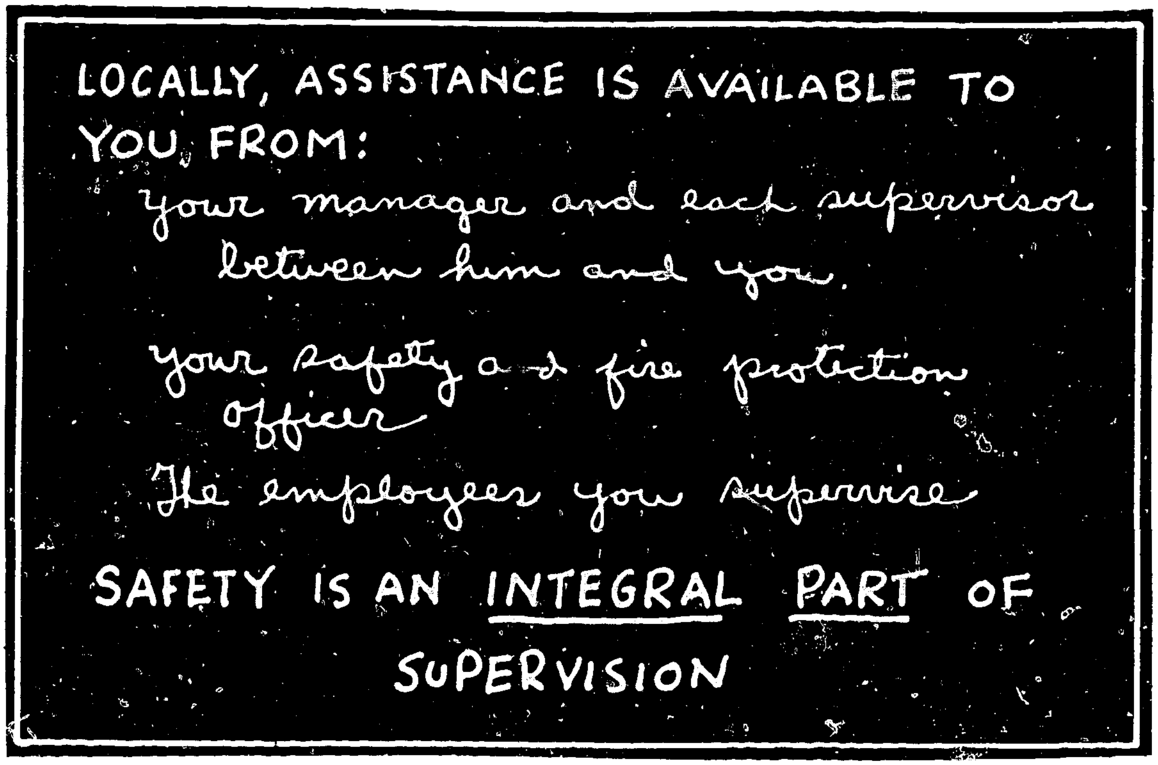
Practice good housekeeping

4. ADEQUATE PROVISION FOR EVACUATION

Keep exit routes in your work area clear

Respond promptly and properly to the fire alarm.

The completed blackboard work for Session Three should look like this:



LOCALLY, ASSISTANCE IS AVAILABLE TO YOU, FROM:

your manager and each supervisor between him and you.

your safety and fire protection officer

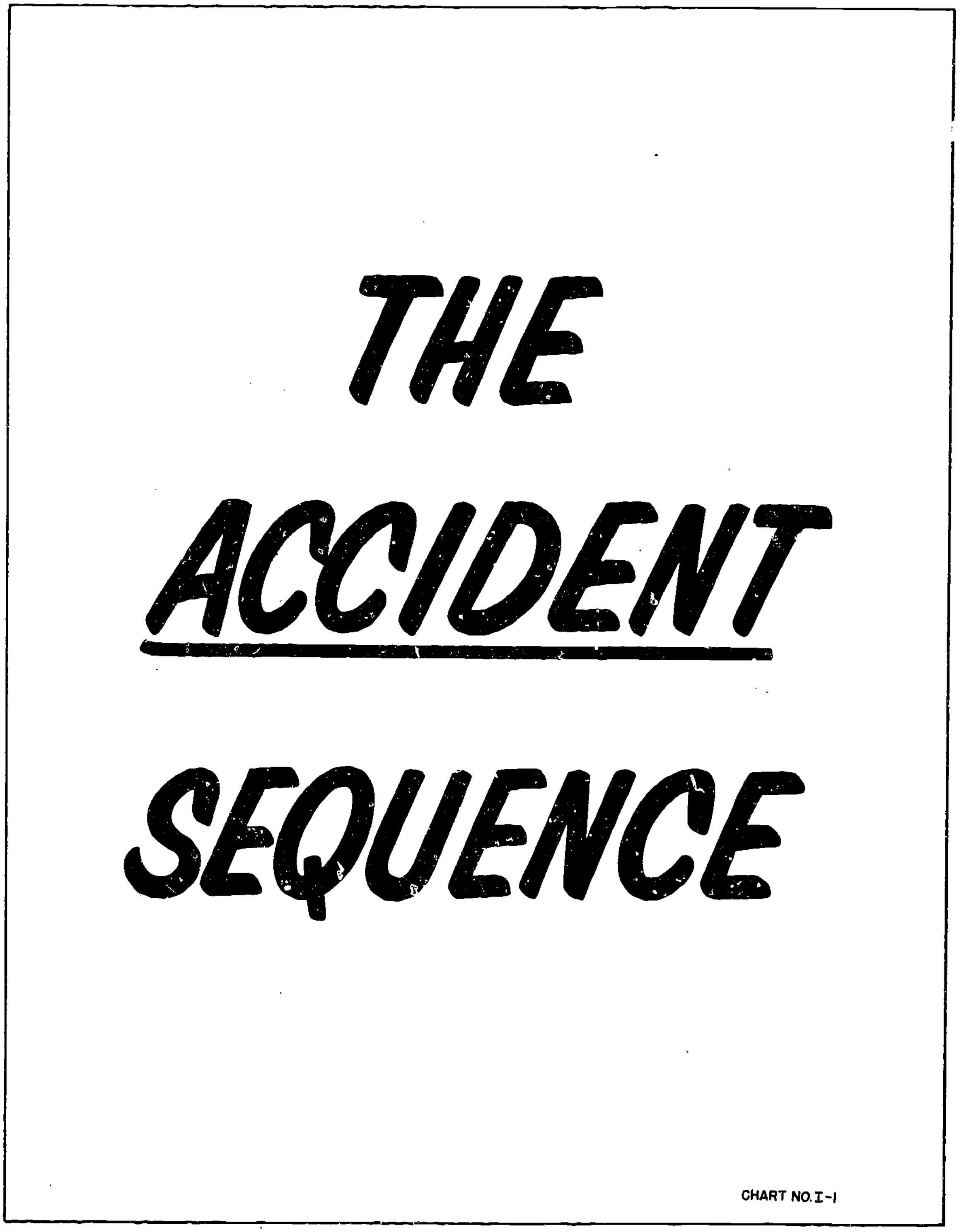
The employees you supervise

SAFETY IS AN <u>INTEGRAL</u> <u>PART</u> OF SUPERVISION

Appendix B

CHARTS

On the following 14 pages are illustrations of the 21-by-32-inch charts which are used in sessions one and two.



THE

ACCIDENT

SEQUENCE

CHART NO. I-1

3442

INHERITANCE AND SOCIAL ENVIRONMENT

PHYSICAL ABILITIES

- EYESIGHT
- HEARING
- MUSCULAR STRENGTH AND COORDINATION
- CONDITION OF HEART, LUNGS, OTHER ORGANS

MENTAL ABILITIES

- REACTION TIME
- ABILITY TO REMEMBER
- ABILITY TO REASON

TEMPERAMENT

- EMOTIONAL STABILITY
- CURIOSITY
- FLEXIBILITY

OUTSIDE INFLUENCES

- HOME
- SCHOOL
- JOB
- CHURCH
- COMMUNITY

CHART NO. I-2

PERSONAL FAULTS

- RECKLESSNESS
- INDIFFERENCE
- INATTENTION
- HOSTILITY
- LAZINESS
- TEMPER
- EXCITABILITY
- STUBBORNNESS
- INCONSIDERATENESS

CHART NO. I-3

THE HAZARD

- THE UNSAFE CONDITION
- THE UNSAFE ACT
- THE UNSAFE CONDITION AND THE UNSAFE ACT

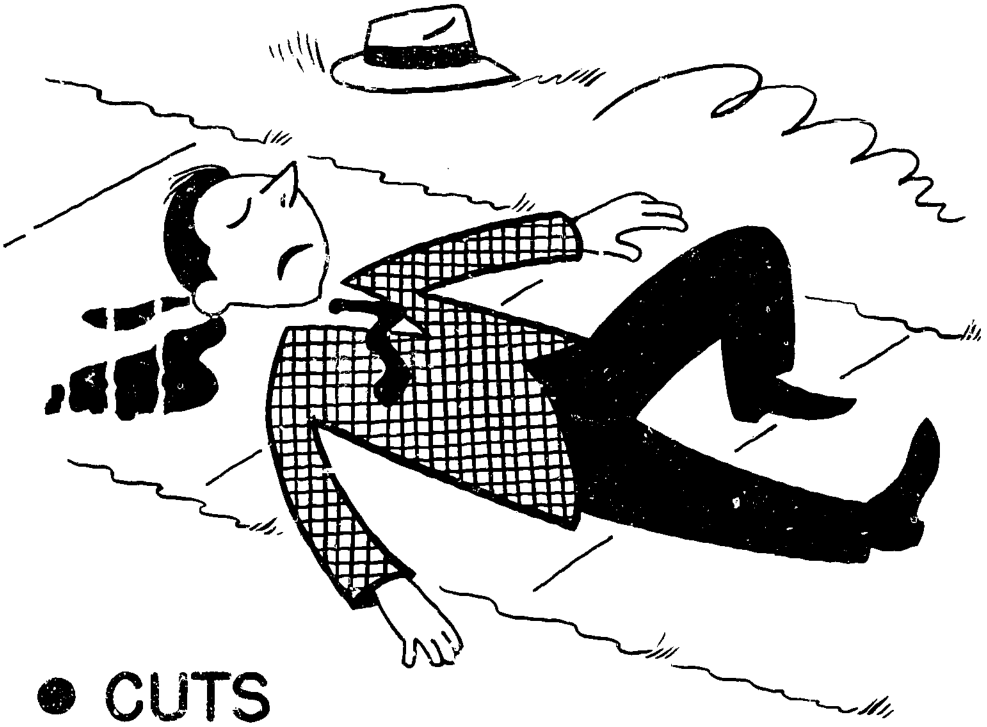
CHART NO. I-4

THE ACCIDENT

- FALLS
- STRUCK BY A FALLING OBJECT
- SLIPS
- SLIDES
- STRIKING AGAINST
- CAUGHT IN OR BETWEEN
- FIRES
- COLLISIONS
- OVEREXERTION

CHART NO. I-5

THE INJURY



- CUTS
- BRUISES
- FRACTURES
- SPRAINS
- STRAINS
- FATALITIES
- BURNS

CHART NO. I-6

ACCIDENT FACTORS

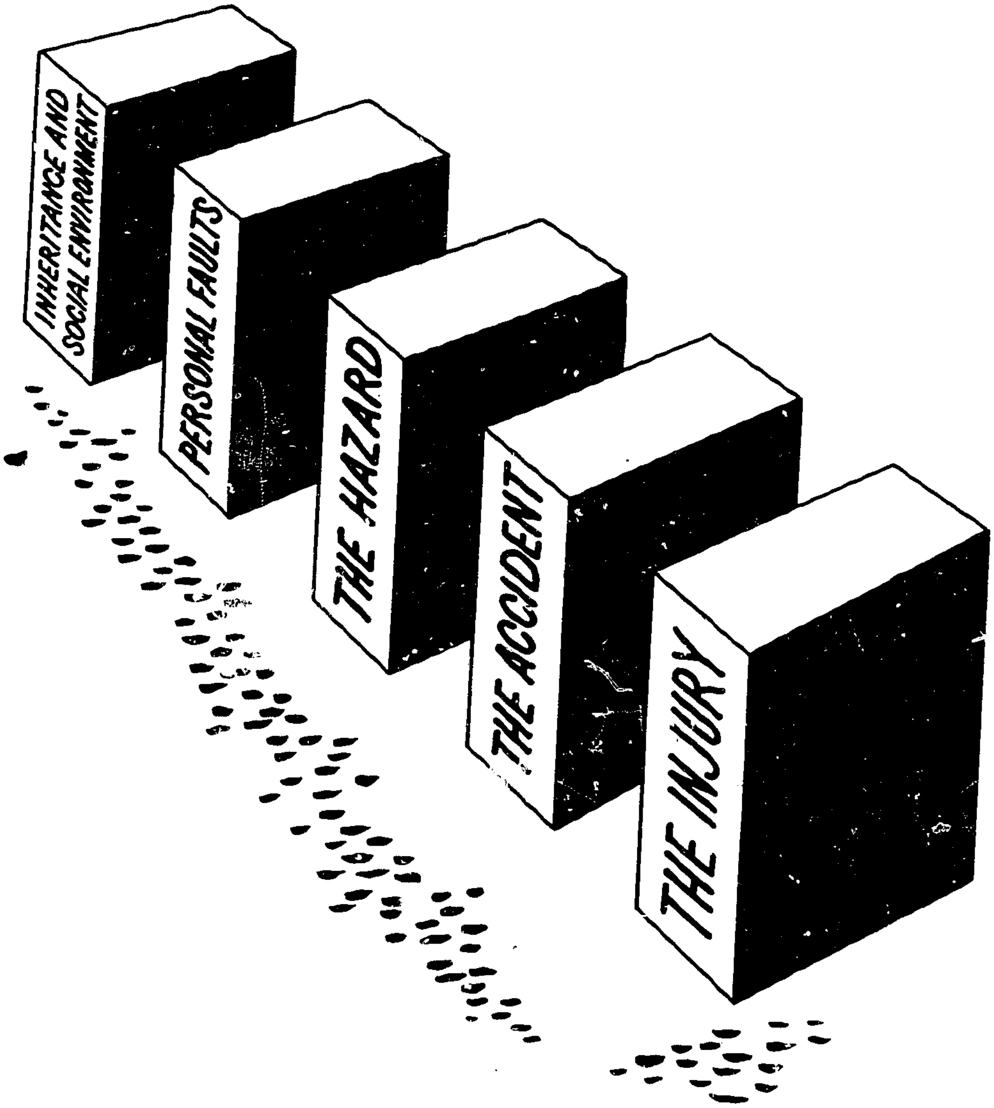


CHART NO. I-7

A SERIES OF EVENTS

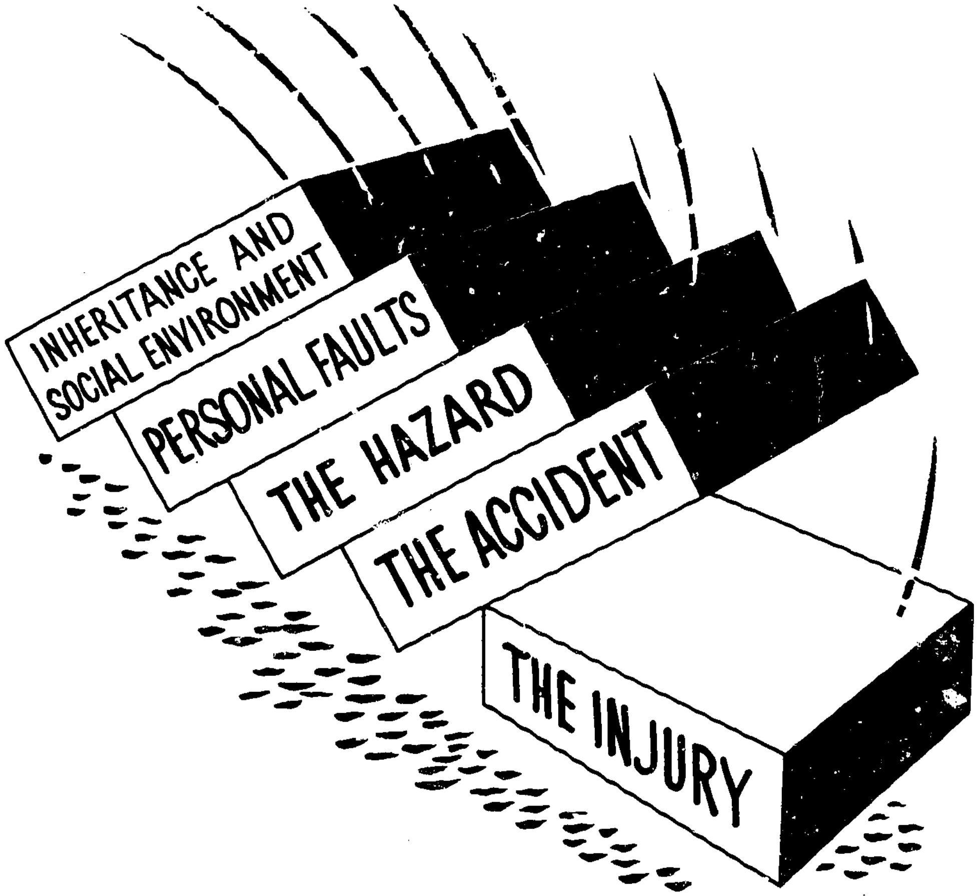


CHART NO. I-8

THE CENTRAL FACTOR

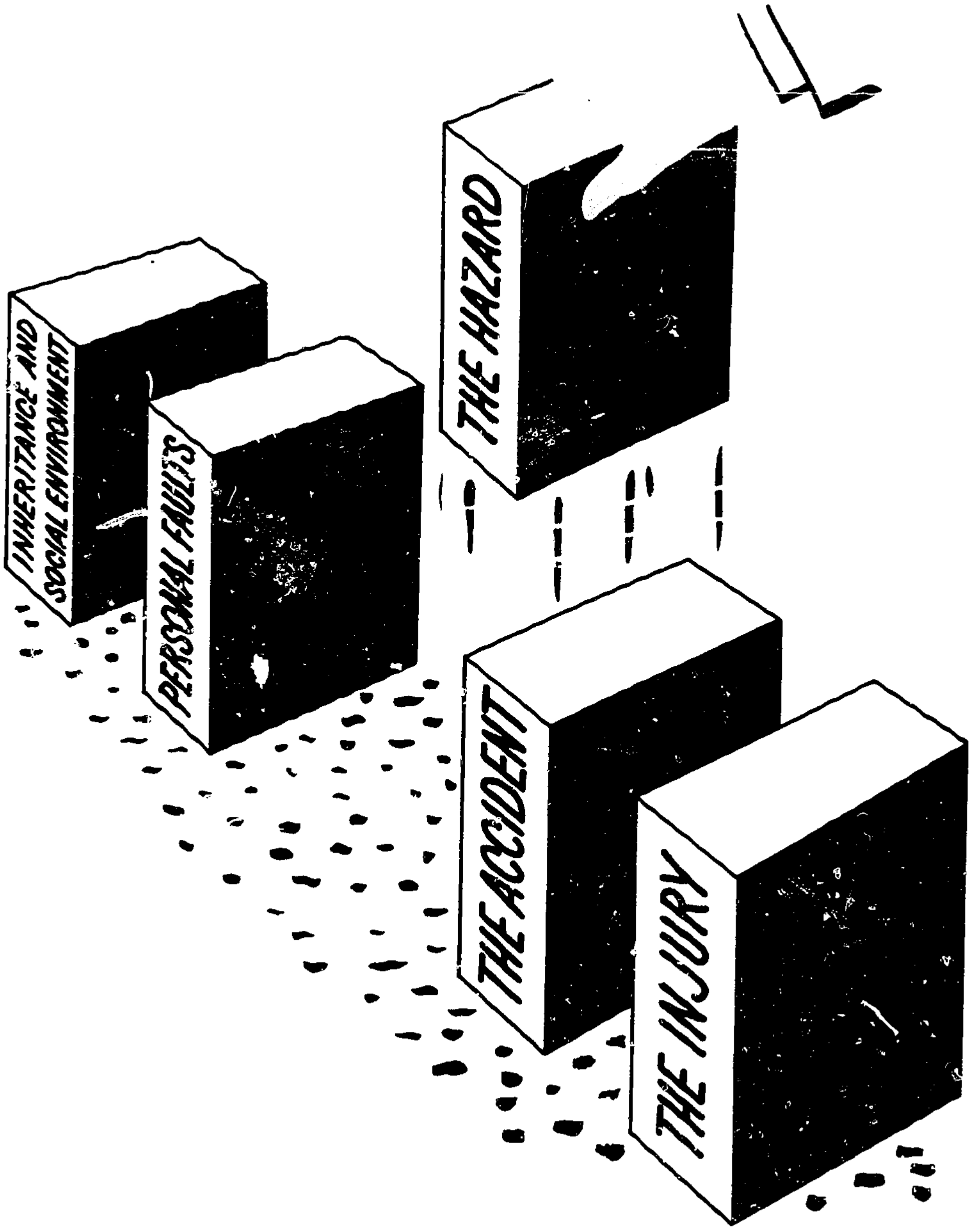
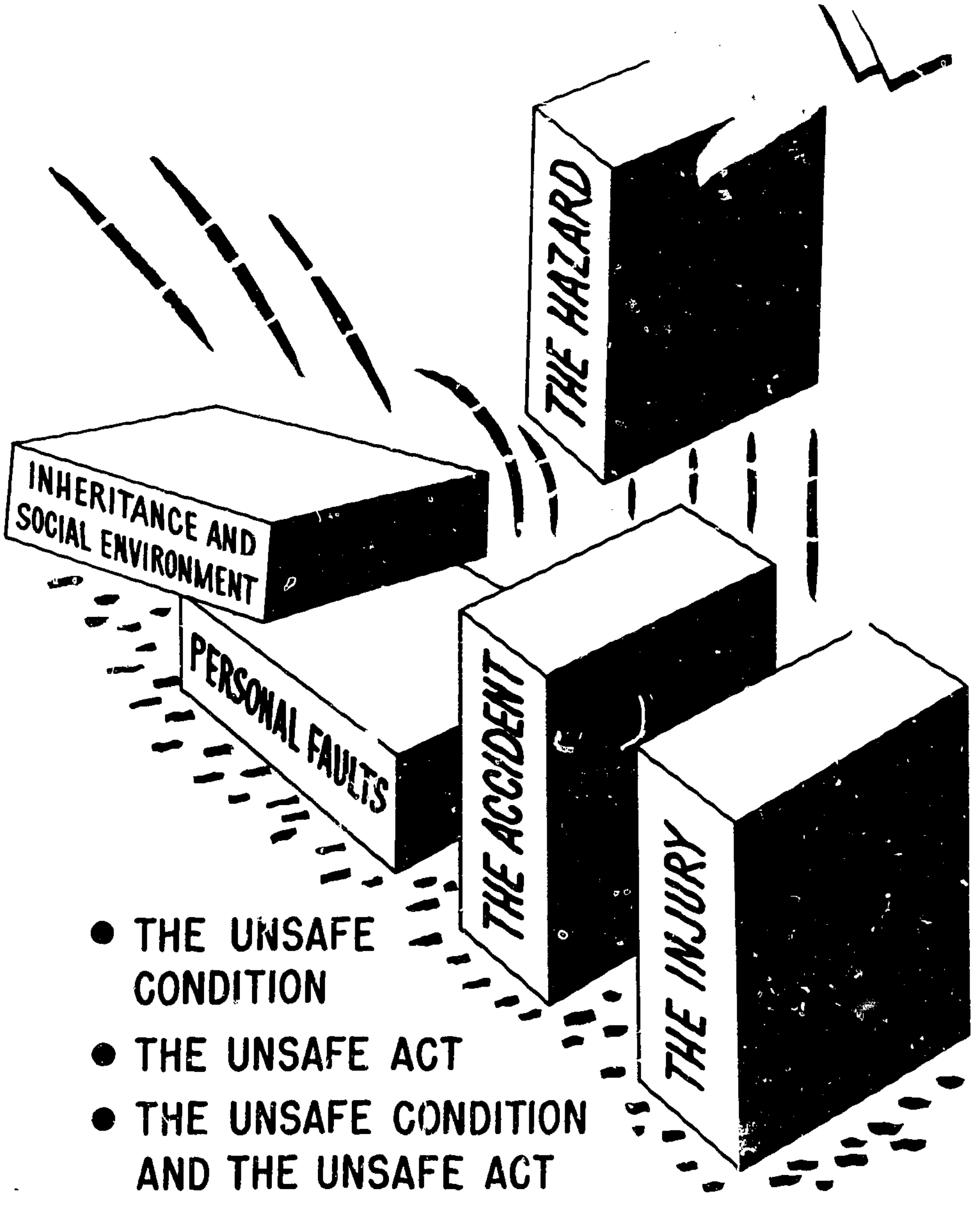


CHART NO. I-9

THE POINT OF ATTACK

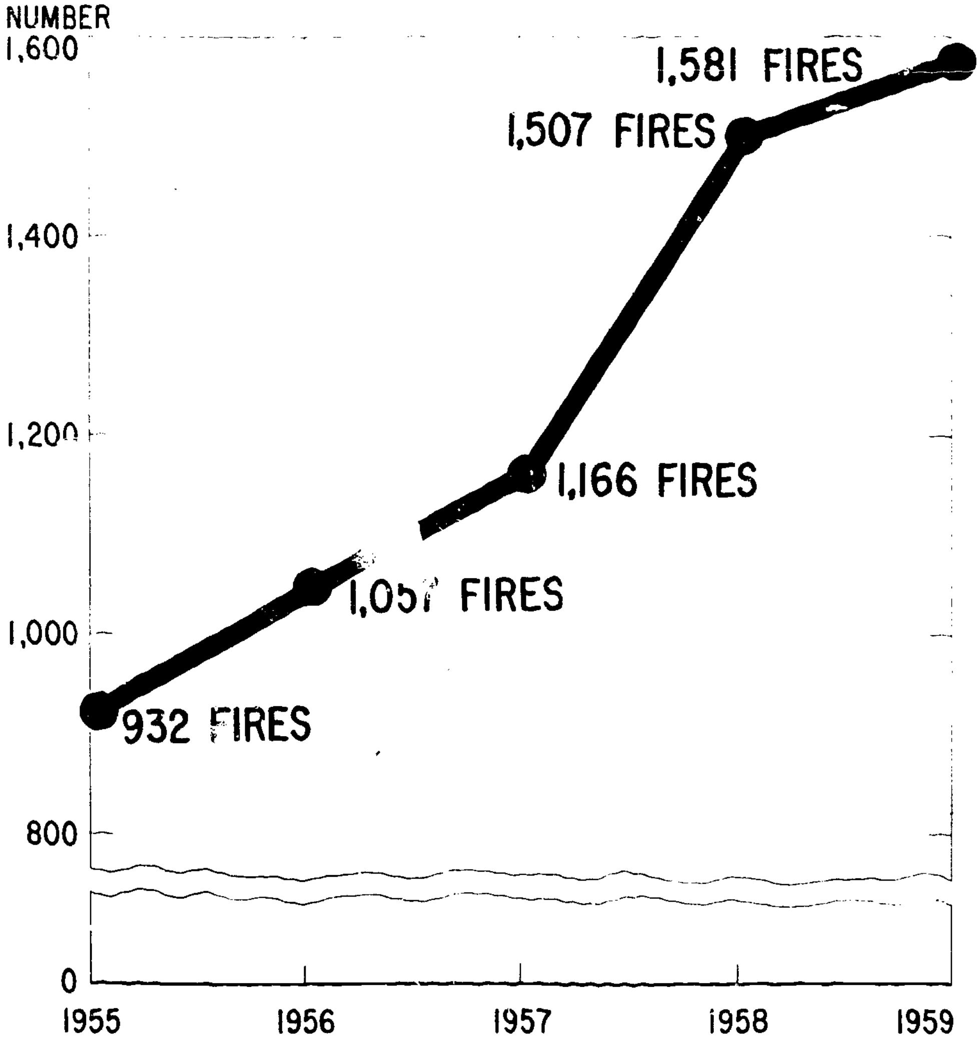


- THE UNSAFE CONDITION
- THE UNSAFE ACT
- THE UNSAFE CONDITION AND THE UNSAFE ACT

CHART NO. I-10

NUMBER OF FIRES IN THE VA

DURING THE LAST FIVE YEARS



53 PEOPLE WERE BURNED IN VA IN 1959

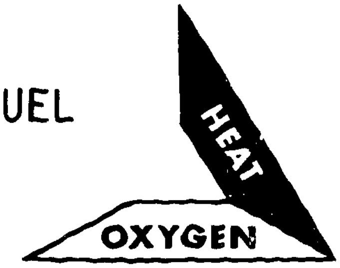
CHART NO. II-1

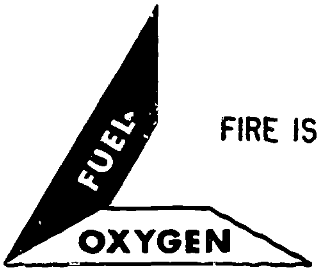
THE CHEMISTRY OF FIRE

FIRE BURNS BECAUSE THERE ARE
THREE ELEMENTS PRESENT...

- FUEL
- HEAT
- OXYGEN

FIRE IS NOT POSSIBLE WITHOUT FUEL





FIRE IS NOT POSSIBLE WITHOUT HEAT

FIRE IS NOT POSSIBLE WITHOUT OXYGEN

CHART NO. II-2

CAUSES OF VA FIRES

CALENDAR YEAR 1959

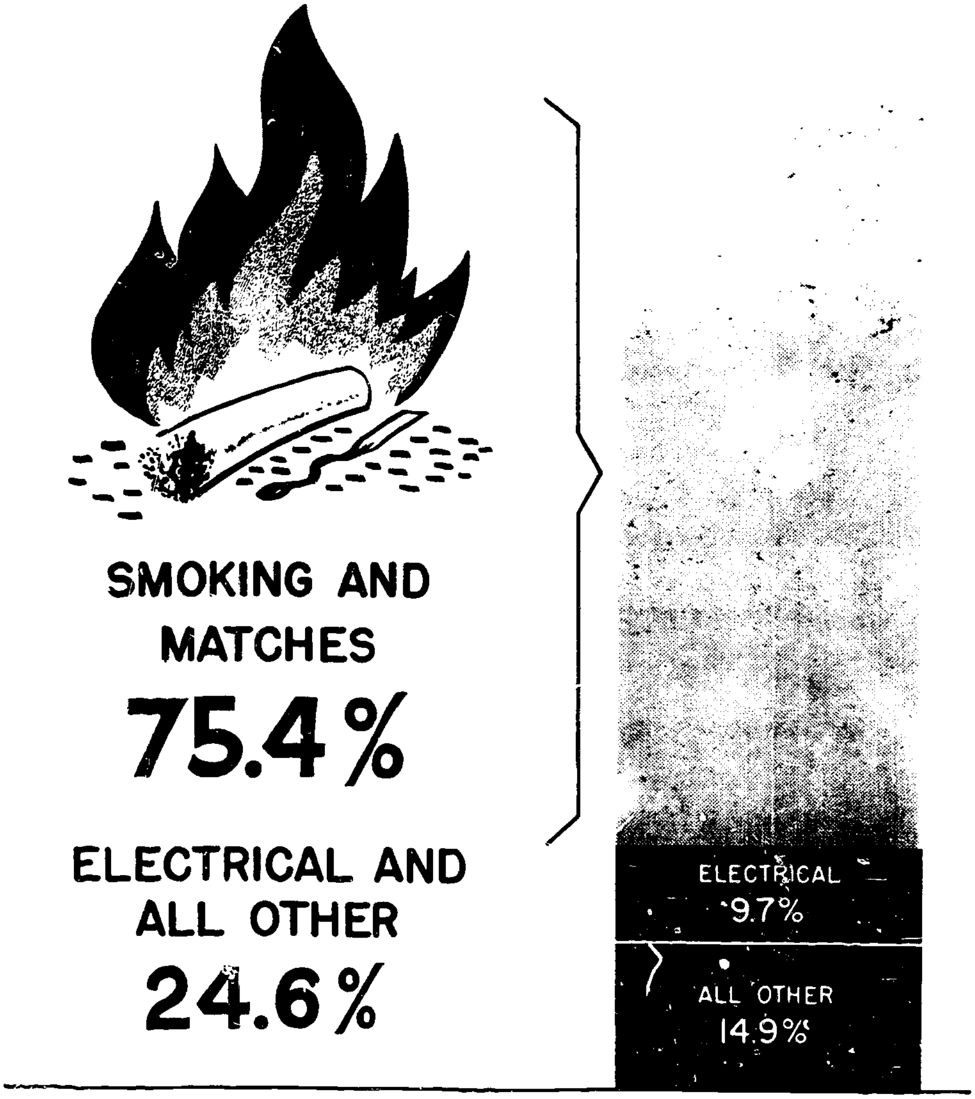


CHART NO. II-3

FIRE EXTINGUISHER FACTS

TYPE OF EXTINGUISHER	FOR WHAT KINDS OF FIRE	CONTENTS	HOW TO START	RANGE AND DURATION
SODA-ACID 	CLASS A (Wood, paper, textiles, etc.)	Water solution of bicarbonate of soda and sulfuric acid.	Turn over	30 to 40 feet 50 to 55 seconds (2½ gallon size) ● *DANGER: Do not use these water base extinguishers on electrical fires.*
PUMP TANK 		Plain water	Pump by hand	
GAS CARTRIDGE 	CLASS A ("Loaded stream" model is also good on Class B)	Water and cartridge of carbon dioxide	Turn over and bump	
FOAM 	CLASS A and CLASS B (Oil, gasoline, paint, grease, etc.)	Water solution of aluminum sulfate and bicarbonate of soda	Turn over	
CARBON DIOXIDE 	CLASS B and CLASS C (Live electrical equipment.) ● *NOTE: If nothing else is available, these extinguishers may have some effect on small Class A fires.*	Carbon dioxide	Pull pin and open valve	6 to 8 feet about 42 seconds (15 lb. size)
VAPORIZING LIQUID 		Carbon tetrachloride and other chemicals. *CAUTION: Avoid breathing vapors from extinguisher, especially in small, closed places.*	Turn handle, then pump by hand	20 to 30 feet 40 to 45 seconds (1 quart size)
DRY CHEMICAL 		Bicarbonate of soda with other dry chemicals and cartridge of carbon dioxide	THREE TYPES Pull pin or collar, then: 1. Open valve, or 2. Press lever, or 3. Turn over & bump, then squeeze nozzle.	About 14 feet 22 to 25 seconds (30 lb. size)

CHART NO. [illegible] 4

Appendix C

HANDOUTS

On the following 16 pages are copies of the 13 handouts used in the three sessions. SF 92, "Supervisor's Report of Accident," should be available at the station. Handout No. II-E, "When the Fire Alarm Sounds--," is incomplete. It is to be completed, based on local procedures and the station fire bill, and reproduced locally.

Veterans Administration Training For Supervisors in Safety and Fire Protection

THE ACCIDENT SEQUENCE

INHERITANCE AND SOCIAL ENVIRONMENT	PERSONAL FAULTS	THE HAZARD	THE ACCIDENT	THE INJURY
				
Physical Abilities, such as-- Eyesight Hearing Muscular Strength and Coordination Condition of Heart, Lungs, Other Organs Mental Abilities, such as-- Reaction Time Ability to Remember Ability to Reason Temperament, such as-- Emotional Stability Curiosity Flexibility Outside Influences, such as-- Home, School, Job Church, Community	Recklessness Indifference Inattention Hostility Laziness Temper Excitability Inconsiderateness Stubbornness	Unsafe Conditions: Poor Housekeeping Unsafe Equipment Unguarded Machinery Poor Lighting--too much; too little Poor Ventilation Absence of Signs Unsafe Acts: Failing to recognize an unsafe condition Using an incorrect method Practicing faulty work habits Failing to use safety devices, such as handrails Engaging in horse-play	Falls Struck by a Falling Object Slips Slides Striking Against-- Caught In or Between Fires Collisions Overexertion	Cuts Bruises Fractures Sprains Strains Fatalities Burns

Handout No. I-A

UNSAFE CONDITIONS TO LOOK FOR

Broken or worn floor coverings

Oil, water, other liquids, and debris on the floor

Absence of necessary safety devices on equipment

Unsafe storage of materials or tools

Interference with free swinging of doors

Windows difficult to open and close

Cluttered window sills

Inadequate illumination

Inadequate ventilation

Need for warning signs in hazardous areas

Supplies and materials stacked improperly

Need to barricade unsafe areas

Supplies and materials stored in inaccessible places

Telephone wires and other electric wires in walk areas

Furniture and equipment in need of repair

Insecure pictures, mirrors, fans, lighting fixtures

Piling of papers and files on top of book cases, filing cabinets, etc.

Tools and accessories accessible to patients

Matches, smoking materials accessible to patients to whom they are restricted.

Lack of observance of special safety precautions in areas where conditions are a special hazard, such as where X-ray equipment and radioisotopes are used.

Inadequate labelling of solvents and poisonous liquids

- CIRCLE those items which you should look for in your own work area.
- ADD other items (not listed) peculiar to your own work area which you should look for:

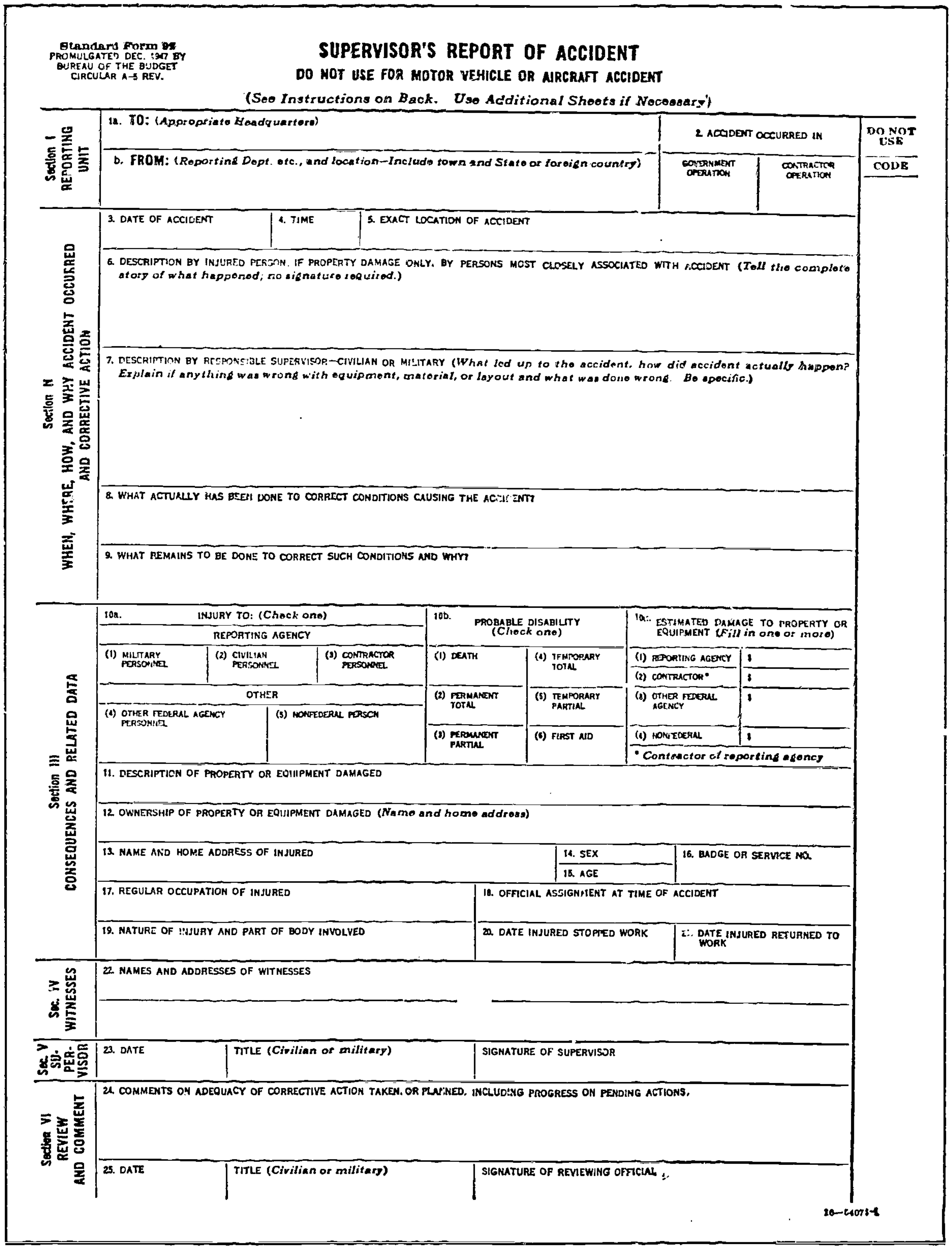
WHEN AN ACCIDENT STRIKES--

1. Go to the scene of the accident.
2. See that the injured gets medical care.
3. Notify your safety officer.
4. Get identifying information--
   a. Who?
   b. When?
   c. Where?
   d. What?
   e. Why?
5. Find the immediate cause.
6. Follow back to the indirect cause.
7. Estimate injury to people and damage to materials and equipment.
8. List the necessary action to remove the cause.
9. Follow through.

Handout No. I-C

SF 92, SUPERVISOR'S REPORT OF ACCIDENT
(front)

On the back of the form are instructions for completing the six sections and an illustration of the form properly completed.



Standard Form 92
PROMULGATED DEC. 1947 BY
BUREAU OF THE BUDGET
CIRCULAR A-5 REV.

SUPERVISOR'S REPORT OF ACCIDENT
DO NOT USE FOR MOTOR VEHICLE OR AIRCRAFT ACCIDENT

(See Instructions on Back. Use Additional Sheets if Necessary)

Section I REPORTING UNIT

1a. **TO:** *(Appropriate Headquarters)*

b. **FROM:** *(Reporting Dept. etc., and location—Include town and State or foreign country)*

2. ACCIDENT OCCURRED IN
GOVERNMENT OPERATION
CONTRACTOR OPERATION

DO NOT USE
CODE

Section II WHEN, WHERE, HOW, AND WHY ACCIDENT OCCURRED AND CORRECTIVE ACTION

3. DATE OF ACCIDENT
4. TIME
5. EXACT LOCATION OF ACCIDENT

6. DESCRIPTION BY INJURED PERSON, IF PROPERTY DAMAGE ONLY, BY PERSONS MOST CLOSELY ASSOCIATED WITH ACCIDENT *(Tell the complete story of what happened; no signature required.)*

7. DESCRIPTION BY RESPONSIBLE SUPERVISOR—CIVILIAN OR MILITARY *(What led up to the accident, how did accident actually happen? Explain if anything was wrong with equipment, material, or layout and what was done wrong. Be specific.)*

8. WHAT ACTUALLY HAS BEEN DONE TO CORRECT CONDITIONS CAUSING THE ACCIDENT?

9. WHAT REMAINS TO BE DONE TO CORRECT SUCH CONDITIONS AND WHY?

Section III CONSEQUENCES AND RELATED DATA

10a. INJURY TO: *(Check one)*
REPORTING AGENCY
(1) MILITARY PERSONNEL
(2) CIVILIAN PERSONNEL
(3) CONTRACTOR PERSONNEL
OTHER
(4) OTHER FEDERAL AGENCY PERSONNEL
(5) NONFEDERAL PERSON

10b. PROBABLE DISABILITY *(Check one)*
(1) DEATH
(4) TEMPORARY TOTAL
(2) PERMANENT TOTAL
(5) TEMPORARY PARTIAL
(3) PERMANENT PARTIAL
(6) FIRST AID

10c. ESTIMATED DAMAGE TO PROPERTY OR EQUIPMENT *(Fill in one or more)*
(1) REPORTING AGENCY $
(2) CONTRACTOR* $
(3) OTHER FEDERAL AGENCY $
(4) NONFEDERAL $
* *Contractor of reporting agency*

11. DESCRIPTION OF PROPERTY OR EQUIPMENT DAMAGED

12. OWNERSHIP OF PROPERTY OR EQUIPMENT DAMAGED *(Name and home address)*

13. NAME AND HOME ADDRESS OF INJURED
14. SEX
15. AGE
16. BADGE OR SERVICE NO.

17. REGULAR OCCUPATION OF INJURED
18. OFFICIAL ASSIGNMENT AT TIME OF ACCIDENT

19. NATURE OF INJURY AND PART OF BODY INVOLVED
20. DATE INJURED STOPPED WORK
21. DATE INJURED RETURNED TO WORK

Sec. IV WITNESSES

22. NAMES AND ADDRESSES OF WITNESSES

Sec. V SUPERVISOR

23. DATE
TITLE *(Civilian or military)*
SIGNATURE OF SUPERVISOR

Section VI REVIEW AND COMMENT

24. COMMENTS ON ADEQUACY OF CORRECTIVE ACTION TAKEN, OR PLANNED, INCLUDING PROGRESS ON PENDING ACTIONS.

25. DATE
TITLE *(Civilian or military)*
SIGNATURE OF REVIEWING OFFICIAL

16—64071-1

PREVENTING ACCIDENTS

Supervisors can prevent accidents by taking the following actions:

1. ELIMINATE UNSAFE CONDITIONS
   - Conduct periodic safety inspections.
   - Ask your employees to watch for unsafe conditions.
   - Correct those conditions which you can correct--those
     - o For which you have the authority to correct, and
     - o Which you can correct without hazard to yourself or others
   - Report all others to higher authority.
2. ELIMINATE UNSAFE ACTS
   - Assign employees to jobs they are qualified to perform.
     - o Include special physical requirements in the position description.
     - o Mention them again in the "Remarks" space of the SF 52, "Request for Personnel Action."
     - o Do not assign tasks to employees who are not physically or mentally able to perform them.
   - Provide for personal protective equipment and enforce its use.
   - Instruct employees in the safe way to do their work--
     - o When he first reports as a new employee.
     - o Throughout his service with you when methods, procedures, machines, tools, or equipment change.
   - Check regularly to see if employees are using proper and safe methods.
   - Take appropriate corrective action at once if they are not.
   - Set a good safety example.
3. INVESTIGATE ACCIDENTS THOROUGHLY.
4. REPORT ACCIDENTS COMPLETELY AND PROMPTLY.

Handout No. I-D

FIRE EXTINGUISHER FACTS

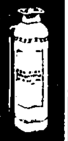
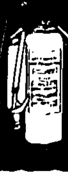
TYPE OF EXTINGUISHER	FOR WHAT KINDS OF FIRE	CONTENTS	HOW TO START	RANGE AND DURATION
SODA-ACID 	CLASS A (Wood, paper, textiles, etc.)	Water solution of bicarbonate of soda and sulfuric acid.	Turn over.	30 to 40 feet 50 to 55 seconds (2½ gallon size) ● *DANGER: Do not use these water base extinguishers on electrical fires.*
PUMP TANK 		Plain water	Pump by hand	
GAS CARTRIDGE 	CLASS A ("Loaded stream" model is also good on Class B)	Water and cartridge of carbon dioxide	Turn over and bump	
FOAM 	CLASS A and CLASS B (Oil, gasoline, paint, grease, etc.)	Water solution of aluminum sulfate and bicarbonate of soda	Turn over	
CARBON DIOXIDE 	CLASS B and CLASS C (Live electrical equipment.) ● *NOTE: If nothing else is available, these extinguishers may have some effect on small Class A fires.*	Carbon dioxide	Pull pin and open valve	6 to 8 feet about 42 seconds (15 lb. size)
VAPORIZING LIQUID 		Carbon tetrachloride and other chemicals. *CAUTION: Avoid breathing vapors from extinguisher, especially in small, closed places.*	Turn handle, then pump by hand	20 to 30 feet 40 to 45 seconds (1 quart size)
DRY CHEMICAL 		Bicarbonate of soda with other dry chemicals and cartridge of carbon dioxide	THREE TYPES Pull pin or collar, then: 1. Open valve, or 2. Press lever, or 3. Turn over & bump, then squeeze nozzle.	About 14 feet 22 to 25 seconds (20 lb. size)

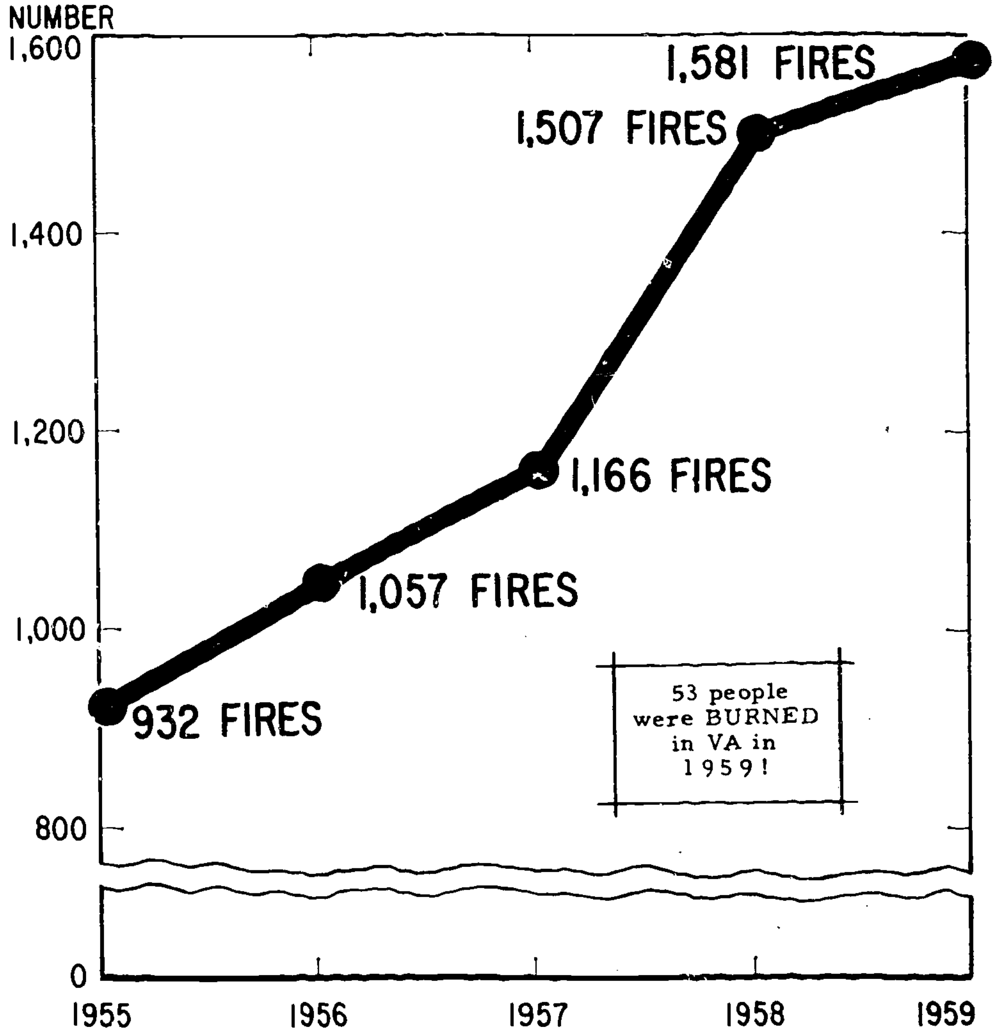
CHART NO. D-4

Handout No. I-E

3462

NUMBER OF FIRES IN THE VA

DURING THE LAST FIVE YEARS

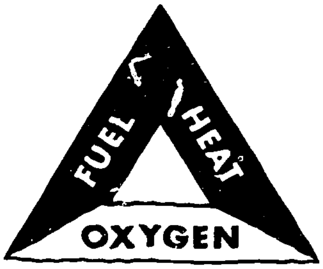


53 PEOPLE WERE <u>BURNED</u> IN VA IN 1959

Handout No. II-A

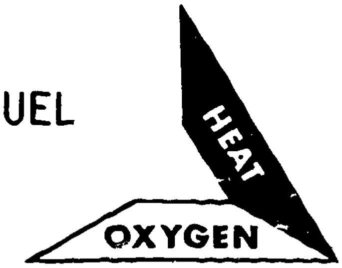
THE CHEMISTRY OF FIRE

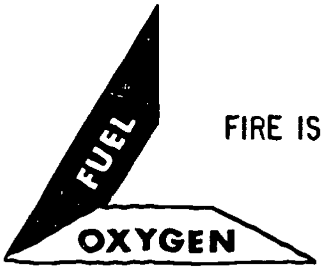
FIRE BURNS BECAUSE THERE ARE THREE ELEMENTS PRESENT...



- FUEL
- HEAT
- OXYGEN

FIRE IS NOT POSSIBLE WITHOUT FUEL





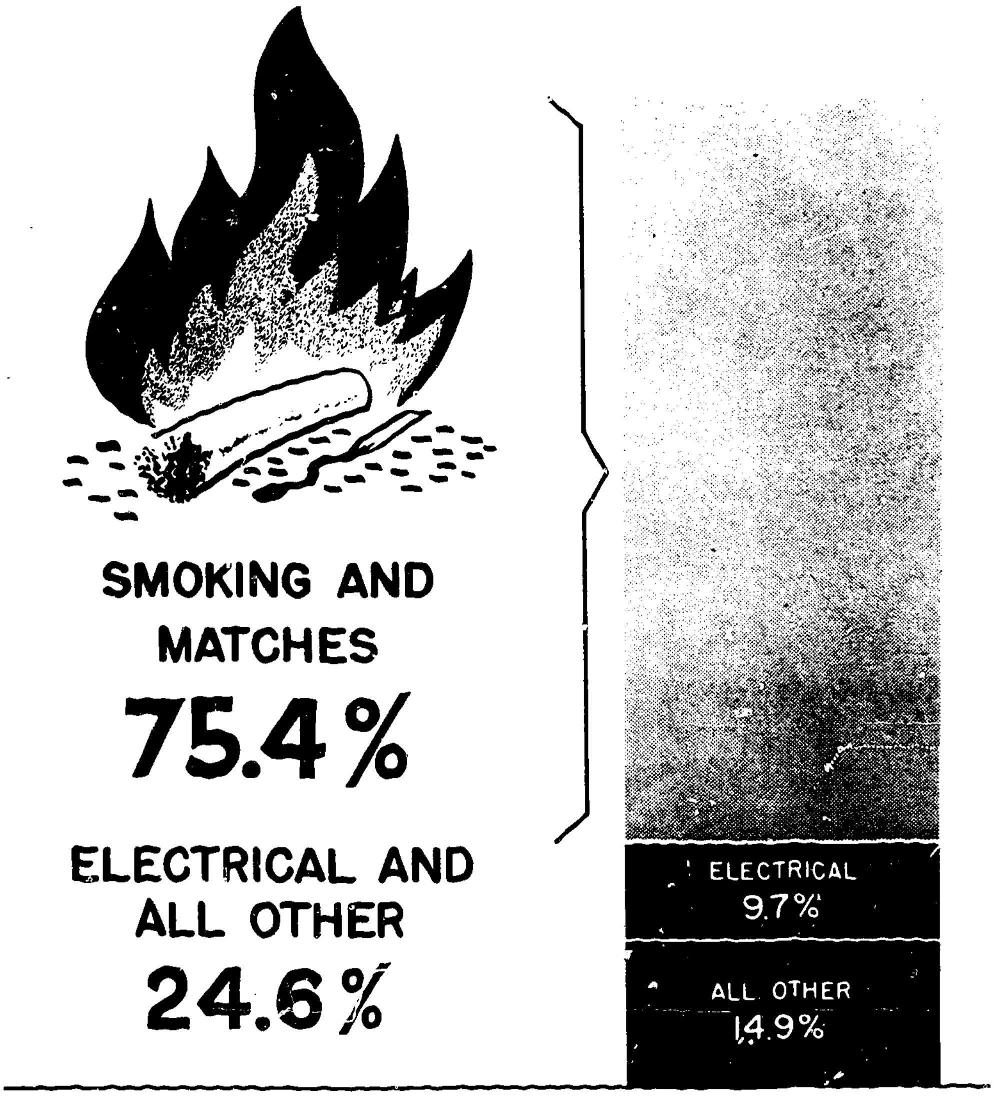
FIRE IS NOT POSSIBLE WITHOUT HEAT

FIRE IS NOT POSSIBLE WITHOUT OXYGEN

Handout No. II-B

CAUSES OF VA FIRES

CALENDAR YEAR 1959



Handout No. II-C

FIRE PREVENTION--Some Things YOU Can Do

You can help CONTROL FUEL.

Fire is not possible without fuel. To help control fuel you can:

- Practice good housekeeping.
- Require the prompt and proper disposal of waste paper, trash, wood shavings, etc.
- Obtain metal containers with snug covers for collecting easily combustible waste, such as cartons, wrapping material, used paper cups.
- Properly store volatile flammable liquids, such as gasoline, alcohol, ether, and paint, and other combustible materials such as matches, bottled gases, and stocks of paper.
- Substitute non-hazardous materials for hazardous ones where possible, such as approved typewriter cleaning fluid for alcohol.
- Keep combustible stocks at a minimum.

You can help CONTROL HEAT.

Fire is not possible without heat. To help control heat and thus prevent ignition, you can:

- Enforce smoking regulations.
- Set a good example in your smoking habits.
- Insure that areas where flammables are stored, used or disposed of carry the necessary "no smoking" signs and warnings.
- Eliminate the storage of--
  - o Oily rags in dark, unventilated corners or closets.
  - o Work clothes liberally spotted with oil, grease, or paint in unventilated lockers.
  - o Bundles of paper in quantity and spotted with oil or paint.
- Report worn, broken, frayed electric wire coverings; loose sockets, faulty plugs; broken or missing switch plates.
- Order replacements for faulty electrical equipment and fixtures.

REMEMBER, KEEP COMBUSTIBLE MATERIAL AWAY FROM SOURCES OF IGNITION!

Handout No. II-D

Veterans Administration Training for Supervisors in Safety and Fire Protection

WHEN THE FIRE ALARM SOUNDS--

Will YOU and YOUR EMPLOYEES be Ready?

- Have you kept the exit routes in your work area clear?
- Do YOU know and do YOUR EMPLOYEES know the sound of the fire alarm?

  [Insert a description of the fire alarm sound at your station.]
- Do YOU know what to do when the fire alarm sounds? Do YOUR EMPLOYEES know?

  [Insert the instructions for your station, such as "Close windows. Disconnect electrical equipment. Leave lights on, etc."]
- Do YOU know where to go when the fire alarm sounds? Do YOUR EMPLOYEES know?

  [Insert the instructions for your station.]
- Are the fire exit doors near your work area clear at all times?
- When did YOU last participate in a fire exit drill?

(To be completed, based on local procedures and the station fire bill, and reproduced locally)

Handout No. II-E

THE ORGANIZATION FOR SAFETY AND FIRE PROTECTION AT A VA FIELD STATION

"Every level of management in VA is responsible for the prevention of accidents and injuries, including occupational disease, to persons under its control, and for the protection of VA property against loss by fire or other accidental damage."

This is the basic policy on safety and fire protection responsibility in the VA as issued by the Deputy Administrator in VA Manual MP-3, Part III, Safety, Fire Protection and Disaster Relief.

In line with this policy, certain field station personnel have particular responsibilities.

The Manager has responsibility for:

- The safety of patients, beneficiaries, visitors, and employees;
- the protection of property;
- establishing and maintaining an active safety and fire protection program;
- supplying aggressive leadership to the program and assuring its current effectiveness;
- assigning a station official to be Safety and Fire Protection Officer;
- establishing and maintaining a Safety and Fire Protection Committee.

The Safety and Fire Protection Officer has responsibility for:

- developing and coordinating the station safety and fire protection program;
- stimulating and guiding a continuing safety and fire protection program, including the development of--
    - detailed programs, and
    - specific corrective actions

The Supervisor has responsibility for:

- applying approved standards, regulations, practices, and work methods;
- instructing and training employees in safe working methods and practices;
- studying the work operations under his supervision and correcting or reporting for correction any condition or practice that appears to be a potential hazard;
- inspecting the work area to detect fire and accident hazards and to initiate preventive or corrective action.

The Individual Employee has responsibility for:

- applying all established safe practices;
- reporting unsafe conditions or practices to his supervisor.

Handout No. II-F

In addition, each VA field installation is required to have two special organizations contributing to its safety and fire protection objectives.

The Safety and Fire Protection Committee--

- advises the Manager on safety and fire protection;
- carries out special assignments for the Manager on safety and fire protection;
- studies all aspects of the station safety and fire protection program, makes recommendations, and evaluates results.

The First-Aid Fire Fighting Organization--

- adequately manned with VA employees who are--
- properly trained in the handling of first-aid fire fighting appliances, including portable extinguishers and inside hand hose,--
- for fighting fire until the fire department arrives.

QUIZ FOR SUPERVISORS ON SAFETY AND FIRE PROTECTION

DO NOT write your name on this paper.

Circle the letter in front of the one best answer for each item.

1. Nearly three-fourths of the fires in the VA are caused by--

    a. electricity.

    b. fires in waste baskets.

    c. lighted cigarettes.

    d. smoking and matches.

2. The major point of attack in accident prevention is--

    a. the hazard.

    b. the accident.

    c. the injury.

    d. the personal fault.

3. In the interest of prompt evacuation in case of fire, you as a supervisor should follow certain practices. Which of the following is <u>not</u> a good fire protection practice?

    a. Keep exit routes in your work area clear.

    b. Insure that your employees know what to do when the fire alarm sounds.

    c. Insure that your employees react promptly when the fire alarm sounds.

    d. Keep fire doors at stairways open at all times.

4. Considering the accident sequence, which one of the following would you properly classify as an accident?

    a. sprain

    b. bruise

    c. fire

    d. burn

5. Which of the following is the most acceptable statement on what to do about doors in limiting the spread of fire?

    a. All doors should be kept closed at all times.

    b. Stairway enclosure doors, smoke barrier doors, and room doors should be kept closed at all times.

    c. Fire doors should not be obstructed or wedged open. Stairway enclosure doors should always be closed.

    d. All fire exit doors, smoke barrier doors, and room doors should be closed at the time of fire.

Handout No. III-A

6. Your Safety and Fire Protection Officer can be of help to you in many ways. Which of the following is <u>not</u> a proper activity for him to perform?

   a. advising you on corrective action which may be taken to eliminate an unsafe condition.

   b. supporting your request for justifiable safety equipment.

   c. preparing SF 92.

   d. suggesting materials for use in employee safety meeti

7. Which of the following types of fire extinguishers may successfully be used on fire in live electrical equipment?

   a. soda-acid.

   b. carbon-dioxide.

   c. water pump.

   d. foam.

8. You as a supervisor can do most to further which of the following fundamental principles of fire protection?

   a. prompt discovery, giving the alarm, and extinguishing of fire.

   b. fire prevention.

   c. limiting the spread of fire.

   d. adequate provision for evacuation.

9. When an accident strikes, which of the following would be the best first four steps to take. Consider both <u>what</u> you would do and the sequence in which you would do it.

   a. Go to the scene of the accident.
      Notify your safety officer.
      Find the immediate cause.
      Get identifying information.

   b. Go to the scene of the accident.
      See that the injured gets medical care.
      Notify your safety officer.
      Get identifying information.

   c. Go to the scene of the accident.
      See that the injured gets medical care.
      Notify your safety officer.
      Find the immediate cause.

   d. Go to the scene of the accident.
      Notify your safety officer.
      See that the injured gets medical care.
      Get identifying information.

10. Which of the following has primarily an advisory role in safety and fire protection.

   a. the Manager.

   b. the station's first-aid fire fighting organization.

   c. the employee.

   d. the safety and fire protection committee.

11. Once an accident has occurred, the key to prevention of similar accidents is--

    a. taking appropriate corrective action.

    b. conducting a training course in safety.

    c. finding the cause of the accident.

    d. providing personal protective equipment.

12. You would not use a soda-acid fire extinguisher [illegible] fire in which of the following--

    a. waste paper basket.

    b. bed clothes.

    c. grease disposal can.

    d. forms and publications storage room.

13. Which of the following is likely to make the least contribution in preventing accidents?

    a. reporting the accident completely and promptly.

    b. seeing that the injured gets medical care.

    c. investigating the accident thoroughly.

    d. enforcing safety regulations.

14. Considering the major cause of fire in the VA, which of the following is the most important thing you as a supervisor can do to control heat in the prevention of fire?

    a. insure that areas where flammables are stored carry the necessary danger signs and warnings.

    b. enforce smoking regulations.

    c. report worn, broken, frayed electric wire coverings, loose sockets, faulty plugs; broken or missing switch plates.

15. Which of the following would not be a proper safety and fire protection maxim for supervisors?

    a. Eliminate the unsafe condition and the unsafe act.

    b. Safety is an integral part of supervision.

    c. Set a good safety example.

    d. Report all unsafe conditions and fire hazards to higher authority for action.

Veterans Administration Training For Supervisors in Safety and Fire Protection

THE ACCIDENT SEQUENCE

INHERITANCE AND SOCIAL ENVIRONMENT	PERSONAL FAULTS	THE HAZARD	THE ACCIDENT	THE INJURY
				
Physical Abilities, such as-- Eyesight Hearing Muscular Strength and Coordination Condition of Heart, Lungs, Other Organs Mental Abilities, such as-- Reaction Time Ability to Remember Ability to Reason Temperament, such as-- Emotional Stability Curiosity Flexibility Outside Influences, such as-- Home, School, Job Church, Community	Recklessness Indifference Inattention Hostility Laziness Temper Excitability Inconsiderateness Stubbornness	Unsafe Conditions: Poor Housekeeping Unsafe Equipment Unguarded Machinery Poor Lighting--too much; too little Poor Ventilation Absence of Signs Unsafe Acts: Failing to recognize an unsafe condition Using an incorrect method Practicing faulty work habits Failing to use safety devices, such as handrails Engaging in horse-play	Falls Struck by a Falling Object Slips Slides Striking Against-- Caught In or Between Fires Collisions Overexertion	Cuts Bruises Fractures Sprains Strains Fatalities Burns

Handout No. I-A
G-1, MP-3, Pt.III

Veterans Administration Training for Supervisors in Safety and Fire Protection

UNSAFE CONDITIONS TO LOOK FOR

- Broken or worn floor coverings
- Oil, water, other liquids, and debris on the floor
- Absence of necessary safety devices on equipment
- Unsafe storage of materials or tools
- Interference with free swinging of doors
- Windows difficult to open and close
- Cluttered window sills
- Inadequate illumination
- Inadequate ventilation
- Need for warning signs in hazardous areas
- Supplies and materials stacked improperly
- Need to barricade unsafe areas
- Supplies and materials stored in inaccessible places
- Telephone wires and other electric wires in walk areas
- Furniture and equipment in need of repair
- Insecure pictures, mirrors, fans, lighting fixtures
- Piling of papers and files on top of book cases, filing cabinets, etc.
- Tools and accessories accessible to patients
- Matches, smoking materials accessible to patients to whom they are restricted.
- Lack of observance of special safety precautions in areas where conditions are a special hazard, such as where X-ray equipment and radioisotopes are used.
- Inadequate labelling of solvents and poisonous liquids

- CIRCLE those items which you should look for in your own work area.
- ADD other items (not listed) peculiar to your own work area which you should look for:

WHEN AN ACCIDENT STRIKES--

1. Go to the scene of the accident.
2. See that the injured gets medical care.
3. Notify your safety officer.
4. Get identifying information--
    a. Who?
    b. When?
    c. Where?
    d. What?
    e. Why?
5. Find the immediate cause.
6. Follow back to the indirect cause.
7. Estimate injury to people and damage to materials and equipment.
8. List the necessary action to remove the cause.
9. Follow through.

Veterans Administration Training for Supervisors in Safety and Fire Protection

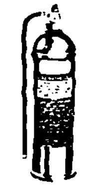
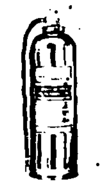
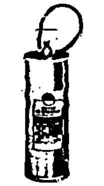
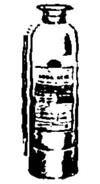
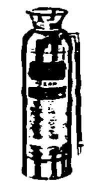
PREVENTING ACCIDENTS

Supervisors can prevent accidents by taking the following actions:

1. ELIMINATE UNSAFE CONDITIONS
   - Conduct periodic safety inspections.
   - Ask your employees to watch for unsafe conditions.
   - Correct those conditions which you can correct--those
     - o For which you have the authority to correct, and
     - o Which you can correct without hazard to yourself or others
   - Report all others to higher authority.
2. ELIMINATE UNSAFE ACTS
   - Assign employees to jobs they are qualified to perform.
     - o Include special physical requirements in the position description.
     - o Mention them again in the "Remarks" space of the SF 52, "Request for Personnel Action."
     - o Do not assign tasks to employees who are not physically or mentally able to perform them.
   - Provide for personal protective equipment and enforce its use.
   - Instruct employees in the safe way to do their work--
     - o When he first reports as a new employee.
     - o Throughout his service with you when methods, procedures, machines, tools, or equipment change.
   - Check regularly to see if employees are using proper and safe methods.
   - Take appropriate corrective action at once if they are not.
   - Set a good safety example.
3. INVESTIGATE ACCIDENTS THOROUGHLY.
4. REPORT ACCIDENTS COMPLETELY AND PROMPTLY.

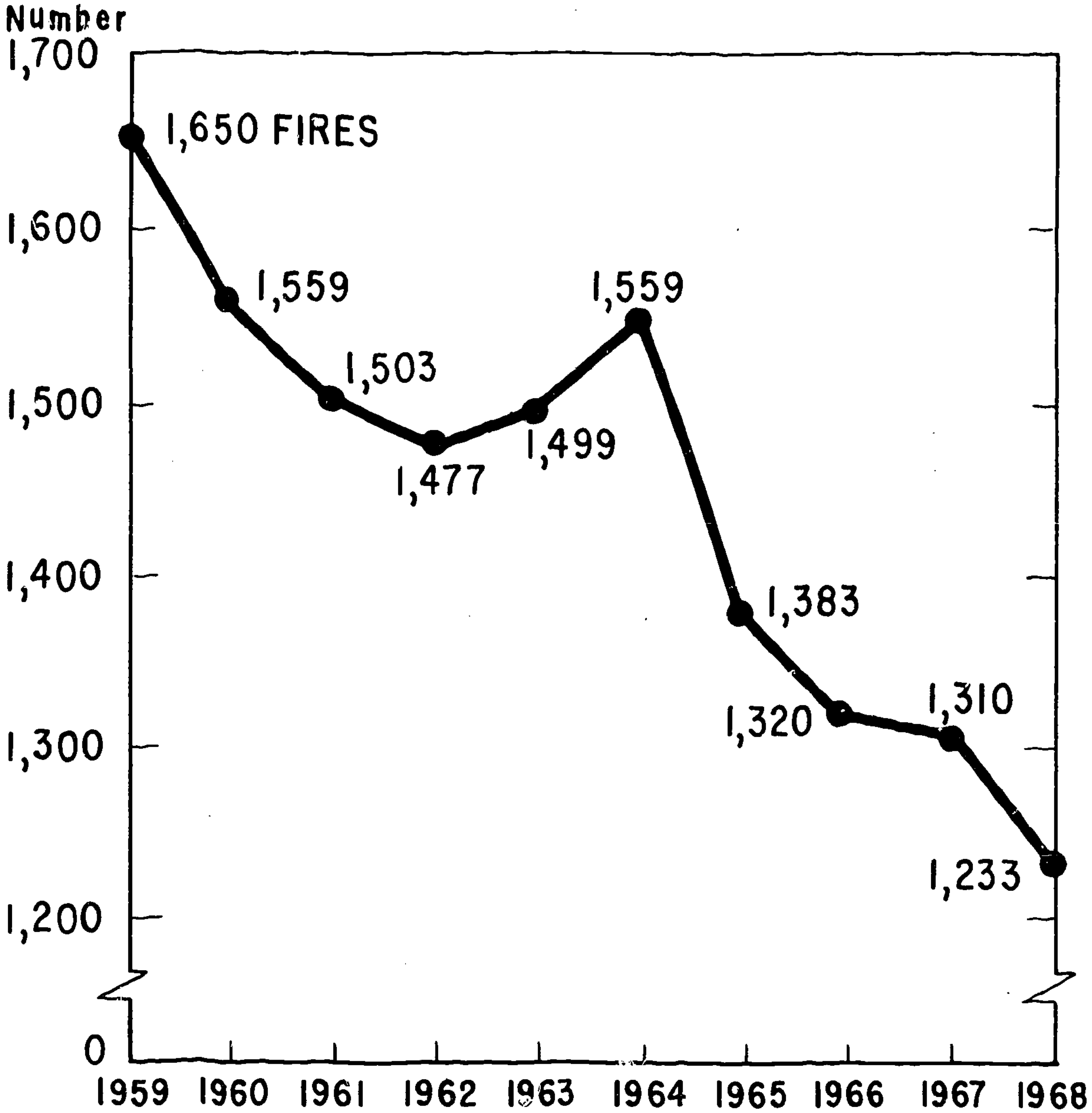
Handout No. I-D
G-1, MP-3, Pt.III

KNOW YOUR FIRE EXTINGUISHERS

TYPE OF EXTINGUISHER	WATER			WATER SODA ACID	FOAM	CARBON DIOXIDE	DRY CHEMICAL			
							SODIUM OR POTASSIUM BICARBONATE		MULTI-PURPOSE ABC	
	STORED PRESSURE	CARTRIDGE OPERATED	PUMP TANK				STORED PRESSURE	CARTRIDGE OPERATED	STORED PRESSURE	CARTRIDGE OPERATED
										
CLASS OF FIRE A WOOD PAPER RUBBER PLASTICS	YES	YES	YES	YES	YES	NO	NO	NO	YES	YES
B FLAMMABLE LIQUIDS GASES GREASES	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES
C ELECTRICAL EQUIPMENT	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES
USUAL OPERATION	PULL PIN SQUEEZE HANDLE	PULL PIN SQUEEZE HANDLE	PUMP HANDLE	TURN UPSIDE DOWN	TURN UPSIDE DOWN	PULL PIN SQUEEZE HANDLE	PULL PIN SQUEEZE HANDLE	PULL PIN SQUEEZE HANDLE	PULL PIN SQUEEZE HANDLE	PULL PIN SQUEEZE HANDLE
RANGE	30'-40'	30'-40'	30'-40'	30'-40'	30'-40'	3'-8'	5'-20'	5'-20'	5'-20'	5'-20'
DISCHARGE TIME	1 MINUTE	1 MINUTE	1 MINUTE	1 MINUTE	1 MINUTE	8-30 SEC.	8-25 SEC.	8-25 SEC.	8-25 SEC.	8-25 SEC.
SIZES	2½ GAL.	2½ GAL.	2½-5 GAL.	2½ GAL.	2½ GAL.	2-20 LBS.	1-30 LBS.	2½-30 LBS.	2½-30 LBS.	6½-30 LBS.

NUMBER OF FIRES IN THE VA

DURING THE LAST TEN YEARS

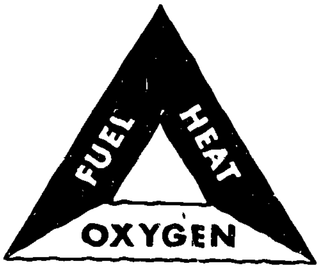


92 PEOPLE WERE INJURED AS A RESULT OF FIRES IN FY 1968

Handout No. II-A
G-1, MP-3, Pt.III
Change 4

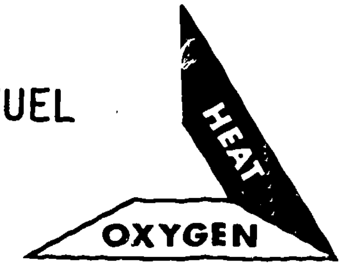
THE CHEMISTRY OF FIRE

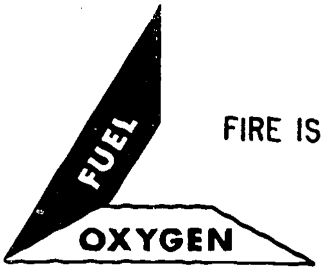
FIRE BURNS BECAUSE THERE ARE THREE ELEMENTS PRESENT...



- FUEL
- HEAT
- OXYGEN

FIRE IS NOT POSSIBLE WITHOUT FUEL





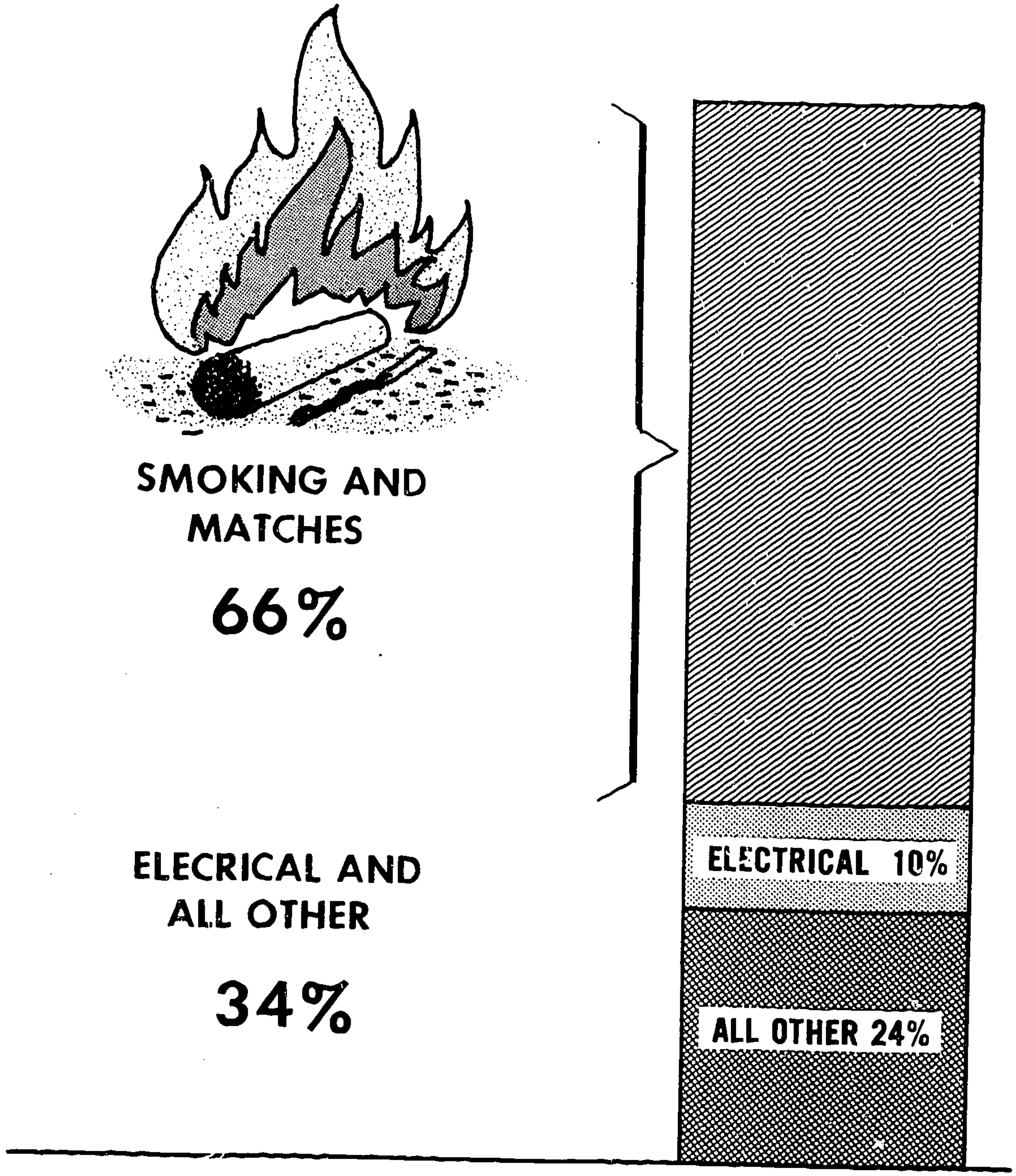
FIRE IS NOT POSSIBLE WITHOUT HEAT

FIRE IS NOT POSSIBLE WITHOUT OXYGEN

Handout No. II-B
G-1, MP-3, Pt.III

CAUSES OF FIRES

FISCAL YEAR 1968



Handout No. II-C
G-1, MP-3, Pt.III
Change 4

FIRE PREVENTION--Some Things YOU Can Do

You can help CONTROL FUEL.

Fire is not possible without fuel. To help control fuel you can:

- Practice good housekeeping.
- Require the prompt and proper disposal of waste paper, trash, wood shavings, etc.
- Obtain metal containers with snug covers for collecting easily combustible waste, such as cartons, wrapping material, used paper cups.
- Properly store volatile flammable liquids, such as gasoline, alcohol, ether, and paint, and other combustible materials such as matches, bottled gases, and stocks of paper.
- Substitute non-hazardous materials for hazardous ones where possible, such as approved typewriter cleaning fluid for alcohol.
- Keep combustible stocks at a minimum.

You can help CONTROL HEAT.

Fire is not possible without heat. To help control heat and thus prevent ignition, you can:

- Enforce smoking regulations.
- Set a good example in <u>your</u> smoking habits.
- Insure that areas where flammables are stored, used, or disposed of carry the necessary "no smoking" signs and warnings.
- Eliminate the storage of--
    - Oily rags in dark, unventilated corners or closets.
    - Work clothes liberally spotted with oil, grease, or paint in unventilated lockers.
    - Bundles of paper in quantity and spotted with oil or paint.
- Report worn, broken, frayed electric wire coverings; loose sockets, faulty plugs; broken or missing switch plates.
- Order replacements for faulty electrical equipment and fixtures.

REMEMBER, KEEP COMBUSTIBLE MATERIAL AWAY FROM SOURCES OF IGNITION!

Veterans Administration Training for Supervisors in Safety and Fire Protection

THE ORGANIZATION FOR SAFETY AND FIRE PROTECTION AT A VA FIELD STATION

''Every level of management in VA is responsible for the prevention of accidents and injuries, including occupational disease, to persons under its control, and for the protection of VA property against loss by fire or other accidental damage.''

This is the basic policy on safety and fire protection responsibility in the VA as issued by the Deputy Administrator in VA Manual MP-3, Part III, Safety, Fire Protection and Disaster Relief.

In line with this policy, certain field station personnel have particular responsibilities.

The Manager has responsibility for:

- The safety of patients, beneficiaries, visitors, and employees;
- the protection of property:
- establishing and maintaining an active safety and fire protection program;
- supplying aggressive leadership to the program and assuring its current effectiveness;
- assigning a station official to be Safety and Fire Protection Officer;
- establishing and maintaining a Safety and Fire Protection Committee.

The Safety and Fire Protection Officer has responsibility for:

- developing and coordinating the station safety and fire protection program;
- stimulating and guiding a continuing safety and fire protection program, including the development of--
    - o detailed programs, and
    - o specific corrective actions

The Supervisor has responsibility for:

- applying approved standards, regulations, practices, and work methods;
- instructing and training employees in safe working methods and practices;
- studying the work operations under his supervision and correcting or reporting for correction any condition or practice that appears to be a potential hazard;
- inspecting the work area to detect fire and accident hazards and to initiate preventive or corrective action.

The Individual Employee has responsibility for:

- applying all established safe practices;
- reporting unsafe conditions or practices to his supervisor.

Handout No. II-F
G-1, MP-3, Pt.III

In addition, each VA field installation is required to have two special organizations contributing to its safety and fire protection objectives.

The Safety and Fire Protection Committee--

- advises the Manager on safety and fire protection;
- carries out special assignments for the Manager on safety and fire protection;
- studies all aspects of the station safety and fire protection program, makes recommendations, and evaluates results.

The First-Aid Fire Fighting Organization--

- adequately manned with VA employees who are--
- properly trained in the handling of first-aid fire fighting appliances, including portable extinguishers and inside hand hose,--
- for fighting fire until the fire department arrives.

Veterans Administration Training for Supervisors in Safety and Fire Protection

QUIZ FOR SUPERVISORS ON SAFETY AND FIRE PROTECTION

DO NOT write your name on this paper.

Circle the letter in front of the one best answer for each item.

1. Nearly three-fourths of the fires in the VA are caused by--

   a. electricity.

   b. fires in waste baskets.

   c. lighted cigarettes.

   d. smoking and matches.

2. The major point of attack in accident prevention is--

   a. the hazard.

   b. the accident.

   c. the injury.

   d. the personal fault.

3. In the interest of prompt evacuation in case of fire, you as a supervisor should follow certain practices. Which of the following is <u>not</u> a good fire protection practice?

   a. Keep exit routes in your work area clear.

   b. Insure that your employees know what to do when the fire alarm sounds.

   c. Insure that your employees react promptly when the fire alarm sounds.

   d. Keep fire doors at stairways open at all times.

4. Considering the accident sequence, which one of the following would you properly classify as an accident?

   a. sprain

   b. bruise

   c. fire

   d. burn

5. Which of the following is the most acceptable statement on what to do about doors in limiting the spread of fire?

   a. All doors should be kept closed at all times.

   b. Stairway enclosure doors, smoke barrier doors, and room doors should be kept closed at all times.

   c. Fire doors should not be obstructed or wedged open. Stairway enclosure doors should always be closed.

   d. All fire exit doors, smoke barrier doors, and room doors should be closed at the time of fire.

Handout No. III-A
G-1, MP-3, Pt.III

6. Your Safety and Fire Protection Officer can be of help to you in many ways. Which of the following is not a proper activity for him to perform?

   a. advising you on corrective action which may be taken to eliminate an unsafe condition.

   b. supporting your request for justifiable safety equipment.

   c. preparing SF 92.

   d. suggesting materials for use in employee safety meetings.

7. Which of the following types of fire extinguishers may successfully be used on fire in live electrical equipment?

   a. soda-acid.

   b. carbon-dioxide.

   c. water pump.

   d. foam.

8. You as a supervisor can do most to further which of the following fundamental principles of fire protection?

   a. prompt discovery, giving the alarm, and extinguishing of fire.

   b. fire prevention.

   c. limiting the spread of fire.

   d. adequate provision for evacuation.

9. When an accident strikes, which of the following would be the best first four steps to take. Consider both what you would do and the sequence in which you would do it.

   a. Go to the scene of the accident.
      Notify your safety officer.
      Find the immediate cause.
      Get identifying information.

   b. Go to the scene of the accident.
      See that the injured gets medical care.
      Notify your safety officer.
      Get identifying information.

   c. Go to the scene of the accident.
      See that the injured gets medical care.
      Notify your safety officer.
      Find the immediate cause.

   d. Go to the scene of the accident.
      Notify your safety officer.
      See that the injured gets medical care.
      Get identifying information.

10. Which of the following has primarily an advisory role in safety and fire protection.

   a. the Manager.

   b. the station's first-aid fire fighting organization.

   c. the employee.

   d. the safety and fire protection committee.

11. Once an accident has occurred, the key to prevention of similar accidents is--

   a. taking appropriate corrective action.

   b. conducting a training course in safety.

   c. finding the cause of the accident.

   d. providing personal protective equipment.

12. You would not use a soda-acid fire extinguisher on fire in which of the following--

   a. waste paper basket.

   b. bed clothes.

   c. grease disposal can.

   d. forms and publications storage room.

13. Which of the following is likely to make the least contribution in preventing accidents?

   a. reporting the accident completely and promptly.

   b. seeing that the injured gets medical care.

   c. investigating the accident thoroughly.

   d. enforcing safety regulations.

14. Considering the major cause of fire in the VA, which of the following is the most important thing you as a supervisor can do to control heat in the prevention of fire?

   a. insure that areas where flammables are stored carry the necessary danger signs and warnings.

   b. enforce smoking regulations.

   c. report worn, broken, frayed electric wire coverings, loose sockets, faulty plugs; broken or missing switch plates.

15. Which of the following would not be a proper safety and fire protection maxim for supervisors?

   a. Eliminate the unsafe condition and the unsafe act.

   b. Safety is an integral part of supervision.

   c. Set a good safety example.

   d. Report all unsafe conditions and fire hazards to higher authority for action.

VT 016 654
SAFETY IN INDUSTRY INSTRUCTOR OUTLINE. SAFE WORKING SURFACES.

BUREAU OF LABOR STANDARDS (DOL), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
BULL-292
SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 20402
(CATALOG #L16.3:292, $.35)
PUB DATE - 67 40P.

DESCRIPTORS - CHARTS; PROGRAM PLANNING; *SAFETY EDUCATION; *SAFETY; *ACCIDENT PREVENTION; PHYSICAL DESIGN NEEDS; *INDUSTRIAL TRAINING; ADULT VOCATIONAL EDUCATION; VOCATIONAL DEVELOPMENT; *VERTICAL WORK SURFACES

ABSTRACT - THIS BASIC INSTRUCTIONAL OUTLINE ON SAFE WORKING SURFACES IS ONE OF A SERIES OF EIGHT DEVELOPED BY THE STAFF OF THE OFFICE OF OCCUPATIONAL SAFETY AND THE INTERNATIONAL DIVISION OF THE BUREAU OF LABOR STANDARDS COVERING SAFETY IN INDUSTRY. ADDITIONAL RESOURCE MATERIALS SHOULD SUPPLEMENT THIS BASIC GUIDE. AN ENTIRE SAFETY TRAINING COURSE, BASED ON THE EIGHT OUTLINES, CAN BE PRESENTED BY MEANS OF CONFERENCES. SUGGESTIONS FOR PLANNING THE CONFERENCES PRECEDE A DSICUSSION OF PREVENTING FALLS AND OTHER INJURIES FROM SCAFFOLDS, LADDERS, AND OTHER ELEVATIONS. A WIDE RANGE OF CHARTS ILLUSTRATES THE TEXT. (SG)

Note: American Standards Association name was changed to United States of America Standards Institute (USASI) August 1966. All American Standards now known as USA Standards (USAS).

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C., 20402 - Price 35 cents

SAFETY IN INDUSTRY

INSTRUCTOR OUTLINE

safe working surfaces

U. S. DEPARTMENT OF LABOR
W. Willard Wirtz, Secretary
BUREAU OF LABOR STANDARDS
Nelson M. Bortz, Director

3490

SUGGESTIONS FOR THE INSTRUCTOR

Each of the eight manuals contains material which will serve as an organized guide for instruction in the safety subjects that are discussed. The text may be used as basic teaching material, but it is advisable to include additional local material in order to present a specific training course in safety which is tailored to the conditions and situations peculiar to the locality and adapted to the needs of the particular conference that the instructor is conducting.

It is recommended that conferences be held once or twice a week, and that they consist of two 50-minute periods with a "break" of 15 minutes between periods. If conferences are held once or twice a week, the instructor will be able to study and organize the instruction material thoroughly in order to prepare himself before the next conference, and the participant will be provided sufficient time for study between conferences. The entire course which is based on the eight manuals can be satisfactorily completed in this manner in 22 weeks to 1 year.

If at all possible, the participants who are selected for each conference should be at the same supervisory or worker level, and they should not have conflicting interests. It is recommended that 15 to 20 participants be the maximum number allowed to attend each conference so that enough time will be made available for discussion and individual participation. Every participant should be encouraged to take an active part in the discussion.

The conference room should be well lighted and comfortable, and devoid of noise and other distractions. A blackboard, chalk, and erasers should be available, and each participant should have facilities for taking notes which he should, of course, be encouraged to do. A projection screen and projector should be provided for showing motion pictures and slide films which may be selected on the various safety subjects.

SAFETY TRAINING TECHNIQUES

It is of utmost importance that the instructor become acquainted with some of the basic training techniques in order to better prepare himself to conduct the course successfully.

Planning

1. The instructor should have such visual aids as are pertinent to the subject matter of the course. These should be set up in proper sequence. An indication or note on the instructor's outline could be very helpful as a guide that a particular visual aid should be used.

2. The course outline as well as the handout material and the visual aids should be checked at regular intervals. This should be done by the instructor in order to revise, improve, and modernize the course presentation. The material should also be checked to make sure that it conforms with policies of labor and management in the country where it will be presented.

3. The instructor's outline should be adapted by him to his particular method of presentation, keeping in mind that this is a discussion conference type of session.

4. The instructor would do well to get a list in advance of the students that will participate and their positions and backgrounds. A study of such information could be very helpful to the instructor when he faces his class.

Preparation of Classroom

Many conferences and courses have failed simply because no preparation was made for the classroom facilities.

1. The classroom should be located in an area where there is the least amount of noise or distraction.

2. Good ventilation, lighting, and sufficient room are important aspects to consider.

3. The seating arrangement and seats should be comfortable as well as informal. A round-table seating arrangement is the most effective for discussion-conference sessions.

4. The room should be equipped with a good blackboard, sufficient chalk, and a clean eraser. A stand should be available for mounting the charts and visual aids to be used during the conference. A 35-mm. slide projector should be available.

Teaching

1. An official of the organization should open the first session with a statement regarding the general objectives of the course. He then should introduce the instructor to give him the proper prestige in relation to the group he will teach.

2. At the first session, the instructor should open with an explanation of the course objectives and its method of presentation. At this time, he should draw upon his experiences to relate an illustrative incident that will bring him in closer relationship with the group and, at the same time, enable him to introduce the theme of the first session.

3. The course should be presented by employing the discussion- conference method.

4. The instructor should have the class follow a predetermined schedule and maintain order at all times. Only one participant at a time should be permitted to give his viewpoint. The instructor should keep the class discussion within the subject matter as contained in the instructor's outline.

5. If possible, an official should be asked to speak at the termination of the course.

Tips for Instructors

Learning is actually the acquisition of new ideas, abilities, and skills acquired through the senses of hearing, seeing, and feeling by touch.

1. New ideas are conveyed through the presentation of knowledge, and thought is stimulated through the student's sense of hearing.

Abilities and skills are presented through the media of telling, demonstrating, and having students demonstrate under the supervision of the instructor. Students acquire abilities and skills via the senses of hearing, seeing, and feeling by touch.

2. An important aspect to teaching is to remember that the student absorbs more when he participates in a discussion. The instructor therefore strives to get 100-percent class participation.

3. The instructor should become aware of outstanding characteristics of his students. This could be very helpful when leading discussions. For example:

A. Some may be more mature.
B. Some may have a knowledge of safety.
C. Some may have actual experience to draw upon in the discussion.
D. Some may have a faster learning speed than others.

E. Some may be "stallers" who can slow down the discussion.
F. Others may be aggressive and want to monopolize the discussion.
G. There may be a "know-it-all" in the group who must be properly controlled.
H. Some may be constant latecomers who ask questions about previous discussions and delay the class.

4. The teaching process consists of:
   A. Telling—this means giving background information to introduce a subject.
   B. Showing—a demonstration of some equipment pertaining to the subject to be discussed is very impressive.
   C. Illustrating—using charts, blackboard, slide, or films are very helpful to highlight specific points in the discussion.
   D. Discussion conference—the participation of the students in formulating their thinking about the subject under discussion is fundamental to getting the most out of the session.
   E. Conclusions—the instructor's summation of the session should knit together the points discussed during the session, and should include other important details that may have been overlooked by the group.
   F. Questions—during the session, the instructor should use questions to stimulate discussion, and also to help bring the discussion back to the subject matter if it has strayed.

Guest Instructors

It is necessary that the instructor be granted full responsibility for conduct of the class; at times, however, he may wish to call in an expert in a particular field as a guest instructor (or lecturer). In such event, it is essential that the instructor maintain control of the course.

The instructor must tie in the work of the guest instructor with the balance of the course; he must outline the phase of the subject to be covered by the guest and satisfy himself that the guest limits himself to the field as outlined; he should summarize the guest's contribution, pointing out its relative importance in the field of accident prevention. While the use of a few guest instructors (properly utilized) can add to the effectiveness of the course, a series of "lecturers" whose topics are nor correlated will inevitably result in confusion.

It is recommended that "guest experts" be used only for *supplementary* training, and not to replace even part of this course which should be taught by *one instructor.*

SAFE WORKING SURFACES

Safe Working Surfaces

Establish the importance of the prevention of falls from elevations. On the blackboard, list the common sources, agencies, causes, and controls related to falls from elevations.

PURPOSE	
NEED FOR PROGRAM	A prevention program will point up the hazards. It will provide the necessary interest in the subject to establish positive action.
OBJECTIVES	Emphasize the importance of prevention of falls and familiarize students with common sources, agencies, causes, and controls related to falls of persons.

Develop understanding of the need for attention to working surfaces and use of all precautions.

IMPORTANCE OF SUBJECT	Falls of persons is a leading cause of injuries in all industry classifications. It is necessary to get management's support by spelling out its responsibilities for selecting, providing, and maintaining the proper type of flooring, recognizing that walkways, ramps, and floors in one department may require a different surface than in another department.

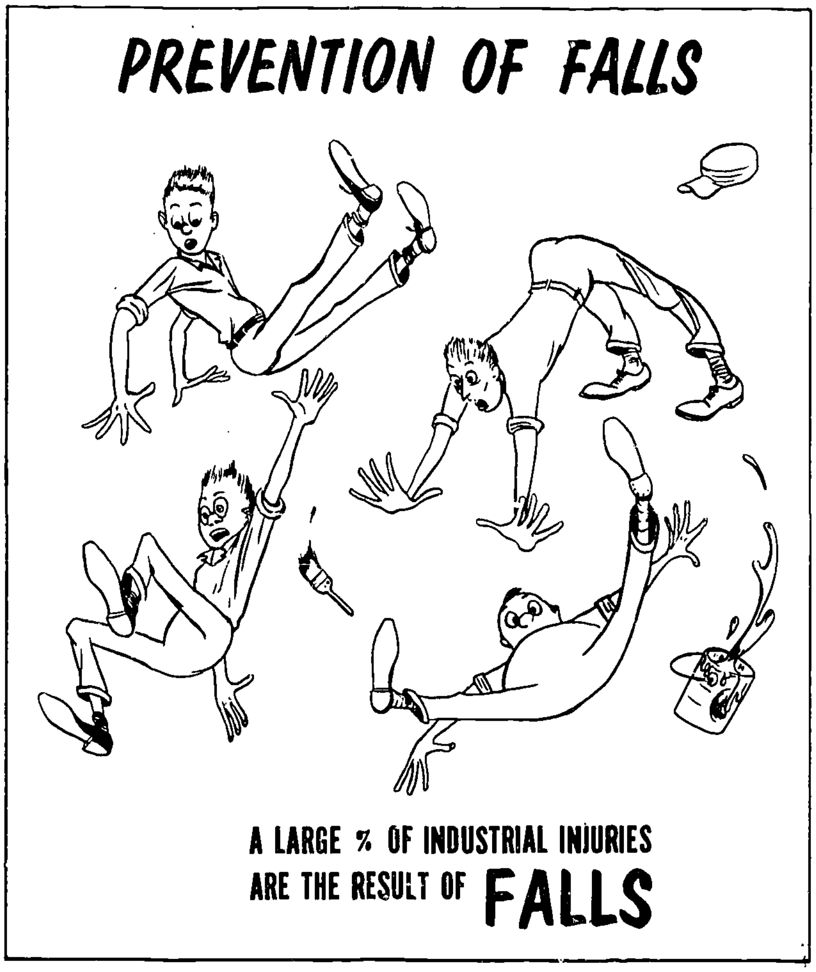


CHART 40—C

LEADING CAUSE OF FATALITIES	Forty-eight percent of all fatal injuries to people over age 44 resulted from falls, and 54 percent of fatalities to people over 65.
PREVENTION BY PLANNING	The design and construction of the plant, its stairs, ramps, passageways, aisles, floors, walking and working areas, surfaces, entrances, exits, stairs, ladders, platforms are all important in preventing falls.

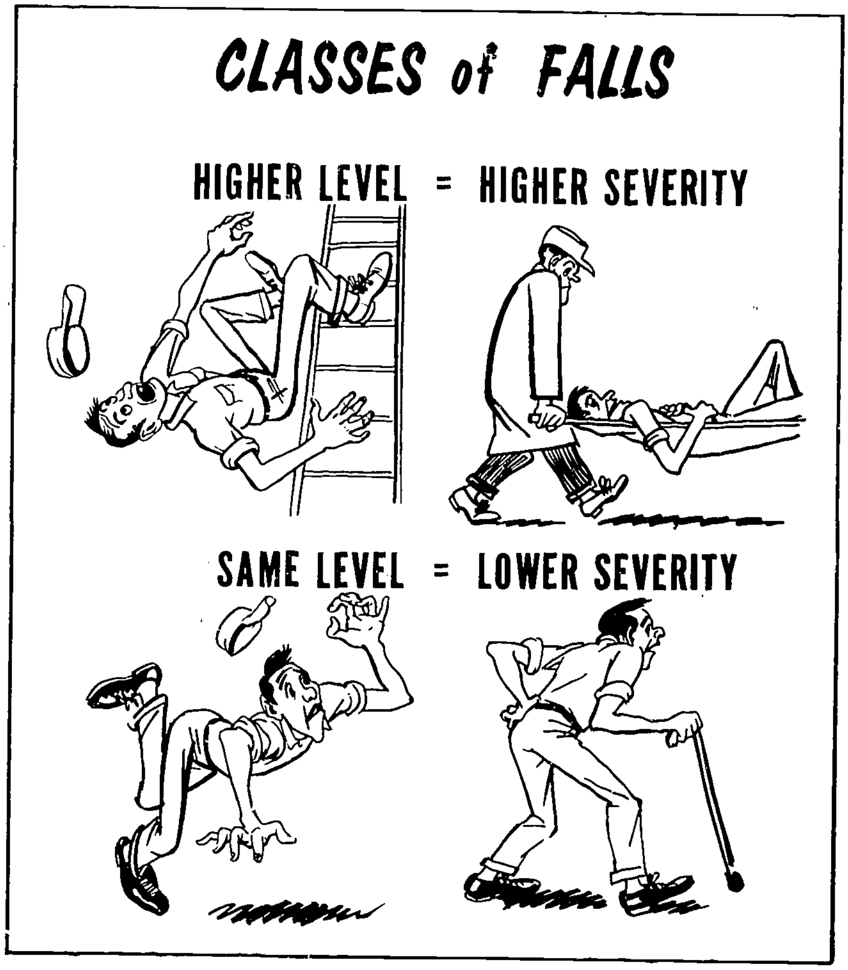


CHART 41—C

CLASSES OF FALLS

For study convenience two classes of falls were considered:

1. From elevations.
2. On same level.

Understandably, falls from higher levels usually result in more severe injuries—but there are more falls at the same level, and many of these can result in serious injuries, especially if a person falls against something, such as a sharp corner.

On the blackboard, list the four basic factors.

1. Selection of agency to be used.
2. Design and construction.
3. Maintenance of agency.
4. Safe practices.

SELECTION OF AGENCY PREFERRED ANGLES	An important factor in determining whether to use ramps, stairs, or ladders would be the slope or the angle made with the horizontal. If the height to be ascended or descended is relatively low, it may be possible to use a ramp. As the height and angle increase, it may require stairs, or if greater, a ladder. Therefore, the height and the angle will have considerable bearing on the agency to be used.
DESIGN AND CONSTRUCTION	The second of the four basic factors should be carried out in accordance with recognized standards. These standards can be obtained as needed; they pertain to the preferred slope and degree of rise of ramps, stairs, and ladders. (ASA A12, A10.2(1944) and NFPA Vol. 4-3311)
MAINTENANCE	The maintenance of ramps, stairs, and ladders is equally as important as that of any other equipment. There should be a definite planned program for their maintenance.
RAMPS	Ramps—maintain even, nonslippery surface free from holes, humps, or hollows. If cleats, railings, or curb guides are used, they should be checked regularly and often.
STAIRS	Stairs—maintain firm, solid nonslip treads. Repair or replace treads, handrails, when unsafe.
LADDERS	Ladders—do not paint wooden ladders (hides grain, cracks, and defects). Coat with clear varnish, shellac, or linseed oil. Portable ladders should be stored away from heat, humidity, direct sunlight, in a horizontal position on hangers so there is no sagging.
SAFE PRACTICES	Safe practices are the most difficult of the four basic factors to control. Proper design and construction are necessary first; then safe practices are essentially a problem of education, training, and enforcement.

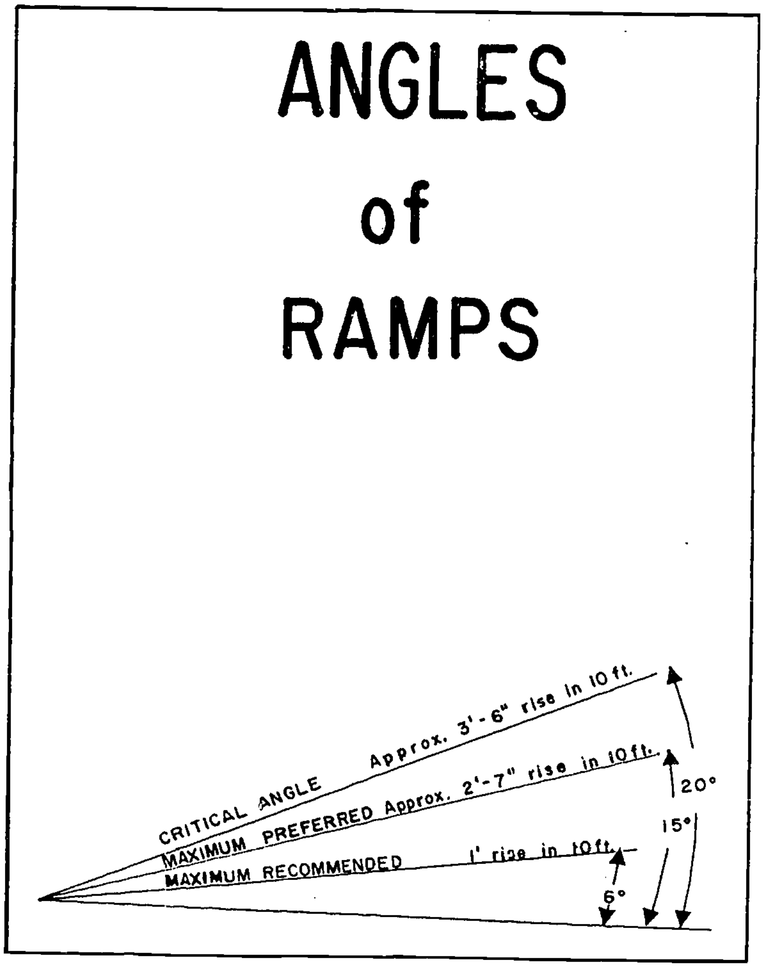


CHART 42—C

RAMPS

Ramps are the simplest means of getting from one elevation to another. They may be temporary or permanent—and may be for use by personnel only or for moving material. They can be made of earth fill, constructed of timbers, concrete, or asphalt. The generally recommended maximum rise of 1 foot in 10 feet of distance limits the use of ramps where there is need for considerable height (a ramp to reach an 8-foot height would have to start 80 feet away). If the ramp is to be used by vehicles (trucks, lift trucks, etc.), it would be hazardous if it were too steep. Sources of information vary as the maximum slope permitted, but an approximate 3½-foot rise in 10 feet could be considered the critical angle. According to the Building Exits Code (Vol. 4 National Fire Codes—NFPA), "All ramps used in connection with exits shall be of substantial construction, adequately designed for use as exits." The maximum slope for the three classes of building occupancy are Class A—1 inch per foot; Class B—1 3/16 inches per foot; Class C—2 inches per foot. (Places of assembly—capacity—Class

	A, 1,000 or more; Class B, 200–1,000; Class C, under 200.) If ramps are to be used for wheeled traffic between levels, they should have a solid curb on open sides and to prevent bottlenecks should be as wide as the aisles or road they service.
SURFACES	The surfaces of steep ramps should be of antislip material, such as abrasive metal plates, nonslip compounds, or abrasive paints. Cleats, when necessary for hand-trucking operations, should be evenly spaced 11 inches to 14 inches apart and should not interfere with operation of trucks.
STANDARD RAILINGS AND TOEBOARDS	Both are recommended, especially for that part of the ramp 5 feet or more above adjacent floor or ground areas. Toeboards should be provided on open sides if persons can pass near or under the ramp, or if it is over or near machinery, or if material while being transported might create a hazard if dropped (example—round objects).

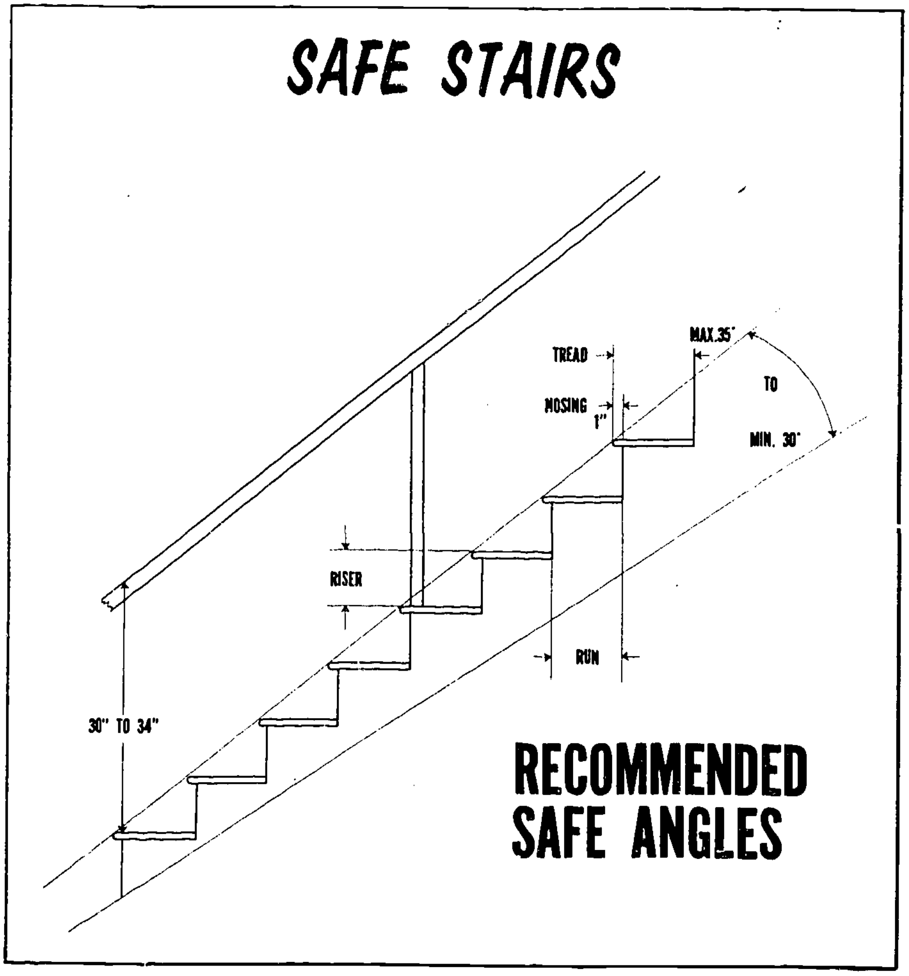


CHART 43—C

SAFE STAIRS

DEFINITIONS

Nosing, Treads, Riser, and Flight Landing

Question:

If everyone is familiar with stairways, why do we have so many injurious accidents?

Answer:

a. Treads—slippery, worn, broken, nonuniform, sloping, weak.
b. Risers—nonuniform in height.
c. Railings—loose, weak, missing.
d. Design—too steep, too narrow, too long.

Tie back to basics.

Question:

What are some of the unsafe practices responsible for stairway injuries?

Answer:

Haste.
Failure to use handrails.
Unsafe shoes.
Obstructed vision.
Horseplay.
Poor housekeeping.

INSPECT FOR:	
RISER HEIGHTS	Should *vary no more than ⅛* inch anywhere in the plant. They should be *no less than 5 inches, nor more than 8 inches. Recommend as best, 7 inches.*
TREAD WIDTHS	Same as risers—⅛ inch variation maximum. *Recommend 10 inches wide, plus nosing. Not less than 9½ inches, plus nosing.*
NOSING	Standard width is 1 inch. *Recommend antislip material to cover nosing and tread.*
FLIGHTS	From 4 to 17 treads between landings. *Recommend an average of 12 treads for comfort and uniformity.*
STAIR CONSTRUCTION	
CLASS A	(From Building Exits Code ASA A9.1) Main stairs for places of public assembly at least 44 inches wide—handrails must not restrict opening by more than 3½ inches on each side. Treads and risers should be so proportioned that the sum of the two risers and a tread, exclusive of its projection, is no less than 24 inches nor more than 25 inches. No riser shall be more than 7 inches and no tread less than 10 inches, exclusive of its projection. No stairway shall have a height of more than 8 feet between landings.
CLASS B	New construction includes virtually all occupancies not covered by Class A. No riser shall be more than 7¾ inches and no tread less than 9 inches, exclusive of its projection. No stairway shall have a height of more than 12 feet between landings.
CLASS C	Existing stairs, although below the standard for new construction (Class B), are acceptable in most existing buildings.

	Stairs at least 36 inches wide—minimum clearance width inside handrails, 29 inches. Pitch of stairs not to exceed 45 degrees, and treads exclusive of nosings or projections, not less than 8 inches.
STAIR RAILINGS VERTICAL HEIGHT	The handrail height should be 30 to 34 inches measured vertically from the top of the handrail to the tread surface in line with the face of riser at forward edge of the tread.

Exception: Intermediate rails shall not be required where stairways are 22 inches or less in width. (ASA A12—Sec. 7, Par. 7.2.)

STRUCTURAL METAL RAILING	For structural metal railings, the posts and top rails should be angle iron of at least 1½ inches by 1½ inches by 3/16 inch or other metal shapes of equivalent bending strength.
POST ANCHORS	The anchoring of posts and framing of members for railings of all types should be of such construction that the completed structure should be capable of withstanding a load of at least 200 pounds applied in any direction at any point of the top rail.
HANDRAILS	A handrail consists of a lengthwise member mounted directly on a wall or partition by means of brackets attached to the lower side of the handrail, so as to offer no obstruction to a smooth surface along the top and both sides of the handrail. The handrail should be of a rounded or other section that will furnish an adequate handhold for anyone grasping it to avoid falling.
STAIRS FOR PHYSICALLY HANDICAPPED PEOPLE	Steps in stairways that might require use by those with disabilities or by the aged should *not* have abrupt (square) nosing.

Explain that individuals with restrictions in the knee, ankle, hip, with artificial legs, long leg braces, or comparable conditions cannot, without great difficulty and hazard, use steps with nosing as shown in Chart 43—C, but they can safely and with minimum difficulty use steps with nosing as illustrated.

HANDRAILS Stairs shall have handrails 32 inches high as measured from the tread at the upper face of the riser.

> Explain that where codes specify handrails to be at heights other than 32 inches, it is recommended that two sets of handrails be installed to serve all people. Where traffic is predominantly children, particularly physically disabled children, extra care should be exercised in the placement of handrails in accordance with the nature of the facility and the age group or groups being serviced, and extra handrails may be necessary.

HANDRAIL EXTENSIONS At least one handrail should extend no less than 18 inches beyond the top step and 18 inches beyond the bottom step.

> Emphasize that care should be taken that the handrail extension itself is not a hazard. The extension may be made on the side of a continuing wall. If possible, refer to ASA standard A117.1 for further information.

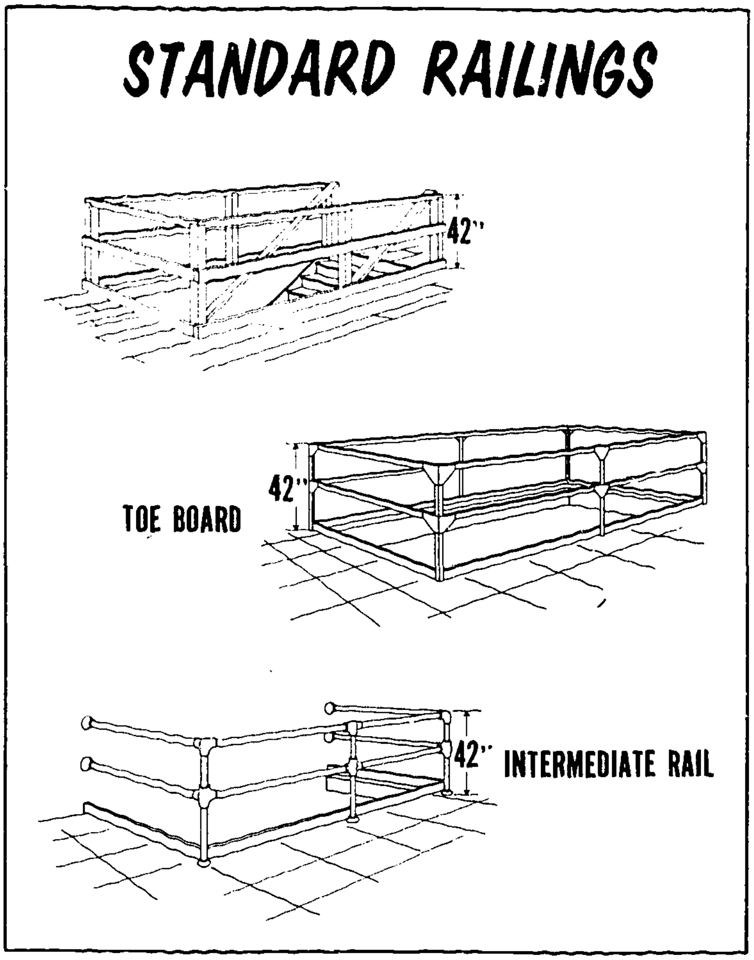


CHART 44—C

STANDARD RAILINGS

A standard railing consists of a top rail, intermediate rail (midrail), and posts, with vertical distance of 42 inches from upper surface of the top rail to the floor, runway, or platform. For wood railings, the posts shall be of stock at least 2 by 4 inches spaced no more than 8 feet apart. The top rails shall be at least 2- by 4-inch stock, or two right angle pieces of at least 1- by 4-inch stock, and the intermediate rail shall be at least 1- by 4-inch or 2-inch stock.

Rail frames should be anchored to platforms to withstand a thrust of 200 pounds applied in any direction at any point of the top rail. The intermediate (midrail) should be approximately halfway between the top rail and the floor, platform, runway, or ramp. A toeboard shall be at least 3 inches high from its top to the level of the floor, platform, runway, or ramp. It should be made of substantial material securely fastened in place with not more than ¼-inch clearance above floor level.

INSPECT STANDARD RAILS FOR	
VERTICAL HEIGHT	Should be 42 inches from platform or working surface.
UPRIGHT POSTS	Maximum of 8 feet on centers.
INTERMEDIATES	Centered between platform and top railing.
DIMENSIONS	Wood: 2- by 4-inch top rail and upright posts. 1- by 4-inch or 2- by 2-inch intermediate rail. Pipe: Intermediate rail at least 1-inch nominal inside diameter. Top rail and upright posts at least 1¼ inches nominal inside diameter. Intermediate rail 1¾-inches by 1¼-inches by ⅛-inch angle iron. Structural Metal: Top rail and posts angle iron at least 1½-inches by 1½-inches by 3/16-inch.
STRENGTH	Rail frames should be anchored to platforms to withstand a thrust of 200 pounds applied in any direction at any point of the top rail.

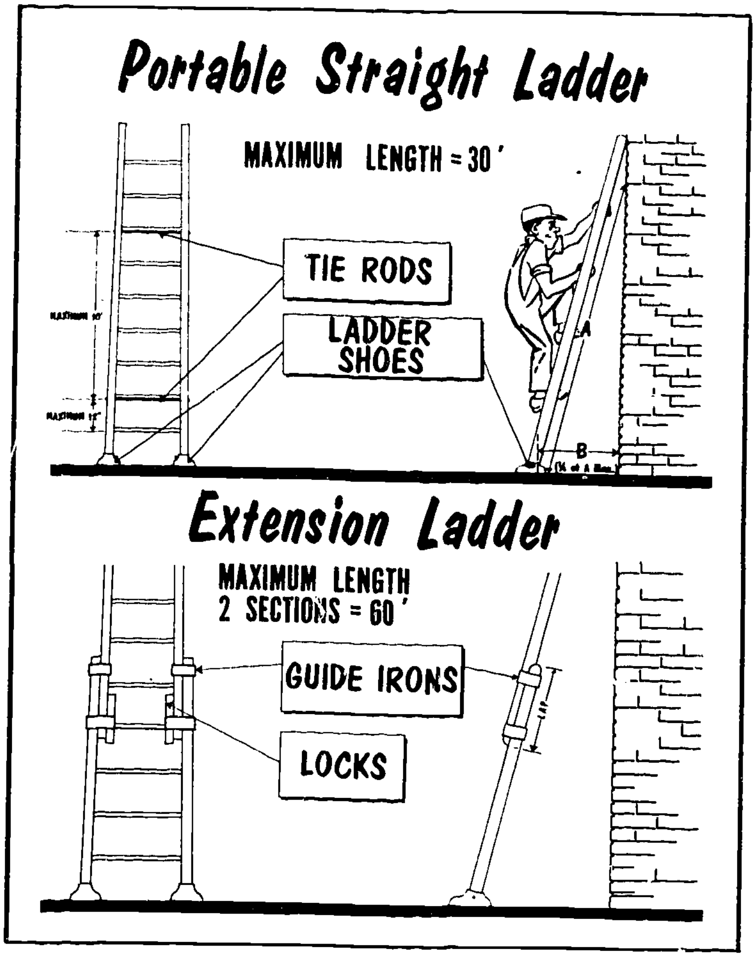


CHART 45—C

PORTABLE LADDERS	Being portable, ladders may be sectional, generally constructed of wood, steel, aluminum or magnesium alloy; some of special materials, such as Fiberglas. Discussed here are only those made of wood.
TO INSPECT	Look for: 1. Wood defects, knots crossgrain, cracks, checks, shakes, decay, loose rings, pitch pocket. 2. Rung spacing maximum 12 inches on center, all spaced equally. 3. Rail spacing minimum width 11½ inches at base for up to 10 feet long; add ¼-inch width for each additional 2 feet over 10-foot length (batter). Two metal cross braces (minimum). Maximum distance between braces 10 feet. 4. Ladder length maximum 30 feet long.
EXTENSION LADDERS AND MECHANISM	Mechanism consists of two substantial automatic locks. Must work efficiently by gravity alone. Check guide irons and locks, size and condition of rope, and pulley arrangement.

LADDER WIDTH	Bottom section following minimum width: Extension up to 28 feet—14½ inches. 28 feet to 40 feet—16 inches. over 40 feet—18 inches.
LAPPING STRENGTH	Lapping—one section overlaps with another to give strength to ladder where sections meet. Overlap 3 feet on 2-section ladder to 36 feet. Overlap 4 feet on 2 sections to 48 feet. Overlap 5 feet on sections over 48 feet.
PORTABLE STRAIGHT LADDER SAFEGUARD	If possible, secure top and bottom, or have helper hold. Maximum horizontal distance of foot of ladder to a vertical position from top of ladder or point of contact: one-quarter length of ladder. See B—Chart 45-C—a 12-foot ladder should be 3 feet from wall.

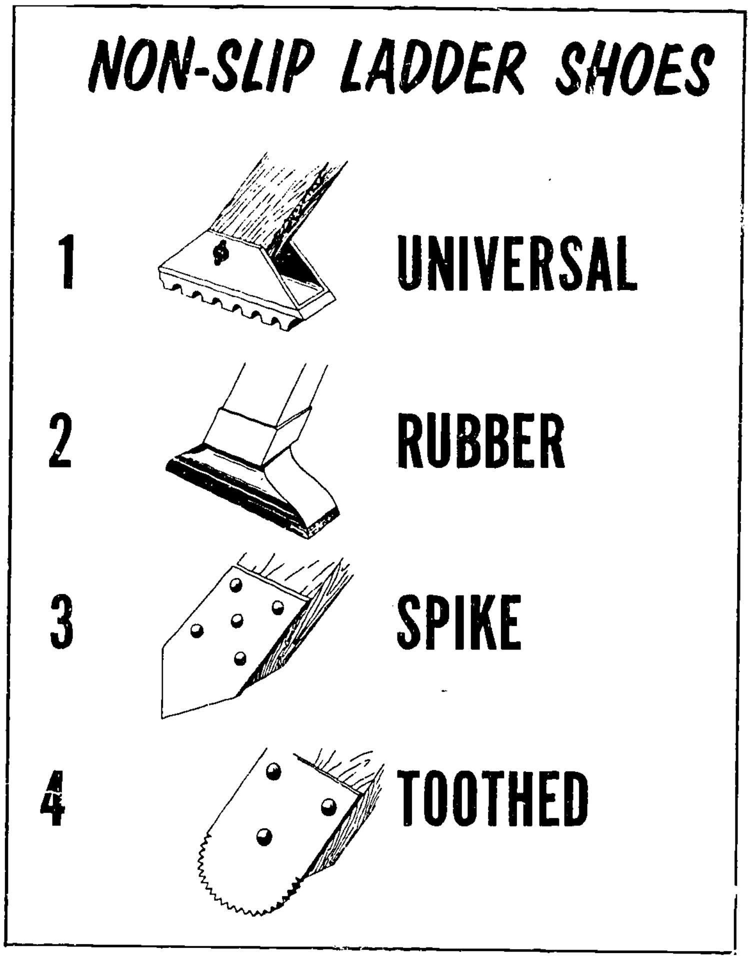


CHART 46—C

NONSLIP LADDER SHOES	Properly selected, they will prevent slipping and will also protect bottom of ladder from wear.
UNIVERSAL	One type is the so-called "universal" ladder shoe which can be used indoors with the corrugated surface to the floor, or with the spike turned down for outdoor use. These are obtainable with corrugated surfaces made of cork, rubber, cord, or abrasive material.
RUBBER	The "rubber" suction surface shoe is available in rubber or neoprene or cord (for wet, smooth surfaces).
SPIKE	The spikes are made of metal, generally of steel or bronze for use outdoors. They are so-called "spike" shoes.
TOOTHED	These are of two or more styles, all of which are toothed for work on construction—for concrete floors, sidewalks, or asphalt surfaces.

PRECAUTIONS	
SPARK HAZARDS	Cork, neoprene, bronze, rubber, wood, and any other bland material may have pieces of steel imbedded in the safety shoe surface and could thus be a hazard in gassy areas or where there have been spills of combustible or flammable materials (spark hazard). Ferrous metal spikes, wheels, or spurs should not be used in such areas.
CHEMICAL DECOMPOSITION	In those areas where oil or certain solvents may be contacted, rubber should not be used on ladder shoes because of the effect of the solvents on rubber. Neoprene and some other plastics are not affected by oil.
MAINTENANCE	It is very important that ladder shoes be maintained in efficient condition; they should be discarded when they can no longer be relied upon for the purpose intended.
ANGLE	Do not try to use ladders at any angle except between 90 degrees, and 50 degrees, even though equipped with "nonslip ladder shoes."

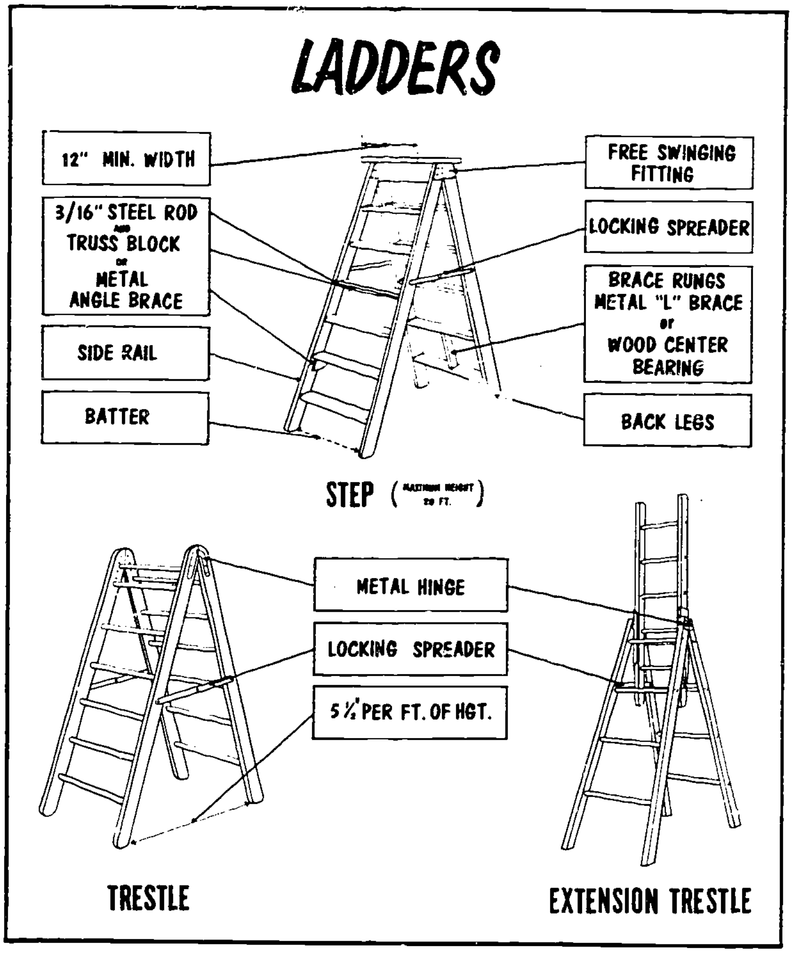


CHART 47—C

PORTABLE STEP-LADDER	Many types for special purposes as follows: 4 to 20 feet high—heavy duty use. 4 to 12 feet high—medium duty use. 3 to 6 feet high—light duty use.
INSPECT FOR	Slope, spacing, width and spread, locking spreader, back steps, or rungs.
TRESTLE LADDER	Generally used in pairs to form supports for planks of temporary scaffold. 1. Trestle ladders or the base sections of extension trestle ladders should be no longer than 20 feet. 2. Trestle ladders are not to be used as stepladders. 3. A trestle ladder is formed by hinging the tops of two single ladders to form equal angles with the base. 4. There should be a locking spreader to hold the front and back sections in an open position. 5. The width between the side rails should be at least 21 inches for

	ladders up to 6 feet long. Longer length should have the width increased at least 1 inch for each additional foot of height. 6. All rungs of front and back should be parallel and level. 7. An extension trestle ladder has an extension unit, which is adjusted vertically and held by locks.
TROLLEY LADDER	Runs on or in an overhead track. Plane of ladder at right angles to plane of motion. Used in mercantile operations. Hazards are same as those for straight ladders.

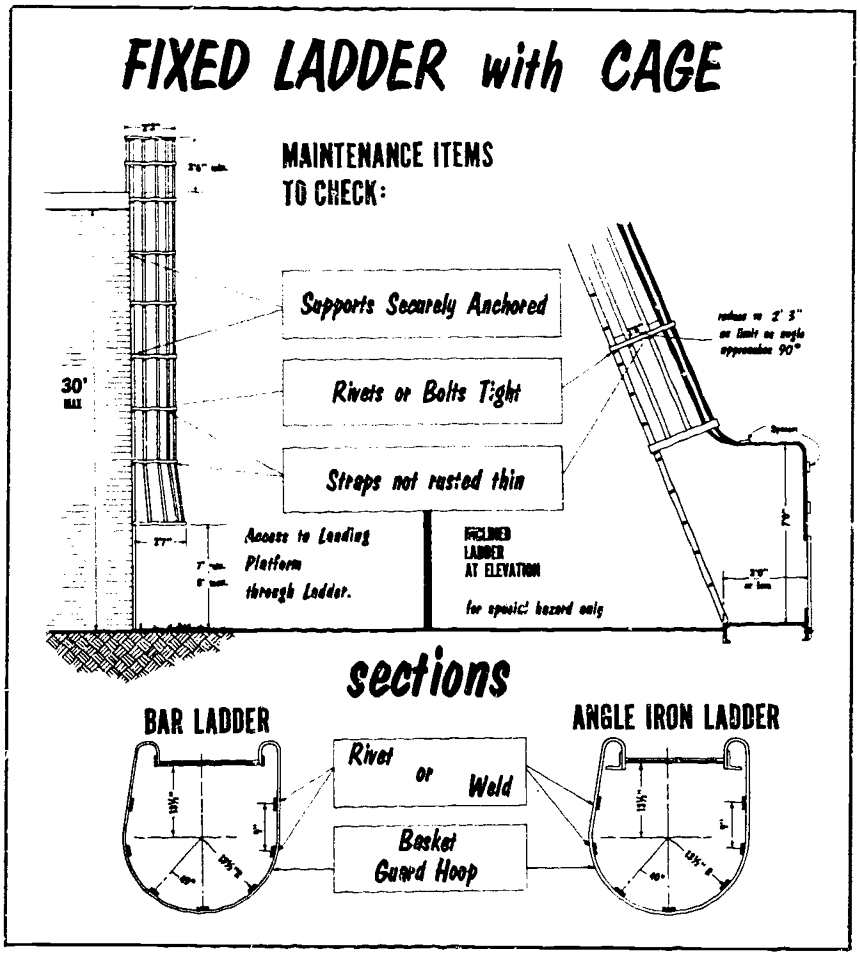


CHART 48—C

FIXED LADDER WITH CAGE	Is permanently fastened to an upright surface; usually constructed of light metal. Should have cages on it if it rises more than 20 feet from floor. Used in mine shafts, powerhouse chimneys, and towers in oil refineries.
DETAILS OF CONSTRUCTION	Cages should extend a minimum of 42 inches above top of landing, and should extend upward not less than 7 feet nor more than 8 feet above the floor level.
WORKING PLATFORM FOR PERSONNEL	Various types of scaffolds used as working platforms will be discussed.

SCAFFOLD SAFETY RECOMMENDATIONS

1. SEE THAT ALL SCAFFOLDS ARE PLUMB AND LEVEL.
2. TIE EXTERIOR SCAFFOLDS INTO THE WALL EVERY 25 FEET OF HEIGHT AND EVERY 28 FEET OF LENGTH
3. USE GUARD RAILINGS REGARDLESS OF HEIGHT.
4. NEVER CLIMB ON CROSS BRACES. ALWAYS USE LADDERS.
5. USE ADJUSTING SCREWS RATHER THAN BLOCKING TO OBTAIN LEVEL SECTIONS.
6. ALWAYS PROVIDE SUFFICIENT SILLS FOR BASE PLATES WHEN ERECTING ON SOFT GROUND.
7. MAKE SURE ALL WING NUTS OR LOCKING DEVICES ARE TIGHT.
8. USE PIVOTED HORIZONTAL BRACES TO OBTAIN A RIGID STRUCTURE.
9. MAKE SURE THAT ALL PLANKING IS OF SOUND QUALITY.
10. GUY ALL FREE STANDING TOWERS EVERY 30 FEET OF HEIGHT.

CHART 49—C

GENERAL REQUIREMENTS FOR SCAFFOLDS	In later revisions of the Standard and in practice, certain designs have become standard; see ASA A10.2–1944—Building Construction. Built to meet usual operation conditions. Use standard lumber sizes.

WOOD FOR SCAFFOLDS	Use only the best grade and quality wood. Wood high in bending and compression stress should be used. Douglas fir, Southern pine, and spruce are best to use.
SCAFFOLD PLANKS	Should be straight grained, free of defects, with high bending stress. Spruce is often used. Its bending stress (1450 to 1200) is not as high as Douglas fir (2150 to 1100) but it is light in weight, and has good straight grain.
FACTOR OF SAFETY	Plank should be at least 2 inches thick and 10 inches wide. Span determines allowable load. Check approved table of safe load at various spans. See ASA A10.2-1944 or later revision.
SAFETY CODES	If available, use State code. If none, comply with ASA, which is recognized as standard in many States. Associated General Contractors of American "Manual of Accident Prevention" is also available.
LIGHT AND HEAVY DUTY	Light duty—intended only for workmen. Designed to carry load of 25 or 30 pounds per square foot. Heavy duty—designed to support a load of materials as well as workmen.
SCAFFOLD CONSTRUCTION NEGLECTED IN PRINT	Too little has been published on the importance of good *construction*, which usually deals with size and specifications for various members.
HIGHLY DETAILED AND SPECIFIC	Instructions on how to construct a good safe scaffold is very detailed and specific for each type of scaffold. Construction of scaffold is one key to its safety. Many occurrences of scaffold failure were due to poor construction in either design or fabrication.
TRANSFER STRESSES TO UPRIGHTS	The purpose of most of the horizontal members of the scaffold is to transfer the stresses to the uprights so that it eventually becomes a compressive stress on the upright.

Be sure class understands the difference in compression stress as contrasted to bending stress. The function of all members of the scaffold is to transfer these bending stresses to a compressive one.

NAILING	Scaffolds are held together with nails which must be large enough to hold securely, yet not too large as to cause material to split. Nails should be placed so no two are in line with each other and not too close to the end as to create a crack that would give way when maximum stress is applied. Nails should be driven through and clinched on other side. Number of nails is determined by experience.

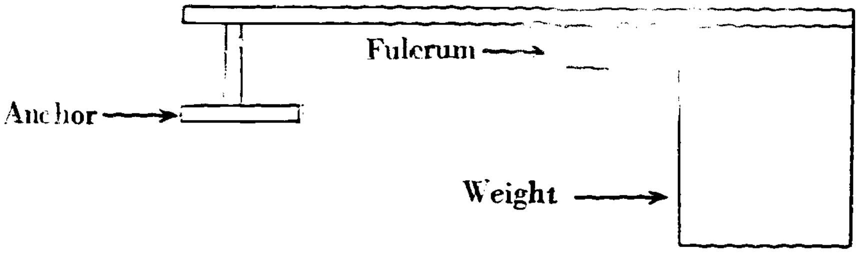
> Some variations can be introduced in handling the details of each of the following types of scaffolds. Where models are available, a thorough discussion of each member can be given as it is attached.
>
> Otherwise, discuss the purpose of the member and and use "How To Inspect" Charts for Scaffolds. The purpose, not mere size of material, should be emphasized as the member is discussed.

DOUBLE POLE SCAFFOLD	The *double pole* scaffold is probably the most common type. It consists of a platform, supported by two rows of poles, one near the building, the other a little way out from the building. This type of scaffold is self-supporting, although it may be tied into the building for rigidity.
SIZE OF MEMBERS	The size of members is determined by the height, also whether it is intended for "light" or "heavy" duty. The inspector should consult ASA A10.2–1944 or later revision—Building Construction Safety Code, for size and spacing of members. Light duty, 25 pounds per square foot. Heavy duty, 75 pounds per square foot.
POLES SET PLUMB	Poles should set plumb on a solid foundation. If set on the ground, a 2-inch by 12-inch by 12-inch support and should be placed under each pole. Poles must be braced both parallel and perpendicular to the building.
LEDGERS	Ledgers should be 2 by 6 inches, overlap at least 2 inches, preferably 3 poles. The ledgers support putlog or bearer and should be left in place as the scaffold is built higher; they should be nailed to the inside of the poles.
PUTLOG OR BEARER	Putlogs are usually 2 by 6 inches or 2 by 8 inches, with greatest dimension vertical; they should extend beyond ledgers and be nailed to posts.
PLATFORM PLANKS	Planks should extend over *three* bearers. Overlapping the bearer is considered satisfactory up to at least 6 inches. Where platform planks abut, use two bearers. At corners, diagonal bearers should be placed to help support the scaffold planks.

GUARDRAIL AND TOEBOARD	When scaffold is 6 feet or over in height, the platform should have a guardrail, preferably 42 inches high with a midrail. Guardrail should be nailed to the inside of poles. (It is less likely to be displaced and it will stand more stress.)
SINGLE POLE SCAFFOLD	A *single pole* scaffold is exactly like a double pole, except that the inner row of poles is omitted, the bearers or putlogs are supported by the building itself. On a brick building, the putlog extends into a hole in the wall, formed by omitting one or more bricks. If it is necessary to notch the putlog, the notch should be cut at the top of it, never at the bottom.
SPECIFICATIONS	The size and spacing of members and other construction details are exactly the same as for a double pole scaffold. *Question:* What would you recommend for a *single pole light duty* scaffold 42 feet in height? *Answer:* Upright poles 4 by 4 inches spaced 7½ feet apart longitudinally and 5 feet from wall (transverse). Ledgers (stringer)—2 by 6 inches spaced 7 feet apart. Putlogs (bearers)—2 by 6 inches. Braces—1 by 6 inches. *Question:* What details would you look for in inspecting pole scaffolds (single and double)? *Answer:* a. Poles plumb. b. Proper footings. c. Proper braces. d. Splicing. e. Scaffold planks. f. Nailing and construction details. g. Correct size of material.
BRICKLAYER'S SQUARE SCAFFOLD PLUS HORSES	This is another common type of scaffold. It consists of a platform composed of planks supported by built-up squares secured to each other by diagonal bracing. It is used almost exclusively by masons and bricklayers.
CONSTRUCTION DETAILS	Square should not be larger than 5 feet on each side. Sides of square are 2 by 4 inches or larger with corner-and-diagonal bracing.

SPACING OF SQUARES	For "light" duty, space 8 feet apart; for "heavy" duty, 5 feet. Adjacent squares are braced front and rear, from top to bottom, by 1- by 6-inch brace.
TIERS	Squares should not be set up more than 3 tiers high, and should be braced front and rear. Each tier should rest on a continuous row of planks, nailed to the lower tier.
HANDRAIL AND TOEBOARD	When scaffold is 12 feet or higher, it should be provided with a handrail and toeboard, fastened to uprights provided for that purpose.
HORSE SCAFFOLD	A horse scaffold consists of a platform supported by a carpenter's horse.
CONSTRUCTION DETAILS	Horses are usually about 48 inches high and 48 inches long. The legs are 2 by 4 inches, the bearer 2 by 6 inches, and adequately braced with diagonal braces from bottom of legs to center of bearer.
SPACING AND TIERING	Spaced 8 feet for "light" duty. Should not be built more than 3 tiers high. When tiering, legs should be nailed to plank on which they rest. Guardrails or toeboards are seldom used with horse scaffolds.
OUTRIGGER SCAFFOLDS	An outrigger scaffold consists of a platform supported by outriggers or thrustouts from or through the wall of the building. The inner ends are secured to the structure.
SUPPORT FOR SUSPENDED SCAFFOLDS	Outriggers on roof or top of buildings are usually used as supports from which suspended scaffolds are held.
CONSTRUCTION DETAILS	Wood thrustouts should be not less than 3 by 10 inches, and set on edge. They should project no more than 6 feet through the wall and should be securely anchored. Ends of thrustouts may be supported by external braces, spaced 6 feet apart.
ANCHORING OUTRIGGERS	The key for outrigger scaffolds is anchoring the inner ends of the beams. Practice of sand bagging outriggers should be discouraged, if not prohibited.
WINDOW JACK SCAFFOLDS USED AT WINDOW ONLY	Should use approved type only. Used for purpose of working at window through which it projects. One person only on jack at one time. Constructed to sustain load of 200 pounds—(safety factor of 4). Planks between jacks prohibited.

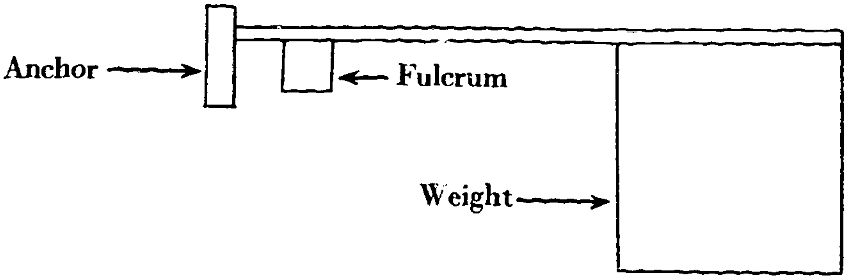
Demonstrate to class on *blackboard* the advantage of outrigger beams, and weakness of window jack (based on lever of first class).



OUTRIGGER

BLACKBOARD:

Length of beam from fulcrum to anchor is much greater than from fulcrum to weight. Thus, anchoring force is much less than actual load supported.



ANCHORING FORCES	**Here length of beam from fulcrum to weight is much more than from fulcrum to anchor. Therefore, the anchoring forces may have to be 5 to 10 times the actual weight on the window jack.**

TUBULAR STEEL SCAFFOLDS

Tubular steel scaffolds are designed, tested, and built commercially. They have many advantages over built-on-the-job wood scaffolds which, in general, they have replaced.

Point out several advantages of tubular steel scaffolds over wood scaffolds, such as safety for the worker, lower costs, decreased fire hazard, improved appearance. Ask class to list additional points.

SCAFFOLDING SERVICE

Most types of steel scaffolding equipment can be either purchased or rented. Complete scaffolding services include layout, erection, inspection by the scaffolding contractor during the job, dismantling, and reconditioning when the job is completed.

STEEL SCAFFOLD CLASSIFICATIONS

In general, present-day steel scaffolds fall into three main classifications:

a. *Built-up scaffolds,* as the name implies, are built up from the ground or floor as the work progresses. They can be made up of either sectional frames or from tube and couplers.

b. *Rolling scaffolds* are easily movable units made by fitting casters to either of the two types of built-up scaffolding, or to special aluminum components.

c. *Hanging scaffolds* include heavy duty suspended equipment and light duty swinging scaffolds.

SECTIONAL FRAME SCAFFOLDING

One of the built-up types is erected from prefabricated, welded, tubular steel transverse frames or panels. They are widely used for bricklaying, stonesetting, steeple and tower work, for refacing plastering, and for electrical installations day-to-day routine uses. On concrete pouring operations, for example, they can support the forms or make a concrete wheeling scaffold. To benefit from all the safety built into sectional scaffolds, follow recommendations listed in Chart 49—C.

TUBE AND COUPLER SCAFFOLD	This, the second built-up type, is erected from four basic parts: galvanized steel tubes of various lengths, joined by fittings which lock, to make a continuous tube; a standard, right-angle coupler for joining members at right angles; adjustable couplers for joining members at other than right-angles, and bases, on which the scaffold is erected. The tubes are usually 2 or 2½ inches nominal outside diameter and from 6 to 13 feet long. Tube and coupler scaffolds are the most versatile built-up type, because working levels can be established on any interval and because braces can be set at any point. Curved surfaces, extreme height, uneven ground, and building set back pose no problem with this type of equipment. Tube and coupler scaffolding are widely used for building renovations and *refacing work*. *All the safety measures* indicated for sectional scaffolds should be followed when the tube and coupler type is used. In addition, the scaffold should be checked after erection to ensure that joints between connecting tubes are locked, as indicated by "match" marks on the members.
SUSPENDED SCAFFOLDS	A suspended scaffold is a platform supported by steel cables suspended from overhead outriggers. They are used for bricklaying and stonesetting on large buildings. The plaform is continuous on one or more sides of the building, and it is raised as the work moves upward.
ANCHORING OF OUTRIGGERS	Outriggers, or thrustouts, are (usually 7 inches, 15.3 pounds) "I" beams or channels anchored with "U" bolts to the steel framework.
HOISTING MACHINES	Hand operated hoisting machines are located on the platform. They should have Underwriters' Laboratories approval.
SWINGING AND FENDER GUARDS	The platform should be tied to the building so that it will not swing away from the building during a high wind. Fenders should also be provided to keep it from bumping against the building.
OVERHEAD PROTECTION	Overhead protection should be provided by a solid wood canopy. Handrails and toeboards are necessary. The space between the handrail and toeboard should be filled with wire screening.
SWINGING SCAFFOLDS	Also know as painter's scaffold, it consists of a platform or plank, the ends of which rest on a hanger which is supported by ropes attached to hooks which hook over the eaves or cornice of a building.
DISTANCE BETWEEN HANGERS	Varies from 10 to 24 feet, depending upon type of platform. Platform may consist of a plank, a ladder section plank, or a beam type platform.
HANGERS	Hangers or stirrups are made of ¾-inch round iron. They should be designed to support a guardrail, intermediate rail, and toeboard.

LIFELINES	Ropes should be ¾-inch manila. Not more than two men should work on a scaffold. Each should have a lifeline, independent of the scaffold ropes.
SAFETY PRECAUTIONS	Many accidents have occurred because the ropes have broken. These should be inspected frequently and securely fastened when in use. Fenders should be provided, and provisions to tie the scaffold to the building. Guardrails and toeboards are necessary. They are often omitted.

Question:

What are the important points to look for when inspecting suspended or swinging scaffolds?

Answer:

a. Overhead protection.
b. Handrails, toeboards, wire filling.
c. Tie into building.
d. Fender guards.
e. Properly fastened thrustouts.

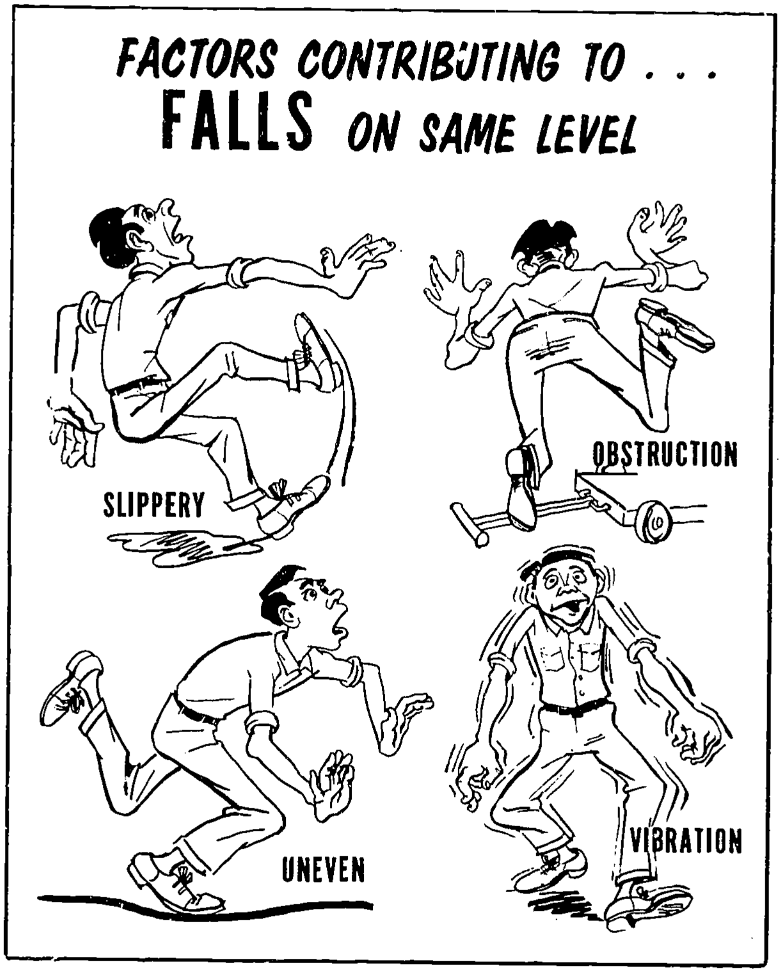
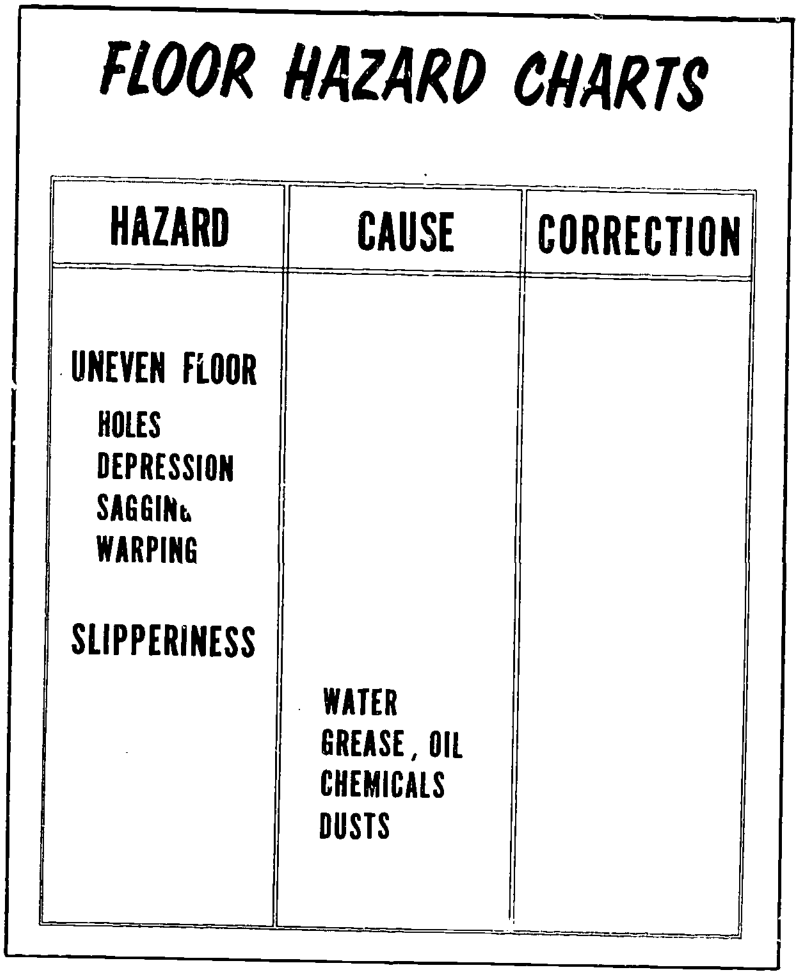


CHART 50—C

MANAGEMENT RESPONSIBILITIES	Management has the responsibility for selecting, providing, and maintaining the proper type of flooring or other walk surfaces, recognizing that walkways, ramps, and floors in one department may require a different surface than those in another department; for example, the plating room and the machine shop.
PLANNING	Lack of proper planning is often the real cause of conditions which lead to falls: 1. Improper drainage. 2. Poor lighting. 3. Overloaded floors, causing distortion of surface. 4. Crowded aisles and congested traffic due to improper layout.
SLIPPERY FLOORS	This condition can be due to any of the following: 1. Liquids, dusts, etc., which have been spilled. (Prevent by safe practices and good housekeeping.)

	2. Improper drainage. (Redesign to correct situation.) 3. Inherent slipperiness. (Use of special wax, paint, or other surfacing material.)
OBSTRUCTIONS	These are generally pieces of equipment, castings, excess or backlog of work in process, tools, repair parts, etc. Workers should be instructed that these should not be left where they may be a hazard to traffic. Storage areas should be allocated for this purpose.
UNEVEN SURFACES	Warped floors, loose boards, worn or rotten surface planks, corroding by chemicals, or settling of the building are the most common causes of uneven walking surfaces.
VIBRATIONS	Vibrations are generally due to various factors: 1. Improper selection of working surface, underpinnings of poor structural design, or improper installation of machinery. 2. Lack of proper building and machine maintenance. 3. Overloading.
HOUSEKEEPING	Poor housekeeping is probably the most prolific source of falls on the same level. Slippery surfaces due to spills of liquids and dusts and stumbling over objects left in aisles are common causes of falls.
EDUCATION AND TRAINING	A well-planned employee safety training and education program helps to secure and maintain the interest and cooperation of the employees in a cleaner, safer environment. Safety meetings, bulletin boards, films, etc., all are means of communication for improvement of housekeeping practices.
SUPERVISION	The way to train a worker properly is to "tell him, show him, have him do it, and follow up to be sure he does it." Also add "supervise him." Set a good example by following this good advice.
MAINTENANCE	There should be a regular system of preventive maintenance inspections, which would include floors, stairs, ramps, and checking for leaks, drainage, and the rotting surfaces and underpinnings.



FLOOR HAZARD CHARTS

HAZARD	CAUSE	CORRECTION
UNEVEN FLOOR HOLES DEPRESSION SAGGING WARPING		
SLIPPERINESS	WATER GREASE, OIL CHEMICALS DUSTS	

CHART 51—C

FLOOR HAZARDS	Uneven floors, depressions, warping, slipperiness. *Corrections:* Eliminate moisture, patch with proper material.

HAZARDOUS CONDITIONS	UNEVEN FLOOR	
	Cause	*Correction*
	Holes, swollen wooden blocks, chipped concrete, rotten or worn wooden floor.	Eliminate moisture, patch with proper material, or replace.
	Asphalt or composition—due to heat or cold.	Replace on a time schedule or eliminate temperature extremes.
	Asphalt or composition—oil or chemical dissolved or softened.	Replace with proper protective surface.
DEPRESSIONS, CRACKS, OR RUTS	Wheels, heat, chemicals, solvents.	Use rubber tires or resurface.
SAGGING	Overloading floor or rotted joists.	Brace—repair, replace. Know and observe limits of floor.
	(Strength: Allowance should be for 4 times the static load or 6 times the moving load.)	
WARPING	Dampness.	Eliminate the cause or substitute the proper flooring material.
SLIPPERINESS	Leaks of water, grease, chemicals, oils.	Eliminate source. Clean up spillage. Use suitable absorbent.
	Process spills of dusts, such as floor, sawdust, cocoa, etc.	Exhaust and dust collector systems, special nonskid surfaces.
	Inherent slipperiness or when wet, such as wood, marble, terrazzo, linoleum.	Use special nonskid wax and keep dry. Employees wear nonskid shoes.
	Smooth metal plates.	Weld beading on surface. Use nonskid paint, substitute grate or matting.
SLIPPERY FLOORS	Leak or condensation plus temperature, formation of ice.	Eliminate condition which causes. Use sand or cinders plus ordinary salt or calcium chloride.

Distribute occupational safety aids—"Trips, Slips, and Falls," "A Ladder and Stairway Inspection Sheet," "Safe Practices—Ladders," "Scaffold Construction," and "Safe Practices—Scaffolds."

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*U.S. GOVERNMENT PRINTING OFFICE : 1967 O—244-739

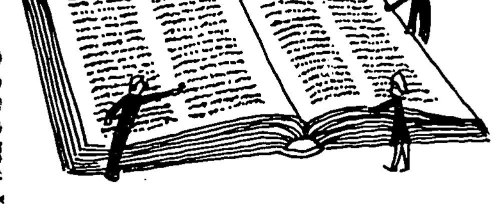
VT 016 655
THE SUPERVISOR'S GUIDE TO LABOR RELATIONS IN THE FEDERAL GOVERNMENT.

CIVIL SERVICE COMMISSION, WASHINGTON, D.C.
BUREAU OF TRAINING.
MF AVAILABLE IN VT-ERIC SET.
CST-26-9401(2-72)
PUB DATE - FEB72 27P. FOURTH EDITION

DESCRIPTORS - *SUPERVISORY TRAINING; *INDUSTRIAL RELATIONS; *FEDERAL GOVERNMENT; ADULT VOCATIONAL EDUCATION; *EMPLOYER EMPLOYEE RELATIONSHIP; *PAMPHLETS; VOCATIONAL DEVELOPMENT; MANAGEMENT EDUCATION; ADMINISTRATIVE PERSONNEL; NEGOTIATION AGREEMENTS
IDENTIFIERS - *LABOR FORCE PARTICIPATION

ABSTRACT - THIS GUIDE IS INTENDED TO ASSIST THE FIRST LINE SUPERVISOR IN HIS ROLE OF MANAGEMENT'S "KEY MAN" IN THE ADMINISTRATION OF THE LABOR AGREEMENT WITH THE LABOR UNIONS. THIS BOOKLET CONTAINS SIX TOPICAL CHAPTERS: (1) THE SUPERVISOR AND THE STEWARD, (2) WHAT THE SUPERVISOR SHOULD KNOW ABOUT CONTRACT NEGOTIATIONS, (3) CONTRACT LANGUAGE, (4) HANDLING GRIEVANCES AND ARBITRATION, (5) STRIKES, OTHER JOB ACTIONS AND THE SUPERVISOR, AND (6) THE SUPERVISOR AND THE EXECUTIVE ORDER. LINE DRAWINGS ILLUSTRATE THE TEXT, DEVELOPED AT A LABOR RELATIONS TRAINING CENTER. BRIEF OUTLINES OF IMPORTANT POINTS TO REMEMBER ARE INCLUDED. (AG)

The Supervisor's Guide To Labor Relations In The Federal Government



U.S. CIVIL SERVICE COMMISSION
BUREAU OF TRAINING
LABOR RELATIONS TRAINING CENTER

FEBRUARY 1972
FOURTH EDITION

CST 26-9401 (2-72)

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INTRODUCTION TO THE FIRST LINE SUPERVISOR

You are the first line supervisor. You are the "key man" in your installation's labor relations with the union or unions with which it has collective bargaining contracts. The importance attached to your role as the first line supervisor in labor relations is strongly supported by the opinions of leading authorities -- arbitrators, government officials, union officials, and academic authorities.

You have been referred to as the "harrassed" in public management. You are required to be expert in the functions of your department or section, keep voluminous records, attend numerous meetings, anticipate production bottlenecks, meet work schedules, and be responsible for work performance. In addition, you are expected to anticipate and substantiate temporary and regular manpower needs and efficiently assign, train, promote, utilize and direct employees.

And in all of the activities you undertake -- actions which involve the efficiency of agency operations and government funds -- you must constantly keep in mind your installation's contractual agreements with the union.

Under pressure of getting the job done, with time at a premium and the union steward always watchful, you might be inclined to overlook rule violations, make verbal side agreements or approve some expeditious but incorrect contract interpretation. This might save some time, but it also might result in harmful and costly precedents which could prove difficult, if not impossible, to eliminate.

This guide is intended to assist in your role of management's "keyman" in the administration of the labor agreement.

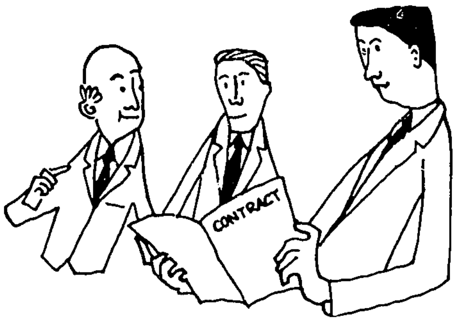
Union education departments distribute labor relations guides to stewards in order to acquaint them with their responsibilities and to broaden their labor relations experience. It is imperative that the first line supervisor have the same familiarity with various phases of labor relations. Your responsibilities in labor relations represent an integral part of the success of the daily and continuing operations of your installation or agency, and of effective labor relations in the Federal Service.

CHAPTER I
THE SUPERVISOR AND THE STEWARD

The signing of an agreement is no guarantee that sweetness and light will prevail during its lifetime between labor and management. It signifies only that the management and the union have reached some accord over the terms and conditions of employment -- the best accord possible under the circumstances.

If this accord was reached in a friendly atmosphere, it will make your job of administering the agreement -- contract administration -- an easier one than if hostility prevailed during the negotiations. Regardless of the atmosphere of the negotiations, you can anticipate that differences over the intent, meaning and application of specific contract clauses will arise almost immediately after the signing of the agreement. Frequently these occur even during the period when management is informing supervisors about the interpretation and application of its terms. You can also expect that differences and disputes will continue in greater or lesser degree during the entire life of the agreement.

YOUR IMPACT ON CONTRACT ADMINISTRATION



Effective contract administration depends on you -- the first line supervisor. The impact of your behavior, your actions and decisions will certainly be felt throughout your section or department. It may be of such consequence that the impact will spill over to the entire installation, and perhaps to the agency as a whole or to other agencies.

All the time spent in extensive preparation for negotiation, careful drafting of contract language, and wide and thorough dissemination of explanations of the interpretation and application of the new agreement may go down the drain by poor day-to-day administration of the agreement by the first line supervisor. Or, you can establish such positive relations with your employees and union stewards that they dramatically promote harmonious labor-management relations in your installation and agency. Your attitudes about the agreement, the union, the union steward, and your behavior in contract administration will greatly influence the quality of your administration of the agreement. As a first line supervisor, you represent management's labor relations policies to your employees and to the union steward, their representative. You occupy an important position -- *the* key position -- in the administration of the agreement.

IT'S YOUR JOB TO MAKE THE DECISIONS

Promoting positive labor relations and increasing the nature and scope of consultation with the senior steward does not mean surrendering your responsibility for taking action or making decisions. Good labor relations can produce an atmosphere of cooperation, of mutual trust and understanding, but management, through you -- the first line supervisor -- must take positive actions and decisions.

For example, under Executive Order 11491, an employee, as an individual, has the right to bring his grievance directly to the supervisor. The supervisor may handle the grievance, but the union must be afforded an opportunity to be present when the grievance is settled, and the adjustment of the grievance may not be in conflict with the terms of the negotiated agreement. If an employee files an individual grievance without supplying a copy to the union, positive action on the part of the supervisor is called for. The supervisor should immediately notify the steward of the grievance and make certain the steward is informed of the date and time set for the hearing, and kept informed of any postponements.

Keeping the union informed is essential to obtaining cooperation. It is not suggested that management must obtain prior consent before taking action for it is not the function of the union to participate in management's decisions. However, affirmatively communicating to the steward such matters as changes in schedules, proposed discharges or layoffs, contemplated overtime, etc. -- after management has made the decision and prior to the announcement to the workers -- can reap the installation many benefits and reduce friction between the management and union representatives.

As a practical matter, enlisting the steward's cooperation by keeping him aware of what actions are to be taken is a demonstration of courtesy which must not be ignored and which will be most beneficial to the installation and agency.

"COOPERATION" DOES NOT MEAN "CO-MANAGEMENT"

By the very nature of their respective positions, the supervisor and the steward are bound to be on opposite sides of many issues and cannot "co-manage." Nevertheless, there are areas in which close cooperation is called for. For example, departmental safety should be of geniune mutual interest, as should the control of absenteeism. These matters are of equal importance to the installation, the workers and the union.

There are no hard and fast rules to be followed which will insure peace between the supervisor, the steward and the workers. The development of a decent relationship is a matter which must be approached differently in every work area. However, it can confidently be stated that following the basic principles of fair, reasonable and honest dealings will, almost always, be the best method of securing the cooperation of the steward and the workers. If this approach does not produce results, the supervisor then is in a position to request that the management exert its influence to have the international take internal corrective action within the local union.

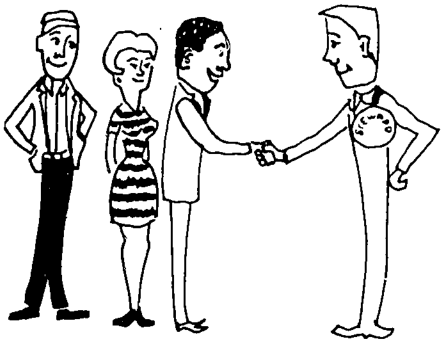
UNDERSTANDING THE STEWARD'S ROLE

Management should recognize the steward as one elected to a position of trust by his fellow members, and accord to him the cooperation and respect necessary for him to do an effective job. Too often supervisors are not informed about the rights and responsibilities of the steward, and a type of personal guerilla warfare ensues.

The supervisor must recognize and understand that the steward is often forced, for political reasons, to take a position with which he does not necessarily agree. This is true, of course, of certain management decisions which the supervisor must follow. In either case, both have the right to expect sympathetic understanding from the other. Labor relations is not a one-way street and, if it assumes that form, resentments and antagonisms will eventually spell disaster for the relationship, the workers and the installation and agency.

The supervisor and the steward have the right to mutual respect. The supervisor must recognize that the steward has contractual rights to handle grievances, and should not be denied reasonable time and access to employees to perform this job. Unions allege that given cooperation, stewards will take care of more borderline grievances than they file. The steward should be allowed to demonstrate his good faith intention in this respect.

Similarly, the supervisor must not be hampered in his primary function of securing efficient production by any actions of the steward. The supervisor has the right to expect the steward to support him in getting a fair day's work for the wages paid.



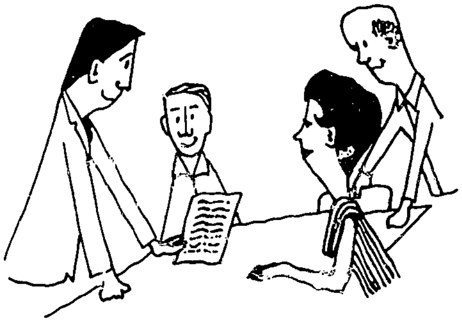
CHAPTER II

WHAT THE SUPERVISOR SHOULD KNOW ABOUT CONTRACT NEGOTIATIONS

Few first line supervisors are involved in contract negotiations as members of management negotiating teams. However, there are at least two major reasons why it is important for you to be acquainted with the process of contract negotiations.

1. It will help you carry out your key role and function in providing informational support before and during actual contract negotiations.

2. By understanding the dynamics and outcome of contract negotiations, it will help you to administer the contract -- to interpret and apply it as intended by management.



PROVIDING SUPPORT IN CONTRACT NEGOTIATIONS

The formal phase of contract negotiations begins when:

1. The newly certified collective bargaining agent (union) requests its first meeting with management to discuss a written contract, or submits its contract proposals, or

2. Within the stipulated number of days prior to the expiration of an existing contract, either party notifies the other concerning the renewal, extension or renegotiation of the contract.

However, supervisors must understand that the planning and preparation phase of contract negotiation begins when the union first appears on the scene, in the case of a first contract, or as soon as a current contract is signed by both parties. Thereafter, there is no real "conclusion" to planning and preparations for contract negotiations.

The supervisor is the member of the management team closest to each employee. He hears rumors concerning union proposals and demands, its bargaining plans and strategies and, occasionally, what the "real" issues are. Without prying into union affairs, the supervisor has access to this information. He is in a position to judge the temper of the employees and the reliability of the information.

Knowing his employees helps the supervisor make this judgement. He can separate fact from fiction, hard information from the exaggerations. Open channels of upward communication should enable him to keep his middle and top management team members continuously informed about these matters.

Unresolved problems and complaints frequently turn up as union contract demands. The supervisor's ability to resolve problems and complaints helps eliminate unimportant demands. Identifying and reporting those problems which could not be resolved helps the negotiating team anticipate union proposals and positions.

As contract negotiations continue, the supervisor is in a position to provide operational and statistical information, such as number of employees by classification and pay rates, number of employees receiving shift differentials, length of service information, overtime worked, etc. The supervisor may be asked about his experiences and his problems in administering the existing agreement.

Finally, he should be involved in assessing the implications and effects of union proposals on contract clauses.

UNDERSTANDING THE DYNAMICS AND OUTCOMES OF CONTRACT NEGOTIATIONS

The final agreement is the outcome of the dynamics of contract negotiations. Chances are that the understanding about the intent and application of each contract clause will be different for both management and the union. This is the reason that the Executive Order requires that each contract have a negotiated grievance procedure to interpret its clauses.

The union will seek to test the boundaries of management intentions in contract administration, often attempting to get from the supervisor what it could not get at the bargaining table. This is standard operating procedure. It is a practical reality of collective bargaining. The supervisor must know the management position on the interpretation of each clause. You should therefore have a considerable interest in being involved in and kept informed about the progress of contract negotiations.

CHAPTER III

CONTRACT LANGUAGE

There is no perfect contract language. The best that can be accomplished is to draft language which is carefully chosen to prevent disputes and eliminate misunderstandings. However, every clause which might appear, on its face, to be clear and understandable is subject to interpretation.

THE NEED FOR ANALYZING CONTRACT PROVISIONS

Once negotiations have concluded, the contract must be distributed to each supervisor and provision must be made for the analysis of the contract clauses. This training is frequently accomplished at a special meeting of supervisors. This analysis is essential in order to assure the development of a consistent and uniform understanding of the contract, and consistent and uniform application of its terms.

HOW TO ANALYZE A CONTRACT PROVISION

The rules of labor contract interpretation are much the same as those followed by the courts in construing other types of contracts. It is not necessary to put the principles in highly legalistic language to understand them. The primary purpose of these rules of interpretation is to determine the intent of the parties. What did the agency and union mean when they wrote the provision?

To determine the meaning of any clause contained in the agreement:

1. Examine the written minutes or notes of meetings at which the language was drafted and agreed upon. What discussions were held? What did the parties say they meant when they considered and adopted the provision?

2. Discuss the language with members of the management negotiating team. What was their understanding of the meaning at the time of agreement?

3. Analyze all grievances involving the provision. How were the grievances disposed of? Were there any interpretive understandings reached in resolving the grievances?

4. Study any prior arbitration decisions in which the particular language was discussed.

5. Research all past practice. How has the provision been administered since it first was written into the agreement?

6. If the minutes of negotiations and discussions with the management representatives reveal that the parties did not focus specifically on the phrases in dispute, and if there is neither history of past practice nor prior arbitration awards, then turn to these rules:

   (a) Words shall be given their normal or common meaning, e.g., "pay" ordinarily implies payment in money.

   (b) Technical words commonly used in labor agreements are given their normal meaning. Words such as "layoff," "strike," "seniority," all have fairly well established meanings in industrial life.

   (c) The contract will be read in its entirety and each separate part interpreted to give effect to its general purpose.

   (d) Where there is a conflict between general and specific language, the specific shall govern. For example, a general clause on seniority may provide that generally, seniority shall be strictly adhered to so long as the employee has the ability to perform the work. However, the overtime clause may provide that the employee normally performing the work will be assigned the overtime. In the event a dispute arises because a junior employee normally performing the work is assigned the overtime, the overtime provision will govern, as it is the more specific.

   (e) If there is a conflict between two clauses, the intention which appears in the most important clause shall govern. For example, the contract may contain a provision stating that the management will continue its policy of providing standard break periods, and also contain the usual management rights clause, spelling out that management shall direct the work force. If an emergency situation arises and the supervisor finds it necessary to keep the men working through the usual break, the management's action shall be sustained as supported by the more important clause, the management rights clause.

In summary, unless management by past practice (including grievance discussions and settlements) has committed itself to some other meaning, there is a good chance that the true intention of the provision will be upheld in arbitration.

THE MAJOR CLAUSES IN EVERY CONTRACT

The ideas contained in each of the clauses to be discussed are expressed differently in many agreements, but the major features noted are the ones to which the supervisor shall be alerted in the contract(s) he is to administer. There are, of course, different details which are covered in a negotiated agreement. Some agreements sketch out the provisions, others become thick volumes. But there are provisions which are universal to almost all agreements.

1. Parties

The first clause which appears in most collective bargaining agreements identifies the parties to the contract. For the union the agreement may be signed by representatives of the international, the local, or both. The management may prefer that both the international and the local sign so that both may be liable for contract violation. Where both sign and the local withdraws from affiliation with the international, the international retains the bargaining rights with the employer. The agency may [illegible] a single employer or as a group representative of several government employers. Provision may also be made to cover the situation in the event of the reorganization of an agency or installation.

2. Preamble and Purpose

The preamble is a general statement of the intent and purpose of the parties in making the agreement. Reference is made to the mutual interest of the employees and the management in furthering efficiency and economy. The preamble contains a statement of the desire and duty of the employer and the employees to cooperate fully in the advancement of a successful operation. Reference is frequently made to carrying out the mandates of Executive Order 11491 amended.

3. Recognition and Scope

The agency states its acknowledgement that the union is the exclusive and sole collective bargaining agent for all employees in the prescribed unit as covered by the agreement. The union must establish that it is entitled to such recognition by obtaining certification after an election. (The Executive Order contains detailed procedures in connection with filing for and holding elections.)

4. Management Responsibilities

A statement of management prerogatives is required in all federal contracts. The clause spells out the management actions which are exclusive functions of management. Some view it as not advisable to list management rights, since the enumeration of certain rights might be construed to exclude other rights not specifically stated.

The clause may be a simple reference to Section 12(b) of the Order, or it may be spelled out.

5. Hours of Work

This provision is not necessarily intended to guarantee any number of hours of work to the employees. The practice is to define the work day, work week, or both, in order to prescribe the regularly scheduled hours during which work is to be performed, as required by law and as a basis for calculating overtime. What is meant by "day" and "week" is set forth in detail.

Sub-paragraphs of this provision may also provide for notice of changes in the hours or assignments to shifts as necessary, for the establishment of new shifts, for notification to employees when there is no work, for minimum time off between tours of duty, selection of shifts based upon seniority, meal periods, wash-up time, etc.

6. Overtime and Premium Pay

Overtime and premium pay rates are set by Federal law and Civil Service Commission regulation. However, overtime and premium pay contract clauses may include provisions that these payments cannot be made unless overtime or premium work is specifically authorized by a supervisor, that adequate notice must be given, that employees may (or may not) refuse overtime or premium work, and that it be distributed in a specific manner.

NOTE:

Provisions Covered By Law or Regulation

SUBJECTS SUCH AS HOURS OF WORK, OVERTIME AND PREMIUM PAY, HOLIDAY WORK AND HOLIDAY PAY, SENIORITY, TRANSFERS AND PROMOTIONS ARE SET BY FEDERAL LAWS AND/OR REGULATIONS -- AGENCY OR CIVIL SERVICE COMMISSION. THESE COVER SUCH MATTERS AS THE HOURS OF WORK PER DAY AND WEEK, OVERTIME PAY RATE, THE NUMBER AND DAYS OF HOLIDAYS, MERIT PROMOTION, ETC.

IN VIEW OF THE IMPLICATIONS OF SECTION 13 OF THE ORDER, UNDER WHICH NEGOTIATED GRIEVANCE PROCEDURES ARE LIMITED TO THE INTERPRETATION AND APPLICATION OF CLAUSES IN THE NEGOTIATED AGREEMENTS, THERE IS THE POSSIBILITY THAT INCLUDING THE LANGUAGE OF THE FEDERAL LAWS OR REGULATIONS IN THE CONTRACT MAY MAKE THESE TOPICS GRIEVABLE UNDER THE NEGOTIATED GRIEVANCE PROCEDURE. WHETHER IT IS JUDICIOUS OR A GOOD MANAGEMENT LABOR RELATIONS PRACTICE TO NEGOTIATE THE LANGUAGE OF LAWS OR REGULATIONS, OR CONTRACT CLAUSES PARAPHRASING THE LAWS AND REGULATIONS, AND INCLUDE THEM IN COLLECTIVE AGREEMENTS IS A MATTER OF INDIVIDUAL MANAGEMENT JUDGMENT AND POWER. IF SUCH CLAUSES APPEAR IN THE CONTRACT, IT IS ADVISABLE THAT THEY SPECIFICALLY BE EXCLUDED FROM THE PROVISIONS OF THE GRIEVANCE PROCEDURE.

HOWEVER, MANAGEMENT MUST BEAR IN MIND THAT THE IMPLEMENTATION OF THESE MATTERS -- HOW OVERTIME IS TO BE DISTRIBUTED, WHEN THE NORMAL WORK DAY BEGINS AND ENDS, WHO SHOULD RECEIVE PREMIUM PAY AND UNDER WHAT CIRCUMSTANCES, HOW LEAVE SHALL BE SCHEDULED -- IS NEGOTIABLE. THESE CAN BE AND ARE INCLUDED IN AGREEMENTS AND COMPLAINTS CONCERNING THEIR INTERPRETATION AND APPLICATION ARE SUBJECT TO THE NEGOTIATED GRIEVANCE PROCEDURE.

7. Holiday Work and Holiday Pay

The number and times of holidays and holiday payments are also set by Federal law and Civil Service Commission regulations, and are not necessarily included in the negotiated agreement. However provision may be made concerning limitations, if any, on scheduling holiday work, and the procedures for rotating regular or special holiday work requirements among employees.

8. Seniority -- Promotions -- Transfers

The concept of seniority -- rewarding employees with greater length of service by preferential treatment -- is involved in many aspects of the agreement. Seniority "rights" are often considered or involved in determining the order of layoff and rehire, promotions, transfers to more desirable duties, choice of vacation time, choice of shifts and work hours, overtime distribution, etc.

The two major considerations are:

(1) Determination of the unit within which seniority shall be applicable -- section, department, installation or entire agency; and

(2) The factors or criteria other than seniority which are involved in promotions and transfers -- skills, training, education, fitness, ability and other qualifications. Merit and fitness are required by merit system principles

Other sensitive matters which may be controlled by seniority provisions are transfers out of or into the bargaining unit, merger of seniority rosters in the event of agency consolidations, preferential (super) seniority for union officials, exclusion from seniority "bumps" of handicapped workers and veterans.

9. Grievances and Arbitrations

All agreements negotiated or renewed since November 24, 1971, must include a negotiated grievance procedure for consideration of grievances over the interpretation and application of the agreement. The details of the procedure are negotiable and not subject to Civil Service Commission regulations.

The negotiated grievance procedure is applicable only to the bargaining unit it covers. It is the exclusive procedure available to the union, management and the employees in the unit for resolving grievances over the interpretation and application of the agreement. Any employee or group of employees in the unit may present such grievances to management and have them adjusted without the intervention of the exclusive union, but the adjustment cannot be inconsistent with the terms of the agreement and the union must be given the opportunity to be present at the adjustment.

Negotiated grievance procedures will generally consist of a number of successive steps or stages, with time limits for initiating the steps and obtaining a response. The first step may be an informal step to enable the parties and employee to adjust the grievance quickly, with the least possible loss of time.

If the grievance cannot be resolved at this step, the next step will usually require the grievant to reduce the grievance to writing. Hereafter, the steps will generally follow the installation's or agency's table of organization until it reaches the highest authority in the agency.

A negotiated grievance procedure may provide for arbitration if the grievance cannot be resolved at the level of the highest authority. Arbitration may be invoked only by the agency or the union. Arbitration is permissible only if negotiated as a step of the negotiated procedure. It can be utilized only for grievances processed through the negotiated procedure. The decision is final and binding, except that either management or the union may file exceptions to the award with the Federal Labor Relations Council under regulations prescribed by the Council. The Council grants a petition for review of an award of an arbitrator on grounds similar to those applied by the courts in private sector labor-management relations.

Grievances initiated by an employee or group of employees in the unit on matters other than the interpretation or application of the negotiated agreement may be presented under any procedure available for such purpose. Where the parties cannot themselves resolve the question of which procedure -- negotiated or other -- is the appropriate procedure for the resolution of a grievance, the issue may be referred for determination to the Assistant Secretary of Labor for Labor-Management Relations.

In negotiating the grievance procedure, management and the union can include the matter of and conditions for providing time off to the grievant, witnesses and the union representative for the purpose of preparing and presenting the grievance. In the agency appeals procedure, time off for preparing and presenting appeals will depend on what rules and regulations are promulgated for that purpose.

The agency should not discipline or otherwise discriminate against an employee because he has filed a complaint or given testimony under the Order. To do so may constitute a management unfair labor practice.

The fact that a contract has terminated does not bar access to the grievance and arbitration procedure for the purpose of processing grievances arising during the term of the contract. As to those grievances arising after the contract termination date, and before a new contract is signed, usually management and union agree that the terms of the expired contract will govern during the interim period, and employee grievances will be processed even though, technically, no contract is in effect. Or, the agreement may be extended until a new agreement is concluded.

Chapter 4 following discusses the role of the first line supervisor in handling grievances under the negotiated grievance procedure.

10. Discipline and Discharge

Management must control the activities of employees during working hours in order to assure the maintenance of order and production in the work place. Management therefore has traditionally retained the right to discipline employees. However, because of past experiences, there have developed protective mechanisms to assure fairness and impartiality in the exercise of these management controls. As a result, employees are protected by laws, Executive Order 11491, Civil Service and agency regulations and contract provisions [illegible] for disciplinary or discharge actions. A major limitation on management's right to discipline or discharge employees involves the prohibition against discriminatory actions because of union membership, race, [illegible] creed, sex or national origin.

If there is no contract provision covering the matter of discipline, management actions in this area are not grievable under the negotiated grievance procedure. Section 22 of Executive Order covers adverse action appeals.

11. Duration

Usually agreements are written to cover a fixed period of time during which the whole agreement is in force. Sometimes the contract specifically provides that a certain provision will have a different termination date. The duration clause sets forth the advance notice requirements to be complied with by the party seeking modification or termination. Agreements may provide for automatic termination on a certain date, or automatic renewal for a specified period if neither party requests changes. In addition, provision is often made that amendments may, by mutual consent, be negotiated during the term of the agreement.

12. Other Provisions

There are, in addition to the types of clauses which have been reviewed in this section, many other subjects dealt with in labor contracts, some applicable to all agencies, some related to special circumstances in a particular agency. There is no intention to suggest that other clauses do not warrant the supervisor's close attention. The clauses selected for review in this section are those which almost always appear in one form or another in labor agreements. Others are of no less importance to the supervisor in his labor relations function. A simple listing of some other types of clauses which may be contained in the agreement will demonstrate the wide variety of possible subjects which may be dealt with:

Leave of Absence (procedures, standards)
Technological Change
Working Conditions and Safety
Charity and Other Collections
Identification Badges (agency, union)
Physical Examinations
Conduct of Union Affairs
Training and Apprenticeship
Outside Activities
Personnel Records
Availability of Agreement to Employees
Death in Immediate Family, etc.

CHAPTER IV

HANDLING GRIEVANCES AND ARBITRATION

A grievance under the negotiated grievance procedure in a collective bargaining agreement is an allegation that the contract has been violated, by an improper interpretation or application of one or more of its terms. It may or may not have a basis in fact, but in either case, it must be considered seriously. It is a fact and must not be ignored.

REDUCING THE NUMBER OF COMPLAINTS

While there is no magic formula for eliminating grievances, the following suggestions should help the foreman reduce the number of grievances.

1. Be alert to the usual causes of grievance. Do not knowingly violate the contract. For example, distributing overtime unequally in violation of a contract provision to the contrary is an open invitation to a grievance.
2. Keep the workers informed regarding the quality of their work performance.
3. Correct minor irritations promptly.
4. Encourage constructive suggestions.
5. Keep promises.
6. Assign work impartially to employees with equal skill and ability.
7. Give reasons for your orders unless they are obvious.
8. Be consistent unless there is an obvious reason for change.
9. Explain change.
10. Act as soon as possible on requests.
11. Avoid showing favoritism.
12. If corrective action has to be taken do not make a public display of the disciplinary talk or action.

In short, use common sense and, until proven wrong, assume that fair treatment will pay off in cooperation.

FIRST DISCUSSION - GET THE STORY

Many "gripes" are not strictly "grievances" because they relate to a complaint about some situation not covered by the contract and the negotiated grievance procedure. While it is quite true that in such a case the grievance should fail, nevertheless, the worker or steward should be heard on the subject. If a "legalistic" attitude is assumed at this stage and the gripe dismissed as not a "contract grievance," irritations and hard feelings will be encouraged and many matters which are properly subjects of the grievance machinery, and which might not otherwise have been grieved, will be used as pressure weapons.

Don't brush off the worker or steward without fully hearing the complaint.

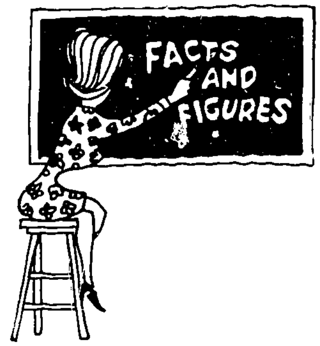
Listen and get the union's story. Let the employee or steward talk without interruption -- then ask questions. If the supervisor doesn't exhibit enough interest to define the problem exactly, he is open to the charge of pre-judging the matter. Sometimes hearing the complaint out is all that is desired. Do not refuse to listen.

Make certain that you fully understand the grievance. Ask questions carefully without becoming argumentative. The argument comes later after the facts have been checked, the contract reviewed, past practices and past grievances analyzed. Now your responsibility is to hear and understand the complaint. Don't promise anything at this time other than a careful investigation.

DON'T GUESS - INVESTIGATE

If the supervisor is absolutely certain of the proper answer and feels that a quick factual response will resolve the matter, then of course an immediate reply is called for. However, if the supervisor is (a) not sure of the facts, (b) not sure of the pertinent contract interpretation or management policy, or (c) doubtful that the atmosphere is right for resolution -- then a delay may be necessary.

A hasty decision under any of these three conditions can be disasterous.



In analyzing a grievance, the key word is investigate. Assuming the complaint is a grievance under the agreement, review the time limits of the grievance procedure. Has the grievance been filed within the required time? (Also keep in mind the time for the answer.)

Weigh all the facts and review any relevant records, such as those covering payroll, attendance, overtime, sick leave, safety, etc. Review personnel jackets of the employees involved.

Obtain information regarding previous settlements of similar grievances and previous contract interpretations. The labor relations officer can assist in this phase of your inquiry. It is in the matter of determining what has gone on before that the danger of establishing unfavorable "past practices" will be most urgently demonstrated. A past practice which adds to, subtracts from or modifies the contract to the disadvantage of management is one of the most disturbing and difficult situations to overcome in the entire field of labor management relations.

arbitrators invariably ask for evidence of what [illegible], what resolution of prior problems was effected, what has been the practice of the supervisor in the past.

Many a supervisor has found, to his dismay, that a hasty or careless decision in the past concerning a relatively minor occurrence comes back to haunt him later when a similar occurrence involves more serious consequences.

Protect yourself -- investigate before you act.

PREPARING THE ANSWER - YOUR DECISION

1. Determine a solution after analyzing all of the facts developed in your investigation. Discuss your answer with others -- your supervisor, the labor relations representatives, other supervisors. Consultation is a sign of caution, not of indecision. A supervisor who has carefully assembled the facts, researched the contract, and reached an independent judgment will not be criticized for reviewing the matter with others.

2. Frame your answer carefully. Policy differs concerning the most effective answer. Some prefer "Grievance denied. No contract violation". Others prefer a more complete discussion in the answer. To insure general consistency throughout your agency, be sure to check your response with the Labor Relations Officer.

3. If the grievance is to be settled or granted, do it promptly. If the decision is that the grievance has merit, do not detract from the satisfactory resolution by a begrudging delay. Achieve some benefits from granting the grievance.

4. Make a written record. No matter whether the grievance is denied, granted or settled by compromise, prepare a complete statement of all that occurred -- the grievance, the facts, the investigation, the interpretation, the decision. If the grievance is denied the statement of facts will be useful on appeal. If the grievance is granted in whole or in part, it constitutes precedent or past practice which will become important in the future. Finally, no effective labor relations program can depend upon memory and word of mouth. The passage of time distorts the recollection of what occurred.

If there is a doubt, give the benefit of the doubt to management. This statement should not surprise you. Ask any union steward and his answer will be -- "The benefit of doubt to the grievant (or the union)." The purpose of the negotiated grievance and arbitration procedure is the resolution of doubtful issues. However, in his area of responsibility in grievance handling, the supervisor does not sit as arbitrator. He resolves those cases in which the grievant is clearly entitled to satisfaction, and since a contract interpretation will affect the entire operation, denies those grievances in which the management is either right or the decision is borderline or doubtful.

One contract covers the installation or agency. It is not the supervisor's role in grievance administration to issue interpretations of the contract which he intends to be applicable solely to his department. He must realize that he is an integral part of management's team. When in doubt about contract interpretation, check with the Labor Relations Officer.

ARBITRATION

It has gradually become [illegible] "[illegible]" [illegible] substitute for "[illegible]," [illegible] differences between labor and management should be resolved in such orderly procedure. Most labor agreements in existence today provide for arbitration as the final step in the grievance machinery. Arbitration contemplates that the procedure will resolve disputes during the term of the agreement.

WHAT IT IS AND HOW IT WORKS

Arbitration is a non-legal proceeding in which an impartial third person, usually chosen by the parties to a dispute, hears both sides and renders a final and binding award.

The arbitrator is not a mediator. A mediator attempts to find a solution satisfactory to both parties. The arbitrator renders a decision which may be unsatisfactory to one or both of the parties.

Arbitrators are supposed to exhibit strict impartiality and to posses the basic knowledge to enable them to become adequately informed concerning the particular facts of a dispute. Arbitration awards should be consistent with the labor agreement.

The first step in the arbitration procedure is the selection of an arbitrator (sometimes called "neutral," "third-party" or "umpire"). Some labor contracts name a "permanent" arbitrator who hears and decides all disputes arising during the term of the agreement. A few allow a government agency to name an arbitrator. However, the majority of contracts provide that the parties will select an arbitrator from a list (a "panel") supplied by either a government agency or by the American Arbitration Association. Arbitrators have varied backgrounds. Some are college professors, others have been associated with government agencies, many are attorneys.

Next, the particular issue (or issues) to be decided by the arbitrator is supplied to him in the form of a "submission" (or "stipulation to arbitrate"), a document which briefly states the subject matter of the dispute. If the parties cannot agree on the exact wording of the issue, they may separately phrase the question as they respectively see it, and both statements will be given to the arbitrator. Since the arbitrator's decision may be final and binding, the management representative must be extremely careful to clearly define the matters which the arbitrator is to consider and decide. The arbitrator's authority should be spelled out in the labor contract or in the submission. Generally, arbitration provisions prohibit the arbitrator from rendering an award which changes or modifies the terms of the labor contract as it is his function to decide if the agreement has been violated but it is not his function to re-write the agreement.

As the final preliminary step, the date, time and place are agreed upon between the parties and the arbitrator. Occasionally the parties may supply the arbitrator with a copy of the labor agreement, and with copies of the grievance, the answer and any appeal step correspondence. Usually, however, the first presentation of this material is reserved for the hearing.

Nearly all arbitration hearings are conducted far more informally than proceedings in the courts. For example, most arbitration cases are presented without witnesses being administered an oath to tell the truth ("sworn") and without a stenographic record of the testimony. The rules of evidence which are observed in the courts, and which govern all aspects of a trial, are only slightly utilized in arbitration. The extent [illegible] informal proceeding [illegible] the parties [illegible] the arbitrator will [illegible] rigid [illegible] proceeding.

[illegible] the parties [illegible] present [illegible] agreement. [illegible] opening statement [illegible] first. As [illegible] side presents its case, it introduces documents [illegible] witnesses to testify [illegible] support its position. The opposing side has the right to [illegible] any evidence introduced by the other side either by cross-examination of the [illegible] or by the testimony of different witnesses or both. All of the so-called "legal rules of evidence" are designed to accomplish one goal -- to develop and set forth all of the facts and circumstances which will assist in the correct determination of the dispute.

After both sides have fully presented all of the evidence they feel will be helpful, final arguments are made, and the hearing is closed. Thereafter, at a later date agreed upon at the close of the hearing, if the arbitrator or the parties so desire, the parties submit written summaries ("briefs") further arguing and supporting their respective contentions. Since ordinarily there is no stenographic record, the briefs serve to highlight important precedents in the form of other cases which have been decided and which bear on the issue, or facts which might amplify the notes which the arbitrator makes as the case is heard.

Sometime after the hearings have been concluded and briefs submitted, the arbitrator sends both sides a copy of his award, usually supplemented by a written opinion outlining his reasons for holding for one side or the other. As has been previously noted, the award is final and binding, when so stated in the agreement.

BE AN EFFECTIVE MANAGEMENT WITNESS

The questioning of witnesses in arbitration hearings is usually conducted in a less formal manner than in court. Nevertheless, the supervisor called as an agent witness should not assume that his testimony is to be regarded as of lesser consequence than if he were testifying in a law suit. A case can be won or lost by the supervisor's testimony. The importance to management of favorable results must not be under-estimated.

The supervisor will be called upon to testify either to facts which he can relate to his own knowledge, or to provide a technical opinion concerning the operation. Prior to the hearing the management representative responsible for the preparation and presentation of the case will meet with the supervisor and review his testimony. There is, of course, nothing improper about such a discussion. In fact, the management representative would be derelict in his duty if he did not adequately prepare his witnesses. The supervisor will be given guidance at this time with respect to the matters upon which he is to be examined, and will also be prepared for questions which the opposition might pose on cross-examination. Since the management hearing representative is primarily responsible for making the best possible presentation, his advice and direction should be followed. A well thought out presentation involves the strategic use of each document and of each piece of testimony. The most effective management witness contributes to the over-all development of the management position by following the suggestions of management counsel concerning the relative value of the testimony which the witness is prepared to give. The following are suggestions which have [illegible] to management witnesses in arbitration proceedings:

1. The attitude and manner of the witness is important. The witness should strive to appear straightforward, calm and objective. Even when "attacked" by [illegible] opposing counsel he should maintain his composure.

2. The witness should be definite in his statements without seeming to be antagonistic. If he is firm and [illegible] he should give that impression.

3. The witness should avoid becoming involved in an argument with opposing counsel. His function is to testify, not to argue the case. The witness should answer the questions asked, and not volunteer information.

4. If the witness testifies to his opinion concerning the ability of a person, or any other matter requiring his personal judgment, he should be prepared to state the facts upon which he bases his judgment.

5. If the witness does not know the answer to a question he should so state and not attempt to guess. The same rule is true if he is unsure of the meaning of a question.

6. The supervisor-witness will be back working with the employees under his direction when the hearing is concluded. Consequently, he must give the impression of being fair and above-board even though his testimony is offered to defeat the union's complaint.

In many cases, the supervisor's account of an event is the [illegible] for management's action and its entire theory of the case. In summary, therefore, it is emphasized that the supervisor should be extremely accurate in recording the precise details upon which management will take action.

CHAPTER V

STRIKES, OTHER JOB ACTIONS AND THE SUPERVISOR

An individual is prohibited from accepting or holding a Federal or District of Columbia Government position if he "participates in a strike ... against the Government of the United States or the Government of the District of Columbia."[1]

In Executive Order 11491, as amended:

Section 2(e)(2) excludes from the definition of a "labor organization," an organization which "assists or participates in a strike against the Government of the United States or any agency thereof or imposes a duty or obligation to conduct, assist, or participate in such a strike."

Section 19(b)(4) on Unfair Labor Practices states that a labor organization shall not "call or engage in a strike, work stoppage, or slowdown; picket an agency in a labor-management dispute; condone any such activity by failing to take affirmative action to prevent or stop it."

However, being realistic, we must expect that job actions will occur. These may range from demonstrations through work stoppages either by the union or by other groups of employees. Almost certainly, the first line supervisor will bear the brunt of the responsibility for maintaining agency services during these disruptions of normal routine.

It might be beneficial to review the types of job actions and consider agency strike plans.

TYPES OF LABOR UNION AND MILITANT GROUP ACTION

DEMONSTRATIONS

- Picketing on own time on government property
- Picketing on own time on public property
- Protest parades or marches
- Protest compaign through public media

LIMITED STRIKES

- Mass resignation
- Picketing on government time
- Mass sick-call, "blue flu," "red crud"

---

[1] Section 7311 of Title V, U.S. Codes (enacted as PL 333, Laws of 1955) as modified by Blount v National Association of Letter Carriers, 305F Supplement 546 (D. D. C. 1969), not appealed by the Government.

[illegible]

[illegible]

[illegible] the better, enforcing [illegible]

STRIKES

Sympathy strike - a strike [illegible] but who wish to [illegible] solidarity or bring [illegible]

[illegible] strike - a strike [illegible] the agreement

[illegible] strike - a spontaneous or unauthorized strike

Sit-down strike - a strike during which the workers stay inside the work place, but refuse to work or allow others to do so

- General strike - a strike involving all organized workers of a community or other geographic area
- Walkout - the same as a strike; union members leave the work place en masse

NON-UNION GROUP ACTION

- Employee group action - a faction within a labor organization or agency uses strike-like action to attempt to accomplish goals that: (1) are normally considered beyond the scope of collective bargaining e.g., better housing and education, day care centers or, (2) fall within the scope of bargaining of the exclusive bargaining agent, e.g., working conditions, employment opportunities for minority groups, promotion opportunities for minority groups, etc.
- Community group action - a group outside the labor organization or agency utilizing demonstrations to bring about pressure to achieve goals that could either be within or outside the scope of bargaining of union and management
- Combined employee group and community group action

JOB ACTION PLANS

Each agency has, or should have, developed plans to prevent job actions from occurring, or to manage the emergency situations resulting from job actions if they do occur.

1. Strike prevention plans. Following are some of the elements of a strike prevention plan:

- Maintenance of equitable conditions of employment for all employees
- Recognition of the exclusive bargaining agent to organize, confer, and bargain with respect to personnel policies and practices and matters affecting working conditions
- Bargaining in good faith
- Adherence to the terms of the negotiated agreement

- Utilization of the collective bargaining process as a system to resolve conflict

- Provision for adequate machinery for adjusting grievances, whether individual or collective, in which both employees and management have confidence

- Fair administration and enforcement of established rules, laws, and regulations

- Provision for full disclosure by management of the terms, conditions and obligations of employment in the public service

- Open lines of communication between management, its employees and their representatives

- Open lines of communication among all members of the "management team"

- Establishment of effecitve procedures for resolving impasses

- Development of management personnel skilled in labor relations techniques

- Development of a strike contingency plan

2. <u>Strike contingency plans</u>. Despite all the positive steps management may take, the possibility exists that strikes or other militant group actions may occur. Because of this possibility supervisors must be prepared for the following:

- To meet such commitments as:

  Providing uninterrupted service to the public.

  Assuring availability of supplies and materials.

  Continuing jobs performed by contractors.

  Establishing ultimate limits to which the agency can go, using its own resources to assure continual service.

- To maintain security (plant, personnel, equipment)

- To meet maintenance requirements

- To assure that the rights of employees who work during the strike are maintained

- To maintain effective communication throughout the organization

- To assure that appropriate legal action can be taken

- To maintain public protection and safety. Protection of managers, working employees and agency property

- To establish critical needs and their priorities

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THE SUPERVISOR'S ROLE DURING A STRIKE

In the event of a strike, the supervisor will be assigned certain emergency duties. The supervisor must be certain of his lines of communication. He should know where to call for instruction and information during the strike. He will be requested to continuously supply facts and he should be extremely careful that they are accurate. Records must be maintained of all incidents and discussions which occur during the strike.

Supervisors will be called upon to work long hours, expend great energy and exhibit unqualified loyalty. Management must be confident that the supervisors are exerting every effort to assist management in a time of crisis.

THE STRIKE IS OVER

During the immediate post-strike period the supervisor, as in other labor relations activities, once again is in the "key" position. If harmony and cooperation are to be re-established quickly, it is the supervisor who will bear the burden of such an accomplishment.

The job of meeting the returning workers is up to him. Management's attitude is reflected in his attitude. The supervisor who handles this assignment well gains the respect and confidence of the top management, the employees and the union officials. Effort is directed to making the work areas "normal" as soon as possible. To this end, the following suggestions are offered for the guidance of those responsible for supplying the leadership to make normalcy possible -- the supervisors.

1. Greet each returning employee by stating: "Good to see you back," or "Glad to have you back."

2. Do not rehash the strike history. Do not discuss who was at fault, or suggest the strike was stupid or uncalled for.

3. Stay in the work area. Be in evidence all day long offering words of encouragement and assistance. Keep a close watch on the progress of the work.

4. Do not display any attitude of partiality by talking at length with non-strikers or those known not to have favored the strike. Do not indicate any special attention toward either the striker or non-striker.

5. Have the work program planned, with exact assignments for each worker. Make certain there is no delay in getting the job done. Keeping the workers busy will help establish the right atmosphere.

6. Be lenient of criticism the first day or two. Friendliness at this time will be appreciated.

7. Be alert to possible conflicts. Unfriendly wisecracks and remarks between strikers and non-strikers should be stopped. Keep the area humming, don't allow groups to gather and discuss. Tempers may be high and must be guarded against.

8. Make certain you are familiar with the exact terms of the settlement. Clarify in advance any questions you may have so that you will be in a position to authoritatively answer inquiries from the workers.

CHAPTER VI

THE SUPERVISOR AND THE EXECUTIVE ORDER

MANAGEMENT UNFAIR LABOR PRACTICES

The Order defines the rights of employees and the obligations of management (and unions). When a supervisor interferes with the rights of employees (their right to join or not join unions, participate in administration of and represent unions, file complaints and grievances or appear as a witness in such action), or shows favoritism to one or another union, or fails to meet management obligations (to meet and confer in good faith with the union officer or shop steward, etc.), he may be engaging in an unfair labor practice. These situations occur during the life of an agreement, and even before the union has secured exclusive bargaining rights.

UNION UNFAIR LABOR PRACTICES

In addition to the types of management conduct forbidden by the Order, there are a number of unfair labor practices in which unions must not engage. Briefly, a union may not:

1. Coerce employees into union membership by using such tactics as threats against employees or their families, interference by mass picketing, or any other strong-arm methods.

2. Coerce employers in their choice of collective bargaining and grievance-handling representatives. If a supervisor is designated as the grievance "hearing officer" at any level of the grievance procedure the union may not force the employer to select another supervisor by refusing to submit grievances to the employer-designated supervisor. Nor may a union refuse to participate in bargaining unless a particular management representative is removed from the management team.

3. Force or attempt to force employers to discriminate against employees for activity on behalf of a rival union, or for failure to join a union.

4. Refuse to bargain collectively in good faith. In this respect, the union has the same obligations as does the employer.

5. Engage in strikes. (See discussion of strikes in Chapter 5.)

THE SUPERVISOR AND MANAGEMENT

Supervisors are excluded from coverage of the Order. The agency is not required to bargain collectively with them. Although they can belong to unions, they cannot be active in unions nor are they to be represented by them except as provided in Section 24 of the Order.

Supervisors are considered part of the "management team." The Order requires that agencies establish a system of intra-management communication and consultation with their supervisors or associations of supervisors. These communications and consultations have as their purposes the improvement of agency efficiency, the improvement of working conditions of supervisors, the exchange of information, the improvement of managerial effectiveness and the establishment of policies that best serve the public interest in accomplishing the mission of the agency. When the agency and the association agree in writing, an agency may deduct dues for an association of supervisors (or management officials) from the pay of the members of the association who make a voluntary allotment for that purpose, subject to the regulations of the Civil Service Commission.

FPM Letter 251.1 provides detailed information concerning intra-management communication and consultation, and the rights of supervisors.

* * *

Again, the importance of the first-line supervisor in labor relations cannot be over-emphasized. You are the key. It is hoped that this booklet will be helpful to you as you fulfill your day-to-day responsibilities.

GPO 928.729

VT 016 659

MURPHY, JOHN O., JR.

SAFETY IN INDUSTRIAL ARTS EDUCATION FOR LOUISIANA SCHOOLS.

LOUISIANA STATE DEPT. OF PUBLIC EDUCATION, BATON ROUGE.

MF AVAILABLE IN VT-ERIC SET.

BULL-1203

PUB DATE - 71 75P.

DESCRIPTORS - *GUIDES; *SAFETY EDUCATION; *ACCIDENT PREVENTION; *EQUIPMENT UTILIZATION; *INDUSTRIAL ARTS; SAFETY

IDENTIFIERS - LOUISIANA; EQUIPMENT

ABSTRACT - DESIGNED FOR THE PURPOSE OF ASSISTING INDUSTRIAL ARTS INSTRUCTORS IN DEVELOPING A COMPREHENSIVE SAFETY PROGRAM, THIS GUIDE CONTAINS INFORMATION REGARDING GENERAL SAFETY HABITS AS WELL AS RULES CONCERNING THE PROPER USE OF EQUIPMENT. THE DATA PRESENTED WERE ADOPTED FROM BULLETINS PREPARED BY DEPARTMENTS OF EDUCATION AND RELATED AGENCIES IN SEVERAL STATES. COVERED ARE THESE TOPICS: (1) INSTRUCTOR LIABILITY, (2) HOW TO PLAN TEACHING OF SAFETY INSTRUCTIONS, (3) EVALUATION OF SAFETY INSTRUCTION, (4) HOW TO PREPARE A SAFETY TEST, (5) CAUSES OF ACCIDENTS, (6) EMERGENCY ACTION, (7) THE FIVE "E'S" OF SAFETY EDUCATION, (8) GENERAL SAFETY INSTRUCTION FOR ALL AREAS OF INDUSTRIAL ARTS, (9) AUTOMOTIVE AND POWER MECHANICS EQUIPMENT, (10) ELECTRICAL AND ELECTRONIC EQUIPMENT, (11) GRAPHIC ARTS EQUIPMENT, (12) METALWORKING EQUIPMENT, AND (13) WOODWORKING EQUIPMENT. (SN)

STATE DEPARTMENT OF EDUCATION OF LOUISIANA

1971

Bulletin No. 1203

SAFETY IN INDUSTRIAL ARTS EDUCATION for Louisiana Schools

Issued by

STATE DEPARTMENT OF PUBLIC EDUCATION

State Department of Education

of Louisiana

1971

Bulletin No. 1203

Safety in Industrial Arts
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PREFACE

This Safety Guide has been prepared to assist instructors in developing a comprehensive safety program. It must be realized that safety is a major part of the Industrial Arts Curriculum and should be taught along with every phase of our Program.

The regulations, guides, and procedures set forth in this publication were adopted from the California State Department of Education publication "Industrial Arts Safety Instruction," prepared by Robert L. Woodward, Consultant of Industrial Arts Education. Additional references were: Bulletin #76H-1, Florida State Department of Education, Ralph Steeb, Consultant of Industrial Arts Education; "Industrial Arts Safety Guide," New Mexico State Department of Education, David M. Goin, State Supervisor of Industrial Arts; "Industrial Arts Safety Checklist" and "Eye Safety in Washington," Washington State Department of Public Instruction, Herbert Bell, Supervisor of Industrial Arts Programs.

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Instructor Liability

The instructor has the legal responsibility for accidents that involve students while they are participating in activities to which they have been assigned. Instructors may be held liable for accidents that happen as a result of their negligence; and this liability may also extend to administrators. The prevention of or protection from liability may best be accomplished by strictly following this check list:

1. Obtain adequate liability insurance from the American Industrial Arts Association or the American Vocational Association.
2. Provide adequate supervision, and be in the classroom or laboratory at all times when class is in session. Never leave while any student is in the laboratory.
3. Act as a reasonable and prudent person would act under the same or similar circumstances.
4. Correct known dangerous and defective conditions or report them to the proper authority, and clearly mark them out of order or dangerous.
5. Use sensible reasoning in the selection of student activities.
6. Insist that safety glasses be worn in all areas in which there is a remote chance of eye injury.
7. Provide proper instruction in the use of all tools, machines and equipment.
8. Maintain the entire physical facility in safe working condition.
9. Provide proper protective equipment and require students to wear it and proper clothing while working in the laboratory.
10. Clearly label all toxic and flammable materials, and provide proper storage for them.
11. Insist that industrial quality guards be provided and used whenever a machine is operated.
12. Set a proper example for students to follow.
13. Instigate a comprehensive safety program and rigidly enforce all rules and regulations.

How To Plan Teaching of Safety Instructions

1. Refer to the Table of Contents of this publication to locate pages concerning the hand tools and machines you have in your industrial arts program.
2. Turn to designated pages which list safety instructions pertaining to your tools and machines.
3. Use selected safety instructions as a guide in preparing your complete lesson plans on the correct use of the equipment.
4. Plan your instruction so it will emphasize safe practices which will be covered in your safety test.
5. Duplicate your set of safety instructions. The safety instructions should be printed on one side of a single sheet of paper. These instruction sheets can be used for (1) reviewing by class members; (2) orienting new students; and (3) posting on equipment.

Evaluation of Safety Instruction

An industrial arts safety test given to all students will:

* Make it possible for the teacher to evaluate his safety instruction.
* Cause each student to acknowledge his understanding of the correct way to work in an environment of tools and machines.
* Furnish written proof that safety instruction has been given.

Following each set of safety instructions in this publication are test questions designed for use in a safety test. The selection of these questions is based upon a frequency count of the items most often asked in safety tests printed in materials prepared by schools and in commercial publications.

Safety is a positive and personal matter. Whenever possible the safety test questions included in this publication emphasize the positive approach to safety education: You should do this for one of these reasons. The student's personal responsibility for safety is stressed by aiming the questions at him rather that at an impersonal someone: You should do this for one of these reasons.

How To Prepare A Safety Test

1. Provide spaces for the student to place his name and class period. By placing this line near the top of the first page of the safety test, it will be easier to record, file, and later readily identify.

   Example:
   Student's Name____Period_______________

2. Include in test title, the name of your school, the area of industrial arts followed by "Safety Test," and, if desired, your name. Example: Louisiana High School, Woodworking Safety Test, John T. Jones, Teacher.

3. List directions for answering test questions.

   Example for multiple-choice questions:
   Directions: Each of the following statements may be completed with a single word or figure. Write the correct word or figure in the space provided to the left.

4. Select questions covering general safety instructions as well as specific hand tool and power machine safety instructions for your particular industrial arts program. The following steps may be used to select questions.

   a. Refer to the Table of Contents to locate pages concerning the hand tools and machines you have in your industrial arts facility.
   b. Turn to the designated pages which list questions pertaining to your tools and machines.
   c. Choose questions for your safety test. Multiple-choice or completion type questions may be used. To offer a variety in your testing program, it is suggested that in one section, multiple-choice questions be used and in another, completion questions be employed. The number of questions used for hand tools and for each machine will depend upon the number of pieces of equipment to be covered in the safety test.

5. Conclude the safety test with a statement of acknowledgment to be signed by the student.

Example:

> This is to certify that I have received ons in Woodworking. My teacher has demonstrated to me how to ch machine correctly and safely. I promise to observe all safety precautions and if ever in doubt regarding any operation, I will get the necessary information from my teacher.
>
> Signed ______________________________
>
> Date ______________________________

6. Duplicate your test. Printed forms are preferred rather than questions asked orally, written on the blackboard, or copied by students.

7. Prepare a test answer key. A test answer key fitted to a duplicated test provides an efficient means of checking answers.

Causes of Accidents

There is an old saying which still applies--accidents don't just happen, they are caused. A conscientious teacher will endeavor to write and teach a "water tight" safety program, but in spite of his best efforts, accidents may still occur. Part of the job of teachers and supervisors is to discover causative factors before they produce accidents and take whatever corrective action may be necessary.

There are three major categories of hazards which contribute to accidents:

1. Unsafe physical facilities
2. Unsafe practices
3. Unsafe personal factors [1]

While an element in any one of these categories could be responsible for an accident, two or more categories are generally involved. The following check lists will help to identify items needing correction. Changing enrollments, course offerings, new materials, pupil differences, equipment additions, etc., dictate that the total environment be under constant scrutiny.

1. Physical Facilities Checklist

   A. Building

      1. Ceiling height
      2. Floor type and condition
      3. Adequacy of illumination
      4. Plumbing and heating pipes and equipment
      5. Windows: protection from breakage; opening, closing and holding devices
      6. Doors: size, swing, operation
      7. Stairways and balconies: railings, non-slip treads
      8. Adequacy of storage facilities
      9. Adequacy of ventilation

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[1] Denis J. Kigin, Teacher Liability in School Shop Accidents, Prakken Publications, Ann Arbor, Michigan, 1963, p. 74.

10. Adequacy and condition of electrical distribution system
11. Space allocations
12. Personal facilities (restrooms, drinking fountains, wash-up facilities, etc.)
13. Traffic flow
14. Emergency exits
15. Alarms and communications systems
16. Fire prevention and extinguishing devices
17. Interior color scheme
18. Noise absorption factor
19. Maintenance and cleanliness

B. Machinery and Equipment

1. Placement and clearance
2. Safety zones marked
3. Non-skid floors around machines
4. All pulleys, belts, gears, blades, and cutters guarded with approved devices in excellent condition (See "Regulation for Guarding Machine Points of Operation", Chapter 1855-11, and "Regulation for Guarding Mechanical Power Transmission Apparatus", Chapter 1855-9, Rules of the Florida Industrial Commission)
5. All cutting blades and knives sharp and secure
6. All machines in good condition, properly maintained and lubricated
7. All switches guarded. Magnetic type switches on all major machines
8. All machines properly wired and grounded
9. All hand and portable power tools in good condition and grounded
10. All machines are of the highest quality available consistent with financial resources
11. Adequate local illumination
12. Safety precautions and rules conspicuously posted near each machine

C. Housekeeping

1. Care of floors, stairs, aisles
2. Care of rags and waste
3. Storage and handling of oils, solvents, and other flammables
4. Effectiveness of clean-up methods or procedures
5. Storage of raw stock
6. Project storage
7. Cleanliness of light fixtures and windows
8. Effectiveness of tool storage methods
9. Adequacy of dust and fume removal equipment

2. Unsafe Practices Checklist

A. Unsafe Teacher Practices

1. Teacher lacks knowledge of certain tools and machines
2. Preliminary instruction is inadequate
3. Follow-up is inadequate
4. Students are inadequately supervised
5. There are gaps in safety instruction and/or testing
6. Students are allowed to play in shop

7. Students or others work unsupervised in the shop after normal hours
8. Teacher is not aware of or does not enforce eye-safety and other laws and regulations
9. Teacher does not set a "safety example"
10. Machines are not checked before allowing operation
11. Teacher does not keep administrators aware of safety needs
12. Teacher does not maintain adequate safety records

B. Unsafe Student Practices

1. Students engage in "h[illegible]lay" or other nonsense
2. Students d[illegible]uction
3. Students fail to develop a positive attitude toward safety
4. Students do not dress properly
5. Students take short cuts or hurry too much
6. Students lack normal judgment
7. Students are absent too much
8. Students sometimes omit use of guards
9. Students achieve poorly on safety tests

3. Unsafe Personal Factors Checklist

A. Each student should be observed carefully and records checked for indications of problems involving:

1. Sight
2. Hearing
3. Coordination
4. Strength and range of motion
5. Epilepsy
6. Nervousness
7. Hypertension
8. Disease or contagion
9. Mental aberration
10. Poor attitude

B. The teacher should apply the same checklist to himself and obtain a yearly basic physical examination.

Emergency Action

BE PREPARED: Think through what you will do in event of injury before the emergency occurs. Discuss emergency procedures with your department head and/or principal. Arrange communications, first aid, transportation, and other details before an accident occurs.

In Event of Injury, Take the Following Steps Immediately:

1. Have someone notify department head and/or principal.
2. First aid, if needed, should be administered by a qualified person only (nurse or person with Red Cross training).
3. If injury is serious:
    a. Give no medication
    b. Notify parents. They should contact family doctor.
    c. If unable to contact parents, contact family doctor direct.
    d. If above fails, call local doctor or hospital.
    e. Contact parents as soon as possible.
    f. Stop profuse bleeding with antiseptic compress. Do not use tourniquet unless trained.
    g. Do not move victim if bone fracture is likely (falls, collisions, etc.)
    h. Keep victim warm.
4. District superintendent should be notified of any serious injury as soon as possible after the injury occurs.

The Five "E's" of Safety Education

ENGINEERING: Control of physical conditions

EDUCATION: A planned, positive approach to learning rules and behavior

ENFORCEMENT: Constant insistence that safety rules be followed

EXAMPLE: The teacher as leader

ENTHUSIASM: The essential ingredient

(Adapted from Teacher Liability in School Shop Accidents, Denis J. Kigin, Prakken Publications, Inc., Ann Arbor, Michigan, 1963)

General Safety Instructions for All Areas of Industrial Arts

Earlier in this publication, certain safety instructions were explained in detail. General safety instructions for students which apply to all areas of industrial arts and cover shop practices, hand tools, and machine tools follow:

1. Ask your teacher to approve all work that you plan to do.
2. Report all injuries, even though slight, to your teacher immediately.
3. Wear suitable eye protection when engaged in any activity where eye hazards may exist.
4. Be sure clothes are safe and suitable for shop work. Remove or fasten any loose clothing. Roll loose sleeves above elbows. Keep hair away from equipment in operation.(Students must confine their hair.)
5. Observe rules concerning operators' zones.
6. Cooperate with your classmates in the student management program of your shop.
7. Caution any other student you see violating a safety rule.
8. Report to the teacher or shop foreman any equipment that does not seem to work properly.
9. Use a brush or piece of wood to clear away dry chips and use a rag to clean oily areas.
10. Keep tools and materials from projecting over the edge of benches whenever possible.

Test Questions Covering General Safety Instructions for All Areas of Industrial Arts

Questions that may be used in preparing a test covering general safety instructions for all areas of industrial arts follow. (Reference should be made to the information on testing and methods of preparing safety tests presented in this material under the heading of "Evaluation of Safety Instruction.")

Test Questions - continued

( ) 1. You should report all injuries, even though slight, to: (a) an advanced student; (b) your principal; (c) your teacher; or (d) the office.

( ) 2. You should wear suitable eye protection: (a) to improve your vision; (b) when engaged in any activity where eye hazards may [illegible] to avoid myopia; or (d) when you desire to improve your appearance.

( ) 3. It is best to fasten or remove loose clothing and roll sleeves above your elbows: (a) before operating any machine; (b) during the operation of the machine; (c) after operating a machine; or (d) only when you are assisting the teacher.

( ) 4. The designated area or operator's zone around a machine is to protect: (a) the power equipment; (b) all the students and the teacher working in the shop; (c) only the teacher; or (d) only the student operating the machine.

( ) 5. It is best that any liquid spilled on the floor should be wiped up immediately because it: (a) looks unsightly; (b) will stain the floor; (c) causes more work for the custodian; or (d) may cause someone to slip and injure himself.

( ) 6. Rags containing oil, gasoline, alcohol, shellac, paint, varnish, or lacquer must be: (a) kept in a covered metal container; (b) stored in a wastebasket; (c) folded neatly and placed on a shelf; or (d) stored in a cool dry place.

( ) 7. Before using any power equipment, you should obtain permission from: (a) an advanced student; (b) your principal; (c) your teacher; or (d) the office.

( ) 8. If you notice any breakage or damage to a tool, instrument, or machine, you should: (a) ask an advanced student to repair it; (b) be careful when you use it; (c) say nothing because you might be blamed; or (d) notify your teacher.

( ) 9. When using a knife, you should: (a) pull the knife toward you; (b) strike the blade with a hammer to make large cuts; (c) use pointed end only; or (d) cut away from your body and hands.

( ) 10. You should grind off a mushroomed head on a chisel or punch so as to prevent: (a) inaccuracies in your work; (b) spoiling the looks of the tool; (c) making the tool difficult to hold; or (d) particles of metal from flying when you strike the head with a hammer.

II

____________________1. All work that you plan to do should be approved by the ____________________________.

____________________2. You should clear away dry chips with a piece of wood or a ___________________________.

____________________3. When using a wood chisel or gouge, you should point the sharp edge of the tool away from your classmates, teacher and ____.

____________________4. You should pass tools to classmates with the handles _________________________.

____________________5. You should make sure that all students are clear of the machine before turning on the ___________________________.

____________________6. Before oiling, cleaning, or adjusting a machine, you should allow the machine to come to a complete__________.

Answers to Test Questions:

I. 1. (c); 2. (b); 3. (a); 4. (b); 5. (d); 6. (a); 7. (c); 8. (d); 9. (d); 10. (d).
II. 1. teacher; 2. brush; 3. self (yourself); 4. first; 5. power (switch); 6. stop.

Automotive and Power Mechanics Equipment

This section contains specific safety instructions for operating certain equipment used in the areas of automotive and power mechanics. Each set of safety instructions relating to the operation of a particular piece of equipment is followed by safety test questions and answers. The general safety instructions presented in an earlier section of this publication also apply to the areas of automotive and power mechanics.

Car Lifts, Hoists, and Cranes

Safety Instructions

1. Obtain permission from your teacher before using a car lift, hoist or crane.
2. Ask your teacher to inspect blocking of car before it is raised.
3. Place crane or hoist directly over the object to be lifted.
4. Determine that the chain, cable or rope to be used in lifting is in good condition.
5. Double-check fastening of the chain, cable or rope to the object to make sure it is secure before lifting with crane or hoist. Balance object before lifting.
6. Make sure all persons and obstructions are clear before raising or lowering an engine or car.
7. Support car with stands or blocks before doing work under the car or removing the wheels.
8. Obtain permission from your teacher before getting under a raised car.
9. Wear face shield or safety glasses (goggles, spectacles) when working under a car.

Safety Test Questions

I

( ) 1. Before doing work under a car that has been raised, or before removing wheels, you should make sure the: (a) transmission is in neutral; (b) car is adequately supported; (c) car is raised enough for the use of a creeper; or (d) hand brake is applied.

( ) 2. When you are about to raise an engine or car by hoist or crane, you should be certain the: (a) battery is disconnected; (b) transmission is in neutral; (c) hand brake is set; or (d) object to be lifted is securely tied and balanced.

( ) 3. You should place crane or hoist directly over the object to be lifted so: (a) weight may be raised faster; (b) crane, hoist or object will not tip over; (c) there will be less wear on the chain; or (d) less room will be needed.

( ) 4. After you have raised a car by crane or hoist, you should place sufficient support under the car so you will be sure the: (a) car will not roll away; (b) strain will be eliminated on the springs and shock absorbers; (c) hoist will last longer; or (d) car will remain in the raised position.

II

______________ 1. When you are about to raise an engine or car by hoist or crane, you should be certain the object to be lifted is securely ______________.

______________ 2. After raising a car by hoist or crane, you should support the car with blocks or ______________.

______________ 3. When lifting an engine with a chain sling, you should be sure the sling is securely ______________.

______________ 4. Before getting under a raised car, you must obtain permission from the ______________.

Answers to Test Questions

I. 1. (b); 2. (d); 3. (b); 4. (d).
II. 1. fastened (tied); 2. stands; 3. fastened (tied); 4. teacher.

Engine

Safety Instructions

1. Obtain permission from your teacher before starting an engine whether the engine is in a test stand or in a car.
2. Check fuel line for possible leaks.
3. Vent exhaust to the outside of building and provide adequate ventilation whenever running an engine whether engine is in a test stand or in a car.

Engine Safety Instructions - continued

4. Keep your hands and head away from revolving fan.

5. Be sure to block wheels of any mobile engine test stand you may use.

6. Use, when necessary, a carbon dioxide (CO_2) extinguisher for flammable liquid fires.

Safety Test Questions

I

( ) 1. You should vent exhaust to the outside of building and provide adequate ventilation whenever running an engine because: (a) an engine needs this air to produce a proper mixture; (b) the noise of the exhaust will be reduced; (c) back pressure on the manifold will be lessened; or (d) it will prevent the release of exhaust gas in the shop.

( ) 2. When working on an engine that is running, you should: (a) remove blocks from the wheels; (b) keep the car in low gear; (c) make sure the tank is full of gasoline; or (d) keep head and hands away from revolving fan.

( ) 3. It is best to use a carbon dioxide (CO_2) extinguisher because: (a) it will extinguish flammable liquid fires; (b) carbon dioxide can be mixed with the exhaust to reduce carbon monoxide; (c) carbon dioxide can be used to make the fuel richer; or (d) it can be used to cool the muffler.

II

____________ 1. Before starting an engine, you should obtain permission from ____________.

____________ 2. When running an engine, you should vent exhaust to the outside of building and provide adequate ____________.

____________ 3. When working on an engine that is running, you should keep your head and hands away from the revolving ____________.

Answers to Test Questions

I. 1. (d); 2. (d); 3. (a).
II. 1. teacher; 2. ventilation; 3. fan.

Storage Battery

Safety Instructions - Servicing

1. Obtain permission from your teacher before servicing or charging a storage battery.

2. Use proper instruments for testing a storage battery.

Storage Battery Servicing Safety Instructions - continued

3. Avoid overfilling a battery, especially if it is to be charged.
4. Use water and baking soda (a neutralizer) to clean off the top of a battery.
5. Remove and transport a battery with a battery lifter.
6. Handle battery or acid with care. Wash immediately any part of your body or clothing that comes in contact with acid.
7. Wash hands immediately after handling a battery.

Safety Instructions - Charging

1. Wear goggles when using a charger.
2. Provide ample ventilation when using a charger.
3. Remove cell covers before charging a battery (unless the covers have other instructions upon them).
4. Keep open flames and sparks away from a battery being charged.
5. Turn off charger before disconnecting leads (wires) from charger to battery.
6. Replace cell covers before moving battery.

Safety Test Questions

I

( ) 1. You should test a storage battery with: (a) a pair of pliers; (b) a screw driver; (c) an analyzer or tester; or (d) a piece of wire.

( ) 2. A good neutralizer for cleaning off the top of a storage battery is water and: (a) borax; (b) baking soda; (c) lye; or (d) lime.

( ) 3. It is best to change storage batteries in a well-ventilated room because the gas given off during charging is: (a) explosive; (b) not dangerous; (c) nonexplosive; or (d) carbon monoxide.

( ) 4. Before disconnecting leads (wires) from charger to storage battery, you should: (a) replace cell covers; (b) check with tester; (c) close windows; or (d) turn off charger.

II

________________ 1. It is best to clean top of storage battery with water and baking ________________.

________________ 2. After handling a storage battery, you should wash your ________________.

________________ 3. An open flame near a storage battery may cause an ________.

________________ 4. Before disconnecting leads (wires) from charger to storage battery, you should turn off ____________________.

Answers to Test Questions on Storage Batteries

I. 1. (c); 2. (b); 3. (a); 4. (d).
II. 1. soda; 2. hands; 3. explosion; 4. charger (power).

Use, Storage and Disposal of Flammable Liquids

Safety Instructions

1. Store flammable liquids in a fireproof room or cabinet.
2. Bring into the shop only sufficient flammable liquid for immediate use.

   Keep only in a safety container approved by the Underwriters' Laboratory.

   Label container with name of contents.
3. Use only approved cleaning solutions.
4. Avoid contact of carbon-removing or paint-stripping compounds with your skin.
5. Place rags containing oil, gasoline, paint, solvents, and other combustibles in designated (approved) metal containers.
6. Keep the top of oil drums and surrounding area clean and free of combustible materials.
7. Dispose of unwanted flammable liquids and combustible materials daily.

Safety Test Questions I

( ) 1. Gasoline should be kept in a safety container approved by the Underwriters' Laboratory because: (a) the odor of gasoline makes some people ill; (b) gasoline vapor is highly combustible; (c) it will not evaporate; or (d) the container is difficult to tip over.

( ) 2. You should use approved cleaning solutions instead of gasoline because: (a) gasoline does not clean as well as solvent; (b) gasoline is too expensive to use for cleaning purposes; (c) parts will be tinted by the red dye in leaded gasoline; or (d) there is danger of an explosion when using gasoline.

( ) 3. Rags containing oil, gasoline, paint, solvents, and other combustibles should be: (a) folded neatly and placed on a shelf; (b) left on the workbench; (c) thrown on the floor; or (d) placed in an approved metal container.

Safety Test Questions - continued

II

________ 1. You should store flammable liquids in a room or cabinet that is ________.

________ 2. When using carbon-removing or paint-stripping compounds, you should avoid contacting material with your ________.

________ 3. You should place rags containing oil, gasoline, paint, solvents, and other combustibles in a designated (approved) metal ________.

Answers to Test Questions

I. 1. (b); 2. (d); 3. (d).
II. 1. fireproof; 2. skin (hands); 3. container.

Electrical and Electronic Equipment

This section contains specific safety instructions for servicing, repairing and operating certain equipment used in the area of electronics. Each set of safety instructions is followed by safety test questions and answers. The general safety instructions as well as instructions concerning the operation of a battery charger presented in earlier sections of this publication also apply to the area of electronics.

Circuits

Safety Instructions

1. Consider all wires and other conductors in a circuit live until proved dead by a safe method of testing.
2. Use test lamp or suitable meter for testing a circuit.
3. Turn off power before replacing a fuse.
4. Turn on switch only when you know what it operates.
5. Locate and correct fault that caused circuit breaker to open or fuse to blow before turning on power.
6. Be sure circuit is protected against overload by a fuse or circuit breaker of correct current-carrying capacity.
7. Make changes in the wiring of a circuit only when power is turned off.
8. Select and use wire of correct current-carrying capacity.

Safety Test Questions I

( ) 1. When replacing a fuse in a switchboard, always: (a) turn off power; (b) replace with a fuse of lower rating; (c) check the lights; or (d) check the voltmeter.

( ) 2. All electrical circuits must be protected from overload damage through the use of: (a) fuses or circuit breakers; (b) jumpers; (c) a penny; (d) other metal objects.

( ) 3. When testing for live wires, a suitable device to use would be a: (a) pencil; (b) wire; (c) test lamp; or (d) screwdriver.

Safety Test Questions - Continued

( ) 4. All wires in a circuit must be considered to be: (a) dead; (b) live; (c) safe; or (d) harmless.

II

________________1. Before working on a circuit, you should make sure it is dead by using a suitable meter or a test ________________.

________________2. When replacing a fuse, you should be certain that the power is turned ________________.

________________3. A fuse or circuit breaker protects a circuit against __________.

Answers to Test Questions

I. 1. (a); 2. (a); 3. (c); 4. (b).
II. 1. lamp; 2. off; 3. overload.

Electrical Equipment

Safety Instructions

1. Disconnect portable, electrically powered equipment from power source before servicing or repairing the equipment.
2. Examine electric cord for possible defects and correct any defects found before using.
3. Make certain frame or housing of portable, electrically powered equipment is properly grounded before operating it.
4. Connect with power source and turn on your own equipment.

Safety Test Questions

I

( ) 1. You should make certain that the frame or housing of portable, electrically operated equipment is: (a) painted green; (b) polished; (c) undergrounded; or (d) grounded.

( ) 2. Before servicing or repairing electrical equipment, be sure that: (a) electric cord has been disconnected from power source; (b) batteries are discharged; (c) fuse has been replaced; or (d) gas has been cut off.

II

________________1. Frame or housing of a portable, electrically operated piece of equipment must be ____________________.

________________2. Only an electric cord free from defects should be______

Answers to Test Questions

I. 1.(d); 2. (a)
II. 1. grounded; 2. used.

Electronic Devices

Safety Instructions -

1. Keep chassis of an AC-DC radio clear of ground wires and other grounded conductors.
2. Avoid coming in contact with grounded objects when making adjustments on an AC-DC radio connected to a power source.
3. Be sure capacitor is discharged before touching its terminals or connections.
4. Disconnect electric cord from power before touching anything behind transmitter panel.
5. Remove headphones while working on a transmitter or receiver.
6. Keep one hand behind your back or in your pocket when testing high voltage circuits.
7. Make certain chassis, cabinet, and cable shields of a transmitter or receiver are grounded.
8. Wear gloves and a face shield when handling a cathode-ray tube.

Safety Test Questions:

I.

( ) 1. If you are working on a transmitter or receiver, the headphones should always be: (a) worn; (b) removed; (c) placed on the floor; or (d) hung around your neck.

( ) 2. Before touching anything behind transmitter panel, be sure: (a) electric cord is disconnected from power; (b) switch is off; (c) stand-by switch is off; or (d) filaments are off.

( ) 3. When testing high voltage circuits, keep one hand (a) behind your back; (b) on the ground; (c) in your pocket; (d) on the switch; or (e) on your head.

( ) 4. Chassis, cabinet, and cable shields of a transmitter or receiver must be: (a) taped; (b) tuned; (c) ungrounded; or (d) grounded.

II.

____________________ 1. Servicing or repairing a transmitter can be dangerous because of ____________________.

____________________ 2. Care must be used in handling a cathode-ray tube because it might ____________________.

Answers to Test Questions

I. 1. (b); 2. (a); 3. (b); 4. (d)
II. 1. high voltage; 2. explode

Graphic Arts Equipment

This section contains specific instructions for operating certain equipment used in the areas of graphic arts. Each set of safety instructions relating to the operation of a particular piece of equipment is followed by safety test questions and answers. The general safety instructions presented in the first section of this publication also apply to the area of graphic arts.

Lead and Rule Cutter, Hand Miterer, Trimming Board, and Proof Press

Safety Instructions

1. Be sure that your fingers are clear of the moving parts of the lead and rule cutter and the hand miterer.
2. Keep your fingers away from the blade when cutting stock on the trimming board.
3. Make certain that when you are ready to use the proof press, your hands are clear of the track and ends of press.

Safety Test Questions

I

( ) 1. As a protection against the knife action of the lead and rule cutter, you should: (a) operate cutter as fast as possible; (b) keep fingers clear of moving parts; (c) cut rules with a hack saw; or (d) place a wedge in cutter to stop knife action.

( ) 2. When using the proof press, you should protect your hands by: (a) handling the brayer correctly; (b) moving the roller fast; (c) asking another student to operate the roller; or (d) keeping them clear of track and ends of press.

II

________________ 1. When using the proof press, you should protect your hands by keeping them clear of the ends of the press and the ________________.

________________ 2. You should make sure that when you are cutting on the trimming board your hands are away from the ________.

Answers to Test Questions

I. 1. (b); 2. (d).
II. 1. track; 2. blade.

Paper Cutter

Safety Instructions

1. Obtain permission from your teacher before using the paper cutter.
2. Make sure that no one but you is inside the operator's zone.
3. Be certain the handle (lever) controlling blade is in its proper position and safety lock is engaged before setting back gauge.
4. Keep hands clear of blade at all times.
5. Limit amount of stock to be cut at any one time.
6. Use care when jogging stock against back gauge and side so as to avoid being cut by the paper.
7. Keep both hands on the handle (lever) controlling blade during cut and return to proper position.
8. Be sure handle (lever) controlling blade is returned to its proper position before reaching for cut stock.
9. Check to see that safety lock engages after using cutter.

Safety Test Questions

I.

( ) 1. Before adjusting the paper cutter, you should be sure that the handle (lever) controlling the blade: (a) is in its farthest downward position; (b) is locked in its proper position; (c) and the clamp is down; or (d) and the knife is down.

( ) 2. When using the paper cutter, you should: (a) limit setting of back gauge to 2 in.; (b) cut all the stock necessary for a job at one time; (c) place the stock against the back gauge without jogging it; or (d) limit the amount of stock to be cut.

( ) 3. While you are operating the paper cutter, you should have: (a) both hands on the handle (lever); (b) only one hand on the handle (lever); (c) one hand on the stock; or (d) one hand on the back gauge adjuster.

( ) 4. You should reach for the cut stock when: (a) blade is on the downward stroke; (b) clamp is tight against stock; (c) blade is being brought upward; or (d) handle (lever) controlling blade is returned to its proper position.

II

________________ 1. You should always keep hands clear of paper cutter clamp and ________________.

________________ 2. You should place stock in the paper cutter only when the handle (lever) controlling blade is in its proper __________.

________________ 3. When operating the paper cutter, you should keep both hands on the ________________.

________________ 4. The clamp bar on the paper cutter should always be lower than the __________________.

Answers to Test Questions

I. 1. (b); 2. (d); 3. (a); 4. (d).
II. 1. blade; 2. position (place); 3. handle (lever); 4. blade.

Platen Press

Safety Instructions

1. Obtain permission from your teacher before using the press.
2. Oil press only when the power is turned off and machine is at a dead stop.
3. Be certain form is locked securely in bed.
4. Apply ink to disc only when press is at a dead stop.
5. Make sure that no one but you is inside operator's zone.
6. Turn on power after permission has been given.
7. Gauge speed of press according to your ability to feed.
8. Use throw-off lever and wait for platen to open before adjusting misfed stock.
9. Stop press before attempting to remove paper picked up by the ink rollers.
10. Stop press before retrieving stock that has fallen between the platen and delivery board or under the press.
11. Turn off power after using press and stand by until the machine has stopped.
12. Check with your teacher to find out whether you should clean ink rollers and disc.

Safety Test Questions

I

( ) 1. You should oil the press only when: (a) the power is turned off and the machine is at a dead stop; (b) the machine is in motion; (c) it is noisy; (d) the ink rollers pass across the delivery board.

( ) 2. It is best to ink the disc when the press is: (a) operating slowly; (b) operating fast; (c) at a dead stop; or (d) coasting.

( ) 3. When feeding the press, you should: (a) lean over press; (b) rest on the delivery board; (c) sit down; or (d) stand erect.

( ) 4. You should gauge the speed of the press according to: (a) the quantity of work to be done; (b) the amount of time you have to do the job; (c) your ability to feed; or (d) the rate of the previous operator.

( ) 5. If paper is picked up by the rollers, you should: (a) let the press run slowly and remove the paper; (b) stop the press completely and remove the paper; (c) reach for it quickly; or (d) disregard it and use a new piece of paper.

II

________________ 1. You should make sure that the form is locked securely in the press ________________.

________________ 2. Before adjusting misfed stock, you should use throw-off lever and wait for platen to ________________.

________________ 3. If you should find it necessary to leave the press for a moment, you should turn off the power and wait for the machine to come to a complete ________________.

________________ 4. Before retrieving stock that has fallen between platen and delivery board or under press, you should stop the ____________.

________________ 5. The power must be off and the press at a dead stop before you clean the ink from the rollers and ________________.

Answers to Test Questions

I. 1. (a); 2. (c); 3. (d); 4. (c); 5. (b).
II. 1. bed; 2. open; 3. stop; 4. press; 5. disc.

Stapling Machine

Safety Instructions

1. Obtain permission from your teacher before using the stapler.
2. Adjust machine only when power is turned off.
3. Wear face shield or safety glasses (goggles, spectacles).

4. Make sure that no one but you is inside operator's zone.

5. Keep your fingers away from movable parts of the stapler.

6. Place your foot firmly on lever control.

7. Turn off power after using stapler.

Safety Test Questions

I

( ) 1. You should adjust stapling machine: (a) when it is in motion; (b) after each staple; (c) when the power is turned off; or (d) while the power is turned on.

II

__________________ 1. In operating the stapler, you should keep your fingers clear of all movable ______________.

Answers to Test Questions

I. 1. (c).
II. 1. parts.

Metalworking Equipment

This section contains specific safety instructions for operating equipment used in working with metal. Many of these pieces of equipment are found in the following industrial arts facilities: automotive mechanics, electronics, industrial crafts, metals, power mechanics, woods, and general industrial arts. Each set of safety instructions relating to the operation of a particular piece of equipment is followed by safety test questions and answers.

Bar Folder

Safety Instructions

1. Obtain permission from your teacher before using the bar folder.
2. Remove sharp burrs and edges on sheet metal before folding.
3. Fold only single thickness of sheet metal within capacity of the bar folder. (Follow manufacturer's gauge limit specifications.)
4. Make sure that no one but you is inside the operator's zone.
5. Keep your hands clear of movable parts.
6. Hold handle firmly.
7. Let the bar down slowly after completing a bend.

Safety Test Questions

I

( ) 1. When folding metal in the bar folder, you should: (a) keep your fingers away from the folding bar; (b) let the folding bar drop; (c) always fold across a hem; or (d) feed the work as rapidly as possible.

( ) 2. When you are using the bar folder, the handle should be: (a) held by another person at all times; (b) let down slowly; (c) thrown back; or (d) rotated.

II

________________ 1. You should always keep your hands clear of movable ____________.

________________ 2. When using the bar folder, you should let the handle down ________________________.

Answers to Test Questions

. 1. (a); 2. (b)
. 1. parts; 2. slowly

Brake

Safety Instructions

1. Obtain permission from your teacher before using the brake.
2. Keep fingers clear of clamping bar and blade.
3. Make sure no one but you is inside the operator's safety zone (clear of counter balance.)
4. Fold only single thickness of sheet metal within capacity of the brake (follow manufacturer's specifications as to gauge limits.)

Safety Test Questions

I

( ) 1. Before operating the brake, you should: (a) drop the leaf; (b) make sure that everyone is clear of the counter balance; (c) remove the counter balance; (d) remove the bending leaf.

( ) 2. When using the brake, make sure that your fingers: (a) are on the clamping bar; (b) on the bending leaf; (c) are on the counter balance; or (d) are clear of the clamping bar.

II

________________ 1. When using the brake, you should keep fingers clear of clamping ____________.

________________ 2. Before operating the brake, you should make sure that everyone is clear of the counter ______________.

Answers to Test Questions

I. 1. (b); 2. (d).
II. 1. bar; 2. balance

Buffer

Safety Instructions

1. Obtain permission from your teacher before using the buffer.
2. Hold work with both hands.
3. Ask your teacher for special instruction and permission to buff small pieces.
4. Make sure that no one but you is inside the operator's zone.
5. Wear face shield or safety glasses (goggles, spectacles).
6. Turn on power after permission is given.
7. Apply compound sparingly.

8. Keep hands away from the wheel while it is in motion.

9. Hold work below center (horizontal axis) as wheel revolves toward you.

10. Buff flat surfaces from center toward lower edge. Sharp edges should point downward.

11. Press material against wheel with correct amount of pressure.

12. Turn off power after using buffer.

13. Clean buffer and area with a brush.

Safety Test Questions

I

( ) 1. When buffing, you should hold your work: (a) on top of wheel; (b) below center (horizontal axis of wheel); (c) above center (horizontal axis) of wheel; or (d) on bottom of wheel.

( ) 2. You must wear goggles or a face shield when using buffer because either of these will: (a) magnify your work; (b) remove glare; (c) help avoid distraction ; or (d) protect your eyes from flying particles.

( ) 3. Special permission to buff small pieces must be obtained from: (a) foreman; (b) teacher; (c) student; or (d) monitor.

( ) 4. When using buffer, you should point sharp edges of your work; (a) upward; (b) sideways; (c) horizontal; or (d) downward.

II

____________________ 1. When using buffer, you should always keep your hands away from ____________________.

____________________ 2. Work being buffed should be held against the wheel just below ____________________.

____________________ 3. Be sure when using buffing wheel to wear face shield or ____________________.

____________________ 4. Special permission to buff small pieces must be obtained from the ____________________.

Answers to Test Questions

I. 1. (b); 2. (d); 3. (b); 4. (d).
II. 1. wheel; 2. center; 3. goggles; 4. teacher.

Drill Press

Safety Instructions

1. Obtain permission from your teacher before using the drill press.
2. Shift belt and make other adjustments only when power switch is turned off.
3. See that belt guard is in place.
4. Be certain that the table and head of drill press are secure.
5. Select proper drill (be sure it is sharp) and coolant.
6. Remove chuck key immediately after using it.
7. Use drill press vise whenever possible. Clamp vise or work to drill press table.
8. Make sure that no one but you is inside the operator's zone.
9. Wear face shield or safety glasses (goggles, spectacles).
10. Turn on power after permission is given.
11. Keep hands away from revolving spindle, chuck, drill, and chips.
12. Operate feed handle so that drill cuts evenly into work.
13. Ease up on feed pressure when drill begins to break through material.
14. Back drill out as soon as hole is drilled.
15. Stop the drill press before attempting to remove work, chips, or cuttings.
16. Use a brush to remove chips or shavings.
17. Keep floor clean around drill press.
18. Step away immediately if work comes loose and is seized by drill; shut off power if possible without endangering self.
19. Turn off power after using drill press and stand by until the machine has stopped.
20. Clean off drill press table and surrounding area. Return cleaned drills, coolants, and clamping devices to designated place.

Safety Test Questions

I

( ) 1. Drill press work should be held: (a) with a pair of tongs; (b) by the hands; (c) in a vise or firmly clamped to the table; or (d) by an assistant at all times.

( ) 2. When the drill begins to break through the work, you should: (a) ease up on the feed pressure; (b) maintain the same feed pressure; (c) stop the drill press immediately; or (d) apply more pressure.

( ) 3. The best way to remove chips from the drill press is with: (a) your fingers; (b) a small drill; (c) a long ruler; or (d) a brush.

( ) 4. By removing the chuck key from the chuck before turning on the power, you will prevent: (a) the chuck from being damaged; (b) the drill from breaking; (c) the chuck key from being thrown out at a terrific speed; or (d) the chuck from becoming unbalanced.

( ) 5. If work is seized by the drill, you should (without endangering yourself): (a) exert more feed pressure; (b) stop the machine immediately; (c) grab it with your hands; or (d) decrease the feed pressure.

II

__________________ 1. Work being drilled on the drill press should be securely clamped to the table or in a ____________________.

__________________ 2. Be sure to remove chuck key from the drill press before turning the power ________________.

__________________ 3. You should remove chips from the drill press table with a ________________________.

__________________ 4. When the drill begins to break through the work, you should ease up on the ________________________.

__________________ 5. If work is seized by the drill, you should (without endangering yourself) immediately turn the power ______________.

Answers to Test Questions

I. 1. (c); 2. (a); 3. (d); 4. (c); 5. (b).
II. 1. vise; 2. on; 3. brush; 4. feed (pressure); 5. off.

Forge

Safety Instructions

1. Obtain permission from your teacher before lighting gas forge.
2. Clear area of all flammable material.
3. Keep area well ventilated.

4. Make sure no one but you is in operator's zone.

5. Light gas forge by following this procedure:

   a. Wear face shield or safety glasses (goggles, spectacles).
   b. Run air for two minutes in unlighted forge.
   c. Turn air off.
   d. Place a lighted piece of paper in the forge.
   e. Create draft by turning on air slowly.
   f. Turn on the gas slowly.
   g. Adjust the flame so that all fire is confined within forge.

6. Handle long and heavy pieces of steel with great care.

7. Use tongs or pliers to handle hot metal.

8. Be careful when carrying hot metal. Warn students who may be in the way. Consider all metal around the furnace as being hot.

9. Mark hot metal with chalk or soapstone with the word "hot" if it is necessary for you to leave your work.

10. Use only tools with safe handles and properly dressed heads.

11. Keep anvil face clear of scraps and flakes of metal.

12. Hammer metal being forged only. Striking hammer on face of anvil may cause chips of steel to fly.

13. Stand so that your face is protected when quenching metal.

14. Shut off GAS first and then AIR when you have finished using the forge.

15. Quench hot tongs before putting them away.

16. Clean up working area.

Safety Test Questions I

( ) 1. Before leaving heated metal unattended, you should use chalk or soapstone to label it with the word "hot" because: (a) someone may be burned if he touches it; (b) other work may be placed on it; (c) you can tell to whom it belongs; or (d) chalk will help cool it.

( ) 2. You should hammer only the metal being forged because striking directly on the face of the anvil may: (a) cause a disturbing sound; (b) damage the hammer; (c) cause chips from the anvil and the hammer to fly and injure someone; or (d) damage the anvil.

( ) 3. You must wear a face shield or safety glasses (goggles, spectacles) when using the forge or hammering on metal because these: (a) are becoming to you; (b) magnify the work, thus making it easier for you to see; (c) protect your eyes from bright light; or (d) protect your eyes from flying particles.

( ) 4. When preparing to light the gas forge, you should first: (a) turn on the gas; (b) run air through the forge; (c) place a lighted piece of paper in the forge; or (d) close all vents.

( ) 5. You must cool tongs before placing them on the tool rack so as to prevent (a) warping of the tongs; (b) burning someone; (c) heating the tool rack; or (d) disorganizing the tool rack.

II

________________ 1. Before leaving heated metal unattended, you should use chalk or soapstone to label it with the word ________________.

________________ 2. You should hold hot metal with pliers or ________________.

________________ 3. In preparing to light a gas forge, you should turn on the air before turning on the ____________________.

________________ 4. Before placing tongs on tool rack, you should make sure that they are ____________________.

________________ 5. When you finish using the gas forge, you should shut off the gas first and then the __________________.

Answers to Test Questions

I. 1. (a); 2. (c); 3. (d); 4. (b); 5. (b).
II. 1. hot; 2. tongs; 3. gas; 4. cool (cold); 5. air.

Furnace (Bench)

Safety Instructions

1. Obtain permission from your teacher before lighting furnace for soldering.
2. Secure soldering copper in a vise when it is necessary to file tip.
3. See that area is properly ventilated.
4. Light furnace by following this procedure:
   a. Stand to one side of furnace.
   b. Place a lighted piece of paper in the furnace if furnace does not have a pilot light.
   c. Turn on the gas slowly.
   d. Adjust the flame so that all the fire is confined within furnace.
5. Place the soldering copper on the prescribed rest when not in use.
6. Determine heated readiness of a soldering copper by testing it with a piece of solder.
7. Use care in handling heated soldering copper.
8. Select correct flux for soldering copper.

9. Stand so that you will be protected from any fumes while tinning a copper or soldering.

10. Use care when wiping off excess solder.

11. Wipe up immediately any spilled flux.

12. Shut off gas when you have finished using soldering furnace.

13. Clean area when you have completed your soldering.

Safety Test Questions

I

( ) 1. Before lighting the gas furnace, you should make sure: (a) all windows are closed; (b) electric lights are turned on; (c) there is a spare soldering copper; or (d) the area is properly ventilated.

( ) 2. When lighting the gas furnace, you should: (a) close all vents; (b) stand to one side; (c) immediately turn on gas full force; or (d) preheat furnace before turning on gas.

( ) 3. In passing a soldering copper to another person, you should: (a) hand it to him point first; (b) grasp it by the middle so that he can take hold of the handle; (c) place it on a rest or in the furnace so that he can pick it up; or (d) wrap a cloth around it so neither of you will be burned.

( ) 4. You should always pick up a soldering copper: (a) by its handle; (b) only when it is hot; (c) only when it is cold; or (d) by its shank.

( ) 5. To determine whether a soldering copper is hot enough to use, you should: (a) test with a piece of solder; (b) dip in water; (c) hold close to face; or (d) look at the flame.

II

________ 1. When lighting the gas furnace, you should stand to one ________.

________ 2. You should always pick up a soldering copper by its ________.

________ 3. When the soldering copper is not in use, you should place it in the furnace or on the ________.

________ 4. You should determine the heated readiness of a soldering copper by testing it with a piece of ________.

Answers to Test Questions

I. 1. (d); 2. (b); 3. (c); 4. (a); 5. (a).
II. 1. side; 2. handle; 3. rest; 4. solder.

Furnace (Crucible)

Safety Instructions

1. Use caution in handling tools, castings, or other metal in the foundry area, as they may be hot.
2. Obtain approval from your teacher before closing a mold.
3. Keep molds covered until ready for pouring.
4. Obtain permission from your teacher before lighting gas furnace.
5. Keep all flammable material away from the working area.
6. Light gas furnace by following this procedure:
   a. Wear face shield or safety glasses (goggles, spectacles).
   b. Run air for two minutes in unlighted furnace.
   c. Turn off air.
   d. Place a lighted piece of paper in the furnace.
   e. Create draft by turning on air slowly.
   f. Turn on the gas slowly.
   g. Adjust the flame so that all fire is confined within furnace.
7. Preheat metal to remove moisture before placing in a crucible containing any molten metal.
8. Preheat skimmer before using.
9. Shut off GAS first and then AIR when you have finished using the furnace.
10. Wear face shield or safety glasses (goggles, spectacles), gloves, and protective covering for the feet when handling ladles or crucibles of molten metal.
11. Move with care and carry molten metal close to the floor to reduce possible dangers.
12. Have mold on floor when pouring metal.
13. Stand so that your face is protected when pouring metal.
14. Allow casting to cool before breaking it out of mold.
15. Clean working area.

Safety Test Questions

I

( ) 1. If water comes in contact with molten metal, it will: (a) discolor the material; (b) cause an offensive odor; (c) cause an explosion; or (d) make the material nonmetallic.

( ) 2. When preparing to light the gas furnace, you should first: (a) turn on the gas; (b) run air through the furnace; (c) place a lighted piece of paper in the furnace; or (d) close all vents.

( ) 3. You must wear a face shield or safety glasses (goggles, spectacles) when you handle ladles or crucibles of molten metal because these: (a) are becoming to you; (b) magnify the work, thus making it easier for you to see; (c) protect your eyes from bright light; or (d) protect your eyes from metal that may splatter.

( ) 4. When pouring metal, you should have the mold placed: (a) on the bench; (b) on the floor; (c) even with your waist; or (d) even with your shoulders.

( ) 5. You should preheat metal before placing it in a crucible containing any molten metal so as to remove: (a) moisture; (b) impurities; (c) oxides; or (d) carbon.

II

________________ 1. In preparing to light a gas furnace, you should turn on the air before turning on the ________________.

________________ 2. When you have finished using the furnace, you should shut off the gas first and then the ________________.

________________ 3. If water comes in contact with molten metal, it will cause an ________________________.

________________ 4. When pouring metal, you should have the mold placed on the ________________________.

________________ 5. You should preheat metal before placing it in a crucible containing any molten metal so as to remove ______________.

Answers to Test Questions

I. 1. (c); 2. (b); 3. (d); 4. (b); 5. (a).
II. 1. gas; 2. air; 3. explosion; 4. floor; 5. moisture.

Grinder

Safety Instructions

1. Obtain permission from your teacher before using grinder.
2. Set tool rest 1/16 in. to 1/8 in. from the wheel.
3. Dress wheel when necessary.

4. See that guard is in place.

5. Make sure that no one but you is inside the operator's zone.

6. Wear face shield or safety glasses (goggles, spectacles) and use glass safety guard on grinder.

7. Stand to one side of wheel.

8. Turn on power after permission is given.

9. Keep hands away from the wheel while it is in motion.

10. Hold work with your hands. Ask your teacher for special instruction and permission to grind small pieces.

11. Use the face of the wheel only.

12. Press material against the wheel with correct amount of pressure.

Safety Test Questions

I

( ) 1. You must wear a face shield or safety glasses (goggles, spectacles) when using grinder because these: (a) are becoming to you; (b) magnify the work, thus making it easier for you to see; (c) protect your eyes from bright light; or (d) protect your eyes from flying particles.

( ) 2. The grinder tool rest must be securely fastened: (a) immediately after grinder is turned on; (b) 1 in. away from wheel; (c) when wheel is not in motion; or (d) after power is turned off and the wheel is coasting.

( ) 3. You should set grinder tool rest: (a) ¼ in. away from wheel; (b) so wheel rubs lightly against tool rest; (c) ½ in. away from wheel; or (d) no more than 1/8 in. from wheel.

( ) 4. To grind small pieces of stock, you should: (a) hold them in your bare hands; (b) hold them with a rag; (c) use a very coarse wheel; or (d) receive special instruction and permission from your teacher.

( ) 5. You should stand to one side of grinding wheel while it is gathering speed because: (a) if it has a defect, the wheel may fly to pieces; (b) the air currents from wheel are unhealthful; (c) it will tempt you to use the wheel too soon and cause it to stop; or (d) you can see if the wheel is running true.

II

________________ 1. You must wear a face shield or safety glasses (goggles, spectacles) when using the grinder because these will protect your ________________.

________________ 2. The grinder tool rest should be set away from grinding wheel no more than ________ inch.

__________ 3. When using the grinder, you should keep your hands away from the __________.

__________ 4. To grind small pieces of stock, you should obtain special permission from the __________.

__________ 5. When starting the grinder, you should stand to one __________

Answers to Test Questions

I. 1. (d); 2. (c); 3. (d); 4. (d); 5. (a).
II. 1. eyes; 2. 1/8; 3. wheel; 4. teacher; 5. side.

Lathe (Metalworking)

Safety Instructions

A. General Turning Instructions

1. Obtain permission from your teacher before using the lathe.
2. Roll sleeves above elbows and remove or fasten any loose clothing.
3. Make all adjustments only when machine is at a dead stop.
4. Check to see that all guards are in place.
5. Be sure that all parts of the carriage will clear any rotating part during full length of cut.
6. Remove chuck key or wrench immediately after using.
7. Set tool on center of work to be turned.
8. Wear a face shield or safety glasses (goggles, spectacles).
9. Make sure that no one but you is inside the operator's zone.
10. Turn on power after permission is given.
11. Place your hands on the controls or at your sides except when filing or polishing.
12. Keep hands away from chips.
13. Finish your cuts that are close to chuck or against a shoulder by hand feed.
14. Bring lathe to a complete stop before reversing.
15. Remove toolholder and tool post before filing or polishing.
16. Shut off power after using lathe and stand by until the machine has stopped.
17. Clean machine and area.

B. Between-Centers Turning Instructions

1. Use safety dog to drive work.
2. Clamp tailstock securely.
3. Adjust and lubricate the tailstock center.
4. Regulate depth of cut according to size and type of metal.
5. Use tools that are properly ground for the particular job.

C. Chuck and Faceplate Turning Instructions

1. Place a board under chuck when threading it on or off spindle. Keep your fingers clear.
2. Secure work firmly in chuck.
3. Remove chuck key or wrench immediately after using it.
4. Counterbalance work on the faceplate if it is irregular in shape.
5. Turn chuck or faceplate by hand through one complete cycle to make sure work is clear.
6. Regulate depth of cut according to size and type of metal.
7. Stand to one side of revolving faceplate.
8. Stop power feed before tool reaches jaws of chuck.

Safety Test Questions I

( ) 1. Measurements should be made when the lathe is at a dead stop so as to: (a) avoid damaging measuring tool; (b) prevent measuring instrument from getting caught and flying out; (c) make faster measurements; or (d) keep chuck tight.

( ) 2. When the lathe chuck or faceplate has been removed from the lathe, you should place it: (a) on the ways; (b) in such a manner that it will not roll and fall onto the floor; (c) on the carriage; or (d) in the chip pan.

( ) 3. Before cleaning your work with a rag, be sure the lathe is: (a) operating slowly; (b) rotating in reverse; (c) at a dead stop; or (d) revolving at full speed.

( ) 4. To prevent the possibility of the chuck key or wrench from flying out of the lathe chuck, you should: (a) operate the lathe at low speed; (b) tighten the chuck; (c) remove the key or wrench immediately after using; or (d) use a key or wrench that fits securely.

( ) 5. Lathe chips are: (a) cool when the lathe is operating slowly; (b) cut from aluminum and brass only; (c) likely to burn and cut if you grasp them; or (d) safe to handle.

II

________________ 1. Shifting gears and changing levers on the lathe should only be done when the machine is ________________.

________________ 2. Before starting the lathe, you should see that it turns freely by rotating it by ________________.

________________ 3. When making cuts where flying chips are a hazard, you must wear ______ ___________.

________________ 4. Before filing or polishing, the toolholder and tool post should be ________________.

________________ 5. You should remove the chuck key or wrench from the lathe chuck immediately after ________________.

Answers to Test Questions

I. 1. (b); 2. (b); 3. (c); 4. (c); 5. (c).
II 1. stopped; 2. hand; 3. face shield (safety glasses); 4. removed; 5. using.

Milling Machine

Safety Instructions

1. Obtain permission from your teacher before using milling machine.
2. Make adjustments or setup only when machine is at a dead stop. Check with the teacher.
3. Use correct fitting wrenches on machine parts.
4. Handle all cutters carefully.
5. Select proper cutter; be sure it is sharp.
6. Use only a soft hammer or mallet to seat work against the parallels of bottom of vise.
7. Be sure that job is securely fastened.
8. Make certain that work, milling machine table, and any holding device will clear arbor and support during cut.
9. Set machine for proper depth of cut.
10. Select correct feed.
11. Disengage handles when automatic feed is to be used or table is to be locked.
12. Make sure no one but you is inside the operator's zone.
13. Stand to one side of machine.
14. Turn on power after permission is given.

15. Be sure that cutter is turning in proper direction.

16. Feed against or opposite to direction of rotation of cutter.

17. Use a brush to remove chips from work when machine is at rest.

18. Keep floor clean around milling machine.

19. Turn off power after using milling machine and stand by until the machine has stopped.

20. Release all automatic feeds.

21. Clean machine and area with a brush.

Safety Test Questions

I

( ) 1. You should check all attachments and clamps on the milling machine for tightness before: (a) turning on the power; (b) oiling the machine; (c) changing the spindle speeds; or (d) turning off the automatic feed.

( ) 2. When cutter of milling machine is revolving: (a) clean the table: (b) oil the bearings; (c) clean the arbor with a cloth; or (d) stand to one side of machine.

( ) 3. The best way to remove metal cuttings or chips from your work is to use: (a) your hand; (b) a clean rag; (c) a brush; or (d) a tool.

( ) 4. Striking a mill cutter with a steel hammer may: (a) cause pieces of steel to fly; (b) break the cutter; (c) damage the arbor; or (d) damage the hammer.

( ) 5. When you have finished using the milling machine, you should: (a) speed up all clutches and feeds; (b) seat work against the parallels; (c) release all automatic feeds; or (d) select proper cutter.

II

____________________ 1. You should check all attachments and clamps on the milling machine before turning on the ____________________.

____________________ 2. When milling machine cutter is revolving, you should stand to one ____________________.

____________________ 3. The best way to remove metal cuttings or chips from your work is to use a ____________________.

____________________ 4. When you have finished using the milling machine, all automatic feeds should be ____________________.

____________________ 5. You should make adjustments or setup only when milling machine is ____________________.

Answers to Test Questions

I. 1. (a); 2. (d); 3. (c); 4. (a); 5. (c).

II. 1. power (switch, machine); 2. side; 3. brush; 4. released; 5. stopped.

Planer (Metalworking)

Safety Instructions

1. Obtain permission from your teacher before using planer.
2. Make adjustments or setup only when machine is at a dead stop.
3. Secure work firmly in the machine.
4. Select proper tool for the job.
5. Set machine for proper depth of cut.
6. Make sure that work clears cross rail and sides of machine.
7. See that stops are set for controlling the movement of table.
8. Make sure no one but you is inside the operator's zone.
9. Protect your eyes with a face shield or safety glasses (goggles, spectacles).
10. Check to see that lever is in neutral position before starting the motor.
11. Turn on power after permission is given.
12. Keep your hands away from cutting tool and line of travel of moving parts of machine.
13. Turn off power after using planer and stand by until the machine has stopped.
14. Clean machine and area with a brush.

Safety Test Questions I

( ) 1. When setting up a job on the planer, be certain: (a) there are no chips on the table; (b) your work is securely fastened on the table; (c) the platen travels at least 6 in; or (d) the machine is in gear.

( ) 2. Before starting the planer, you should make sure the work will clear the: (a) starting lever; (b) operator; (c) table; or (d) cross rails and sides of machine.

( ) 3. When operating the planer, you should: (a) oil the machine; (b) sweep the chips from the floor immediately; (c) wear a face shield or safety glasses; or (d) increase the cutting speed.

( ) 4. You should use a file to remove sharp burrs and corners from your work so as to: (a) prevent work from being marred; (b) avoid tearing your clothes; (c) prevent your fingers from being cut; or (d) speed up production.

( ) 5. When the planer is in motion, you should: (a) lean on the cross rail; (b) sit nearby and watch; (c) stop the table each time it returns; or (d) keep your hands away from the work.

II

________________ 1. In setting up a job on the planer, you should be certain that your work is securely ________________.

________________ 2. Before starting the planer, you should make sure the work clears the sides of machine and the cross ____________.

________________ 3. When operating the planer, you should wear a face shield or ____________________.

________________ 4. When the planer is in motion, you should stand to one ________________.

________________ 5. Sharp burrs and corners should be removed from your work with a ____________________.

Answers to Test Questions

I. 1. (b); 2. (d); 3. (c); 4. (c); 5. (d).
II. 1. fastened (held); 2. rail; 3. safety glasses (goggles, spectacles); 4. side; 5. file.

Portable Electric Drill

Safety Instructions

1. Obtain permission from your teacher before using portable electric drill.
2. Select proper drill (be sure it is sharp) and coolant.
3. Make sure switch is in an "off" position.
4. Remove chuck key immediately after using it.
5. See that a grounded wire is connected to the portable electric drill.
6. Keep drill, electric cord, and plug dry at all times.
7. Plug in electric cord.
8. Hold the machine firmly.
9. Turn on power after permission is given.
10. Keep hands away from revolving spindle and drill.
11. Apply straight and steady pressure on the drill.
12. Ease up on pressure just before drill begins to break through material.
13. Back drill out as soon as hole is drilled.
14. Turn off power and hold machine firmly until it comes to a dead stop -- then rest machine on its side.

15. Disconnect electric cord. Clean and return machine to designated place.

Safety Test Questions

I

( ) 1. You should select a location that is dry and not grounded for using a portable electric tool or appliance so as to avoid: (a) soiling the equipment; (b) serious electric shock; (c) motor bearings deterioration; or (d) discoloring the electric cord.

( ) 2. By removing the chuck key from the drill chuck before turning on the power, you will prevent the : (a) chuck from being damaged; (b) drill from breaking; (c) chuck key from being thrown out at a terrific speed; or (d) chuck from becoming unbalanced.

( ) 3. Before plugging in the portable electric drill, you should: (a) remove the drill; (b) check the armature; (c) make sure the switch is off; or (d) disconnect the ground wire.

( ) 4. When you turn off the switch on the portable electric drill, you should: (a) disconnect electric cord; (b) inspect rotor; (c) blow the sawdust out of the armature opening; or (d) hold the machine firmly until it comes to a dead stop.

II

______________ 1. You should select a location that is dry and not grounded for using a portable electric tool or appliance so as to avoid serious electric ______________.

______________ 2. Be sure to remove the chuck key from the drill chuck before you turn the power __________.

______________ 3. Before plugging in the electric drill, you should make certain the switch is __________.

______________ 4. When you turn off the switch on the portable electric drill, you should hold the machine firmly until it comes to a ______________.

Answers to Test Questions

I. 1. (b); 2. (c); 3. (c); 4. (d).
II. 1. shock; 2. on; 3. off; 4. stop.

Shaper (Metalworking)

Safety Instructions

1. Obtain permission from your teacher before using shaper.

2. Make adjustments or setup only when machine is at a dead stop.

3. Use soft hammer or mallet to set work on the parallels.

4. Secure work firmly in the machine.

5. Select proper tool for the job.

6. Set machine for proper depth of cut.

7. Be sure that ram and head will clear your work and any holding device.

8. Make sure no one but you is inside the operator's zone.

9. Protect your eyes with a face shield or safety glasses (goggles, spectacles).

10. Check to see that lever is in neutral position before starting the motor.

11. Stand to one side of machine.

12. Turn on power after permission is given.

13. Keep your hands away from cutting tool and line of travel of all moving parts.

14. Turn off power after using shaper, and stand by until the machine has stopped.

15. Clean machine and area with a brush.

Safety Test Questions

I

( ) 1. When setting up a job on the shaper, be certain: (a) there are no chips on the vise; (b) your work is securely fastened in the machine; (c) the stroke of the ram is at least 3 in. long; or (d) the machine is in gear.

( ) 2. Before starting the shaper, you should make sure the ram and head will clear the: (a) starting lever; (b) ram clamp; (c) operator; or (d) work and holding device.

( ) 3. When operating a shaper, you should: (a) oil the machine; (b) sweep the chips from the floor immediately; (c) wear a face shield or safety glasses; or (d) increase the cutting speed.

( ) 4. You should use a file to remove sharp burrs and corners from your work so as to: (a) prevent work from being marred; (b) avoid tearing your clothes; (c) prevent your fingers from being cut; or (d) speed up production.

( ) 5. When the shaper is in motion, you should: (a) lean on the ram; (b) sit nearby and watch; (c) raise the tool holder on each back stroke; or (d) keep your hands away from the work.

II

____________________ 1. In setting up a job on the shaper, you should be certain that your work is securely ____________________.

____________________ 2. Before starting the shaper, you should make sure the ram and head clear your ____________________.

____________________ 3. When operating a shaper, you should wear a face shield or ____________________.

__________________ 4. When the shaper is in motion, you should stand to one ____________________.

__________________ 5. Sharp burrs and corners should be removed from your work with a ____________________.

Answers to Test Questions

I. 1. (b); 2. (d); 3. (c); 4. (c); 5. (d).
II. 1. fastened (held); 2. work; 3. safety glasses (goggles, spectacles); 4. side; 5. file.

Shear

Safety Instructions

1. Obtain permission from your teacher before using the shear.
2. See that guards are in place.
3. Follow manufacturer's specifications as to gauge of sheet metal that can be safely cut.
4. Cut narrow strips of metal crosswise only.
5. Make sure that no one but you is inside the operator's zone.
6. Stand directly in front of machine.
7. Feed pieces of metal into shear from front (operator's position).
8. Keep your fingers away from clamp and blade.
9. Hold stock securely against guide.
10. Make sure the foot that is not being used to operate treadle is clear before pushing down on treadle.
11. Regulate pressure on treadle according to gauge and type of stock. Keep foot on treadle to ease its return to normal position.
12. Allow small pieces of metal being cut to drop to the floor or into a container.
13. Use care when picking up trimmings.

Safety Test Questions

I

( ) 1. The shear must be operated by: (a) several students at once; (b) an advanced student and the shop foreman; (c) one student and a helper; or (d) only one person at a time.

( ) 2. You should make sure that the foot that is not being used to operate the foot treadle of the shear is kept: (a) on the treadle; (b) under the treadle; (c) clear of the treadle; or (d) away from the floor.

( ) 3. When using a shaper, you should keep your fingers: (a) near the clamp and blade; (b) under the clamp and blade; (c) away from the clamp and blade; or (d) between the clamp and blade.

( ) 4. After pushing down on the shear's treadle for a cut, you should allow the treadle to: (a) stay down; (b) return to its normal position as fast as possible; (c) return only part way; or (d) return slowly to its normal position.

II

________________ 1. The shear must be operated by only one ________________.

________________ 2. You should make sure that the foot that is not being used to operate the foot treadle is clear of the ________________.

________________ 3. When using the shear, you should keep your fingers away from the clamp and ____________________.

________________ 4. After pushing down on the shear's treadle for a cut, you should allow the treadle to return to its normal position ____________________.

Answers to Test Questions

I. 1. (d); 2. (c); 3. (c); 4. (d).
II. 1. person (student); 2. treadle; 3. blade; 4. slowly.

Welder

Safety Instructions - Oxygen-Acetylene Welding

1. Obtain permission from your teacher before using welding equipment.
2. Fasten cylinders with a chain or other suitable device as a protection against falling or rolling.
3. Close cylinder valve and replace protective cover before moving cylinder.
4. Keep welding equipment free of oil and grease. Use only clean rags for wiping off welding equipment.
5. Inspect hose before using.
6. Make sure that hose is properly connected and that all connections are tight.
7. Report any leaking of cylinders or connections to teacher immediately.
8. Make sure you have ample ventilation.

9. Keep all flammable material away from working area.

10. Be sure that you wear welding goggles. All assistants and observers must also wear welding goggles.

11. Release regulator pressure screw. Open cylinder valves gradually.

12. Open acetylene cylinder valve one and one-fourth turns or less. Keep wrench in place so that valve may be shut off quickly if necessary.

13. Keep acetylene pressure in the hose below 15 pounds per square inch.

14. Use a friction torch lighter to ignite torch.

15. Close acetylene valve first if torch backfires.

16. Make certain lighted torch always points away from yourself and other students.

17. Keep sparks and flame away from cylinders.

18. Close cylinder valve when you have finished your welding job.

19. Quench section of metal that has been welded or mark with chalk or soapstone the word "hot" on the metal if it is necessary for you to leave your work.

Safety Test Questions - Oxygen-Acetylene Welding

I

( ) 1. You should make sure welding equipment is: (a) lubricated with oil; (b) tightened by hand; (c) kept free of oil and grease; or (d) lubricated weekly.

( ) 2. Welding goggles are worn because they: (a) magnify your work; (b) protect your eyes from dust; (c) help you concentrate on your work; or (d) protect your eyes against heat, rays, and sparks.

( ) 3. The valve on a cylinder of acetylene should be opened: (a) with a pair of pliers; (b) three full turns; (c) one and one-fourth turns or less; or (d) as many turns as possible.

( ) 4. When you light a welding torch, you should use a: (a) friction torch lighter; (b) match; (c) fluid lighter; or (d) piece of lighted paper.

( ) 5. If a welding torch backfires, you should: (a) dip the torch in water; (b) inspect the hose; (c) hang an out-of order sign on equipment; or (d) close the acetylene valve first.

II

__________ 1. Before moving a cylinder, you should close the valve and replace __________.

__________ 2. You should report any leaking of cylinders or connections immediately to the __________.

__________ 3. You should keep the acetylene pressure in the hose below __________ pounds per square inch.

__________ 4. The valve on a cylinder of acetylene should be opened not more than __________ turns.

__________ 5. Anyone watching a welding flame must wear welding __________.

Answers to Test Questions

I. 1. (c); 2. (d); 3. (c); 4. (a); 5. (d).
II. 1. cover (cap); 2. teacher; 3. 15; 4. 1¼; 5. goggles.

Safety Instructions - Electric Welding

1. Obtain permission from your teacher before using welding equipment.
2. Wear a helmet with proper observation window, treated gauntlet gloves, and treated leather apron. All assistants and observers must also wear this equipment.
3. Keep your sleeves and pants cuffs rolled down. Wear leather jacket.
4. Make sure electric welding is done only in a correctly constructed booth or room or behind proper screens.
5. Be sure there is ample ventilation.
6. Keep all flammable material away from working area.
7. See that floor area is clear of all obstructions.
8. Report to your teacher at once if electrode holder, holder cable connection, cable or cable terminals at the welding machine, ground clamp, lugs, or cable get hot.
9. Hang up electrode holder and turn off welder when work is being changed or when work has been completed.

Safety Test Questions - Electric Welding

I

( ) 1. If observation window in your welding helmet is cracked, it will: (a) allow dust to pass through it; (b) obstruct your view; (c) transmit infrared and ultraviolet rays; or (d) rattle every time the helmet is flipped up.

( ) 2. When you are through using the electrode holder, you should: (a) place it on a metal workbench; (b) clamp it on the metal frame of the workbench; (c) rest it on the floor; or (d) suspend it so that it will not touch any metal.

( ) 3. If a cable or the electrode holder overheats, you should: (a) notify your teacher; (b) turn the voltage down; (c) stop welding and wait until it cools; or (d) change the electrode holder.

( ) 4. You should always draw the curtains on the welding booth before you strike an arc so as to: (a) protect your eyes from the infrared and ultraviolet reays; (b) keep the work from getting cool; (c) prevent anyone from noticing any mistakes; or (d) protect anyone nearby from the infrared and ultraviolet rays.

( ) 5. Before leaving heated metal unattended, you should use chalk or soapstone to label it with the word "hot" because: (a) someone may be burned if he touches it; (b) other work may be placedon it; (c) you can tell to whom it belongs; or (d) chalk will help cool it.

II

____________ 1. For eye protection against infrared and ultraviolet rays, you must wear a welding ____________.

____________ 2. If a cable or the electrode holder overheats, you should notify the ____________.

____________ 3. When chipping slag, you must wear ____________.

____________ 4. Arc welding should be done only behind proper screens or in a ____________.

____________ 5. If your skin is exposed to electric arc rays, you will be ____________.

Answers to Test Questions

I. 1. (c); 2. (d); 3. (a); 4. (d); 5. (a).
II. 1. helmet; 2. teacher; 3. goggles; 4. booth; 5. burned.

Woodworking Equipment

This section contains specific safety instructions for operating equipment used in working with wood. Many of these pieces of equipment are found in the following industrial arts facilities: electronics, industrial crafts, woods, and general industrial arts. Each set of safety instructions relating to the operation of a particular piece of equipment is followed by safety test questions and answers.

Band Saw

Safety Instructions

1. Obtain permission from your teacher before using the band saw.
2. Plan sawing procedure so there may be a maximum forward feed with a minimum of backing out of cuts.
3. Cut only stock with a flat surface.
4. Make sure the proper width saw is on the machine for your particular job.
5. Check to see that all guards are in place.
6. Make adjustments--only when machine is at a dead stop.
7. Set upper saw guide ¼ in. or less above the stock to be cut; check with teacher if stock is rough or warped.
8. Ask your teacher to approve all special setups.
9. Make sure that no one but you is inside the operator's zone.
10. Wear face shield or safety glasses (goggles, spectacles).
11. Turn on power after permission is given.
12. Hold material firmly.
13. Keep fingers a safe distance from saw blades.
14. Feed material into machine at a moderate rate of speed.
15. Keep saw blade from twisting or binding when cutting curves.
16. Allow machine to come to a dead stop before backing saw out of a long cut.

17. Keep waste from accumulating on the saw table.

18. Step away immediately if the saw breaks or comes off. Shut off power if possible without endangering self. Notify your teacher.

19. Turn off power after using band saw (use brake if provided) and stand by until machine has stopped.

20. Clear away scraps of wood on the table only after saw stops running.

Safety Test Questions

I

( ) 1. You should make all adjustments on the band saw: (a) only when the machine is at a dead stop; (b) more than ½ in. above the stock; (c) while the machine is coasting; or (d) only when the power is on.

( ) 2. It is best to set upper saw guide of the band saw: (a) when the power is off and the saw is coasting; (b) ¼ in. or less above the stock; (c) tight against the stock; or (d) ½ in. or more above stock.

( ) 3. You should plan your sawing procedure on the band saw so that: (a) small curves can be cut easily with wide blades; (b) there will be a maximum forward feed with a minimum of backing out of cuts; (c) there will be little scrap left on the table; or (d) back-outs can be made after each ½ in. of forward feed.

( ) 4. When it becomes necessary to back out stock from a long cut on the band saw, you should: (a) carefully back the stock away while the blade is in motion; (b) stop the machine, then back out the stock; (c) try to turn the stock on the table; or (d) continue to saw forward.

( ) 5. If the band saw blade breaks or comes off, you should: (a) call another student to cut off the power; (b) back your stock away from the blade immediately so as to avoid damage to your work; (c) continue cutting until the blade comes to a stop; or (d) step away immediately, shut off power (without endangering yourself), and then notify your teacher.

II

________________ 1. You should make adjustments on the band saw only when the machine is ________________.

________________ 2. The proper height at which to set the band saw's upper guide above the stock being cut is ________________ inch or less.

________________ 3. You should plan your sawing procedure on the band saw so that you will have a maximum of forward ________________.

________________ 4. Before backing out stock from a long cut on band saw, you should allow the machine to come to a complete ________________.

________________ 5. If the blade breaks or comes off while you are operating the band saw, you should, without endangering yourself, turn the power ________________.

Answers to Test Questions

I. 1. (a); 2. (b); 3. (b); 4. (b); 5. (d).
II. 1. stopped; 2. ¼; 3. feed; 4. stop; 5. off.

Circular Saw

Safety Instructions

1. Obtain permission from your teacher before using the circular saw.
2. Be sure that all lumber is free from loose knots, nails, and/or paint.
3. Select and install proper saw blade for ripping material or cutting across grain. Make sure blade is sharp and free of cracks or other defects.
4. Make adjustments only when the machine is at a dead stop.
5. Limit saw blade extension to 1/8 in. or less above the stock being cut.
6. See that all guards and other safety devices are in their proper position.
7. Ask your teacher to approve all special setups and dado heads.
8. Use ripping fence or cutoff gauge when cutting material. See that a cutoff board is properly mounted on cutoff gauge.
9. Fasten a clearance block to ripping fence when multiple cutting stock to length--when ripping fence is used as a gauge.
10. Use a holding jig or a method of clamping for cutting cylindrical stock. Check with your teacher.
11. Be certain there is an adequate number of proper push sticks immediately available.
12. Make sure that no one but you is inside the operator's zone.
13. Stand to one side of the line of the saw.
14. Wear face shield or safety glasses (goggles, spectacles).
15. Turn on power after permission is given.
16. Keep fingers clear of path to the saw blade.
17. Stop saw and move out of operating zone before responding to anyone trying to attract your attention.

18. Use approved push stick when ripping narrow pieces of stock.

19. Feed stock only as fast as the saw will freely cut.

20. Push the stock by yourself.

21. Make certain that a helper tailing off only supports the material.

22. Turn off power after using circular saw and stand [illegible] until the machine has stopped.

23. Clear away scraps of wood on the table only after saw stops running.

24. Reset saw adjustments to a normal position when completing an operation requiring a special setup.

Safety Test Questions

I

( ) 1. The guard must always be in place over the saw blade of the circular saw except when: (a) cutting stock with a thickness of more than 1 in.; (b) short pieces tend to catch under the guard; (c) using a thick blade; or (d) your teacher has authorized its removal for special setups.

( ) 2. All adjustments on the circular saw are made: (a) while the machine is coasting; (b) by the shop foreman; (c) while machine is at a dead stop; or (d) while the power is on.

( ) 3. You should limit the extension of the circular saw blade above the stock being cut to: (a) 1 in.; (b) ¼ in.; (c) 1/8 in.; or (d) ½ in.

( ) 4. When tailing off on the circular saw, the helper must: (a) support stock from underneath but not grasp it; (b) pick up all tailings that might cause an accident; (c) use a brush when cleaning up tailings; or (d) hold the stock and pull gently.

( ) 5. You should use a push stick when operating the circular saw to: (a) rip short and narrow pieces of stock; (b) adjust the saw; (c) turn on the power; or (d) remove scraps.

II

________________ 1. Adjustments on the circular saw are made only when the saw blade has ________________________.

________________ 2. Dadoing and tilting the arbor are special setups; therefore, you must obtain the approval of your ____________.

________________ 3. To avoid being hit by flying material, you should stand to one side of the line of the saw ______________________.

________________ 4. You should limit the extension of the circular saw blade above your work to ________________ inch.

________________ 5. It is best to use a push stick when ripping pieces of stock on the circular saw if they are short or ______________.

Answers to Test Questions

I. 1. (d); 2. (c); 4. (a); 5. (a).
II. 1. stopped; 2. teacher; 3. blade; 4. 1/8; 5. narrow.

Jointer

Safety Instructions

1. Obtain permission from your teacher before using jointer.
2. Use only clean lumber.
3. Inspect all wood for checks, loose knots, or other defects.
4. Make sure that only stock 12 in. or longer is used on the jointer.
5. Clamp fence firmly.
6. See that guard is in place over the knives.
7. Make adjustments only when machine is at a dead stop.
8. Limit cuts to 1/8 in. or less.
9. Ask your teacher to approve all setups involving stop-cuts, beveling, tapering, or rabbeting.
10. Make sure that no one but you is inside the operator's zone.
11. Wear face shield or safety glasses (goggles, spectacles).
12. Turn on power after permission is given.
13. Keep hands at a safe distance from the revolving head.
14. Use an approved push stick whenever possible.
15. Whenever possible, allow two fingers of the right hand to ride along top of fence when push stick is not being used.
16. Feed the stock slowly; consider the grain.
17. Push the stock far enough past the knives so that the guard will return before picking up the stock.
18. Turn off power after using jointer and stand by until the machine has stopped.

Safety Test Questions

I

( ) 1. The jointer is used for smoothing: (a) painted stock; (b) lumber containing knots or cracks; (c) warped stock; or (d) clean lumber.

( ) 2. In adjusting the depth of cut on the jointer, you should limit cut to: (a) 1/16 in.; (b) 1/8 in.; (c) ¼ in.; or (d) 3/16 in.

( ) 3. The shortest length of stock that can be safely cut on the jointer is: (a) 6 in.; (b) 4 in.; (c) 18 in.; or (d) 12 in.

( ) 4. When facing stock on the jointer, you should: (a) use an approved push stick whenever possible; (b) remove the guard from over knives; (c) limit depth of cut to ½ in.; or (d) feed stock as fast as possible.

( ) 5. Before picking up stock that has been surfaced on the jointer, you should make sure you have pushed the stock far enough past the knives so that the: (a) stock drops clear of the table; (b) outfeed table raises the material above the level of the knives; (c) fence will cover the work; or (d) guard will return over the cutter knives.

II

______________ 1. You should make sure the jointer cutter knives are covered by the ______________.

______________ 2. In adjusting the depth of cut on the jointer, you should limit cut to ______________ inch.

______________ 3. The shortest length of stock that can be safely cut on the jointer is ______________ inches.

______________ 4. The rear or outfeed table of the jointer is preset and needs no further ______________.

______________ 5. End grain should be surfaced with a ______________.

Answers to Test Questions

I. 1. (d); 2. (b). 3. (d); 4. (a); 5. (d).
II. 1. guard; 2. 1/8; 3. 12; 4. adjustment; 5. plane.

Lathe (Woodworking)

Safety Instructions

1. Obtain permission from your teacher before using lathe.
2. Roll loose sleeves above elbows and remove or fasten any loose clothing.
3. Make sure the stock is free from checks, loose knots, or other defects.
4. Make certain that all glued work is properly glued and dry.
5. Be sure stock is correctly mounted in lathe.

6. Clamp tool rest holder firmly.
7. Be certain tool rest is adjusted correctly.
8. Make adjustments of tool rest only when lathe is at a dead stop.
9. Shift belt on belt-driven lathes (for changes of speed) only when lathe is at a dead stop. Some machines must be in operation; check with teacher.
10. Check sharpness of turning tools and condition of handles.
11. Wear face shield or safety glasses (goggles, spectacles).
12. Start lathe at lowest speed when beginning operation.
13. Stand to one side when power is first turned on.
14. Grasp turning tool firmly with both hands while cutting stock.
15. Hold turning tool firmly against the rest.
16. Keep hands away from stock whil it is revolving.
17. Use correct amount of tool pressure against stock.
18. Stop lathe when using inside or outside calipers.
19. Maintain tool rest as close as reasonably possible to the stock by making frequent adjustments.
20. Remove tool rest when sanding and finishing.
21. Use for polishing only a small rag folded into a pad.
22. Shut off power after using lathe and stand by until the machine has stopped.
23. Clean machine.

Spindle Turning Instructions

1. See that centers are properly embedded in the stock.
2. Use oil or beeswax on the dead center.
3. Clamp tailstock firmly in place and tighten screw.
4. Turn spindle (rough stock) one revolution by hand.
5. Start lathe at lowest speed when beginning operation.
6. Rough stock down cylindrical form before using a higher speed. Maintain correct tool rest adjustment.
7. Govern speed according to the diameter of the work.

Faceplate Turning Instructions

1. Cut stock circular on band saw or scroll saw.
2. Select proper size and style of faceplate.
3. Choose the correct size and number of screws according to design of work.
4. Fasten stock or subbase glued to stock (through Paper) to faceplate with screws.
5. Be sure screws are tight.
6. Have teacher check fastenings and adjustments.
7. Keep an accurate check on depth of cut in work to avoid stiking screws.
8. Be certain that tool rest adjustment is correct and is correctly maintained.
9. Revolve work once by hand.
10. Use the lowest speed when beginning operation.
11. Use correct speed in relation to diameter of stock.
12. Make frequent inspection of screws to be sure they do not loosen.

Safety Test Questions I

( ) 1. As soon as stock is located between centers for spindle turning, you should: (a) clamp tailstock firmly in place and tighten screw; (b) remove tailstock and mount steady rest on the ways; (c) rotate stock counterclockwise to avoid burning; or (d) have it inspected by another student.

( ) 2. You should make all adjustments of the lathe tool rest: (a) while machine is rotating slowly; (b) after initial cuts are made; (c) when lathe is at a dead stop; or (d) 2 in. below center of stock.

( ) 3. It is best to set lathe tool rest so it is: (a) in slight contact with the stock, thus reducing chatter; (b) below and to right of center; (c) the same width as the lathe tool being used; or (d) ¼ in. or less from the rough stock.

( ) 4. When starting lathe for a beginning operation, you should use: (a) the highest speed; (b) the lowest speed; (c) any belt or gear ratio; or (d) a tool rest with a 3.1 ratio.

( ) 5. You should hold lathe turning tool: (a) to the right of the tool rest; (b) flat on the tailstock; (c) firmly against the tool rest; (d) just above the tailstock.

II

__________ 1. Before using the lathe, you should roll loose sleeves above elbows and remove or fasten any loose __________.

__________ 2. When starting the lathe, you should stand to one __________.

__________ 3. Tool rest adjustments on the lathe must be made when the machine is __________.

__________ 4. Prior to starting lathe, you should turn rough stock one revolution by __________.

__________ 5. Before sanding and finishing on the lathe, you should remove tool __________.

Answers to Test Questions

I. 1. (a); 2. (c); 3. (d); 4. (b); 5. (c).
II. 1. clothing; 2. side; 3. stopped; 4. hand; 5. rest.

Mortiser

Safety Instructions

1. Obtain permission from your teacher before using mortiser.
2. Clamp all stock securely on table.
3. Make adjustments only when machine is at a dead stop.
4. Check with your teacher for correct method of installing mortiser bit and chisel.
5. Make adjustments for depth stops and lateral travel.
6. Make sure that no one but you is inside the operator's zone.
7. Wear face shield or safety glasses (goggles, spectacles).
8. Turn on power after permission is given.
9. Keep hands away from chisel when the machine is turned on.
10. Feed chisel only as fast as machine will easily cut.
11. Turn off power immediately if cutting is difficult or the chisel burns. Check with your teacher.
12. Lift bit clear of the mortise before moving table.
13. Turn off power after using mortiser and stand by until machine has stopped.
14. Clean off mortiser table.

Safety Test Questions

I

( ) 1. You should make sure the chisel and bit of the mortiser are: (a) sharpened before and after each use; (b) properly aligned; (c) adjusted so that the chisel leads the bit; or (d) cooled after each cut.

( ) 2. It is best that all stock used on the mortiser is: (a) free of warps and checks; (b) big enough to hold with both hands; (c) at least 1 in. thick and 1 ft. long; or (d) securely clamped on the table.

( ) 3. If cutting on the mortiser becomes difficult or the chisel starts to burn, you should: (a) turn off machine and notify the teacher; (b) wax or grease chisel; (c) press harder on the pedal; or (d) release depth stop.

( ) 4. When the mortiser is turned on, you should: (a) adjust for depth of cut; (b) change alignment of chisel and bit; (c) keep away from table; or (d) keep your hands away from bit and chisel.

II

__________ 1. You should make sure mortiser bit and chisel are properly __________.

__________ 2. Before cutting on the mortiser, you should make sure your work is securely clamped on the __________.

__________ 3. If cutting on the mortiser becomes difficult or the chisel starts to burn, you should turn off machine and notify __________

__________ 4. When mortiser is turned on, you should keep your hands away from chisel and __________.

Answers to Test Questions

I. 1. (b); 2. (d); 3. (a); 4. (d).
II. 1. aligned (lined up); 2. table; 3. teacher; 4. bit.

Planer (Surfacer)

Safety Instructions

1. Obtain permission from your teacher before using planer.
2. Use only clean lumber.
3. Be sure that all wood is free from loose knots or other defects.
4. See that length of stock is longer than the distance between centers of feed rolls.
5. Make adjustments only when machine is at a dead stop.
6. Adjust cut to measurements taken on thickest part of the board.
7. Limit cuts to 1/8 in. or less on narrow stock.

8. Limit cuts on wide stock to 1/16th in. or less.

9. Run thin stock through planer on top of a thick surfaced board.

10. Make sure that no one but you is inside the operator's zone.

11. Wear face shield or safety glasses (goggles, spectacles).

12. Turn on power after permission is given.

13. Stand to one side of planer when machine is in operation.

14. Keep hands away from feed rolls and away from board(s) already gripped by the feed rolls.

15. Turn off power and call your teacher if machine does not seem to operate correctly.

16. Allow material to travel completely through planer before making any additional depth of cut adjustment.

17. Turn off power after using planer and stand by until the machine has stopped.

Safety Questions I

( ) 1. Stock to be run through the planer must have a minimum length which is: (a) longer than the distance between centers of the feed rolls; (b) determined by the width of the lumber; (c) left up to the decision of the operator; or (d) determined by depth of cut.

( ) 2. When operating the planer, you should stand: (a) behind the machine; (b) in the area marked off for the machine; (c) in front of the machine, provided you have someone to tail off; or (d) in an upright position and to one side of the machine.

( ) 3. You should limit your cuts on the planer to: (a) the amount specified on the depth gauge; (b) 1/8 in. on narrow and medium width stock; (c) three turns of the depth adjustment wheel; or (d) half the width of the board.

( ) 4. When board is gripped by the feed rolls of the planer, you should: (a) push the stock through; (b) readjust depth of cut; (c) increase cutting speed; or (d) keep your hands away from the feed rolls.

( ) 5. If stock jams in the planer or fails to feed, you should: (a) apply more pressure on feed rolls; (b) push the stock through; (c) adjust depth of cut; or (d) turn off power and call your teacher.

II

________________ 1. Stock to be run through the planer must be longer than the distance between the centers of the feed ____________.

________________ 2. When operating the planer, you should stand to one __________.

________________ 3. On narrow or medium width boards, you should limit planer cut to ____________ inch.

________________ 4. On wide boards, you should limit planer cut to _______ inch.

________________ 5. If planer does not seem to operate correctly, you should turn off the power and call the ____________.

Answers to Test Questions

I. 1. (a); 2. (d); 3. (b); 4. (d); 5. (d).
II. 1. rolls; 2. side; 3. 1/8; 4. 1/16; 5. teacher.

Radial-Arm Saw

Safety Instructions

1. Obtain permission from your teacher before using radial-arm saw.
2. Ask your teacher to approve all special setups.
3. Make sure that no one but you is inside the operator's zone.
4. Wear face shield or safety glasses (goggles, spectacles).
5. Hold stock firmly against fence.
6. Stand to one side and keep hands away from the direction of travel of saw.
7. Feed saw into material only as fast as it will easily cut.
8. Cut only one piece of stock at a time.
9. Use a piece of wood to remove scraps from path of saw blade only when saw is at a dead stop.
10. Turn off power after using radial-arm saw, return saw to beginning position carefully, and stand by until the machine has stopped.
11. Clean working area.

Safety Test Questions I

( ) 1. The radial-arm saw is used primarily for: (a) cutting short stock; (b) ripping lumber into smaller strips; (c) crosscutting stock too long for a table saw; or (d) curved cuts that cannot be done on band saw.

( ) 2. In operating the radial-arm saw, you must take great care: (a) not to take too deep a cut, especially with a combination blade; (b) to cut on the line you have intended to follow so as to avoid burning the blade; (c) in feeding material only as fast as it will easily cut; or (d) when ripping lumber into short lengths.

( ) 3. You should remove scraps from the path of the radial-arm saw blade with: (a) your fingers; (b) a tool, such as a rule; (c) an air hose; or (d) a piece of wood only while saw is at a dead stop.

( ) 4. At the completion of each cut, the radial-arm saw blade must be: (a) returned to its position behind the guide fence; (b) removed and placed in its proper place; (c) rotated below guide fence; or (d) left at a point nearest to the operator.

II

____________________ 1. The type of cutting done on the radial-arm saw is ____________.

____________________ 2. You should hold stock firmly against the radial-arm saw ____________________.

____________________ 3. You should stand to one side and keep your hands away from the direction of travel of the radial-arm saw ______________.

____________________ 4. It is best to remove scraps from the path of the radial-arm saw blade with a piece of wood while the saw is ____________.

Answers to Test Questions

I. 1. (c); 2. (c); 3. (d); 4. (a).
II. 1. crosscutting; 2. fence; 3. blade; 4. stopped.

Router

Safety Instructions

1. Obtain permission from your teacher before using the router.
2. Fasten stock firmly with vise or clamp.
3. Make adjustments only when electric cord is disconnected from power source.
4. Tighten all bits and cutters with proper wrenches.
5. Ask your teacher to approve setup and adjustments.
6. Be sure that the switch is in an off position and machine is on its side before plugging in electric cord.

7. Wear face shield or safety glasses (goggles, spectacles).

8. Hold the machine firmly.

9. Turn on power after permission is given.

10. Keep hands clear of revolving cutters.

11. Feed the cutter slowly into the material.

12. Turn off power and rest machine on its side when a desired cut has been finished.

13. Disconnect electric cord. Clean and return machine and its parts to designated place.

Safety Test Questions

I

( ) 1. You should select a location that is dry and not grounded for using a portable electric tool or appliance so as to avoid: (a) soiling the equipment; (b) serious electric shock; (c) motor bearing deterioration; or (d) discoloring the electric cord.

( ) 2. Prior to using the router, you should: (a) request other students to stay at least ten feet from the area of operation; (b) turn blades by hand; (c) have machine turned on before connecting electric cord; or (d) obtain permission from teacher.

( ) 3. Before changing bits or cutters or making adjustments on the router, you should make sure: (a) the electric cord is disconnected from the power source; (b) other students are at a safe distance; (c) to turn blades by hand; or (d) one hand is free.

( ) 4. When turning on the power to the router, you should: (a) attempt to make as deep a cut as possible; (b) hold the machine firmly with both hands; (c) readjust bits and cutters; or (d) reverse motor rotation.

( ) 5. When cutting with the router, you should: (a) feed the cutter as fast as possible; (b) hold electric cord with one hand; (c) keep hands clear of the revolving cutters; or (d) rest machine on its side.

II

________________ 1. You should select a location that is dry and not grounded for using a portable electric tool or appliance so as to avoid serious electric ________________.

________________ 2. You should make adjustments on the router only when the electric cord is ________________.

________________ 3. While using the router, you should hold it firmly with both ________________.

________________ 4. It is best to feed the cutter of the router into the material ____________________.

________________ 5. When cutting with the router, you should keep your hands clear of the revolving____________.

Answers to Test Questions

I. 1. (b); 2. (d); 3. (a); 4. (b); 5. (c).
II. 1. shock; 2. disconnected; 3. hands; 4. slowly; 5. cutters.

Sander

Safety Instructions

1. Obtain permission from your teacher before using sanding machine.
2. Hold work securely.
3. Make adjustments only when sander is at a dead stop. Portable sander electric cord should be disconnected.
4. Check belt or disc for breaks or tears.
5. Be sure that the switch is in off position and machine is on its side before plugging in electric cord on a portable sander.
6. Wear face shield or safety glasses (goggles, spectacles).
7. Turn on power after permission is given.
8. Keep fingers away from the abrasive surface on the sander.
9. Sand on downward motion side of disc sander.
10. Use special care in sanding small or irregular pieces. Check with your teacher.
11. Feed stock into the abrasive material at a moderate rate of speed and pressure.
12. Turn off power and rest portable sander on its side while changing position of board.
13. Turn off power after using sander and stand by until the machine has stopped.
14. Disconnect electric cord of portable sander and return cleaned machine to designated place.

Safety Test Questions

I

( ) 1. You should make all adjustments on the portable sander: (a) while the electric cord is disconnected; (b) only when other students are at a safe distance; (c) with one hand; or (d) while it is in gear.

( ) 2. Before you plug in the electric cord of the portable sander, you should be certain: (a) machine is free of sawdust; (b) machine is resting on its abrasive surface; (c) sanding belt or disc has been removed; or (d) switch is turned off and machine is on its side.

( ) 3. When operating a disc sander, you should hold your work against the disc: (a) rim; (b) center; (c) upward motion side; or (d) downward motion side.

( ) 4. While sander is in motion, you should: (a) blow away the sawdust; (b) remove abrasive surface; (c) use extreme feed pressure; or (d) keep your fingers away from abrasive surface.

( ) 5. You should feed stock into the abrasive material of the sander: (a) as fast as possible; (b) at a moderate rate of speed and pressure; (c) both upward and downward; or (d) both forward and backward.

II

__________ 1. You should make adjustments on the portable sander while the electric cord is __________.

__________ 2. When operating a disc sander, you should hold your work on the side where the motion is __________.

__________ 3. While sander is in motion, you should keep your fingers away from the abrasive __________.

__________ 4. You should feed stock into the sanding machine at a moderate rate of speed and __________.

__________ 5. Before plugging in the portable sander, you should make sure the switch is __________.

Answers to Test Questions

I. 1. (a); 2. (d); 3. (d); 4. (d); 5. (b).
II. 1. disconnected; 2. downward (down); 3. surface (face); 4. pressure; 5. off.

Scroll Saw

Safety Instructions

1. Obtain permission from your teacher before using the scroll saw.
2. Cut only stock with a flat surface on bottom.
3. Make adjustments only when machine is at a dead stop.
4. Make sure the saw blade is the proper size for the job.
5. Check blade for correct tension.

6. Adjust hold-down so it will be as close as possible to the work.

7. Turn machine by hand to make sure all parts are clear.

8. Make sure that no one but you is inside the operator's zone.

9. Select correct machine speed.

10. Wear face shield or safety glasses (goggles, spectacles).

11. Turn on power after permission is given.

12. Hold material firmly.

13. Feed the material into the machine at a moderate rate of speed.

14. Keep fingers away from saw and hands out of the path of saw.

15. Report mechanical defects or a broken blade to your teacher.

16. Turn off power after using scroll saw and stand by until the machine has stopped.

17. Clear away scraps of wood on the table only after saw stops running.

Safety Test Questions

I

( ) 1. You should install the scroll saw blade to cut: (a) on the down stroke of the saw; (b) at minimum speed; (c) on the up stroke of the saw; or (d) on both the up and down stroke of the saw.

( ) 2. Before you start the scroll saw, you should check the hold-down adjustment to make certain: (a) there is a half-inch clearance between it and the stock; (b) it is as close as possible to the work; (c) the correct size of blade is installed; or (d) it is against the table.

( ) 3. Prior to starting the scroll saw, you should turn machine by hand to be sure: (a) saw blade teeth point upward; (b) hold-down moves up and down; (c) the beginning cut is on the line marked on stock; or (d) all moving parts are clear.

( ) 4. Stock to be cut on the scroll saw should be: (a) soft; (b) hard; (c) flat on the bottom; or (d) round on the bottom.

( ) 5. You should feed stock into scroll saw: (a) in rhythm with motion of hold-down; (b) at a rate dependent upon pulley speed; (c) as fast as possible; or (d) at a moderate rate of speed.

II

__________________ 1. You should install scroll saw blade so it will cut on the __________________ stroke.

__________________ 2. After installing scroll saw blade, you should check blade for correct __________________.

________________ 3. To ensure that all moving parts are clear after making adjustments on the scroll saw, you should turn machine by ________________.

________________ 4. Stock to be cut on the scroll saw should have a flat surface on the ________________.

Answers to Test Questions

I. 1. (a); 2. (b); 3. (d); 4. (c); 5. (d).
II. 1. downward (down); 2. tension; 3. hand; 4. bottom.

Shaper (Woodworking)

Safety Instructions

1. Obtain permission from your teacher before using the shaper.
2. Make sure the stock is free from loose knots, cracks, or other defects.
3. See that knives are correctly seated before tightening the lock nut.
4. Use fence whenever possible.
5. Employ fixed collar whenever possible.
6. Ask your teacher to approve all setups.
7. Remove all loose articles from the bed of the shaper before starting operations.
8. Make sure that no one but you is inside the operator's zone.
9. Wear face shield or safety glasses (goggles, spectacles).
10. Turn on power after permission is given.
11. Keep hands well away from revolving cutters; use spring guard whenever possible.
12. Use push stick whenever possible.
13. Enter all work opposite to the direction of the rotation of the cutter.
14. Test setup on sample piece of safe size.
15. Turn off power after using shaper and stand by until the machine has stopped.
16. Clean shavings from the table.

Safety Test Questions

I

( ) 1. In selecting stock for use on the shaper, you should make sure the stock is: (a) at least 2 in. by 4 in. by 18 in.; (b) correctly seated under lock nut; (c) grained; or (d) free from loose knots, cracks, or other defects.

( ) 2. You should make sure that the shaper knives are: (a) correctly seated before tightening lock nut; (b) all of the tang type; (c) tightened with a fixed collar; or (d) flush with the table top.

( ) 3. Prior to starting shaper, you should: (a) request the assistance of another student, especially on long stock; (b) check the hold-down attachment for rigidity; (c) remove all loose articles from the shaper bed; or (d) loosen the lock nut.

( ) 4. In operating the shaper, it is best to: (a) enter all work in the direction the knives are rotating; (b) use fence or fixed collar whenever possible; (c) back up work, especially in corners of small radii; or (d) enter all work above fixed collar level.

II

________________ 1. Before a shaper is started, all setups must be examined by the ________________.

________________ 2. Make adjustments on the shaper only when the machine is at a dead ________________.

________________ 3. In shaper operation, whenever possible, you should use a push ________________.

________________ 4. Prior to starting shaper, you should remove all loose articles from the shaper ________________.

Answers to Test Questions

I. 1. (d); 2. (a); 3. (c); 4. (b).
II. 1. teacher; 2. stop; 3. stick; 4. bed.

VT 016 672

INSTRUCTOR'S GUIDE FOR PRE-EMPLOYMENT SCHOOL BUS DRIVER EDUCATION COURSE.

OHIO STATE DEPT. OF EDUCATION, COLUMBUS. DIV. OF VOCATIONAL EDUCATION.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 01JUL70 6P.

DESCRIPTORS - *TEACHING GUIDES; *STUDENT TRANSPORTATION; *JOB TRAINING; *TRAFFIC SAFETY; ACCIDENT PREVENTION; SCHOOL SERVICES; SHORT COURSES; *DRIVER EDUCATION; BUS TRANSPORTATION
IDENTIFIERS - *SCHOOL BUS DRIVERS

ABSTRACT - THIS TEACHING GUIDE IS DESIGNED SPECIFICALLY TO BE USED IN THE IMPLEMENTATION OF A 13-HOUR PRE-EMPLOYMENT DRIVER EDUCATION COURSE FOR SCHOOL BUS DRIVERS. THE TOPICS TO BE COVERED ARE DIVIDED INTO 6 INSTRUCTIONAL UNITS WITH TIME LIMITS SUGGESTED FOR EACH. THE AREAS FOR DISCUSSION INCLUDE: (1) THE SCHOOL BUS DRIVER, (2) PUPIL TRANSPORATION LAWS AND REGULATIONS IN OHIO, (3) MOTOR VEHICLE TRAFFIC LAWS, (4) SCHOOL BUS ORIENTATION, (5) DRIVING FUNDAMENTALS, AND (6) ON-THE BUS INSTRUCTION. POINTS TO EMPHASIZE IN THE FINAL SESSION ARE LISTED AND THE CLOSING CLERICAL PROCEDURES OUTLINED. (SN)

VT 016 672

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OHIO STATE DEPARTMENT OF EDUCATION

DIVISION OF VOCATIONAL EDUCATION

INSTRUCTOR'S GUIDE FOR
PRE-EMPLOYMENT SCHOOL BUS DRIVER EDUCATION COURSE

7/1/70

3633

UNIT I THE SCHOOL BUS DRIVER (30 minutes)

A. Materials Needed

1. Medical examination form

2. Sample bus driver's certificate

B. Points to Emphasize

1. If bus driver has any disabilities listed on the disqualification sheet he cannot drive a bus, even if his medical examination form is signed by a medical doctor.

2. Each driver needs a driver's certificate that shall be displayed in the bus. These certificates are issued annually. It should be pointed out to the drivers that the procedure to obtain their driver's certificate varies over the state. Usually local district bus drivers apply through their local school superinendent's office. Drivers from city and exempted village districts shall apply to their respective superintendents.

3. Personal appearance of drivers is very important

4. Medical examination report

   a. Arrangement made through sponsoring school to provide forms

   b. Medical report completed during the behind-the-wheel driving

   c. Examining physician(s) shall be assigned by local district

5. State highway patrol

   a. Instructor, if possible, arrange appointment for all participants

   b. Arrangement made to use a school bus

   c. Participant must have completed medical examination report

   d. Participant take written test

    e. Participant takes driving skill test
    f. Award certificate to participants successfully completing course

UNIT II PUPIL TRANSPORTATION LAWS AND REGULATIONS IN OHIO (60 minutes)

A. Materials needed
    1. Copy of Pupil Transportation Laws and Regulations in Ohio
    2. Sample copy of time schedule (use local school copy)
    3. Sample copy of trip ticket (use local school copy)

B. Points to Emphasize
    1. Drivers do not establish routes and time schedules
    2. Duties of the bus driver.
    3. Bus operating procedures

UNIT III MOTOR VEHICLE TRAFFIC LAWS (90 minutes)

A. Materials Needed
    1. Copy of Digest of Motor Vehicle Traffic Laws

B. Points to Emphasize
    1. Necessity of knowing the law
        a. State vehicle traffic laws
        b. Local ordinances
    2. Definition of a school bus
    3. Traffic control devices
    4. Speed regulations
    5. Yielding right-of-way
    6. Overtaking and passing
    7. Starting and backing
    8. Railroad crossings

9. School bus regulations

10. Responsibility for establishing regulations

11. School bus inspection

12. Lights on the bus

13. Warning devices and their proper use for disabled vehicles

UNIT IV SCHOOL BUS ORIENTATION (45 minutes)

A. Materials Needed

1. One school bus
2. A pointer (for daylight meetings)
3. A flashlight (for night sessions)

B. Points to Emphasize

1. Explain need for the drivers to have a general understanding of the component parts of the bus which he operates
2. Use the school bus. Point out features and equipment of the exterior and interior of the bus
3. Stress the importance of the driver to be thoroughly familiar with all switches, gauges and equipment located inside the vehicle.
4. Because of limited space to see and ovserve various items, be certain that everyone has an opportunity to see and hear the instructor as well as the item being pointed out.
5. Give ample time and opportunities for questions which may arise as the instructor leads the group throughout the bus.

UNIT V DRIVING FUNDAMENTALS (90 minutes)

A. Materials Needed

1. One school bus available

B. Points to Emphasize

1. Never use gear that places undue load on engine

2. Never skip a gear in shifting up or down

3. Shift up or down as may be necessary to prevent lugging or excessive engine R.M.P.

4. When stopped, keep front wheels straight and brake pedal depressed until starting into left turn

5. Put gear shift lever into neutral when loading and unloading children

6. Demand silence upon approaching a railroad crossing and that silence be maintained until the bus has cleared the tracks

C. The instructor will need to conduct practical bus driving covering the skills in this unit

UNIT VI ON-THE-BUS INSTRUCTION

A. Materials Needed - One school bus fully equipped

B. Divide the class into groups of three. Each group will spend five, one and one half hour (1½) sessions in the bus for a total of seven and one (7½) hours. Each group member will drive for one half hour (½) and observe for one (1) hour.

C. Points to Emphasize

1. Seat and mirror adjustment
2. Instrument panel and controls
3. Proper engine starting and warm up
4. Coordination in shifting gears upward and downward
5. Proper starting and stopping procedure for vehicle
6. Proper steering position of hands
7. Proper student pick-up and discharge procedure
8. Proper procedure in crossing railroad tracks
9. Porper turn around procedure

10. Proper use of mirrors at all times
11. Proper left and right hand turns
12. Driving procedures as related to road conditions
13. Proper parking procedures

CLOSING

A. Instructor completes attendance record in triplicate

    1. Send one copy to driver education consultant
    2. Send one copy to the sponsoring school
    3. Instructor keeps one copy

B. Send 3" x 5" information cards to driver education consultant

C. Send evaluation forms to driver education consultant

D. Complete payment request sheet and send to the sponsoring school

VT 016 676
BOOS, STUART L.;BERGSTROM, ROBIN M.
MARKETING CLUSTER PROGRAM.

LEBANON UNION HIGH SCHOOL, OREG.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - ND 56P.

DESCRIPTORS - SECONDARY GRADES; BEHAVIORAL OBJECTIVES; *SHORT COURSES; *DISTRIBUTIVE EDUCATION; *MARKETING; COURSE DESCRIPTIONS; PROJECT APPLICATIONS; VOCATIONAL DEVELOPMENT; *VOCATIONAL EDUCATION; *OCCUPATIONAL CLUSTERS
IDENTIFIERS - BEGINNING COMPETENCE: DECISIONS; CAREER AWARENESS; EDUCATIONAL AWARENESS

ABSTRACT - THIS INSTRUCTIONAL OUTLINE FOR A 2-WEEK MARKETING CLUSTER PROGRAM AT THE HIGH SCHOOL LEVEL CONTAINS GENERAL AND SPECIFIC PROGRAM GOALS AND OBJECTIVES, DESCRIPTIONS OF SHORT COURSES IN DISTRIBUTIVE EDUCATION, VARIOUS PROGRAM FORMS, AND BRIEF OUTLINES OF INSTRUCTIONAL UNITS. DESCRIPTIONS OF PROJECTS INVOLVING PROCEDURES FOR RUNNING A SCHOOL STORE ARE INCLUDED. DEVELOPED BY TWO HIGH SCHOOL TEACHERS, THIS PROGRAM WILL PREPARE THE STUDENT FOR FURTHER POST SECONDARY TRAINING, ENTRY LEVEL EMPLOYMENT, AND DECISION MAKING RESPONSIBILITIES IN HIS AREA OF SPECIALIZATION WITHIN MARKETING AND DISTRIBUTION. (AG)

THE MARKETING CLUSTER PROGRAM

THE REGON WAY

MARKETING CLUSTER PROGRAM
AT
LEBANON UNION HIGH SCHOOL

By

Stuart L. Boos
Robin M. Bergstrom
Lebanon Union High School
Lebanon, Oregon 97355

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MARKETING CLUSTER PROGRAM OBJECTIVES

1. The student will be prepared to attend post secondary schools, vocational schools or ente apprenticeships.

   The student will be able to pursue an advanced study in marketing by attending post secondary schools, vocational training schools, normally in apprentice programs or involvement in company sponsored training programs.

2. The student will qualify for entry level employment in a distributive occupation.

3. The student will be able to assume decision making responsibilities related to his specialized areas.

4. The career-oriented student who has completed the 2-week program will be qualified with the technical knowledge and the practical experience to achieve a subprofessional level of competency in their area of specialization within marketing and distribution careers.

SPECIFIC OBJECTIVES

1. The student will be able to complete a job application and interview.

2. The student will operate a cash register observing proper cashiering techniques, change tapes and dates, read out machine, and achieve 95 percent accuracy.

3. The student will be able to understand and apply the fundamentals of display (form, color, balance, etc.) by designing and building three types of displays: glass display cases, standing window display and bulletin board two or three dimensional displays.

4. The student will be able to demonstrate and use the knowledge of human relations by successfully working with his co-workers and supervisors at an exploratory work station, in the student sotre, and at a cooperative work station.

5. Students will be able to utilize math fundamentals including basic functions, fractions, percentage, decimal fractions, and measurement in working with invoices, sales slips, tally sheets, order forms, inventory forms and other recordkeeping forms utilized in business.

6. The student will be able to develop a sales plan and present a sales demonstration on a variety of specific products or services using varied sales approaches and sales techniques.

7. The student will demonstrate a knowledge of advertising concepts by selecting items and organizing an advertising program. They will create this advertisement by using the elements of a good advertising layout.

8. The student will select a product, conduct a survey, relate product information to buying motives, justify product prices, provide product information sources, explain product uses and interpret product label information.

9. The student will apply his knowledge of market research by designing and conductin a survey in a specific market area of his choice. This will include merchandising, markets, store locations, sales promotion, and cost analysis.

10. The student will be an active member of the local DECA chapter and will select a minimum of one (1) skill contest and prepare to complete on a local basis.

THE MARKETING CLUSTER PROGRAM

GENERAL OBJECTIVES

The student will be prepared for entry level employment in a basic distributive occupation.

2. The student will be able to qualify for enrollment in a more advanced study of marketing, such as a career development (Marketing III and IV) program.

3. The student will be prepared to pursue post high school training in a chosen career field either at a university, community college, or within the framework of an on-the-job training program.

CLUSTER PROGRAM ORGANIZATION

IN THE CLASSROOM

simulated selling
developing sales promotions
building displays
operating cash register and adding machine
working on invoices, billing, and inventory problems
human relations and market research
learning skills and job procurement techniques

ON THE JOB

selling
building displays
working with advertising materials
operating cash register and adding machines
using invoices, billing, and inventory
working with and for people
applying and interviewing for a job

MEMBERSHIP IN THE DECA YOUTH GROUP

selling contests
display and advertising contests
merchandise math contest
public speaking contest
market and product research
working with and leading people
job interview contest

TYPICAL MARKETING (DISTRIBUTIVE EDUCATION)

CLUSTER OCCUPATIONS (O.E. 04.0800)

Occupations

- advertising layout man
- art director
- artist
- assistant buyer
- building and construction salesman
- cashier
- copywriter
- copywriter chief
- credit clerk
- detective business service
- department manager
- designer
- display manager
- doorman
- entertainment managers
- fashion designer
- fashion model
- financial institution managers
- food products salesman
- franchises
- hotel/motel management
- industrial salesman
- insurance salesman
- in-store sales person
- mailing clerks
- marketing director
- marketing research analyst
- merchandise manager
- personnel manager
- product specialist
- proofreader
- public relations man
- purchasing agent
- radio/TV advertising manager
- real estate salesman
- receiving clerks
- retail salesman
- route delivery man
- sales correspondent
- sales manager
- sales promotion
- salesman delivery
- sign writers
- stock clerk
- store manager
- traffic clerk or dispatcher
- truck drivers
- warehouseman
- watchman
- wholesale salesman and agent
- window trimmer
- wrappers

BUSINESS EDUCATION

OCCUPATIONAL SPECIALTY COURSES FOR

MERCHANDISING CLUSTER PROGRAM

		9	10	11	12
Typing Ia & Ib	1/2 cr. ea. Sem.	X	X	X	X
Business Cruise	1/2 cr.	X	X	X	X
Record Keeping	1/2 cr.	X	X	X	X
Briefhand	1/2 cr.		X	X	X
Business Machines	1/2 cr.		X	X	X
Typing IIa & IIb	1/2 cr. ea. Sem.		X	X	X
Bookkeeping Ia & Ib	1/2 cr. ea. Sem.		X	X	X
Data Processing	1/2 cr.		X	X	X
Personal Law	1/2 cr.			X	X
Shorthand Gregg Ia & Ib	1/2 cr. ea. Sem.			X	X
Office & Lab Assistant	1/2 cr. ea. Sem.			X	X
Machine Shorthand Ia & Ib	1/2 cr. ea. Sem.			X	X
Marketing Ia & Ib	1 cr. ea. Sem.			X	X
MARKETING IIA & IIB	1 cr. ea. Sem. (including Co-op Work Experience)				X

CO-OP WORK EXPERIENCE AND EXPLORATORY WORK EXPERIENCE

BUSINESS EDUCATION
Lebanon Union High School

SUGGESTED MARKETING COURSES

9	10	11	12
Business Cruise	Record Keeping	**Marketing Ia	Marketing IIa
Typing Ia	*Typing Ia	**Marketing Ib	Marketing IIb
Typing Ib	*Typing Ib	Bookkeeping Ia	Cooperative Work Ex
	Business Machines	Bookkeeping Ib	

ELECTIVES

Typing IIa
Typing IIb
Data Processing
Personal Law

*If not taken in the ninth grade
**A two hour class

SHORT COURSE DESCRIPTIONS

Typing Ia--Theory and practice. The beginning course to learn the keyboard and proper techniques. Designed for personal typing and as a foundation for further commercial training.

Typing Ib--*Typing Ia. The course is a continuation of first semester typing with emphasis on building speed and accuracy, and on typing letters, themes, research papers, and tabulation problems.

Record Keeping--Keeping both business and personal records for small business and for your home.

Data Processing--Principles of automated data processing are taught. Goes from analysis of a problem to preparation of input data to solving a problem by machine.

Business Cruise--Four and one-half weeks of exploratory work in each of the following areas: Marketing--accounting--secretarial--clerical.

Personal Law--A course covering legal concepts that businessman and consumers deal with concerning contracts, employment, bailments, and sales.

Bookkeeping Ia & Ib--Two semester courses running in succession. The recording of business transactions and their effect upon the assets, liabilities, and proprietorship of business. Journals, ledgers, payroll, depreciation, and projects tend to make the contents realistic.

Marketing Ia--Introduces the student to distributive education. Instruction investigates the fields of retailing, wholesaling, and service occupations. Emphasis is placed on salesmanship, sales promotion, math skills, record keeping, and job seeking techniques. A two hour class.

Marketing Ib--Provides the student with two types of work experience. Nine weeks are spent working and learning skills in a simulated store operation (Student Store) and nine weeks are spent out in the community at an exploratory work station. A two-hour class. *Requires completion of Marketing I.

Business Machines--An exploratory course to acquaint students with business machines. No typing is required.

Typing IIa & IIb--*Typing Ib. Primarily designed for students who are planning to seek employment in typing. Includes skill building, business forms, business letters, and duplicating for seniors. Students should have earned a "C" or better in typing Ib.

Cooperative Work Experience--One hour of credit may be allowed if a student qualifies. The job must train the skills learned in a vocational class which the student is currently enrolled.

DECA--(DECA) or Distributive Education Clubs of America is an organization for students enrolled in Marketing courses. Its goals are to teach students interested in a career in marketing and distribution: Vocational Understanding, civic consciousness, social intelligence, and leadership development.

Marketing IIa--A one hour course designed to enhance skills in selling, sales promotion, and market and product research. Students must produce a manual suitable to compete on a local basis in DECA. **

Marketing IIb--Preparation for competition in State Leadership Conference for DECA. Students must prepare for a minimum of one (1) state individual skill contest. Business Organization, management, and operation are stressed.**

** Students must have a cooperative work station to take either of these courses.

CODE OF ETHICS

FOR STUDENTS ENROLLED IN

DISTRIBUTIVE EDUCATION

1. Distributive education is a part of the school curriculum; therefore, I will not accept a training job unless I intend to keep it.

2. I will report for work at the scheduled time. If I find that I am unavoidably detained, ill, or unable to report for work, I will always inform my coordinator and employer promptly.

3. I will be honest with money, merchandise, time, and effort.

4. I will perform an honest day's work and will strive at all times to do the best job possible.

5. I will not receive visitors on the job, neither will I make or receive unnecessary personal telephone calls.

6. When I am on the job, my work will always come first.

7. If I feel that my studies, physical health, or moral well-being are jeopardized because of my job, I will consult with parents, my coordinator, and my employer before making a decision to resign. If I quit my job or change jobs without conculting my coordinator, I know that I will automatically be dropped from distributive education. This will result in the loss of distributive education credits.

8. I realize that to be dishonest or to fail on my job reflects not only on me, but on my school and my coordinator. I therefore agree to uphold this Code of Ethics in order to maintain the reputation of myself and my school.

Signature of Student__________________
Signature of Parent___________________
Signature of coordinator______________
Signature of employer_________________

MERCHANDISING CLASSES

GRADING SYSTEM
NINE WEEKS

Minimum Points required for each grade

A	50
B	43
C	35
D	26
F	25 or Less

Methods of earning points	Maximum/Nine Weeks				
Test	1	@	10 points	=	10 points (required)
Quiz	3	@	5	=	15
Performance tests	20	@	1	=	20
DECA Participation				=	20
IAA Evaluation				=	10 (+ or -)
					75

IAA Evaluation*

Industry	Student Store and Work Station
Attendance	Classroom
Attitude	DECA Activities

DECA Participation

Joining DECA by October 15	2
Attending Regular Meetings	1
Fall Board of Governors	5
State Leadership Conference	10
National Leadership Conference	10
Fund Raising Activities	
Calendar Sales (per calendar)	1/2
Concession Stand at games	1
Selling in Stands (football)	2
Miscellaneous activities	1

When working in the store

9 skill projects 5 points each = 45 points plus DECA and IAA points and 9 weeks test

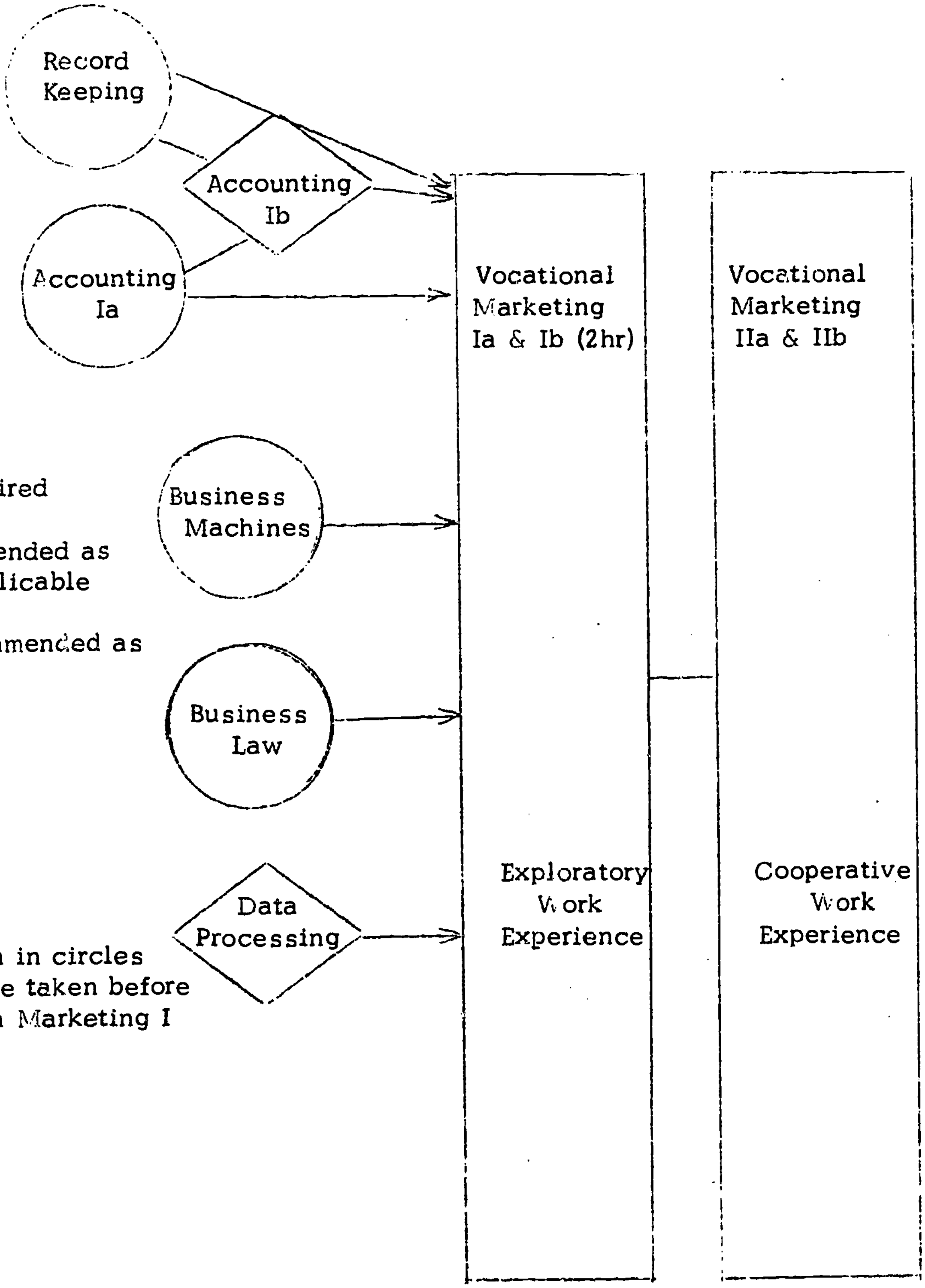
When on job downtown

3/4 point per day of satisfactory work (maximum of 34 points) plus DECA and IAA points and 9 weeks test

10 points for special project = creation of employer manual

*IAA evaluation by DE instructor may be addition of or subtraction of up to 10 points

MARKETING CLUSTER



NOTES

Rectangles are required

Circles are recommended as
being highly applicable

Diamonds are recommended as
being helpful

Other Electives
- Business Cruise
- Typing Ia
- Typing Ib
- Typing IIa
- Typing IIb

The courses showsn in circles and diamonds can be taken before or concurrently with Marketing I or Marketing II

CLASS OPERATION

MARKETING Ia (2 hours) Introduction to marketing

Job Seeking Techniques	2 weeks	Advertising	2 weeks
Merchandise Math	2	Display	2
Record Keeping	2	Salesmanship	2
Cash Register Operation	1	DECA	2
DECA	1	Human relations	1
Market Research	1		

MARKETING IIb (2 hours) Marketing Lab

Student store operation 9 weeks
Skill areas include:
- Cash register operation and maintenance
- Popcorn machine operation and maintenance
- Deposit and recording sales
- Advertising in school paper and on public address system in school
- Display design and building
- Stocking and inventory
- Ordering merchandise

Exploratory Work Station 9 weeks

Students report to a cooperating local businessman and work without pay for about 1 1/2 hours daily. Students are supervised by school personnel and are evaluated by both employer and supervisor from the school.

Skill areas include:
- Application of those skills learned in class and student store
- Working with and for others
- Following directions
- Assuming responsibility for being on time and doing what is asked
- Observing and reporting on weekly student report forms

One half of the class will usually work at work stations or in the student store while the rest remain in the classroom. Students are rotated from student store, exploratory work station, and classroom to ensure total program coverage.

CLASS OPERATION

MARKETING III Sales, promotion, and research

DECA	1 weeks	Studies in Marketing	3 weeks
Salesmanship	3	Merchandise Research	3
Advanced Advertising	3	Distribution Research	3
Advanced Display	2		

MARKETING IV

Business communications	1 weeks	Management	3 weeks
State Leadership Conference preparation	3	Establishing a business	3
Business Organization	2	Career Study and Folder	2
Wholesaling and buying	3	Job Seeking Techniques	1

MERCHANDISING I

Second Semester

The second semester the second section of the class will complete the classroom curriculum plan as previously outlined. The first section will replace the second section on exploratory work experience and student store operation.

EXPLORATORY WORK EXPERIENCE

Five or more students will be placed in appropriate businesses in the community to work without pay, but as part of their class work. They will report to the business work station at their regular classtime for two hours of experience and skill application. Transportation will be provided by the district and the regular school insurance will cover them on the job as this is considered part of the curriculum. After nine weeks these students will be rotated with the students in the student store. Evaluation and grade will be determined by student, teacher and employer rating sheets and interviews.

STUDENT STORE OPERATION

The student store will be operated solely by distributive education students. The cash register in the school cafeteria will also be operated by the same students. They will conduct all business and sales in the student store with the supervision of senior distributive education students. These students will have overall supervision and student assistance functions.

The students will complete work sheets in the following areas of store operation as well as perform the carefully outlined duties of each skill job.

Selling and Cashiering
Deposit and records
Advertising
Display
Inventory
Buyer
Stocking, Marking and pricing
Store maintenance
Equipment maintenance

STUDENT STORE OPERATION

SKILL PROJECTS

SCHOOL STORE

Area: Operations

Descriptive Title: Selling and Cashiering--communicating facts, influencing buying decisions, providing required services, and registering cash received

Objectives and Purpose:

1. to learn to make change correctly and quickly
2. to be able to operate a cash register
3. to apply knowledge of steps of a sale
4. to build goodwill and a clientele

Project:

1. wait on customers and help them with their selection
2. never sell a last item on the shelf without checking stockroom for replacement. If rushed at the time, keep a notebook for reminding you
3. keep a record of customer requests. This is to include items never stocked before as well as out-of-stock items
4. handle customer objections and encourage buying decisions
5. total cash in register and register tape. Compare. (daily)

Evaluation:

1. speed and accuracy in making change
2. recording customer requests
3. were you proud of the store at all times
4. does cash in register equal total receipts recorded on register tape (daily)

SCHOOL STORE

Area: Operations

Descriptive Title: School Store Equipment Maintenance

Objectives or Purpose:

1. to keep the machines in operation at all times
2. to cut down our cost of machine repairs by preventive maintenance
3. to learn to recognize mechanical problems with food preparation equipment

Project:

1. popcorn machine:
    - a. change filter every 9 weeks
    - b. change gear box grease once a year (September)
    - c. clean popcorn pot with recommended cleaner supplied by machine manufacturer once every three weeks as per instructions
    - d. wash glass inside and outside weekly
    - e. clean the retainer pan for unpopped popcorn daily
    - f. fill popcorn and salt containers weekly rotating stock every time
    - g. fill seasoning oil container every three days or when necessary

SCHOOL STORE

Area: Operation

Descriptive title. Posting, proof of cash, and recording sales

Objectives or purpose:

1. to demonstrate the ability to make up daily and special deposits
2. to determine cash overages and shortages in student store operation
3. to maintain accurate store records of all sales

Project:

1. to make up cash register change fund
2. to make up and deliver to school secretary coop. deposit
3. to make up student store deposit and deliver to vault
4. to prove cash noting overage or shortage, if any
5. to demonstrate accuracy, dependability and responsibility in money handling

Evaluation:

1. accuracy of records
2. accuracy of deposits
3. observation of correct security measures

SCHOOL STORE

Area: Merchandise

Descriptive Title: Advertising--"telling and selling." Presenting and promoting ideas, goods, or services to a large number of prospects.

Objectives or Purposes:

1. to increase sales on the item(s) advertised.
2. to develop customer acceptance on new items.

Project:

1. advertise on or more items stocked by the store or new item(s).
2. Your method may involve posters, signs, reader board in school store, announcement over P.A. system, school newspaper, or any combination of the above. ***
3. Consult past inventory records for normal sales of old items. (For new items, merely record change in sales during second and third weeks.

Evaluation:

1. Implement advertising campaign second week and third week.
2. Record sales end of third week.
3. Note change in sales between first consultation of inventory records and third week record.

***Advertisement must be approved by store manager assistant and advisor.

SCHOOL STORE

Area: Merchandise

Descriptive Title: Displaymen-Display is the placement of merchandise at or near the point of sale to attract customers to buy

Objectives or Purpose:

1. to understand and be able to apply the elements of a good display
2. to learn the steps to be followed in planning and creating a display
3. to learn effective methods of making items attractive to customers
4. to increase sales of items displayed

Projects:

1. to build and maintain display on the item you picked to advertise
2. display to be complete by end of second week
3. assume responsibility for the overall decor of the store

Evaluation:

1. evaluation on the appearance of display and store decor as judged by store manager, other manager assistants, and advisors
2. evaluation on the basis of increased sales of items which can be attributed to the display efforts

SCHOOL STORE

Area: Operations

Descriptive Title: Stocking, Marking, and Pricing

Objectives or Purpose:

1. to learn the value of keeping shelves stocked
2. to have opportunities to assume certain responsibilities
3. to learn the value of an efficiently run stock room

Project:

1. assume complete charge of stock control for the school store for a period of three weeks. Make a daily note of stock taken from stockroom and shelved
2. work with the buyer and give him information necessary to place orders. It will be your responsibility to see that the store never runs out of essential merchandise
3. check on all orders being placed to know what to watch for
4. unpack all incoming merchandise and check against packing slip
5. enter merchandise received in control record sheet. Be sure to get all information. If there is new merchandise, a new card must be filled out.
6. Route packing slip to bookkeeper who will match it to invoice. (In some cases, the placing slip is the invoice.)
7. see that all merchandise is correctly marked. If it is new merchandise and not pre-marked, set it aside until you can confer with the Manager Assistant or Advisor as to the price to charge
8. before back stocking merchandise be sure front stock is up
9. stock merchandise so that it can be easily seen and counted. Have like things together
10. whenever possible, remove by units of packaging when stocking the front of the store. This makes for easier inventories
11. remove all empty cartons, etc. It's your responsibility to keep the store free from clutter

Evaluation

1. did you record daily merchandise taken from stockroom
2. stockroom condition will be evaluated
3. condition of shelves--was there always enough merchandise available on the shelves when there was a large supply in the stockroom

SCHOOL STORE

Area: Merchandise

Descriptive Title: Inventory--A physical count of the merchandise on hand to compare the actual inventory with the "count" on the books. Each item in stock is counted and recorded on a form along with its cost and retail value

Objectives or Purpose:

1. to become acquainted and skilled with an acceptable inventory system
2. to assume responsibility of keeping inventory records for the school store
3. to be able to accummulate and translate information to others on the school store staff

Project:

1. Assume complete responsibility for the weekly inventory for the school store for the period of three weeks keeping accurate and up-to-date records of all inventories. (Use the form attached.)

Evaluation:

1. Are inventory records always kept up-to-date? Are they neat?
2. When inventories began to get low, did student inform buyer of shortages?

SCHOOL STORE

Area: Merchandise

Descriptive Title: Buyer for school store-planning, obtaining, and controlling manufactured goods or raw materials for resale or processing.

Objectives or Purpose:

1. to learn the value of keeping accurate records on merchandise movement
2. to become aware of supply and demand and ensure that store is adequately stocked for all occasions
3. to have opportunities to assume certain responsibilities

Project:

1. become acquainted with inventory records and stock records as already set up and note normal sales activity.
2. take into consideration supply and demand and those elements causing fluctuations, then order merchandise for each week or per special need with permission
3. coordinate with advertising and display when purchasing new and old items being promoted.
4. check with cashier to find out customer "wants" requests
5. follow procedures on returns and exchanges, if any
6. keep up-to-date on buying trends

Evaluation:

1. each week do an analysis of inventory and sales records to determine if product turnover was enough to ensure product freshness and quality
2. note instances of over supply or over stock and out-of-stock items which may cause loss of sales

SCHOOL STORE

Area: Operations

Descriptive Title: Maintenance of School S[illegible] and Surrounding Area

Objectives or Purpose:

1. to learn the importance of the appearance of the store inside and outside
2. to keep the store and nearby hallways neat and clean

Project:

1. work with stockman to remove packaging from store area
2. clean store shelves and counters
3. sweep store and stock room area
4. sweep hallways twice daily or when necessary

Evaluation

1. store and hallways cleanliness and neatness

CLASSROOM
INSTRUCTIONAL UNITS

JOB SEEKING TECHNIQUES

Objectives

The student can:
- Prepare a data sheet that could be used
- Write and type a letter of application
- Complete several application blanks
- Prepare a data folder (Marketing II students)
- Participate in simulated job interview

Job Source Information

- School youth employment agencies
- State and city employment agencies
- Newspaper want ads
- Friends and relatives
- Civil service
- Personnel departments

The Data Sheet

- Personal information including picture
- Education and training information
- Experience and interest information
- References
- Outstanding accomplishments of related interests
- Special abilities

Letter of Application

- Self-identification
- Statement of interest or purpose
- Special qualifications and experience or education
- Availability information
- References (if no data sheet is used)

Job Application blanks

- Personal and family information
- Education and experience
- Ability--skills, machines, and equipment
- Interest areas, special qualifications
- References

The Actual Interview

- What to take with you
- What to wear
- How to act
- What to say and how to say it
- Poised entrance and gracious text
- Interview follow-up--how, when, why

Employment tests

- Ability tests
- Psychological tests
- Aptitude tests
- Physical examination

MERCHANDISING MATH

Objectives

The student will

1. solve merchandising math problems rapidly and accurately
2. use fundamental math processes and work with fractions, percentages, decimals, and weights and measures

Sales records

- credit procedures
- tally sheet
- sales slips
- charge sales
- computing sales tax
- figuring postal charges

Cash register

- receipt tapes
- detail audit tape
- change funds
- solving change problems
- calculating average sales
- cash over and short
- loss sales and layaway
- prove cash

Inventory topics

- codes
- inventory sheets
- price and inventory logs
- physical inventory
- record inventory
- inventory extension

Merchandise receiving

- invoices
- cash and trade discounts (percentages)
- shipping charges
- invoice dating
- back orders
- storing goods

Pricing merchandise

- mark up and mark down
- determining retail prices
- margins
- marking goods

Payroll

- salaries, wages, bonuses and commissions and overtime
- deductions
- total earnings and net pay

RECORDKEEPING

Objectives

The student will complete a project with the records for a retail business

Project
- door-to-door salesman
- customer sales slip
- company order forms
- alphabetical list of customers
- alphabetical list of customers by state

Project
- retail delivery salesman
- merchandising situations
- delivers daily and weekly statements
- platform return sheets

Project--insurance salesman service
- billing
- account summaries, receivable cards, lists of accounts receivable
- statements of balance due
- petty cash book

Project--retail store inventory control
- code sheets
- price sheets
- physical inventory sheets
- account cards
- collection sheets

Project--department store payroll records
- time sheets
- payroll registers
- payroll cash sheets
- banking payroll slips
- earnings records

Project--retail self market cash control
- daily receiving logs and cashier reports
- weekly cashiers shortage and overage reports
- deposit tickets and daily cash summaries
- selling price computation sheet
- purchase register
- checks
- cash receipts and cash payments

CASH REGISTER

Objectives

The student will

1. operate cash register and make change using prescribed procedure
2. handle customer checks
3. demonstrate knowledge of security measures
4. demonstrate effective cashier--customer human relations

Cash register nomenclature
- adjustment controls
- operational controls
- read-out and clearing control
- release and emergency control

Cashiering transactions
- use of change fund
- making change
- giving courteous service
- calling prices
- money in handline
- safeguards in handling money

Check cashing procedures
- company policy
- identification techniques
- endorsement procedure

Charge transactions
- procedure and policy
- identification techniques
- credit authorizations
- lay away

Other transactions
- coupons
- trading stamps
- paid-outs
- refunds

DECA

Objectives

The student will

1. demonstrate knowledge of the high school and post secondary youth organization for DE students
2. demonstrate an understanding of the leadership processes

Purpose of DE program
- marketing and distribution occupations
- new business methods
- advanced technology
- increased computation
- management

DE program of work
- on the job
- in the classroom
- in the youth organization

Purposes of DECA
- develop future leaders
- provide student recognition
- build status and careers in marketing

DECA's part in DE
- group activities and competition
- show window for student achievement
- student reward
- channel for business support
- service to the community

DECA support
- donor organizations
- special contributors
- cooperating organizations
- state and local support

How does DE help you
- provide part-time jobs for students
- establish career programs
- develop job attitudes
- create a desirable relationship with school, community and parents

DECA Organization
- national, regional, state, local
- your place in DECA

MARKET RESEARCH

Objectives

The student will:

1. demonstrate his ability to use correct information gathering and decision making techniques
2. use various interview and questionnaire techniques
3. locate, select and use appropriate data sources
4. conduct a preliminary research, select a problem, develop a hypotheses and prepare a schedule by a research plan

Decision making processes
- alternatives
- scientific decision
- steps in market research
- role of research in market decisions
- formulation of testing hypotheses

Information needed for decisions
- market mix
- role of research
- controlable factors
- uncontrolable factors
- uses of information
- sources of information

Methods of gathering data
- secondary data
- external data
- primary data
- internal data

Sampling
- sample random
- stratified random
- systematic random
- quota sampling
- judgment sampling

Interviewing
- training
- approach
- role playing
- preliminary research
- defining the purpose
- situation analysis
- informal investigation
- formulation of problem
- informal investigation

Preparation and presentation of report
- adding data
- coding data
- tabulating data
- analyzing and interpreting data

ADVERTISING

Objectives

The student will

1. be able to list and explain purposes and forms of advertising
2. demonstrate the skills of ad layout by constructing newspaper ads, radio ads, or total promotional outlines

What is advertising
- purposes
- importance
- goals
- regulations
- job opportunities

Advertising media
- printed media
- broadcast media
- position media
- specialty advertising

Writing copy
- planning
- writing headlines
- writing copy
- copy style

Layout
- design principles
- elements of layout
- steps in preparing and advertising layout
- advertising illustrations

Direct mail advertising
- purposes of direct mail
- principle advantages
- building mailing lists
- other direct mail media
- postal rates and regulations

Planning advertising campaigns
- promotional campaigns
- advertising campaigns
- goals of the campaign
- cost of the campaign

Selling advertising
- media salesman's role
- qualities of a good media salesman
- approach, selling and close

Measuring advertising effectiveness
- advertising research
- advertising impact
- measuring media audiences

DISPLAY

Objectives

1. The student will plan and create display using proper principles of design, color, and form.
2. Given a display rating sheet the student will visit, observe, and evaluate displays in the community indicating their knowledge of good display techniques.
3. The student will plan, prepare, and when possible, conduct, conduct a sales promotion program for a consumer product

- Career opportunities display and promotion
    - entry and career level jobs
    - qualifications
    - promotional mix
    - importance of display and sales promotion in retailing
    - publicity and public relations

- Display types and finishes
    - purposes of display
    - window display
    - interior display
    - use of interior space
    - outside display
    - trends in display

- Creating and evaluating display
    - planning
    - Building display
    - judging display
    - using display rating sheets

- Design fundamentals
    - Components of design
    - The color wheel
    - psychology of color

- Using design
    - precepts of design
    - display arrangements
    - balance

- Display materials
    - practical props
    - stands and easels
    - mannaquin and forms
    - papers, fabrics, and ribbons
    - artifical flowers and trees

- Sales promotion
    - use of premium
    - scope
    - contest and sweepstakes
    - product samples
    - trade shows and exhibits
    - ads for sales staff

- Publicity and public relations
    - publicity
    - publicity releases
    - publicity and the distributive education program
    - publicity and public relations working together

SALESMANSHIP

Objectives

1. The student will demonstrate basic skills and abilities of salesmanship practicing simulated sales demonstrations.
2. The student will practice a series of sales dialogues demonstrating the personal qualities and social skills that affect every aspect of selling.
3. The student will gear his sales presentation to the buying motives resulting from the selling process.
4. The student is encouraged to develop a specific plan for the improvement of his own sales personality.

Selling importance
- employment in sales occupation
- objectives of selling
- selling defined

How a sale is made
- steps of a sale
- organizing sales presentations
- meeting objectives

Prospects and customers
- customer needs and desires
- emotional buying motives
- rational buying motives
- patronage and product motives
- buying decisions

Use of product knowledge
- know your merchandise
- information wanted for customers
- sources of production knowledge
- use of product knowledge

Beginning a sale
- first impressions
- approach
- openers

Effective demonstration
- rules for successful demonstration
- dramatization
- key benefits
- hidden features
- visual aids

Overcome an objection
- excuses and objections
- procedures and handling objections
- methods for handling objections
- handling excuses

Closing the sale
- natural close
- techniques for closing
- handling a turn down
- leaving a customer

Building sales personality
- developing sales-winning personality
- salesman qualities
- personal attitudes of salesman
- salesman standards

DECA STATE LEADERSHIP CONFERENCE PREPARATION

Objectives

1. The student will prepare for the state leadership conference by familiarizing himself with the purposes, rules and agenda of the conference.
2. The student will prepare himself or assist others in preparation for specific contest (s) by reviewing and becoming thoroughly familiar with all materials pertaining to the specific contest area (s).
3. The student will cooperate and participate with members of the DECA advisory board in all preparations and screening activities prior to the state leadership convention.

CONTESTS

Sales demonstration

Select, research and prepare sales demonstration
Practice sales demonstration in class
Compete in local contest in front of the advisory committee
Local seniors refine sales demonstration with the aid of advisory committee

Advertising

Study all available information on advertising
Study all ad layout information
Practice different ad layouts
Compete in local advertising contest
Local seniors to receive additional help from advisory committee

Display

Study and become familiar with display information
Compete in local contest using display windows in community
Local seniors receive additional preparation with the aid of members of advisory committee

Public speaking

The student will practice writing speeches in the prescribed preparation time--they will conform to time limits of the speech contest using subjects given to him
The student will practice speaking in front of his class using proper poise, posture and speaking techniques
The student will practice on speech in front of the advisory committee
The student will read materials concerning the DE program and the DECA adult organization to give himself adequate background

Job interview

The student will familiarize himself with all aspects of job interview and application by reading available resource materials
The student will practice filling in application blanks
The student will participate in a local interview contest
The local seniors will refine their job interview techniques with the assistance of the advisory committee members

DECA STATE LEADERSHIP CONFERENCE PREPARATION CONT.

Merchandise math (state contest only)
The student will familiarize and practice solving merchandising math problems in preparation for the state contest

Chapter study, planning, development and presentation of resolutions to the board of governors at state leadership conference

HUMAN RELATIONS

Objectives

1. The student will prepare a personality profile and develop a plan to strengthen the weakest qualities to increase his ability to improve his personality and work with others.
2. The student will become familiar with those personal qualities an employer desires of an employee, how to develop them, and the nature of what both the employee and employer contribute to their working relationship.
3. The student will improve his leadership ability by assuming a leadership role in improving human relations in business.

Importance of human relations
    Purposes of human relations
    Human relationships on and off the job
    Human relations with customers
    Structured and nonstructured human relations

Personality
    Characteristics that shape personality
    Common sense, attitudes and character
    Dealing with emotion
    Ways to change your personality

Your contribution of personal qualities
    How employeers evaluate your personal qualities
    Building and keeping the right attitudes
    Abilities and knowledge employers expect

Employer and employee relations
    The meaning of work in our economy
    What skills are in time
    Employer contributions
    Employee contributions

Formal organization
    Organizational chart
    Employee relationship with organization
    Communications within the formal organization
    Types of leadership

Informal organization
    Natural structure
    Dealing with co-workers
    The grape vine
    Status and status symbols

Management action for improvement of human relations
    Training for leadership
    Communications
    Employees improvement of human relations
    Organized labor units
    Fundamentals of training programs

BUSINESS ORGANIZATIONS

Objectives

1. The student will become familiar with advantages and disadvantages of different types of business organizations.
2. The student will become familiar with the franchise method of business organization by conducting an in-depth study of a selected franchise operation by producing an acceptable study and report.

- Costs of operating businesses
    - Fixed costs
    - Variable costs

- Business Organization
    - Single proprietorship
    - Partnership
    - Cooperatives
    - Corporations

- Franchise operations
    - What is a franchise
    - How are franchises started
    - What do you buy when you purchase a franchise

- Business evaluation
    - Cost of operation
    - Operating ratios
    - Net profit
    - Stock turnover

- Company policy
    - Pay and hours
    - Benefits
    - Production of merchandise and money
    - Decision making
    - Training program
    - Organized labor

- Marketing decision
    - Merchandising
    - Sales promotion
    - Operation and maintenance
    - Finance and control
    - Personnel

- Retail distribution
    - Providing goods
    - Making shopping convenient
    - Pricing
    - Serving the community
    - Serving the economy

WHOLESALING

Objectives

1. Given a particular wholesale operation the student will determine the marketing functions performed, factors affecting length and width of the channel of distribution and a comparison of wholesaling jobs with other marketing jobs.
2. The student will build a customer service program identifying the source of data used and preparing a plan for marketing a private label product
3. The student will develop a complete strategy for promoting a wholesaler to a manufacturer who is seeking a channel of distribution

The wholesale field
- Marketing
- Customers
- Career opportunities
- Functions of wholesaling
- Kinds of wholesalers

Value added by wholesalers to products
- Selection of channel of distribution
- Basis for selection of channel
- Factors affecting the length and width of the channel
- Product value compared to product cost

Marketing jobs in wholesaling--an inside look
- The buyer and staff
- Sales and promotion
- Office and customers services
- Merchandising handling

Customer services development
- Delivery
- Merchandise aids
- Finances
- Cooperative advertising
- Sample rooms and demonstrations
- Technical assistance

Product planning
- Research
- Sources of supply and new products
- Development of private brands
- Buying for resale
- Standards and grading

Physical distribution
- Warehouse advantages
- Warehouse design and organization
- Inventory control

Wholesaler promotion strategy
- Peronsl selling
- Wholesaler catalogs
- Advertising
- Direct mail
- Wholesaling specialists
    - Rack robbers
    - Grain elevator
- Commission merchants
    - Auctioneers
    - Farm production assemblers
    - Petroleum drillers

Wholesales future
- Current trends
- Activities and services
- Future career opportunities

MANAGEMENT

Objectives

1. The student will demonstrate his ability to solve management case study problems.
2. Given a specific retail area, the student will outline the management and supervisory areas pertinent to that particular business.

Human relations
- Motivation
- Manager's personal qualities
- Substantial performance and unpromotables
- Handling grievances
- Understanding conflict
- Theft and pilferage

Training and supervision
- Interviewing
- Costs
- Supervisor's responsibility
- Breaking in new workers
- Delegating duties
- Effective communication
- The middleman
- Turnover

Job improvement
- Living with change
- Productive meetings
- Constructive disagreement
- Compensations and benefits
- Safety

Finance and accounting
- Requirements of financing
- Banking and borrowing
- Risk and insurance
- Credit policy and procedure
- Collection policies and procedures
- Budgeting
- Tax obligations
- Profits
- Controlling costs

Pruchasing
- Your wholesaler
- Purchasing policies
- Stock control procedures

Marketing
- Operations
- Marketing channels
- Pricing policies and procedures
- Obtaining and servicing customers
- Salesmanship
- Advertising and sales promotion

Managing your job--the manager
- budgeting your time
- family-owned business
- small-service firm

ESTABLISHMENT OF A BUSINESS

Objectives

1. A student will demonstrate his ability to select a business site for preparing a proposal for a specific business location
2. The student will plan and develop the layout of a store plan including interior and exterior
3. The student will conduct a financial analysis for the planned store location.
4. The student will apply budgeting procedures to this hypothetical location.

Store location

Buying, leasing, renting
Zoning regulations and loss
Trading area and customer traffic
Business trends
Opportunities for future expansion

Store layout

Building and equipment
Building interior and fixtures
Parking lot and surrounding landscape
Sketch of front elevation

Financial analysis

Estimate specific capital expenditures for buildings fixtures and equipment
Estimate cost of remodeling if any
Statement of operating capital for one month include initial stock, sales promotion and labor costs
Justify financing sources

Budgeting procedures

Estimate a determination of gross budget and sales
Plan for sales promotion

CAREER STUDY

Objectives

1. The student will complete an occupational self-appraisal
2. The student will prepare a review of job application and interview techniques
3. The student will plan, organize, and prepare a complete resume or data folder
4. The student will write a report on his selected career area of interest that appears to be his personal goal

Occupational self-appraisal

- Personality appraisal test
- Interest inventory

Review of application and interview techniques

- Selected readings
- Class discussion
- Work sheets

Resume or data folders

- Use format on following page

Career report

- Job requirements
- Job opportunities
- Working conditions
- Employment benefits
- Promotion opportunities
- Develop a composit story of this career area

FORMAT FOR DATA FOLDER

COVER SHEET
Personal Data of______________________________

TITLE PAGE

____________________HIGH SCHOOL
Department of ____________________
Papers of____________________
Year of Graduation__________
Address and telephone (if you desire)

TABLE OF CONTENTS (do last)

Picture 1
Sample of Handwriting 2
Personal Data 3
Education 4
Activities 5
Letter of Recommendation 6

(Your work experience, if any, could be entered under "Education" or "Activities.")

PICTURE

HANDWRITING
"This is a sample of my handwriting: 12345678910 (your name)"

PERSONAL DATA
(Include what you want to include.)
Name
Either date of birth or age
Address
Telephone
Height
Weight
Health
Marital status
Social Security number

EDUCATION
Where
When
What courses and grades (if good)

ACTIVITIES
Go into more detail than on personal data sheet

LETTERS OF RECOMMENDATION
Begin it with TO WHOM IT MAY CONCERN

BLANK SHEET

MARKETING PROGRAM PERSONAL INTERVIEW FORM
(Teacher Use)

Name________________________________Date____________________

What do you plan to do after graduating from high school?________________
Why (to the above question)______________________________________
What do you know about this program for which you are being interviewed?______
____
What do you think you will gain from being in this program?______________
What do you think would be the most interesting thing about working in a marketing position?____
What do you think you would dislike most about a marketing job?____________
Are you working now?____(If yes, where)___________________________
How long with this firm?____Beginning hourly wage_____Present hourly wage______
In what subjects do you think you need more work?_____________________
In what type of marketing job would you like to work?____________________
In which marketing skills do you think you are most skilled?_______________

If you were working in a store and the person working next to you talked constantly, therefore, keeping you from getting your work done, what would you do?_________

You are on your way to an interview and your best friend comes along and is persistent about going with you and waiting in the reception room, what would you do?___

Organization policy states that coffee breaks are 15 minutes long; the group that you are sitting with isn't finished with their conversation and 15 minutes have gone by. What would you do?______________________________________

What should an individual do if he is told to do something by his teacher (or his employer) and he feels that such action is not necessary or he feels that he knows of a better way of accomplishing the same results?_______________________

Do you have a hobby?______________Extra-curricular activities you enjoy_______
____

Quality	Highly Acceptable	Acceptable	Doubtful	Unacceptable
Personal appearance				
Poise (self confidence)				
Speech (tone and grammar)				
Personality				
Attitude				
Ability to make decisions				
Social courtesies				
Acceptance of policies				
Mannerisms				

INVENTORY OF STUDENT'S WORK EXPERIENCE AND CAREER OBJECTIVE

NAME______________________ADDRESS____________________PHONE_____________

1. High school classification (circle): a. sophomore b. junior c. senior

2. Have you ever taken or are you now taking any of the courses listed below? (Check)

____Typing Ia
____Typing Ib
____Business Cruise
____Record Keeping
____Business Machines
____Typing IIa
____Typing IIb
____Bookkeeping Ia
____Bookkeeping Ib
____Data Processing
____Personal Law
____Gregg Shorthand Ia
____Gregg Shorthand Ib
____Office & Lab Assistant
____Machine Shorthand Ia
____Machine Shorthand Ib
____Marketing Ia
____Marketing Ib
____Marketing IIa
____Briefhand
____Office lab

3. Are you employed outisde of school hours? Yes_____ No______
If the answer if YES:
a. Where are you employed?______________________________________
b. What type of work do you do?__________________________________
c. What is your salary?____

4. Were you employed during the summer? Yes_______ No_______
If the answer is YES:
a. Where were you employed?_____________________________________
b. What type of work did you do?_________________________________
c. What was your salary?____
d. How did you secure this employment?___________________________

Does any member of your family work in a business office? Yes______No____
If the answer is YES: (Check the type of work he/she does)

____Accountant
____Clerk
____Manager of a business
____Owner of a business
____Sales
____Secretary
____Stenographer
____Other (specify)____________________

6. What kind of work would you like to do when you graduate from high school?
____

7. Are you planning to attend a business college, college, or university? Yes__No__
If the answer is YES:
a. What school do you plan to attend?____________________________
b. What course do you plan to follow?____________________________

- -

TRAINING AGREEMENT

COOPERATIVE WORK EXPERIENCE

Student's Name________________________________Birth Date________Age____

Student's Address______________________________Telephone______________

Student's Grade____Teacher-Supervisor____________________________________

Employer's Name______________________Work-supervisor____________________

Employer's Address_______________________________Telephone______________

The major purpose of this program is to provide valuable work experience education for students. This agreement is made to show responsibilities of the participants: student, parent, schoo, and employer.

1. The student enters this program to learn as much as the employer can provide in the nature of job information, skills, and attitudes.

2. The student-learner will keep regular attendance both at school and on the job. He cannot work on any school day that he fails to attend school. Exceptions are permissible only with the mutual consent of the employer and teacher-coordinator. Students will inform employers as to absences due to illness, or anticipated absences due to other activities.

3. A student-learner who quits school loses this job at once. Any job change must be arranged in advance by the employer and the teacher-coordinator.

4. Pay and hours are to be determined by the employer. Wages are as required by the Wage & Hour Division-Bureau of Labor applies. A work permit is required for all student-learners under 18 years of age.

5. The employer expects the student-learner to be honest, punctual, cooperative, courteous, and willing to learn. The employer may discharge the student-learner for just cause; however, the teacher-coordinator requests consultation with the employer beforehand.

6. Parents or guardians are responsible for the conduct of their children in the program.

7. The school provides a teacher-coordinator to supervise the student on the job. He will make periodic visits to observe the student-learner and consult with the employer and the student-learner. Evaluation of job performance will be a joint effort of the employer and the teacher-coordinator. School credit is granted for successful job performance.

8. The employer agrees to provide Workman's Compensation protection for the student-learner.

____________________________ ____________________________

(Student's signature) (Teacher-coordinator's signature)

____________________________ ____________________________

(Parent's Signature) (Employer's signature)

TRAINING AGREEMENT

EXPLORATORY WORK EXPERIENCE

The agreement is between______________________________and Lebanon Union

High School District U-1 for the training of ______________________________.

SECTION I--The student learner agrees as follows:

a. That he or she will enter this program of training as a ____________________ to learn as much as the program can provide in the nature of job information, skills, and attitudes.

b. That he or she will be honest, punctual, cooperative, courteous and make an honest effort to learn and abide by all rules of this program.

SECTION II--The parent agrees as follows:

a. That they approve, assist and encourage their child in the pursuit of this program.

b. That they will share the responsibility (with school officials) for their child in this program.

SECTION III--The school agrees as follows:

a. That they will provide classroom instruction for the student and provide a teacher-coordinator to supervise the student learner while in the training station.

b. That they will provide school insurance for students while doing supervised exploratory work experience.

SECTION IV--The cooperating employer agrees as follows:

a. That they will recognize this program as a training program and attempt to provide a realistic and board range of exploratory experiences to the student learners.

b. That they have the right to refuse, reject or terminate those students which faily to comply with the rules and procedures of the cooperating employer. The teacher-coordinator will be notified prior to any action being taken.

c. That they will be cognizant of student liability and provide experiences in keeping with their own responsibilities and with safety of the student and patients in mind. Insurance coverage beyond that of regular school policy will be the responsibility of the employer.

I have read the provisions of this training agreement and agree to its content.

____
(Student-Learner)

____
(Teacher-Coordinator)

____
(Parent)

____
(Cooperating-Employer)

MARKETING CAREERS
COOPERATIVE WORK EXPERIENCE PROGRAM

Rating of Student Employee Name______________________

Employed by______________________ Date______________

Circle the letter of the one statement in each group which best applies to the student.

1. Job attendence:
   a. Almost never absent or tardy
   b. Infrequently absent but reports by telephone.
   c. Quite often absent or tardy.
   d. ______________________

2. Attitude:
   a. Always friendly and cheerful.
   b. Usually pleasant.
   c. Seems timid, insecure, "withdrawn".
   d. Inclined to find fault.
   e. ______________________

3. Personal Appearance:
   a. Neat, clean, or suitably dressed.
   b. Acceptable dress and grooming average.
   c. Careless about cleanliness and hair.
   e. ______________________

4. Cooperation:
   a. Willing to see point of view of co-worker.
   b. Occassionally critical/stubborn.
   c. Does best when working by self.
   e. ______________________

5. Responsibility:
   a. Assumes responsibility well.
   b. Keeps up routine tasks.
   c. Inclined to wait for directions from others.
   d. ______________________

6. Alertness:
   a. Able to follow instructions.
   b. Usually needs to be told more than once.
   c. Must be given repeated instructions.
   d. Unable to remember procedures long.
   e. ______________________

7. Competency:
   a. Does assigned tasks skillfully.
   b. Skillful considering length of training and age.
   c. Fair, standard of skills average.
   d. Careless, needs to improve.
   e. ______________________

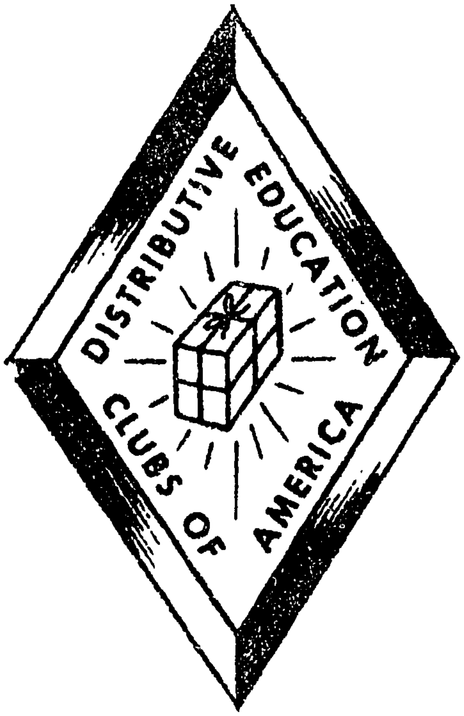
8. Industry:
   a. Works deligently.
   b. Usually busy or seeking work.
   c. Must be prodded.
   d. Likes to "kill time."
   e. ______________________

Signature of Employer ______________________

DECA

DISTRIBUTIVE EDUCATION CLUBS OF AMERICA

Vocational Understanding



Leadership Development

Civic Consciousness

Social Intelligence

(DECA) or Distributive Education Clubs of America if an organization for students enrolled in marketing courses. Its goals are to teach students: vocational understanding, civic consciousness, social intelligence and leadership development.

Activities include fund raising, contests, social and community projects. Associated membership is available for students who are not enrolled in marketing classes.

DECA GENERAL INFORMATION

1. DECA is the only youth organization operating through the public schools of the nation to attract young people to careers in marketing and distribution.

2. DECA encourages free enterprise and economic awareness through individual instruction, Studies in Marketing projects, Creative Marketing projects, exposure to successful business leaders, and by practical experience in business establishments.

3. DECA encourages civic responsibility through professional conferences, chapter activities, school improvement projects, and support of community activities.

4. DECA maintains a series of State and National Contests--all designed to stimulate and motivate classroom interest, career encouragement, and vocational competence.

5. DECA believes in competition and offers awards and recognition to student members for outstanding accomplishment.

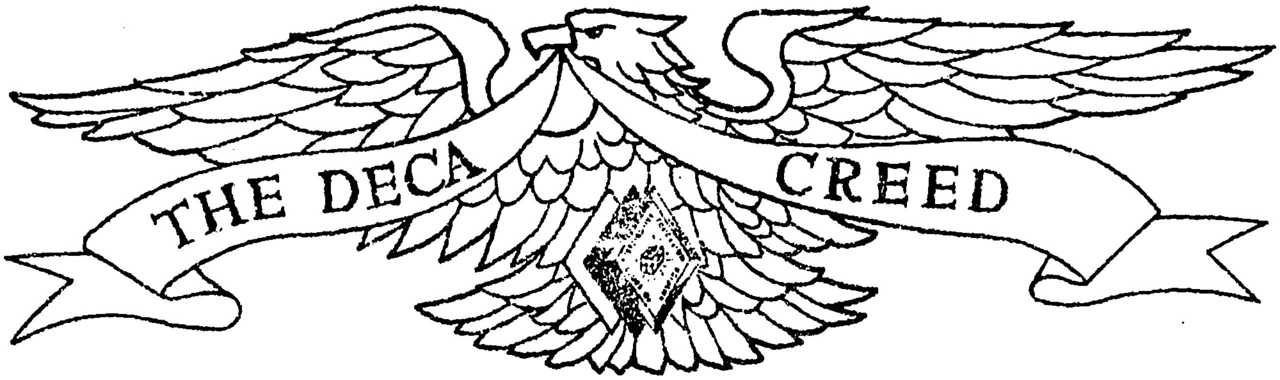
6. DECA maintains its won Scholarship Loan Program to assist and encourage its members toward higher education.

7. DECA pays its own way. Its national headquarters and staff are maintained entirely by student dues and other internal income.

8. All contributed funds are used directly for student benefit through our Program of Youth Activity:

   Awards and Recognition
   Leadership Conferences
   Program Development
   Public Information
   Leadership Training
   Scholarship Loans

9. Your support of DECA will help in developing future leaders for marketing and distribution.



THE DECA CREED

I Believe in the future which I am planning for myself in the field of distribution, and in the opportunities which my vocation offers.

I Believe in fulfilling the highest measure of service to my vocation, my fellow beings, my country and my God—that by so doing, I will be rewarded with personal satisfaction and material wealth.

I Believe in the democratic philosophies of private enterprise and competition, and in the freedoms of this nation—that these philosophies allow for the fullest development of my individual abilities.

I Believe that by doing my best to live according to these high principles, I will be of greater service both to myself and to mankind.

DISTRIBUTIVE EDUCATION STUDENT-LEARNER'S WEEKLY TRAINING STATION REPORT

Coordinator's Initials:____________

Student-learner________________________For week ending________

1. What were your responsibilities or duties on the job this week?

	Responsibility or Duty	Approximate Time Spent
a.		
b.		
c.		
d.		

2. What new knowledge or skill did you learn on the job? Describe.____________

____

____

____

3. What did you learn in class that you applied on this job, either from study or classroom discussion? Explain.

____

____

____

4. What difficulty occurred or what mistake did you make on the job? What did you do to correct it?

____

____

____

5. On what skill or question could you use help in performing your job better?

____

____

DISTRIBUTIVE EDUCATION STUDENT-LEARNER'S WEEKLY TRAINING STATION REPORT
Continued--

6. What interesting or challenging relationship did you have this week with a fellow worker, a customer, or your job sponsor? Describe.

____

____

____

Summary of Duty Time and Earnings

			Duty Hours	
Date	Check-in Time	Check-out Time	Regular	Overtime
____	____________	____________	______	________
____	____________	____________	______	________
____	____________	____________	______	________
____	____________	____________	______	________
____	____________	____________	______	________
____	____________	____________	______	________
____	____________	____________	______	________
		Totals	______	________

Total hours ________

Regular hourly rate ________

Gross earnings for regular hours ________

Overtime hours ________

Overtime hourly rate ________

Gross earnings for overtime hours ________

Total earnings ________

Less deductions: ____________ ________

__________________________ ________

Total deductions ________

Net earnings for the pay period ________

APPLICATION FOR DISTRIBUTIVE EDUCATION HIGH SCHOOL PROGRAM
(Required for Admission to Class)

Name__________________________Address__________________________

Telephone______________Age__________Sex_____Height_______Weight_______

Own or use of car_____________(Yes or No) Drivers License______ (Yes or No)

Physical Defects:________Explain:________________________________

Father or Guadian's Name______________________________________

Father or Guardian's Occupation__________________________________

Mother or Guardian's Name_____________________________________

Mother or Guardian's Occupation_________________________________

Year in School__________________Estimated High School GPA___________

Credits needed to graduate (Required and Elective)____________________

Attendance last year: Absent____________________Tardy____________

Names and grades for business courses taken in hgih school:_____________

____

____

Clubs and Organizations____

____

Hobbies____

Sports participated in____

Are you working now?______Where?____________________Hours per week____

What do you plan to do after high school graduation?__________________

List work experience; start with most recent; omit present job, if any__________

If I am admitted to the distributive education program I will put forth my best effort to be honest, dependable and productive in my school work and employment.

Signed__________________________
(Student)

I consent to ________________'s entering the distributive education program and to being cooperative with the school and the training agency.

Signed__________________________
(Parent or Guardian)

MODEL MARKETING CLUSTER
ASSESSMENT PROFILE

Major Elements	Assessment Profile				Model Range	
ARTICULATION	0	20	40	60	80	100
YOUTH ORGANIZATION	0	20	40	60	80	100
COOPERATIVE WORK EXPERIENCE	0	20	40	60	80	100
EXPLORATION	0	20	40	60	80	100
PROGRAM DESIGN	0	20	40	60	80	100
EVALUATION	0	20	40	60	80	100
MARKETING PROJECTS	0	20	40	60	80	100
ORIENTATION K-6	0	20	40	60	80	100
FACILITIES, EQUIPMENT, & MATERIALS	0	20	40	60	80	100
STAFFING	0	20	40	60	80	100
ADULT EDUCATION	0	20	40	60	80	100
LONG-RANGE PLANNING	0	20	40	60	80	100
CAREER ORIENTED METHODS	0	20	40	60	80	100
SCHOOL AND COMMUNITY RELATIONS	0	20	40	60	80	100
CAREER ORIENTED CURRICULUM	0	20	40	60	80	100
MEETING INDIVIDUAL NEEDS	0	20	40	60	80	100
ADVISORY COMMITTEE	0	20	40	60	80	100
INTERDISCIPLINARY APPROACHES	0	20	40	60	80	100

MASTER ASSESSMENT				Model Range	
0	20	40	60	80	100

MASTER ASSESSMENT:
TOTAL PROGRAM

Vocational Business Proficiency Certificate

CONFERRED UPON

____

By the Vocational Business Department, Lebanon Union High School, Lebanon, Oregon.

The holder of this certificate has successfully completed the

____________________ curriculum during the __________ . school year.

This student has shown proper attitude, responsibility, initiative and regular attendance.

Business Courses

Skills

RECOMMENDED FOR EMPLOYMENT

____
Principal

____
Dept. Chairman

VT 016 681

FIRST STEPS: PLANNING A CAREER DEVELOPMENT ACTIVITY IN YOUR CLASSROOM.

NORTHERN ILLINOIS UNIV., DE KALB.; ILLINOIS STATE BOARD OF VOCATIONAL EDUCATION AND REHABILITATION, SPRINGFIELD. VOCATIONAL AND TECHNICAL EDUCATION DIV.

MF AVAILABLE IN VT-ERIC SET.
ABLE MODEL PROGRAM, NORTHERN ILLINOIS UNIVERSITY, DEKALB, IL 60115 ($1.00)
PUB DATE - AUG72 62P.

DESCRIPTORS - *CAREER EDUCATION; *GOAL ORIENTATION; *VOCATIONAL DEVELOPMENT; EDUCATION INNOVATION; INSTRUCTIONAL MATERIAL CENTERS; *CURRICULUM DEVELOPMENT; CURRICULUM PLANNING; CURRICULUM RESEARCH; TEACHING TECHNIQUES; *OCCUPATIONS; TEACHING
IDENTIFIERS - PROJECT ABLE

ABSTRACT - THIS PUBLICATION PREPARED BY THE ABLE MODEL PROGRAM IS ONE OF SEVERAL COMPRISING A PACKAGE ON CAREER EDUCATION PROGRAM DEVELOPMENT AND IMPLEMENTATION. IT IS TEACHER ORIENTED AND EMPHASIZES THE WORK OF THE TEACHER RATHER THAN THE PRODUCTION OF WRITTEN GUIDES; THEREFORE, ITS SUCCESS LIES IN THE ABILITY OF THE TEACHER TO THINK AND PLAN EFFECTIVELY SO THAT THE LEARNER'S INTEREST CAN LEAD TO ACCOMPLISHMENT. THE MATERIAL IS DESIGNED TO HELP THE TEACHER STRUCTURE PROGRAMS WHICH FOCUS UPON THE DEVELOPMENT OF HUMAN RESOURCES. SIGNIFICANT CONCEPTS FOR BUILDING A THEORETICAL FRAMEWORK OF INSTRUCTION ARE INTRODUCED. SAMPLE FORMS, EXAMPLES OF LEARNING ACTIVITIES WHICH MAY BE MODIFIED TO SPECIFIC OCCASIONS, AND INFORMATION ON INTERVIEWING SKILLS SHOW HOW CAREER EDUCATION MAY BE INTEGRATED WITH TRADITIONAL SUBJECTS. TO FURTHER EXPLAIN THE INTEGRATION OF CAREER EDUCATION AND TO AID IN ITS IMPROVEMENT, QUESTIONS AND ANSWERS ARE INCLUDED AS WELL AS EVALUATION INSTRUMENTS USEFUL TO IMPLEMENTERS IN ASSESSING A PROGRAM'S SOUNDNESS. (SN)

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FIRST STEPS:
PLANNING A CAREER DEVELOPMENT ACTIVITY IN YOUR CLASSROOM

Prepared by
ABLE MODEL PROGRAM
Northern Illinois University
DeKalb, Illinois 60115

in cooperation with
The Division of Vocational/Technical Education
Board of Vocational Education and Rehabilitation
State of Illinois

Revised, August 1972

TABLE OF CONTENTS

I. INTRODUCTION

This material is designed to help teachers try out career education activities in their own classrooms. A brief discussion of key concepts, examples of activities, and sample forms are included to encourage quick planning and implementation.

This publication is part of a package our research and development project is offering to those initiating career education programs. Other items include an introductory pamphlet, *IMPLEMENTING CAREER EDUCATION THROUGH ABLE MODEL PROGRAM*; a resource guide, *CAREER EDUCATION ACTIVITIES THROUGH WORLD OF WORK RESOURCES*; and *INTRODUCING CAREER EDUCATION TO TEACHERS: A HANDBOOK FOR CONSULTANTS, WORKSHOP LEADERS, AND TEACHER EDUCATORS.*

A 16mm sound/color film is also available. *PEOPLE HAVE CAREERS: A PRIMARY TEACHER INTEGRATES CAREER DEVELOPMENT IN BASIC AREAS OF THE CURRICULUM* can be ordered through the NIU Film Library.

Section II introduces key concepts and encourages reflection about questions often asked about career education in the elementary school.

Section III has sample materials which may be copied or modified to meet local needs. It also contains suggestions based upon the classroom experiences of many teachers to contribute to the shaping of expectations and plans.

Section IV provides information about teaching interviewing skills and shows how career development activities can be woven within traditional areas of the curriculum. Examples from language arts, mathematics, science, and social studies are included. Sample plans will help teachers visualize opportunities for planning integrated instruction. An instrument to diagnose interests and attitudes is included to help teachers begin to focus upon evaluation. In this respect, the *values* of instruction are highlighted.

Section V contains two ideas which were developed into organizing centers for instruction. *BUILDING* presents three possibilities for thinking through career development activities. *THE GREENHOUSE* organizes thoughts in the same manner, but suggests other content areas for creative teaching and management.

Section VI presents a flow chart detailing the work of a career education teacher as a person might work through a complete instructional unit.

The last section is a brief review of the concepts, techniques, and strategies explored by ABLE Model Program until June, 1972.

Project staff for the 1971-72 academic year were:

Mrs. Carol Allen	Mrs. Judith Starks
Mrs. Mary Anne Boies	Miss Mary Stell
Mr. Jerrold McLaughlin	Mrs. Becky Stueben
Mr. Charles Pryor	Mrs. Janet Whealon

Dr. Walter Wernick
Project Director
815-753-1959

II. REFOCUSING FOR CAREER EDUCATION

Welcome to a movement which has strong support from national and state governments, school boards, administrators, teachers, parents, and many active segments of our local communities.

Welcome to a movement which focuses upon the development of our human resources - career education!

We have taken the position that our schools must help students plan their lives in *and out of school*. We know that many professionals have been "career education" teachers for a long time and we feel fortunate to be participating in a venture to develop *a theory of practice* with them. The work of the professional teacher is at the heart of any instructional program and we know that teachers can plan and implement life-centered activities effectively.

Our approach is teacher-oriented. We believe the teacher's imagination is the key instrument of instruction. Therefore, the following material is designed to focus your imagination upon specific elements of your work.

A. THE ORGANIZING CENTER CONCEPT

An organizing center depends upon a teacher's imaginative view of instruction. Each teacher's imagination produces a form. This form, based upon a person's individual talents and experiences, is important because it subsequently shapes the teacher's variety of activities, time intervals, and levels of expectation. Whatever the size of one's undertaking, however, a plan that rests comfortably upon a personal base is usually most productive.

Effective teachers think and plan elastically, appropriate to what needs to be done. The questions below set a frame and help us think of work that has to be done:

ACCESSIBILITY:	What materials and services can be available to the learner?
MOBILITY:	What content areas (skills, facts, attitudes, etc.) can emerge from this idea?
ACCOMPLISHMENT:	What can the learners do?

ACCESSIBILITY

1. What materials can a child use in the daily course of instruction? When a decision allows one child free access and excludes others, what reasons lie behind the selection? (maturity, skill development, social manners, interest)

2. Where can a child go to study? To organize? To practice? How are the places different?

3. What different sensory stimuli can the child encounter? (printed page, voice, film, touch)

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4. What tools can the child use to uncover information? (card catalogue, thesaurus, telephone) When? With whom?

5. What human talent can come into contact with the child? Can the contact take place during school hours? Is the child expected to observe or interview talent outside the school?

6. How is the child encouraged to make his own thoughts and feelings accessible for his own reflection and/or action?

MOBILITY

1. Can the content build upon overt interests of the children? Can new interests be generated? Can individuals work upon the ideas and skills at their own pace? To their own accomplishment level?

2. Can the reason for instruction of this area (fact, skill, attitude) be clear to the learner? Clear to the parents?

3. When ideas spin out from the center, can they pull together new relationships from past studies? What academic areas can contribute to ongoing learning?

4. Can the complexity of thought and accompanying activities increase as the ideas are studied in depth? Can the concepts and skills be applied to practical tasks?

5. Can the content enable children to encounter the fundamental life activities of their local community? Of their religion? Of their contemporary world?

6. Can the content enable children to delve through time and cultures so as to build an appreciation of their heritage? Can the content have a continuing effect upon the child's self-image as a person who is creating his human biography each new day?

ACCOMPLISHMENT

1. In how many different ways can a child express himself to you? To others in the classroom? To his parents? To others in the community?

2. In what ways can learning efforts be evaluated? Learning achievement? What can the child contribute to the evaluation process?

3. How can the child be encouraged to use different resources? When (and for how long) can he put together his work? Where can he practice? With whom?

4. Can learning efforts be stored in an accessible area? Can the child review and redo his own work?

5. Can others see the child's achievements? Can a child get feedback about how he has used media as well as about the content he has had to express?

The *organizing center approach* encourages teachers to zero in upon the needs, interests, and abilities of individual children. It also brings increased attention to the use of community resources, especially the people of the community. Relevancy of instruction is increased as children are brought into direct contact with world of work people and content.

Helping children inquire from primary sources in their own community is a significant goal. Helping children relate in-school learning to out-of-school experiences will help children clarify their values and lead to decision making opportunities appropriate to their maturational level.

Career education means a refocusing upon people. The organizing center concept allows teachers to plan people-oriented activities easily and within their regular ongoing curricular structure.

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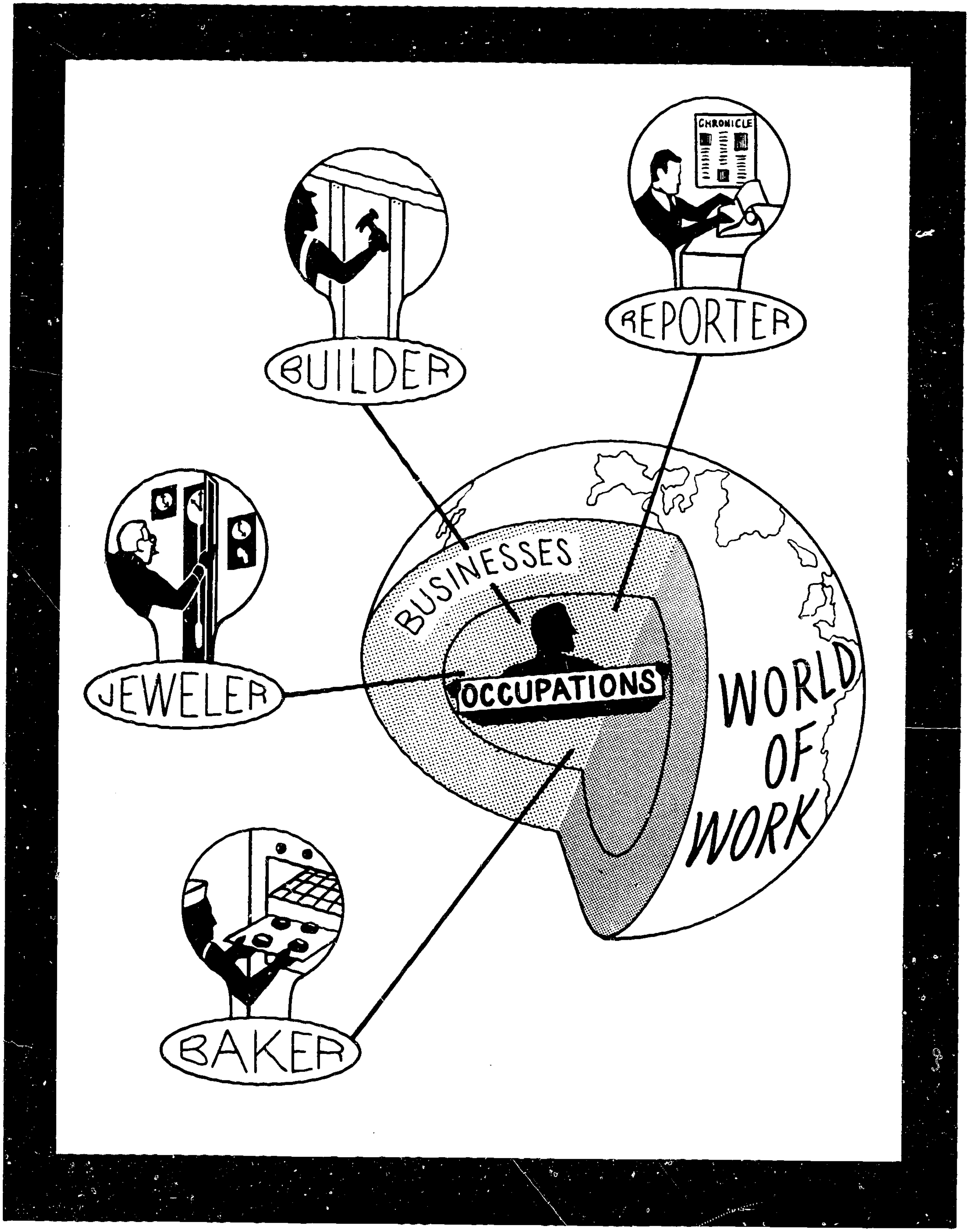

CHRONICLE
REPORTER
BUILDER
JEWELER
BUSINESSES
OCCUPATIONS
WORLD OF WORK
BAKER

3706

B. REFOCUSING INSTRUCTIONAL CONTENT UPON PEOPLE

What holds the elementary school together? What energies pull towards the center? What can the teacher use as a heart for the curriculum?

The study of occupations can be a suitable place to start instruction for young children. Children have a natural interest in seeking contact with working adults. Their wonder of what the future holds for them and their active search for worthwhile expression thrusts them into positive learning roles. A progression from human forms (adult roles) to abstract knowledge (subject matter) appears natural.

Since living forms evoke maximum stimuli and also contain within themselves the heritage of our civilization, the study of occupations affords an excellent vehicle for management of motivations and content. Effective teachers have to be relevant to the lives of learners as well as to their contemporary culture. *With organizing centers formed from life-centered activities, teachers can plan, implement, and evaluate such relevant instruction with confidence.*

Imagine the direct experiencing potential within life-centered organizing centers!

As children study active adults, at work or pursuing other careers, they will receive "occupational information" and have many opportunities to build their career-consciousness. Career preferences will develop and change, and as they do so, they will strengthen the child's self-image. Exploratory, academic, and sharing activities all contribute to the development of a self-image shaped from the credible actions of adults.

Children can "choose" jobs many times, roleplay situations to incorporate affective content, and review consequences resulting from the direct experience of others. Within such opportunities, their performance is open, subject to guidance from the teacher, and available for parent comment. The built-in features of a career development approach help children to understand themselves as well as to learn about their opportunities in the world of work.

C. VISIBILITY

Our approach to career education relies upon the performance of the teacher. We are positive about the productivity of our practicing professionals and want to help them achieve the success which they should rightfully receive. *We encourage visibility because it is natural to share, because feedback adds to the motivations of learners, and because the teacher's work can be placed in the public domain.*

Local resources will suggest the means and ends of your display products. Obviously, if several cameras are available and your talent enables you to manipulate these effectively, your work may be picture-oriented. Each person sees as his own mind's eye allows. However, some displays require very little technical equipment and, as you look over your instructional program, you'll be able to draw out bits and pieces that will fit together. A coordinated assembly of student products is not a difficult task.

Open houses for parents, exhibits for grade level meetings, and other occasions when the work of the teacher is called for, can all be made more vivid with materials that elicit multi-sensory responses.

-stories and pictures about visits with talent or about field trips
-letters to parents by students
-experience charts
-spelling papers
-taped interviews
-compositions
-folders

Projects that involve group cooperation and a sharing of thinking would include:

- picture-story "TV" presentation of chart
- reporting or explanations of work
- exhibits
- dioramas
- mobiles
- plays

Other materials that will help illustrate the work of the teacher are:

- comments of parents and community members on academic performance
- letters written by visiting talent and parents
- letters to parents by teachers
- collages and montages
- lesson plans
- flow charts

Our strategy calls for a confident teacher to demonstrate what work went into planning, implementation, and evaluation of instruction. Our program is *teacher-oriented*. The community must be helped to realize that the significant educational experiencing of their young in school is guided by competent professionals.

D. QUESTIONS AND ANSWERS

1. *Why careers?*

   The lives of people are important. What a person has done (been), what a person wished to do, and what a person plans to do with his energies are worthy for communication. We interpret career education to mean careers in family life, in the community, and in the vocational areas.

2. *Is my entire curriculum to be based on career education? How much time should I spend on it?*

   A combining of the interests of your children, resources of your community, and your judgment of what your children need to learn *is* your curriculum. Actual classroom time spent on career education depends on many factors, the most important one being *how comfortable you feel in this approach.*

   ABLE did not intend career education to be your whole program. However, some teachers who use the people-centered approach as their organizing centers can manage to deal with the entire curriculum. Other teachers find it is not successful as a full-time venture, but regard career development as a significant theme to be applied wherever possible.

   If you can't enjoy what you're doing, it probably means that you're trying to force too much in too short a time.

3. *What do we do with our present curriculum materials?*

   All materials should serve the purpose of increasing learning potential of children. There are many good stories and exercises in standard text materials; but there is also much which could be ignored because it is not relevant to your particular needs at that time. Our approach pulls the teacher away from being an assistant to textbooks and forces one to *plan in terms of doing activities.* The real world offers much printed matter, visual imagery, and direct experience that is significant and adaptable to your curriculum.

4. *How do I relate skill areas to the world of work?*

   Skill areas are *related to people* and their daily lives. By involving children with an authentic career situation, the teacher can demonstrate the relevance of the skill areas to the occupation. (See our outlines about the skill areas of language arts, science, social studies, and mathematics.)

5. *How do teachers avoid repetition through the grades?*

   If career education is implemented throughout your school, basic procedures can be outlined for each grade. As in using any other approach, different levels of instruction will take place in each grade. Just as reading is taught throughout the grades, a child exposed to the same career at different times will extract what is important to him at that particular time because he is at a different stage of development. Planned clusters (areas) of occupations can be presented for different age levels.

6. *Are we eliminating subjects in order to teach career education?*

   Teachers who have used this approach have found they and their students have much more enthusiasm for content. Instead of eliminating subjects, parents and students become more involved and accomplish more. Career education is academically respectable.

7. *Why should I involve people in my career education program? How can I do this?*

   People are the basis of your career education program, more specifically, the *person-in-the-occupation* will be the organizing center for instructional plans. If the purpose of education is to prepare children for adult roles, then acquaint them with authentic adult roles; the *person-in-the-occupation*.

   There are two basic methods of involving people in your classroom activities. You can bring adults to your classroom or you can take your students to the adults. Both involve you familiarizing yourself with your community, children, parents, and with basic field trip procedures. (See our suggestions about the teaching of interviewing techniques.)

8. *How can I involve the local business community? Will they tire of this involvement?*

Call upon a few friendly people first. Learn what they have to offer. Use parents wherever possible. *Start with brief meetings of children and adults.* Discover what is close to home before venturing out upon exotic trips. Community resources are rarely used to capacity.

Until people tell you you are not wanted, be positive and utilize what you can to benefit the children. Forms and strategies can be obtained from ABLE staff and others developing credible programs for children. Utilizing community resources is not a new concept.

9. *How should I get started?*

We suggest you *make up a plan for a short period of time using a specific resource with which you are familiar.* Start with an idea comfortable to you and an outside guest speaker with whom you can freely communicate. If you plan to accentuate language skills, then highlight elements of your guest's work that relate to language skills. For instance, if your guest is a policeman, then some concurrent follow-up or language skills might include: interviewing, letters of explanation to parents, vocabulary related to policeman (badge, siren, sergeant), and thank-you notes.

10. *Should all the children participate? What about children with special needs?*

Career education is for all children. Children with special needs must begin to be realistic about their occupational goals. This approach eliminates the need for isolating these children as there are many levels of performance within any area of study.

11. *Can this method be used for both the self-contained classroom and the open classroom?*

This approach is flexible and can be integrated into any type classroom situation. *The heart of our program lies with the teacher's imagination.*

12. *Will I lose discipline and control with this approach?*

Employ the same high quality of management as you did with any other approach. Highlighting children's interests does not mean you are no longer the creative leader. Your authority emerges from your expertise as a professional teacher.

13. *What do parents think of this type of instruction? How do I actively involve them in my career education program?*

Communicate objectives as actively and as often as you can, as visibly as you can. What your parents think of your career education program will depend primarily upon how you involve them in it. Ask them to aid your "doing" activities.

Most parents who have become actively involved enjoy entering the classroom and talking about what they do. Methods of parental involvement will depend upon the past history of the school's program and the courage of teachers to reach out and communicate.

14. *How do I get administrative support?*

Point out the direct parental and community involvement this program can accomplish. Your administrators are apt to be receptive as motivation and skill development is increased. *Their public relations program depends on active and visible teaching.*

15. *Who can help me?*

The person who would be most valuable to you is an experienced teacher. ABLE Model Program, NIU, DeKalb, Illinois could direct you to such persons. You may find help through other staff members such as your superintendent, principal, curriculum director, counselors, and state consultants. *Find one person you trust and talk about what you would like to do.*

16. *Where do I get materials?*

Talk to your librarian or learning center director. The sources which you will use will depend upon what you are teaching. If you are studying in the area of health, the hospital, medical catalogues, local doctors, nurses, technicians, etc. could be obvious beginning points. Ask the children and parents for suggestions. Volunteer help will arise and provide materials you never considered as aids before. (e.g. An inventory checklist from a supermarket for experiences in mathematics.)

17. *How do I keep records of the child's work?*

Help the child learn to evaluate himself. In addition, some teachers use samples of the child's work, anecdotal records, interest and attitudinal inventories, and journals kept by the children. An organized cumulative folder system should help people see a developing history of each child.

18. *Are there any statistics comparing childrens' achievements who are in a career education program to those in traditional programs?*

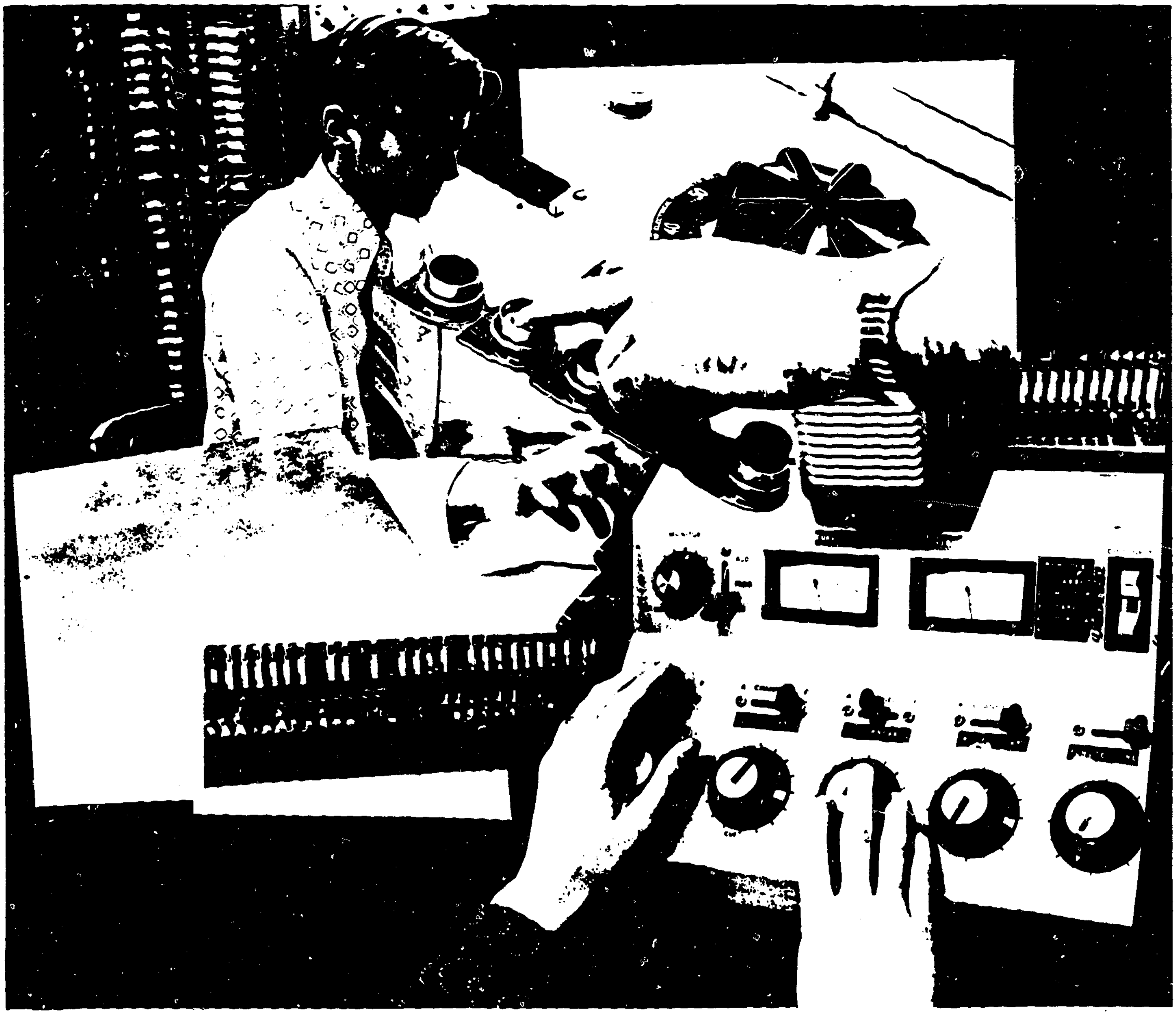
There are no statistics as yet; the program is still in the developmental stages. However, efforts in this direction are being pursued. (Peoria, Illinois started a federally funded, K-8 program in the spring of 1972 and will have some tangible results during the 1972-73 academic year.) Teachers using this method must remember not to evaluate their students on an hourly or weekly schedule. Attitudes need time to be adequately developed. With all the problems we face, *a life-centered education seems mandatory and well worth the risk.*

Read *EDUCATIONAL ACCOUNTABILITY: BEYOND BEHAVIORAL OBJECTIVES* by Arthur W. Combs. This booklet was distributed by the ASCD in the summer of 1972. (Library of Congress Catalog Card number: 72-80216. Price $2.50. Order from Association for Supervision and Curriculum Development, 1201 Sixteenth St., N.W., Washington, D.C. 20036.)

III. RESOURCES FOR CAREER EDUCATION

This section includes ideas and forms to facilitate a program of active involvement with people and places in the local community.

The forms may be modified to meet local needs.



A. COMMUNICATE AND INVOLVE PARENTS

SCHOOL____________________GRADE__________TEACHER_________

Dear Parents,

As a part of our regular instructional program, we would like parents to come to our class and tell the students about their occupations. Our children will benefit by contact with an adult who is contributing to himself and his society. We are sure they will have many important questions to ask.

Please fill out and return this form. You will be contacted to arrange a definite time and date. The general objectives of the program and suggestions for the things we would like to know about will be available. We are interested in all occupations.

Please return to the teacher.

Name___________________________________Phone___________

Address____

Occupation____

Company or Firm______________________________________

It would be most convenient for me to be at your school on (days and times).

____

____

____

____

Signature

B. A SAMPLE THANK YOU LETTER

Date

____

____

____

____

Dear______________,

Thank you for participating in our program of career talks. We find this activity very helpful to our elementary students. Direct experience with working adults adds relevance and meaning to their studies.

We appreciate the time and energy you gave to the education of our students.

Sincerely,

____

Rather than using an impersonal thank you letter, the students can express their own thoughts and feelings. Many language skills can be taught from this base. Letter writing by children can become an integral part of an instructional program.

C. A SAMPLE LETTER TO INTERESTED TALENT

Thank you very much for your willingness to participate in our program. Without your cooperation this phase of our program could not exist.

The objective of these sessions is not to get students to make career choices, but rather to help elementary students realize that everyone works, that all useful work is honorable. We hope to acquaint them with the wide variety of occupations that exist and make their present schooling more relevant to their future. There are many things to be besides cowboys, firemen, nurses, and teachers.

Your company or business may have some materials they would furnish for you to bring along, perhaps some pamphlets. You might check with your public relations office. Please bring your tools or whatever you work with. Certainly, if you wear a uniform or special clothing of any kind (welding hood?), bring or wear it if you can. Here are the kinds of things we would like to hear about:

--What is your job title or description?
--Briefly describe what you do.
--What aptitudes or skills are important for your job?
--Do you have to deal with the public? If so, would you care to comment on this?
--If you are separated from people most of the time, working with *things*, how do you feel about that? Do you prefer *not* having to deal with the public or fellow workers?
--What do you consider the best points of your job? the worst?
--Is your job personally rewarding and fulfilling? Do you enjoy going to work? Do you recommend it as one of the alternatives students should consider?
--You may want to touch upon the financial aspect. Do you consider the pay to be adequate, very good, unsatisfactory?
--What is the outlook? Will this type of employment exist when these students enter the world of work?
--What changes in equipment, automation, personnel, training requirements have you experienced in the time you have been in this field?
--What training is required? (High school? Trade school? College? Apprenticeship? Graduate degrees?)
--Is the field difficult to enter? (Union membership, professional school entrance quotas, etc.)
--How does this type of career relate to what these students do now in school?
--General information on working conditions, bosses, employees, etc.

D. BUSINESS RESOURCE QUESTIONNAIRE

1. What is the name of your business?________________________

    A. Address____________________________________

    B. Phone______________________________________

2. Who should be contacted to arrange the visit?____________

    A. Position with firm____________________________

    B. Phone______________________________________

3. Would someone be able to visit the classroom to prepare for the trip or follow it up?______________________________

4. For what age children is the tour appropriate?____________

5. How many can be accomodated at one time?________________

6. How many school groups can be handled per year?___________

7. What is the best time of year to visit?___________________

8. What is the best time of week to visit?___________________

9. What is the best time of day to visit?____________________

10. How much time is needed for the visit?____________________

11. What is the cost to the pupils?________To the school?_____

12. Are there facilities for meals?____________________________

13. Is there ample parking space?______________________________

    A. Bus_________________

    B. Car_________________

14. What can be seen, heard, tasted, felt, etc. that you feel is unique to your business?_______________________________

    ____

    ____

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Questionnaire Cont.

15. Do you have special exhibits, films, tapes, etc. that could be used for instructional purposes? If so, what are the subjects and how may they be secured?______________

____

____

16. Brief description of the tour______________________________

____

____

17. Is guide service provided?________________________________

18. Are there any special safety precautions to be observed during the visit?____

____

19. In what other ways can the business and industries of this area contribute to the education of our young?____________

____

____

____

____

____

20. What can the school community do for you?________________

____

____

____

____

____

E. HOW TO GET MATERIALS AND OTHER SERVICES

Texts, workbooks, films, filmstrips, and other programmed materials are useful, but only a teacher's imagination will search out materials and services from local resources.

The district's professional library, learning centers of the schools, and even classroom library may be starting points for resource materials. Liason with interested parties in the community, especially parents, will help to keep materials relevant and appropriate to the interests of the children. Free materials are available from many sources within the community as well as from national foundations and trade associations.

Many "public relations" materials, especially films, may be borrowed at little cost. Teachers will be doing the business concerns a favor by utilizing the office which is set up to promote the company's image.

State office personnel and faculty of state universities are available for a variety of services. Requests may bring individuals or instructional teams to aid with specific projects.

F. SUGGESTIONS FOR STAFF DEVELOPMENT ACTIVITIES

Here are some suggestions which may help you generate support in your school setting:

1. An ad hoc committee made up of classroom teachers and administrators to talk about activities for interested teachers.
2. Visitations to classrooms where World of Work instruction is being planned and implemented (within and outside the school district).
3. Special workshops to focus attention upon educational goals and outcomes.
4. In-service meetings to share teaching skills which bring children into contact with active adults.
5. Lay advisory committees to suggest new directions and priorities.
6. Grade level teams reporting to school faculties and parent groups about forthcoming programs.
7. Special projects by learning center directors to highlight particular careers or to show the relevance of academic content to particular occupations.
8. Pilot projects to test selected concepts in classroom settings.
9. World of Work fairs and other all-school projects that bring school personnel and people in the community together for sharing activities.
10. Consultant help from state office personnel and/or university faculties.

These may be suggested to curriculum developers, administrators, and other educational leaders in your school district.

IV. A CREDIBLE THEORY OF PRACTICE

This section includes ideas and outlines to help teachers implement specific skills within an ongoing instructional program.

Basic, life-centered activities can be woven within the regular curriculum to motivate, to increase relevance of instruction, and to furnish performance opportunities for the purposes of evaluation. *Learning by doing* is an old maxim. *Planning by doing, teaching by doing,* and *evaluating by doing* are maxims that guide us toward a self-confident instructional program.

Through activity we discover life!

A. INTERVIEWING: A Basic Instrument Of Inquiry

As you organize how the content of your instruction will be accessible to the children, your plans will lead you to use people from the community. Interviewing skills might have to be taught in order to facilitate your plans. Perhaps the most obvious skill involved in interviewing is asking appropriate questions.

The following list of questions may help you, your guests, and your class get started with this important tool of communication and inquiry.

The questions are designed for children who are learning to interview.and can also be presented to an adult prior to his visit. They can also be used for conducting a group or class conference with adults in school or at the resource site.

The depth and quality of the interview will depend, of course, upon the preparation each interviewer has in the area. Also, motivation to find out will be an important factor. Those who are avidly curious will push the process of inquiry to its appropriate limits.

Certain questions will be appropriate to some areas and not to others. However, there is a commonality to the process of interviewing and the teacher can guide students to learn many of the general communication skills necessary for effective interviewing.

Interviewing skills are merely one branch of the communicative arts. Once children learn to communicate through the process of interviewing, they enter other worlds of discourse and many realms of meaning.

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Some typical questions you may ask are: Can the children do it? Will there be some foundation upon which I can build? Will I be able to get this new material across? Which children won't get it? Which ones will need much practice? What if they're not interested? What if there isn't anyone who cares?

Interviewing is a vehicle as well as a bridge. It is a process and content. It is something that can be taught by itself and something that can be taught by interweaving it within traditional subject matter.

The last section on evaluation has proved helpful in setting standards for learning performance and increasing the visibility of the inquiry process.

DEVELOP SKILLS THROUGH ROLEPLAYING

Pre-stressed performance skills can be laced into the varied activities of the school year. If this is done on a regular basis, the children's efforts will not dissipate when tested by adult characters in real settings.

Tapes of children interviewing each other are easy to make and allow for healthy criticism of learning performance. Dittoed sheets of questions with spaces for responses also offer tangible supports. Stick puppets and other media can be used for roleplaying practice.

A teacher can build a platform of appropriate materials for one class, then use it to introduce new concepts to other groups. Also, prepared tapes (of actual interviewing) are available from commercial sources. "Friendly" school personnel afford excellent first experiences.

QUESTIONS STIMULATE INTERACTION

1. What do you do on the job? (Children are interested in how school-taught skills fit in with real work.)
2. Why did you take this job? Did others agree with your thinking?
3. What tools do you use? Is there a special way of talking about your work?
4. Was this your first job choice? How many times did you change your mind about what you wanted to be before you went to work? Why?
5. What part of your job do you like best? Why? What part of it do you wish you didn't have to do? Why?
6. Who depends upon your work? Upon whom do you depend for your work?
7. What experiences and training on this job might prepare you for some other kinds of jobs should you ever want to change?
8. How does your job affect your personal life? Do you have to work nights? Are you tired when you get home? Do you have noise during the day so that you need quiet at home at night? Do you have a job where you have to be nice to people all day - even people who are crabby and ill-mannered?
9. What inventions could put you out of work?
10. Are people with your kinds of skills usually needed - even when business may be bad? Is your work at all seasonal? Where could you work in this occupation? Is your kind of work limited to geographical areas?
11. What kind of education is necessary for this kind of work? Apprenticeship? Trade school? College? Advanced degrees? Is there any personal quality for this job that is really more important than diplomas?
12. About how much money can a person earn in this kind of work? Is there a chance of getting a lot of money all at once? of losing a lot of money quickly?
13. When does your boss compliment you? (or when do you compliment your employees?) When are people fired?
14. Is there anything we should have asked? What would you like to ask us?

CONFERENCING LEADS TO TRUE SOCIAL STUDIES

When a resource person is sharing information with a group of students in a conference setting, it might be helpful to send the talent a list of the questions the class is considering. Your note can explain that the purpose of the meeting is to get some information about an occupation from a person actively involved in that occupation.

Familiarize your students with questions as those listed above. Ask the students to mark those they would like to ask. Questions should be asked with the understanding that the resource person does not have to answer.

Each interview will be a new opportunity for ideas to develop. Your analysis of the growing threads of the discussion and your firm, but subtle leadership toward target goals will move irrelevant talk toward fruitful discourse.

Be alert to step in and help facilitate communication if you see either the student or the resource person is not understanding what the other has said. Feel free to ask questions of your own to clarify answers whenever it is desirable to do so.

If you explain the reasons behind children's questions, resource people and students will sketch more appropriate pictures in their mind's eye. As you relate their brief ideas into areas of class concern, shy adults (or students) and the academic activities of your classroom will be pulled together. *The teacher has to be the bridge.*

Young children can move curiosity into inquiry, inquiry into the academic domain, and academic performance into healthy character and career development. The bridge to becoming has to be built upon, with, and for people.

Teaching children to inquire from primary sources, the adults in your community, builds a firm place for career development to begin. Children will be more ready to relate school studies to life-centered activities and more prepared to make appropriate choices for their developing lives-to-be.

EVALUATE INTERVIEWING SKILLS AS INSTRUCTIONAL CONTENT

How do you know when children have learned to interview? *How can you tell they are making progress toward that accomplishment?*

Local conditions shape standards. Different criteria have to be applied depending upon individual expectations. However, *your view of children's performance will determine an assessment of their progress and achievement.* To help you focus upon visible evidence, the following questions are offered:

1. Can the child roleplay the interviewing process?
   a. Does the "Interviewer" question with a purpose?
   b. Does the "Interviewer" follow a strategy?
   c. Does the "Interviewer" show appreciation for the feelings of the person being interviewed?

2. What products show that the child is "interviewing?"
   a. How are the interviewed person's thoughts recorded?
   b. How is the interview reported to others?

3. Can the child explain interviewing skills in writing?
   a. Are steps in interviewing set out in an orderly manner?
   b. Can the child judge his own talents against what has been set out for the class?

4. Does the child use interviewing skills in voluntary situations?
   a. Are ordinary encounters turned into learning situations?
   b. Does the child seek interviewing situations?

5. Does the child read "interviews" in newspapers and magazines or watch "interviews" on television?
   a. Does he volunteer information about media presentations that highlight interviews?
   b. Does he share what he has experienced (seen, read, or heard) with others?

6. Does the interviewed person send feedback to the teacher and/or class?
   a. Are expressions directed to the content of the interview? the studies of the class?

7. Does the child express a hope to work in an occupation which requires interviewing skills? (Sales? Receptionist? Teaching?)

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B. SKILL AREAS

Will career education allow for teaching of the basic skills? How can I relate skill areas to specific activities and to community resources?

These questions are most frequently asked by elementary teachers when first introduced to the concept of career education. The purpose of this section outlines a few skill areas in language arts, mathematics, science, and social studies and relates them to persons-in-the-occupation and life-centered activities. A few examples for primary, intermediate, and upper levels of the elementary school are included.

Teachers using "open school" or "individualizing" approaches will appreciate the structure our outlines offer. From such a secure base, a teacher can plan activities which encourage education to become a social process.

Teachers using programmed material and working with subjects within specific time frames will appreciate the opportunity to take an idea (from a traditional content area) and develop relevant projects. One of our themes has been *TAKE AN IDEA AND SEE WHERE IT LEADS YOU.*

LANGUAGE ARTS AND CAREER EDUCATION

. . . PRIMARY . . .

SKILL	PERSON-IN-THE-OCCUPATION	LIFE-CENTERED ACTIVITY
Identifies letters of the alphabet	File Clerk	Alphabetizes names of students in class
Forms letters legibly	Sales Clerk	Set up store and write receipts for articles
Pronounces words correctly	Telephone Operator	Roleplay phone company operations
Uses acceptable spacing and alignment	Person who does Newspaper lay-outs	Practice forming letters and words on advertising pages of newspaper
Places events in sequence	Sportscaster, Reporter	Retell stories using proper sequence
	. . . INTERMEDIATE . . .	
Selects appropriate words when writing	Secretary	Write letters to outside talent
Organizes and expresses thoughts clearly	Factory Foreman	Write a report of tasks completed
Spells correctly	Proofreader, Signmaker	Proofread an article for the class newspaper
Follows oral directions	Gas Station Attendant	Follow oral directions to clean out cabinet
Makes inferences from reading	Newspaper Editor	Group discussion on a contemporary social issue
	. . . UPPER . . .	
Speaks with poise and confidence	Restaurant Hostess	Plan a social event for parents and interested community people
Summarizes and organizes in outline form	Minister	Report interviews with adult talent
Transmits intended meaning through oral communication	Lawyer	Arrange a mock political debate
Analyzes content	Advertising Manager	Write ads
Punctuates correctly	TV News Writer	Write a news article to be read out loud
Clarifies complex material	Seamstress, Tailor	Follow simple written directions to make a wall hanging

. . . PRIMARY . . .

SKILL	PERSON-IN-THE-OCCUPATION	LIFE-CENTERED ACTIVITY
Identifies kinds of plants	Florist	Collect, identify, and display various types of plants
Identifies kinds of animals	Veterinarian	Organize a program for a Pet Day
Describes 5 basic senses	Baker, Perfume Saleslady	Buy ingredients and bake for a social event
Discusses sun as a source of heat and light	Farmer	Plant seeds in darkness, shade, and direct sunlight. Observe growth
Discusses growth in regard to living things	Pediatrician, Parent,	Display photographs of children with stories about special events at particular times in their development
	. . . INTERMEDIATE . . .	
Classifies animals into groups	Zoo or Museum Worker	Organize a make-believe zoo
Classifies plants into groups	Gardener, Agronomist	Convert school grounds into a botanical garden
Demonstrates how chemical changes produce new materials	Artist, Chemical Engineer, Fire Extinguisher Salesman	Make plaster of paris sculpture or fire extinguishers. Display products and report about process
Discusses basic water cycle, rain, evaporation and clouds	Weather Reporter on radio or TV	Set up model weather station
Plans an electric circuit	Electrician	Experiment with batteries, bells, bulbs, buzzers, and beepers
	. . . UPPER . . .	
Demonstrates an understanding of metamorphosis	Pest Control Specialist, Butterfly Collector	Gather cocoons (or tadpoles) and record developmental stages
Plans testing of concepts by identifying hypothesis and variables	Race Track Mechanic, Highway Safety Engineer	Conduct experiments using hypotheses
Demonstrates an understanding of the rotation of the earth	Communications Specialist, Meteorologist	Set up a model solar system
Demonstrates understanding of gravity	Pilot	Build miniature rockets
Demonstrates understanding of vibrations and sounds	Disc-Jockey, Musician	Tape record musical compositions
Demonstrates understanding of chemical change	Pharmacist	Make root beer

. . . PRIMARY . . .

SKILL	PERSON-IN-THE-OCCUPATION	LIFE-CENTERED ACTIVITY
Follows simple map directions	Policeman	Make a map of neighborhood
Discusses time sequence in terms of people's lives	Relatives and Friends	Describe how grandparents dressed as a child
Uses communication to foster social interaction	Postman	Organize a classroom postal system
Recognizes important national, historical personalities	Historian, Librarian	Pantomine or roleplay their favorite historical figure
Discusses importance of the community water supply	Water Commissioner	Make a collage showing the uses of water and explain it to other classes
. . . INTERMEDIATE . . .		
Compares agrarian development in different countries	Salesman for farm supplies	Make a collage showing various tools, methods, and products of different countries
Explains the development of items in their historical sequence	Car Dealer	Arrange pictures and models of automobiles in a historical time sequence
Demonstrate how land is used in relationship to topography	Real Estate Salesman	Make models showing different land types: (mountains, plains, swamps)
Investigates institutions in local community	Board Member, Superintendent, Representative of Teacher's Organization	Interview school administrator, board member and teacher, and make chart showing interrelationship of roles
Locates building on a city map	City Planning Commissioner	Make a model town
. . . UPPER . . .		
Explains legend on a map	Highway Engineer	Chart cross-country trips
Discusses development of local industry in relation to natural and human resources of area	Local businessmen, Farmers, etc.	Exhibit products grown or developed by local industry
Discusses contributions of significant people during a certain period of history	Historian, Librarian	Create a play in which historical figures are the main characters
Compares values of different cultures in relationship to births and burials	Various speakers representing various cultures	Make a display denoting the different customs from the cultures studied
Discusses basic economics of a business	Member of the Chamber of Commerce	Set up a "mock" company

. . . PRIMARY . . .

SKILL AREA	PERSON-IN-THE-OCCUPATION	LIFE-CENTERED ACTIVITY
Solves simple number sentences (1+1=2)	Housewife	Use recipes
Counts from 1-100	Stock Boy	Inventory materials in room
Measures quantities	Clerk	Display items sold by the pound, ounce, pint, gallon, etc.
Recognizes and cuts out shapes	School Crossing Guard, Bus Driver	Make safety signs by cutting out squares, circles, triangles, etc.
Tells time - figures hours, minutes, etc.	Timekeeper	Keep time sheet of classroom activities
	. . . INTERMEDIATE . . .	
Utilize addition, subtraction, multiplication, and division concepts	Banker	Set up model bank in classroom
Makes change	Grocery Store Clerk	Set up model grocery store
Discusses understanding of fractions	Chef	Follow recipes
Reads and writes temperatures, Centigrade and Fahrenheit	Nurse's Aide	Record temperatures of students. Read patient charts
Constructs and reads graphs	Sales Manager of car dealership	Graph sales of each class member for a money-making project
	. . . UPPER . . .	
Solves word problems	Carpet Layer, Furniture Salesman	Measure furniture in room for possible rearrangements
Finds perimeters and areas	Architect, Draftsman	Make scale drawings of school building
Finds diameter, radius, and circumference of circles	Tire Salesman	Measure bicycle and automobile wheels and compare costs
Finds volume	Building Inspector	Find cubic areas of rooms in the school
Finds percents	Bank Loan Officer	Operate a model bank
Knows time zones, daylight time, AM & PM	Airline Pilot	Figure time differences encountered on vacation trips. Discuss health implications

C. CAREER EDUCATION COMES TO LIFE

By Mrs. Virginia Weston
Teacher
Willow Grove School
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and

Mrs. Janet Whealon
Career Education Specialist
ABLE Model Program
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Four first grade teachers in Willow Grove School in Buffalo Grove, Illinois, have been involving their students in career education projects throughout the year. They involve children in learning experiences with local community resources, relate school experiences to life outside school, and help children learn to make decisions. The following describes one of their cooperative ventures during February, 1972.

The Willow Grove teachers decided to have their children learn about people who sell things, store owners, and stores in general. The next few days were spent planning with the students, making lists of the different kinds of stores, and discussing the various types of jobs involved. As a result of this introduction, the children suggested they would like to operate a department store.

The teachers thought each first grade class could be responsible for one department within a large store, but did not go into details about the financial aspects of the project. To help the children gather appropriate knowledge from primary sources and to help the children learn to interview adults, the teachers decided to invite members of the business community to their classrooms so that the children could inquire directly from them.

The first visitor was a banker. He explained how his bank helps businessmen finance their stores. He brought slides and other hand-outs as well as mini-budget books for mini-allowances. Through their interviewing of the banker, the children discovered that banks are businesses that make money by handling money.

Once a few key financial concepts were explored, a district manager from a local department store was interviewed. He explained how, why, and where stores are located and how merchandise is selected for each individual store. He also brought a supply of catalogues and showed the children how to use the order form.

Another department store manager visited and the children learned about promotions, sales items, cashiers, etc. To learn how stores got their products to sell, a factory representative from a food manufacturing concern explained his job in person. The children found out that a network of relationships exist behind every department store sale.

One of the most interesting interviews was with a wholesale salesman. The children were especially interested in the fact that a salesman is "his own boss", that he has no regular hours, that he has no office or place of employment where he is required to be each day. This led into a discussion of commissions and, interestingly enough, self-discipline.

But people didn't only come to school to be interviewed. All four classes visited a department store owned by one of the first-grader's father. The children were guided through the accounting, receiving, shipping and sales departments.

In addition, the children made trips after school to various stores such as a bakery, a pet store, a drug store, and a large department store. This was done in small groups after school under the supervision of volunteer mothers. The children wrote individual learning contracts before going, and then reported their findings to the class when they had fulfilled their contracts.

Direct experiencing built motivation for scholarly activity and social projects. The children were eager to open their own store. The children chose an area of special interest to them. They proceeded to form groups, plan their operations, and stock the area of the classroom that had been designated as their store.

Four stores were put into operation - a boutique, a sweet shop, a toy shop, and "Take-Five Store." The "Take-Five Store" was a place where children could purchase tow cookies and juice for five cents as well as rest while they were shopping. Many aspects of operating a store came into play -- production of articles to be sold, planning the physical layout of the store, pricing, advertising, and selling.

Some of the children made decoupage plaques and necklaces with the help of two volunteer mothers to sell in the boutique; some made candy for the sweet shop; some made cookies for the "Take-Five Store"; some repaired toys which they brought from home to sell in the toy shop. Involvement in these activities produced tangible accomplishments in the academic areas of language arts, math, social studies, and science.

Oral language skills were developed through interviewing; written language skills through the writing of notes, reports, and thank-you letters to the people who visited; mathematical skills through measuring ingredients for the candy and cookies. Each child was involved in an educational activity that combined many dimensions of the child's work-play world. Each child was learning to inquire from primary sources in his own community, to relate school studies to his life outside of school, and to make decisions appropriate to his maturational age.

D. FORMS FOR EVALUATION

HOW I FEEL ABOUT THE WORLD OF WORK

(Developed with the help of
Mrs. Judith White, Bowling Green,
Kentucky)

DIRECTIONS: Read each question carefully, then circle yes or no: (You will not be graded on this - there are no "right" or "wrong" answers -- just answer according to how you feel.)

Yes No 1. I like studying about the World of Work.

Yes No 2. I like to interview people about their work.

Yes No 3. Every person's job is important.

Yes No 4. When we go on a field trip, I try to watch people at work.

Yes No 5. I would rather study as I did last year, instead of studying about the World of Work.

Yes No 6. My subjects in school seem to "fit in" with my studies about the World of Work.

Yes No 7. I am thinking more and more about the work I want to do when I grow up.

Yes No 8. I know more things about peoples' jobs now than I did when school started.

Yes No 9. I want to be prepared to get a good job.

Yes No 10. I feel important when I interview people.

Yes No 11. People who come to school for us to interview seem to like talking to us.

Yes No 12. People should be happy with their jobs.

Yes No 13. Earning a good amount of money is important when you are choosing a job.

Yes No 14. I would rather make a lot of money on a job than be happy on a job.

Yes No 15. I would rather be happy with a job than make a lot of money on a job.

Yes No 16. It is all right to change jobs if you want a different job.

Yes No 17. In school, we learn many things which we will use later on in a job.

Yes No 18. People must learn to get along with each other and work well together in order to be good workers on the job.

Yes No 19. I sometimes tell my parents about the World of Work program.

Yes No 20. I want to study the World of Work next year.

Yes No 21. There are many good jobs which you can have without needing a college education.

Yes No 22. A job in which your hands or clothes get soiled is as important as a job in which you stay clean.

Other questions which seek to gather feelings and thoughts from the affective domain might be:

1. When I talked to my parents about our World of Work activities they____
____

2. When I talked to my friends about our World of Work activities they____
____

3. In my opinion the difference between work and play is____
____

4. Things that make me feel important are________________
____

5. Things that are important to my teacher are__________
____

SOME THINGS I HAVE LEARNED ABOUT THE WORLD OF WORK

DIRECTIONS: Answer each question the best you can. You will not be graded on this.

1. Name one thing you like <u>best</u> about studying the World of Work.______________________________

2. Name one thing you do not like about studying the World of Work.______________________________

3. Name 5 of the best interviewing questions you ask people:

    1.______________________________

    2.______________________________

    3.______________________________

    4.______________________________

    5.______________________________

4. Name 3 interesting or unusual things you have learned about any jobs you have studied?

    1.______________________________

    2.______________________________

    3.______________________________

5. Do you have any ideas about what you want to do when you grow up?________ If you do, tell why you would choose the job you think you want.______________________

    ____

    ____

6. If there are some jobs you would like to learn about which we have not studied, name them:______________

    ____

7. Which school subject seems to "fit in" best with studying about the World of Work?____________________

8. Which of your school subjects do you like best?____________________ Have you used this subject in learning about the World of Work?____________________
If so, how did it "fit in?"____________________

____

9. Which subject do you like least?____________________
If you could interview any one in the world, who would you choose, if you knew that they would come to talk to us?____________________

10. Are you learning from other students in the class by sharing your ideas and classwork?____________________

11. My teacher can help me more by doing____________________

____

12. In the space below, name as many units as you can which we have studied, the person interviewed, and some words you studied in the unit:

Name of the Unit	People We Interviewed	New Words

V. PLANNING MODELS

Thinking about what to do as a teacher can begin with *any* idea. A teacher can think of an object, an activity, a goal, a theme, or a person and then proceed to plan.

What a teacher does with an initial idea is significant. *Does a teacher's imagination guide the idea's development into professional dimensions?*

Our thesis is that the way in which an emerging idea is guided determines *thought* as well as deed.

Some insight into what might be outcomes of thinking through the organizing center approach follows. These planning models indicate ideas that may find relevance at several levels of the educational ladder.

BUILDING ■ OCCUPATIONS ■ Architect
Carpenter
Lumber Yard Salesman

Building, *as an idea*, has great generative qualities. By itself, it offers wholesome and worthwhile areas for study. However, we feel that the idea is too broad for use as the center of instruction in the elementary class setting. Young children need more than an abstraction. They need the warmth and color of real human characters.

An occupation can be an organizing center for instruction in the elementary school. The "content" of an occupation gives the teacher a variety of instructional choices and focuses upon life-centered activities. Also, personal authenticity is brought directly to the classroom.

All three occupations could be studied at once. That would require a great amount of pedagogical talent. We advise those entering our program to *plan one step at a time* until such time as large blocks of activities and events fit into place. Each page is designed to *help the teacher think through specific doing* possibilities for each occupation.

This introductory brochure is not intended as a teacher's guide for lesson by lesson instruction. Rather, it is seen as one of the many materials a teacher looks over in order to prepare for that sudden coming together of insight and expertise that is the hallmark of the artist-professional.

Illustrations of more detailed planning, implementation, and evaluation will be available at project headquarters.

ARCHITECT

ACCESSIBILITY

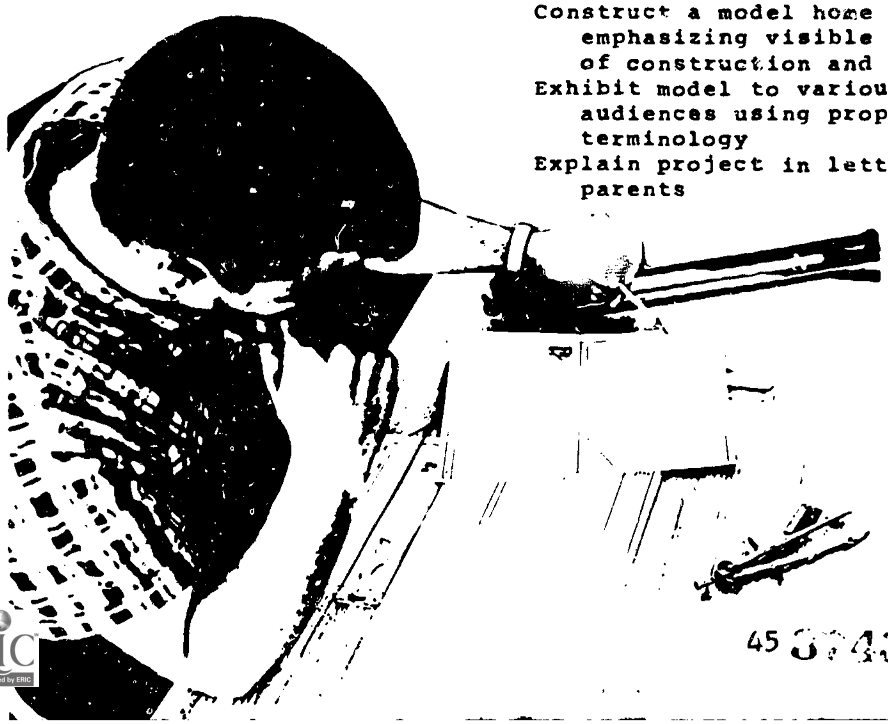
Architect
Realtor
Plan books and blueprints
Model home
Library materials (including films, filmstrips, tapes, etc.)
School building

MOBILITY

History of home structures
Planning and design of a structure
Coordination of products and services for a specific goal
Esthetic qualities of house and environment
Economic factors of construction
Building codes and zoning laws
Community services to house (gas, water, electricity, streets, sewer)

ACCOMPLISHMENT

Interview with "talent" to be written as an article for the school newspaper
List values which determine home design and construction
Roleplay home buyer and architect
Draft a design to scale
Interview city officials who supervise zoning and building codes
Construct a model home emphasizing visible features of construction and services
Exhibit model to various audiences using proper terminology
Explain project in letters to parents



CARPENTER

ACCESSIBILITY	Carpenter House under construction Work room with hand tools School building Children's apartments or homes Library materials
MOBILITY	Carpentry skills, training and working conditions Tools and technology (prefabrication) Mathematical skills Vocabulary development History of carpentry
ACCOMPLISHMENT	Handle tools and use terminology in reports and exhibits Interview workers in building trades for articles in school newspaper Outline steps in house construction Figure costs of lumber (side walls, flooring system, roof system) Write letters to parents about the features of a carpenter's work Report on the history of a carpenter's work Report on home repair carpentry

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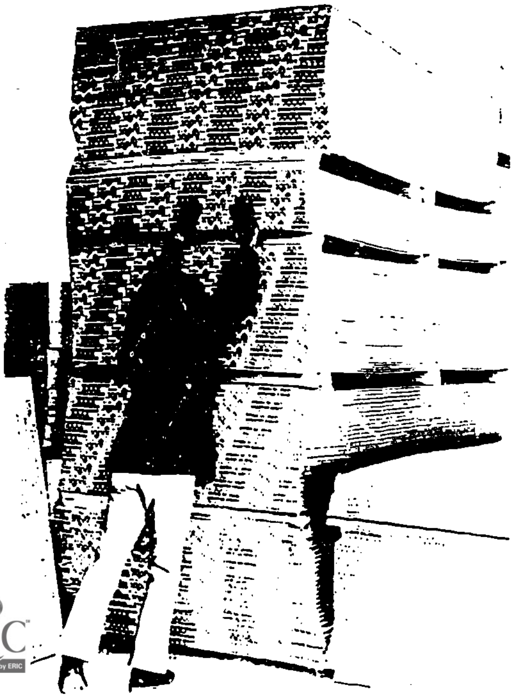
LUMBER YARD SALESMAN

ACCESSIBILITY	Salesmen from lumber companies Lumber yard Forest preserve Trees around school area Library materials
MOBILITY	Home building products (manufacture, transportation, sales) Occupations, geographic areas, characteristics of job, future of industry Cultural traditions Conservation and development of natural resources New products under development
ACCOMPLISHMENT	Map study (product maps) Exhibits of building materials to show processing from raw to finished product Write reports using vocabulary drawn from studies Interview community members about housing needs and desires Hands-on experience with different lumber yard products Collections of nails, woods, etc. to show variety of products and their uses Analyses of building products used in school construction Report on how products are maintained and serviced



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■

THE GREENHOUSE ■ OCCUPATIONS ■ Clerk
Floral designer
Grower

SAY IT WITH FLOWERS!

So many times in our lives we have given flowers to express such sentiments as joy, happiness, sorrow, love. We have used them to make social events more festive. Often we call a florist in the morning and expect to have flowers delivered in the afternoon. Have we ever stopped to think of the people, the time, the effort involved from the day the seed is planted until the moment the delivery man rings our doorbell?

The florist, as *an organizing center*, can be the means of having children learn to appreciate what goes on behind the scenes. This study of the *person-in-the-occupation* can set the stage for introducing them to social amenities of friendship, an area that may be forgotten in our increasingly technological world.

An imaginative *ABLE* teacher could use this topic as a springboard for going into the study of ecology as well as for developing interest in plant life. When one uses *a life-centered approach* to teaching, there are few limits to the possibilities available.

CLERK

ACCESSIBILITY

Clerk
Florist shop
Library materials (including films, filmstrips, tapes, etc.)

MOBILITY

Customer-clerk relations
Mathematical skills (money changing)
Holidays
Economics
Delivery methods
Geography

ACCOMPLISHMENT

Involve parents in discussion and write about how much of one's income should be spent on flowers
Roleplay clerk and customer ordering flowers
Figure out money exchanges
Figure out quantities of floral arrangements for a wedding or other social gathering
Make a chart showing cost of a variety of floral arrangements
Write a report on the floral needs of the community
Make a display of the kinds of flowers most in demand in the community
Hold a panel on the problems of a florist
Report on the risks involved in being a florist
List the occasions on which people send flowers
Have a play to illustrate holidays and the flowers associated with them
Describe the transportation used to insure fresh merchandise

FLORAL DESIGNER

ACCESSIBILITY	Designer Designer school Florist Library materials Posters Songs
MOBILITY	Artistic skill Appreciation of art (use of colors, shapes) Letter writing Poetry Music Sense-awareness (sight, smell, touch) Cultural traditions
ACCOMPLISHMENT	Cut out and display magazine pictures of floral arrangements Make and display arrangements for holidays Write letters to a designer school for information on kinds of arrangements List materials needed by a floral designer Report on ways of keeping flowers fresh Draw pictures of floral arrangements Pantomine sentiments expressed by giving flowers Study symbolism of various flowers Sing songs about flowers Write poetry about flowers Use real flowers as catalysts to expressions about sense awareness Save money to send flowers for Mother's Day

GROWER

ACCESSIBILITY

Grower
Greenhouse
Library materials
Posters
Catalogues of supply houses

MOBILITY

Botany
Chemistry (soil analysis and temperature control)
Vocabulary development
Agriculture
Ecology

ACCOMPLISHMENT

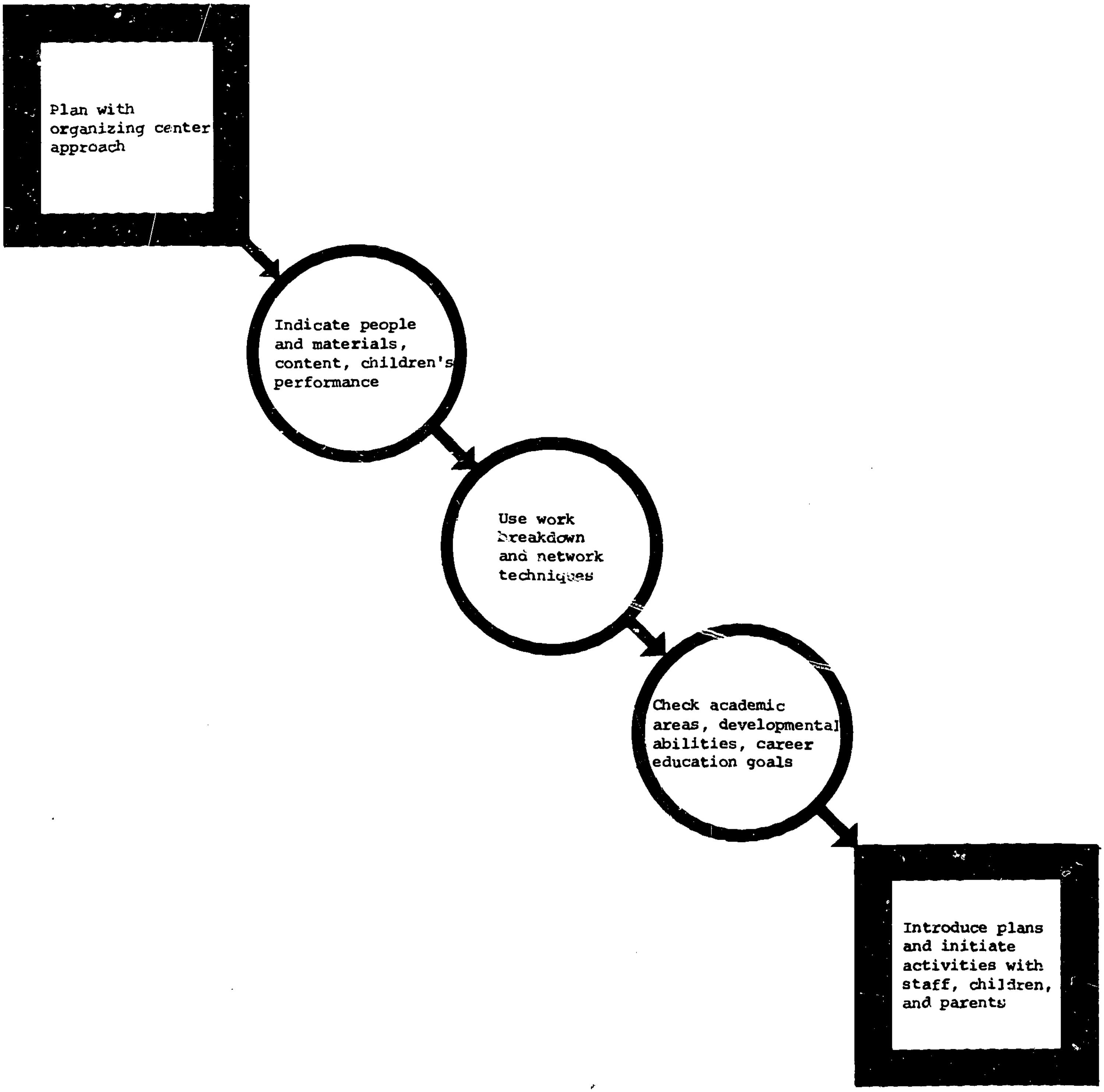
Report on work hours and duties required of a grower
Plant seeds and bulbs
Make a bulletin board showing kinds of soil
Report on importance of temperature control
Make a chart showing parts of a flower
Report on the care of a plant from seed to full bloom
Describe methods of killing bugs
Describe methods of fertilization
Make a picture file showing conditions necessary for growth of plants
Make a map to show where the most common flowers grow
Interview parents re: Why aren't there many commercials on flowers?
Describe how plant leaf looks under microscope

VI. AN ANALYSIS OF THE WORK OF THE TEACHER

The flow chart which begins on the next page is designed to help teachers understand what can be done. It is not intended as a prescription for a career education instructional program, but it does offer enough attention to detail so that communication about the work of teaching can be specific and practical.

A network of relationships shows how activities are interdependent. It also suggests where teachers need to establish priorities and which competencies are needed for *an effective instructional program involving active children and active parents.*

WHAT CAN AN able TEACHER DO?



Plan with organizing center approach

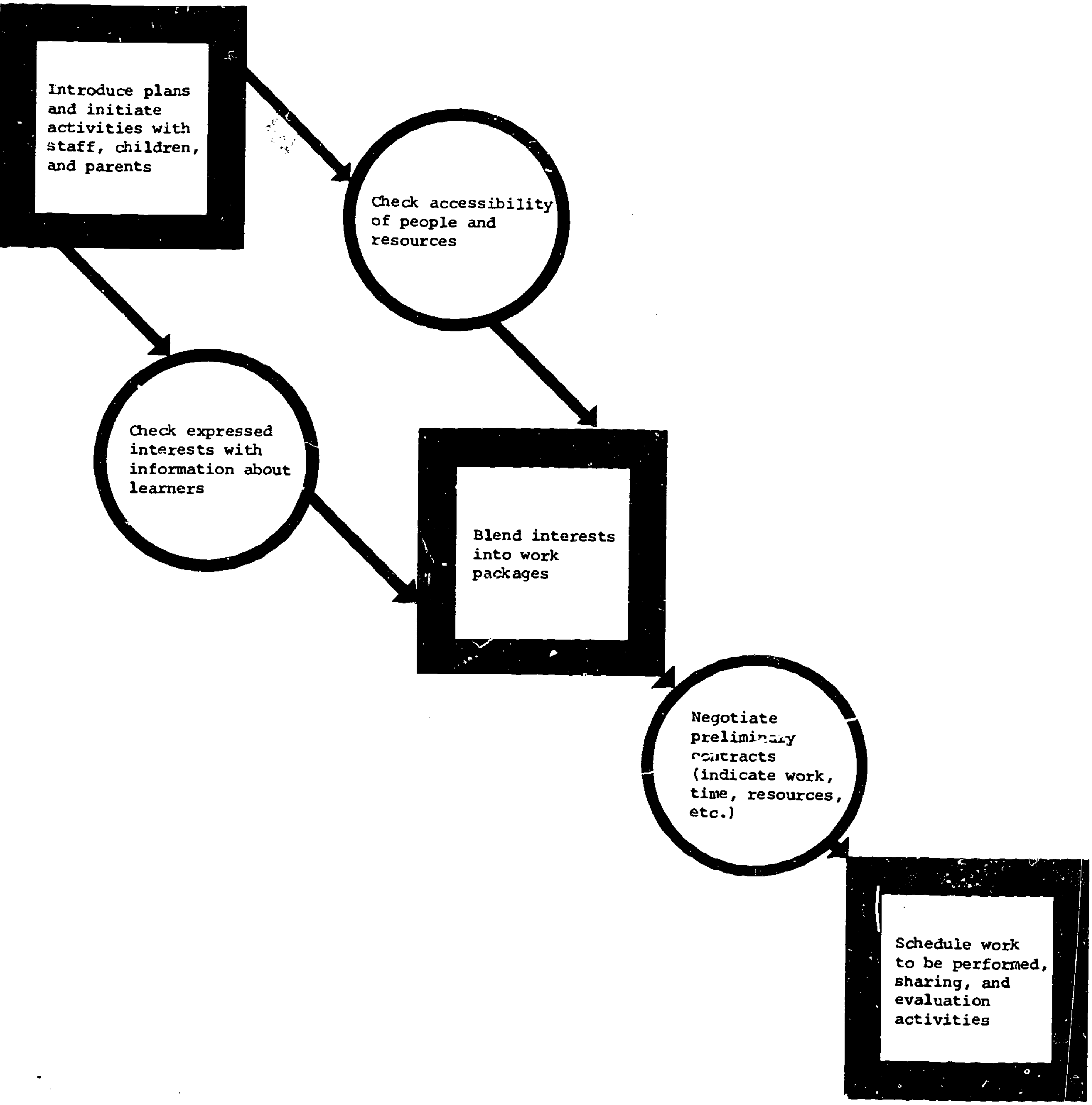
Indicate people and materials, content, children's performance

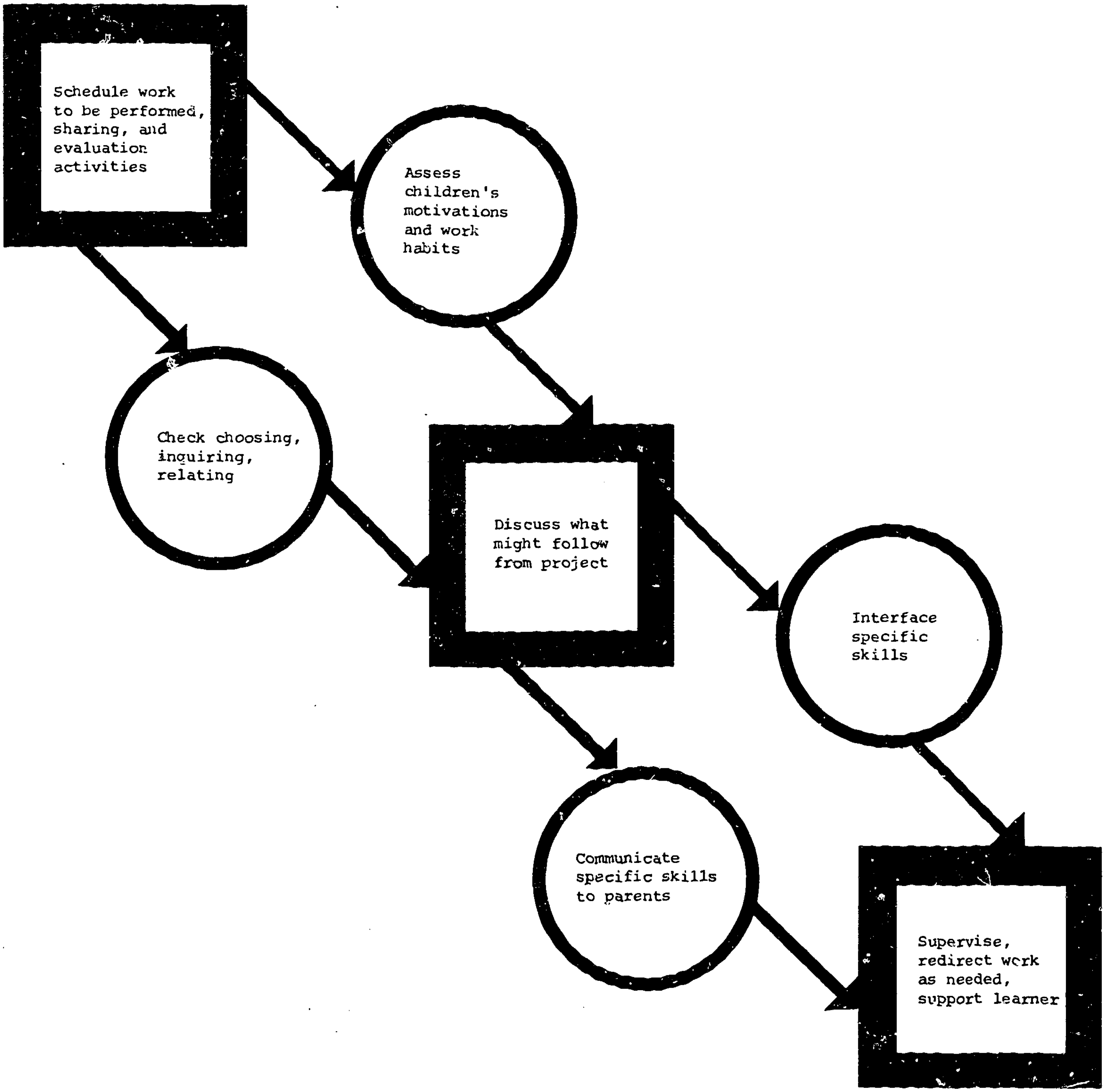
Use work breakdown and network techniques

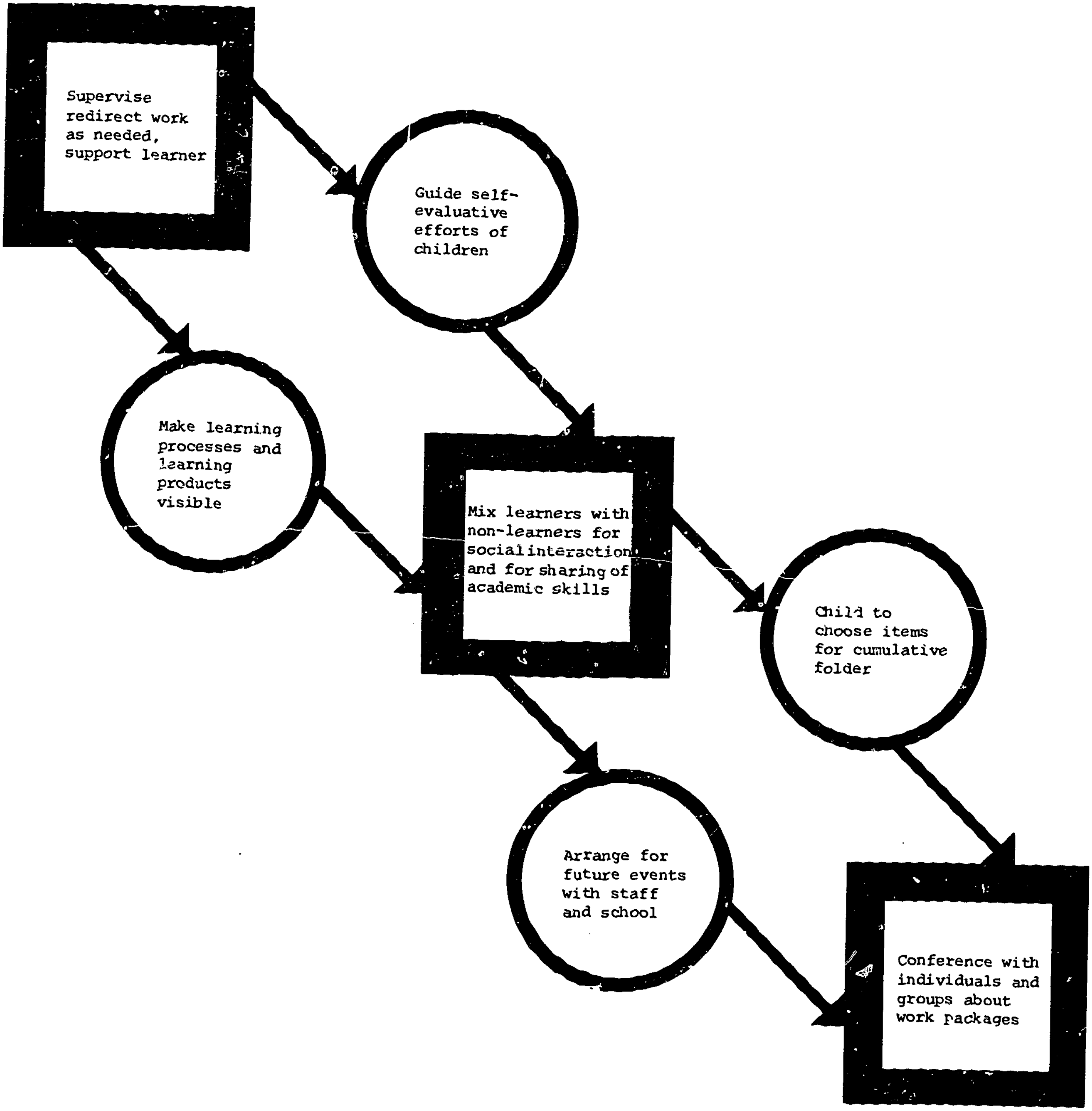
Check academic areas, developmental abilities, career education goals

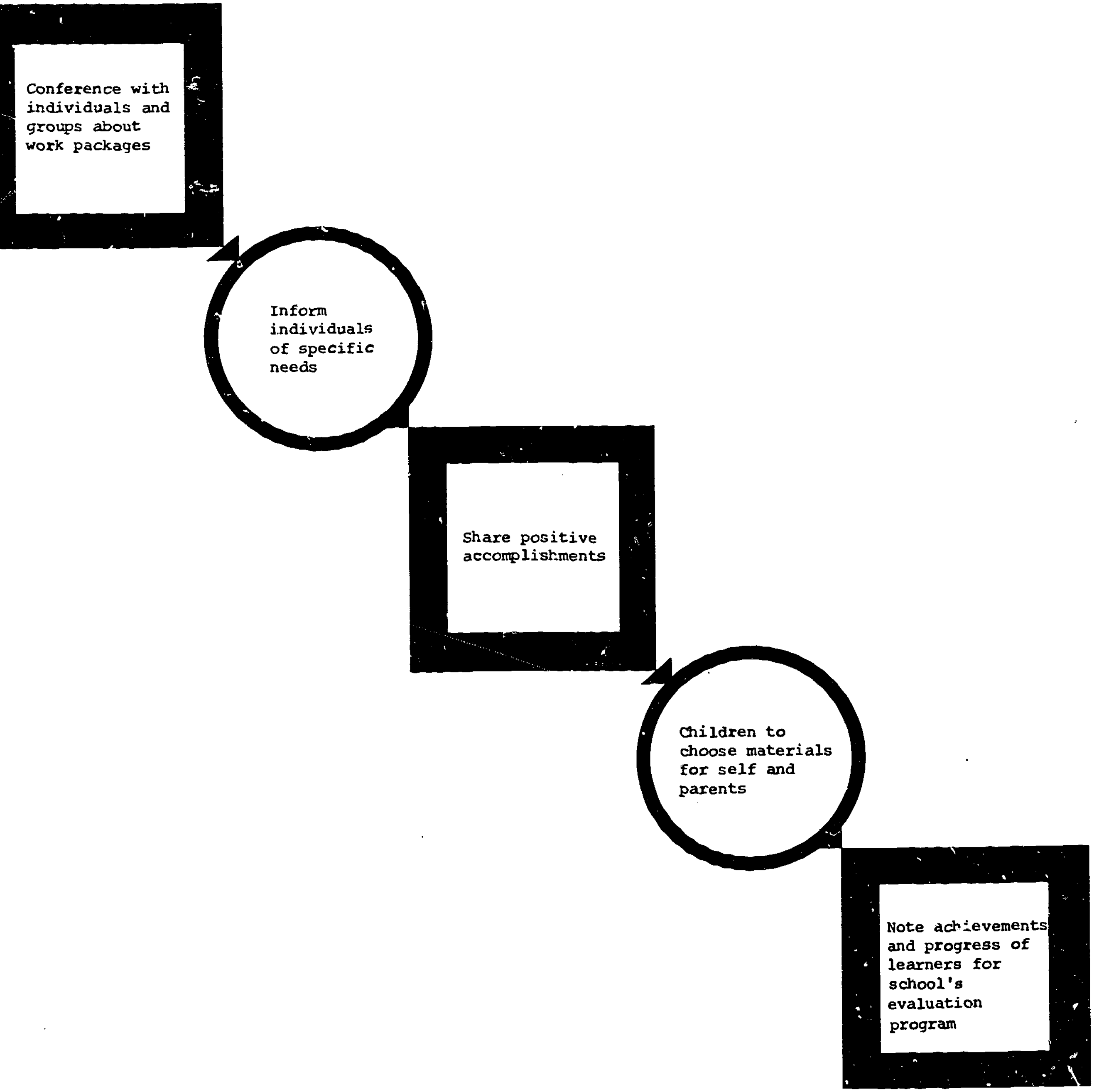
Introduce plans and initiate activities with staff, children, and parents

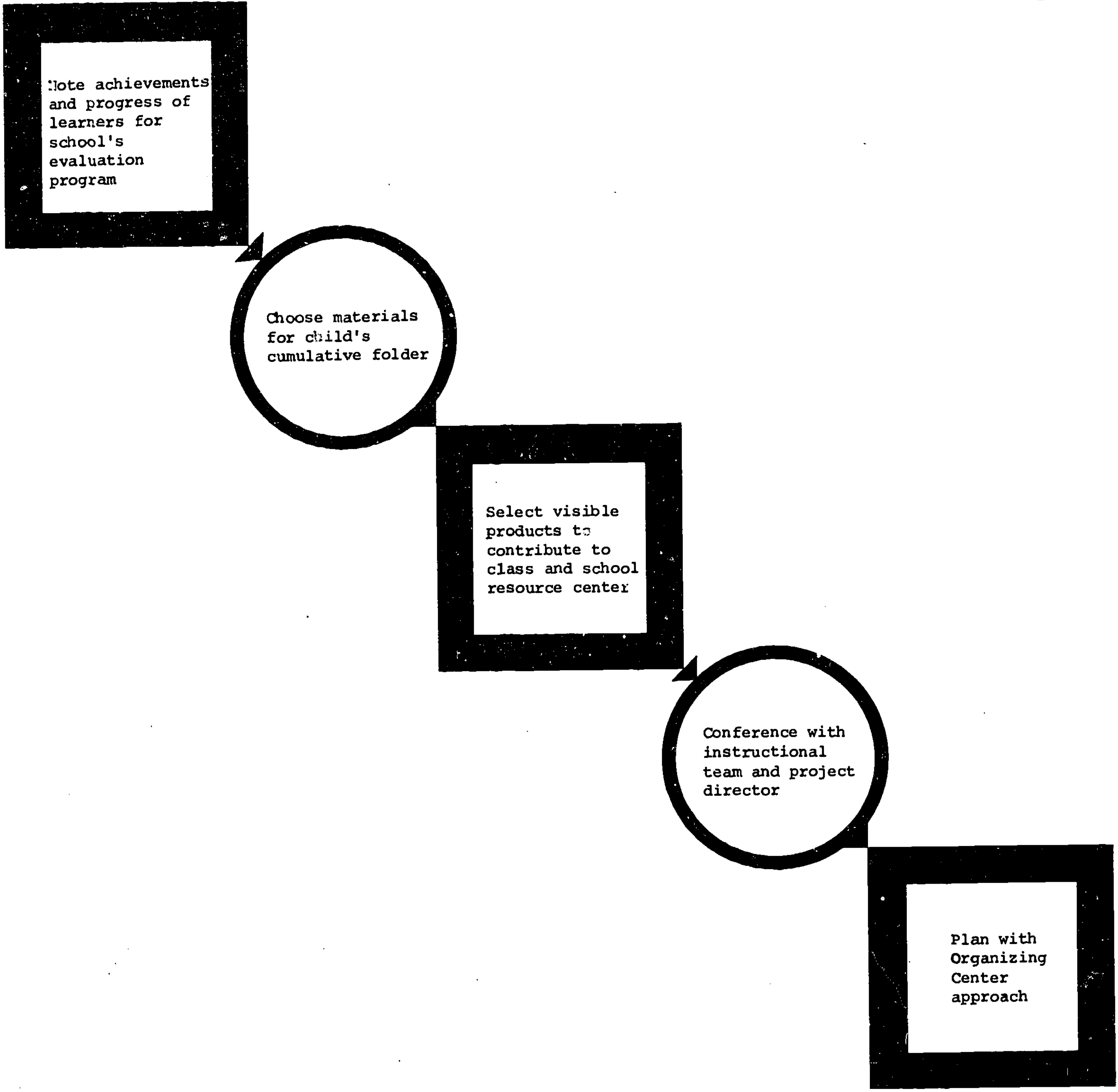
V


Introduce plans and initiate activities with staff, children, and parents
Check accessibility of people and resources
Check expressed interests with information about learners
Blend interests into work packages
Negotiate preliminary contracts (indicate work, time, resources, etc.)
Schedule work to be performed, sharing, and evaluation activities


Schedule work to be performed, sharing, and evaluation activities
Assess children's motivations and work habits
Check choosing, inquiring, relating
Discuss what might follow from project
Interface specific skills
Communicate specific skills to parents
Supervise, redirect work as needed, support learner


Supervise redirect work as needed, support learner
Guide self-evaluative efforts of children
Make learning processes and learning products visible
Mix learners with non-learners for social interaction and for sharing of academic skills
Child to choose items for cumulative folder
Arrange for future events with staff and school
Conference with individuals and groups about work packages


Conference with individuals and groups about work packages
Inform individuals of specific needs
Share positive accomplishments
Children to choose materials for self and parents
Note achievements and progress of learners for school's evaluation program


Note achievements and progress of learners for school's evaluation program
Choose materials for child's cumulative folder
Select visible products to contribute to class and school resource center
Conference with instructional team and project director
Plan with Organizing Center approach

VII. REVIEW OF K[illegible]DEAS DEVELOPED
BY ABL[illegible]GRAM

Teachers have found our emphasis upon the work of the teacher to be a refreshing change from curriculum development approaches which center upon the production of written guides, units, and other background materials. Unfortunately, many model builders are ignorant of classroom problems and furnish materials especially designed to make the teacher an assistant to the text. Our *teacher-oriented approach* establishes the teacher's imagination as the key instrument of instruction.

Our invention, *the organizing center*, enables teachers from a wide variety of school environments to agree upon the work that teachers must do in order to provide quality learning experiences. Planning through the organizing center encourages parent involvement and the utilization of resource people from the local community. It also sets specific, practical objectives for the students and the teacher.

The *person-in-the-occupation concept* is our way of focusing attention upon people and the work they do. Career education means refocusing content upon people and our approach sets workers, hobbyists, and other active adults within a human dimension that is psychologically sound and philosophically rewarding.

Our model includes instructional support systems such as a *teacher-parent communication system.* We feel the teacher's work to inform parents and other community people about the activities of the learners is necessary and significant.

All of our concepts are developmental. No one needs to undergo a lengthy program of in-service education to begin career development activities. We have tried to set out ideas on *a teaching continuum.* Those who find our concepts quite new can try them with a wink and a tickle while those who are already carrying out some of our suggestions may be seriously analytical and sophisticated in improving their expertise and effectiveness.

Management is an important concern of all teachers. Our ideas are intended to help teachers focus upon target goals, plan more relevant activities, and evaluate the qualities of instructional efforts. In a very real sense, the only person a teacher can control is himself. Our work should help a teacher be more skillful, more humane, and more self-confident.

Our outlines of integrating skill areas with career education and our materials about the teaching of interviewing skills are a result of our *research and development activities*. We try to plan with participating teachers to uncover needs and problems. Our mission is to develop a credible theory of practice. We are interested in a teacher's ideas because they emerged in the authentic instructional arenas of our schools.

Please contact us if you uncover problems we have not perceived or if you would like to contribute new ideas to our kaleidoscopic endeavors.

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VT 016 682
CAREER EDUCATION ACTIVITIES THROUGH WORLD OF WORK RESOURCES.

NORTHERN ILLINOIS UNIV., DE KALB.; ILLINOIS STATE BOARD OF OCATIONAL EDUCATION AND REHABILITAT RINGFIELD. VOCATIONAL AND TECHNICAL UCA N DIV.
MF AVAILABL T-ERIC SET.
ABLE MODEL PROGRAM, NORTHERN ILLINOIS UNIVERSITY, DEKALB, IL 60115 ($3.00)
PUB DATE - 72 158P.

DESCRIPTORS - TEACHING TECHNIQUES; OCCUPATIONAL CLUSTERS; *CONCEPTUAL SCHEMES; *ELEMENTARY GRADES; *CAREER EDUCATION; VOCATIONAL DEVELOPMENT; CAREER LADDERS; *RESOURCE UNITS; HUMAN RESOURCES; COMMUNITY RESOURCES; *LEARNING ACTIVITIES; TEACHING PROCEDURES; QUESTIONING TECHNIQUES HUMANITIES
IDENTIFIERS - CAREER AWARENESS; PROJECT ABLE

ABSTRACT - THIS BASIC RESOURCE UNIT CONTAINING CAREER EDUCATION ACTIVITIES WILL BE USEFUL FOR CURRICULUM SPECIALISTS IN IMPLEMENTING CAREER EDUCATION PROGRAMS IN THE ELEMENTARY GRADES. TEACHING TECHNIQUES INCLUDE FIELD TRIPS, ROLE PLAYING, INTERVIEWING, AND THE USE OF RESOURCE PERSONS. THE SEVEN TOPICAL UNITS FOCUS ON: (1) THE CONCEPTUAL FRAMEWORK FOR THE ABLE MODEL PROGRAM, (2) LEARNING ACTIVITIES AND RESOURCE MATERIALS, WITH CURRICULUM TIE-INS, (3) COMMUNITY RESOURCES, (4) PROGRAM PLANNING, (5) DIAGRAMS OF TEACHING PROCEDURES, (6) SAMPLE UNITS BUILT AROUND OCCUPATIONAL CLUSTERS, AND (7) DIAGRAMS OF CAREER LATTICES FOR VARIOUS GRADE LEVELS. PHOTOGRAPHS ILLUSTRATE THE TEXT, DEVELOPED BY MEMBERS OF THE ABLE MODEL PROGRAM, A RESEARCH AND DEVELOPMENT PROJECT IN CAREER EDUCATION. (AG)

Career Education Activities through World of Work Resources

able
MODEL PROGRAM

Career Education Activities through World of Work Resources

Career Education Activities through

Library of Congress Catalog Card Number: 72-589

Northern Illinois University, DeKalb, 60115

Printed in the United States of America

3762

World of Work Resources

Prepared by

able
MODEL PROGRAM

NORTHERN ILLINOIS UNIVERSITY

DeKalb, Illinois 60115

in cooperation with

The Division of Vocational/Technical Education

Board of Vocational Education and Rehabilitation

State of Illinois

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TABLE OF CONTENTS

Many people are writing curriculum guides, resource units, and putting together material which will help teachers focus upon the World of Work. We felt we could be of service to curriculum specialists who are helping teachers to reorganize classroom activities by gathering practical ideas from many sources and presenting them in one useful package.

Although we have some suggestions for the process of curriculum development based upon our experience in implementing Career Education activities and programs, we have only sketched how a school district might utilize committees, visitations, workshops, or consultants. Involvement is the key. The curriculum planner knows teachers have to be active participants in the renewal process.

Several brochures used in our research and development project illustrate specific performance. The practical suggestions have been appreciated by classroom teachers concerned with the details of management. We've organized the material in sections so that parts can be lifted and then amplified to local needs and resources.

Many school administrators will aim for a coordinated, articulated plan for the entire school spectrum K-12. This resource unit for those who are planning curricular renewal for their school districts is only a beginning. It does not propose a master plan for all teachers within the system.

One small step by teachers who thoughtfully plan, implement, and evaluate what they teach is worth more to a school system than a highly polished superstructure that is difficult to energize.

The end product should be what happens to the child. Therefore, what follows has been written with the teacher's imagination in mind. What the teacher thinks about instruction is reflected in how the teacher relates to the child.

Each new lesson or unit taught will add to the background of the teacher. Those who produce their own resource booklets should design activities so teachers can try out ideas as soon as possible. The teacher learns by doing, too. Booklets describing the actual lessons of the teachers are helpful because they build identification with the work of the practicing teacher.

A curriculum specialist's work to help teachers share what they have done should be just as thoughtfully planned and executed as the work to motivate new directions and set higher standards.

The frame of reference which follows is our attempt to share some of the most practical ideas we've come across. Let us know what you need to develop a vigorous program of meaningful activities and we shall try to be relevant to your needs.

Dr. Walter Wernick
Project Director

Carol Allen, 1971-72
Mary Begley, 1970-71
Mary Anne Boies, 1971-72
Jerry McLaughlin, 1971-72
Barb Prendergast, 1970-71
Charles Pryor, 1970-72
Judith Starks, 1971-72
Mary Stell, 1971-72
Becky Stueben, 1971-72
Sandra Wesol, 1971
Janet Whealon, 1971-72

able
MODEL PROGRAM

Materials developed by the research and development efforts of project staff working upon *ABLE Model Program* are included in this introductory section.

Funded by the Division of Vocational and Technical Education, State of Illinois, as *The World of Work as an Organizing Center for the Curriculum of the Elementary School*, our headquarters are at Northern Illinois University. From there we have sought to develop a theory of practice with participating teachers in selected school districts in the northern part of the state. Ideas have been developed, tested, refined, transformed, and evaluated in a variety of classroom settings.

The activities of the project are still in process, but several concepts and activities have already proven helpful. They are included to suggest practical ways to plan, implement, and evaluate Career Education instruction.

The project also acts as a clearinghouse for the World of Work activities and we trust school districts will send along copies of their Career Education curriculum guides to:

ABLE Model Program
Northern Illinois University
DeKalb, Illinois 60115

Those who want special consultant help for an elaboration of specific concepts or for problems unique to their localities may call 815-753-1959 for assistance. Workshops and other in-service programs can be developed cooperatively.

HAVE A HEART

By Dr. Walter Wernick
(Reprinted from the March 1972
NEWSLETTER, Department of Program
Innovations and Pupil Personnel
Services, Office of the
Superintendent of Public Instruction

What holds the elementary school together? What energies pull towards the center? What can the teacher use as a heart for the curriculum?

ABLE Model Program, a newly funded research and development project at Northern Illinois University, is attempting to build a visible model with *The World of Work as the Organizing Center for the Curriculum of the Elementary School.* The research team believes that the study of occupations can be a suitable place to start instruction for young children. With public school districts and the University School, "content" opportunities of occupations are being identified and linked to other significant areas of the traditional curriculum.

The rationale has been suggested by many educational reformers but never organized into an instructional plan of this magnitude. ABLE Model Program is attempting to build a "visible" teacher, one whose planning, implementation, and evaluation are based upon performance criteria. An attempt will be made to place this teacher in "visible" settings so that support systems which aid the teacher's instructional program are also available for review. Accent upon the teacher's drawing upon the resources of the school and community should enable the "systems" approach to portray new dimensions of an elementary school teacher's work.

Children have a natural interest in seeking contact with working adults. Their wonder of what the future holds for them and their active search for worthwhile expression thrusts them into positive learning roles. A progression from human forms (adult roles) to abstract knowledge (subject matter) appears natural; yet our schools often mirror everything except natural life processes. How often do we find educational planning a mere patchwork quilt of assorted subjects and schedules?

Since living forms evoke maximum stimuli and also contain within themselves the heritage of our civilization, *the study of occupations* affords an excellent vehicle for management of motivations and content. Effective teachers have to be relevant to the lives of learners as well as to their contemporary culture. With *organizing centers formed from life-centered activities,* teachers can plan, implement, and evaluate such relevant instruction with confidence.

ABLE Model Program is not after a total program, nor is it attempting to add on to an already crowded schedule of subjects. Its mission is to describe a viable heart.

Imagine the potential within life-centered organizing centers!

As children study occupations, they receive "occupational information" and have many opportunities to develop and change their career choices. Exploratory, academic, and sharing activities all contribute to the development of a self-concept shaped from the authentic actions of adults.

Children can "choose" jobs many times, roleplay situations to incorporate affective content, and review consequences resulting from the direct experience of others. Within such opportunities, their performance is open, subject to guidance from the teacher and available for parent comment. The built-in features of the new approach help children to understand themselves as well as to learn about the world of work.

ABLE Model Program is offering a more effective heart for an elementary school. What organizing center holds together your instructional activities?

An organizing center depends upon a teacher's imaginative view of instruction. Each teacher's imagination produces a form. This form, based upon a person's individual talents and experiences, is important because it subsequently shapes the teacher's force and variety of activities, time intervals, and levels of expectation.

Narrowing a plan zeros in on specific resources and specific target behaviors. Conversely, enlarging a teacher's plan opens up energy potentials for all concerned.

Whatever the size of one's undertaking, however, *a plan that rests comfortably upon a personal base is usually most productive.* A plan in which imagined teaching energies are acceptable to one's own professional self-concept can shape ideas and organization into vigorous images . . . and actions.

Effective *thinking* and effective *teaching* are more closely related than usually believed. If we link the two activities, *thinking like a teacher* and *performing as a teacher,* within one form, we shall have a powerful instrument for communication about teaching. We have tried to develop this instrument by using *the organizing center concept.*

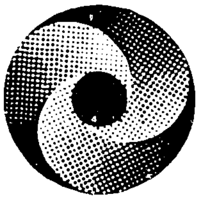
Our common ground gives us a place to start, a base from which we can safely venture to restructure and recreate, and a center from which we can reform instructional processes. More relevant and more effective teaching is our aim.

Effective teachers think and plan *elastically,* appropriate to what needs to be done. We hope that our *form of an organizing center* helps stretch or shrink teaching plans to fit the needs of specific instructional stiuations.

Now on to the wave currents of our mind. The questions below set a frame and should help us get started.

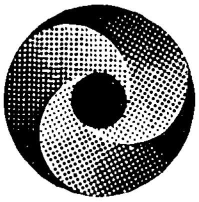
- ACCESSIBILITY: What materials and services can be available to the learner?
- MOBILITY: What content areas (skills, facts, attitudes, etc.) emerge from this idea?
- ACCOMPLISHMENT: Wha can the learners do?

ACCESSIBILITY



1. What materials can a child use in the daily course of instruction? When a decision allows one child free access and excludes others, what reasons lie behind the selection? (maturity, skill development, social manners, interest)
2. Where can a child go to study? To organize? To practice? How are the places different?
3. What different sensory stimuli can the child encounter? (printed page, voice, film, touch)
4. What tools can the child use to uncover information? (card catalogue, thesaurus, telephone) When? With whom?
5. What human talent can come into contact with the child? Can the contact take place during school hours? Is the child expected to observe or interview talent outside the school?
6. How is the child encouraged to make his own thoughts and feelings accessible for his own reflection and/or action?

MOBILITY



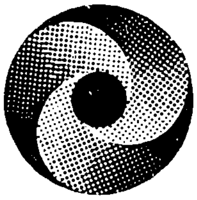
1. Can the content build upon overt interests of the children? Can new interests be generated? Can individuals work upon the ideas and skills at their own pace? To their own accomplishment level?
2. Can the reason for instruction of this area (fact, skill, attitude) be clear to the learner? Clear to the parents?
3. When ideas spin out from the center, can they pull together new relationships from past studies? What academic areas can contribute to ongoing learning?

4. Can the complexity of thought and accompanying activities increase as the ideas are studied in depth? Can the concepts and skills be applied to practical tasks?

5. Can the content enable children to encounter the fundamental life activities of their local community? Of their relition? Of their contemporary world?

6. Can the content enable children to delve through time and cultures so as to build an appreciation of their heritage? Can the content have a continuing effect upon the child's self-image as a person who is creating his human biography each new day?

ACCOMPLISHMENT



1. In how many different ways can a child express himself to you? To others in the classroom? To his parents? To others in the community?

2. In what ways can learning efforts be evaluated? Learning achievement? What can the child contribute to the evaluation process?

3. How can the child be encouraged to use different resources? When (and for how long) can he put together his work? Where can he practice? With whom?

4. Can learning efforts be stored in an accessible area? Can the child review and redo his own work.

5. Can others see the child's achievements? Can a child get feedback about how he used media as well as about the content he had to express?

TAKE AN IDEA AND SEE WHERE IT LEADS YOU

By Mary Stell

It was the end of the first week of orientation for our staff and my head was swimming with ABLE's approach to teaching. Teachers' and students' lives would be more enjoyable, meaningful, and so on. Dr. Wernick, the project director, was enthusiastic, but then it was his idea. Chuck Pryor, who had been with the project for a year, seemed pleased with what he had seen as he had worked in various schools.

But the real worth of the idea could only be found in the words of a teacher who had actually tried it with the children as they lived with the nitty-gritty of everyday life in the classroom. Having been a teacher myself, I couldn't be convinced until I had heard how it worked out in practice.

So it was that I appeared at the doorway of Linda Hyyppa's classroom one day after school in early September. Linda had used the idea of the florist as an organizing center last fall. I was told she could be of help to me in writing up a brochure.

After we had introduced ourselves, I told her that I was getting ideas for a brochure on the workers in a floral shop. Her eyes lit up and she began talking about how she had become involved with the idea during the fall semester of the 1970-71 school year:

> *The whole idea came about when the class was studying living things. The children thought it would be a good idea to plant seeds and watch them grow. So June Hart, my colleague across the hall, and I decided to go along with it. They wanted to learn how to care for the plants so we decided to visit the grower at a greenhouse. The grower was most helpful and the children learned much that goes into producing the flowers sold at the floral shop. But we also found there are good seasons and bad for going to the greenhouse. Fall was not a good time; but around Christmas and Easter were good times.*
>
> *In the discussion that followed the visit to the greenhouse, the children decided to have a greenhouse sale. They made things to sell and brought additional materials from home.*

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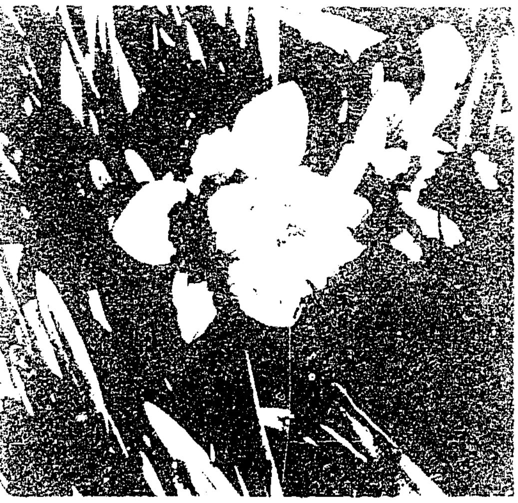


In the process of setting up the greenhouse the children learned many things needed to finance a new enterprise. They had to have a source of money so a discussion of the need for an initial investment led to the children's each contributing a nickel. This, in turn, brought on a discussion of taking out loans. They had to negotiate with the secretary to get change for the sale. Another decision that required planning was the number of hours they would be open on the day of the sale. When the day came they sold out in one half-hour, so we held a discussion concerning the need for the buyer to predict how much to buy and when to buy for resale.

They made a total of $30. Naturally, there was much talk about how to spend it. Finally, they decided to use it to help stop pollution. An outdoor education teacher who taught in the school was invited to talk with us. The money was used to buy books and filmstrips for the school library.

The children felt so good about the outcome of the sale they wanted to have another sale in the spring. They had learned much from their previous experience so the second endeavor came off more smoothly. This time they made $40 and decided to buy trees for the school yard. A resource person was invited in to advise them on how to buy trees and how to care for them. Since I have a multi-age group, some of the children who were involved last year have already asked to plant seeds this year.

I really think the approach that the ABLE Model Program is advocating is a good one. A teacher can take as little time or as much time as she wishes on the organizing center and the children are so enthusiastic! They learn to make decisions, to plan together, to begin to see the relationship between what they are learning and real life. They are so pleased when a person comes to the class and speaks with them. One of the most rewarding things I learned was that the children thought of the good ideas and made them succeed.

We talked of other things related to ABLE such as the study of art which had led into so many directions. As I drove away from the school, I began to see that such phrases as *"Take an idea and see where it leads you"* and such terms as *"accessibility", "mobility"*, and *"accomplishment"* could exist in the real world.

COMMUNICATE

As you organize how the content of your instruction will be accessible to the children, your plans may include the use of *community talent*. Interviewing skills might have to be taught in order to facilitate your plans. Perhaps the most obvious skill involved in interviewing is asking appropriate questions.

The following lists of questions may help you, your talent, and your class get started with this important *tool of communication and inquiry*.

One set of questions is designed for children who are learning to interview. It can also be presented to the talent prior to his visit.

The second group of questions is designed for conducting a group or class conference with talent in school or at the resource site.

The depth and quality of the interview will depend, of course, upon the preparation each interviewer has in the area the talent represents. Also, motivation to find out will be an important factor. Those who are avidly curious will push the process of inquiry to its appropriate limits.

Certain questions will be appropriate to some talent areas and not to others. However, there is a *commonality to the process of interviewing* and an *ABLE* teacher can guide students to learn many of the general communication skills necessary for effective interviewing.

The last section on evaluation has proved helpful in setting standards for learning performance and increasing the visibility of the inquiry process.

. . . without form and void; and darkness
was upon the face of the deep . . . . . .

Does this describe the fear we hold at the onset of each new venture to improve our students' skills and attitudes?

Can the children do it? Will there be some foundation upon which I can build? Will I be able to get this new material across? Which children won't get it? Which ones will need much practice? What if they're not interested? What if there isn't anyone who cares?

Interviewing skills are merely one branch of the great human tree of communicative arts. We've chosen it as a primary performance skill because of its inherent mobility. Once children learn to communicate through the process of interviewing, they enter other worlds of discourse and many realms of meaning.

Interviewing is a vehicle as well as a bridge. It is process and content. It is something that can be taught by itself and something that can be taught by interweaving it within traditional subject matter.

Then why the fear? Why the empty feeling when we approach this foundational activity in our classroom?

Maybe the question should be *"How can I begin?"* A new venture such as this should be initiated in a positive, encouraging setting. Can we design developmental activities for the acquisition of interviewing skills so that first happenings are fool-proof? Motivating? Generative?

If our thinking and your thinking are moving within the same dimensions, then you're probably already shaping practical means and working out specific tactics. Are we thinking alike? Have you arrived at the same beginning that we have?

Planning roleplaying, interviewing situations within the secure learning atmosphere of your classroom, is a safe, sure-fire way to get started. Children will be more free to explore in an environment wherein no harmful consequences may befall them. Whereas outside talent may be threatening to the development of tender thoughts and feelings, *your warm support of the child as a learner* will help the light to shine. Then, from trust and self-confidence, appropriate forms of interviewing behavior will develop.

Roleplaying is not only a process by which to learn the skills of interviewing; it is also protection for the learner (and the teacher) so that learning procedures may be started away from the foreboding consequences of direct encounters.

Thus, the darkness of our classrooms might first be penetrated by "artificial" light - *roleplaying.* When interviewing skills have been sufficiently shaped by this careful nurturing process, emergent behaviors can be brought into the "real" world for trial.

Pre-stressed performance skills can be laced into the varied activities of the school year. If this is done on a regular basis, the children's efforts will not dissipate or dissemble when tested by adult characters in real settings.

Tapes of children interviewing each other are easy to make and allow for healthy criticism of learning performance. Dittoed sheets of questions with spaces for responses also offer tangible supports. "Friendly" school personnel can be used for practice.

A teacher can build a platform of appropriate materials for one class, then use it to introduce new concepts to other groups. Also, prepared tapes (of actual interviewing) are available from commercial sources.

1. What do you do on the job? (Children are interested in how school-taught skills fit in with real work.)

2. Why did you take this job? Did others agree with your thinking?

3. What tools do you use? Is there a special way of talking about your work?

4. Was this your first job choice? How many times did you change your mind about what you wanted to be before you went to work? Why?

5. What part of your job do you like best? Why? What part of it do you wish you didn't have to do? Why?

6. Who depends upon your work? Upon whom do you depend for your work?

7. What experiences and training on this job might prepare you for some other kinds of jobs should you ever want to change?

8. How does your job affect your personal life? Do you have to work nights? Are you tired when you get home? Do you have noise during the day so that you need quiet at home at night? Do you have a job where you have to be nice to people all day - even people who are crabby and ill-mannered?

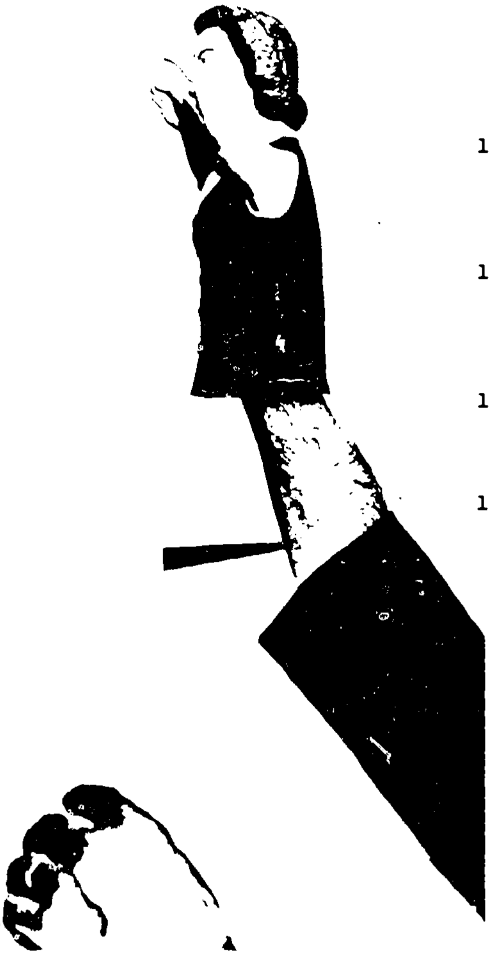
9. What inventions could put you out of work?

10. Are people with your kinds of skills usually needed - even when business may be bad? Is your work at all seasonal? Where could you work in this occupation? Is your kind of work limited to geographical areas?

11. What kind of education is necessary for this kind of work? Apprenticeship? Trade school? College? Advanced degrees? Is there any personal quality for this job that is really more important than diplomas?

12. About how much money can a person earn in this kind of work? Is there a chance of getting a lot of money all at once? of losing a lot of money quickly?

13. When does your boss compliment you? (or when do you compliment your employees?) When are people fired?



When a resource person is sharing information with a group of students in a conference setting, it might be helpful to send the talent a list of the questions the class is considering. Your note can explain that *the purpose of the meeting is to get some information about an occupation from a person actively involved in that occupation.*

Familiarize your students with lists of questions such as those we put together. Ask the students to mark those they would like to ask. Questions should be asked with the understanding that the resource person does not have to answer.

Each interview will be a new opportunity for ideas to develop. Your analysis of the growing threads of the discussion and your firm but *subtle leadership toward target goals will move irrelevant talk towards fruitful discourse.*

Be alert to step in and help facilitate communication if you see either the student or the resource person is not understanding what the other has said. Feel free to ask questions of your own to clarify answers whenever it is desirable to do so.

If you explain the reasons behind children's questions, talent and students will sketch more appropriate pictures in their mind's eye. As you relate their brief ideas into areas of class concern, shy talent (or students) and the academic activities of your classroom will be pulled together. The teacher has to be the bridge.

Naturally, over-management of social amenities can produce puppet performances and turn talent sour. *ABLE* teachers, interested in effective affective as well as cognitive behavior, will enhance instruction through their managerial artistry. Vigor and sparkle is almost assured as the style of the teacher and the talent of the community are stirred into planned activities.

Young children can move curiosity into inquiry, inquiry into the academic domain, and academic performance into healthy character and career development. The bridge to becoming has to be built upon, with and for people.

1. What schools did you attend?
2. What is your present job?
    a. How did you get it?
    b. How long have you worked there?
    c. What time did you go to work this morning?
    d. What was the first thing you did?
    e. How long did that take?
    f. What did you do next? (Follow through the entire day.)
    g. Did you do anything yesterday that was different from what you did today? Does that happen often?
    h. What else do you do on your job?
    i. Of all these various duties, which ones take most of your time?
3. What changes have taken place recently? Do you foresee any in the near future?
4. What things do you like most about your job? Least? Are there any hazards?
5. What is the usual starting salary in jobs like yours?
6. What qualifications do you need to get the job? Age? Sex? Height? Weight? Other? Marital Status? Tools? License? Aptitudes? Unions? Discrimination? Veteran? Capital?
7. Preparation? Minimum? Desirable? Time? Cost? Content? Approved schools? Preferred subjects?
8. Supply and demand for workers? Outlook for the future? Advancement?
9. Hours? Regular? Overtime? Evening? Sunday? Holiday? Steady or seasonal?
10. Is there anything we should have asked? What would you like to ask us?

(adapted from material in *Occupational Information* by Robert Hoppock, McGraw-Hill Book Company, 1967.)

Teaching children to inquire from primary sources, *the adults in your community*, builds a firm place for Career Education to begin. Children will be more ready to relate school studies to life-centered activities and more prepared to make appropriate choices for their developing-lives-to-be.

How do you know when children have learned to interview? How can you tell they are making progress toward that accomplishment?

Local conditions shape standards. Different criteria have to be applied depending upon individual expectations. However, *your view of children's performance will determine an assessment of their progress and achievement.* To help you focus upon visible evidence, the following questions are offered:

1. Can the child roleplay the interviewing process?
   a. Does the "interviewer" question with a purpose?
   b. Does the "interviewer" follow a strategy?
   c. Does the "interviewer" show appreciation for the feelings of the person being interviewed?

2. What products show that the child is "interviewing"?
   a. How are the interviewed person's thoughts recorded?
   b. How is the interview reported to others?

3. Can the child explain interviewing skills in writing?
   a. Are steps in interviewing set out in an orderly manner?
   b. Can the child judge his own talents against what has been set out for the class?

4. Does the child use interviewing skills in voluntary situations?
   a. Are ordinary encounters turned into learning situations?
   b. Does the child seek interviewing situations?

5. Does the child read "interviews" in newspapers and magazines or watch "interviews" on television?
   a. Does he volunteer information about media presentations that highlight interviews?
   b. Does he share what he has experienced (seen, read or heard) with others?

6. Does the interviewed person send feedback to the teacher and/or class?
   a. Are expressions directed to the content of the interview? . . . the studies of the class?
   b. Are expressions directed to the interviewing process?

7. Does the child express a hope to work in an occupation which requires interviewing skills? (Sales? Receptionist? Teaching?)

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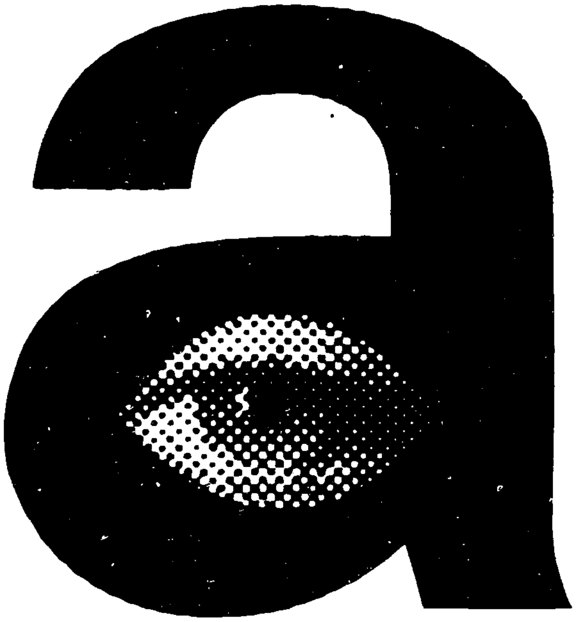


In the eyes of the child, teacher planning and teaching performance is perceived as work. The teacher is a live model of an adult worker. What a teacher does (or doesn't do) will convey attitudes about work clearly and forcibly.

How can the work of teaching be made more evident? How can the products of learning - the children's work - be displayed? These questions highlight a concern for visibility, a concern for helping teachers, parents, administrators, community people, and children become more aware of career development and the world of work as significant themes for our public schools.

The following suggests more activities than we expect any one person to be able to manage in a year's time. However, as teachers ourselves, we're quite realistic about the time and energy a teacher can muster after the daily, continuing demands of classroom instruction. We're also well aware that a dedicated "display-minded" teacher could spend full-time just producing materials for our project. In other words, even though our written suggestions may seem formidable, our expectations do adjust to what is possible.

Local resources will suggest the means and ends of your display products. Obviously, if several cameras are available and your talent enables you to manipulate these effectively, your work may be picture-oriented. Each person sees as his own mind's eye allows. However, some displays require very little technical equipment and, as you look over your instructional program, you'll be able to draw out bits and pieces that will fit together. A coordinated assembly of student products is not a difficult task. (Of course, it is helpful if the teacher could have the sketch of a display in her initial plan. Ah! How to get that sketch in the mind's eye --- that's the secret, isn't it?)

Open houses for parents, exhibits for grade level meetings, and other occasions when the work of the teacher is called for, can all be made more vivid with materials that elicit multi-sensory responses. For example, children's work that is important to ABLE Model Program and is also appealing to lay individuals includes:

stories and pictures about visits with talents
  or about field trips
letters to parents by students
experience charts
spelling papers
taped interviews
compositions
folders

Projects that involve group cooperation and a sharing of thinking would include:

picture-story "TV" presentation or chart
reporting or explanations of work
exhibits
dioramas
mobiles
plays

Other materials that will help illustrate the work of the teacher are:

comments of parents and community members on
  academic performance
letters written by visiting talent and parents
letters to parents by teachers
collages and montages
lesson plans
flow charts

The World of Work has enough solid substance to allow a teacher to explore almost any occupation at any grade level. We've picked out a few specific activities and presented them within three groupings: primary, intermediate, and upper levels.

More activities are available, many perhaps better suited to your local needs, but since we're merely trying to give your imagination a place to begin, the ones we chose have very visible objectives and outcomes. As you think through the activities, you'll probably come up with many more elements to design an effective instructional program for your children.

Most materials for teachers include separate lists of objectives and outcomes. *We feel that our suggested activities have these built-in.* However, should you desire to look at objectives and outcomes separately, you may wish to write out what you perceive within those we present. Perhaps your development of these or other activities will be enhanced by close attention to objectives and outcomes. Perhaps not.

Naturally, we feel ABLE ideas presented earlier, especially the teaching of interviewing, are appropriate for all children in the elementary school. In the activities that follow *we assume that the use of interviewing skills is an integral part of the process.*

A developmental program, founded upon basic understandings of how children learn, requires early instruction, much praise and practice, and continued attention to the progress and achievement of each individual learner.

We must remember the planning process matters only in terms of what the child finally experiences.

Students can:

1. describe their parents' jobs and tell where they work. (Teacher-made experience charts with questions such as: "What does your father, mother, do? Where does he work? How does he get there? Does he work by himself? What does he do in his job?" help develop language skills.)

2. put together a bulletin board or collage from pictures of their parents' occupations. (If no pictures are available, have students draw what they believe goes on.)

3. roleplay occupations in the classroom. (Use hats and costumes as small props and act out various jobs.)

4. discuss their jobs in the home. (What role does the job play in the family? What jobs would the child like to do? What do they perceive as "work" as opposed to "play"?)

5. tour school and discuss jobs performed by school personnel.

6. make a mural about the community. Include such places as the supermarket, laundry, post office, etc. (Children can cut out pictures from magazines or use actual photos of people they know.)

7. make a diorama of parts of the city or town that hold interest for them. Discuss what people do there. (Arrange coffee hours for parents to see and hear what their children are learning.)

8. seek out easily accessible "workers" to share their talent and experiences. (Select some adults that children may not usually see. Try to have them realize the variety of occupational roles.)

9. discuss *"What I Would Like To Be"* and review reasons. (Introduce the idea that they will have to plan their studies for a career.)

10. cut out pictures of people at work from magazines and newspapers. They may then act out favorite occupations. (Pantomine and puppetry are favorites of young children. This might be a good activity to weave in the idea that people may have to change their occupations during their work life.)

11. visit several places where people work by taking walking tours in the school neighborhood. (Frequent visits will build familiarity with adults and call attention to features of the work they do. You can ask, "How did they get where they are?" to stimulate thinking about the children's futures.)

12. identify and discuss jobs men do, jobs women do, and why certain jobs appear suited more to a particular sex. (See what you can do with equal employment based on sex.)

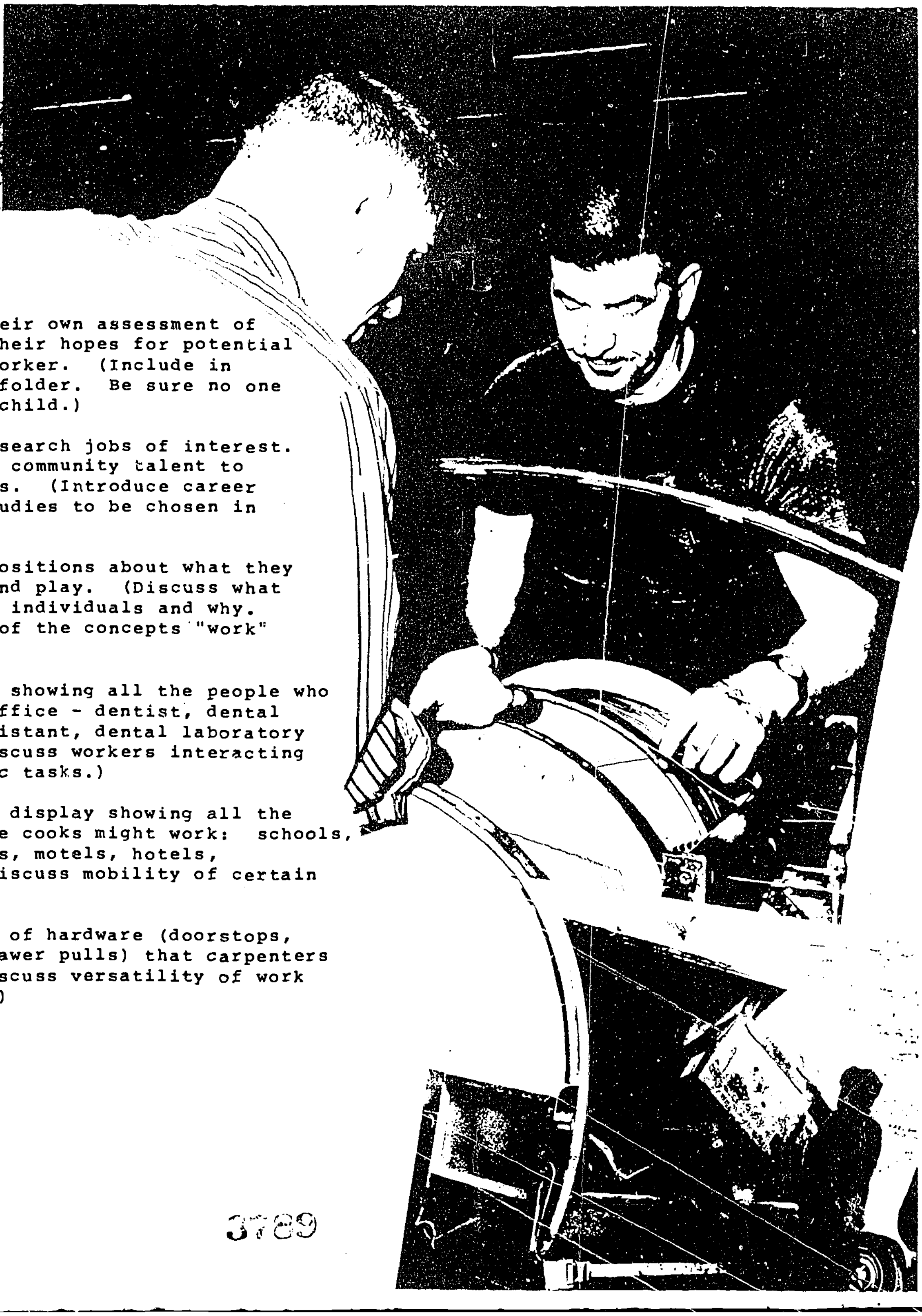
13. write about any or all of the above activities in picture stories, booklets, class newspapers, etc. (Share these with other classes and parents.)

Learning is cumulative. Rarely do we have to start our instruction from a foundation of complete ignorance. If teachers know of and can build from primary activities, their programs will probably be more effective. Every one of the activities presented earlier can be deepened and enlarged at the intermediate level. Reinforcement can allow the child to relive and reflect upon his experience and values.

Mere repetition may be boring and turn children off. However, attitudes may have changed because of increasing maturity. Parents may have changed their jobs. Teachers may have accepted new ideas for their instructional goals. With this in mind, the following activities may awaken interest and move away from routinized procedures.

Students can:

1. make up questions for a quiz show on occupations. (A list of words identifies a job. What is the job?)
2. analyze newspaper ads for discussion of jobs available for men and women. (Discuss "tradition" and new social trends.)
3. plan a hobby show and follow it with a discussion of related occupations. (The presence of adults would bring out the show's credibility.)
4. read through the Yellow Pages to seek out the many different types of jobs available in the community. (Interview a personnel director.)
5. write "What I Want To Be When I Grow Up". (Discuss the features of occupations that appeal to children.)
6. fill out an appropriate Interest Inventory. (Discuss the features of occupations that appeal to children.)
7. play "What's My Line" game with "real" adults or make believe roles. (Discuss the values expressed by the children after the game.)



8. express in writing their own assessment of their abilities and their hopes for potential success as an adult worker. (Include in student's cumulative folder. Be sure no one item stereotypes the child.)

9. use Career Kits to research jobs of interest. Interview appropriate community talent to further investigations. (Introduce career planning of school studies to be chosen in higher grades.)

10. write open-ended compositions about what they like to do for work and play. (Discuss what influences acted upon individuals and why. Build verbalizations of the concepts "work" and "play".)

11. make a bulletin board showing all the people who work in a dentist's office - dentist, dental hygienist, dental assistant, dental laboratory technician, etc. (Discuss workers interacting to accomplish specific tasks.)

12. make a bulletin board display showing all the different places where cooks might work: schools, restaurants, factories, motels, hotels, dormitories, etc. (Discuss mobility of certain occupations.)

13. exhibit various kinds of hardware (doorstops, hinges, doorknobs, drawer pulls) that carpenters have to install. (Discuss versatility of work *within* an occupation.)

By the time a child is twelve he should be able to know how to find out information about the world in which he lives. Concern for the World of Work is natural and if the school has been providing direct experiences with community talent and resources, the child should have a background of knowledge about many occupations.

His skills of inquiry will depend, in part, upon his motivation, but then the converse is true, too. His eagerness to learn more will be greatly influenced by his mastery of inquiry skills.

At this level of schooling, recording, analyzing, synthesizing, and evaluating can be emphasized. Also, increased use of tape recorders, cameras, and slide projectors can aid in the processing of pertinent information and the presentation of reports.

Relating school studies to life-centered activities in the community is an important goal for children this age. High school students who have to be convinced that school studies are relevant to their lives make reluctant scholars. The groundwork has to be prepared at the elementary levels.

Concern for relevance should start as soon as the first lesson of formal schooling begins. Every teacher has to be alert to what can be gained - and what can be lost.

It may seem obvious to say that children can do more at this age, but active, doing children need competent leadership as life in the classroom becomes more complex and closer to adult roles. As interest and effort become stronger, so must the teacher's planning and talent as a *person-performer*.

Students can:

1. discuss the concept of retraining and its implications for new programs in the public school. (Who is to finance them? Interview the school business manager.)

2. discuss psychological needs with attention to why people work. (Comparison with authentic interviews would be valuable.)

3. share in-school and out-of-school work experiences. (Class newspapers or radio shows could be the vehicle for large group sharing.)

4. plan, implement, and analyze money-making activities. (Descriptive records would help the children see how they're learning as well as what.)

5. interview someone whose job they admire. *(Discussion about "significant people" can lead to great expressions of personal value systems.* Precede this activity with an interview. Follow with oral or written reports and class discussion.)

6. prepare a slide program on community resources. Show to the PTA or local service clubs. (Analyze the school's public relations program. What should the schools present to the public?)

7. write articles for the class or school newspaper. (Expect children to deal with relevant problems as well as historical issues. Develop themes which help academic-minded parents see the scholarly efforts of their youngsters.)

8. organize a World of Work Fair for the entire school. Invite another class from a culturally different environment to share the day. (Set up a lay advisory committee to help the project. Invite the local Chamber of Commerce.)

9. read a selection from literature that describes the work a person does and his feelings about it. (Contrast the author's perceptions and attitudes with those of the children. Make a chart comparing labor and materials of different cultures. Compare past to modern day methods.)

10. read and review job applications. (What features are noted? Interview a personnel director of a local business or industry to find out about employment needs and trends.)

11. seek out printed interviews (or listen to interviews on TV) and critically evaluate the interviewing skills utilized. (Prepare a team of "experts" to teach interviewing skills to primary children.)

12. make a survey of interesting jobs in the community and start a resource file of available speakers for future classes. (Involve the Learning Center Director and local service clubs.)

13. participate in mixed panels of children and adults to examine cultural values and the World of Work. (Set up these "shows" for the school assemblies.)

14. construct a model community illustrating interdependence of work roles. (The Learning (Resource) Center could be transformed into the model. The "city planners" could explain their thoughts through school-wide media.)

PRELIMINARY FINDINGS FROM OUR RESEARCH INDICATE FIVE COMMON ELEMENTS WEAVING THROUGH THE CONTENT OF OCCUPATIONS

A. Occupations have a *history*. The past, present, and future of the "job" and its "setting" can be interesting as well as informative. This historical view helps children understand the story of mankind. The way in which we have worked is, in large part, the way human beings have lived. Local, visible people can serve as jumping off places for studies of human life throughout recorded history.

B. People and resources are usually located at fixed points. The natural environment within which they are found can be described and is worthy of being communicated, too. When we consider the sources and destinations of talent and resources, aren't we studying *geography?* Concepts and skills in this area can be blended into plans by inquiring where people and products come from and go.

C. Occupations involve *communication* within the "work station area" and from that specific area to (or with) others who may be clients or customers. *Language* may be ordinary English, but often special images and other vehicles of expression are used. *Terminology* is an important aspect of this element. (Let's not draw it out in sterile batches and make a list of technical words the one standardized method of evaluating learning activities.)

D. Tools and procedures to increase the energy available to do work are exciting content areas for children because they themselves are bursting upon the world with developing powers of their own. Studies of *technology* have great learning power potential. Children love to be involved with the many ways energy can be put to work. If "hands-on" experiences aren't possible, then roleplaying situations can be planned.

E. *Human relationships* have traditionally been the fourth "R." Since the study of occupations focuses attention upon life-centered activities, adult roles take on more meaning because the consequences of authentic actions can be seen to have meaning. People are the heart. People are the process. People are the content. The study of occupations is the study of people.

F. A new content area might be called *The Future*. Studies of what people will be doing, what they might be doing, and what they might prefer to be doing are natural to the *mobility* of a people-oriented generative idea. Alvin Toffler's masterful *Future Shock* provides us with an excellent rationale for incorporating studies of *The Future* into our plans.

. . . PRIMARY . . .

SKILL	PERSON-IN-THE-OCCUPATION	LIFE-CENTERED ACTIVITY
Identifies letters of the alphabet	File Clerk	Alphabetizes names of students in class
Forms letters legibly	Sales Clerk	Set up store and write receipts for articles
Pronounces words correctly	Telephone Operator	Roleplay phone company operations
Uses acceptable spacing and alignment	Person who does Newspaper lay-outs	Practice forming letters and words on advertising pages of newspaper
Places events in sequence	Sportscaster, Reporter	Retell stories using proper sequence
	. . . INTERMEDIATE . . .	
Selects appropriate words when writing	Secretary	Write letters to outside talent
Organizes and expresses thoughts clearly	Factory Foreman	Write a report of tasks completed
Spells correctly	Proofreader, Signmaker	Proofread an article for the class newspaper
Follows oral directions	Gas Station Attendant	Follow oral directions to clean out cabinet
Makes inferences from reading	Newspaper Editor	Group discussion on a contemporary social issue
	. . . UPPER . . .	
Speaks with poise and confidence	Restaurant Hostess	Plan a social event for parents and interested community people
Summarizes and organizes in outline form	Minister	Report interviews with adult talent
Transmits intended meaning through oral communication	Lawyer	Arrange a mock political debate
Analyzes content	Advertising Manager	Write ads
Punctuates correctly	TV News Writer	Write a news article to be read out loud
Clarifies complex material	Seamstress, Tailor	Follow simple written directions to make a wall hanging

. . . PRIMARY . . .

SKILL	PERSON-IN-THE-OCCUPATION	LIFE-CENTERED ACTIVITY
Follows simple map directions	Policeman	Make a map of neighborhood
Discusses time sequence in terms of people's lives	Relatives and Friends	Describe how grandparents dressed as a child
Uses communication to foster social interaction	Postman	Organize a classroom postal system
Recognizes important national, historical personalities	Historian, Librarian	Pantomine or roleplay their favorite historical figure
Discusses importance of the community water supply	Water Commissioner	Make a collage showing the uses of water and explain it to other classes
	. . . INTERMEDIATE . . .	
Compares agrarian development in different countries	Salesman for farm supplies	Make a collage showing various tools, methods, and products of different countries
Explains the development of items in their historical sequence	Car Dealer	Arrange pictures and models of automobiles in a historical time sequence
Demonstrate how land is used in relationship to topography	Real Estate Salesman	Make models showing different land types: (mountains, plains, swamps)
Investigates institutions in local community	Board Member, Superintendent, Representative of Teacher's Organization	Interview school administrator, board member and teacher, and make chart showing interrelationship of roles
Locates building on a city map	City Planning Commissioner	Make a model town
	. . . UPPER . . .	
Explains legend on a map	Highway Engineer	Chart cross-country trips
Discusses development of local industry in relation to natural and human resources of area	Local businessmen, Farmers, etc.	Exhibit products grown or developed by local industry
Discusses contributions of significant people during a certain period of history	Historian, Librarian	Create a play in which historical figures are the main characters
Compares values of different cultures in relationship to births and burials	Various speakers representing various cultures	Make a display denoting the different customs from the cultures studied
Discusses basic economics of a business	Member of the Chamber of Commerce	Set up a "mock" company

. . . PRIMARY . . .

SKILL	PERSON-IN-THE-OCCUPATION	LIFE-CENTERED ACTIVITY
Identifies kinds of plants	Florist	Collect, identify, and display various types of plants
Identifies kinds of animals	Veterinarian	Organize a program for a Pet Day
Describes 5 basic senses	Baker, Perfume Saleslady	Buy ingredients and bake for a social event
Discusses sun as a source of heat and light	Farmer	Plant seeds in darkness, shade, and direct sunlight. Observe growth
Discusses growth in regard to living things	Pediatrician, Parent,	Display photographs of children with stories about special events at particular times in their development
	. . . INTERMEDIATE . . .	
Classifies animals into groups	Zoo or Museum Worker	Organize a make-believe zoo
Classifies plants into groups	Gardener, Agronomist	Convert school grounds into a botanical garden
Demonstrates how chemical changes produce new materials	Artist, Chemical Engineer, Fire Extinguisher Salesman	Make plaster of paris sculpture or fire extinguishers. Display products and report about process
Discusses basic water cycle, rain, evaporation and clouds	Weather Reporter on radio or TV	Set up model weather station
Plans an electric circuit	Electrician	Experiment with batteries, bells, bulbs, buzzers, and beepers
	. . . UPPER . . .	
Demonstrates an understanding of metamorphosis	Pest Control Specialist, Butterfly Collector	Gather cocoons (or tadpoles) and record developmental stages
Plans testing of concepts by identifying hypothesis and variables	Race Track Mechanic, Highway Safety Engineer	Conduct experiments using hypotheses
Demonstrates an understanding of the rotation of the earth	Communications Specialist, Meteorologist	Set up a model solar system
Demonstrates understanding of gravity	Pilot	Build miniature rockets
Demonstrates understanding of vibrations and sounds	Disc-Jockey, Musician	Tape record musical compositions
Demonstrates understanding of chemical change	Pharmacist	Make root beer

. . . PRIMARY . . .

SKILL AREA	PERSON-IN-THE-OCCUPATION	LIFE-CENTERED ACTIVITY
Solves simple number sentences (1+1=2)	Housewife	Use recipes
Counts from 1-100	Stock Boy	Inventory materials in room
Measures quantities	Clerk	Display items sold by the pound, ounce, pint, gallon, etc.
Recognizes and cuts out shapes	School Crossing Guard, Bus Driver	Make safety signs by cutting out squares, circles, triangles, etc.
Tells time - figures hours, minutes, etc.	Timekeeper	Keep time sheet of classroom activities
	. . . INTERMEDIATE . . .	
Utilize addition, subtraction, multiplication, and division concepts	Banker	Set up model bank in classroom
Makes change	Grocery Store Clerk	Set up model grocery store
Discusses understanding of fractions	Chef	Follow recipes
Reads and writes temperatures, Centigrade and Fahrenheit	Nurse's Aide	Record temperatures of students. Read patient charts
Constructs and reads graphs	Sales Manager of car dealership	Graph sales of each class member for a money-making project
	. . . UPPER . . .	
Solves word problems	Carpet Layer, Furniture Salesman	Measure furniture in room for possible rearrangements
Finds perimeters and areas	Architect, Draftsman	Make scale drawings of school building
Finds diameter, radius, and circumference of circles	Tire Salesman	Measure bicycle and automobile wheels and compare costs
Finds volume	Building Inspector	Find cubic areas of rooms in the school
Finds percents	Bank Loan Officer	Operate a model bank
Knows time zones, daylight time, AM & PM	Airline Pilot	Figure time differences encountered on vacation trips. Discuss health implications

SUGGESTIONS OF VALUE CLARIFYING ACTIVITIES FOR CHILDREN

1. Show pictures of people doing different kinds of work and have children indicate which jobs they would like to do and which they would not like to do. Have a discussion on the reasons for their choices.

2. After three persons have told the class about their work have a discussion on:

   a. Which person seemed to enjoy his work most
   b. Which probably makes the most money
   c. Which person they liked the most
   d. Why each person chose his job
   e. How each spends his leisure time
   f. The importance of each one's work to the community

3. Offer the children three or more alternatives of the same monetary value such as a flower, a dime, a candy bar. Have a discussion on each one's choice.

4. Have the children name three things they would enjoy doing when they grow up. Ask them what kind of job they would need to have in order to do these things.

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National College of Education. *Value Sharing*. Evanston, Illinois: National College of Education, 1969.

*Raths, Louis E., Merrill Harmin, and Sidney B. Simon. *Values and Teaching*. Columbus, Ohio: Charles E. Merrill Publishing Company, 1966.
Price: $4.25.

*Simon, Sidney, Leland Howe, and Howard Kirschenbaum. *Clarifying Values: A Handbook of Practical Strategies*. New York: Hart Publishing Co., May, 1972.
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*These books may be ordered with payment from:
Adirondack Mountain Humanistic Education Center
Upper Jay, New York 12987
Other materials on teaching values in various subject areas are also available from this address.

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LIFE-CENTERED SUMMER ACTIVITIES ACROSS CULTURAL LINES

by David F. Yeck
Assistant Professor of Education
University Laboratory School
Northern Illinois University

Many summer schools are run for the remedial reader, the slow student, or the disadvantaged student. If this assumption is correct, then summer school should present students with exciting, highly motivating learning situations.

The summer program in many schools is often "more of the same." Children are asked to attend, with the hope they will accomplish what the regular year program failed to do. If children have found the regular program insignificant, a summer program must be varied and individualized.

The following explains our plan for teaching using an occupation as the organizing center. "Truck Farming" was originally proposed. Emphasis was placed on raising common vegetables from plants and the wholesale-retail selling of produce. This idea was further expanded by a teaching team to include a study of the migrant worker, food preparation using the produce, canning of food, lifestyle of migrant workers, and sharing the beautiful harvest with others.

This interest-oriented plan, based on using an occupation as an organizing center for the curriculum, actually served two groups of children. Those enrolled in the regular year program were involved in preliminary activities contributing to the success of the summer school project. The summer session students carried the activities through.

During the month of May, students plotted and tilled a garden area on the school property. They discussed the prospects of yield, length of time to maturity, and opportunities to sell or use the production. This group agreed upon which plants to purchase and borrowed the money from a school bank with every confidence that the outcome of the summer school project could repay this indebtedness.

By the start of summer school the garden was growing and in excellent shape. One group of children immediately became involved in weeding, watering, and starting to harvest radishes and onions. Another group was getting ready for the visit of six migrant children who were to spend a week in our school. Others were preparing for canning some of the vegetables from the garden. Children were permitted to select a group on the basis of interest.

The group of children working in the garden was out every morning picking ripe vegetables. They determined a fair price and were selling to teachers, parents, and others. They were also observing how plants blossom, how the fruit is attached, what plants produce their product underground, and how water affects plant growth and production. Many scientific and economic principles emerged from the sensory activities.

The group preparing for the migrant workers was involved in human relations to a degree generally not expected of children six to ten years of age. They explored the geographic locations of the homes of these children, their ethnic backgrounds, and what they could do to make these children comfortable. A highlight of this activity was when a mother came to school to make tortillas for everyone.

One group was involved in selecting vegetables for canning, how such preservation of food is accomplished, the equipment used, and the health and safety standards necessary. The children visited a canning factory as well as several places which served both fresh and canned food. They made pickles and relishes, using cucumbers, onions and tomatoes.

During the last week of the summer session, with the garden still producing and the profits assured to repay the loan, all groups combined to plan a luncheon for parents. The buffet menu featured large trays of fresh tomatoes, onions, cucumbers, dishes of relishes, and was supplemented with cold cuts and cheese purchased from the profits.

Children were using math, science, reading, communication skills, and social studies concepts in a relevant and useful way. They were also gaining in the affective areas. They demonstrated self-confidence, self-direction, and cooperative and independent learning.

HOW I FEEL ABOUT THE WORLD OF WORK

DIRECTIONS: Read each question carefully, then circle yes or no: (You will not be graded on this - there are no "right" or "wrong" answers -- just answer according to how you feel.)

Yes No 1. I like studying about the World of Work.

Yes No 2. I like to interview people about their work.

Yes No 3. Every one's job is important.

Yes No 4. When we go on a field trip, I try to watch people at work.

Yes No 5. I would rather study as I did last year, instead of studying about the World of Work.

Yes No 6. My subjects in school seem to "fit in" with my studies about the World of Work.

Yes No 7. I am thinking more and more about the work I want to do when I grow up.

Yes No 8. I know more things about peoples' jobs now than I did when school started.

Yes No 9. I want to be prepared to get a good job.

Yes No 10. I feel important when I interview people.

Yes No 11. People who come to school for us to interview seem to like talking to us.

Yes No 12. People should be happy with their jobs.

Yes No 13. Earning a good amount of money is important when you are choosing a job.

Yes No 14. I would rather make a lot of money on a job than be happy on a job.

Yes No 15. I would rather be happy with a job than make a lot of money on a job.

Yes No 16. It is all right to change jobs if you want a different job.

Yes No 17. In school, we learn many things which we will use later on in a job.

Yes No 18. People must learn to get along with each other and work well together in order to be good workers on the job.

Yes No 19. I sometimes tell my parents about the World of Work program.

Yes No 20. I want to study the World of Work next year.

Yes No 21. There are many good jobs which you can have without needing a college education.

Yes No 22. A job in which your hands or clothes get soiled is as important as a job in which you stay clean.

Other questions which seek to gather feelings and thoughts from the affective domain might be:

1. When I talked to my parents about our World of Work activities they ______________________________

   ____

2. When I talked to my friends about our World of Work activities they______________________________

   ____

3. In my opinion the difference between work and play is______________________________________

   ____

4. Things that make me feel important are____________

   ____

5. Things that are important to my teacher are________

   ____

SOME THINGS I HAVE LEARNED ABOUT THE WORLD OF WORK

DIRECTIONS: Answer each question the best you can (you will not be graded on this).

1. Name one thing you like best about studying the World of Work.

   ____

2. Name one thing you do not like about studying the World of Work

   ____

3. Name 5 of the best interviewing questions you ask people:

   1. ____________________________________
   2. ____________________________________
   3. ____________________________________
   4. ____________________________________
   5. ____________________________________

4. Name 3 interesting or unusual things you have learned about any jobs you have studied?

   1. ____
   2. ____
   3. ____

5. Do you have any ideas about what you want to do when you grow up?__________ If you do, tell why you would choose the job you think you want.______________________

   ____

   ____

6. If there are some jobs you would like to learn about which we have not studied, name them:____________________

   ____

7. Which school subject seems to "fit in" best with studying about the World of Work?________________________

8. Which of your school subjects do you like best?__________ __________ Have you used this subject in learning about the World of Work?__________ If so, how did it "fit in"?__________

____

9. Which subject do you like least?__________ If you could interview any one in the world, who would you choose, if you knew that they would come to talk to us?

____

10. Are you learning from other students in the class by sharing your ideas and classwork?__________

11. My teacher can help me more by doing__________

____

12. In the space below, name as many units as you can which we have studied, the person interviewed, and some words you studied in the unit:

Name of the Unit	People We Interviewed	New Words

HOW TO GET THE MOST FROM A LEARNING EXPERIENCE OUTSIDE OF THE CLASSROOM . . .

WHY SHOULD YOU GO ON A FIELD TRIP?

To be worth the time you spend, a field trip must meet a specific need of the group. It can stimulate an activity, help in the search for more information, or pull together diverse activities of a class into a unifying whole.

Field trips can help your group:

1. add to and clarify information by seeing and feeling things you read and talk about.
2. learn to interview workers and observe how people work together.
3. see how adults carry out there responsibilities.
4. correlate skills and other curricular areas with experience in meaningful situations.
5. give children an opportunity to work together outside the classroom, to meet friends in a different atmosphere, to practice skills in human relations in real settings.

WHAT KINDS OF FIELD TRIPS BEST SUIT YOUR NEEDS?

A field trip may be:

1. within the school itself to get acquainted with the building, the grounds and the personnel.
2. in the school neighborhood to sharpen observation of the child's immediate environment.
3. to another school to exchange experiences or to introduce a group to another school situation.
4. outside of his immediate school neighborhood to explore an area of interest in a more distant part of the city or its surrounding area.

Field trips might be suggested to small groups or individuals for exploration on their own time. This may be the kind of suggestion which leads children and their families to explore an area of interest related to a topic of discussion in the classroom. A new interest may develop into a new topic of study for the class.

HOW TO PREPARE FOR A FIELD TRIP?

The following are suggestions of things to do to get ready. Each group will need to work out its own procedures depending upon the needs and interest of the group. However, there are some areas of definite responsibility.

The teacher should be responsible for:

1. guiding the choice of field trip and selecting the time at which the children will profit most by the experiences offered by the trip.

2. investigating the situation, if possible taking the trip in advance, to become familiar with the place to be visited, and things to be seen on the way to and from the place to be visited.

3. obtaining permission for the trip from

   (a) the principal before discussing it with the group.
   (b) the person in charge of the place to be visited.
   (c) the parents of the children.

Much of the field trip experience can be cooperatively planned together. A teacher and class can:

1. list the things they expect to see and the questions they would like to have answered. Children may decide who will be responsible for getting answers to their questions.

2. gather information before the trip using books and audio-visual materials.

3. discuss every detail of the trip

   (a) Time -- date, hour of departure, time to be spent on the trip.
   (b) Transportation -- how the group will travel and the safety rules to be observed.
   (c) Group needs -- social responsibilities of each individual as a member of the group, the organization of the group enroute and while on the trip, the possible need for members of the School Patrol.
   (d) Personal needs -- type of clothing needed, need for lunch, special equipment or tools.

HOW DO YOU USE YOUR EXPERIENCE WHEN YOU RETURN TO THE CLASSROOM?

The learning opportunities opened to the group as a result of a field trip are limited only by the group's capacity to learn, the sensitivity of the teacher, and the time available. The teacher and the group should evaluate the trip to:

[illegible] questions were answered.

2. decide if the plans they made were satisfactory.

3. note progress of class thinking and discuss energy to be applied to further work.

The group will probably want to do some of the following in order to build effective learning experiences:

1. Gather more information to answer new questions that arose as a result of the new experience.

    (a) review some of the materials used and search for new materials.
    (b) look up related articles in books at school, at home, and at the public library.

2. Use the experience to correlate the classroom activities with various curriculum areas -- to make learning *visible.*

    (a) write thank you letters, letters for additional information, stories, poems, reports, booklets.
    (b) organize reports for the class, for other groups in the school, for parents.
    (c) create songs and dramatic plays.
    (d) make charts, diagrams, murals, dioramas, materials for the opaque projector, illustrations for booklets.

Most of all, the teacher will want to make use of the children's increased interests. The quality of living in the classroom can be improved if enthusiasm for life-centered activities is real.

Dear Parents:

Students at our school this year are participating in a new program which aims to better acquaint them with the "working world" of their community.

The basic intent of this project is to make accessible the on-going life activities of workers functioning in our community. With this accessibility, and using a multi-sensory approach, we hope to expand our students' view and understanding of the world of work. We also hope to stimulate new interests which will lead to relevant and significant activities in the classroom.

We hope to be able to visit some of the industries and businesses of our community to see the on-going work activities and to talk with workers. We will attempt to invite workers to visit our classrooms to discuss their occupations and the interrelatedness of our community. We intend to involve our students in interviews and research. We expect much learning content (subject matter) to emerge from our ideas. History, geography, technology and language are just a few of the areas we can cover naturally and realistically.

We recognize, of course, that our beginning focus point must be as close to our own locality as possible. We believe we can use the parents of many of our students as resource persons. Would you be willing to come to our classrooms to tell about your occupation? to tell about the training required or the special vocabulary used in your profession? to demonstrate the tools or machines used in your trade? to tell about the interrelatedness and interdependency of those who work with you?

If so, please let us know how you feel we can work together and we will attempt to make the necessary arrangements. Also, if you desire more information about our project, please contact us.

Sincerely yours,

Here's an approach you may use to develop a community resource file. We are enclosing a typical questionnaire form for use with business resources.

Dear ____________________________

"Teach where the action is." With that guiding maxim, the Education Committee of the DeKalb Chamber of Commerce needs your help.

In cooperation with Community School District 428 and the Department of Elementary Education, Northern Illinois University, we are surveying the businesses and industries of this area to see how they can contribute to ongoing instructional programs. We are pleased that a group of students from NIU are assisting in this project and hope that their efforts will speed up the collection of data and compilation into a resource book for area teachers.

Please fill out the questionnaire and return it in the enclosed envelope. If further information about this project is desired, please call.

Very truly yours,

Chairman, Education Committee

1. What is the name of your business? ____________________

A. Address ____________________

B. Phone ____________________

2. Who should be contacted to arrange the trip? ____________________

A. Position with firm ____________________

B. Phone ____________________

3. Would someone be able to visit the classroom to prepare for the trip or follow it up? ____________________

4. For what age children is the tour appropriate? ____________________

5. How many can be accomodated at one time? ____________________

6. How many school groups can be handled per year? ____________________

7. What is the best time of year to visit? ____________________

8. What is the best time of week to visit? ____________________

9. What is the best time of day to visit? ____________________

10. How much time is needed for the visit? ____________________

11. What is the cost to the pupils? __________ To the school? __________

12. Are there facilities for meals? ____________________

13. Is there ample parking space? ____________________

A. Bus ____________
B. Car ____________

14. What can be seen, heard, tasted, felt, etc. that you feel is unique to your business? ____________________

____

____

____

Questionnaire Cont.

15. Do you have special exhibits, films, tapes, etc. that could be used for instructional purposes? If so, what are the subjects and how may they be secured? ______________________________

____

____

16. Brief description of the tour ______________________________

____

____

17. Is guide service provided? ______________________________

18. Are there any special saftey precautions to be observed during the visit? ______________________________

____

19. In what other ways can the business and industries of this area contribute to the education of our young? ______________________________

____

____

____

____

YOU CAN RECORD PERTINENT DATA ON A FORM LIKE THIS:

Name of business ____________ Address ____________ Phone ____________

Contact (Whom) ____________ Position ____________ Phone ____________

Resource person available for visit to school: Yes ____ No ____

Name ____________ Position ____________ Phone ____________

Maximum number of students allowed ____________ Grade Level ____________

Number of school groups handled per year ____________

Best time of year ________ Best time of week ________ Best time of day ____

Approximate time needed to make the tour ____________

Cost to the pupil ____________ Cost to the school ____________

Facilities for meals ____________

Parking facilities ____________ Bus ____________ Car ____________

Special Instructional Materials Available ____________

____

____

Exhibits ________ Films ________ Tapes ____________

Printed materials ____________ Others ____________

Description of the tour ____________

____

____

____

Guide service provided ____________

Special safety precautions to be observed, if any ____________

____

Appropriate follow-up activities ____________

____

. . . OR A SYSTEMATIC CARD FILE COULD BE KEPT IN A LEARNING CENTER OR LIBRARY. THESE SUGGESTIONS ON HOW TO ORGANIZE DATA FOR QUICK RETRIEVAL AND USE HAVE BEEN USED IN SEVERAL SCHOOL DISTRICTS.

(front)

Resource Persons

Subject__________Age/Grade Level__________

Name & title of person to contact__________

____

Address (home)__________Phone__________

Address (business)__________Phone__________

Best time to contact__________

How far ahead__________

Days available__________Hrs. available__________

Occupation__________

Educational Background__________

(back)

Previous experience presenting subject to:

Children________Youth__________Adults__________

Evaluation by other teachers:

	School	Grade	Date	Comments
1.				
2.				
3.				
4.				

FIELD TRIP SURVEY MASTER CARD

file heading
Industry
(front)

Name of agency__________________ Date contact__________

Address______________ ____________ ____________________
(st) (city)

Telephone____________________

Name of contact person________________________________

Trip suitable for age group___________________________

Number of persons_____________________________________

Instructional materials available_____________________

____

Time - day/year_______________________________________

Time required tour____________________________________

Special instructions__________________________________

Is first-aid service available_________________________

(back)

Evaluation by Other Teachers

Name of Teacher	School	Date	Age	Unit	Guide Service Satisfactory

Remarks____

HERE IS A REPORT ABOUT THE USE OF A FEW COMMUNITY RESOURCES IN WHEELING.

VOLUNTEER-AIDE BUREAU
School District #21
Wheeling, Illinois

TO: All Staff Members FROM: Sandra Nizzi, Coordinator

During the year several resources have been available for use by our teachers.

Some industries in our area have been willing and able to be a resource for us . . .

Ekco Products will come and *visit in the classrooms and show a film* on their assembly line processes.

Television Manufacturers of America will take small groups through their assembly line process and let them see how television sets are manufactured. They also will answer any questions in a discussion group following the tour.

National Food Store in Dunhurst Shopping Center will take small groups of students through their store, explaining various departments and their functioning.

Culligan Soft Water Company will send a speaker to inform students on the chemical process for making soft water. Tours of their plant in Northbrook are available.

Abbott Laboratories will *send speakers with slides and movies* on ecology and drug abuse from the offices in Waukegan. Speakers with films regarding careers at Abbott and one dealing with products manufactured at Abbott are available.

March Manufacturing Company in Glenview has *speakers available* on how pumps work and methods of production.

Denoyer-Geppert Company has a speaker who will come out to schools and show how maps are made and how to read them. They prefer 4th graders and up.

Oscar Mayer Company has a *film on meat inspection*, processing, grading, buying, identification. Speakers, too.

Honeywell Industries, Wheeling, will send speakers to explain air conditioning, how a furnace is installed and operated, security alarm systems, etc.

Commonwealth Edison will give a presentation to students on electricity and its uses, how it is utilized in homes, etc.

Peterson Enterprises, Inc. has information on manufacturing of motion picture machines and their attachments.

WBBM radio will send *a speaker on newswriting* and producing radio shows or any phase of radio requested.

SCHOOL____________________GRADE_______TEACHER__________________

Dear Parents,

As a part of our regular instructional program, we would like parents to come to our class and tell the students about their occupations. Our children will benefit by contact with an adult who is contributing to himself and his society. We are sure they will have many important questions to ask.

Please fill out and return this form. You will be contacted to arrange a definite time and date. The general objectives of the program and suggestions for the things we would like to know about will be available. We are interested in all occupations.

Please return to the teacher.

Name__________________________________Phone____________________

Address____

Occupation____

Company or Firm____

It would be most convenient for me to be at your school on (days and times).

____

____

____

____

Signature

You may wish to send this kind of letter to interested talent.

Thank you very much for your willingness to participate in our program. Without your cooperation this phase of our program could not exist.

The objective of these sessions is not to get students to make career choices, but rather to help elementary students realize that everyone works, that all useful work is honorable. We hope to acquaint them with the wide variety of occupations that exist (there are many things to be besides cowboys, firemen, nurses, and teachers) and make their present schooling more relevant to their future.

Your company or business *may* have some materials they would furnish for you to bring along, perhaps some pamphlets. You might check with your public relations office. Please bring your tools or whatever you work with. Certainly, if you wear a uniform or special clothing of any kind (welding hood?), bring or wear it if you can. Here are the kinds of things we would like to hear about:

--What is your job title or description?
--Briefly describe what you do.
--What aptitudes or skills are important for your job?
--Do you have to deal with the public? If so, would you care to comment on this?
--If you are separated from people most of the time, working with *things*, how do you feel about that? Do you prefer *not* having to deal with the public or fellow workers?
--What do you consider the best points of your job? the worst?
--Is your job personally rewarding and fulfilling? Do you enjoy going to work? Do you recommend it as one of the alternatives students should consider?
--You may want to touch upon the financial aspect. Do you consider the pay to be adequate, very good, unsatisfactory?
--What is the outlook? Will this type of employment exist when these students enter the world of work?
--What changes in equipment, automation, personnel, training requirements have you experienced in the time you have been in this field?
--What training is required? (High school? Trade School? College? Apprenticeship? Graduate degrees?)
--Is the field difficult to enter? (Union membership, professional school entrance quotas, etc.)
--How does this type of career relate to what these students do now in school?
--General information on working conditions, bosses, employees, etc.

EXAMPLE OF THANK YOU LETTER:

DATE

____

____

____

____

Dear______________,

Thank you for participating in our program of career talks. We find this activity very helpful to our elementary students. Direct experience with working adults adds relevance and meaning to their studies.

We appreciate the time and energy you gave to the education of our students.

Sincerely,

Rather than using an impersonal thank you letter, the students can express their own thoughts and feelings. Many language skills can be taught from this base. Letter writing by children can become an integral part of an instructional program.

HERE IS A DIFFERENT KIND OF APPROACH TO PROVIDE OCCUPATIONAL INFORMATION TO CHILDREN.

The following occupations appeared in stories of basic readers and were used as vehicles for videotape programs. The tapes were produced and used locally. A special teacher presented the videotapes in different classes and organized discussions and follow-up activities.

	GRADE LEVEL
School Crossing Guard	K
Policeman	K
Supermarket	1
Mail Carrier	1
Bank Teller	2
Bus Driver	2
Meat Cutter	3
School Principal	3
Excavator Operator	3
Hamburger Drive-In	4
Pet Store Owner	4
Photographer	4
Service Station	5
Radio Station	5
Telephone Installer	5
Computer Operators	5
Barber	6
Secretary	6
Librarian	7
Railroad Switching Crew	7
Forest Preserve Naturalist	7
Jeweler	8
Job Printer	8
Plumber	8

From Thornton Area Public School Association

Our strategy has been to work with the teacher's imagination rather than to provide a platform of texts, workbooks, films, filmstrips, and other programmed materials. However, every curriculum committee should have one person dedicated to the task of developing a library of resources for instruction.

The district's professional library, learning centers of the schools, and even classroom library corners may have to be restructed to give visible impetus to the new directions of your program. *If materials are accessible, they will be used more frequently and more effectively.*

Liason with interested parties in the community especially parents, perhaps lay advisory committees may have to be formed, will help to keep materials relevant and appropriate to the interests of the children.

Free materials are available from many sources within the community as well as from national foundations and trade associations.

Many "public relations" materials, especially films, may be borrowed at little cost. Sometimes teachers may find they will be doing the business concerns a favor by utilizing the office which is set up to promote the company's image. Naturally, your school district's support system to acquire books and other media for its teachers should be made known to teachers in pre-school workshops and lists of available materials distributed early and often throughout the school year.

The talent and expertise of state office personnel and faculty of state universities are available for a variety of services. Requests through proper channels will bring individuals or instructional teams to aid with specific projects. Many people have experience in utilizing community resources to make *The World of Work An Effective Organizing Center For The Elementary School.*

Sharing actual teaching experience makes new innovations credible. Sharing life-centered activities puts soul in Career Education so all educational workers appreciate each other's efforts and communicate about appropriate goals.

1. How should I start this program?

Make up a plan for a short period of time using a specific resource with which you are familiar. Start with an idea comfortable to you and an outside guest speaker (talent) with whom you can freely communicate.

In your plan accentuate the language skills which may be learned and try to highlight important elements of this person's work and life. Build in a simple evaluation device such as letters written by your children to their parents about the speaker.

Carefully examine your feelings about the attitudes that were developed as well as your thoughts about academic performance of your children. Talk to a few colleagues about what you did. Listen to their criticisms.

2. What should I do with my present curriculum which stresses subjects? What about sequence?

Life comes first.
A combining of the interests of your children, resources of your community, and your judgment of what your children need to learn *is* your curriculum.

Sequence begins and ends with individual learners. Subjects become alive when content becomes portrayed through the actions of people. Curriculum guides which lay out sequence and scope should be used as benchmarks, but not as day-to-day teaching guides.

Be tough-minded about planning with a people-oriented organizing center.
Don't be browbeaten by administrators who care more about covering the curriculum than they do about opening up the child's future.

3. What should I do with my textbooks and workbooks?

All materials should serve the purpose of increasing learning potential of children. Many magnificent stories and exercises are in standard text materials.

There's also much that can be ignored because it is not relevant to your particular needs at the time.

Stop being an assistant to the textbooks.
Use them with discretion.
Plan in terms of "doing" activities.
There's nothing special about the printed word as published in a text. The real world offers much printed matter, visual imagery, and direct experience that is wholesome and significant, too.

But don't throw out all your books.
Those who "burn the books" are the most visible radicals and will suffer the most severe consequences first.

4. How can I find out what the children are learning? How will I be able to see the development of attitudes?

The qualities of children's performances can be ascertained by arranging many opportunities for them to display what they can do.
Oral and written reports, roleplaying situations, and graphic representations are excellent visible means by which specific behaviors can be highlighted.

Planned instructional activities should provide for self-evaluation by students as well as for evaluation by the teacher.
Attitudes are inferred from actions.
Writing about or acting out attitudes can provide evidence for even an unskilled observer. These can be checked through person-to-person conferences.

Expressions which tap a child's self-image can be reliable indicators of what is being taught and/or learned. However, no one expressive statement should serve to stereotype a child throughout his school career.

5. How time consuming is this approach? What about skill development?

Take one small step at a time.
Those who need to cover specific curriculum areas in particular time allotments may blend subjects and create "free space" for discussion and review.
Don't be ashamed if your planning is directed to help you survive in a traditional setting. Very few teachers are autonomous.

Some teachers can integrate many subject areas and skills into one unifying experience. Other teachers need to plan specific times when they do one thing well. In any approach, take care that if a skill is to be taugh an evaluation of that skill can be easily obtained.

Organizing around people should allow for more free time to be used by children for expressive activities. Their learning energies will be related to meaningful real-life situations.
They will produce higher quality work because they will be forced to communicate with people who use and expect acceptable (language) forms.

The person-in-the-occupation may not be THE organizing center for you. Use the new Career Education ideas as you would any idea that has value. Don't expect *all* skills suddenly to fit within your "new approach". Incorporate skills naturally, stretch yourself a bit, but don't try for a complete integration of all content at first. Few of us have that kind of creativity and planning energy when we begin a new program.

6. How can I get administrative support for this approach?

Two ways of gaining support can be tried at once. The first one looks positively at the latent wealth residing in the immediate school community, especially the power potential residing in parents of children in your class. Showing the results of an inventory you have taken of occupations, travels, hobbies, and other interests confronts your educational leader with substantial evidence of what might be done. *A few simple, yet practical plans for involvement of parents would demonstrate your interest and expertise.*

The second approach points out deficiencies in present student achievement, then sujgests increased motivation for learning might come through people-centered activities. *Children who identify with real people and see meaning in their studies usually progress further along the academic ladder.*

(Of course, your children could begin their studies of the World of Work by expertly interviewing the "boss" and turning back feedback of high quality academic learning to his office.)

7. How should I explain the new content we're studying to parents?

Let the child do the work. Have the children write, speak, and draw to explain their feelings and thoughts. Add a cover letter and send many pieces home.

Parents love to see their children'w work.
Even if the child is trying and there is little evidence of successful accomplishment early in the school year, parents will appreciate being informed about the nature of the instructional program and the objectives to be attained.

Parents who become involved by participating directly in interviewing and field trip experiences of the class will speak naturally and excitedly about their involvement. Your school's public relations program can capitalize on the positive force you have created. Pictures in the local paper and stories on radio and TV do much to introduce and reinforce your life-centered approach to education.

Open houses and other such social activities add to the morale and spirit of the class . . . and parents.

Some administrators are very talented in arranging "public relations" and can be of great service, especially if your program meets their self-interest. (It does!)

8. Which speakers are appropriate for my class? What should I ask them to do? How can I prepare the children for the outside talent?

If you have thought through specific behavioral goals for your children, you should be able to center on particular community people who could help you in your work.
You may decide to begin with a person working in the bank because you want to develop mathematical skills or some concepts about our economic system.

On the other hand, you may wish to begin with a trip to a supermarket because of interest aroused in foods or consumer education.
"Who" will often depend upon "what".
Of course, friendly folk can be made more accessible than those who might frighten you because their work is too sophisticated, or too political, or too dry, or too sexy.

You might want to use a field trip as a diagnostic tool to understand your students better.
Then again, you might decide to build a program of parent visitation so that the "community" of your classroom is enhanced.

Use the suggestions about interviewing. Prepare the children and the talent. Above all, *encourage face-to-face discussion about authentic work experience,* displaying tools, uniforms, and so forth.

Children can be led to see school studies are related to the world around them. They should report such relationships to you, to peers, to parents, and also back to the visiting adult talent.

9. Which field trips will be best?

Children can't make sense of everything they encounter. Some places in the community are dangerous to children. Some places in the community have little to offer because the children are not able to get behind the scenes. Some scenes are too distasteful and some places in the community are too sophisticated for young minds. You have to determine the potential of each field trip and weigh the direct experience against what could be gained by reading, telephoning, or other means.

Classic field trips such as a visit to the fire station can become more significant as children learn interviewing skills and meet people as well as fire engines.
"Now we're going to see where people work."

Generally speaking, field trips to exotic places far away from the school and field trips which require *extensive* pre-planning are not worth the trouble they take
Frequent, short, local visitations are preferable to one big, drawn-out day.

10. Which occupations must be studied? In which grades?

There can never be a master list.
Some teachers might choose an occupation (adult role) for an attitudinal reason while others might see the person-in-the-occupation as a stimulant to greater effort in a particular skill area, e.g. measuring.

Many is probably the best answer.
Your use of the dimension *accessibility* will influence what you can do.

If you use parents to begin your program, the type of encounters you will have depend upon your people-subjects.

Variety should be considered.
An overemphasis upon government workers could give the students a distorted picture of our working society. Young children need to come into contact with people who risk their monetary fortunes, too. Otherwise, we might be accused of preparing a generation of corporation and government bureaucrats.

The occupations, career lattices, and cluster groupings can be decided in conference with those who plan your school system's total educational programs or your project managers.

11. What occupations are especially suited to very young children?

Let's forget the "community helper" approach. That concept has clouded the work scene so children are prevented from seeing things as they really are. *Making a living is not a difficult concept to learn.* In fact, children in many communities have been closer to such problems than were their academic-minded educators. (Sorry about that.)

Values of the person-performer determine the choice, not some grand curricular design. For instance, if you are working within a community where most of the children are poor and come from homes which are on relief or where parents and relatives work on factory assembly lines, would you shy away from contact with executive-type occupations? Would you want the bank president or the manager of a department store to be a guest talent?
Or would you rather choose the bank teller, the saleslady, or the clerk at the cash register?

The choice depends upon what you think the children need *and what you think you can do.*
You know it will take more time, energy, and materials to introduce and build upon "decision-making" concepts, the heart of the executive-type jobs. Let's not be naive.

You know your children have little background in their home environments to undergird your plans. You also know your children desperately need higher horizons. And, of course, you are committed to using the energies of the school social progress.

What will you do? Will you spend the extra time and energy to introduce these persons-in-the-occupations to first graders? Will you teach for "higher" abstract goals?
Or will you stay with the more traditional, visible human models and leave the "decision-making" direct experiences to other teachers in the upper grades?

Your school board may set policy about this aspect of the World of Work (I doubt it).
Your principal may set some guidelines about whom you should contact and how you should proceed in your instructional program, but *the actual teaching is up to your imagination and your willingness to work against great odds.*

Hopefully, you will know what your specific priorities are for your class of children and you will be extremely tough-minded about following through with your professional plans. *Do what you think is right!*

12. Where can I go to visit classrooms where teachers are using these new ideas?

Interested teachers in schools throughout Northern Illinois tested out ideas and activities. Our project serves as a clearinghouse for instructional innovations for this area. Active participants have included educational workers in Rockford, DeKalb, Wheeling, Long Grove, Glen Ellyn, and Maywood. Other areas have been utilized and host visitors. We will be happy to help classroom teachers and administrators with visitations as well as with consultant services and materials.

April 18, 1971

TO: ABLE Staff

I've finally decided to list some of my opinions about "tested education values" using World of Work as fuel for teaching second grade.

1. Most important there is greater transfer value from classroom instruction to the outside world.
2. Respect is gained for educators by letting the outside world into the classroom.
3. New dimensions are added to basic texts. Story characters work and use tools, too.
4. New opportunities are provided for skill building and personal development in social and academic behavior.
5. Extends opportunities for finding and implementing students interest. (Individualized instruction)
6. More opportunities are available for students to make choices and judgments about themselves and others.
7. Students have a greater awareness of community and larger world dependency of people upon each other because of their work. (Composite needs)
8. Reinforces "work ethic" at a time when it is being tested by segments of society.
9. Builds student competence in relating to adults and their world.
10. Adds dimension to the teachers "role" through working with other adults in other fields.

P.S. I have gained or reinforced these opinions through daily use of the World of Work format in my classroom.

Sincerely,

Doris Miller
Teacher, 2nd Grade
Willow Grove School

Dear Dr. Wernick:

As the year draws to a close, I find enough experiences behind me to begin evaluating the World of Work and what it has done for my classroom.

To begin with, I would like to explain how we used the World of Work in our classroom. Through trial and error we found that not enough interest was generated or skills taught when we tried having one visitor per week. It seemed to be "too confusing" and "too much". We would just get rolling on one project and then have to lay it aside and begin a new project. *Our class this year is one that enjoys long term special contracts and projects.* By having too many people in to explain about their occupations, not enough time was available for research before the next visitor was "knocking at the door". We then found that by spending several weeks exploring all areas, for example of the building industry, it spurred more special interest groups and more individual project involvement. *It also gave us more time to interview several people who might be performing the same job.* This the children did on their own and brought back their findings to be shared with the whole classroom.

Each Friday we shared our interviews with each other and compared our findings. *Children learned interviewing skills very quickly as they listened to those around them and evaluated each others' findings.* They found out what was important to know and what was of little or no interest.

As a classroom teacher, more time with each project allowed planning time for certain skills that evolved from a particular project. I could also take time *to individualize assignments* so that all children were not doing the same thing at the same time. During our Friday sharing time I found these individualized assignments to be invaluable for the shy, quiet, often non-involved child. *The World of Work also promoted a higher interest level for learning basic second grade material because the program correlates with so many fields* (math, science, social studies, health, reading, language arts, etc.). *What more could a teacher ask for?*

Throughout the year we have covered as thoroughly as possible all phases of the building industry, the story of flight, animal care beginning with the veterinarian straight through to using animals in medical research.

Because of spending many weeks on each project, we were able to research all of the occupations needed to build and sell real estate. We found out how many people it took to run a veterinary hospital and how we use animals in research. We scratched the surface of O'Hare Field and found that fifteen different occupations were needed to get our pilot, Mr. Chandler, off the ground and flying his American Airlines Boeing 727. Consequently, *material never runs out,* just time, the teacher, or both!

As a teacher involved in the World of Work, *I have found hundreds of avenues of learning opened,* many yet to be researched. I have also discovered that a program such as this must be tailored for each incoming group of students according to their special interests -- no chance to become stagnant! *One teacher may find her way of using the program entirely different than another teacher at the same grade level.* That proves that *the World of Work is a fine instrument for teaching because it allows a teacher to individualize herself as well as her students with regard to instruction.*

I am sorry to admit that you have only a random sampling of what really went on "behind the scenes" in our classroom. Had I known ahead of time what the results would be on some of the projects my class accomplished, I would have made arrangements with parents to keep more of their work. I find it very difficult to ask a parent to part with a hand-made, hand-painted helicopter that looks so real it could fly. I guess that "hind-sight" is better than "no sight".

Our class has decided that they would like to end this year with a slide program especially for parents, to share with them some of our experiences while working with the World of Work. When we finish with the slides, we will send them to DeKalb, if you wish. We also have some materials from our flight project that you may have if you are interested.

See you at EXPO '71 and thank you for allowing me the opportunity of participating in the World of Work. *It has proven to be an invaluable experience for myself and my second graders.*

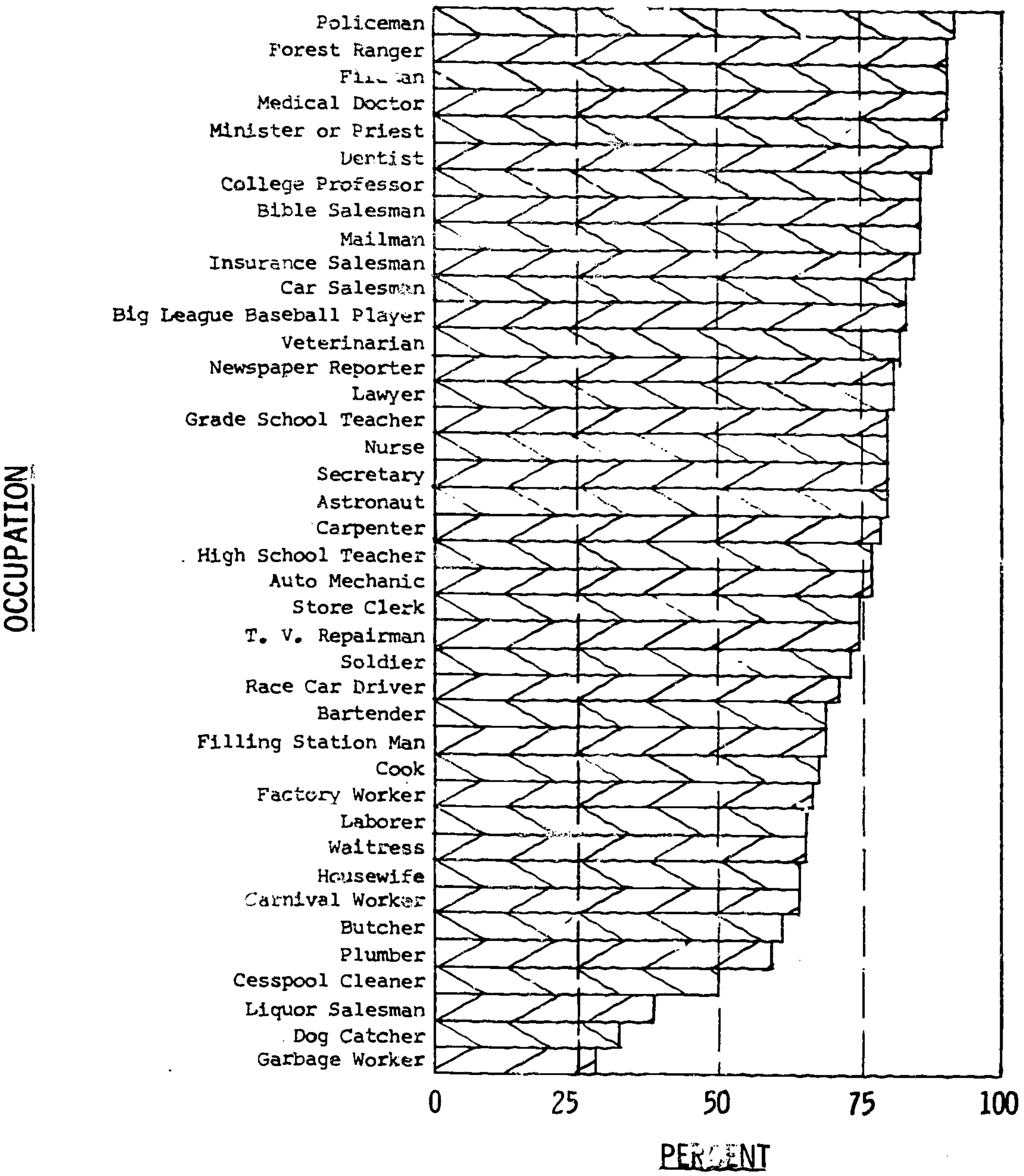
Sincerely,

Sandra Anderson
Second Grade, Willow Grove

(Italics by project staff) May 1971

PERCENT INDICATING THAT WORKERS IN CERTAIN OCCUPATIONS SHOULD BE PROUD OF THEIR JOBS

INTERMEDIATE - GRADES 4 THRU 6



Primary and Inte[illegible]te rank order [illegible] correlation: .88

Responses to "What kinds of jobs would you like to learn more about?"

FOURTH GRADE

FREQUENCY	OCCUPATIONAL AREA
138	- Teaching
100	- Nurse
83	- Professional Athlete
38	- Secretary
37	- Policeman
35	- Racing Cars
34	- Medical Doctor Scientist Veterinarian
32	- Mechanic
24	- Counselor
23	- Truck Driver Fireman
21	- Engineer
19	- Pilot Farming
18	- Astronaut Artist
17	- Armed Services Salesman
16	- Airline Stewardess Beautician
15	- Lawyer
13	- Actor or Actress
12	- Railroad Worker Architect Waitress Carpenter
10	- Cook
9	- Construction
8	- Horse Trainer Clerk Missionary
6	- Banker Zoo Work Factory Worker Computer Programmer Jockey
5	- Mayor Writer Movie Producer Steel Producer Scuba Diver Telephone Company Dancer Model
4	- Singer Babysitter Lumberman or Logger Minister or Priest Postman
3	- President Principal Electrician Gardener Machinist
2	- Shipper Game Warden Druggist School Dept. Broadcasting Housekeeper FBI Agent Garbage Worker Cesspool Cleaner Accountant Skater Dress Maker Painter
1	- Governor Life Guard Bottle Maker Bartender Fisherman Stock Broker Psychiatrist Heavy Eq. Driver Computer Repairman Skier Engraver Judge Banker Canner Barber Designer

INTERVIEWING

The following outline of a workshop on interviewing was developed by Wayne Rehmer of Booth Tarkington School, Wheeling. It contains suggestions for teaching children to interview. A few ideas were "borrowed" from other ABLE brochures, but the organization and courage to implement the activities were the work and talent of Mr. Rehmer, one of our participating teachers.

Information retrieval and communication skills should be taught to elementary students. Interviewing techniques increase inquiry skills in many areas.

We are proud to be able to bring this work to the attention of interested professionals. Our theory of practice is founded upon the talents of our participating teachers.

LET'S COMMUNICATE

I. Important Skills to be Learned and Improved by Interviewing

  A. Finding information (In our age where knowledge is doubling and redoubling, we must have sources for finding information available by interviewing others who have information)

  B. Communicating -- questioning, answering (Involvement can cut across generation gap)

II. Planning for Teaching Interviewing

  A. Purpose: establish a reason for interviewing. Discuss uses of interview with students

  B. Strategy: plan appropriate questions with children

  C. Interview: practice in a variety of settings, Evaluate performance with students. Refine techniques and apply

III. Interviewing Activities for Intermediate Grades

  A. Lead-up activity

    1. children paired off; talk for 3 minutes to find an interest, ability, or unusual background; choose one to develop
    2. children work together to establish purpose, plan strategy, then interview on tape
    3. playback taped interview to evaluate performance

B. Roleplay a story character

   1. interview the character to uncover his feelings
   2. interview to review story details

C. Book Reports

   1. interview reader to discuss opinions
   2. interview to review plot, settings, characters

D. Interview adults about jobs for vocational information

   1. easiest to do with personnel in school
   2. walking tours in neighborhood
   3. field trips to work stations in community
   4. record on cassette, play in class and discuss

E. Roleplaying of past and present renowned people

   1. historical detail
   2. character traits
   3. opinions and feelings

F. Creative involvement

   1. roleplay and interview almost anybody or anything - Martian, champion, animal
   2. roleplay imaginative situations - funny, difficult

G. To get information for reports

   1. surveys, comparisons, opinions of "real" people
   2. interview adults about their childhood heroes and classmates
   3. survey and compare findings

. Observations and Reflections

A. Can be done anywhere: classroom, school, field trips

B. Cassettes: easy to operate, accurate information feedback

C. Must learn and practice asking appropriate questions

D. Must appreciate feelings of people being interviewed

E. Must learn to be comfortable - practice for style

F. Must learn to adjust strategy during interviewing

G. Must learn to respond to a "yes" or "no" answer with "Why?"

H. Interviewing is *Motivating* and *Encouraging*

I. Interviewing is *Inquiring* and *Communicating*

SUGGESTIONS FOR STAFF DEVELOPMENT ACTIVITIES

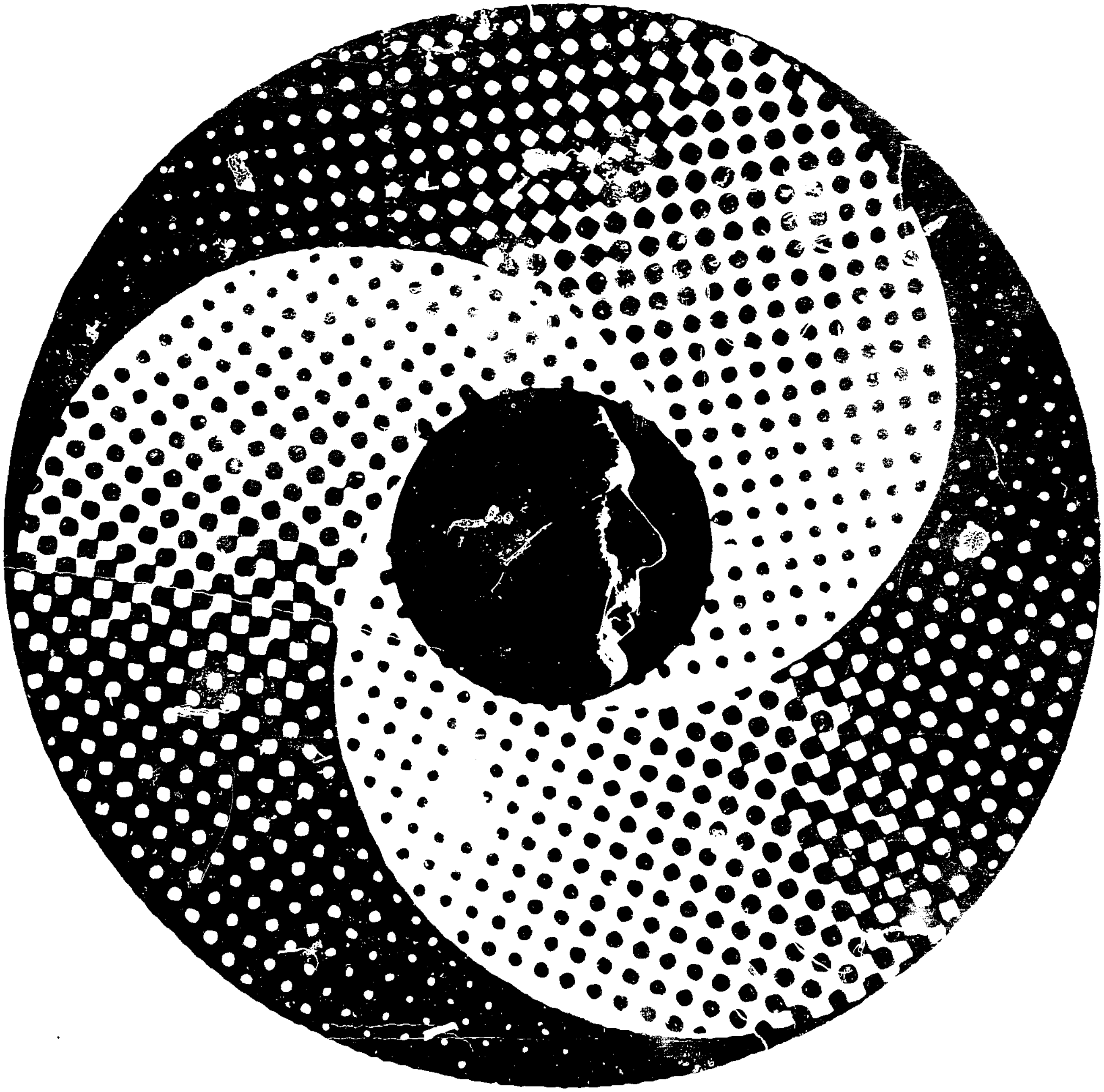
By this time you're probably becoming a little anxious because you want to weave all of this content into a plan for the development of your staff. As a benchmark for your thinking we are including a short outline to satisfy your need to put process and content together. How many of the following have you already thought through? How many can you manage with the energy system available to you?

1. A committee made up of classroom teachers and administrators to plan specific behavioral objectives and activities for interested teachers.
2. Visitations to classrooms where World of Work instruction is being planned and implemented.
3. Special workshops to focus attention upon educational goals and outcomes.
4. In-service meetings to learn new skills of teaching.
5. Lay advisory committees to evaluate present products of schools and suggest new directions and priorities.
6. Grade level teams reporting to school faculties and parent groups.
7. Special projects by learning center directors to highlight particular careers or to show the relevance of academic content to particular occupations.
8. Pilot experiments to test selected concepts in classroom settings.
9. World of Work Fairs and other all-school activities that bring school and community together.
10. Consultant help from state office personnel and/or university faculties.

The beginning of a plan is an idea. After a teacher considers an idea in relation to broad questions of policy, instructional management depends upon:

1. What materials and services can be available?
2. What attitudes, facts, and skills can be developed from my idea?
3. What can the children do?

The organizing center approach enables teachers to work through practical concerns quickly so they can take an idea and see where it leads them.



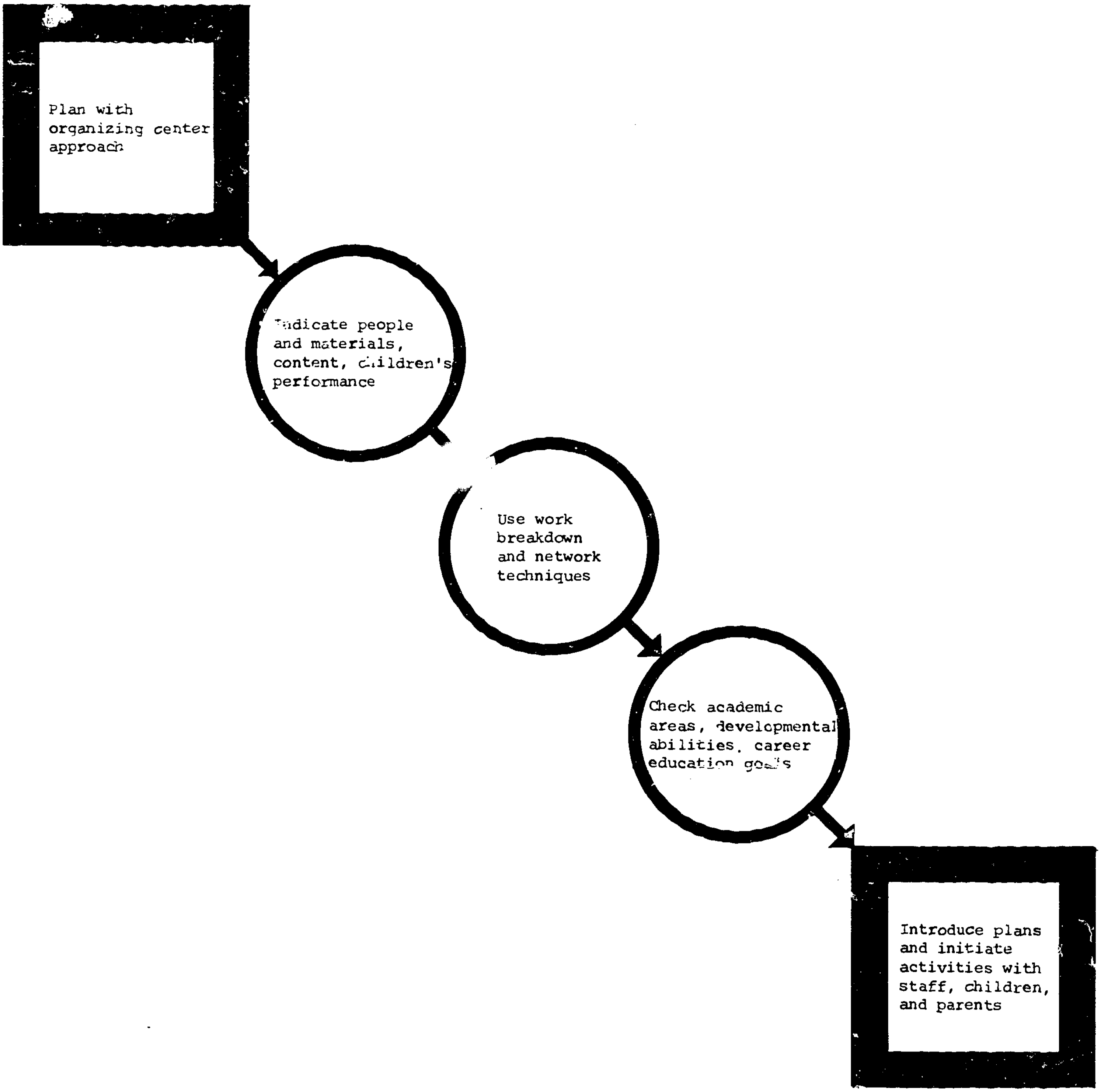
PARENTAL ATTITUDES

SCHOOL TRADITIONS

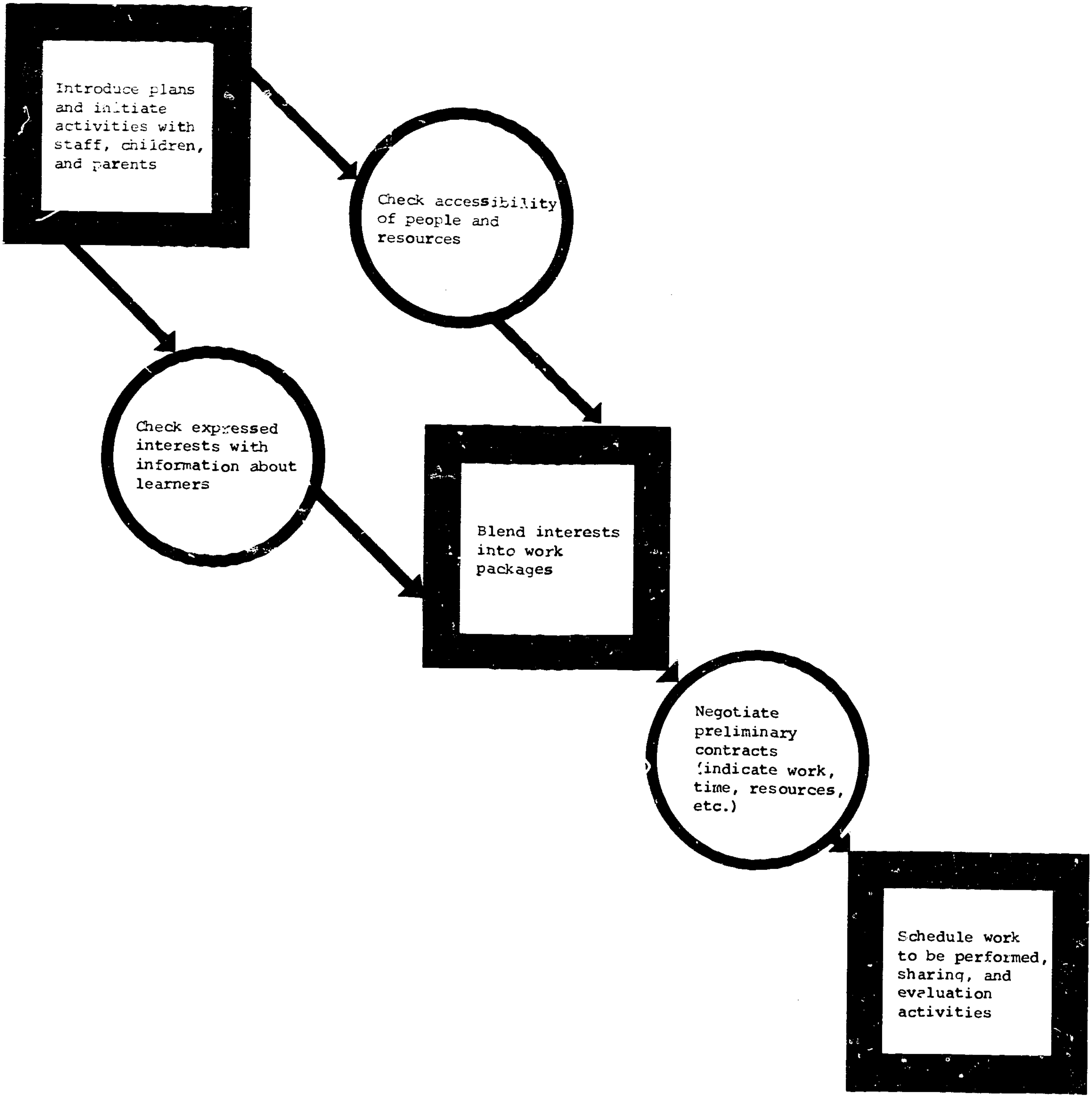
CHILDREN'S NEEDS AND INTERESTS

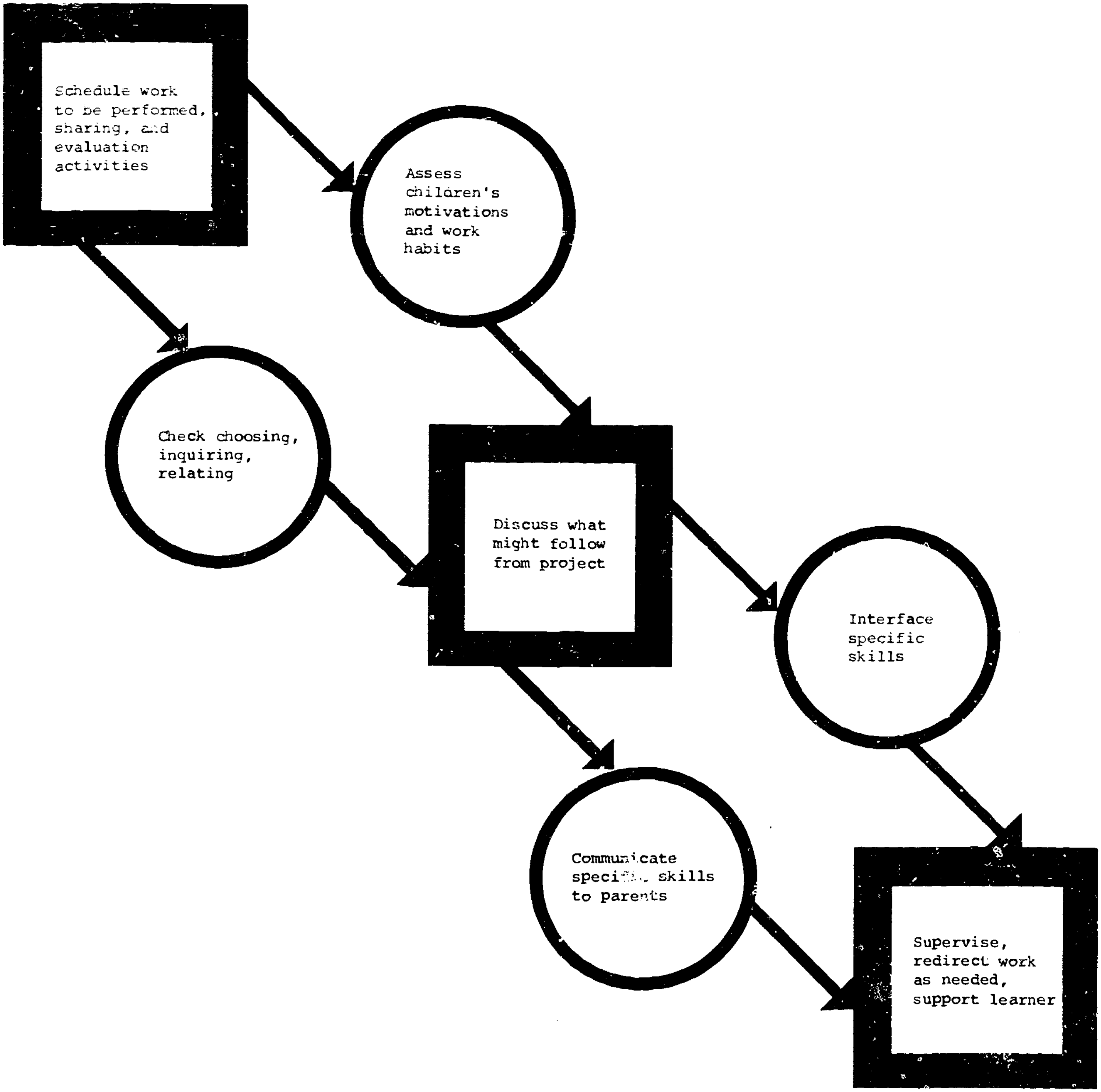
CONCERNS OF COMMUNITY

PROFESSIONAL COMMITMENT


Plan with organizing center approach
Indicate people and materials, content, children's performance
Use work breakdown and network techniques
Check academic areas, developmental abilities, career education goals
Introduce plans and initiate activities with staff, children, and parents

V

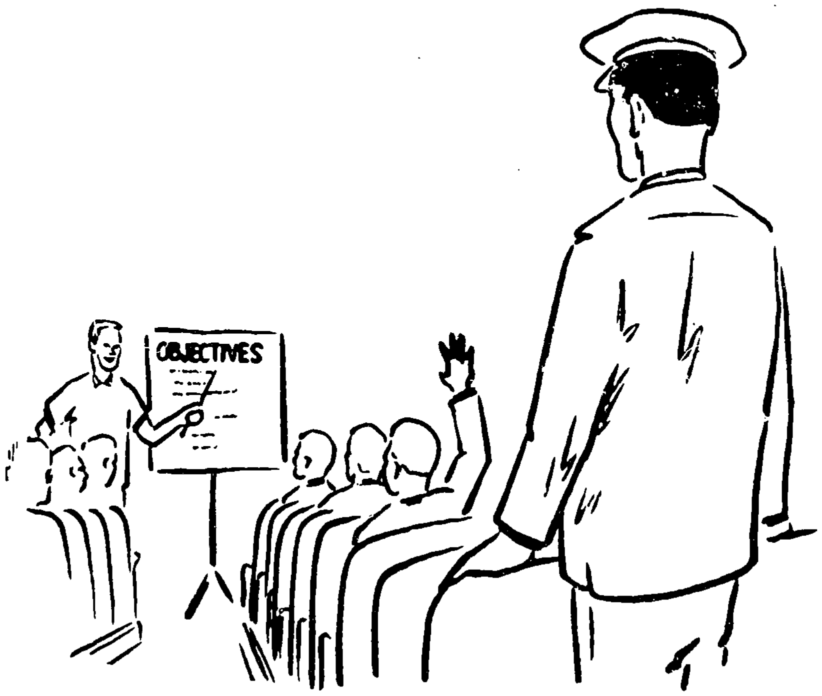

Introduce plans and initiate activities with staff, children, and parents
Check accessibility of people and resources
Check expressed interests with information about learners
Blend interests into work packages
Negotiate preliminary contracts (indicate work, time, resources, etc.)
Schedule work to be performed, sharing, and evaluation activities


Schedule work to be performed, sharing, and evaluation activities
Assess children's motivations and work habits
Check choosing, inquiring, relating
Discuss what might follow from project
Interface specific skills
Communicate specific skills to parents
Supervise, redirect work as needed, support learner

(frame 22 continued)

How is this phase of the preparational step motivational?

	FRAME NO.
This phase is not related in any way to motivating the trainee to learn.	24
This phase gives the instructor a chance to observe the trainees and determine where special needs or abilities lie.	27
The trainee feels that his opinions are important and his talents and abilities, useful to the class	30



(from Frame 21) 23

YOUR ANSWER: The following best demonstrates a portion of a good course preview:

> "McKeeley Park is located in the northwestern corner of the state twenty-two miles south of Rockville. It was founded as a State Park in 1936 as a part of the conservation program of Roosevelts's administration. This site was chosen because of the warm sulfur springs that flow here in a naturally beautiful mountain setting. The source of the springs....."

If Mr. Bright began his preview of the tour to McKeeley Park in this manner, his students might have either sneaked off the bus and gone home or caught a catnap between commas! It is important to remember that instruction does not take place during the preparation step. Your purpose in this step is to get the student physically and mentally ready to learn. A chef might prepare an elegant meal for you, but unless you were hungry you could not be made to eat it. Even in previewing the course or lesson, remember that you are still in the process of motivating the trainee. Pick out the most interesting things that he will study. Ask some thought-provoking questions which will be answered in the lesson. Show him that instructor and trainee will be working together to reach the objectives of the course.

A point to ponder: It has been said that the best instructor does the least talking! Return now to frame 21 and make the correct response.

(from Frame 22) 24

YOUR ANSWER: This phase of the preparation step is not related in any way to motivating the trainee to learn.

Perhaps you need to ask yourself again what motivation is. Motivation is showing the trainee the need to learn, generating interest to learn, giving him the desire to learn. The phase of preparation that we have discussed gives the trainee the opportunity to have a say in planning his course of study and making the classroom rules that he will have to follow. What is motivational about this? The same thing that causes the tiny private farm plots in Russia to produce more than the huge communal farms operated by the government. The small plot of land belongs to the individual. He can use the produce for his family or sell it in the market. Because it is his and he can reap the benefits of it directly, he works harder to make his little garden productive.

Return now to frame 22 and make the correct response.

YOUR ANSWER: The Preparation Step sets the mood for learning because it prepares us for the type of instruction that is to come.

Correct! You don't buy something without first examining it to see if you really want it and if it is worth the money. Your trainees won't "buy" your instruction unless you have given them some idea of what it's all about and its worth to them. The Preparation Step is part of the plan of instruction because your trainees won't learn unless they are ready and willing to do so.

Let's summarize all that we have said about preparing the learner:

I. Provide proper facilities.

  A. The trainee must be physically comfortable.

    1. Seats must be arranged properly.

      a. The student must be able to see.
      b. His legs should rest comfortably on the floor.
      c. His work area (desk top, table, etc.,) must be large enough for the task that he is assigned.

    2. Lighting must be evenly distributed.

    3. Ventilation must be provided to prevent trainee from becoming overheated or cold.

  B. The trainee must have safe, healthful surroundings.

    1. Desks, chairs, tables, etc., must be arranged to provide easy passage around the room.

    2. Lighting must be adequate to prevent eyestrain.

    3. Wiring and electrical outlets and equipment must be checked to insure safety in use.

    4. Room must be adequately ventilated.

      a. Proper ventilation prevents air from becoming stagnant.
      b. In use of some chemicals, etc., proper ventilation prevents dangerous fumes from being trapped in the room.

GO ON TO THE NEXT PAGE

(frame 25 continued)

II. Motivate the trainee to learn.

  A. Put him at ease.

  B. Find out if he is ready to learn.

    1. Principle of learning--readiness.
    2. What is the student's background?
    3. What does he already know about the subject?
    4. What does he need to know?

  C. Preview the course.

    1. Touch only the high points.
    2. Make the trainee want to know more.

  D. Involve the student in planning the lesson or course.

    1. Ask him to set goals for the lesson, to make rules for classroom behavior, and to suggest ways to make the study more interesting
    2. Observe the trainees to discover special interests and aptitudes.

Now we are ready to see how well you understand the Preparation Step of the "Four-Step Method of Instruction. Turn to frame 26 for your first question.

(from Frame 25)

What is the first step in the Four-Step Method of Instruction?

	FRAME NO.
Preparation of the learner	29
Planning to teach	32
Presentation of information	34

(from Frame 22) 27

YOUR ANSWER: This phase of the preparation step is motivational because it gives the instructor a chance to observe the trainees and determine where special needs or abilities lie.

This phase does give you a chance to observe your trainees and. like a doctor, diagnose their needs and abilities. This information that you are gathering as your trainees participate in planning might be used to motivate them as the class goes on. The question asked. however, how this phase is motivational, not how the information that you gather from this phase might be used to motivate. You must then ask yourself what the trainees do that encourages them to learn. It is the same thing that motivated our founding fathers to come to America--self-determination.

More than likely, you merely misread the question. With this reminder to be more careful, return to frame 22 and make the correct response.

(from Frame 30) 28

YOUR ANSWER: The Preparation Step sets the mood for learning because it causes the trainee to eagerly anticipate learning the lesson.

This is true only if the mood that you set is a favorable one. If you follow the points that we have discussed, you should be able to set a desirable mood. If, on the other hand, the mood you set makes the trainee more tense, if he is made to feel that your class will be like a prison camp with nothing to gain but hard work and hard times, you will have set a mood; this mood will hinder, not help, learning.

You are on the right path. Make sure that you think through the responses before making your selection. You may return now to frame 30 and choose the correct answer.

(from Frame 26) 29

YOUR ANSWER: The first step in the Four-Step Method is the preparation of the learner.

Good! You recognized the fact that planning to teach must come before actual instruction begins and that you cannot present instruction until the learner is prepared by being made comfortable and being motivated to learn.

Proceed to the next question by turning to frame 33.

(from Frame 22) 30

YOUR ANSWER: This phase of the preparation step is motivational because the trainee feels that his opinions are important and his talents and abilities, useful to the class.

Good! The motivation lies in the trainee's feeling about himself, his class and the whole learning situation.

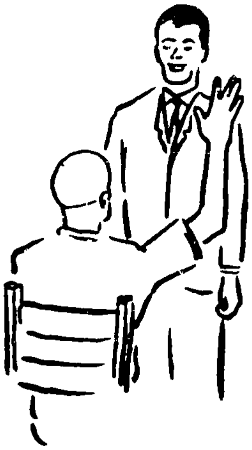
We have just completed the Preparation Step of the "Four-Step Method of Instruction." All of the points that we have discussed concerning this step prepare the learner to receive instruction and set the mood for learning. If we compare the use of the "Four-Step Method" to a movie, the preparation step would be the music before the movie actually begins. You can usually tell whether the movie will be a drama, a western, a comedy, or a murder mystery by the kind of music that introduces it. If it is shrill, loud, and perhaps even weird music, we expect a horror movie or a murder mystery. Our bodies tense and we might grasp the arm of the seat a little more tightly. Mood music has prepared us to expect what is to come. The Preparation Step has the same purpose. By the time you are ready to begin the next step, the trainee knows what to expect from you and from the lesson. The more pleasant and interesting the mood you set for your class, the better prepared your trainees will be for receiving instruction.

GO ON TO THE NEXT PAGE

(frame 30 continued)

What do we mean when we say that the Preparation Step sets the <u>mood</u> for learning?

	FRAME NO.
It prepares us for the type of instruction that is to come.	25
It causes the trainee to eagerly anticipate learning.	28
The instructor plays music that relaxes the trainee so that he can receive instruction.	31



(from Frame 30) 31

YOUR ANSWER: The Preparation Step sets the mood for learning because the instructor plays music that relaxes the trainee so that he can receive instruction.

You misinterpreted the point. It might not be a bad idea in many instances to use music to set the mood for a lesson. Music could not be used alone, though. You must determine where to begin your instruction, how to make the trainee comfortable, and what the trainee needs to learn. Your trainee needs to know what he will be expected to learn, how you will determine if he has learned, and why he needs to know what you are offering to teach him. He does not want to walk into the study of your trade blindfolded. There is fear in the unknown, and it is your job to erase any fears or doubts the trainee might have before he begins the lesson. This is what is involved in setting the mood. Music was used as a comparison because it can set or change a mood. It can make you tense or relax you; it can make you sad or happy. The mood in a classroom can motivate a trainee or make him indifferent to learning. When you have created a good mood for learning, the preparation step has been completed.

Return now to frame 30 and re-read the information on this frame before making another response.

(from Frame 26) 32

YOUR ANSWER: The first step in the Four-Step Method is planning to teach.

Remember, the Four-Step Method deals only with instruction of the trainee. It is necessary to plan your strategy before beginning to teach, but the Four-Step Method tells you what you must do when the trainees are actually before you.

Now that your memory has been refreshed a bit, return to frame 26 and select the right answer.

(from Frame 29) 33

What teaching principles do you apply when you prepare the learner?

	FRAME NO.
repetition IQ	35
readiness motivation	39
interest evaluation	40

(from Frame 26) 34

YOUR ANSWER: The first step in the Four-Step Method is the presentation of information.

If you walk into the classroom and begin to present instruction immediately, how will you know whether the trainee is physically comfortable, whether lighting is proper, or whether the trainee is really ready to learn what you have planned to teach him? Before these questions are suitably answered, the instructor should never present a lesson.

Return to frame 26 to make the proper answer selection.

(from Frame 33) 35

YOUR ANSWER: The teaching principles that you apply when you prepare the learner are repetition and IQ.

Repetition is an important principle involved in learning, but not in this step. This principle deals with allowing the trainee to practice what you have taught as often as is necessary to learn the skill or information. A trainee's IQ is not a principle of teaching; it is useful to the instructor to know the trainee's IQ in order to prepare him for learning as well as to know how to present material to him.

Do not allow yourself to be tied up in terminology. Sometimes words look impressive, and we tend to use them though they mean little to the situation. It is necessary for you to know and understand the principles of teaching in order to make your teaching effective. Think of these words as being trade terms, but make sure you know what they mean before using them.

Return to frame 33 and ask yourself what each word means before making your answer choice.

(from Frame 37) 36

YOUR ANSWER: Paragraph "A" best demonstrates proper preparation of learner.

Look again at the paragraph you have chosen:

"Good morning, class! We begin a new lesson this morning on the muscular system. We have muscles for two reasons: 1) to bring about movement and 2) to provide support. Muscles also produce body heat when we move actively. There are two distinct types of muscles--smooth muscle and striated muscle. Smooth muscle fibers usually constitute involuntary muscles like the heart. The heart is called an involuntary muscle because we do not consciously control its movements. Striated muscles contract much more rapidly than smooth muscles, and we do have conscious control of most striated muscles. An example would be the muscles of the legs. You can move these muscles when you need to. If you saw a bear coming toward you, your brain would quickly send a message through your nervous system to your legs saying, "Run, legs, run..........."

GO ON TO THE NEXT PAGE

(frame 36 continued)

Is this instructor preparing the trainee to learn? What has he discovered about the trainee's readiness? Has he made any plans with his class for the study of this lesson? Do his trainees know what will be expected of them, i. e. what they are to learn and how they will demonstrate that they have learned? Have the trainees been motivated to learn? Upon examination of this paragraph, I think that you will discover that the instructor has skipped the preparation step entirely. He is already presenting the information to his trainees--the second step of instruction. In other words, he is building his house before he pours the foundation!

Make sure that your next response satisfies each question. Return now to frame 37. Put each paragraph through the test that we gave your answer choice.

37

Which of the following situations best demonstrates proper preparation of the learner?

FRAME NO.
36

A

"Good morning, class! We begin a new lesson this morning on the muscular system. We have muscles for two reasons: 1) to bring about movement and 2) to provide support. Muscles also produce body heat when we move actively. There are two distinct types of muscles--smooth muscle and striated muscle. Smooth muscle fibers usually constitute involuntary muscles like the heart. The heart is called an involuntary muscle because we do not consciously control its movements. Striated muscles contract much more rapidly than smooth muscles, and we do have conscious control of most striated muscles. An example would be the muscles of the legs. You can move these muscles when you need to. If you saw a bear coming toward you, your brain would quickly send a message through your nervous system to your legs saying, "Run, legs, run!"

GO ON TO THE NEXT PAGE TO STUDY TWO MORE SITUATIONS BEFORE SELECTING THE CORRECT ONE.

(frame 37 continued)

FRAME NO.
38

B

"We have little time to spare, so let's get down to the job at hand. We begin a new lesson today on the muscular system. I wouldn't waste time teaching this lesson, but you have to know this information to pass the State Barbering Exam. I'm passing out a pamphlet to you which contains all the information you need to know in order to do well on the test at the end of the lesson. Some of you will do well on this lesson; some of you will fall by the wayside. I will do the best I can for those who try, but don't bleed on my shoulder at the end of the lesson if you sit and do nothing. If you don't have what it takes, you should get it over with now. I don't want you in this class. Now that we have that point clear, look at the model of the muscular system on the table. Find the parts that match the numbered muscles in your pamphlet and label each part. I'll let you know when your time is up."

FRAME NO.
41

C

"Good morning, class! We are ready to begin a new lesson this morning. Some changes in seating may be necessary to make sure that everyone will be able to see. How many of you know anything about the muscular system? In order to be a good barber and in order to pass the State Barbering Exam, you must be able to recognize and name each muscle of the body--particularly of the head and neck. At the conclusion of this lesson, you will be able to label all muscles indicated on the diagram that I am passing out to you. You will also be able to meet the requirements necessary to pass the State Exam. Jim, you are a good artist. Will you prepare a chart of the muscular system for us to refer to in our study? I will call upon many of you to share your talents with us in this study. Now, how can we make this study more interesting? What goals should we set for ourselves in this lesson. As we discuss these points, I will ask George to keep notes of our discussion. Jack, will you write the main points on the board for us at the conclusion of the discussion?"

(from Frame 37)

YOUR ANSWER: Paragraph "B" best demonstrates proper preparation of the learner.

Let's look at the paragraph you have ch[illegible] it more closely:

"We have little time to spare, so let's get down to the job at hand. We begin a new lesson today on the muscular system. I wouldn't waste time teaching this lesson, but you have to know this information to pass the State Barbering Exam. I'm passing out a pamphlet to you which contains all the information you need to know in order to do well on the test at the end of the lesson. Some of you will do well on this lesson; some of you will fall by the wayside. I will do the best I can for those who try, but don't bleed on my shoulder at the end of the lesson if you sit and do nothing. If you don't have what it takes, you should get it over with now. I don't want you in this class. Now that we have that point clear, look at the model of the muscular system on the table. Find the parts that match the numbered muscles in your pamphlet and label each part. I'll let you know when your time is up."

Is the learner put at ease? Has this instructor determined if he is ready to start this lesson? Did the instructor preview the course for the trainees to give them an idea of what they would study? Did he involve them in course planning? Did he set a good mood for learning? Negative attitudes on the part of instructors are contagious. They tend to give the trainees the same negative attitude toward the whole lesson. Remember, a person can learn anything that he wishes to learn. Motivation and trainee readiness are key points in preparation of the learner.

Return, now, to frame 37 and read each answer choice carefully before making another response.

(from Frame 33)

YOUR ANSWER: The teaching principles that you apply when you prepare the learner are readiness and motivation.

You are correct! The most important questions the instructor asks himself during this step of instruction are, "Is the trainee ready to learn? and, "does the trainee have the desire to learn?"

You may continue to the next question. Turn to frame 37, please.

(from Frame 33) 40

YOUR ANSWER: The teaching principles that you apply when you prepare the learner are interest and evaluation.

You are hedging on the answer. Trainee interest is one aspect of an important principle involved in preparing him to learn. Evaluation, however, is one of the major steps of instruction. It is not a teaching principle.

Remember, the job that you are trying to accomplish is to get the trainee ready to learn and to make him want to learn what you are trying to teach.

Go back, now to frame 33 and consider the choices carefully before making another response.

(from Frame 37) 41

YOUR ANSWER: Paragraph "C" best demonstrates proper preparation of the learner.

Excellent! In the perfect situation, the instructor would not dominate the scene as he does in this simulated situation. The best instructor does the least amount of talking. The classroom is instructor-centered more during the preparation of the trainee than during any other step in instruction, however. The important point here is that this situation meets the standards we have set in this lesson for proper trainee preparation. We put the learner at ease, determine if he is ready for this particular lesson, preview the course with him and try to motivate him to learn, discover special talents and abilities to bring him actively into the study, involve him in the class planning and set a favorable mood for study.

You are ready to learn now how to present the information or skill to the student. Go now to Module IV of the "Four-Step Method" to begin this lesson.

VT 016 183
TERRY, MARTHA, ED.
THE FOUR-STEP METHOD OF INSTRUCTION. A PROGRAMMED COURSE FOR OCCUPATIONAL INSTRUCTORS. MODULE 4

REHABILITATION RESEARCH FOUNDATION, ELMORE, ALA.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
OEC-2-7-006711-4542
PUB DATE - ND 68P.

DESCRIPTORS - GROUP INSTRUCTION; *PROGRAMED MATERIALS; INSTRUCTIONAL AIDS; TEACHING GUIDES; *EFFECTIVE TEACHING; *VOCATIONAL EDUCATION TEACHERS; PROGRAMED INSTRUCTION; *TEACHER IMPROVEMENT; VOCATIONAL EDUCATION

ABSTRACT - THIS MODULE IS THE FOURTH IN A SERIES OF SIX WHICH CONSTITUTE A 4-STEP PROGRAMED COURSE IN CERTAIN TEACHING TECHNIQUES AND STRATEGIES THAT HAVE BEEN DEVELOPED PRIMARILY FOR OCCUPATIONAL TEACHERS. IN AN EFFORT TO IMPROVE INSTRUCTIONAL COMPETENCY THIS MODULE ANALYZES THE PRESENTATION OF INSTRUCTION IN FOUR STEPS THAT ARE NECESSARY FOR THE ACTUAL LEARNING PROCESS TO TAKE PLACE. THESE STEPS ARE: (1) DEMONSTRATE AND EXPLAIN ONE IMPORTANT STEP AT A TIME, (2) ILLUSTRATE YOUR INSTRUCTION WITH THE PROPER AIDS AND MATERIALS, (3) QUESTION THE TRAINEES TO SEE THAT THEY UNDERSTAND WHAT YOU HAVE PRESENTED, AND (4) REPEAT INSTRUCTION WHEREVER ANSWERS TO YOUR QUESTIONS INDICATE THAT THERE IS A NEED. OTHER COMPONENTS TO THE SET ARE AVAILABLE AS VT 016 180-VT 016 185 IN THIS ISSUE. (SN)

VT 016 183

THE FOUR STEP METHOD OF INSTRUCTION

A Programmed Course
For Occupational Instructors

MODULE 4

THE FOUR-STEP METHOD OF INSTRUCTION

A Programmed Course

for

OCCUPATIONAL INSTRUCTORS

Module 4

Developed by the

REHABILITATION RESEARCH FOUNDATION
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Pursuant to a Contract with

U. S. Office of Education
Contract No: OEC2-7-006711-4542

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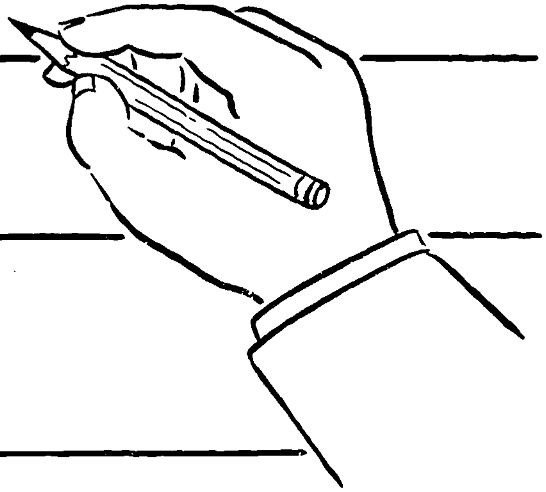
As a vocational instructor, you will be teaching two kinds of lessons: You will be teaching individual skills that make up your trade, and you will be teaching related information that will help the trainee to do the skill better. The "Four-Step Method" is used for both lessons, so we will discuss instruction generally for both types unless we specify one or the other.

The hardest part of your job is already over. You have your plan of action mapped out in your lesson plans. Your trainee has been physically and mentally prepared for instruction. This means that you are ready to begin the second step of the "Four-Step Method"--Presentation of Instruction. Let's break down the operation of Presentation of Instruction into steps (we will fill in the key points when we examine each step in detail):

JOB: Using the "Four-Step Method" OPERATION: Presenting instruction

STEPS	KEY POINTS
1. Demonstrate and explain one important step at a time.	
2. Illustrate your instruction with the proper aids and materials.	
3. Question the trainees to see if they understand the skill or information that you have presented.	
4. Repeat instruction wherever answers to your questions indicate that there is a need.	

GO ON TO THE NEXT PAGE

(frame 1 continued)

When you present instruction, what four things must you do to make sure that the trainee will understand and learn?

	FRAME NO.
Show the trainees how to do the skill using aids and materials. Check to make sure they're paying attention. Go on to the next lesson.	3
Demonstrate, illustrate, question, repeat instruction.	5
Prepare the trainee, present the skill or information, allow application of skill or information, evaluate progress.	7

(from Frame 5)

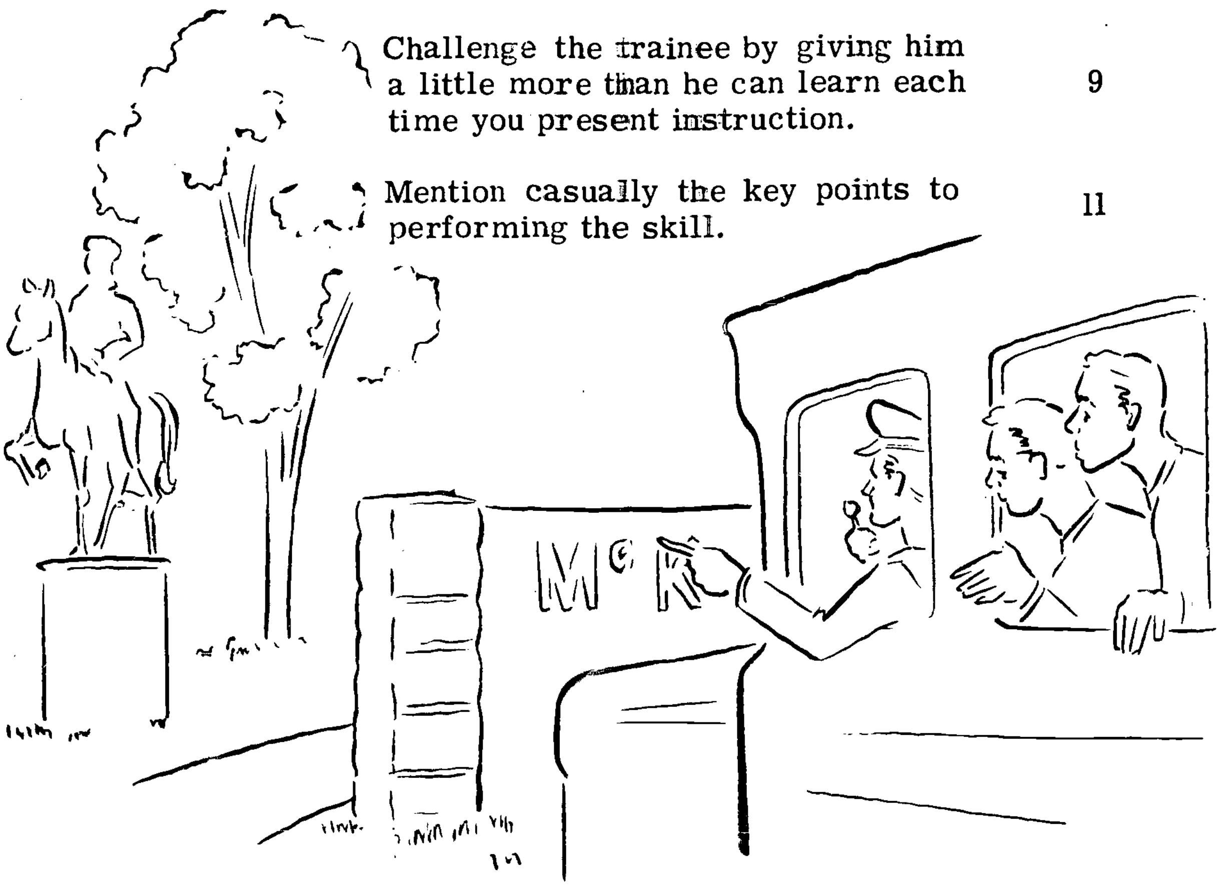
YOUR ANSWER: The teaching principles that Mr. Bright is applying are known to unknown and simple to complex.

Excellent! Having applied the principle of teaching from the known to the unknown and from the simple to the complex, you can decide your starting point and begin your demonstration.

The demonstration is a kind of "show and tell." This step is particularly important to a skill lesson. The trainee needs to see the operation performed as he will be asked to perform it. You should accompany your demonstration with a full description of how you do the operation and why you do it in this manner. You should instruct slowly, completely, and patiently one important step at a time making sure that you speak to the trainees and not mutter down into the equipment or the lectern that you are using. Be sure that you stress the key points in performing the operation. Lastly, don't try to give the trainees more information at one time than they can master. As soon as you have presented a major point, question for understanding and repeat instruction if necessary.

Which of the following is the most important point to remember in demonstrating a skill or related information?

	FRAME NO.
Teach one important step at a time.	6
Challenge the trainee by giving him a little more than he can learn each time you present instruction.	9
Mention casually the key points to performing the skill.	11



(from Frame 1) 3

YOUR ANSWER: The four things that you must do to make sure that the trainee will understand and learn when you present instruction are:

Show the trainees how to do the skill
Use aids and materials
Check to make sure they're paying attention
Go on to the next lesson

On the surface your answer seems to be a restatement of the four points that we listed. Let's examine each to discover why they are not sufficient. The first point is stated, "Show the trainees how to do the skill." Something more is necessary than merely "showing" them. You must also make each move clear by telling them what you are doing and why. The word we use is "demonstrate" which means "to prove or make clear by reason or evidence." That means a great deal more than "show," doesn't it? The second point which you have chosen is, "Use aids and materials." We have discussed the importance of aids and materials, and you should know that aids and materials must not simply be used. They must help to teach by reinforcing what you have already presented or making clear a point that some of the trainees missed in your presentation. The word we used which has this meaning is "illustrate." Your third point is, "Check to make sure they're paying attention." This step has a much more important purpose than as a disciplinary measure. You need to know if your instruction is effective. Have the trainees learned what you wished from your presentation?

Return now to frame 1 and select the response that answers this question.

(from Frame 5) 4

YOUR ANSWER: The teaching principles that Mr. Bright is applying are unknown to known and simple to complex.

Have you ever seen anyone build a house from the roof down? Of course not! In effect, this is what you are saying that Mr. Bright is doing. You are saying that he is beginning his lesson with something his passengers know nothing about and teaching toward what they already know. The previous frame stated that Mr. Bright chose McKeeley Park because "most of his passengers have been there." In other words he plans to start with something known and teach toward that which is unknown. The trainee's previous knowledge should serve as a foundation upon which to build each lesson.

You may have misread the answer response. If not, return to frame 5 and look carefully at the information given you before making another choice.

YOUR ANSWER: The four things that you must do to make sure that the trainee will understand and learn when you present instruction are:

Demonstrate
Illustrate
Question
Repeat instruction

Very good! Following each of these steps carefully will insure that the trainees grasp each lesson before going on to the next. You will be building their learning solidly as you go. Just like stacking building blocks, learning is built upon skill and information already learned. Pull one block from the middle and what happens? Collapse! Leave out a block and the stack is not as high as it could be. One lesson unlearned or learned improperly leaves the trainee that much short of the goals you have set.

You now know the steps involved in presenting instruction. The question is, "Where do you begin your demonstration?" You refer to your lesson plans to see which lesson you have decided to teach first. You then refer to notes you made about your trainees' readiness when you observed them during the preparation step. Suppose you are teaching carpentry. The first lesson you plan to teach is "how to identify the simple tools of carpentry." Most of your trainees are already familiar with these tools, so you will need only a brief lesson to refresh memories and to instruct those who are not familiar with the tools.

GO ON TO THE NEXT PAGE

(frame 5 continued)

You are using two very important teaching principles here. First of all, you are beginning your instruction with something familiar to the trainees, and you will lead into something that they have not yet learned. This is called teaching from the known to the unknown. Secondly, you are beginning with the simplest subject matter of your trade--recognizing the simple tools--and you will build upon this lesson to teach more difficult subjects. This is called teaching from the simple to the complex.

Mr. Bright chose McKeeley Park to begin his tour for two reasons: 1) it is close to the departure point and most of his passengers have been there; 2) the park is fairly small and takes only a little while to cover. What teaching principles is he applying?

	FRAME NO.
Known to unknown Simple to complex	2
Unknown to known Simple to complex	4
Readiness Motivation	8

YOUR ANSWER: The most important point to remember in demonstrating a skill or related information lesson is to teach one important step at a time.

Good! You are wise to realize that you cannot feed information to your trainee as you would to a computer, nor can you open a hinged trap in your trainee's head and pour in the information. You must feed him knowledge and skill as he is able to digest it. Otherwise, there will be a loss of information rather than a steady gain.

In demonstrating a skill we need to emphasize another very important key point. If at all possible, the trainee should observe the performance from the same viewpoint that he will have to perform--in some cases, from behind the instructor, not from the front. Why? Do you ever have trouble tying a necktie as you look in a mirror? What you thought was left is actually right. You can't seem to become coordinated. Your hands keep trying to go in the wrong direction. The problem is that you have to determine how the mirror reflects your image before you can decide which hand is which.

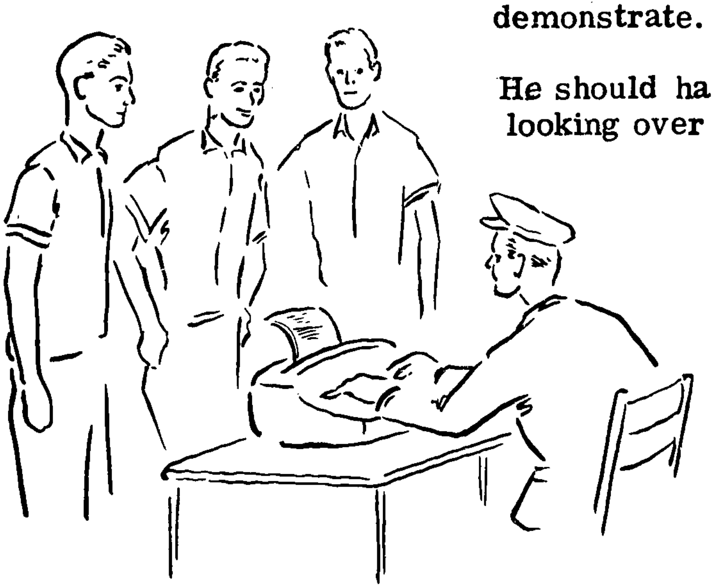
GO ON TO THE NEXT PAGE

(frame 6 continued)

In watching you perform a skill from the front, your trainees will have to turn you around mentally in order to see the job done as they will have to do it. They will more than likely become confused trying to reverse the process. You must simplify the trainees' learning process by making your demonstration as much like the trainees' own performance as possible.

Mr. Bright is showing his trainees how to operate the typewriter at the rear of the bus. What is wrong with his demonstration?

	FRAME NO.
He is giving his trainees more than one major step at a time.	10
He should have a trainee who understands the process to demonstrate.	13
He should have the trainees looking over his shoulder.	15



(from Frame 1) 7

YOUR ANSWER: The four things that you must do to make sure that the trainee will understand and learn when you present instruction are:

Prepare the trainee
Present the skill or information
Allow application of skill or information
Evaluate progress

I think that you must have misunderstood the question. The question asked you to select the four steps to follow when <u>presenting</u> instruction. Look again at the four steps you have chosen. You probably realize by now that you have chosen the four major steps of the "Four-Step Method"! What we are asking is that you identify the four points to follow in carrying out the second step of the "Four-Step Method."

Make sure you have read the question carefully before choosing the correct response. Return now to frame 1 and review the frame briefly before making another selection.

(from Frame 5) 8

YOUR ANSWER: The teaching principles that Mr. Bright is applying are <u>readiness</u> and <u>motivation</u>.

These principles of learning are most important in the preparation step. You cannot begin the presentation step unless these principles have been applied successfully in the preparation step, as a matter of fact. How would you know where to begin presentation of information if you did not know the trainees' level of readiness? How effective would your presentation be if the trainees were not motivated?

When you begin the presentation step, you must know that the trainee is ready and motivated to receive instruction. Then you determine in the presentation step exactly where you will begin to instruct. The teaching principles that you should have chosen will tell you this.

Return to frame 5 and study the frame carefully before making the correct response.

(from Frame 2) 9

YOUR ANSWER: The following is the most important point to remember in demonstrating a skill or related information lesson: Challenge the trainee by giving him a little more than he can learn each time you present instruction.

This tactic is like dangling a carrot in front of a horse to make him run. In some cases this may work, but not in all. When the horse realizes that he cannot get the carrot regardless of how hard he tries, he will stop trying altogether. This is the same effect that teaching above the learner's head or teaching each point too quickly have. The learner will try harder for a while; but when he sees that the goal is unreachable, he stops trying.

Instead of creating frustration for the trainee, you must attempt to minimize the frustrations of learning as much as possible.

There is a better answer for this question. Return to frame 2 and find it.

(from Frame 6) 10

YOUR ANSWER: Mr. Bright is giving his trainees more than one major step at a time.

Since you are given only a picture, it would be almost impossible to determine if this were true. Look at the picture again. Mr. Bright is demonstrating the use of the typewriter. How well do you think his passengers will be able to operate this machine after watching his demonstration? Do you think they can all see the demonstration? Can those who are able to see turn the machine around in their minds well enough to remember what Mr. Bright has shown them? Putting on a demonstration in this manner is like tying a lead weight around someone's waist while teaching him how to swim. He will be so busy merely trying to keep his head out of the water that he won't have time to listen to your instruction.

With these remarks as clues, return to frame 6 and make the correct response.

(from Frame 2) 11

YOUR ANSWER: The most important point to remember in demonstrating a skill or related information lesson is to mention casually the key points to performing the skill.

Casually mentioning the key points related to performing some skills could mean the difference in the trainee's having a hand or losing one! Key points not only tell the person performing the skill the best way to do a step; they also include any safety hints necessary to prevent accidents while performing the step. Therefore, key points must be stressed rather than mentioned lightly in passing. You are the instructor, and only you can warn the trainee of any danger that might exist in performing an operation.

You probably realize your error by now. Return to frame 2 please, and select the correct response.

(from Frame 15) 12

YOUR ANSWER: When Mr. Bright makes his demonstrations interesting, easy to follow, and slow enough for all students to catch on, he is applying the principle of success.

Saying that success is the name of the teaching principle that we discussed is like saying that your name is man. Success is not the principle, but a characteristic that determines how well the principle works. If the trainee has a high degree of success with learning, the principle has been applied properly; if he is not successful, the principle has been applied poorly.

Re-read carefully the information in frame 15 before making your next response.

(from Frame 6) 13

YOUR ANSWER: Mr. Bright should have a trainee who understands the process to demonstrate.

It is always good to involve as many of your trainees as possible in the teaching situation. It is not "Who" that is important here, but "How"! If you've ever learned a dance step from someone, you know that you cannot stand facing the person who is teaching you; you must stand beside him to imitate his steps easily. The same principle applies in your demonstrations. Is Mr. Bright making his demonstration easy for his passengers to repeat?

Return to frame 6 and ask yourself this question as you examine the picture.

(from Frame 17) 14

YOUR ANSWER: You should use teaching aids and materials in the classroom as a time filler.

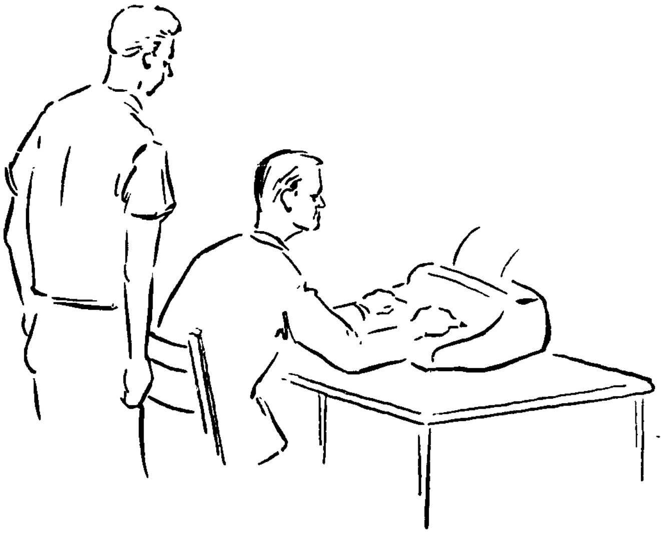
No activity that is carried on in the classroom should ever be for the purpose of filling time. If it does not relate to the lesson, it should not be used. If it does not add to the learning of a particular point or step, it should not be used. You have gone to a great deal of trouble in preparing the learner to set the proper mood for the lesson that you are going to teach. Nothing should interfere with the reaction that you have started. To do so would be like getting a passenger train up to a good speed and uncoupling the coaches. Regardless of how fast the engine runs, the rest of the train will go nowhere! The engineer will lose time having to return and pick up the detached cars.

Regardless of how good an aid or material is, if it does not add to the point you are trying to teach, don't use it!

Return now to frame 17 and select the correct response.

(from Frame 6)

YOUR ANSWER: Mr. Bright should have the trainees look over his shoulder as he demonstrates.



Certainly! From this point of view, the trainees can see Mr. Bright manipulate the buttons and levers on the typewriter just as they will in their use of the machine.

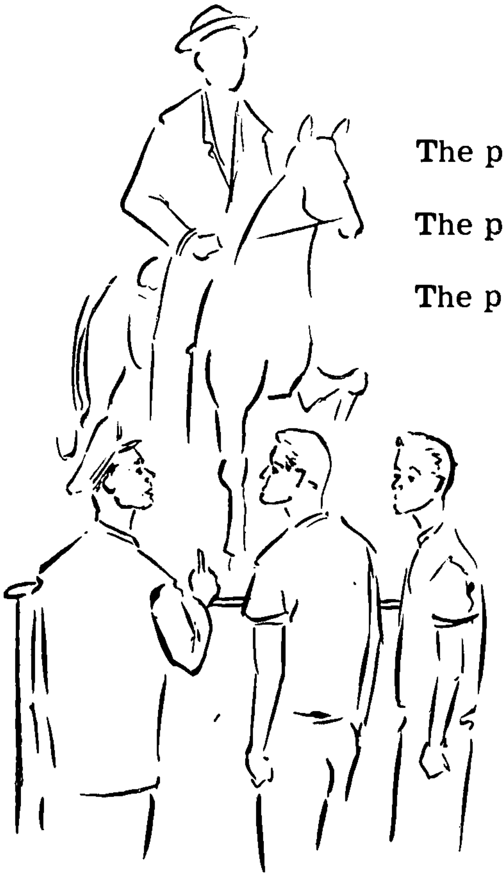
We have mentioned throughout our discussion of the "Four-Step Method" the importance of making the trainee comfortable, making him want to learn, and minimizing any unnecessary interferences with his task of learning. This has probably led you to realize that the classroom is actually "trainee-centered" rather than "instructor-centered."

GO ON TO THE NEXT PAGE

(frame 15 continued)

You have been hired to do a job; that job is to teach your trainees your trade and anything else that will help them learn to do this trade more easily, more skillfully, and more efficiently. You would not put your foot on the brake pedal and the accelerator of your car at the same time, would you? Not only would it make the car's task impossible, but you would get nowhere. You might even wind up paying to have your brakes relined! By the same token, the precautions that you take in the classroom to make learning simpler and more pleasant for your trainees are not for the purpose of pampering them, but rather shortcuts to doing your job better. There is a teaching principle which incorporates this theory --the principle of EFFECT. In short, this principle states that the trainee must have success with and get satisfaction from learning in order to retain what is taught and to desire to learn more.

What principle of teaching is Mr. Bright applying when he makes his demonstrations interesting, easy to follow and slow enough for all trainees to catch on?



	FRAME NO.
The principle of success	12
The principle of effect	17
The principle of readiness	19

AIDS

KIND	DEFINITION	EXAMPLES
Display aids	Eye-catching arrangements of materials displayed in the classroom	Chalk board drawings, pictures and diagrams on large pads of paper, posters, cartoons, flip charts, felt boards, and permanent wall charts.
Projected aids	Enlargements of subject matter on a screen with a projector	Slides, filmstrips, motion pictures, opaque or overhead projector.
3-D	The object about which you are teaching, a part of it, a model or a mock-up of it.	Mock-up (a full-sized model built accurately to scale) Model (a duplicate of the object built to scale. May be larger or smaller than actual object). Actual object.
Duplicated aids	Materials printed to hand out to individual trainees.	Job breakdown sheets, grading sheets, outlines of lessons, fact sheets, diagrams.

(frame 16 continued)

Which kinds of aids would Mr. Bright be using if he used an overhead projector to introduce his presentation, distributed fact sheets for the trainees to refer to, and used a series of pictures on a flip chart to add to his presentation?

	FRAME NO.
Display aid, projected aids, 3-D aid	18
3-D aid, duplicated aid, display aid	21
Duplicated aid, display aid, projected aid	23

YOUR ANSWER: When Mr. Bright makes his demonstrations interesting, easy to follow, and slow enough for all trainees to catch on, he is applying the principle of <u>effect.</u>

Very good! Not only is it important to apply the principle of effect, but to apply it correctly. The effect of learning upon a trainee can be a favorable one giving him a feeling of success and accomplishment, or the effect can be a poor one turning the trainee against the learning process. Application of this principle does not end with the demonstration step but is carried on throughout the presentation step as well as the application and evaluation steps. We will discuss its proper use as we continue our lesson.

In our job breakdown of the presentation step, our second step is "Illustrate each point with the proper aids and materials." We have already discussed how to go about selecting teaching aids and materials. Now we will tell you how to use them to best advantage. The word "Illustrate" gives you a clue. It means "to enlighten, to shed light upon, to clarify." This is the purpose for using aids and materials in the classroom. This is the reason that Mr. Bright was chosen to illustrate the teaching points made in this lesson. Each time you present a major idea or a major step, you should illustrate with appropriate aids and materials. For those who understood your demonstration, the illustrations will strengthen their learning by repetition. For those for whom your demonstration might not have been clear, the aids and materials should present the same material in an interesting way to "enlighten" these trainees.

GO ON TO THE NEXT PAGE

(frame 17 continued)

Why should you use teaching aids and materials in the classroom?

	FRAME NO.
As a time filler	14
To clarify a step	20
To teach a point	22

(from Frame 16) 18

YOUR ANSWER; If Mr. Bright used an overhead projector to introduce his presentation, distributed fact sheets for the trainees to refer to, and used a series of pictures on a flip chart to add to his presentation, he would be using a display aid, a projected aid, and a 3-D aid.

Your answer is partially right. An overhead projector is a projected aid and a flip chart is a display aid. What about the fact sheets? Are they 3-D aids? A model car would be a 3-D aid. The fact sheet might contain information about a car, but a model car is actually a reproduction of a car.

Return to frame 16. Study the chart carefully to discover to what group of aids the fact sheet belongs. You may then make another answer selection.

(from Frame 15)

19

YOUR ANSWER: When Mr. Bright makes his demonstrations interesting, easy to follow, and slow enough for all trainees to catch on, he is applying the principle of readiness.

Until the trainee is ready to learn, you cannot begin to present instruction. The principle of readiness, then, is applied in the preparation step, not in the presentation step. Of course, each of the principles that you apply after the preparation step depends upon how well you carried out the principles of readiness and motivation.

Return now to frame 15 and make the correct response.

(from Frame 17)

20

YOUR ANSWER: You should use aids and materials in the classroom to clarify a step.

Excellent! Aids and materials are like a hat on a well-dressed man or gloves on a woman--they add the finishing touches. They should be used to stimulate interest, to add variety to the lesson, and, most important of all, to help the instructor by clarifying and repeating information that you have presented. Aids and materials should NEVER be used as time fillers or as substitutes for you, the instructor.

We have listed previously aids and materials that you will use in your instruction. Let's divide these into groups and discuss them briefly. You are not expected to memorize the kinds of aids and materials, but to familiarize yourself with them. This will help you to decide which ones best suit the needs of each lesson.

In the next frame we have prepared a chart listing the kinds of aids and materials, a definition for each, an idea of their uses, and examples of each. Please go on to frame 16 and study this chart carefully.

(from Frame 16) 21

YOUR ANSWER: If Mr. Bright used an overhead projector to introduce his presentation, distributed fact sheets for the trainees to refer to, and used a series of pictures on a flip chart to make his presentation, he would be using a 3-D aid, a duplicated aid, and a display aid.

I believe that you have confused 3-D and projected aids. The fact sheet is a duplicated aid; the flip chart is a display aid. Is the overhead projector a 3-D aid? The overhead projector throws an enlargement of subject matter from a "transparency" onto a screen. It is like a slide movie that you create yourself as you go along or prepare ahead of time. The "film" is called a "transparency" and looks like a thick sheet of transparent plastic. A 3-D aid is not a picture. It is either an actual object or a reproduction of the object built to scale. A toy gun could be a 3-D aid, then, if it were built to scale and used to demonstrate the use or workings of the actual gun.

You may wish to look again at the information provided on projected and 3-D aids on frame 16. After you have studied these carefully, you may choose the correct response.

(from Frame 17) 22

YOUR ANSWER: You should use teaching aids and materials in the classroom to teach a point.

Warning! Never use aids and materials to teach. Hub caps are pretty, but you don't need them unless you have a car to put them on. Pictures add a great deal to the appearance of a room, but what good are they without walls on which to hang them?

Teaching aids do just that--aid or help the instructor by clarifying and making subject matter more interesting. They should never be used as a substitute for the instructor. Only you know what your trainees need, and only you can coordinate different aids, materials, methods, and activities into a worthwhile lesson. No teaching aid or material can serve this purpose alone.

Return to frame 17 and select the correct response.

(from Frame 18)

YOUR ANSWER: If Mr. Bright used an overhead projector to introduce his presentation, distributed fact sheets for the trainees to refer to, and used a series of pictures on a flip chart to add to his presentation, he would be using a display aid, a duplicated aid, and a projected aid.

Good! The overhead projector is a projected aid, the fact sheet is a duplicated aid and the flip chart of pictures is a display aid.

Next we want to examine the kinds of materials that you may want to make use of in your teaching. For this purpose, turn to frame 24.

Look at the chart below now and examine the teaching materials carefully:

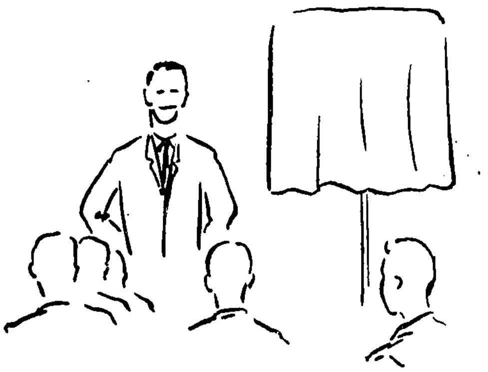
MATERIALS

KIND	DEFINITION	EXAMPLES
Textbook	A book used in the study of a subject.	Any book on the trainee's level which covers the subject in the manner you desire.
Manual	A handbook	Same as above.
Reference works	Any books relating to the subject that are made available to trainees.	Same as above.
Workbook or study guide	Individual exercise book of problems to be solved directly on the pages.	Book usually designed to accompany the text.
Programmed lesson	A body of knowledge or information arranged in sequence for self-instructional purposes.	The lesson that you are taking is a programmed lesson.

What kind of teaching material are we using to teach you the "Four-Step Method"?

	FRAME NO.
Workbook	26
Programmed lesson	29
Manual	31

YOUR ANSWER: This picture and caption illustrate Mr. Bright's best attempt to use the seven hints for presenting aids and materials.



"There are many things of interest to see and do in McKeeley Park. The map I am about to show you will point out the places we will tour."

Very good! Mr. Bright has the aid or material at hand; it is covered to prevent the trainees' distraction until he is ready to show it; and he is facing the trainees as he prepares them for the aid. There are several points that could not be weighed by the information that you were given. For instance, we do not know if the trainees were told enough to interest them in the presentation of the map, nor do we know if they were told precisely what he expected them to gain from viewing the map's presentation. In comparison with the other answer choices, however, this was the most adequate.

The next step in our breakdown of the operation PRESENTING INSTRUCTION is "Question the trainees to see if they understand the skill or information that you have presented." Why question the trainees during the Presentation Step? Questioning is a form of evaluation. Doesn't this belong with the Evaluation Step of the "Four-Step Method"?

Actually, you evaluate your trainees continually during the entire instruction. Questioning is particularly important during this stage of the Presentation Step to catch any trainee who may have missed all or any part of your instruction. By discovering this now, you will prevent him from snowballing into more and more misunderstanding.

GO ON TO THE NEXT PAGE

(frame 25 continued)

What is the purpose of questioning a trainee as a step in the task of Presentation of instruction?

	FRAME NO.
To test the trainee's ability to retain the information	27
To make sure he was listening to the presentation	32
To find out if he has understood what you have taught	34

(from Frame 24) 26

YOUR ANSWER: The kind of teaching material we are using to teach you the "Four-Step Method" is a workbook.

Stop and think for a moment. Workbooks are books containing exercises that make you apply information studied in a textbook. Do you use a pencil at all with the teaching material that we are using? Does this lesson have an accompanying textbook? The type of material that you are using is designed to teach you without aid of an instructor. A workbook is not. There are other types of materials similar to this one that look like a workbook, but the material is complex in arrangement and needs no accompanying text to supply information.

You need to study the chart on the original frame more carefully before making your next answer selection. Please return now to frame 24.

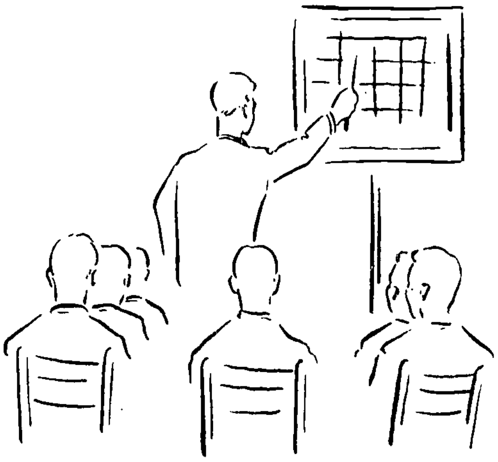
(from Frame 25) 27

YOUR ANSWER: The purpose of questioning the trainee as a step in the task of presentation of Instruction is to test the trainee's ability to retain the information.

During the Preparation Step, if you remember, you find out as much as you can about the trainee's interests and abilities. Without knowing on what level to begin your instruction, you cannot go on to the Presentation Step. If you have not presented the skill or information on your trainee's level of ability, a failure on the trainee's part to answer a question correctly should point out a weakness in your instruction. If you try to dance on roller skates and fall flat on your face, odds are that it's your inability--not the skates!

Keeping this in mind, return to frame 25 and make the correct response.

YOUR ANSWER: This picture and caption illustrate Mr. Bright's best attempt to use the seven hints for presenting aids and materials:



"This will be a map of the route we will take through McKeeley Park."

Study carefully the picture that you have chosen. How well do you think the trainees can hear Mr. Bright? What do you think the trainees are doing with their time while they wait for him to complete the map? Did he prepare the trainees by telling them just what he wished them to look for in his presentation of the map?

Go to frame 29 which lists the seven hints for presenting aids and materials. Study especially numbers 1, 4, and 5. Then you may turn to frame 30 to make another selection.

YOUR ANSWER: The kind of teaching material we are using to teach you the "Four-Step Method" is a programmed lesson.

Correct! We are using this programmed lesson to show you a plan of action to use in the classroom. If you are thinking, "One aid or material by itself should never be used to teach a lesson," you are right! We hope, since we cannot have an instructor to coordinate your study properly, that this program will motivate you to study other materials and use other aids that will help you with your teaching task. You must be your own teacher, and we have supplied you with one material to get you started.

We know that we use aids and materials to clarify instruction, to help teach a step, to generate interest, to involve more senses in the learning process. We know what aids and materials we can use. Now that we know the <u>why</u> and <u>what</u> we need to know <u>how</u>. The answer to this question will make the use of aids and materials effective.

You have already previewed the aid or material in the planning stages to decide what you wish the student to look for when it is presented. You have arranged the room properly for the use of the aid or material in the preparation step. This much of the how has already been accomplished.

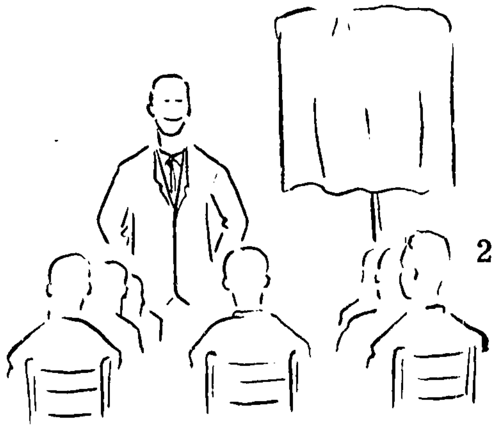
For some hints toward completing the <u>how</u>, GO ON TO THE NEXT PAGE.

(from Frame 29) 30

The following pictures show Mr. Bright's attempt to use the seven things listed on the previous frame. Study each picture and caption. You may refer to the information on the previous frame to help you decide which is the best.

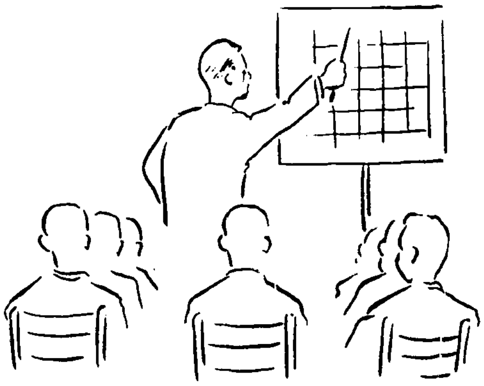
FRAME NO.

"There are many things of interest to see and do in McKeeley Park. The map I am about to show you will point out the places we will tour.



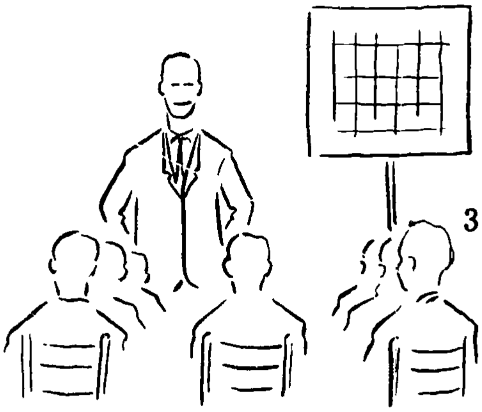
25

"This will be a map of the route we will take through McKeeley Park."



28

"Now that we have discussed the varieties of activities in the park, let's look at the map and trace our tour through it."



33

(from Frame 24) 31

YOUR ANSWER: The kind of teaching material we are using to teach you the "Four-Step Method" is a manual.

If you will recall, a manual is a handbook--a book that one can carry as a handy reference. The teaching material that we are using is almost impossible to use as a reference book. The frames are "scrambled" so that it cannot be read like a reference book. A table of contents is next to impossible because the ideas are so closely woven that you jump into the middle of an idea at almost any point within the lesson. With a reference manual, you want information that you can put your finger on immediately to solve some problem or to aid your performance. Manuals are not designed to teach, but to supply information.

Return to frame 24 and survey the chart again before making another response.

(from Frame 25) 32

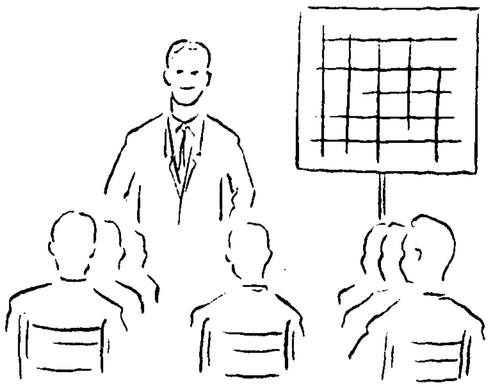
YOUR ANSWER: The purpose of questioning the trainee as a step in the task of Presentation of Instruction is to make sure he was listening to the presentation.

This could be an important indicator to you regarding the effectiveness of your instruction. If the trainee is daydreaming, it may be because your presentation is over his head, dull, or too long. It could also mean that the trainee has personal problems that are hindering his concentration.

You should not look upon questioning the trainee as a means of catching him in the act of "goofing off." You must be asking questions that reveal what he has learned from your presentation and what you need to do to teach him what he has missed.

Return now to frame 25 and make the correct response.

YOUR ANSWER: This picture and caption illustrate Mr. Bright's best attempt to use the seven hints for presenting aids and materials:



"Now that we have discussed the varieties of activities in the park, let's look at the map and trace our tour through it."

Mr. Bright has set himself up with some competition by using this approach to his presentation. He has a very interesting-looking map, and it's in his favor that he has it drawn in advance of his presentation. The problem is that his trainees will be looking at the map instead of listening to his presentation of the lesson. By the time he gets around to discussing the map, the trainees will be bored with it. It will have lost its effect.

Read the caption again. Aids and materials should illustrate a step in a lesson. Do you think that tracing the route of the tour illustrates a step concerned with the varieties of activities in the park?

Return to frame 30 which lists the seven hints for presenting aids and materials. Pay special attention to numbers 2, 3, and 4 before you go on to the next frame to choose the correct response.

YOUR ANSWER: The purpose of questioning the trainee as a step in the task of Presentation of Instruction is to find out if he has understood what you have taught.

Excellent! If the trainee can answer the question correctly, you know that he is ready to continue to the next step. If he cannot, then you must decide by the type of answer that he gives where the problem lies so that you can help him solve it. Good questions keep you from going ahead with instruction until you are sure that every trainee understands the information or skill.

This leads us to ask, "What is a good question?" A good question not only tells you what the trainee knows and spot-checks your own effectiveness, but it can stress a point, serve to review, and cause the trainee to apply information presented.

A question should be brief, simply stated, and limited to one main idea. For instance:

THIS: "How do you divide 7 into 49?"

NOT THIS: "Define dividend, divisor, quotient, and remainder; then show how they interact to interpret 1/7 of the numerical value of 49." (Actually two questions; too wordy!)

A question should begin with "how," "why," "when," "where," or "what." These question words tend to lead into questions that require a thoughtful, complete answer. Example:

THIS: "How do you apply the Golden Rule?"

NOT THIS: "Do you live by the Golden Rule?" (A question that requires a "yes" or "no" answer tells you little of what the student knows.)

CONTINUE TO THE NEXT PAGE

(frame 34 continued)

Finally, the manner in which you state a question is important. You should not embarrass or frighten the trainee when you ask a question. Questions should encourage, not squelch, discussion. Asking an opinion is always a good approach. The question should be posed in a conversational manner to the whole group, pausing before calling upon one person to answer. This assures that everyone is alert and has a chance to think about the question before he is called upon:

> **THIS:** "How do you change the spark plugs in a car, Ralph?"
>
> **NOT THIS:** "Jack, we will assume that you know everything since you were not paying attention. Explain the ignition system in a car."

Which of the following questions best follows the rules that we have discussed above?

	FRAME NO.
"Steve, which route through McKeeley Park is the shortest and still covers the most important points of interest?"	36
"Why do you think McKeeley Park will appeal to tourists, Ed?"	38
"Do you think that the park is well-facilitated enough to draw tourists, Sam?"	40

YOUR ANSWER: If your questions revealed that a trainee did not grasp your instruction, you must repeat the instruction.

You are showing evidence of becoming a better instructor. It is hard for most instructors to understand the importance of this part of the Presentation Step. They look for an easier way out. Usually they discover that the "easier" way only puts off for a little while the necessity for re-teaching and makes the job of repeating instruction more difficult. Many instructors try to put the blame on the trainee when learning doesn't take place. The good instructor realizes that he might have reached some trainees in his presentation, but partially or completely missed others. He feels just as responsible for the instruction of those that failed to learn as he does for those who easily grasped his instruction.

How can you make sure that your repetition of instruction will be successful? Variety is the key. You would hardly pay to see a movie the second time unless you enjoyed it tremendously the first. A trainee won't learn anything from a lesson the second time it is presented if you merely say and do the same things again. This does not mean that your first presentation was poor. It may have been very effective using good methods and appropriate aids and materials. For the trainee who caught on the first time, though, this will be old hat; he'll turn you off and take a nap. For the trainee who was not reached by your first approach, a repetition of the same thing won't help him. You'd be wasting your breath and his time.

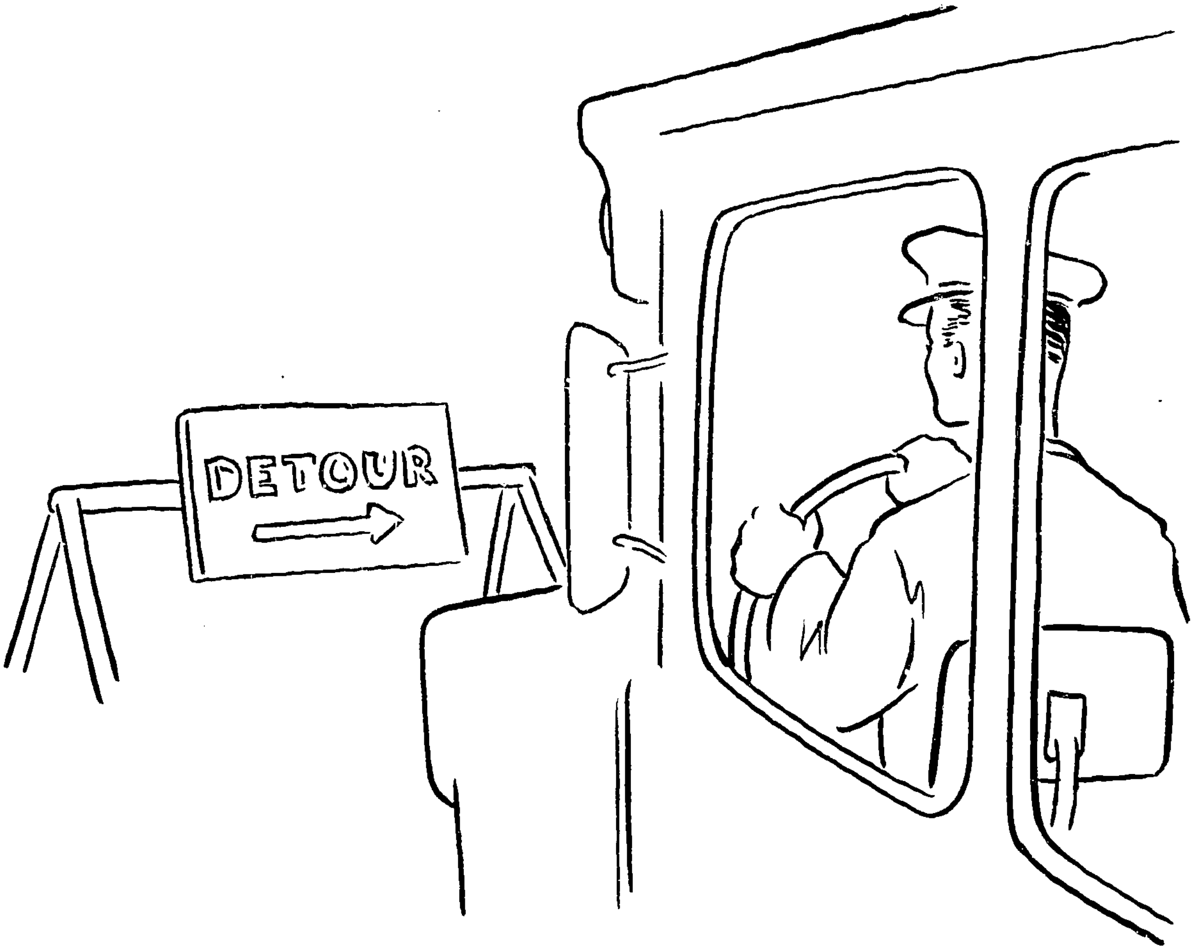
You allowed yourself some leeway in your timetable for detours like this. Just choose some other methods, select some more good aids and materials from your list that will support your new methods, and have at it again.

GO ON TO THE NEXT PAGE

(frame 35 continued)

What should Mr. Bright do when he sees that he must repeat instruction?

	FRAME NO.
Back up and go over the instruction again	37
Remember that there are other ways to get where he is going	42
Give up the teaching profession	44



(from Frame 34)

YOUR ANSWER: The following question best follows the rules that we have discussed for a good question:

"Steve, which route through McKeeley Park is the shortest and still covers the most important points of interest?"

Let's test this question by our rules and see how it stands up:

1. A question should be brief, simply stated, and limited to one idea.

Does this question fit the rule? I think we can safely say that it is simple and brief enough. Even though it sounds as if it is asking two questions, it is really concerned with only one idea.

2. A question should begin with "how," "why," "when," "where," "which," or "what."

This question begins with "which," so it fits this rule.

3. Questions should encourage discussion, should be posed in a conversational manner, <u>should be stated to the whole group before calling on one person to answer.</u>

Look at the underlined portion of this sentence and then at the question. The person's name is called first. This means that Steve is not given a chance to think through the question before he has to answer. It also means that the rest of the class hear Steve's name and, deciding that the question does not concern them, don't bother to listen to the question or think it through.

There is a better response for this question. Return to frame 34 and find that response.

(from Frame 35)

YOUR ANSWER: When Mr. Bright sees that he must repeat instruction, he should back up and go over the instruction again.

Do you like leftovers? Even the best meal becomes unappetizing after it's served for the second or third time. If the cook is clever, though, he can add spices or make it into a stew or a casserole so that you don't even recognize the hash from the last meal.

Some of your trainees didn't "eat" the "hash" the first time you served it. Do you think they'll gobble it eagerly the second time? Try spicing it up with new methods, aids, and materials. I think they'll find it much easier to digest!

Return now to frame 35 and make the correct response.

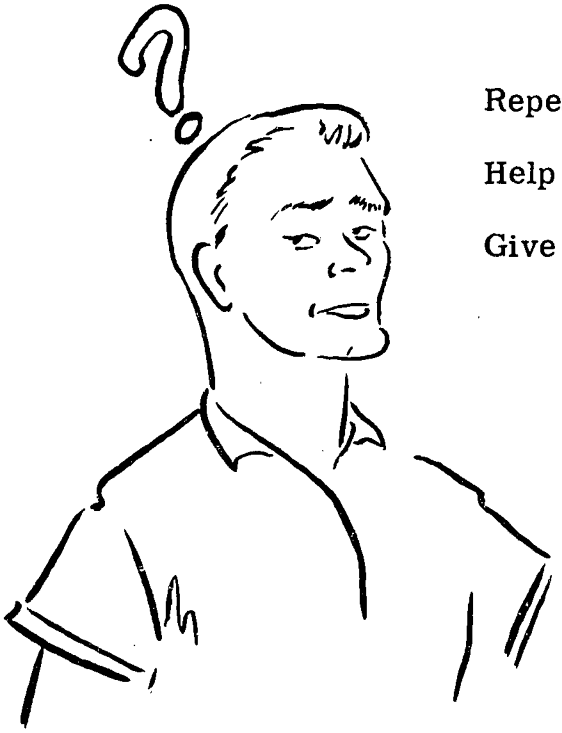
YOUR ANSWER: The following question best follows the rules that we have discussed for a good question:

"Why do you think that McKeeley Park will appeal to tourists, Ed?"

Excellent! Not meaning to boast, but this is a particularly good question. It starts with a good question word, "why." It asks the trainee's opinion, too. This keeps the trainee from feeling guarded about his answer--fearful that it will be wrong. It also makes him support his answer. He is defending a position that he had taken. It is stated briefly and simply. Lastly, other members of the class will think through the answer and be prepared when called upon. This improves discussion.

So far in the Presentation Step, you have demonstrated, illustrated, and questioned. The questions revealed to you whether the trainees knew what you wished them to know. If one trainee showed that he did not understand your presentation, there is a chance that your instruction failed for others as well. Remember that you are building your instruction from the simplest task and the easiest information lesson to the most difficult. Each lesson depends upon the one that went before it to make sense and have meaning. You can no more go on to a new lesson without making sure that every trainee understands everything presented thus far than you could build a ten-story building leaving out the eighth floor!

What must you do, then, if your questions revealed that a trainee did not grasp your instruction?



	FRAME NO.
Repeat the instruction	35
Help him after class	39
Give him some extra homework	41

YOUR ANSWER: If your questions revealed that a trainee did not grasp your instruction, you must help him after class.

This answer assumes several things: 1) that every trainee in the class except one understood your instruction completely; 2) that it was the trainee's failure to learn, not some failure on your part to teach; 3) that even if these first two points were correct, the trainee can spare the time after class for extra help; 4) that you would not embarrass the trainee by making it evident to the rest of the class that he could not keep up.

First of all, you cannot assume that only one trainee did not grasp your instruction. If one did not understand, there is a chance that others missed it as well. Secondly, you must remember that you are teaching individuals who respond differently to different things. If you said the word "cat" to a room full of trainees, each one would have a different mental picture. Some would immediately see a domestic cat; others would see a tiger or lion; still others might even be thinking of a "hep" cat! Just because some of the trainees understood your own mental picture immediately does not mean that all the rest are dumb. Thirdly, you must remember that your trainees may have other commitments outside class--a parttime job, for instance. Staying after class might be impossible. Lastly, remember that you are concerned with the effect of learning on your trainees. You want to make learning as pleasant for them as you can. You don't want to make them look foolish in the eyes of their classmates by suggesting that they cannot keep up with the class. You must keep them motivated to learn in order to teach them anything. Otherwise, they will close you out.

With these things in mind, return to frame 38 and make the correct response.

(from Frame 34) 40

YOUR ANSWER: The following question best follows the rules that we have discussed for a good question:

> "Do you think that McKeeley Park is well-facilitated enough to draw tourists, Sam?"

Whether you know the answer to this question or not, you could answer with a 50-50 chance at the correct response. It is best to avoid oral questions that require only a "yes" or "no" response, true-false questions, or objective questions with only two answer choices. The trainee can often guess the answer to this type question. This prevents you from accurately evaluating the trainee's understanding of the information or skill.

Review frame 34 briefly before making your next answer choice.

(from Frame 38) 41

YOUR ANSWER: If your questions revealed that a trainee did not grasp your instruction, you must give him some extra homework.

Many instructors use homework to teach something in the same way that some also depend upon the textbook to do the job of teaching. The fact is that YOU are the instructor. TEACHING is your responsibility. You cannot expect to get away from this responsibility by piling extra work on your trainees.

Homework should be planned to give the trainee practice with and add to his understanding of the skill or information that he has learned during the class period. If the trainee missed the presentation, how can he do the homework? He will end up making an effort to teach himself which may only confuse him and make your job harder.

There is a better answer for this question. Return now to frame 38 and make the correct response.

(from Frame 35)

YOUR ANSWER: When Mr. Bright sees that he must repeat instruction, he should remember that there are other ways to get where he is going.

Very good! When you come to a detour sign on a highway, you might be taken back for a moment until you realize that another route is marked for you to follow. If you have traveled the original route several times, you may find the detour more interesting. There is never only one route to your destination. If one road won't get you there, take another.

The same applies to teaching. Using a new approach to repeating instruction serves as a good review for those who caught on the first time, helps the trainees who failed to learn the first time, and keeps you from becoming static and bored with your own teaching. You are challenged to make the lesson more interesting the second time around.

This completes the Presentation Step. Go on to frame 43 for a short review.

Now, as a review, we'll fill in the job breakdown we began at the first of the lesson:

JOB: Using the Four-Step Method of Instruction

OPERATION: Presenting instruction

STEPS:	
1. Demonstrate the skill or present the information.	a. Known to unknown; simple to complex. b. One important step at a time. c. No more at a time than trainees can grasp d. Key points stressed. e. EFFECT--trainees must experience success with learning.
2. Illustrate with the use of aids and materials.	a. Aids and materials clarify, add interest and variety, and help teach. b. Aids or materials kept out of sight or covered until proper time for use. c. Short preview to create interest and explain what trainee should look for. d. Instructor should speak to the trainees, not to the aid or material. e. Discussion should follow presentation of aid or material. f. Repetition of information helps to reinforce learning.

CONTINUE TO THE NEXT PAGE

(frame 43 continued)

3. Question for understanding.	a. At this point in instruction, you must make sure that the trainee understands everything thus far. b. Questions should begin with "why" "how," "when," "which," "where," and "what." c. Questions should be limited to one main thought. d. Questions should be stated to the whole group before calling on one person to respond. e. Trainee should not be embarrassed by method of questioning.
4. Repeat instruction whenever necessary.	a. If questions reveal that ONE trainee does not understand, it is necessary to repeat instruction. b. If your first approach failed, it won't teach the second time either! Use new methods, aids, and materials. c. Basic rules for demonstration step should be followed.

To see how well you mastered the Presentation Step, continue to the first question by turning to frame 45.

(from Frame 35) 44

YOUR ANSWER: When Mr. Bright sees that he must repeat instruction, he should give up the teaching profession.

Don't give up hope! You are a fine craftsman at your trade, or you would never have been selected for this job. As a craftsman, you would not allow yourself to do a sloppy job. You would not consider yourself finished with a job until you felt that you had done your best.

As a teacher you have the same feeling of responsibility. Your trainees will be leaving with your mark of approval, and you will not be satisfied to let them go until you are sure they know everything you can teach them. This is nothing more than professional pride.

I feel sure that you know the correct answer. Take heart, and return to frame 35 to make the right response.

(from Frame 43) 45

Which of the following correctly lists the procedure the instructor should follow in the presentation step of the 4-Step Method?

	FRAME NO.
prepare trainee present information allow application evaluate progress	47
demonstrate skill question for understanding allow application evaluate progress	49
demonstrate skill illustrate question for understanding repeat instruction	51

(from Frame 48) 46

YOUR ANSWER: Mr. Bright is applying the teaching principle of determining student readiness.

Readiness is an important principle in teaching, but the trainee's readiness must be determined before the actual presentation of a skill or information begins. How did Mr. Bright know that he should start with the tour of McKeeley Park? He had prepared the trainees well in the preparation step of instruction. He had learned what they already knew and what they needed to know. In other words, he had determined their readiness. When he began the tour (presentation), he knew where he must start the tour and how the tour should progress from that point because he had determined their readiness. The principle of readiness, properly applied, helped to put into play the principle he is applying in this situation.

All of his trainees had been to McKeeley Park. This would not be strange territory to them. It would be easy for the trainees to survey other points of interest having begun the tour with something familiar. In other words, if a person does not know that $1+1=2$ you should not try to teach him $\frac{\text{Mass}}{\text{Volume}} = \text{Density}$

The above should serve to refresh your memory so that you can return to frame 48 and make the correct response.

(from Frame 45) 47

YOUR ANSWER: The following correctly lists the procedure the instructor should follow in presenting a lesson: prepare trainee, present information, allow application, evaluate progress.

These words should look familiar to you; they name the steps in the Four Step Method of Instruction. The question asks for the procedure in carrying out the second step--presentation of information or skill.

Perhaps you simply were not careful in the reading of the question. Return to frame 45 and read both the question and the answer choices closely before you respond.

(from Frame 51) 48

Mr. Bright begins the tour of McKeeley Park He has chosen this park to tour first because it is closest to the starting point and most of his passengers are familiar with this area. He reviews with his passengers the points of interest that they know best, adding information that makes the review more interesting. He then takes them to the places within the park that are generally missed by the public.

What teaching principle related to the presentation step is he applying?

	FRAME NO.
determining trainee readiness	46
beginning with the known and working to the unknown	50
providing feedback	52

(from Frame 45) 49

YOUR ANSWER: The following correctly lists the procedure the instructor should follow in presenting a lesson: demonstrate skill, question for understanding, allow application, evaluate progress.

Your answer is partially correct. The first two steps an instructor follows when he is ready to present the lesson to the trainee are to demonstrate then to question to see if the trainee understands what has been presented to him. Application of information and evaluation of progress are major steps in the 4-Step Method, however. There are two important steps in presenting a lesson that are not included in this response. Without these two steps, the instructor would not be sure that his students were ready to apply what they had learned.

Paying close attention to each response, return to frame 45 and select the correct answer.

(from Frame 48) 50

YOUR ANSWER: Mr. Bright is applying the teaching principle of beginning with the known and working to the unknown.

Certainly"! Mr. Bright knows that all learning is based on previous knowledge and experience. Instructors must begin with something familiar to the trainee and build upon this to teach the trainee something new.

Please go to the next question by turning to frame 53.

51

YOUR ANSWER: The following correctly lists the procedure the instructor should follow in presenting a lesson: demonstrate skill, illustrate, question for understanding, repeat instruction.

Very good! The instructor that presents a lesson using this procedure minimizes the chance that any trainee will progress to the application step without the foundation he needs to perform the skill or apply the information.

You are doing well! Continue to the next question by turning to frame 48.

(from Frame 48) 52

YOUR ANSWER: Mr. Bright is applying the teaching principle of providing feedback.

You seem to be guessing. Feedback is a principle of learning, and it may be used effectively in the Presentation Step. Its most important use comes in the Application and Evaluation Steps when the trainee is actually performing. For this reason we have not discussed the use of this principle in the Presentation Step. Feedback means "The positive or negative results that the learner receives upon attempt to do something." I think you can see from the definition that this principle is irrelevant to this situation.

Turn to frame 48 to make another answer selection.

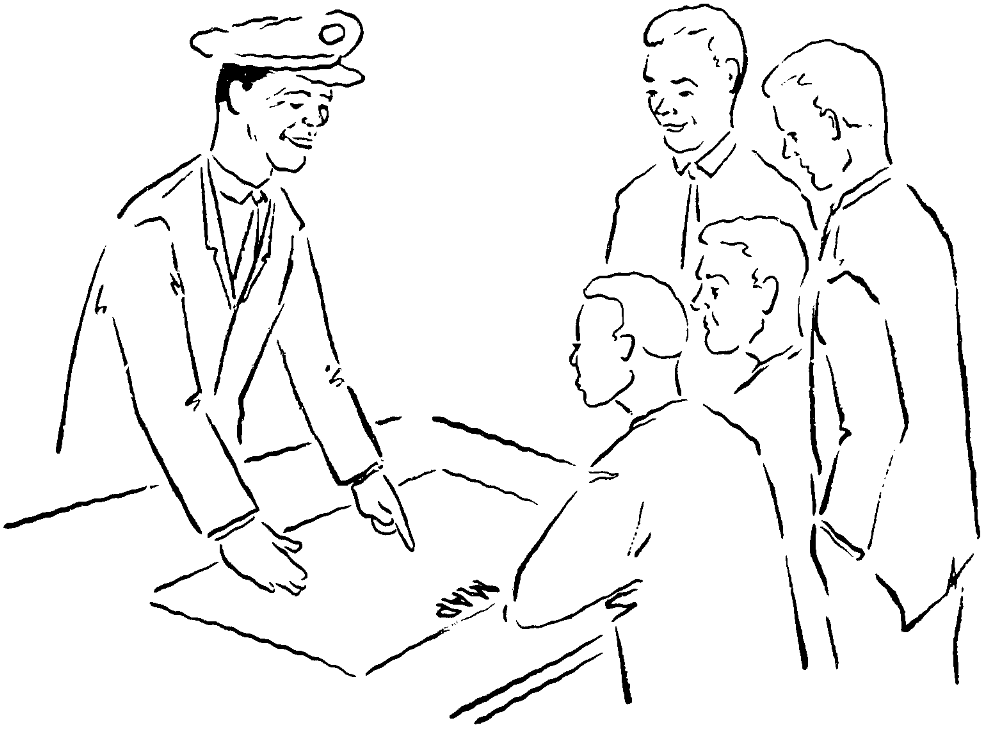
(from Frame 50) 53

Mr. Bright sees that several of his passengers are having trouble keeping up with him. One has a puzzled look on his face. Another has trouble taking notes fast enough. Still another lags behind trying to get his equipment and notes together.

What should be Mr. Bright's reaction to this situation?

	FRAME NO.
He should remind these people of the importance of keeping up with the group in order to meet the time schedule.	55
He should realize that some trainees simply will not be able to keep up.	56
He should instruct more slowly taking one important step at a time.	59

YOUR ANSWER: The following picture shows the best way for Mr. Bright's passengers to get the most from this demonstration:



Do you remember our discussion of the mirror and the perspective from which we view ourselves in the mirror? The trainees in this picture are looking at the map upside down and backwards. In order to properly relate what Mr. Bright is showing them to their tour, they must mentally turn the map around. This thinking in reverse absorbs so much of their concentration that they miss the point of the demonstration. Any well-conducted demonstration is performed from the trainee's vantage point just as the trainee will be asked to perform--not upside down or backwards.

There is a picture that shows this to better advantage. Return to frame 60 and select this picture.

(from Frame 53) 55

YOUR ANSWER: Mr. Bright should remind these people of the importance of keeping up with the group in order to meet the time schedule.

Should the time fit the needs of the lesson or the lesson fit the needs of the time? Surely, time is an important factor. That is why we set up a timetable before we ever begin instruction. One of the most important factors to be included in the timetable is "flexibility." If more time is required to meet the needs of the trainees, the timetable should allow for this extra time. Making timetables is like being fitted to a pair of shoes: You do not (if you are wise and care for your feet) try to fit your feet to a pair of shoes that are too small; you select shoes that fit your feet, since you cannot select another pair of feet to fit the shoes.

There is a response that suggests a better remedy to Mr. Bright's situation. Return now to frame 53 and find this response.

(from Frame 53) 56

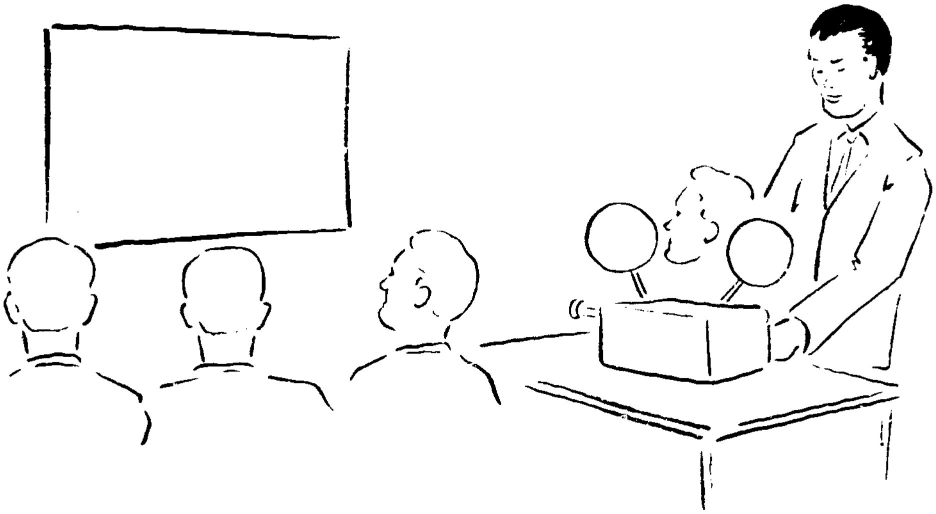
YOUR ANSWER: Mr. Bright should realize that some trainees simply will not be able to keep up.

This is an instructor's crutch. Whenever the going gets rough and the pressure to finish the lesson is at the explosion level, the instructor tends to forget that he is there to teach the trainees, not to survey a course. An instructor can never assume that the trainee cannot keep up; this may or may not be true. What he should do instead is to investigate his own method of approach and examine critically the speed with which he is covering the lesson. More information must be obtained on a trainee before his ability to learn can be determined. Thomas A. Edison must have made fools of his instructors when he became famous for his inventions. He was considered a "dullard" by many of them because he "lagged in his studies."

Give careful thought to the remaining answer choices before making another selection. Return to frame 53.

(from Frame 61)

YOUR ANSWER: Picture and caption "A" show the proper way of preparing trainees for viewing aids and materials.



Mr. Bright forgot two very important points in this illustration. First of all, he must not only try to present the aid to interest the trainee (as he did), but he must also point out the things to which he wishes the trainee to pay careful attention. Without this preparation, the trainee could view the whole film and miss entirely the points the instructor wished to make by using it. Secondly, the instructor's introduction should be made to the trainees, not to the aid or materials. The trainees' attention tends to wander to the aid and is not focused on the instructor's preview.

Study the two remaining choices closely before making another selection. Please return to frame 61.

(from Frame 60) 58

YOUR ANSWER: The following picture shows the best way for Mr. Bright's passengers to get the most from this demonstration:

You are correct! The trainees must observe the demonstration from the perspective from which they themselves must perform. All trainees must also be able to see the demonstration.

You may continue to the next question by turning to frame 61.

(from Frame 53) 59

YOUR ANSWER: Mr. Bright should instruct more slowly taking one important step at a time.

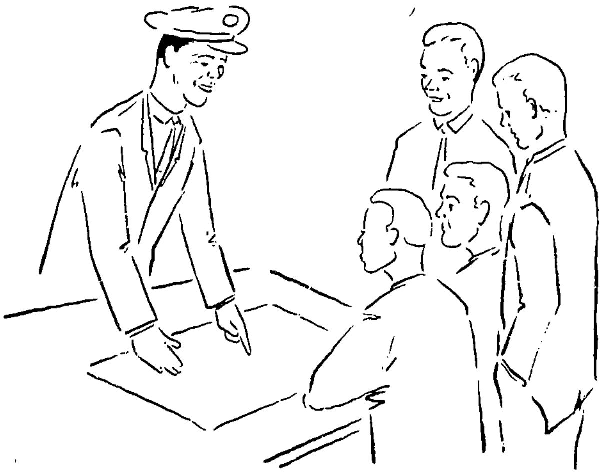
Excellent! The trainees' ability to keep up should determine the rate at which a lesson is taught. Have you ever watched a mother of a new baby at feeding time? Some new mothers think that they should function as a steam shovel stuffing their children at an unbelievable rate. Some instructors try to do the same thing to a trainee with their subject matter. This approach to the subject defeats one of the most important teaching principles--the trainee must experience success. Funneling the lesson down a trainee only results in frustration.

You are doing well. Continue to the next question. Turn to frame 60.

(from Frame 59)

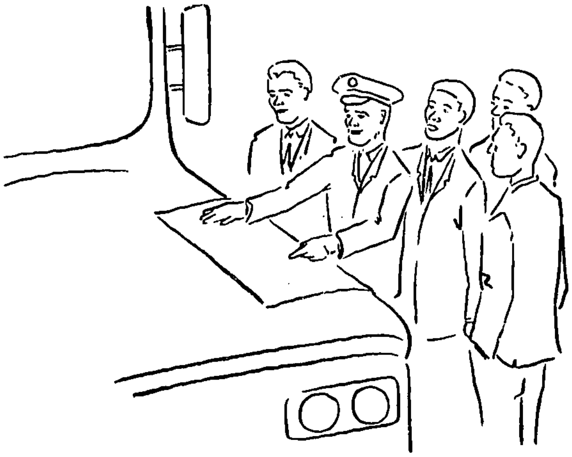
Mr. Bright is showing his passengers a map of the park pointing out the places they will see. Which of the following pictures shows the best way for Mr. Bright's passengers to get the most from this demonstration?

FRAME NO.



54

58



62

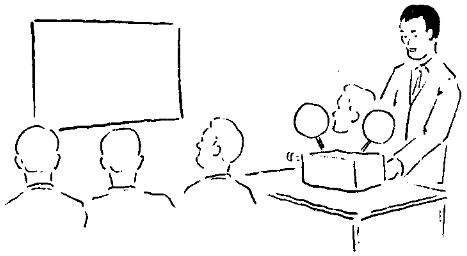
Mr. Bright has brought on the tour some slides, movies, filmstrips, and other materials. Each night these visuals will be shown as a preview of the places they will visit the following day. He has set up his slide projector in the hotel convention auditorium and is preparing his passengers to see a film. In which of the following pictures and captions is he doing the best job of preparing trainees for viewing aids and materials? (Study each carefully before making your selection.)

FRAME NO.

A

"Tonight we will see a movie entitled 'A Vacation at Blue Lake.' This will give you some idea of what to expect from tomorrow's tour. This is one of the most beautiful of our state's recreation areas. You should take notes as you view to remind yourself of significant points when you are collecting your materials on this tour. Lights out, please."

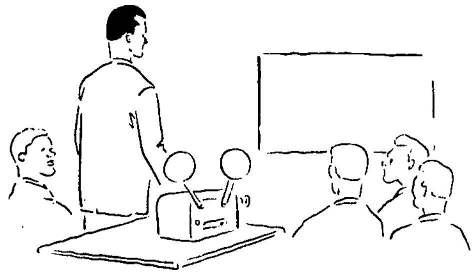
57



63

B

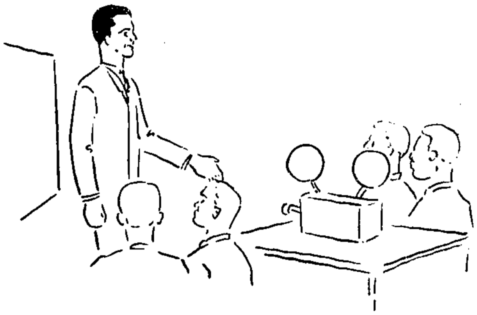
"The film we will see tonight is entitled 'A Vacation at Blue Lake.' Because of the length of the film, we will begin immediately. At the end of the film, we will discuss the points of importance."



C

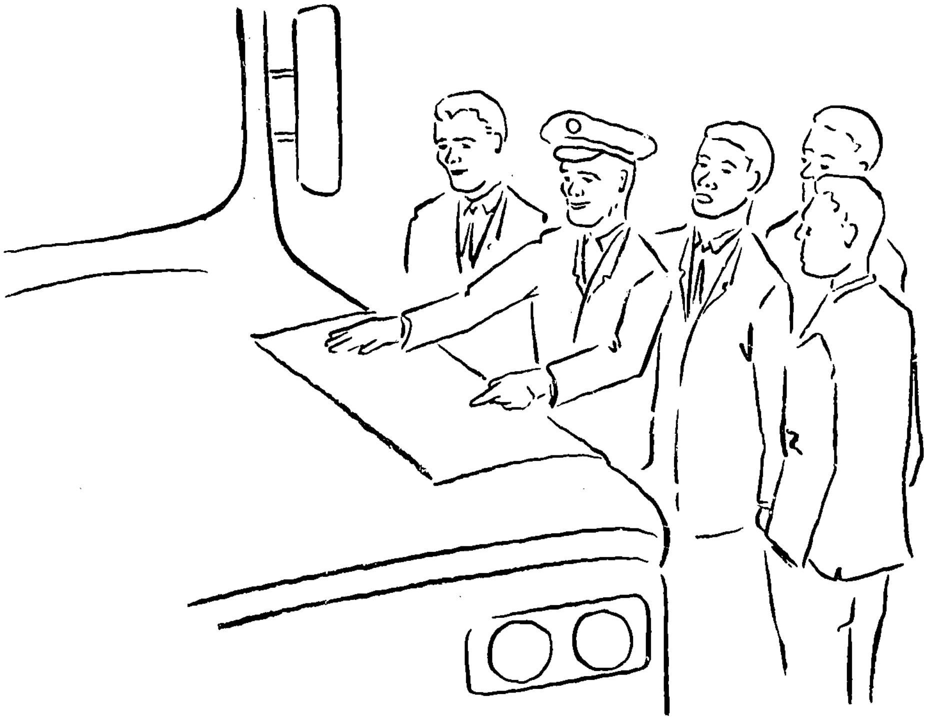
"This film is entitled, 'A Vacation at Blue Lake.' Blue Lake will be one of the most exciting stops on our tour. This movie should give you an idea of what to expect tomorrow. Pay close attention to the forms of recreation found here. You will be amazed at the variety. Because of its location, you will note an interesting collection of plant and animal forms. This resort area provides facilities for vacationers ranging from campgrounds to a plush hotel."

65



(from Frame 60)

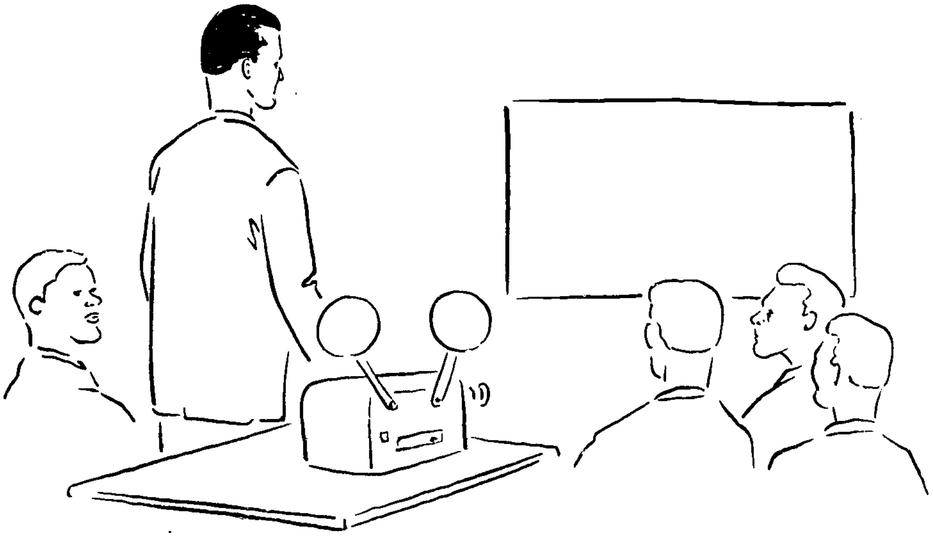
YOUR ANSWER: The following picture shows the best way for Mr. Bright's passengers to get the most from this demonstration:



Look at the picture carefully. Do you think that all the passengers (trainees) are benefitting from the demonstration? Can all of them see the demonstration? What about the position of the map? It is true that the trainees should observe from the vantage point that they themselves will have to perform, but the demonstration will be useless if the trainees observing cannot see or are uncomfortable.

You are getting the idea. With this hint, you should be able to respond correctly now. Please return to frame 60.

YOUR ANSWER: Picture and caption "B" show the proper way of preparing trainees for viewing aids and materials.



We need to ask some questions about this picture and caption. Is the instructor talking to the trainees or to the aid? He is not standing in front of the trainees, and he is turned toward the movie screen. If someone is looking at you when he is talking, you usually look at him, don't you? If someone looks away from you as he talks, you tend to look at the object that seems to hold his attention. Eye contact is very important. Another question: Why are the trainees asked to look at the film? He doesn't tell them, does he? They must draw their own conclusions, which may or may not be correct. What does he expect them to learn from viewing the film? He has not given them an inkling here either. They are asked to take notes, but the important things to note are not discussed. He suggests a discussion after the film, but without giving the trainees some line of direction, the discussion could ramble over any variety of tipics that have little significance to the lesson.

Consider both picture and caption in making another selection. Remember the questions we asked of this illustration and apply them to your next choice. Return now to frame 61.

(from Frame 66)

64

YOUR ANSWER: Aids and materials should not be used as substitutes for instructors.

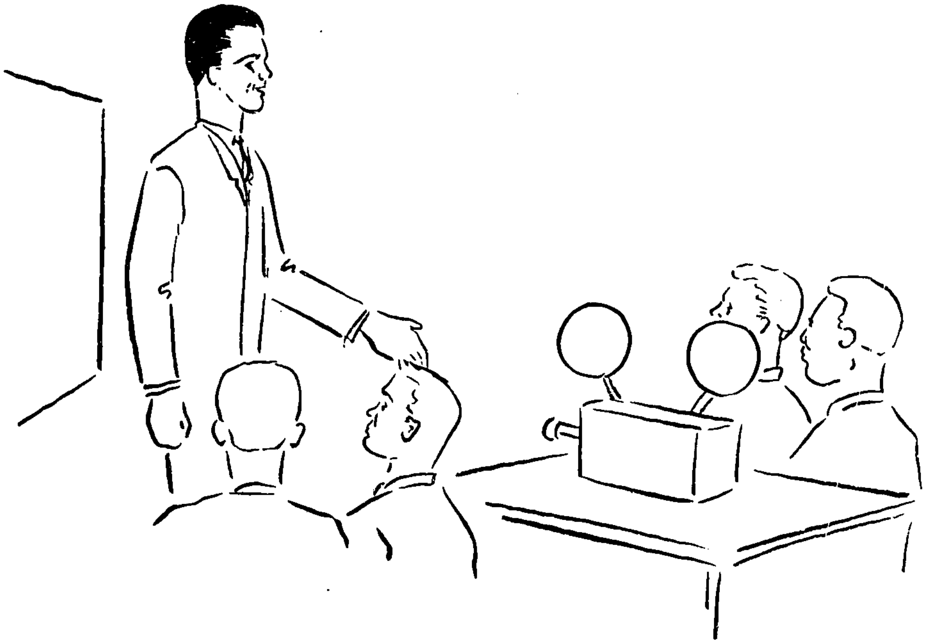
You do well to recognize this fact! You are the coordinator and the director for a lesson. An orchestra should be provided with sheet music if they don't know a particular composition; the music is no substitute for the conductor, however. Without him a beautiful sonata would become a muddled mess. Aids and materials must be used judiciously, and you are the only one who can determine if they are used correctly.

Proceed to the next question, please, by turning to frame 68.

(from Frame 61)

65

YOUR ANSWER: Picture and caption "C" show the proper way of preparing trainees for viewing aids and materials.



Very good! The instructor is speaking to the trainees, not to the aid in making his preparation for the aid's presentation. The trainees' attention is focused on the instructor. He has motivated the trainees to wish to see the film and has told them precisely the points to which he wants them to give special attention.

You are progressing well! Please go on to the next question by turning to frame 66.

(from Frame 65) 66

A certain instructor comes to class armed each day with collections of aids and materials. His favorite aids are movies. When a colleague asks him what he plans for his class on a certain day he replies, I think I'll show a movie." Often after he has turned on the projector, he leaves the classroom to take a smoke, returning just in time to turn it off and dismiss the class. Which response is the best critique of this situation?

	FRAME NO.
Aids and materials should not be used as substitutes for instructors.	64
The instructor should make sure that the movie will last long enough for him to take a break.	67
The more teaching aids and materials used, the better the class.	70

(from Frame 67) 67

YOUR ANSWER: The instructor should make sure that the movie lasts long enough for him to take a break.

Unless it is absolutely necessary, an instructor should never leave the area of instruction during a class period. It is just as necessary for the instructor to be in the class when he is presenting an aid or material as when he is giving a demonstration. Even with a movie that has already been previewed with the class, the instructor cannot be assured that questions will not arise that should be answered at that point or that there will not be a mechanical failure. You are an instructor, not a baby-sitter. It is your job to teach your trainees, not to provide them with diversion.

There is a better analysis of this situation. Return to frame 66 and select the best answer.

(from Frame 64) 68

Which of the following groups of aids and materials would be most appropriate for Mr. Bright's tour of Blue Lake. (CLUE--The objective of this lesson is "The passengers will be able to list and support 10 reasons why Blue Lake is an ideal spot for tourists and vacationers with varied interests.")

	FRAME NO.
travel posters of facilities offered at Blue Lake information sheet of sports offered color slides--"A World of Wildlife"	71
map of Blue Lake Resort mock-up of ski lodge movie of Blue Lake's history--"From Dream to Reality."	73
information check sheet of clothes needed at Blue Lake flip chart--estimated costs of two weeks at Blue Lake pamphlets--"Future Development of Blue Lake Facilities."	76

(from Frame 71) 69

Mr. Bright wants to see how well his trainees understood his overview of points of interest at Blue Lake. Which one of the following questions is best posed to test for trainee understanding?

	FRAME NO.
"Jack, how many different varieties of recreational outlets are offered at Blue Lake, and which ones are best facilitated?"	72
"Why is Blue Lake Resort considered a sportsman's paradise, Harry?"	74
"Are there forms of recreation for every season, John?"	77

(from Frame 66) 70

YOUR ANSWER: The more teaching aids and materials used, the better the class.

Have you ever eaten candy until you became sick? Too many aids and materials are like too much candy--they create more problems than they solve! Once you've eaten too much candy, chances are that you will not want to see any more for a long time to come. Trainees become bored when aids and materials are overused. They tend to ignore charts that are used repeatedly in the same position on the wall, for instance.

Aids and materials should be used like garlic--to add flavor, but not to replace a meal. Too little garlic has no effect on a sauce; too much garlic makes the sauce inedible; but the right amount makes the sauce delectable.

Return now to frame 66 and make the correct response.

(from Frame 68) 71

YOUR ANSWER: Of the groups of aids and materials listed, the following group would be the most appropriate for this lesson: travel posters of facilities offered at Blue Lake, information sheet of sports offered, color slides--"A World of Wildlife."

Good! You recognized that this does not sound like the ideal group of aids and materials for this lesson, but each one of the aids and materials in this group meets the needs of the lesson as stated by the objective.

It is easy to get any number of aids and materials that relate in some manner to any given topic, but to choose aids and materials that specifically meet the needs of your lesson takes careful selection.

You are ready to continue to the next question. Please turn to frame 69.

YOUR ANSWER: The following question is best posed to test for trainee understanding: "Jack, how many different varieties of recreational outlets are offered at Blue Lake, and which ones are best facilitated?"

Let's recall some rules for good questions: First of all, the question should begin with "how," "when," "which," "where," "why," or "what." This question meets that requirement. Secondly, the question should be stated to the whole group before calling upon one person to answer. This gives the trainees time to think and holds all trainees' attention until the question is answered. Does this question follow that rule? No. Next, the question should be brief and easily understood. Would you say that this question is stated as simply as possible? Wouldn't it be easier to ask, "What sports are offered, and which ones have the best facilities?" Lastly, a question should ask for only one idea. Two complete answers to two questions are asked in this one, aren't they?

Following the rules we have reviewed above, return to frame 69 and select the best answer.

YOUR ANSWER: Of the groups of aids and materials listed, the following group would be the most appropriate for this lesson: map of Blue Lake Resort, mock-up of ski lodge, movie of Blue Lake's history--"From Dream to Reality."

We need to look again at the objective for this lesson in order to determine if these aids and materials will help the passengers to reach their goal:

> "The passengers will be able to list and support 10 reasons why Blue Lake is an ideal spot for tourists and vacationers with varied interests."

Does a mock-up of a ski lodge help to meet the requirements of the objective? The instructor might possibly use the mock-up to illustrate the excellent facilities offered to skiers. What about the map? We might say that a map would be useful to give a general view of the areas that draw vacationers. To this extent the map could be used to help reach the objective. These two visuals, then, could be used under the right teaching circumstances, but what about the movie? The movie might be interesting and might contain information that the trainees should know, but the objective does not state that the trainees should know anything about the history of the resort. If this is important to the passengers, it might be contained in an objective for another lesson.

Remember, if an aid or material does not meet the needs of a particular lesson, it should not be used. Unsuitable aids and materials tend to break the chain of learning that you set up. Weigh the value of each aid and material against the objective for this lesson before choosing another response. Return to frame 68.

(from Frame 69) 74

YOUR ANSWER: The following question is best posed to test for trainee understanding: "Why is Blue Lake Resort considered a sportsman's paradise, Harry?"

Very good! This question meets all the requirements for a good question. It begins with a good interrogative word--"why." It is asked before the trainee's name is called to give the whole group time to think through the answer. It is stated very simply and briefly. It contains only one main idea. It also requires the trainee to apply what he has been taught.

You are doing well! Continue to the next question, please, by turning to frame 78.

(from Frame 78, 75

YOUR ANSWER: The most important point to remember in repeating instruction is to separate those trainees who need to repeat the instruction.

In some cases this may be necessary, but it is hardly the most important point to remember in repeating instruction. If you are clever in your approach, re-teaching could serve as a review for all the trainees. For those who know the material thoroughly, a change of method and aids will help to reinforce what they already know. Of course, if you only parrot the same material in the same way as you did before, you will probably not help those trainees who need the repetition, and you will bore to tears those who did catch on the first time.

Think about each choice before making another response. Return to frame 78.

YOUR ANSWER: Of the groups of aids and materials listed, the following group would be the most appropriate for this lesson: information check sheet of clothes needed at Blue Lake, flip chart--estimated costs of two weeks at Blue Lake, pamphlets--"Future Development of Blue Lake Facilities."

In order to examine your choice, let's study the objective:

> "The passengers will be able to list and support 10 reasons why Blue Lake is an ideal spot for tourists and vacationers with varied interests."

The first two visuals listed in your answer choice deal with information that the tourists would need to know before they came to Blue Lake, but the trainee's aim is to learn the attractions that draw tourists to Blue Lake. The pamphlets, too, could be of interest, but they are unsuited to helping the passengers reach their goal.

Choosing aids and materials should be approached in the same manner that you would furnish a room. You choose furniture that is tasteful and well-suited to the room. If you have a small room, you would not purchase more pieces than you need just because they are on sale. A bargain is no bargain at any price if you do not need it. The same is true of aids and materials. You do not use aids and materials simply because they are available. They must be exactly suited to the needs of your lesson.

There is a response that best suits the requirements of the objective for this lesson. Return to frame 68 and choose this response.

(from Frame 69) 77

YOUR ANSWER: The following question is best posed to test for trainee understanding: "Are there forms of recreation for every season, John?"

There are only two possible answers here--"yes" or "no." This gives the trainee a 50-50 chance of answering correctly even if he does not know the answer. In other words, this type of question does not really test for understanding.

Remember, the best questions begin with "why," "when," "where," "which," "how," and "what." Questions that begin with these words cause the learner to make a complete answer that will show whether or not he has really comprehended the information.

Return to frame 69 and select the proper answer.

(from Frame 74) 78

What is the most important point to remember in repeating instruction?

	FRAME NO.
Separate those trainees who need to repeat the instruction.	75
"If you don't have time to do it right, when will you have time to do it over?"	80
Change your tactics.	82

79

You have arrived at this page by mistake. Please return to your last frame and follow instructions.

(from Frame 78) 80

YOUR ANSWER: The most important point to remember in repeating instruction is "If you don't have time to do it right, when will you have time to do it over?"

You may have heard this expression before. It applies to many situations, but not to teaching. If you are fixing a car, there is only one way to fix it correctly. People are not mechanical creatures, however, and they may respond differently to different things. Just because instruction is successful for some of your trainees the first time does not mean that it should be successful for <u>all</u>. Each person is different in his previous experiences and his background. For this reason approaches that appeal to some may not get through at all to others.

Unlike the car that needs repairing, there is no one way that is right to teach a lesson. You must choose the method that seems to be best to you. If it fails for some, that does not mean that the method was wrong necessarily; it simply points out to you that you must try another method to reach the rest of your trainees.

Return now to frame 78 and make another selection.

81

You have arrived at this page by mistake. Please return to your last frame and follow instructions.

(from Frame 78)

82

YOUR ANSWER: The most important thing to remember in repeating instruction is to change your tactics.

Good! Successful instructors learn that it does not pay to repeat the same instruction in the same manner if it failed the first time. Regardless of how carefully you plan a lesson, the method that you have chosen may not be effective for all trainees. You must allow time for repeating instruction in your timetable so that you will not feel pushed to go ahead without making sure that all trainees understand the instruction. When you change your method and all the teaching aids and materials you use the first time, you will find that it is not necessary to divide the class in order to re-teach. Your second presentation should keep the whole class interested and should reinforce the learning of those who caught on the first time.

Congratulations! You have passed the test on this portion of our program. The next section deals with application of the skills and information that you have taught. How should you go about allowing the trainee to apply what he has learned? What are the teaching principles that apply to this step of instruction? What is the role of the instructor during this step? These are the questions that will be answered in the next lesson.

When you are ready, you may begin Module V of the "Four-Step Method."

VT 016 184
TERRY, MARTHA, ED.
THE FOUR-STEP METHOD OF INSTRUCTION. A
PROGRAMMED COURSE FOR OCCUPATIONAL
INSTRUCTORS. MODULE 5.

REHABILITATION RESEARCH FOUNDATION, ELMORE,
ALA.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
OEC-2-7-006711-4542
PUB DATE - ND 29P.

DESCRIPTORS - *EFFECTIVE TEACHING; *PROGRAMED
MATERIALS; INSTRUCTIONAL AIDS; *TEACHING
TECHNIQUES; *TRADE AND INDUSTRIAL TEACHERS;
*TEACHER EDUCATION

ABSTRACT - THIS MODULE IS THE FIFTH IN A SERIES OF SIX WHICH CONSTITUTE A 4-STEP PROGRAMMED COURSE IN TEACHING TECHNIQUES AND STRATEGIES. DEVELOPED PRIMARILY FOR OCCUPATIONAL TEACHERS, THE PURPOSE OF THE PACKAGE IS TO AID IN IMPROVING INSTRUCTIONAL COMPETENCY. IN MODULE 5, THE FOCUS IS ON THE APPLICATION OF THE INFORMATION PRESENTED. CONCEPTS INCLUDED ARE: (1) DEMONSTRATION, (2) REPETITION, AND (3) REINFORCEMENT. OTHER COMPONENTS TO THE SET ARE AVAILABLE AS VT 016 180 - VT 016 185 IN THIS ISSUE. (SN)

VT 016 184

THE FOUR STEP METHOD OF INSTRUCTION

A Programmed Course
For Occupational Instructors

MODULE 5

THE FOUR-STEP METHOD OF INSTRUCTION

A Programmed Course

for

OCCUPATIONAL INSTRUCTORS

Module 5

Developed by the

REHABILITATION RESEARCH FOUNDATION
Elmore, Alabama

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Pursuant to a Contract with

U. S. Office of Education
Contract No: OEC2-7-006711-4542

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In the Presentation Step, you demonstrated the skill or presented the information and made sure that every trainee mastered what he observed and heard. Now he is ready for the third step of instruction--the Application Step. The theme of this step is "Experience is the best teacher."

Have you ever watched a three-year-old going through the process of learning to tie his shoes. He watches you many times. Finally, he becomes very independent and decides he wants to do it himself. It looks so easy, and he's watched you do it so many times. Usually the first time he tries, he succeeds only in twisting the laces around his fingers. You show him again how it is done. Each time he tries, he learns something. Each time he makes a mistake, you stop him and show him the right way. Soon he is able to tie his shoes alone.

This is basically what happens in the Application Step. The trainee must practice what you have taught him to make the use of the skill or the application of the information a natural reaction to him. It is easy to parrot what we hear and see, but it takes actual practice to make learning mean something to us.

What is the purpose of the Application Step?

	FRAME NO.
To show the trainee how to apply information.	3
To give the trainee a chance to practice what he has learned.	5
To allow the trainee to perform the skill alone.	6

(from Frame 5)

YOUR ANSWER: In the following situation Mr. Bright is carrying out the first stage of the Application Step:

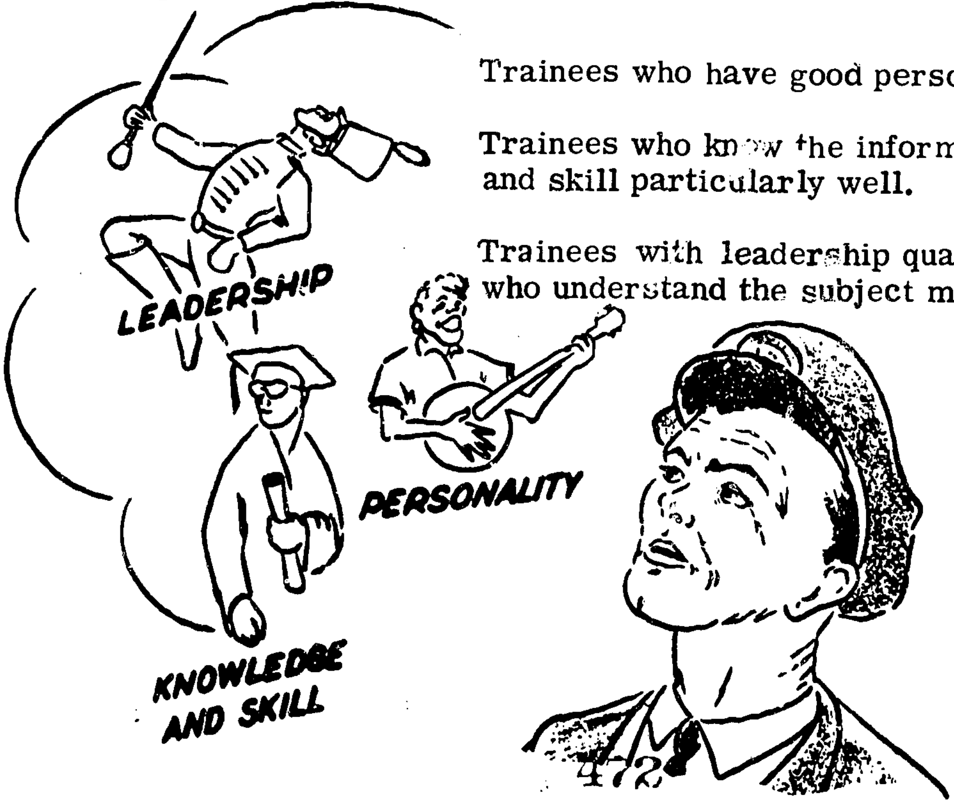
> Three of Mr. Bright's best trainees demonstrate to small groups how to write a travel folder.

Correct! This approach to the Application Step has several advantages: 1) The trainees are gradually allowed to perform individually; 2) The trainees who learn the task more quickly have a chance to practice the skill and share what they have learned with their classmates; 3) The trainees who need more time are given extra instruction by observing their classmate perform; 4) You have a chance to supervise the group demonstrations and catch any errors that may be made before each trainee attempts the operation.

Let's discuss briefly the best way to carry out the trainee group demonstration. You must make sure that you choose carefully the trainees to conduct the demonstrations. From your observations of each trainee's performance during the Preparation and Presentation Steps, you should know which of your trainees have leadership qualities and a good understanding of the skill and information. Let each of these trainees demonstrate the skill for a small group of their classmates. Here, the same rules apply as in your own demonstration. The most important rule--LET THE TRAINEES SEE THE SKILL PERFORMED AS THEY WILL HAVE TO PERFORM IT.

Which of the following kinds of students should Mr. Bright select to conduct a group demonstration?

	FRAME NO.
Trainees who have good personalities.	4
Trainees who know the information and skill particularly well.	8
Trainees with leadership qualities who understand the subject matter.	10



(from Frame 1) 3

YOUR ANSWER: The purpose of the Application Step is to show the trainee how to apply information.

This is your task during the Presentation Step, not the Application Step. You have made sure in the Presentation Step that they know everything you have taught them. During the Application Step you give them a chance to use what they know. You have shown them how; before they can learn anything more, they must do the task themselves.

With this reminder, return to frame 1 and make the correct response.

(from Frame 2) 4

YOUR ANSWER: Mr. Bright should select trainees who have good personalities to conduct group demonstrations.

A person's personality is no indication of his ability. You must remember that the trainees you select will be helping you teach. They must have mastered the skill or information that you have taught in order to conduct the demonstration. Even this is not enough. The trainee must have his classmates' respect in order to hold their attention and be believed. This trait is called leadership.

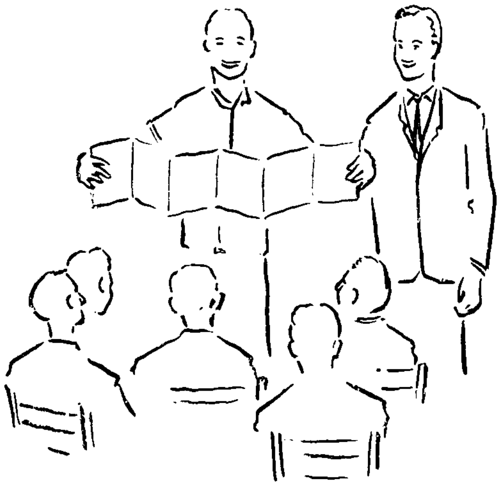
Remember, it takes both mastery of subject matter and leadership to make a good group leader. Return now to frame 2 and select the correct response.

YOUR ANSWER: The purpose of the application step is to give the trainee a chance to practice what he has learned.

Good! Now you are beginning to see how the Four-Step Method really works. You prepare the trainee to learn, you show him the skill and knowledge that he needs and make sure that he understand these, then you give him a chance to try his hand at using what you have taught him.

Instruction does not end where the Application Step begins. As a matter of fact, this step is probably the most important in your instruction. You are giving the trainee a chance to practice what you have taught, but NOT WITHOUT CLOSE SUPERVISION. He is not put on his own and told to perform. You want him to be confident that he can do the task before giving him that responsibility. Therefore, the Application Step, like the other steps of the Four-Step Method, is carried out gradually. In the first stage, selected trainees perform an operation for small groups of their classmates; in the second stage, each individual trainee is allowed to try his hand under careful supervision.

In which of the following situations is Mr. Bright carrying out the first stage of the Application Step?



	FRAME NO.
Three of Mr. Bright's best trainees demonstrate to small groups how to write a travel folder.	2
Each of Mr. Bright's trainees begins compiling his information.	7
Mr. Bright demonstrates for each trainee individually how to set up information for a travel folder.	9

(from Frame 1) 6

YOUR ANSWER: The purpose of the Application Step is to allow the trainee to perform the skill alone.

If you allow the trainee to perform a skill or apply information on his own at this stage of instruction, he will learn bad habits that will be hard for him to break later. You are still in the process of teaching. It is necessary for you to be on hand to correct any errors that are made WHEN they are made.

As you will see, the process of allowing the trainee to apply information or perform a skill is a gradual one. The trainee is not allowed to perform on his own until the last step of the Four-Step Method, and then only when the instructor is sure that he can work without supervision.

Return now to frame 1 and make the correct response.

(from Frame 5) 7

YOUR ANSWER: In the following situation Mr. Bright is carrying out the first stage of the Application Step:

> Each of Mr. Bright's trainees begins compiling his information.

There have been cases in which parents have thrown their small children into a swimming pool to teach them how to swim. In some cases this has worked, but in others the child had to be fished out. Likewise, some of your trainees are ready to perform; others are not. To make a trainee perform a task before he is ready does more harm than good. He fumbles through the operation, self-conscious of his inability. He may either form some bad habits which you will have to catch and correct or he may give up altogether.

As you probably realize by now, you have chosen the second stage of the Application Step. Not all trainees are ready to perform yet. Some need to see the skill demonstrated again before they are ready. The first stage of the application step takes care of this. Return to frame 5 and find the correct response.

(from Frame 2) 8

YOUR ANSWER. Mr. Bright should select trainees who know the information and skill particularly well.

Your answer is partially correct. The trainee must know how to perform the skill himself before he can show others. You have forgotten another important characteristic, though. A person's personal traits are important when he works with other people. Some people have a natural air of authority that commands others' attention and respect. Because the group demonstration helps to teach other trainees you want to make sure that your trainee instructor has this ability--it's called <u>leadership.</u>

Some of your trainees are good leaders, but lack the ability to master information or skill. Others have the ability to learn easily, but cannot influence other people. Your trainee instructor needs a blend of both characteristics. Some of your trainees already have both traits. You should help others develop these traits as the course continues.

This cue should help you to make the correct response. You may return to frame 2 now.

(from Frame 5) 9

YOUR ANSWER: In the following situation Mr. Bright is carrying out the first stage of the Application Step:

> Mr. Bright demonstrates for each trainee individually how to set up information for a travel folder.

It would probably be ideal if this type of instruction were possible. The question is, what would the rest of your trainees be doing while you were working with <u>one</u>?

Later on in the Application Step when the trainees are able to practice individually, you <u>will</u> have a chance to work with each trainee making sure he is performing the task correctly. For right now, however, you must remember that you have some trainees who catch on quickly. These trainees should be given a chance to use what they have learned. Others who need more help before they can perform often learn more from classmates than they would from you simply because they're shy.

There is a more efficient way to begin the Application Step. After considering the information above, return to frame 5 and see if you can choose the best situation.

(from Frame 2) 10

YOUR ANSWER: Mr. Bright should select trainees with leadership qualities who understand the subject matter.

Good! The trainees that you have chosen to conduct the trainee demonstration are ready to practice what they have learned. They should not be held back. You are a good instructor to recognize this. By giving these trainees the opportunity to practice what they have learned, you not only help to reinforce their learning, but you also motivate these trainees to work harder. They may make your job easier by getting across an idea to trainees you were unable to reach.

You are probably beginning to wonder just what your role in the Application Step is. For a discussion of this matter, go on to the next frame, please, by turning to frame 12.

(from Frame 12) 11

YOUR ANSWER: The following accurately describes Mr. Bright's role in the Application Step:

> Mr. Bright observes a group demonstration, complimenting the trainee when he performs well. After the demonstration has been completed, he corrects any errors made and re-teaches any points necessary.

Look at the part of the sentence that is underlined above. This is the cue to your mistake. If a child slips and falls from a high place, would you try to break his fall or would you let him injure himself--possibly seriously? You would, of course, try to catch the child. The same theory should apply to catching errors as they are made and correcting them. To allow the trainee to complete the task without correcting errors when they are made creates several problems: 1) The trainee has forgotten what he did by the end of the performance; a correction will not mean as much to him as it would when the error was made. 2) The performing trainee and the observing trainees have already learned the incorrect method from the demonstration; you will have to re-teach the right way instead of simply correcting the error. 3) One mistake may cause a chain reaction of errors; by the time the trainee completes the demonstration, you may have to re-teach the whole skill!

The trainee should see only the right way to do a skill so that he will form the correct habits. If errors are made, be sure to correct them IMMEDIATELY! Return now to frame 12 and find the correct answer.

We can sum up the instructor's task in the Application Step in four words: observe, question, correct, and repeat. You should observe each group demonstration. This is the first chance you have had to watch your trainees in action and analyze their needs for further instruction. While you observe, take every opportunity to compliment the trainee for a good performance. Be sincere and don't overdo your praise, however. During your observation ask questions that clarify the demonstration for the observing trainees, that make the performing trainee think through his actions, and that help you to determine how well he understands what he is doing. The same question words (why, how, when, where, what, and who) that we used in the Presentation Step make the best test for understanding, and the same method of questioning that we discussed should be followed.

Your observation and questions may have revealed errors either in the trainee's performance or in his reasoning behind the performance. You must correct these errors immediately after they are made. Tact is necessary to avoid embarrassing the trainee. Find something good about his performance before showing him the correct method. This softens the correction and helps him save face before his classmates.

Repetition of instruction takes place whenever you discover a need for it. If the trainee group demonstration has brought up questions or pointed out weaknesses in your presentation of the subject, you should instruct again answering all questions that have arisen and strengthening all weak areas of your first instruction.

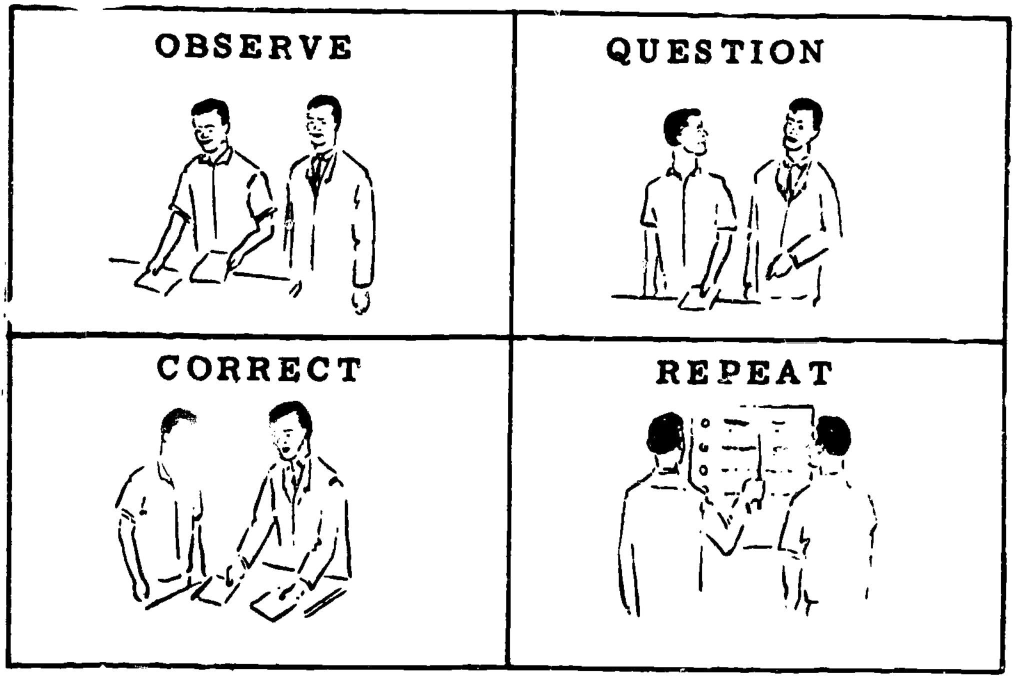
You may wish to re-read this frame before going on to the next to answer a question concerning this information. When you are ready, go on to the next page.

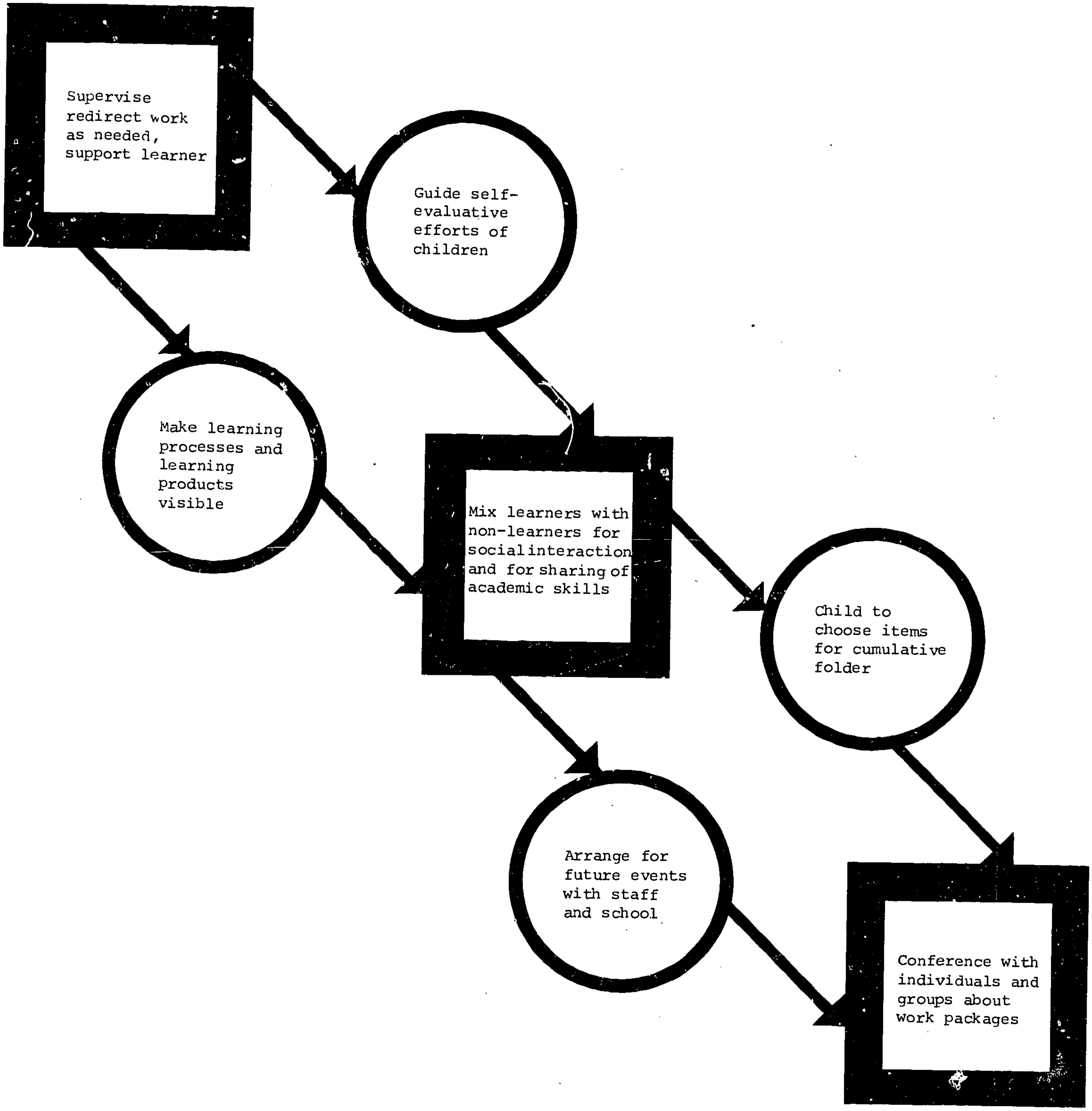
FRAME 12 CONTINUED

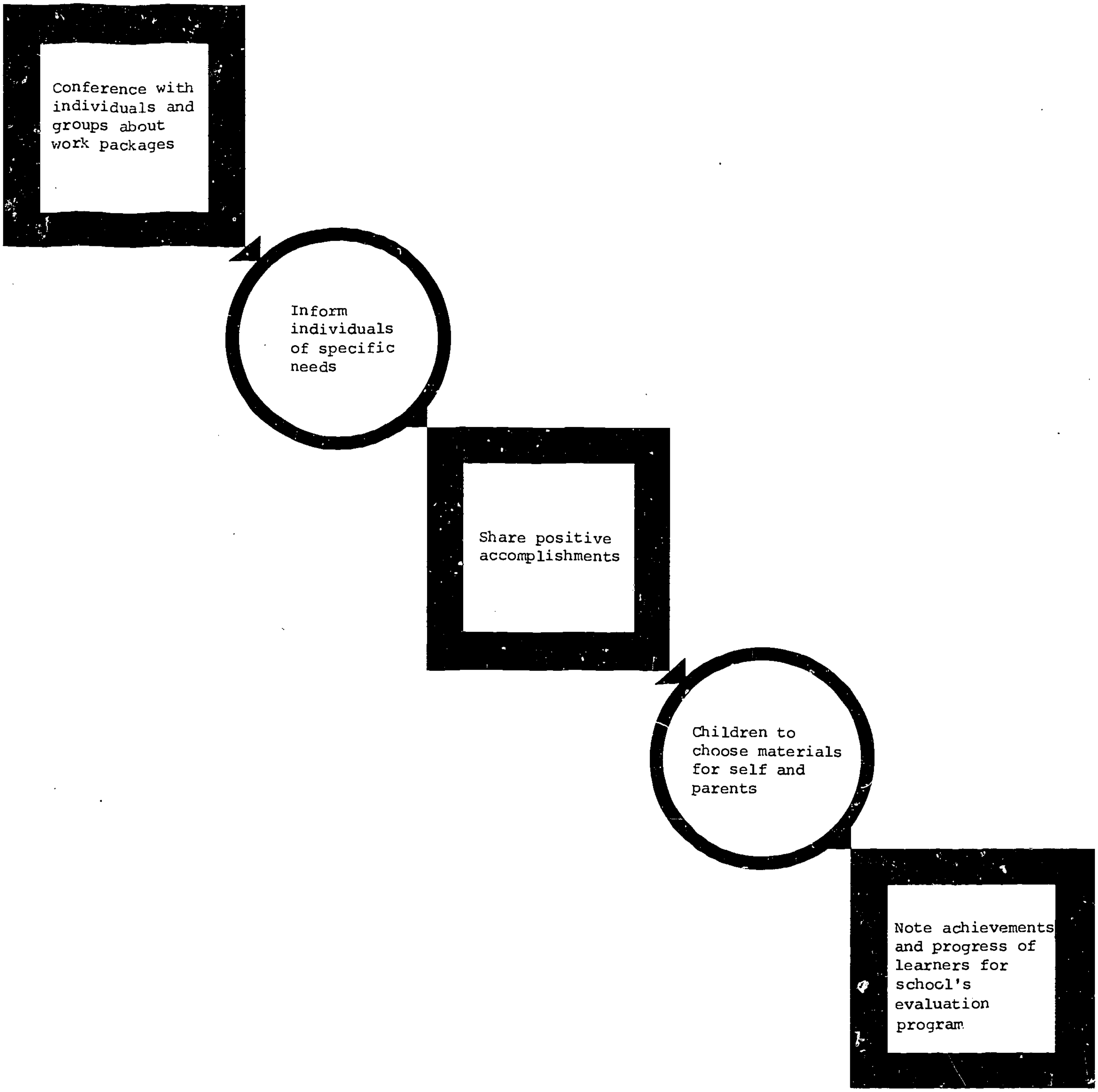
(frame 12 continued)

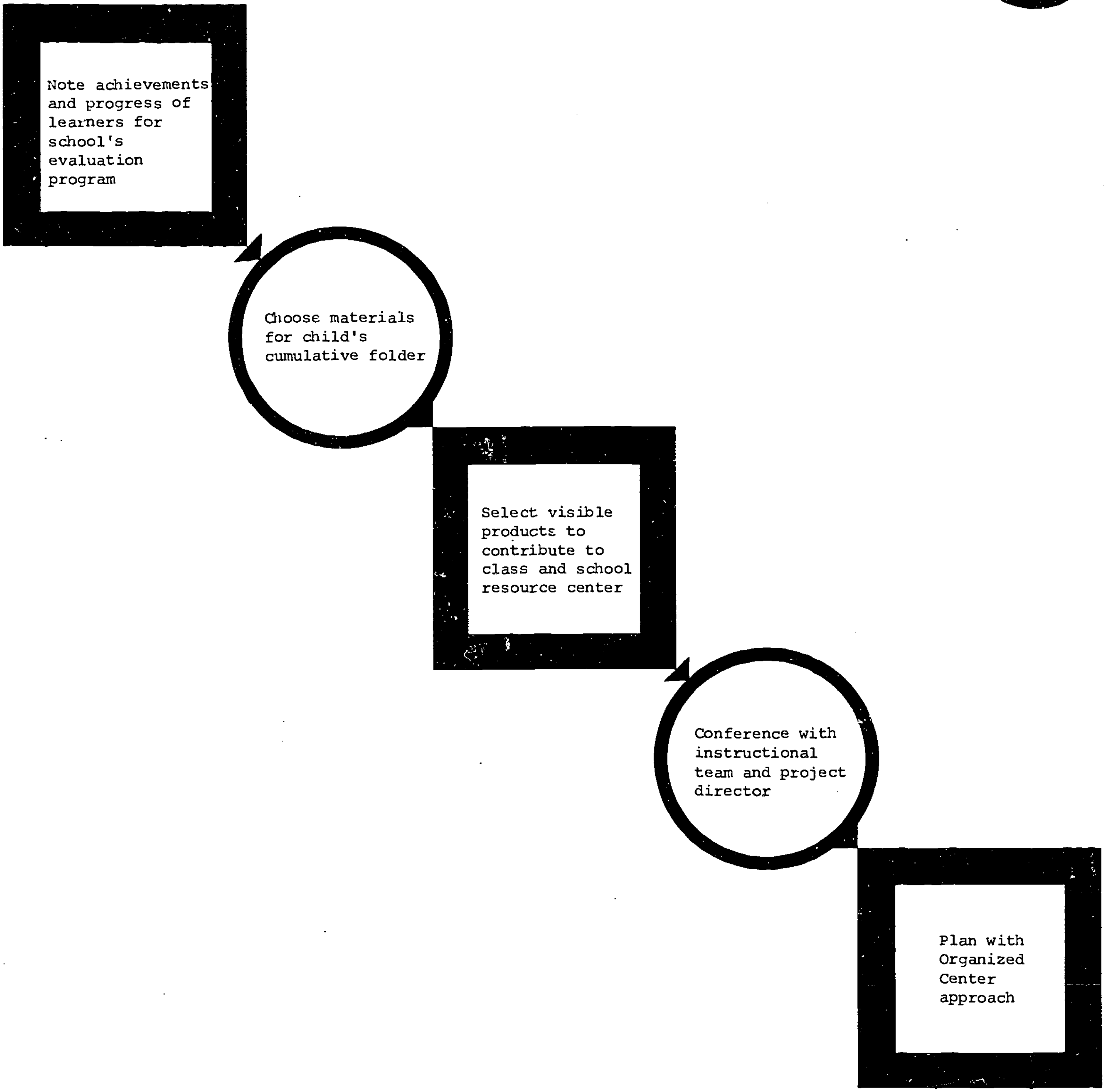
Mr. Bright is observing as a trainee shows the rest of the group how to set up information for a travel folder on McKeeley Park. In which of the following situations is Mr. Bright doing the best job of carrying out the Application Step of instruction?

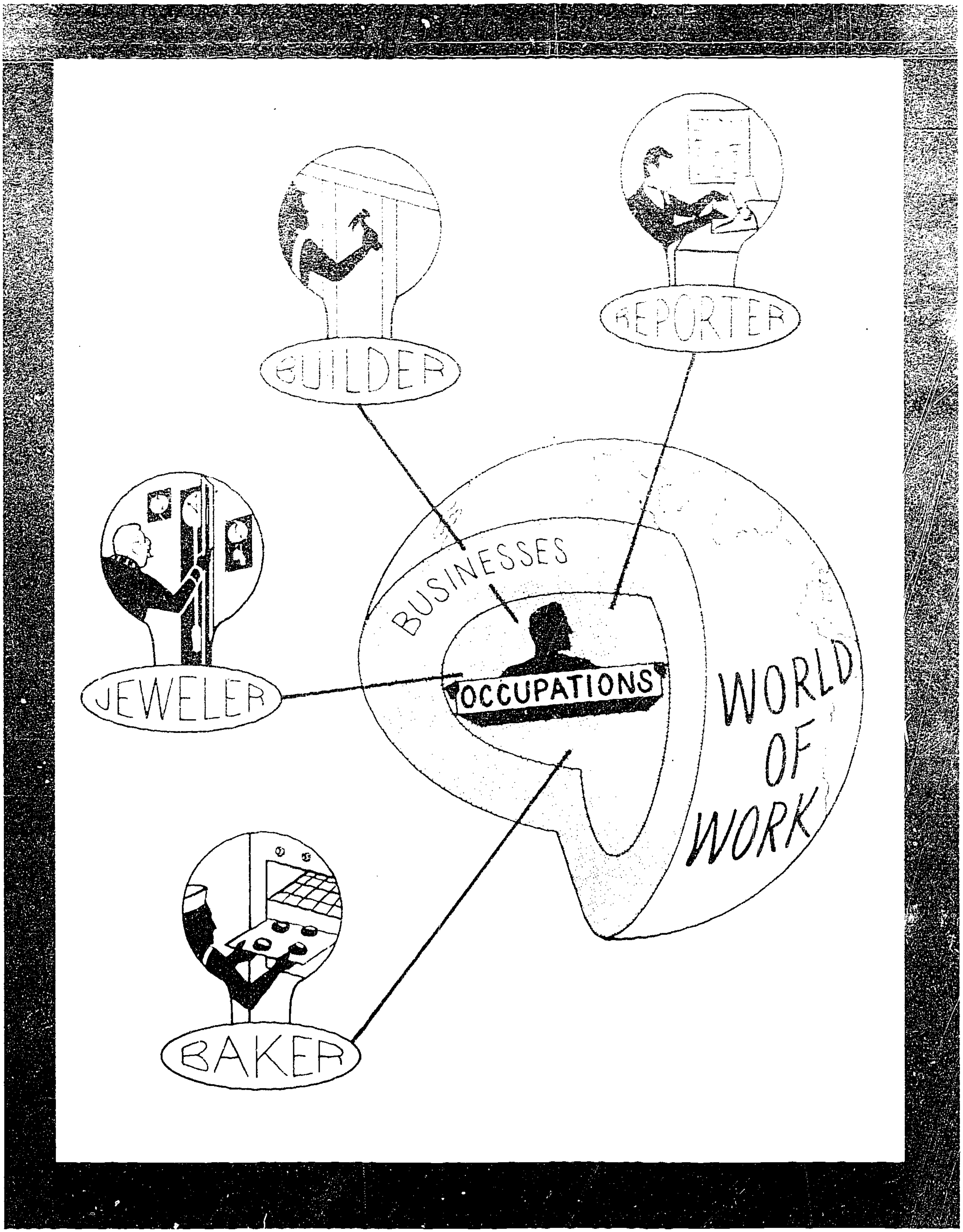
	FRAME NO.
Mr. Bright observes the demonstration, complimenting the trainee when he performs well. After the demonstration has been completed, he corrects any errors made and re-teaches any points necessary.	11
Mr. Bright observes the demonstration and questions the performing trainee. He corrects all errors as soon as they are made, but waits until the demonstration has been completed before he re-teaches any weak points he has discovered.	16
Mr. Bright watches the demonstration carefully. He questions the trainee and corrects errors as they arise. When he sees that a trainee does not understand, he stops the demonstration and repeats instruction completely before allowing the demonstration to proceed.	18




Supervise redirect work as needed, support learner
Guide self-evaluative efforts of children
Make learning processes and learning products visible
Mix learners with non-learners for social interaction and for sharing of academic skills
Child to choose items for cumulative folder
Arrange for future events with staff and school
Conference with individuals and groups about work packages


Conference with individuals and groups about work packages
Inform individuals of specific needs
Share positive accomplishments
Children to choose materials for self and parents
Note achievements and progress of learners for school's evaluation program


Note achievements and progress of learners for school's evaluation program
Choose materials for child's cumulative folder
Select visible products to contribute to class and school resource center
Conference with instructional team and project director
Plan with Organized Center approach


BUILDER
REPORTER
JEWELER
BAKER
BUSINESSES
OCCUPATIONS
WORLD OF WORK

BUILDING ■ OCCUPATIONS ■ Architect
Carpenter
Lumber Yard Salesman

Building, *as an idea,* has great generative qualities. By itself, it offers wholesome and worthwhile areas for study. However, we feel that the idea is too broad for use as the center of instruction in the elementary class setting. Young children need more than an abstraction. They need the warmth and color of real human characters.

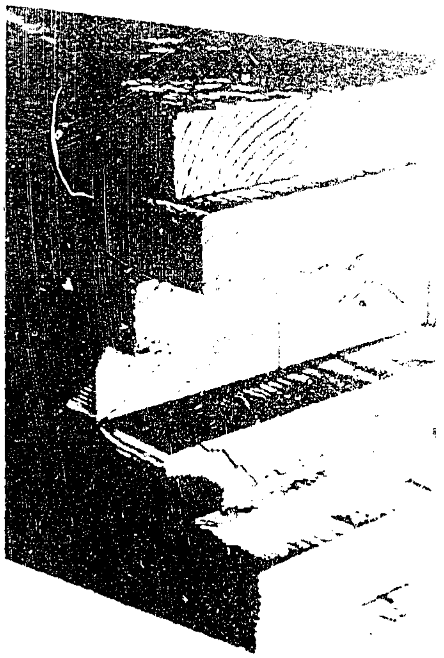
An occupation can be an organizing center for instruction in the elementary school. The "content" of an occupation gives the teacher a variety of instructional choices and focuses upon life-centered activities. Also, personal authenticity is brought directly to the classroom.

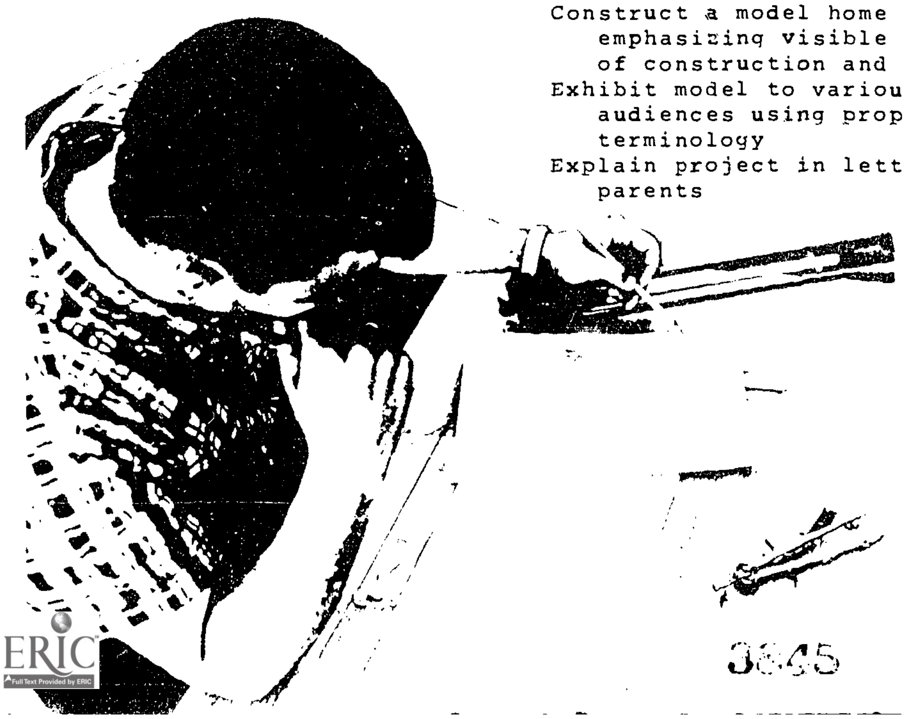
All three occupations could be studied at once. That would require a great amount of pedagogical talent. We advise those entering our program to *plan one step at a time* until such time as large blocks of activities and events fit into place. Each page is designed to *help the teacher think through specific doing* possibilities for each occupation.

This introductory brochure is not intended as a teacher's guide for lesson by lesson instruction. Rather, it is seen as one of the many materials a teacher looks over in order to prepare for that sudden coming together of insight and expertise that is the hallmark of the artist-professional.

Illustrations of more detailed planning, implementation, and evaluation will be available at project headquarters.

ACCESSIBILITY	Architect Realtor Plan books and blueprints Model home Library materials (including films, filmstrips, tapes, etc.) School building
MOBILITY	History of home structures Planning and design of a structure Coordination of products and services for a specific goal Esthetic qualities of house and environment Economic factors of construction Building codes and zoning laws Community services to house (gas, water, electricity, streets, sewer)
ACCOMPLISHMENT	Interview with "talent" to be written as an article for the school newspaper List values which determine home design and construction Roleplay home buyer and architect Draft a design to scale Interview city officials who supervise zoning and building codes Construct a model home emphasizing visible features of construction and services Exhibit model to various audiences using proper terminology Explain project in letters to parents





ACCESSIBILITY

Carpenter
House under construction
Work room with hand tools
School building
Children's apartments or homes
Library materials

MOBILITY

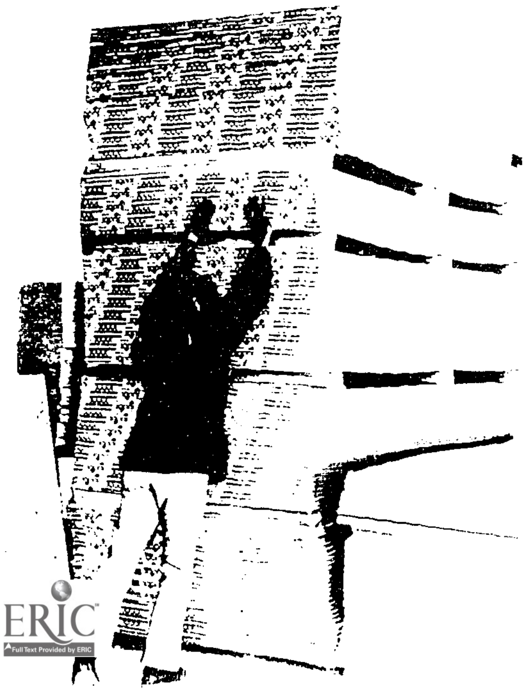
Carpentry skills, training and working conditions
Tools and technology (prefabrication)
Mathematical skills
Vocabulary development
History of carpentry

ACCOMPLISHMENT

Handle tools and use terminology in reports and exhibits
Interview workers in building trades for articles in school newspaper
Outline steps in house construction
Figure costs of lumber (side walls, flooring system, roof system)
Write letters to parents about the features of a carpenter's work
Report on the history of a carpenter's work
Report on home repair carpentry

3646

ACCESSIBILITY	Salesmen from lumber companies Lumber yard Forest preserve Trees around school area Library materials
MOBILITY	Home building products (manufacture, transportation, sales) Occupations, geographic areas, characteristics of job, future of industry Cultural traditions Conservation and development of natural resources New products under development
ACCOMPLISHMENT	Map study (product maps) Exhibits of building materials to show processing from raw to finished product Write reports using vocabulary drawn from studies Interview community members about housing needs and desires Hands-on experience with different lumber yard products Collections of nails, woods, etc. to show variety of products and their uses Analyses of building products used in school construction Report on how products are maintained and serviced



3847

THE BAKERY ■ OCCUPATIONS ■ Baker
Clerk
Entrepreneur
Wholesale Salesman

How many times have you heard a child ask,*"May I have a cookie?"* Have you ever thought of this everyday occurrence as an instrument to further a child's intellectual development?

Baking, as an organizing center, affords the classroom teacher a kaleidoscope of significant topics that can be enjoyed as they are studied. Almost any product or process that has to do with food is a "natural" for children. It's easy to promote this area of human endeavor since perfecting the art of cooking, or eating, has been a life-long enterprise for many adults.

Teachers who start with fundamental life activities find themselves surrounded with wholesome social events. Those who start with abstractions and logic find themselves searching about for motivational gimmicks and ways in which to strengthen their classroom activities.

ABLE teachers have to be more effective because they are latching on to *life*. Less time will be spent explaining why studies are necessary (the material is self-evident) and more energies furthering instruction will be contributed by interested children, parents, and other community talent.

Fundamental life activities *such as baking* may not appear as erudite as behavioral objectives which have been abstracted to form a master conceptual plan. After all, who can compare a crumbly cookie to the neat mind of a statistical researcher? Nevertheless, the multi-sensory facets of a cookie reflect as those of our most precious diamonds in bringing basic understandings of our human heritage to the learning child.

3648

ACCESSIBILITY

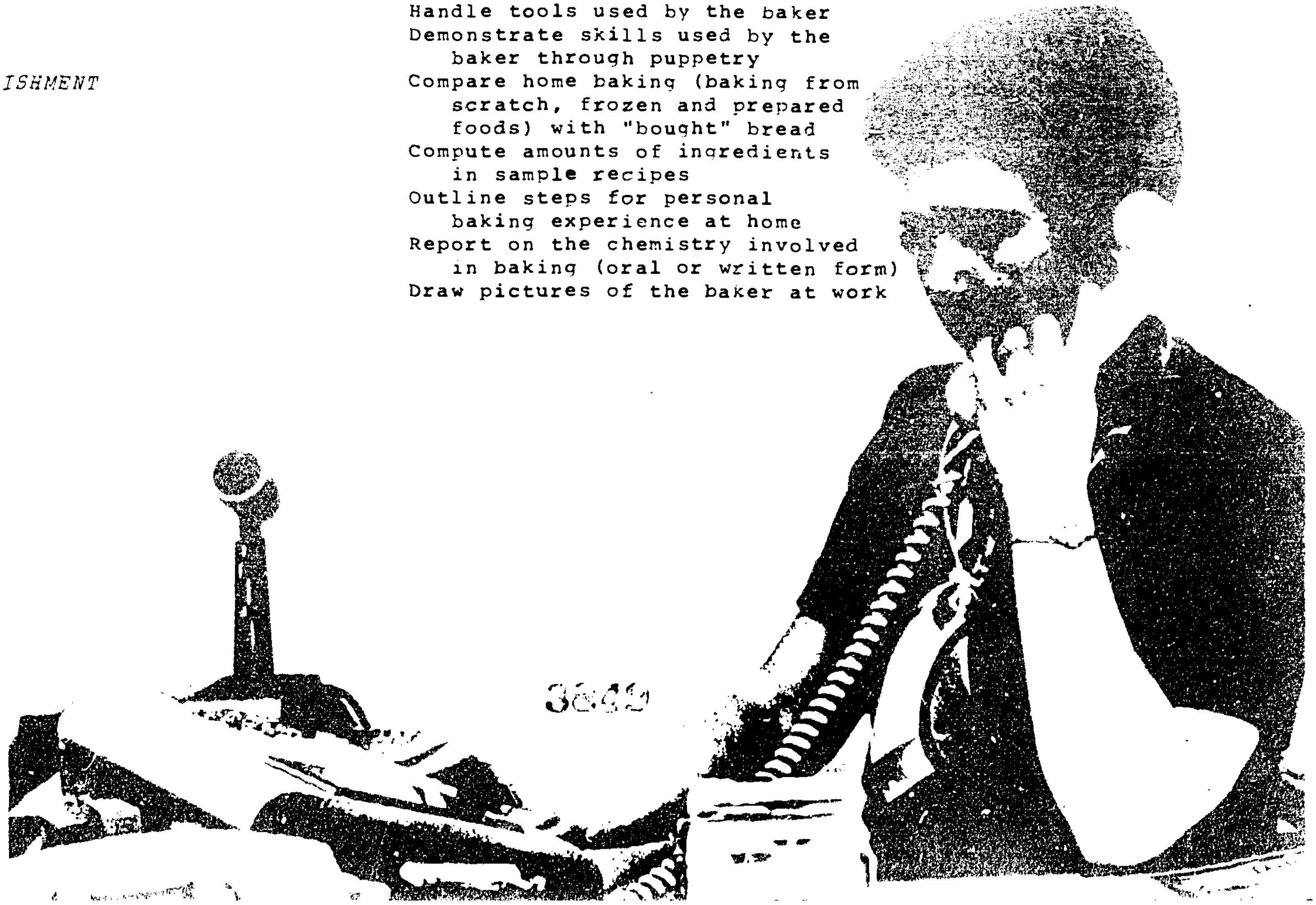
Baker
Bakery
Recipes
Kitchen utensils
Baking ingredients
Library materials (including film, filmstrips, tapes, etc.)

MOBILITY

Baking (skills: baking, decorating; training - schooling; working conditions - sanitary regulations)
Tools and technology (past and present)
Mathematical skills (fractions, weight, volume)
Chemistry (effects of temperatures)
Vocabulary development

ACCOMPLISHMENT

Handle tools used by the baker
Demonstrate skills used by the baker through puppetry
Compare home baking (baking from scratch, frozen and prepared foods) with "bought" bread
Compute amounts of ingredients in sample recipes
Outline steps for personal baking experience at home
Report on the chemistry involved in baking (oral or written form)
Draw pictures of the baker at work



ACCESSIBILITY	Clerk Bakery Dictionary Cook books Library materials
MOBILITY	Customer-clerk relations Mathematical skills (money changing) Health standards Ethnical baking - customs of cultures
ACCOMPLISHMENT	Roleplay clerk and customer ordering quantities of baking products Construct a model retail bakery Detail sanitary habits and codes in a public establishment Figure money exchanges Figure quantities of bakery products for parties Exhibit samples (and word lists) of ethnical baking Taste ethnical products and describe appearances and tastes Make a mural of bakery products advertised in newspapers and magazines Read aloud vignettes from "literature" wherein baking processes or products are described

ACCESSIBILITY	Owner of the bakery (entrepreneur) Employees of municipal health department Bakery Library materials
MOBILITY	Planning and design of a bakery (assembly line) Economic factors (labor, cost of materials, equipment costs, overhead, profit) Capitalism Technology - past and present (tools and equipment) Sanitary laws - government Ethnical aspects - culture (Italian, Jewish, Bohemian, Swedish) Delivery methods (home, supermarket)
ACCOMPLISHMENT	Roleplay employer interviewing prospective employees Display selected baking developments from past to present Explain health standards and function of government agencies Interview people from different ethnical groups about customs, tools, and products for articles in school newspaper Exhibit samples of ethnical baking Illustrate profit, loss, and gain in graph form Construct a model assembly line Use new terminology in written work Chart routes of delivery

ACCESSIBILITY

Wholesale salesman of bakery
Order forms
Products used in baking (sugar, flour, salt)
Farms
Processing plant
Library materials

MOBILITY

Original and manufactured sources of baking ingredients
Processing of raw products into marketable items
Transportation (packaging, routes, storaging)
Mathematical skills (computation of orders using volume, weight, and prices)
Economics (wholesale and retail)

ACCOMPLISHMENT

Make and discuss product maps
Exhibit the transformation of raw products into finished marketable items
Illustrate transportation methods in chart form
Interview salesmen and housewives about ingredients to make certain products for article
Figure (mock) wholesale and retail costs
Analyze graphs and report sales figures
Use technical vocabulary of baking product salesmen in oral or written reports
Write articles for school newspaper
Arrange class bake sale

HE POST OFFICE ■ OCCUPATIONS ■ Postmaster

Clerk

Mailman

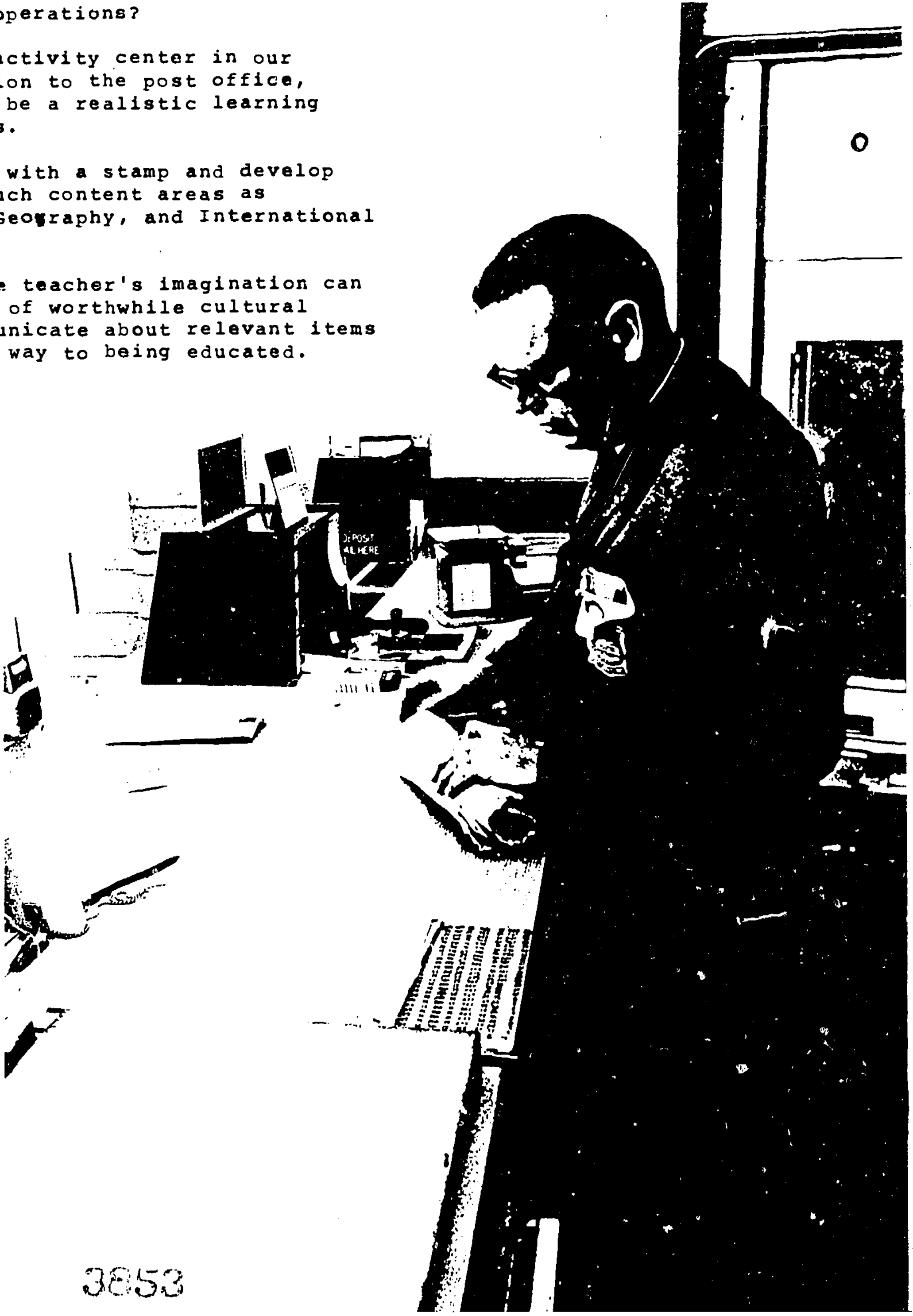
Truck Driver

As a child, how often did you go to the post office? hat was your role in this adventure? Were you an n-looker or a participant? What was your reaction to the official "behind-the-scene" operations?

The post office is a basic activity center in our social life. An early introduction to the post office, and the structure behind it, can be a realistic learning adventure for elementary students.

An ABLE teacher could begin with a stamp and develop ideas to lead students through such content areas as Graphics, Mathematics, History, Geography, and International Relations.

Children's interests and the teacher's imagination can combine to build a strong bridge of worthwhile cultural content. When children can communicate about relevant items in their culture they are on the way to being educated.



ACCESSIBILITY

Postmaster
Post office
Stamp collections
Zip code book
Library materials (including films, filmstrips, tapes, etc.)

Mathematical skills (money changing)
Management
International relations
United States history
Geography

Compute with stamps
Design "commemorative" stamps
Describe the process of making a stamp
Outline the structure of a post office
Report describing the history of the post office
Letters to parents explaining post office operations
Exhibit stamp collections from around the world
Report on postal systems of other countries
Interview the local postmaster for news article
Write letters to people in other countries
Arrange exchange program with children of other cultures
Panel discussion on public versus private message delivery systems
Report on supervision and inspection of employees

CLERK

ACCESSIBILITY	Clerk Packages to send Postal scale Students' mail Students' stamps Mail system in class
MOBILITY	Mathematical skills, money changing, volume weights Study of shapes Composition - letter writing Packaging Holidays
ACCOMPLISHMENT	Roleplay of clerk and customers Develop a class mail system Send letters to classmates within school Send letters to parents explaining project Wrap packages (could have a social-work aspect by sending these packages to needy people in area) Weigh packages Make chart showing shapes of various types of packages Exhibit designs for stamps made by children Compare work done by clerks in other businesses with that done by post office clerk Report on seasonal mail and cultural customs Explain zip code system

ACCESSIBILITY

Mailman
Students' mail
Photo of uniforms
Mail bag
Library ma

MOBILITY

Human relationships
City geography
English composition
Interviewing skills
History
Government

ACCOMPLISHMENT

Interview mailman for news article
Develop map of city mail routes
Construct a model post office
Letter writing to friends and relatives
Have children try to carry an authentic filled mail bag
Deveop a chart of the city's postal system
Write a report explaining recent changes in mail system
Discuss delivery of mail throughout history of United States
Report on famous messages (Battle of Marathon, Garcia)
Report on alternate ways of sending messages (phone, TV, special messenger)

ACCESSIBILITY	Truck driver Larger post office (photos) Helicopters (photos) Truck Library materials
MOBILITY	Transportation structure (how mail travels) Geography Cartography skills Interviewing skills Management (central receiving) Labor relations
ACCOMPLISHMENT	Chart differences of post offices in urban and rural areas Interview truck driver for school radio station Report on receiving system of school, of school system Set up a central receiving system in classroom for messages from others in the school Make a map showing the stops one letter may go through Compare work of truck drivers in various businesses Report on mail delivery systems (air, truck, train) Report on handling mail (zip codes)

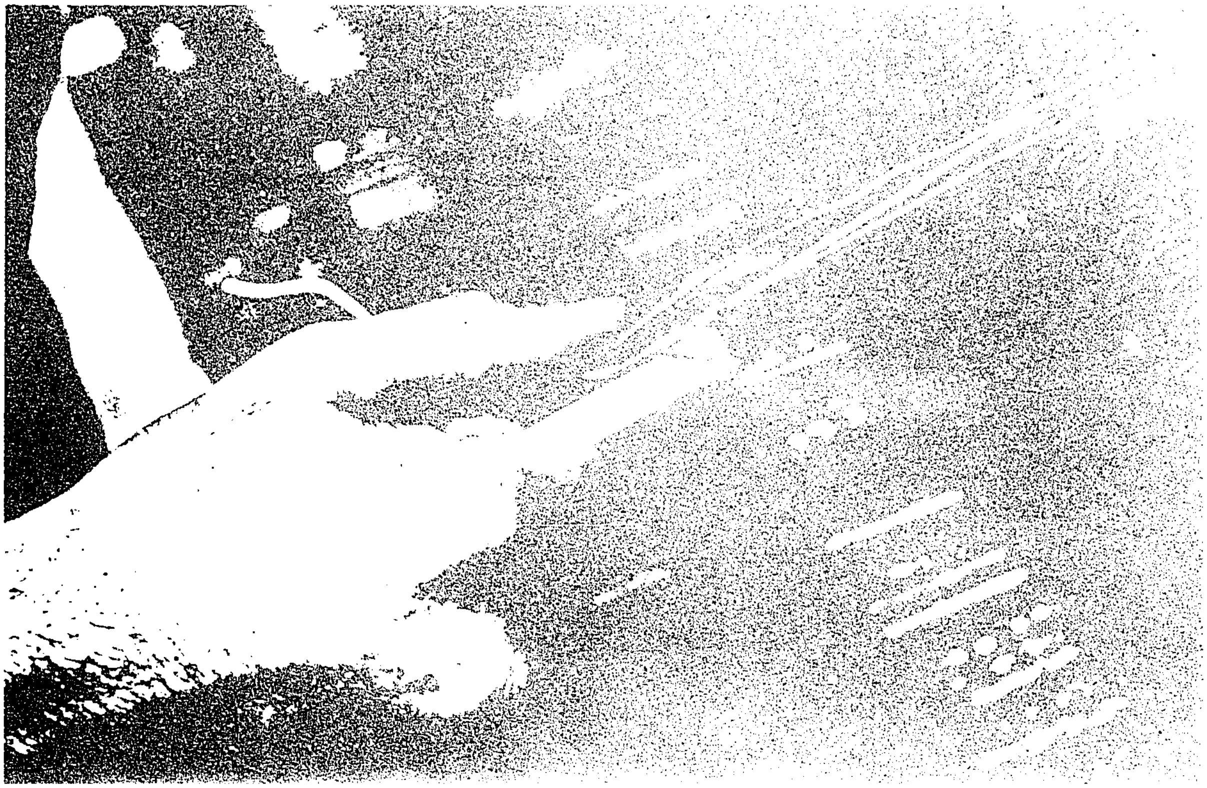
THE TELEPHONE ■ OCCUPATIONS ■ Service Representative
Telephone Installer
Telephone Operator
Clerk

Have you ever stopped to think about how many times a day you use the telephone? Are you aware of the many operational facets of the telephone company? A few of the occupations in this business have been chosen as representative and developed within a form we introduced in an earlier brochure.

Many vistas can be revealed through encounters with men and women in the "telephone business". In fact, you might say *the material lends itself to being an academic supermarket.* From the person to his skills, from the person to his business relationships, solid subject matter awaits!

Using the "telephone business" as an idea for an *organizing center* can also generate avenues into correlated learning areas. For example, an enterprising teacher may wish to explore communications media. A journey into the future to preview and predict the kinds of communication available for twenty-first century man *(the children in your class today)* is no longer an idle, romantic dream. Guided thinking about our unfolding world is a necessity; that is, if *instruction is to be relevant to the needs of a planning society in the seventies.*

The material presented here indicates only a few of the instructional possibilities in the broad area of communications. No doubt, you'll think of many more as you move your imagination along these lines. Your thoughts, keyed to your local classroom setting, will be more specific, more vivid, and we're certain more suited to your *ABLE* children.



ACCESSIBILITY

Service representative
Telephone
Telephone books
Library materials (including films, filmstrips, tapes, etc.)
Posters

MOBILITY

Mathematics (distance, billing, tolls, cost)
Conversational skills
Science of sound
Writing skills (i.e., abbreviations)
Communications services in the home, business, industry
Vocabulary skills
History of communication via the telephone

ACCOMPLISHMENT

Roleplay interviews
Interview persons about the uses of the telephone (personal, business) for article
Construct a model telephone
Prepare a bulletin board on use of the phone
Write reports using technical vocabulary
Roleplay taking steps to have a phone installed
  a. in a home
  b. in a business
Plan a class publication (newspaper, brochure) on communication in modern society

ACCESSIBILITY

Telephone installer
Installer's truck
Installer's tools
Telephones
Site where construction is
underway
Library materials

MOBILITY

Vocabulary development
Technology and communication
Communication in other countries
Geography skills (i.e., globe study)
Communication satellites
Communication media of the future
Letter writing skills

ACCOMPLISHMENT

Write letters to communication
media services requesting
information
Exhibit models of communications
satellites
Write oral reports on communication
technology
Prepare a script and pictures for
school program on communications
Dramatize significant inventions
contributing to the progress
of communication (what, when,
who, where, how, why)
Draw pictures of the telephone
installer at work

ACCESSIBILITY

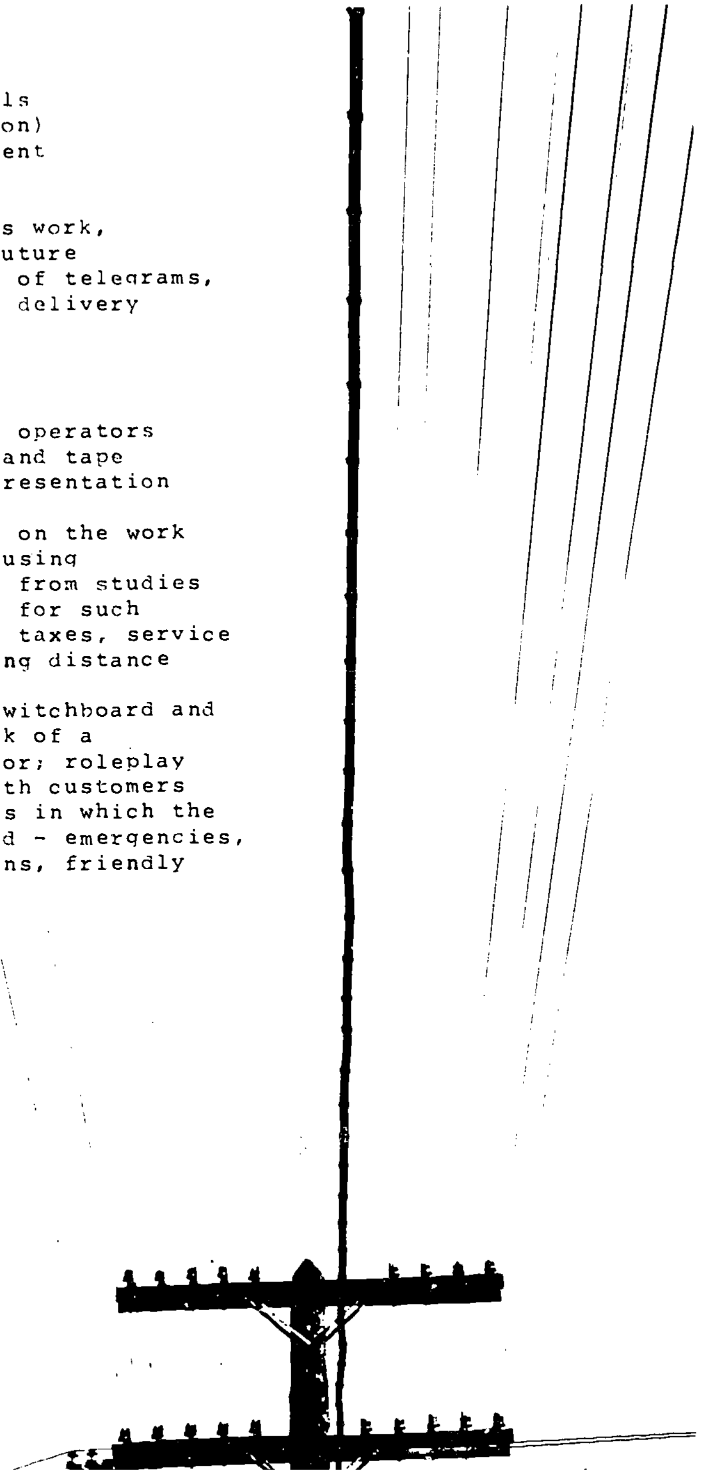
Telephone operator
Telephone company building
Telephone
Library materials
Display materials

MOBILITY

Telephone manners
Conversational skills
   (i.e., enunciation)
Vocabulary development
Mathematical skills
Interviewing skills
Telephone operator's work,
   past, present, future
History and science of telegrams,
   cablegrams, mail delivery

ACCOMPLISHMENT

Interview telephone operators
   about job (film and tape
   recording) for presentation
   to another class
Write a composition on the work
   of the operator using
   vocabulary drawn from studies
Analyze phone bills for such
   things as tolls, taxes, service
Figure costs for long distance
   calls
Construct a model switchboard and
   simulate the work of a
   telephone operator; roleplay
   conversations with customers
Dramatize situations in which the
   phone is utilized - emergencies,
   social invitations, friendly
   conversation



ACCESSIBILITY	Clerk School secretary School office Business office of telephone company Business office equipment Display materials
MOBILITY	Vocabulary development Office technology - past, present and future Writing and speaking skills Mathematical skills (billing, payments) Computer programming
ACCOMPLISHMENT	Simulate answers for want-ads of available office jobs Set up a business office - roleplay various jobs Interview the different kinds of plant clerks (tape and film recording) for reports Compute mock payroll for telephone company employees -tax deductions, etc. Roleplay: cashier and customer Make an experience chart listing available jobs at phone company Make a dictionary of technical terms used in telephone company business Roleplay: customer and repair service Interview school secretary about her work Panel discussion on advantages and disadvantages of office work

■

THE BANK ■ OCCUPATIONS ■

Teller
Billing Clerk
Loan Officer
President

Penny wise, pound foolish!

A penny saved is a penny earned!

How many of these pithy maxims have you learned? How many do you use when you're teaching?

Now stop for a moment and reflect. Do your children understand the background of your expressions? So many of our commonplace proverbs have no meaning to children because they've had no sensory experience with concepts behind the words. *Besides, we're living in an age of credit and the maxims of the eighteenth century often do not apply to contemporary life.*

Children who will be living through the last third of this twentieth century will almost certainly be using the services of a bank. Accounts will be opened, if they haven't been opened already. Very few will be able to function effectively by hiding savings under a mattress. Today, even money from the tooth fairy gets deposited or spent.

We earn money, spend it, save it, borrow it, or invest it. People who work in a bank and the institution of banking help us in these money-centered activities.

Learning how to manage assets and resources helps a child feel "grown up". But feeling big is only half the mission. Knowledge and skills have to be learned, too. What child can develop a mature self-image in our capitalist society if he does not know how to deal with money matters?

ACCESSIBILITY

Teller
Currency
Checks
Bank forms
Saving account books
Library materials (including films, filmstrips, tapes, etc.)

MOBILITY

Customer relations
Procedures of withdrawing and depositing money
Checking accounts
Saving accounts
Proper use of checks
Mathematics (arithmetic processes, computation of interest, etc.)
Currency - past and present
Currency - foreign
Types of checks (traveler's checks, personal, payroll)
"Quality control" procedures in processing checks and money

ACCOMPLISHMENT

Roleplay teller and customer transacting business
Roleplay cashing a check (traveler's check, etc.)
Bulletin board describing the different types of currency
Chart illustrating currency - past and present
Explain the different types of checks (oral, written)
Dramatize security procedures in case of holdup
Discuss what could be used in place of money
Write reports on history of banking

BILLING CLERK

ACCESSIBILITY

Clerk in billing department
Billing department in bank
Bank statements
Bank forms
Library materials

MOBILITY

Concept of interest
Mathematics (computing interest, balances)
Terminology within work stations
Procedures and machines to increase productivity (addressing, mailing)
Accounting procedures
Computer "language"

ACCOMPLISHMENT

Compute:
- a. balance of savings accounts
- b. interest on amounts for varying lengths of time

Explain information found on bank statements
Explain purpose and operation of machines in billing department
Write reports regarding use (and misuse) of checking accounts
Roleplay telephone calls between customer and billing clerk about bank balance
Write interview with clerk for news article in class journal
Compare clerk's job with the job of school secretary

ACCESSIBILITY

Loan officer
Loan applications
Bank forms
Bank
Library materials

MOBILITY

Economics of capitalism (credit, loans, capital)
Development of the concept of loans
Duties and responsibilities of loan officers
Different types of loans (mortgages, farm loans, home improvements, business)
Procedures i... ng
and obt...
Methods
Gover... lations of loa...
Loan
Com... nterest

ACCOMPLISHMENT

R... tom...
ref...
ads
dif... ent typ...
ch...
...rts de...
apply... loa...
Se... des...
velopment o... ce
tions
b
Discuss
agencie...
available

ACCESSIBILITY	President Bank Office of Secretary of State, State of Illinois American Banking Association banking kit Library materials
MOBILITY	Duties of executives (management, decision-making) Internal operations of a bank Development of trade and money History of banking (variety of banks) Government regulations The Federal Reserve System Security arrangements Community services (public relations)
ACCOMPLISHMENT	Draw pictures of a bank's different operations Write reports describing the duties of the president and other executives Roleplay the bank president with other bank employees Explain organizational chart illustrating the management of a bank Chart illustrating the development of materials used as money Chart illustrating the community services of local banks (bond issues, etc.) Set up a bulletin board illustrating critical incidents in the history of banking Write reports describing government regulations of a bank Discuss the Federal Reserve Banking System (interest rates, etc.)

David F. Yeck
Assistant Professor
University Laboratory School
Northern Illinois University

When children need to know we have the richest environment for effective teaching. The following describes an instructional program in which subject matter became meaningful to students who were using work activities of the adult world.

When first presented as an opportunity to learn about "banking", sixty-one children, ages six to ten, out of a total of seventy in the cluster group, indicated an interest. With such a healthy beginning, the teacher then developed the following program.

Construction of a classroom bank was undertaken with the help of local merchants and the Industrial Arts teacher in our cluster. The children first designed what they wanted in their bank and then proceeded with construction. In the process children used hammers and nails, drills, screwdrivers, handsaw, saber saw, and a plane. Upon completion, painting and naming of the bank took place.

The bank contained two slidable teller windows and an operational door. Later, a burglar alarm system was set up for the bank.

Before the grand opening, two local bankers and a savings and loan executive came in and discussed their role in their business operations. All three had been given a list of questions prepared by the students and were prepared to talk about the human element of their occupations. Also, the consultants explained in detail many of the relationships between people working at their businesses.

After the community talent was interviewed and the children discussed their thoughts about how to proceed, an election was held for bank board president. In the preliminary election, seven candidates were reduced to three. Before final balloting, the three candidates presented their ideas on running the bank. After selection of the president, six people were appointed to the bank board.

Policies of the bank were to be decided upon by the bank board. One of the problems facing the bank board was the decision regarding rate of interest to be paid to depositors. The children had to determine how the bank would be able to pay this.

Through discussion the children came up with the idea that loans could be made to individuals and private enterprises. Interest from the loans could then pay dividends to depositors at a predetermined interest rate.

Development of a company followed. It was formed by presenting the children with the opportunity to develop their own idea into a company. The only restriction placed upon the children was that of having all age levels represented in the company.

Thus, a company was set up composed of sixteen children in the banking project. This company would (hopefully) float a loan from the Cluster C Savings Bank in order to purchase their needed materials.

A president and treasurer were elected to set up the company. One of the first tasks undertaken by the company was the selection of a product. Candy came to mind. A study of the price of various kinds of candy from a wholesaler showed that the profit of margin was too small for consideration. Other products were also suggested with the eventual acceptance of popcorn as the product for the company to sell. The company then became known as the Cluster C PC Company. PC for popcorn. Expenditures for supplies were discussed and it was decided the company would need twelve dollars. The president and treasurer then sought to negotiate a loan for the amount with the bank board.

The importance of establishing a concrete proposal had been presented to the class earlier by the authentic banking consultants. The bank board knew the need for security when making a loan. These two ideas were clearly in mind as the negotiations went on.

The president of Company C PC began with, *"How much money do you have in the bank?"* From that point on the bank personnel took the offensive and after some spirited discussion, unanimously voted no on the proposed loan.

After both sides discussed the situation by themselves, the bank board was approached again about the possibility of loaning a smaller amount. The bank board asked for time to meet without the CPC people and considered the situation carefully. Then the company representatives were asked back into negotiations and given the following proposal: the bank would loan the company seven dollars at a sixty per cent interest rate. (The original loan under consideration was twelve dollars at four per cent interest.) The bank explained to the company the reason for the increase in interest rate and the decrease in the loan was due to the company, considered by the bank, as a poor risk. ("Poor risk" had been explained two days prior to the loan by the local consultants.) Later, in discusion with the bank board, the president pointed out that if they had made the seven dollar loan at forty per cent it would not cover the interest they were to pay their depositors.

The consultant from the savings and loan company returned and spoke to the class before the loan was made. He spent an hour with the Cluster C Savings Bank Board and the PC Board about the process of making a loan. One of the main concerns at this meeting was the contract to be drawn between the two boards. The bank board wanted to establish without a doubt that the company was legally responsible to repay their loan.

The contract was signed and capital finally secured. PC Company proceeded with advertising and the securing of the materials needed for their popcorn sale. The sale involved a total of twenty-four pounds of popcorn, a gallon and a half of oil, a box of popcorn salt and three hundred and twenty popcorn bags.

After expenses, the company had made a profit of thirteen dollars and ninety-nine cents.

The bank had total deposits of eighteen dollars and twenty-five cents. Children were permitted to deposit a maximum of twenty-five cents on which they would receive twenty per cent interest. In listening to the consultant from the savings and loan explain how dividends were paid on a specified date, the bank president explained the dividend date of the Cluster C Savings Bank. In the process of operating the company, a second loan of five dollars at forty per cent had been made to the company. This depleted the bank's fund to six dollars and twenty-five cents thus setting up a possible "run on the bank", which had been explained by the consultants.

The run on the bank was possible because PC Company was having an unannounced penny candy sale, instigated by the teacher. The objective was to study the reaction of the children to see if they would withdraw their savings before the dividend date. The bank board was informed of the situation and decided there may be a need for a larger reserve. They clearly saw why savers might withdraw from their accounts and were concerned. As a result, they decided to re-negotiate the second loan of five dollars at forty per cent with the PC Company for an earlier pay-back date. The concept of a dividend date was firmly established for only three children withdrew a total of seven cents from the bank.

After computing the interest to be paid Cluster C Savings Bank savers and the expenses of the PC Company, the total project netted twenty-two dollars and one cent.

A project such as the bank provides the teachers with a wide range of concepts which can be developed. Opportunity to discuss ideas and actions with many individuals was turned into many teachable moments. Many levels of difficulty in the cognitive, affective, and skill areas were present. Another important aspect of the project was the positive relationships between the school personnel, parents, and people in business.

We've used the World of Work as an Organizing Center for the Curriculum of the Elementary School and it worked well for us. Will we plan and implement other activities such as this one? You can *Bank On It!*

[illegible]

■

THE NEWSPAPER ■ OCCUPATIONS ■ Reporter
Display Advertising Manager
Circulation Manager
Editor

The widespread epidemic of teacher-proof programmed materials has finally met with an educational cure which ABLE teachers are administering in full dosages.

Life forms are ***returning*** *to full effectiveness.* Test curves reveal student apathy is disappearing from the acadedemic scene.

EXTRA! EXTRA!

This new medico-educational breakthrough focusses upon a few occupations found in the field of journalism.

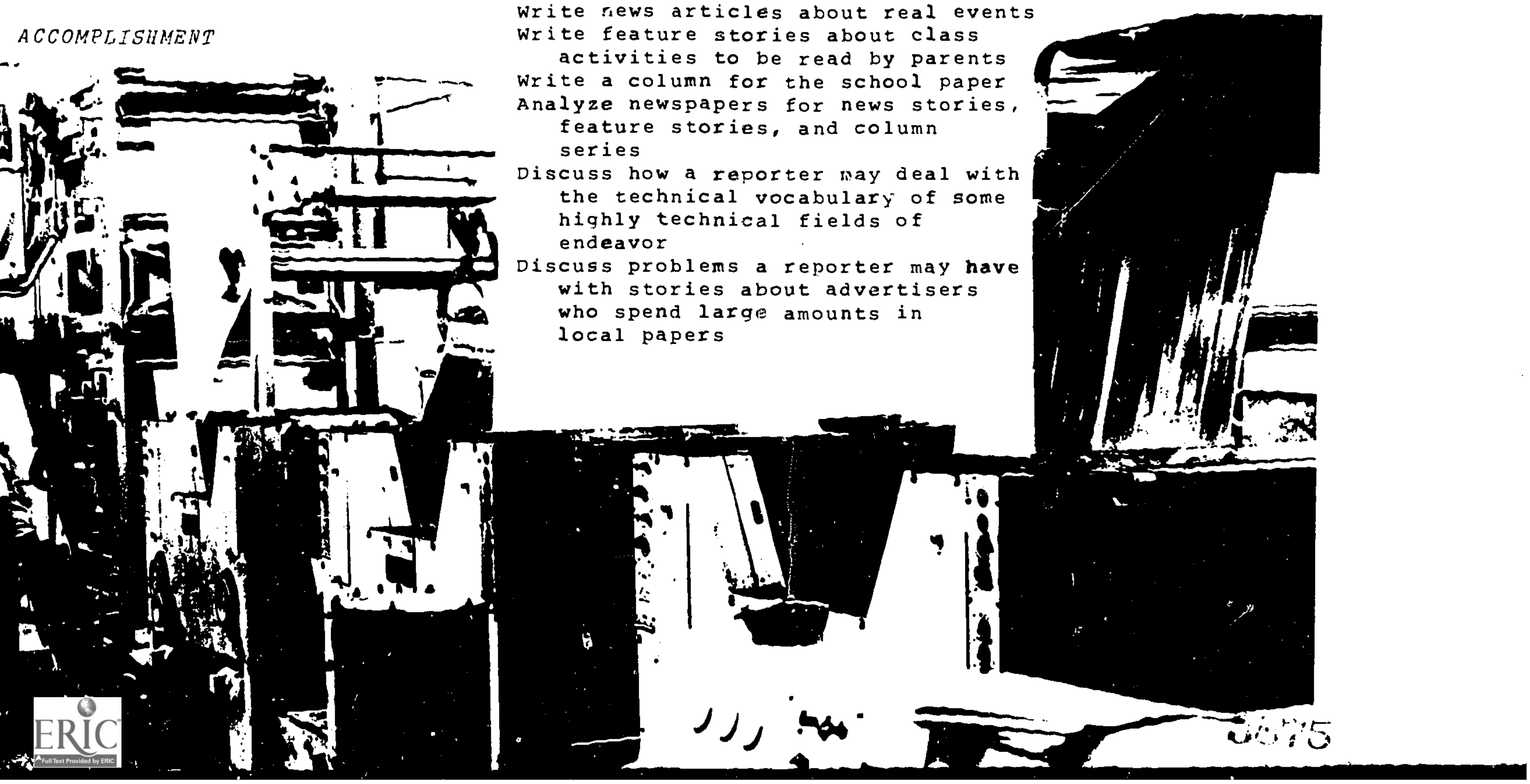
In this approach, the *authentic* members of a newspaper staff serve as a clinical team to assist the teacher in classroom operations. Teaching vitality is returning.

In addition, the newspaper staff carries with them *visible* medication in the forms of *history, relationships, language, and technology.*

The ailing classroom appears to be responding well to these journalism occupations.

Further details are explained in the following supplement.

ACCESSIBILITY	Reporter Photographer Newspapers Library materials (including films, filmstrips, tapes, etc.)
MOBILITY	Types of reporting (news, feature stories, and columns) Photography as a means of reporting Written communication skills Verbal communication skills, especially interviewing techniques Relationship of reporter to editor Relationship of reporter to "news makers" (those interviewed as well as to public)
ACCOMPLISHMENT	Discuss advantages and disadvantages in writing a story as opposed to showing a picture Roleplay reporter working with an editor Roleplay reporter interviewing a witness (to a robbery, to a fire, etc.) Write news articles about real events Write feature stories about class activities to be read by parents Write a column for the school paper Analyze newspapers for news stories, feature stories, and column series Discuss how a reporter may deal with the technical vocabulary of some highly technical fields of endeavor Discuss problems a reporter may have with stories about advertisers who spend large amounts in local papers



ACCESSIBILITY

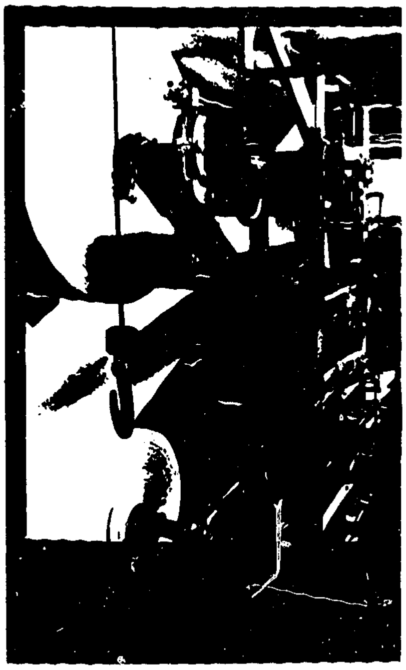
Display advertising manager
Typographer
Merchant
Newspaper
Library materials

MOBILITY

Relationships within the advertising departments
Types of advertising (business, political, public service)
Sources of advertising
Contributions of advertising to the life of newspapers
National, regional, and local advertising accounts
Terminology (space, page, position)
Technology (mats)
History of equipment used for advertising purposes

ACCOMPLISHMENT

Display terminology of advertising staff and sample ads on bulletin boards
List words often used in ads and discuss denotations and connotations
List products often advertised and those rarely advertised
Analyze slogans used in advertising
Evaluate advertisements for content, esthetics, and potential impact
Illustrate difference between the early American presses and modern presses (in regard to advertising)
Write reports on old and new advertising techniques
Originate ads for selected products
Roleplay selling advertising space to cooperating merchant



ACCESSIBILITY

Circulation manager
Paper boy
Truck driver
Newspaper distribution agency
Route forms
Library materials

MOBILITY

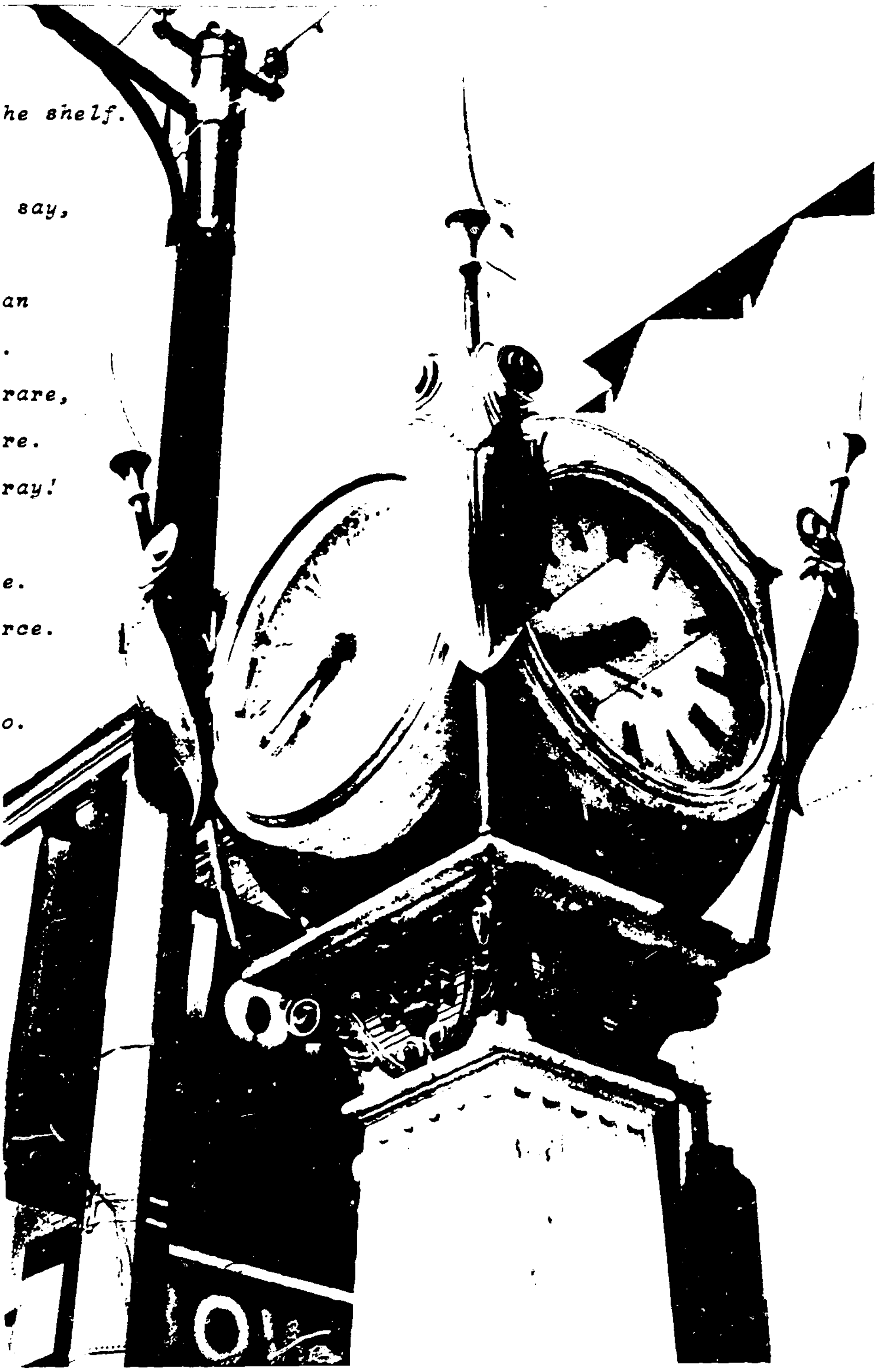
History of the circulation of news throughout community (town crier to modern newspaper delivery methods)
Transactions of money in wholesale and retail operations
Opportunities for small business activities
Terminology
Technology (transportation, record-keeping)
Relationships (manager, paper boy, customers)
Mathematics (time, size, weight, volume, computation of monies)

ACCOMPLISHMENT

Chart illustrating circulation of newspapers in local community
Chart illustrating transportation and handling of city newspaper to suburban and rural areas
Discuss reasons for international, national, and local newspapers
Roleplay circulation manager hiring a paper boy
Write reports (and give dramatizations) on how people received the news before newspapers
Compute a paper boy's earnings in relation to number of customers
Discuss new ideas for acquiring new customers for the neighborhood newspaper

ACCESSIBILITY	Editor Newspaper plant Newspapers Library materials
MOBILITY	Relationship of editor to newspaper staff Ways in which editing is done Sources for editorial viewpoints Public interest in editor's work (letters to the editor) Concept of timing and events Technology Language skills (reading comprehension, hidden meanings)
ACCOMPLISHMENT	Roleplay editor directing his staff Write an editorial page for the school newspaper Write letters to the editor of the local newspaper Edit news stories as published in community newspapers Compare editorials written in one newspaper to those written in another newspaper (about the same subjects, if possible) Discuss reasons why one editor might hold a different viewpoint than another editor Discuss reasons why an editor has certain viewpoints and why he often develops a "professional" editorial viewpoint other than his personal beliefs

THE JEWELRY STORE ■ OCCUPATIONS ■ Watch Salesman
Diamond Salesman
Jewelry Repairman
Manager



"Tick, tick, tick" from the clock on the shelf.
Ready for teaching? Prepare yourself.
How many times have you heard children say,
"What are we going to study today?"
Time is a wink. Let's catch what we can
by studies surrounding the jeweler man.
Concepts of time, jewels precious and rare,
take on a new light if handled with care.
Water clocks, hourglasses - what an array!
History, technology - all on display.
Reading and writing, science, of course.
Enough solid content with plenty of force.
Take an idea and follow it through.
Your ABLE children will know what to do.

ACCESSIBILITY	Watch salesman Watches and clocks Jewelry store Library materials (including films, filmstrips, tapes, etc.)
MOBILITY	Watchmaking (past and present) The concept of time Technology (tools, watch parts) Different types of watches (skindiver, stop watch) Terminology Mathematics (computation of hours, minutes and seconds in "x" amount of time) Maintenance of watches Sales of watches and other timepieces
ACCOMPLISHMENT	Reports describing the development of the concept of time Set up bulletin board illustrating the development of watches Construct models of ancient time keepers (hour glass, sun dial) Reports describing different watches and their uses in contemporary society Design watch faces and bands Roleplay watch repairman and customer Cut out magazine advertisements and compare prices and styles of timepieces

ACCESSIBILITY

Diamond salesman
Jewelry store
Pamphlets from jewelry store
Library materials

MOBILITY

Customer relations
Technology of diamond setter
Fashion, diamond cuts and sales of diamonds for non-industrial uses
Industrial uses of diamonds
Sources of diamonds
Methods used in processing and transporting diamonds
Synthetic diamonds
Custom regulations on importing and exporting of diamonds

ACCOMPLISHMENT

Roleplay diamond salesman and perspective diamond buyer
Describe the tools used by a diamond setter
Chart describing the qualities of a diamond
Cut out pictures from magazines depicting different diamond settings
Compute point value of diamonds
Construct product maps
Reports describing industrial use of diamonds
Charts illustrating industrial uses of diamonds
Charts illustrating processing and transporting of diamonds
Reports describing the process of producing imitation diamonds
Roleplay customs inspector and tourist

ACCESSIBILITY	Jewelry repairman Jewelry store Jewelry Library materials
MOBILITY	Technology Mathematics (computation of cost) Different types of jewelry (necklace, pin, etc.) Terminology Difference of fine quality jewelry and reproductions Processes used in obtaining precious gems Precious metals, gems and pearls (processes to obtain and cultural values) Customer relations Care of fine jewelry
ACCOMPLISHMENT	Roleplay jewelry repairman and customer Compute cost to repair an article of jewelry Articles describing skills of jewelry repairman for class newspaper Chart illustrating tools Collect pictures from magazines showing different types of jewelry for men and women Describe the different types of precious gems, pearls, and metals in oral and written reports Construct product maps Reports describing transportation methods used in shipping gems and precious metals List other uses for precious metals other than for jewelry Estimate values of items of jewelry

ACCESSIBILITY	Manager Jewelry store Sales receipts Repair tickets Library materials
MOBILITY	Services offered to community (engraving, diamond sales, appraisal, bridal registry) Customer relations Financial aspects (overhead, profit) Luxury tax Different types of jewelry sold History (jewelry of the past) Contemporary jewelry fashions
ACCOMPLISHMENT	Roleplay storeowner and customer Construct model jewelry store and carry on normal procedures (receipts, pick up cards) Compute cost of an item of jewelry, including taxes Charts showing the different types of jewelry Reports describing the uses and styles of jewelry in different eras of history Display different types of jewelry (costume, heirlooms, fine jewelry, contemporary) Create pieces of jewelry Make booklets describing the jewelry used by different ethnic groups (Indians, Eskimos)

■

THE GREENHOUSE ■	OCCUPATIONS ■	Clerk
		Floral designer
		Grower

SAY IT WITH FLOWERS!

So many times in our lives we have given flowers to express such sentiments as joy, happiness, sorrow, love. We have used them to make social events more festive. Often we call a florist in the morning and expect to have flowers delivered in the afternoon. Have we ever stopped to think of the people, the time, the effort involved from the day the seed is planted until the moment the delivery man rings our doorbell?

The florist, as *an organizing center,* can be the means of having children learn to appreciate what goes on behind the scenes. This study of the *person-in-the-occupation* can set the stage for introducing them to social amenities of friendship, an area that may be forgotten in our increasingly technological world.

An imaginative *ABLE* teacher could use this topic as a springboard for going into the study of ecology as well as for developing interest in plant life. When one uses *a life-centered approach* to teaching, there are few limits to the possibilities available.

ACCESSIBILITY

Clerk
Florist shop
Library materials (including films, filmstrips, tapes, etc.)

MOBILITY

Customer-clerk relations
Mathematical skills (money changing)
Holidays
Economics
Delivery methods
Geography

ACCOMPLISHMENT

Involve parents in discussion and write about how much of one's income should be spent on flowers
Roleplay clerk and customer ordering flowers
Figure out money exchanges
Figure out quantities of floral arrangements for a wedding or other social gathering
Make a chart showing cost of a variety of floral arrangements
Write a report on the floral needs of the community
Make a display of the kinds of flowers most in demand in the community
Hold a panel on the problems of a florist
Report on the risks involved in being a florist
List the occasions on which people send flowers
Have a play to illustrate holidays and the flowers associated with them
Describe the transportation used to insure fresh merchandise

ACCESSIBILITY

Designer
Designer school
Florist
Library materials
Posters
Songs

MOBILITY

Artistic skill
Appreciation of art (use of colors, shapes)
Letter writing
Poetry
Music
Sense-awareness (sight, smell, touch)
Cultural traditions

ACCOMPLISHMENT

Cut out and display magazine pictures of floral arrangements
Make and display arrangements for holidays
Write letters to a designer school for information on kinds of arrangements
List materials needed by a floral designer
Report on ways of keeping flowers fresh
Draw pictures of floral arrangements
Pantomine sentiments expressed by giving flowers
Study symbolism of various flowers
Sing songs about flowers
Write poetry about flowers
Use real flowers as catalysts to expressions about sense awareness
Save money to send flowers for Mother's Day

ACCESSIBILITY	Grower Greenhouse Library materials Posters Catalogues of supply houses
MOBILITY	Botany Chemistry (soil analysis and temperature control) Vocabulary development Agriculture Ecology
ACCOMPLISHMENT	Report on work hours and duties required of a grower Plant seeds and bulbs Make a bulletin board showing kinds of soil Report on importance of temperature control Make a chart showing parts of a flower Report on the care of a plant from seed to full bloom Describe methods of killing bugs Describe methods of fertilization Make a picture file showing conditions necessary for growth of plants Make a map to show where the most common flowers grow Interview parents re: Why aren't there many commercials on flowers? Describe how plant leaf looks under microscope

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THE RESTAURANT ■ OCCUPATIONS ■ Manager

Chef

Hostess

Waiter/waitress

"Let's eat out tonight." How many times have you heard a member of your family make that statement? Sometimes we forget how much we are away from home cooking and how often we rely upon restaurants.

Using the restaurant as *an organizing center* encompasses many avenues of correlated learning areas. For example, a teacher may explore the idea of manners or the art of relating to other people. Health, science, and mathematical skills also come to mind. Still others may say, *"Ah, here's where we eat our way through Social Studies."*

Breaking bread together has been a time-honored custom. The more we relate school studies to fundamental human activities, the closer we are to using the built-in motivation of life-centered content.

ACCESSIBILITY	Manager School cafeteria Restaurant Library materials (including film, film strips, tapes, etc.)
MOBILITY	Mathematics (income, expenditures, tallying costs) Employer-employee relations Customer relations Letter writing skills Conversational skills Vocabulary skills Government licensing
ACCOMPLISHMENT	Interview parents about how they use restaurants and share findings Interview manager for newspaper article Roleplay ordering supplies, hiring personnel Construct a model restaurant Visit a restaurant for lunch Visit school cafeteria and compare operations with outside restaurant Write reports using technical vocabulary Report on franchising Report on trade related to holidays, seasons, birthdays, etc. Discuss locations for restaurant Detail community services needed for enterprise (water, garbage disposal, power)

CHEF

ACCESSIBILITY	Chef Chef's utensils Library materials Kitchen
MOBILITY	Health (cleanliness) Science (chemistry) Mathematics (measurement) Vocabulary skills Writing skills (abbreviations) Judgment, logic, sequence Cooking skills Ethnic customs Geography
ACCOMPLISHMENT	Construct model kitchen Prepare various dishes (mixture proportions, size of portion) Make a booklet of menus (appearance of foods, serving order) Roleplay chef discussing operations of week's business (profit, labor) Construct bulletin board of duties of kitchen help Report about work in the kitchen area as it affects human feelings Write to chef schools for information Interview parents and other adults for recipes Report on ethnic customs Map work involving foods around the world

ACCESSIBILITY

Hostess
Restaurant
Menus
Library materials

MOBILITY

Conversational skills
Vocabulary development
Mathematical skills
Personal grooming
Public relations

ACCOMPLISHMENT

Roleplay hostess seating people, handling complaints, ringing up check
Write thank you letters
Report on daily schedules
Construct a model restaurant with emphasis on hospitality
Contrast drive-in restaurant business with sit-down dinner atmosphere
Interview adults about their favorite eating places and share findings
Arrange school cafeteria as a social environment (flowers, music, helpers)

ACCESSIBILITY	Waiter/waitress Restaurant Library materials
MOBILITY	Vocabulary development Communication skills, especially listening and writing Mathematical skills Interviewing techniques Table manners
ACCOMPLISHMENT	Set up proper place settings Roleplay taking orders, serving food in classroom Write out orders Tally total price of meals Bulletin board display of various orders Act as a waiter/waitress in school cafeteria Interview health inspector for information about health habits Cut out table arrangements from magazines Make centerpieces for dining tables for use at home Exhibit table settings in school cafeteria

THE SCHOOL ■ OCCUPATIONS ■

Teacher
Principal
Nurse
Secretary
Custodian
Cook
Social Worker
Counselor

MINI-UNIT I: *SCHOOL AS A WORK COMMUNITY*

This study can be helpful in three ways:

1. Students will see the school as a small community. They will study the occupations which contribute to the successful operation of this small community.
2. Students will meet the "World of Work" first hand.
3. By learning more about the various persons-in-the-occupations, students will be able to discuss the interrelatedness of their roles in the school community.

School unity can be developed through better understanding of occupational roles.

The school is a fertile place to start in an initial exploration of the "World of Work" because all of the resource personnel are close at hand. Teachers could devote as much time as they deemed necessary to this study without having to make elaborate long range plans.

The term mini-unit means exactly what the name implies, a rather small-unit which can be covered in a relatively short time. The mini-unit concept has been incorporated into the study of the school because the school is sort of a mini-society or a microcosm.

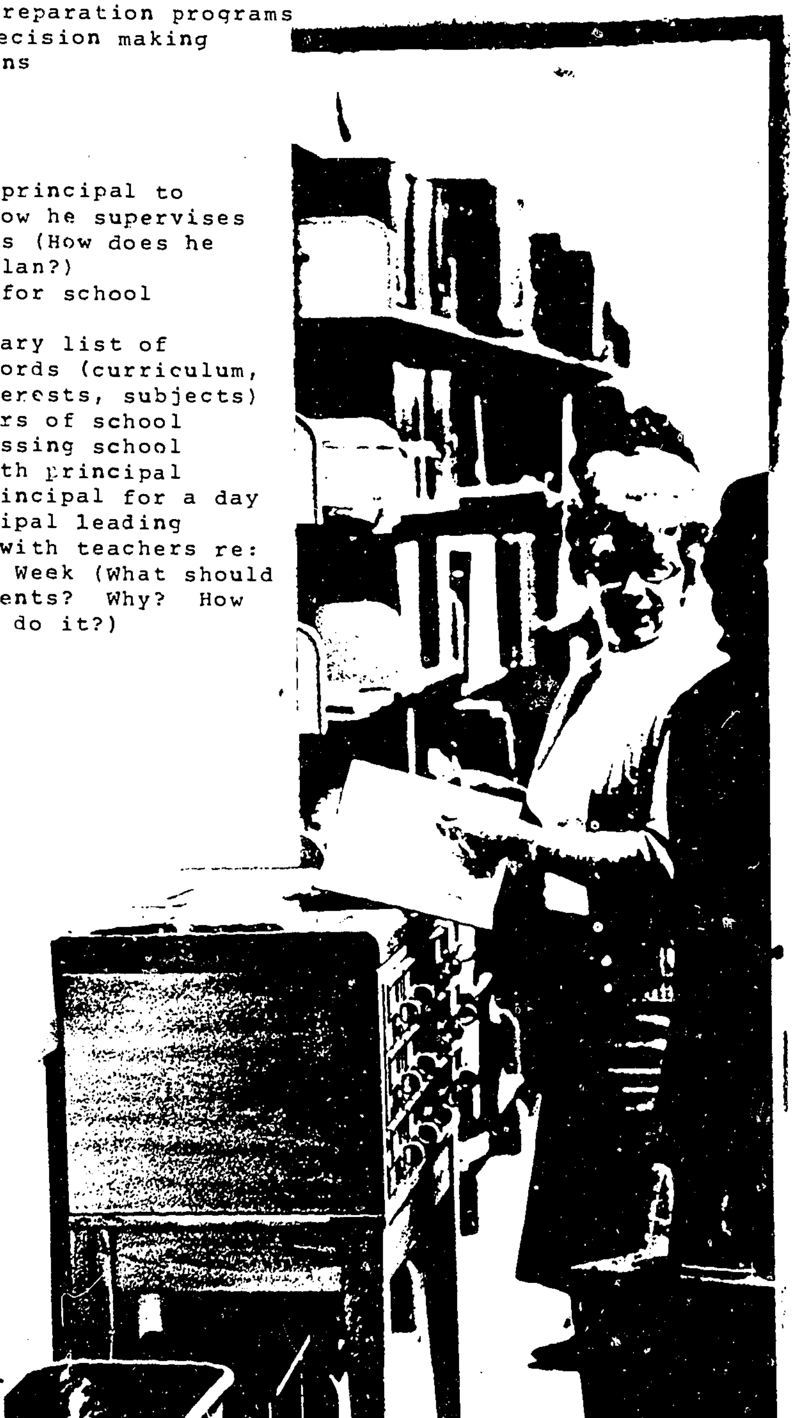
What is the value of the mini-unit?

1. A teacher (or student teacher) can present a complete *ABLE-style* unit in a short amount of time.
2. The mini-unit will provide a dynamic demonstration of the *ABLE* concept, *"Take an idea and see where it leads you"*. The mini-unit provides an organizing center that is near, alive, and full of worthwhile content.

ACCESSIBILITY	Teacher School
MOBILITY	Teaching as an occupation School as a socializing institution Learning Management
ACCOMPLISHMENT	Make a bulletin board showing the work of the teacher Discuss the freedom of the teacher to make decisions Discuss how a teacher influences children Write a news article about a current project in the school Roleplay teacher starting a group to work; explaining work to a student who doesn't understand; talking to principal; talking to parents

PRINCIPAL

ACCESSIBILITY	Principal School office
MOBILITY	Role of the school principal as educational leader Professional preparation programs Management - Decision making Public Relations
ACCOMPLISHMENT	Interview the principal to determine how he supervises his teachers (How does he help them plan?) Write article for school newspaper Make a vocabulary list of technical words (curriculum, lesson, interests, subjects) Roleplay members of school board discussing school projects with principal Intern with principal for a day Roleplay principal leading discussion with teachers re: Open School Week (What should we show parents? Why? How can we best do it?)



SCHOOL NURSE

ACCESSIBILITY

School nurse
Nurse's office
Stethoscope
Scale
Audio-meter

MOBILITY

Health
History
Human relationships
Safety
Vocabulary

ACCOMPLISHMENT

Make a chart of class heights, weights, and measurements
Make medical tags
Discuss basic first aid procedures
List common "incidents" when a school nurse is needed
Roleplay nurse and mother discussing health habits of children
Discuss childhood diseases
Exhibit "tools" used by nurse
Review rules of safety to avoid accidents

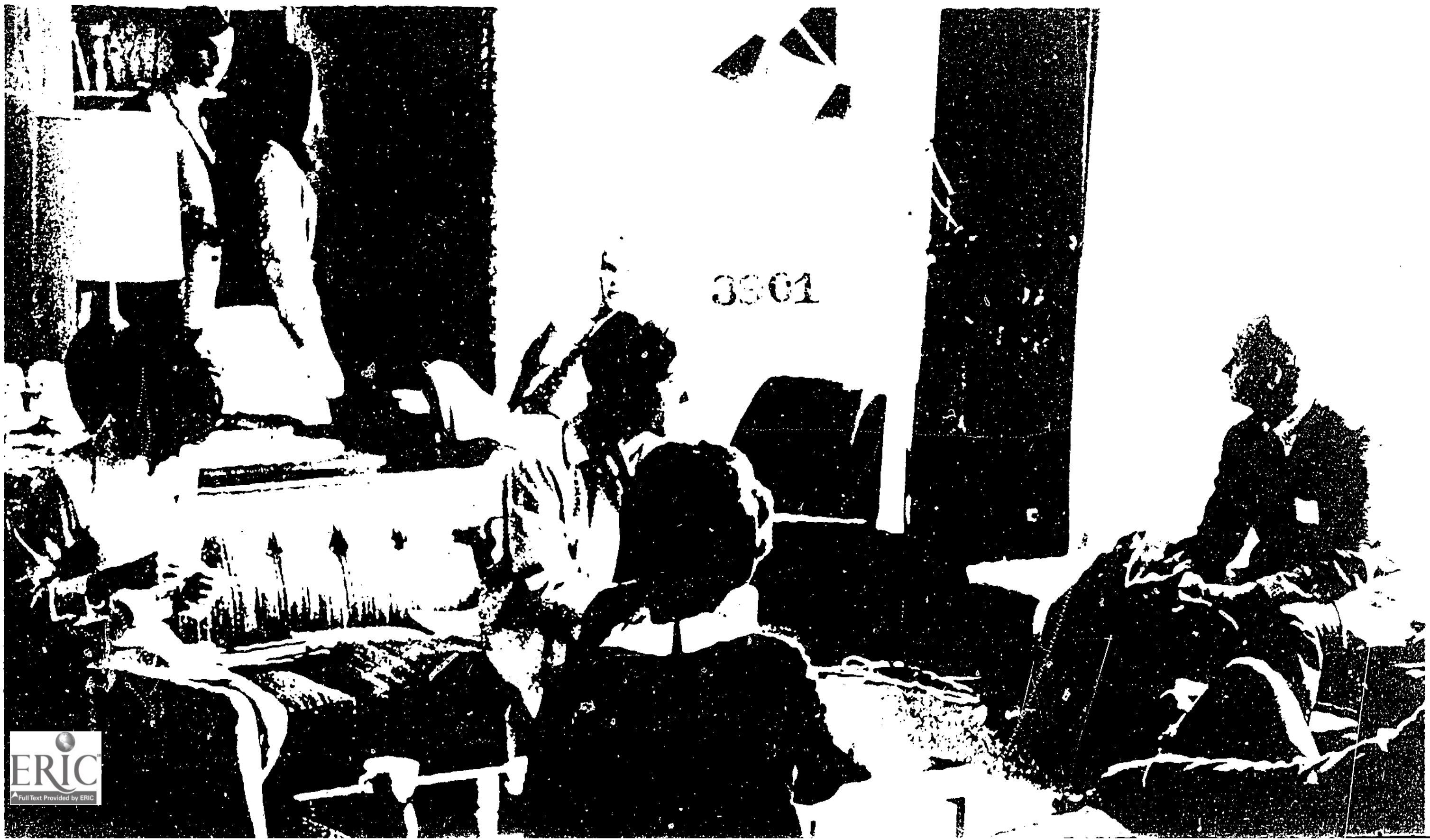
ACCESSIBILITY	School secretary School business office Intercom Typewriter Adding machines Photo copy machine
MOBILITY	Training for secretarial work English Bookkeeping Filing Record keeping Human relations
ACCOMPLISHMENT	Use alphabetizing and filing skills in learning center Record the way they have spent their money or how they used their time Roleplay telephone discussions with parents, newspaper reporters, business people Roleplay face-to-face discussions with teachers, children Write news article about office activities Compare school secretary's work to those working in other businesses

ACCESSIBILITY	Custodian Custodian's workshop School
MOBILITY	Heating, lighting, water services Maintenance of building and grounds Sanitation and waste disposal Human relationships Technology Vocabulary
ACCOMPLISHMENT	Report about the heating systems in school and home Discuss landscaping of school and maintenance of grounds Report how waste is disposed of by the school, by the community Discuss how the custodian relates to school community Write about the people in the community who do business with the custodian List tools and supplies used by the custodian to clean, to repair - make a dictionary to show other classes

ACCESSIBILITY	Cook School cafeteria
MOBILITY	Food preparation for large groups Measurement Geography History Health - standards of cleanliness for kitchen workers Vocabulary development
ACCOMPLISHMENT	Report about a special food from their country of national origin Make up a recipe booklet Prepare selected foods Write article about school cook for class newspaper Make a dictionary of cooking implements (picture for primary grades)

ACCESSIBILITY	Social worker Social worker's office
MOBILITY	School and community services Communication skills History Morals
ACCOMPLISHMENT	Roleplay a meeting of social workers preparing for the school year Write an article about the social worker for the school paper Roleplay the social worker giving a speech to the local Chamber of Commerce

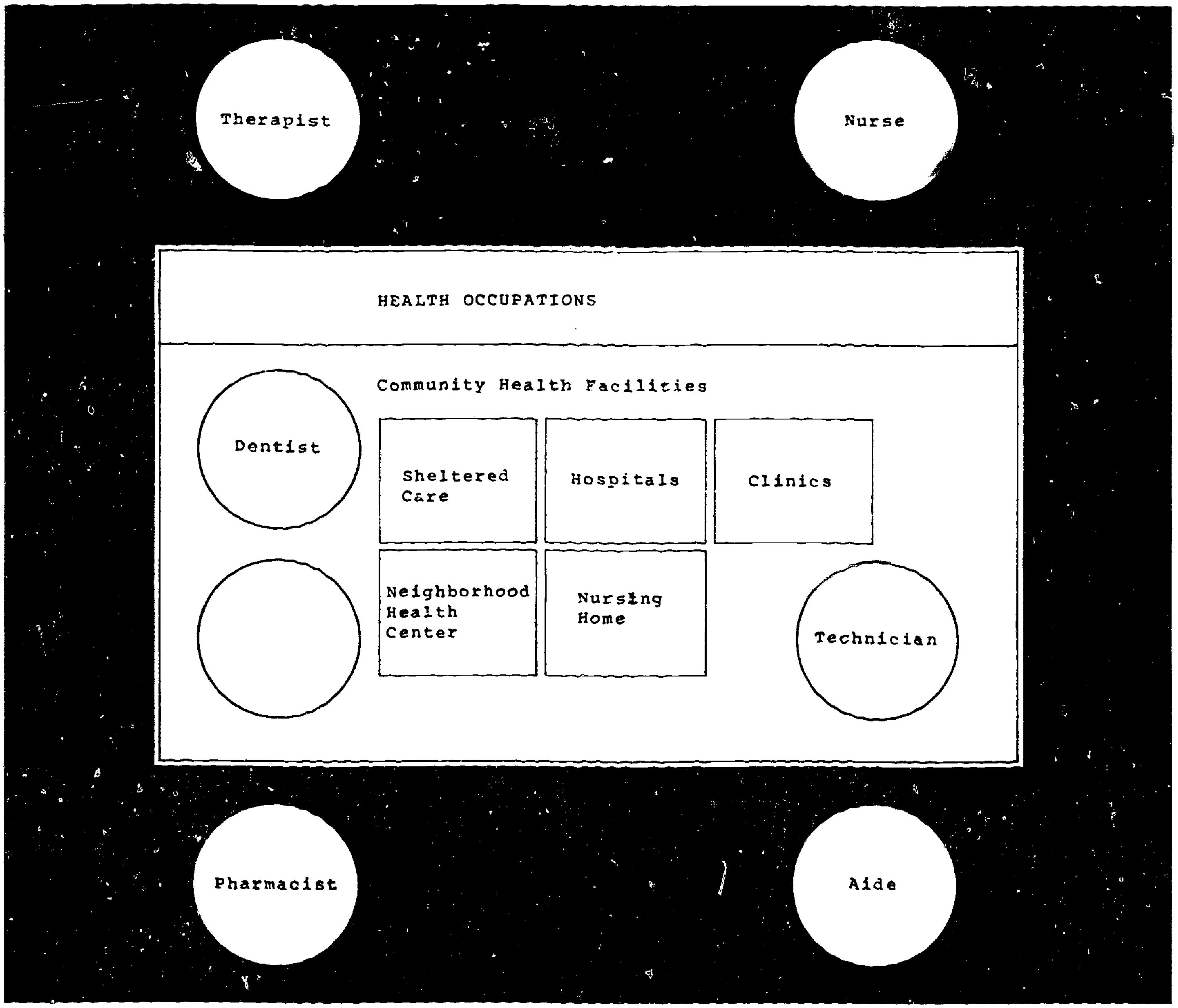
ACCESSIBILITY	Counselor Counselor's office
MOBILITY	Human relationships Psychology Learning Community services
ACCOMPLISHMENT	Discuss roles of helping people in community Discuss differences between the work of a teacher and the work of a counselor Roleplay a meeting between counselor and child Write a news article about the work of the counselor Roleplay a counselor reporting to the school board



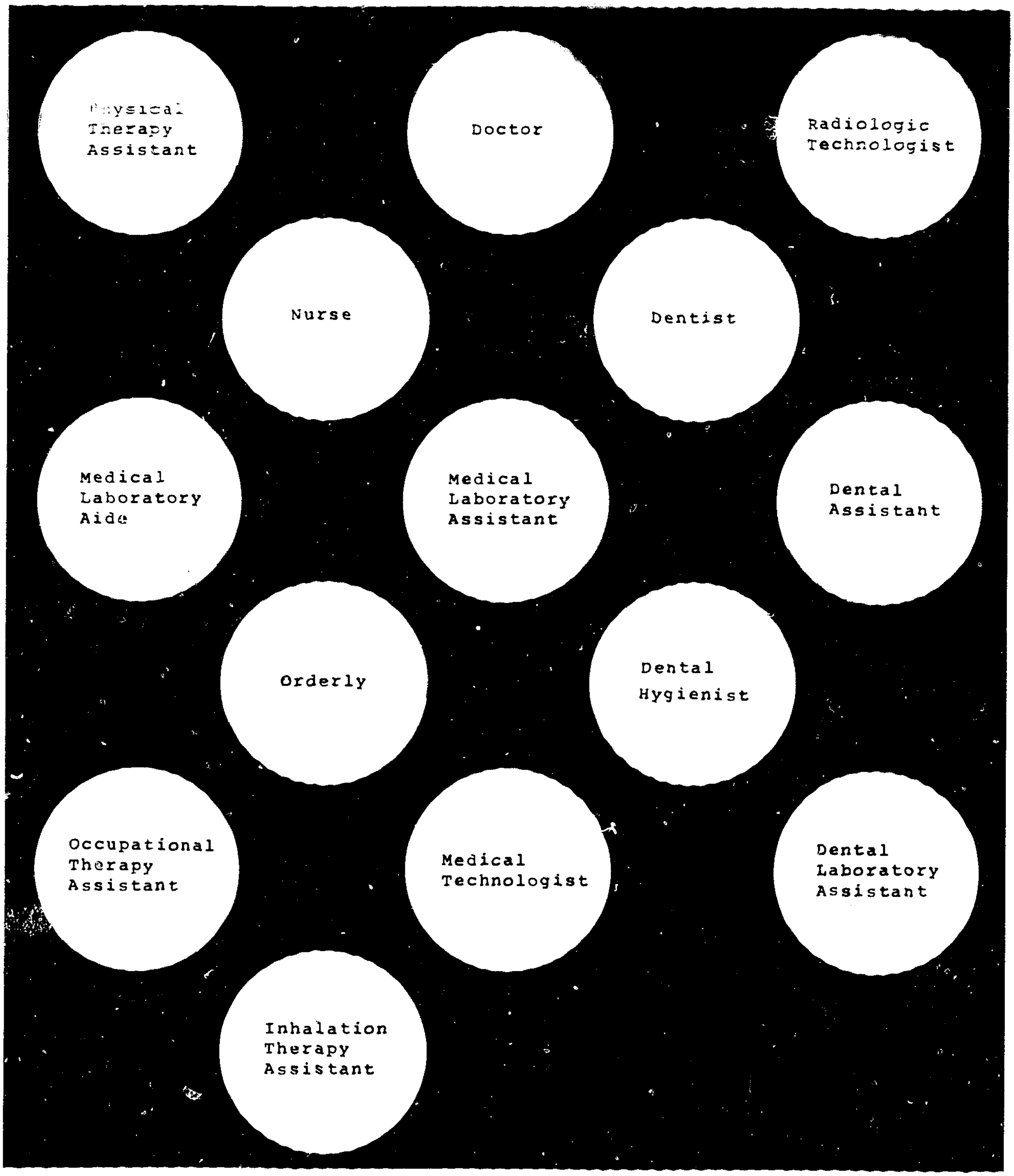
VII

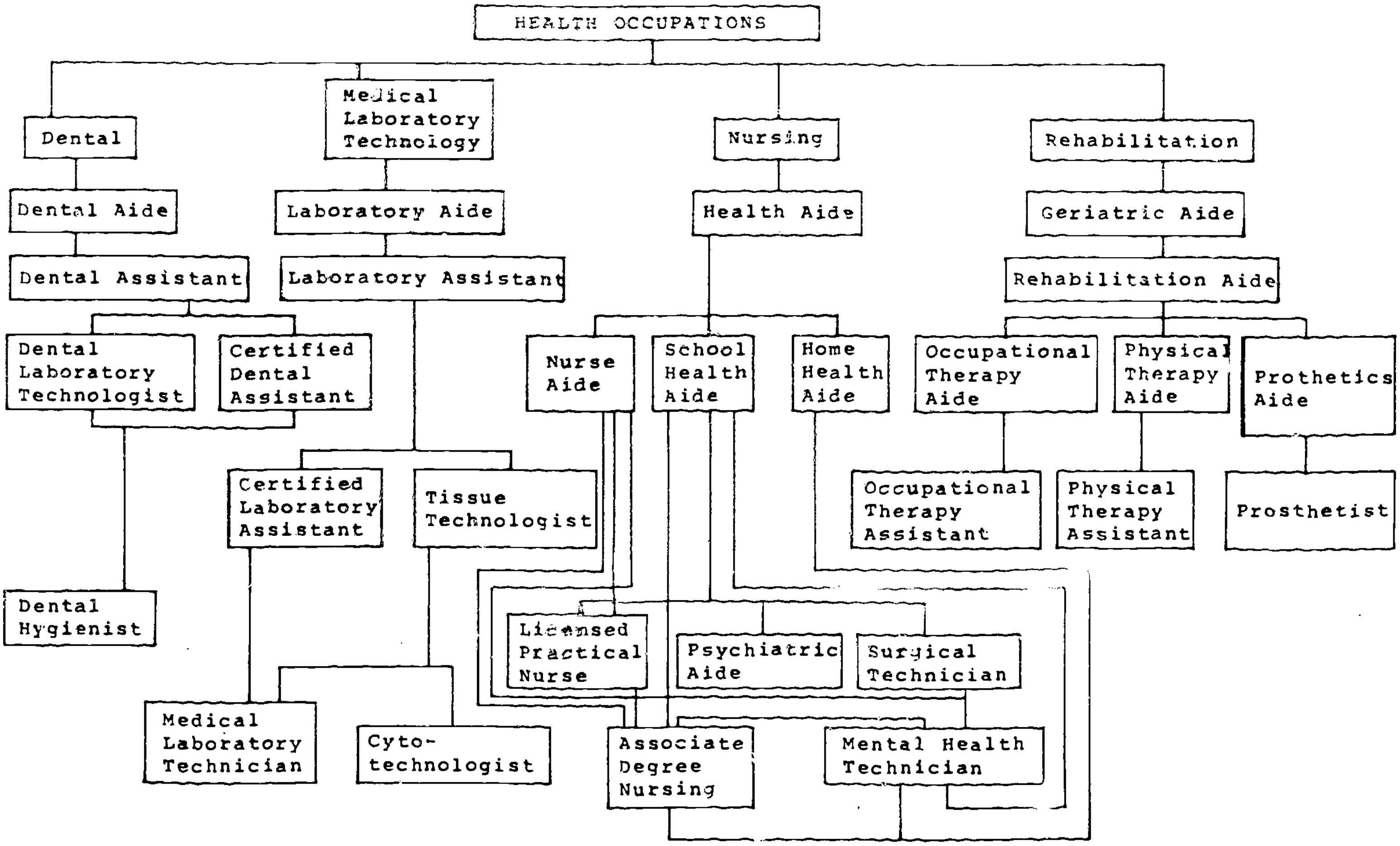
Several teachers have been helped by a quick overview of the occupations available within broad areas.

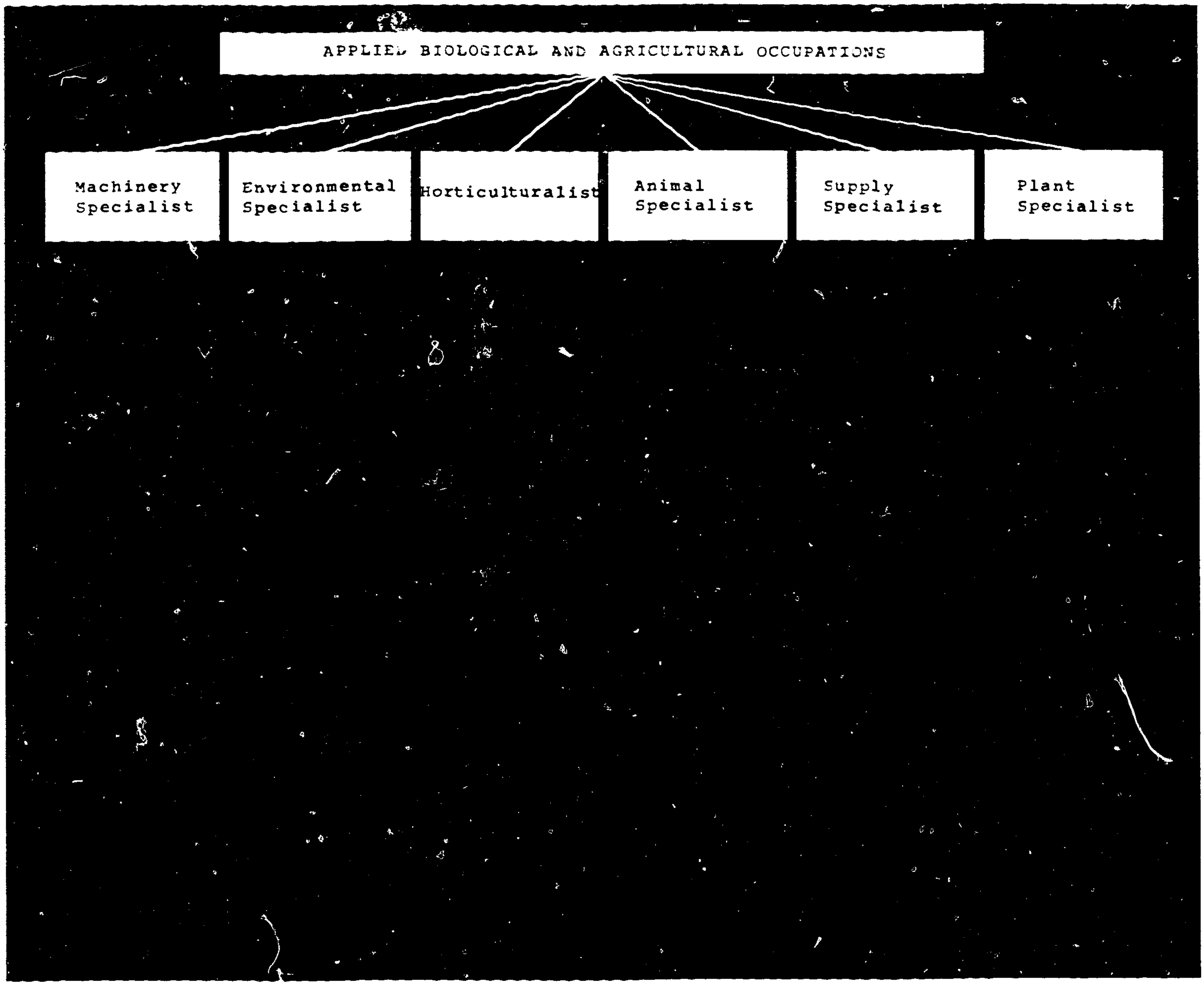
The outlines are not meant as specific guides to instruction, but rather as a quick stimulus to think about what occupations may be accessible to children.

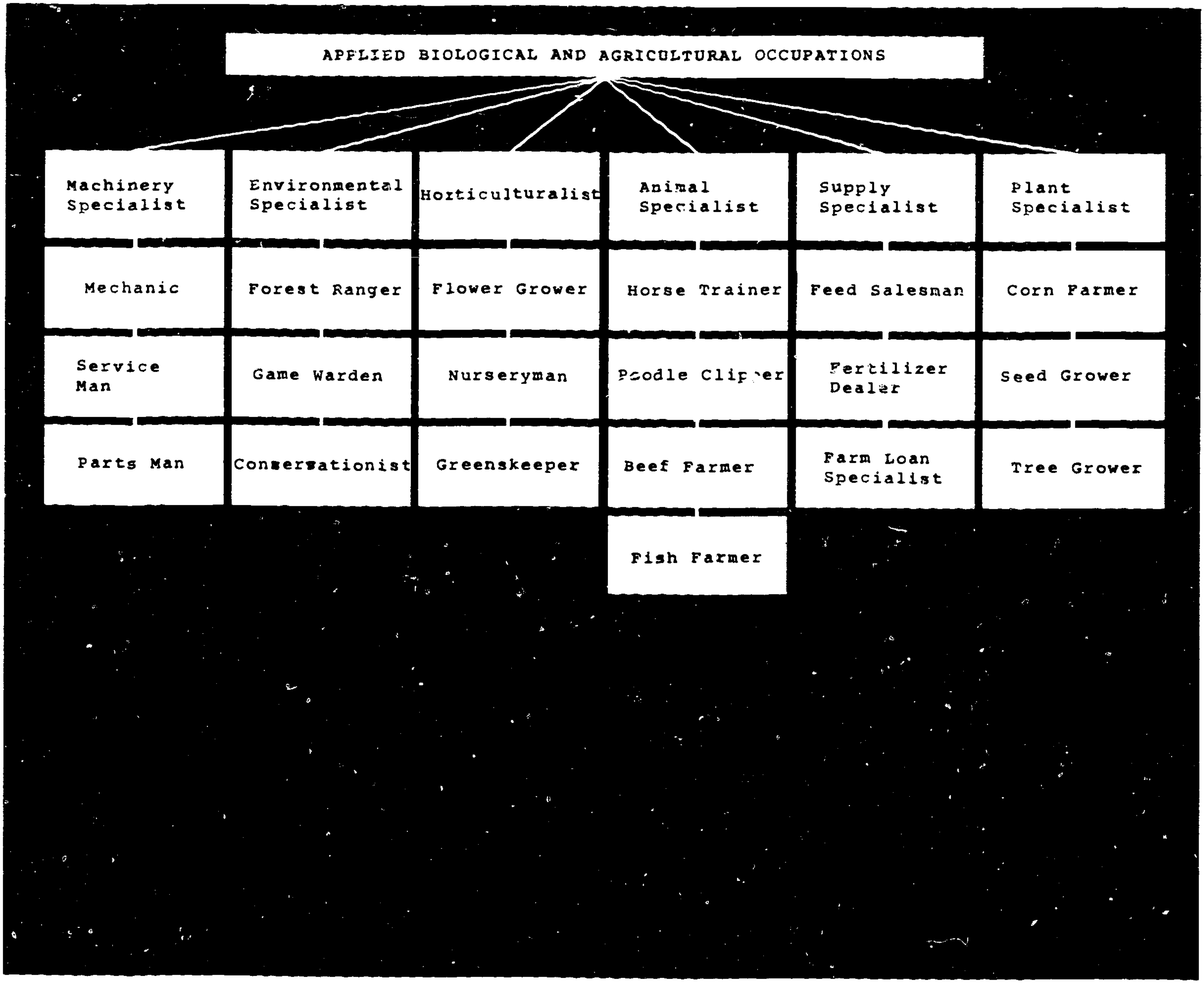

Therapist
Nurse
HEALTH OCCUPATIONS
Community Health Facilities
Dentist
Sheltered Care
Hospitals
Clinics
Neighborhood Health Center
Nursing Home
Technician
Pharmacist
Aide

HEALTH OCCUPATIONS



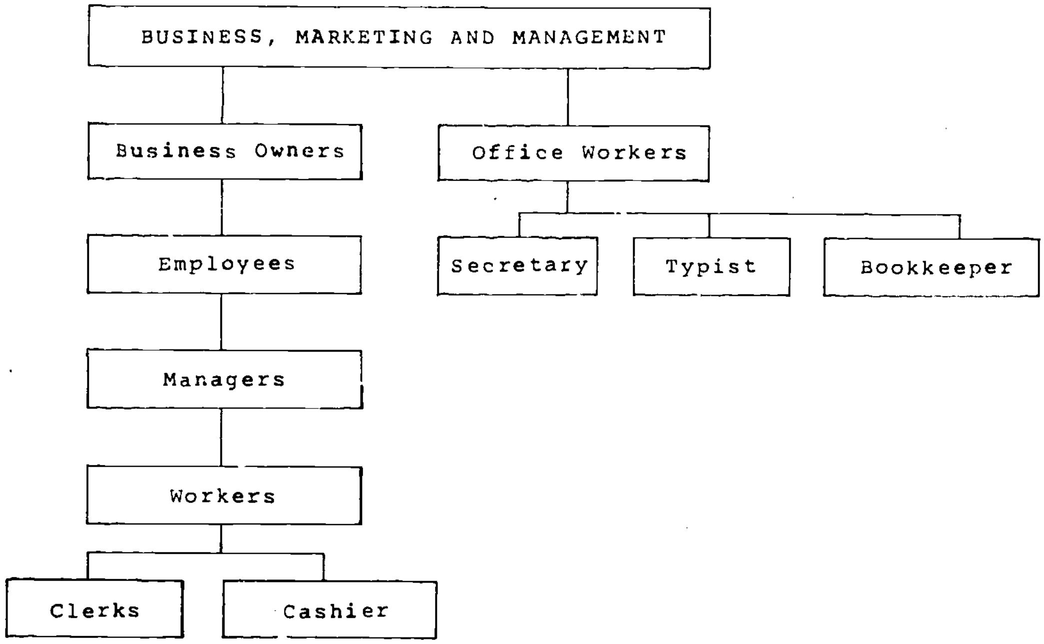

HEALTH OCCUPATIONS
Dental
Medical Laboratory Technology
Nursing
Rehabilitation
Dental Aide
Laboratory Aide
Health Aide
Geriatric Aide
Dental Assistant
Laboratory Assistant
Rehabilitation Aide
Dental Laboratory Technologist
Certified Dental Assistant
Nurse Aide
School Health Aide
Home Health Aide
Occupational Therapy Aide
Physical Therapy Aide
Prothetics Aide
Certified Laboratory Assistant
Tissue Technologist
Occupational Therapy Assistant
Physical Therapy Assistant
Prosthetist
Dental Hygienist
Licensed Practical Nurse
Psychiatric Aide
Surgical Technician
Medical Laboratory Technician
Cyto-technologist
Associate Degree Nursing
Mental Health Technician

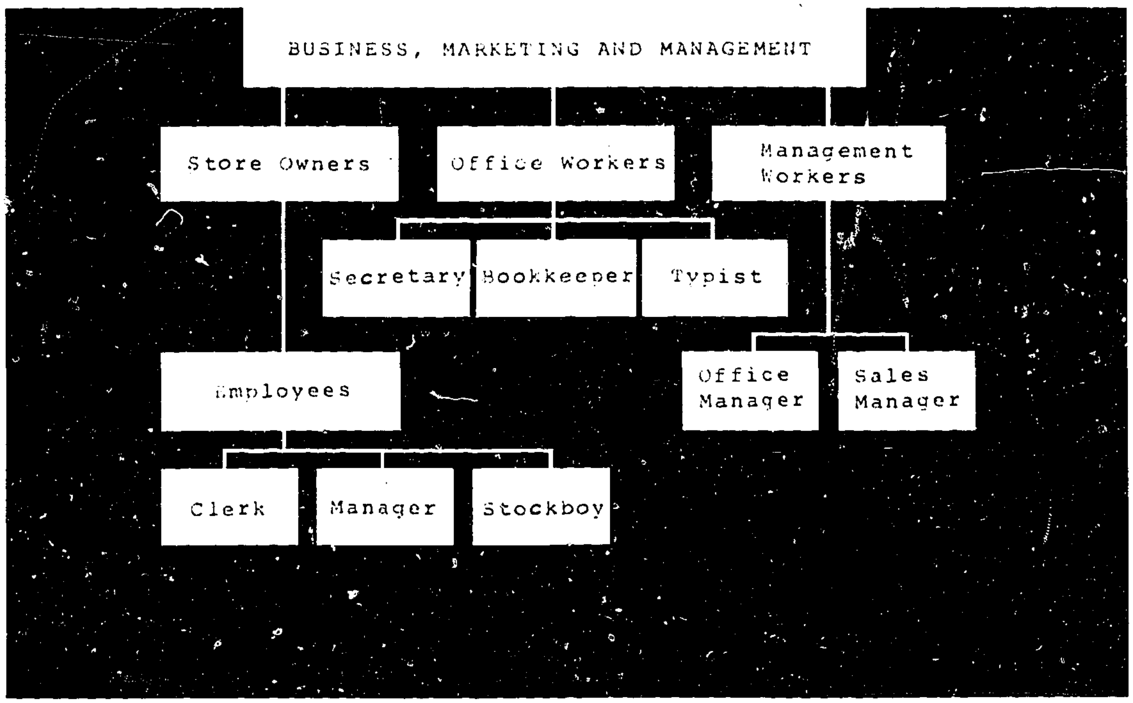

APPLIED BIOLOGICAL AND AGRICULTURAL OCCUPATIONS
Machinery Specialist
Environmental Specialist
Horticulturalist
Animal Specialist
Supply Specialist
Plant Specialist

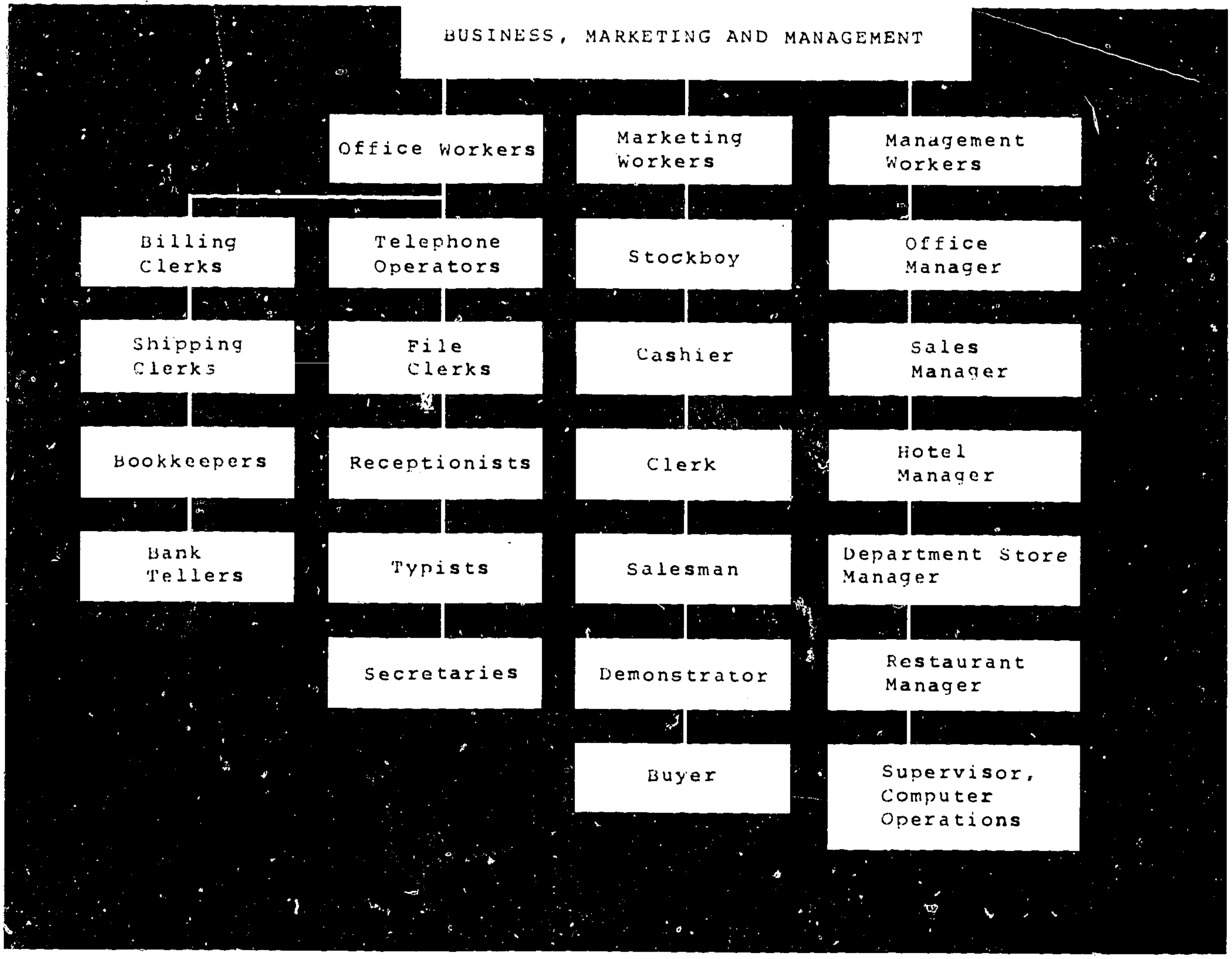

APPLIED BIOLOGICAL AND AGRICULTURAL OCCUPATIONS
Machinery Specialist
Mechanic
Service Man
Parts Man
Environmental Specialist
Forest Ranger
Game Warden
Conservationist
Horticulturalist
Flower Grower
Nurseryman
Greenskeeper
Animal Specialist
Horse Trainer
Poodle Clipper
Beef Farmer
Fish Farmer
Supply Specialist
Feed Salesman
Fertilizer Dealer
Farm Loan Specialist
Plant Specialist
Corn Farmer
Seed Grower
Tree Grower

APPLIED BIOLOGICAL AND AGRICULTURAL OCCUPATIONS

Machinery Specialist	Environmental Specialist	Horticulturalist	Animal Specialist	Supply Specialist	Plant Specialist
Implement Dealer	Recreation Farm Manager	Golf Course Superintendent	Veterinarian	Elevator Operator	Plant Breeder
Supplier Representative	Game Biologist	Florist Shop Owner	Pet Shop Owner	Manager of Cooperative	Crop Farmer
Agricultural Engineer	Pollution Controller	Nursery Owner	Farrier	Aerial Pesticide Applicator	Plant Pathologist
Teacher	Soil Conservationist	Landscape Contractor	Livestock Farmer	Farm Manager & Appraiser	Crop Processor
Equipment Operator	Game Farm Manager	Teacher	Government Inspector	Farm Organization Specialist	State Inspector
Safety Technician	Teacher	Tree Expert	Teacher	Teacher	Teacher
			Meat Processor		Fruit Grower

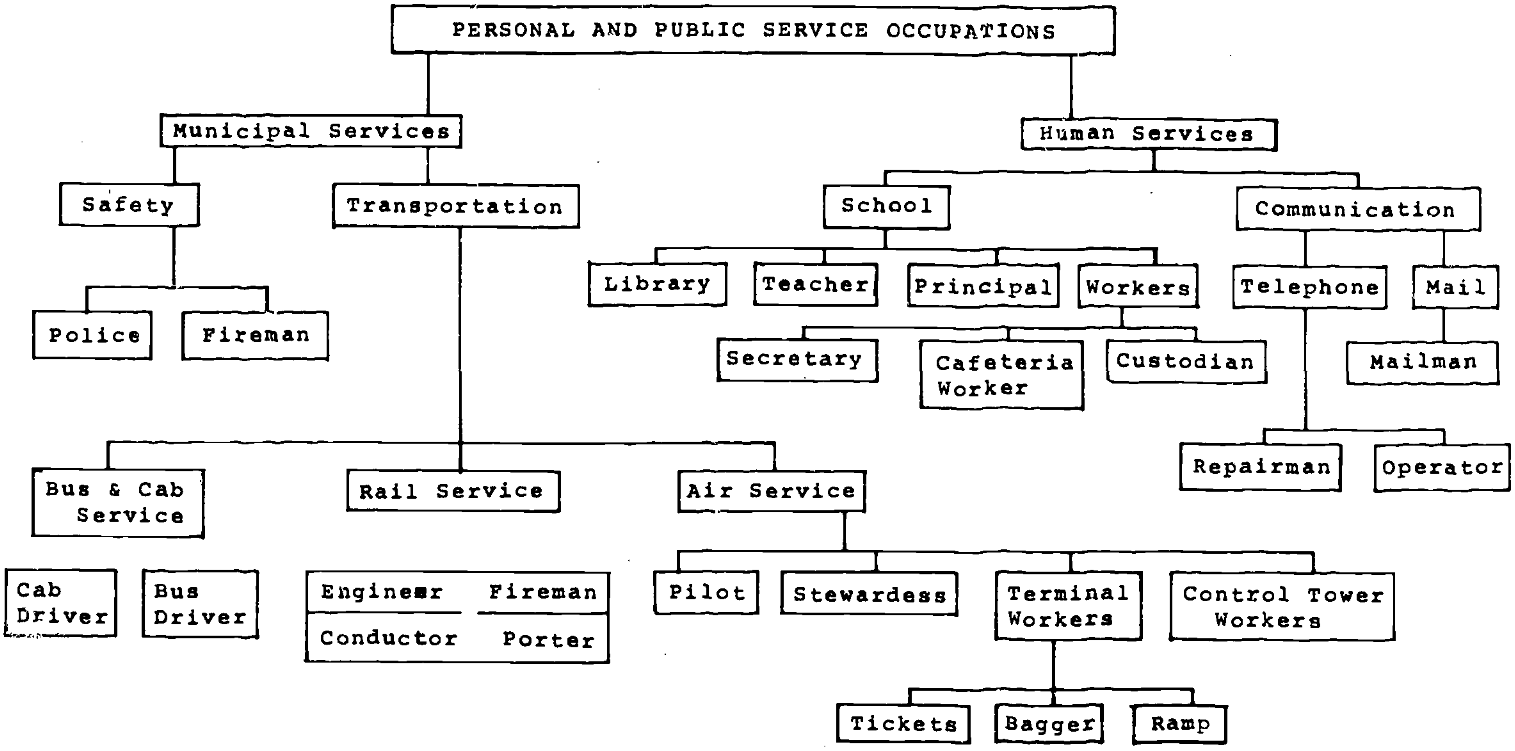

BUSINESS, MARKETING AND MANAGEMENT
Business Owners
Office Workers
Employees
Secretary
Typist
Bookkeeper
Managers
Workers
Clerks
Cashier

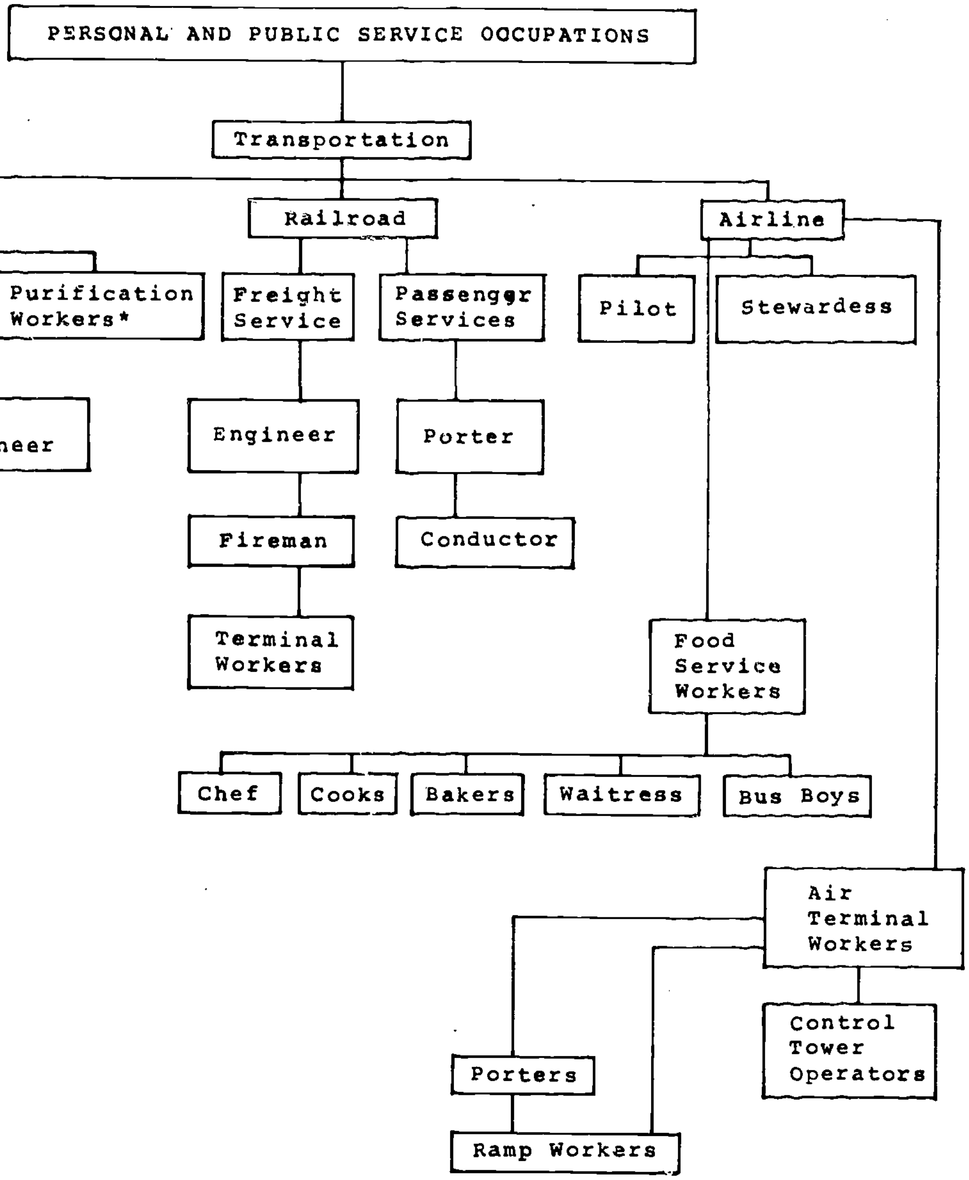

BUSINESS, MARKETING AND MANAGEMENT
Store Owners
Office Workers
Management Workers
Secretary
Bookkeeper
Typist
Employees
Office Manager
Sales Manager
Clerk
Manager
Stockboy



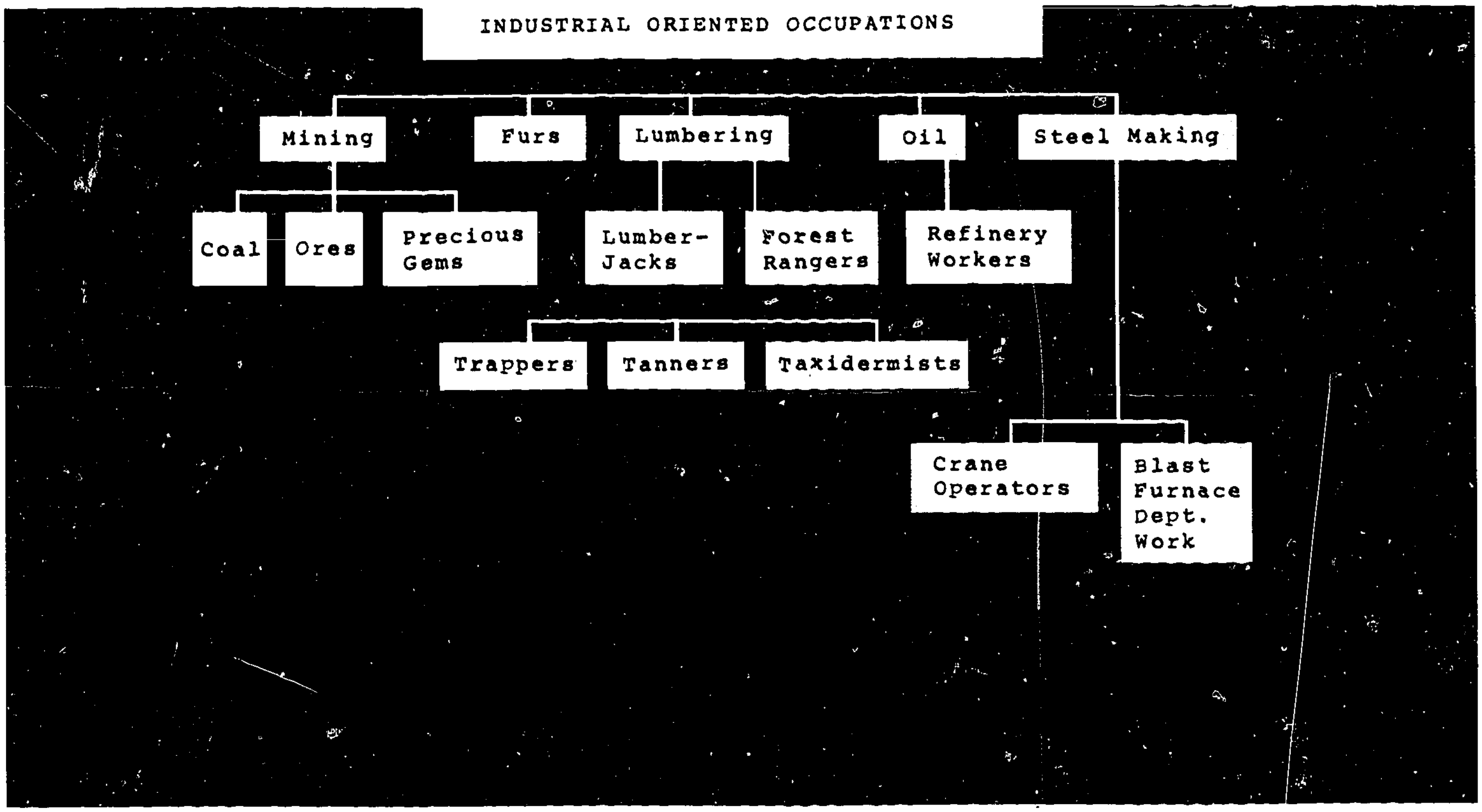
BUSINESS, MARKETING AND MANAGEMENT

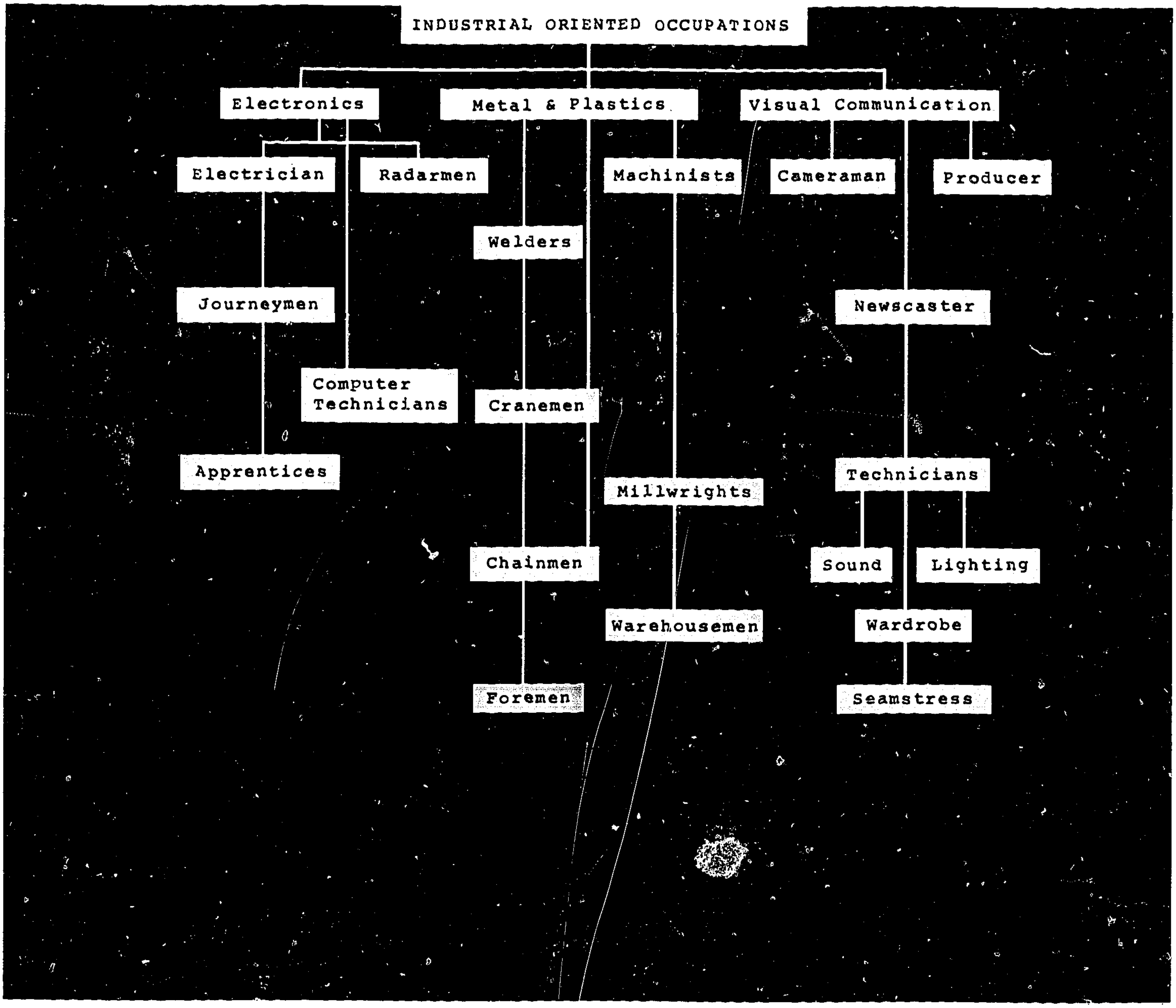
- Office Workers
  - Billing Clerks
  - Shipping Clerks
  - Bookkeepers
  - Bank Tellers
  - Telephone Operators
  - File Clerks
  - Receptionists
  - Typists
  - Secretaries
- Marketing Workers
  - Stockboy
  - Cashier
  - Clerk
  - Salesman
  - Demonstrator
  - Buyer
- Management Workers
  - Office Manager
  - Sales Manager
  - Hotel Manager
  - Department Store Manager
  - Restaurant Manager
  - Supervisor, Computer Operations


PERSONAL AND PUBLIC SERVICE OCCUPATIONS
Municipal Services
Human Services
Safety
Transportation
School
Communication
Police
Fireman
Library
Teacher
Principal
Workers
Telephone
Mail
Secretary
Cafeteria Worker
Custodian
Mailman
Repairman
Operator
Bus & Cab Service
Rail Service
Air Service
Cab Driver
Bus Driver
Engineer
Fireman
Conductor
Porter
Pilot
Stewardess
Terminal Workers
Control Tower Workers
Tickets
Bagger
Ramp



*Water purification workers are a part of municipal services.


INDUSTRIAL ORIENTED OCCUPATIONS
Mining
Furs
Lumbering
Oil
Steel Making
Coal
Ores
Precious Gems
Lumber-Jacks
Forest Rangers
Refinery Workers
Trappers
Tanners
Taxidermists
Crane Operators
Blast Furnace Dept. Work


INDUSTRIAL ORIENTED OCCUPATIONS
Electronics
Metal & Plastics
Visual Communication
Electrician
Radarmen
Machinists
Cameraman
Producer
Welders
Journeymen
Newscaster
Computer Technicians
Cranemen
Apprentices
Millwrights
Technicians
Chainmen
Sound
Lighting
Warehousemen
Wardrobe
Foremen
Seamstress

FOR EASE IN INFORMING STUDENTS ABOUT THE WIDE RANGE OF OCCUPATIONS THEY HAVE BEEN CATEGORIZED INTO FIFTEEN BROAD CLUSTERS. THE LISTING BELOW SHOWS THE SEQUENCE OF ASSIGNED CLUSTERS BY GRADE LEVEL. THE TEACHER IS FREE TO TOUCH ON OTHER CLUSTERS AS WELL.

GRADE LEVEL	ASSIGNED CLUSTER
FIRST	PUBLIC SERVICE, HEALTH OCCUPATIONS
SECOND	AGRI-BUSINESS OCCUPATIONS, CONSUMER HOMEMAKING, AND RELATED OCCUPATIONS
THIRD	HOSPITALITY-RECREATION, PERSONAL SERVICES
FOURTH	MARKETING AND DISTRIBUTION, CONSTRUCTION
FIFTH	COMMUNICATIONS AND MEDIA, TRANSPORTATION
SIXTH	ENVIRONMENTAL CONTROL, MANUFACTURING
SEVENTH*	BUSINESS OFFICE, FINE ARTS AND HUMANITIES, MARINE SCIENCE
EIGHTH & NINTH	INDIVIDUAL REVIEW AND EXPLORATION
TENTH, ELEVENTH & TWELFTH	SPECIFIC TRAINING

*BY THE END OF THE SEVENTH YEAR ALL STUDENTS WILL HAVE HAD MINIMAL EXPOSURE TO ALL CLUSTERS.

THE BOWLING GREEN, KENTUCKY PUBLIC SCHOOLS ARE USING THIS FRAME OF REFERENCE FOR ORGANIZING THE WORLD OF WORK FOR CHILDREN FROM FIRST GRADE THROUGH TWELFTH. THE CLUSTER GROUPINGS ARE DRAWN FROM MATERIAL DISSEMINATED BY THE UNITED STATES OFFICE OF EDUCATION.

VT 016 686
OFFICIAL TRAFFIC SIGNAL MANUAL OF INSTALLATION PRACTICES AND MAINTENANCE PROCEDURES.

INTERNATIONAL MUNICIPAL SIGNAL ASSOCIATION, INC., HOUSTON, TEX.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - ND 122P.

DESCRIPTORS - *MANUALS; *TRAFFIC REGULATIONS; *TRAFFIC CONTROL; SAFETY EDUCATION; *FEDERAL LAWS; *STATE LAWS; PUBLIC POLICY; EQUIPMENT MAINTENANCE

ABSTRACT - THIS TRAFFIC SIGNAL MANUAL WAS DEVELOPED TO PROVIDE INFORMATION ON CURRENTLY OPERATING UNIFORM CONTROL PRACTICES FOR STREETS AND HIGHWAYS IN THE UNITED STATES, TO THOSE PERSONS WHO ARE UNAWARE OF THEIR EXISTENCE. THE TOPICS COVERED ARE: (1) TYPES OF CONTROL, (2) PREVENTIVE MAINTENANCE, (3) EMERGENCY REPAIR, (4) TROUBLE SHOOTING, AND (5) SIGNAL SYSTEMS. AN INTRODUCTION, GLOSSARY OF TERMS, AND INDEX ARE INCLUDED. (SN)

INTERNATIONAL MUNICIPAL SIGNAL ASSOCIATION, INC.

OFFICIAL
TRAFFIC SIGNAL MANUAL

OF
INSTALLATION PRACTICES AND
MAINTENANCE PROCEDURES

International Municipal Signal Association
2712 Southwest Freeway, Suite 118
Houston, Texas 77006
(Area Code 713) 528-0685

INTERNATIONAL MUNICIPAL SIGNAL ASSOCIATION, INC.

Traffic Signal Manual

CONTENTS

INTERNATIONAL MUNICIPAL SIGNAL ASSOCIATION, INC.

TRAFFIC SIGNAL MANUAL

INTRODUCTION

This introduction to the first printing of the manual must explain the official authority, history of actions of the IMSA and concept in the developing of such a work. In 1965 at the Board of Directors meeting in Chicago, it was decided to publish manuals in all areas of the scope of the IMSA. Little was done, however, except collection of material until February of 1969 during an Executive Committee meeting in New York City when it was decided to call a meeting of all traffic signal commercial firms and associated companies and the Educational Committee and the Traffic Signal Committee.

This meeting was held in Nashville, Tennessee in June of 1969 where an outline was drawn to be submitted in sections to various committees to compile and edit all available material for publication.

A rough draft of the manual was compiled by the Educational and Traffic Signal Committees with the assistance of commercial members. A second meeting of the National Traffic Signal Committee with representatives of related manufacturers was held in Baton Rouge, Louisiana in June of 1970 where the rough draft was shown and edited. A third meeting will be held in Houston, Texas, September 21, 1970 to review this first printing before re-printing and making the manual available to membership.

It has been found during the past eight years since the publication of the "Manual on Uniform Control Devices for Streets and Highways", by the U.S. Department of Commerce, Bureau of Public Roads in 1961, that uniformity is not being achieved. The "Traffic Engineering Handbook" third edition published by the Institute of Traffic Engineers in 1965 and other excellent materials are not getting into the hands of everyone responsible for installing traffic devices. The Insurance Institute for Highway Safety in its May 19, 1969 Status Report stated, "sound engineering practices are being ignored, professional "Manuals" are apparently gathering dust, and even common sense is being flagrantly offended". Representative John A. Blatnik (D-Minn.) who heads a special House Subcommittee on the Federal-Aid Highway Program said, "This whole area seems to be a welter of confusion, bordering on chaos.

It is hoped that this Traffic Signal Manual can be placed into the hands of a large percentage of the people who are not presently being reached by other books and manuals on uniformity. If we can publish a work compatable with other manuals and bridge this communications gap, the IMSA which is an educational organization, will have performed a very useful service not only to all who are involved in the public safety services but to the general public as well.

Tom L. Spoonts
Second Vice President, IMSA

SECTION I

Glossary of Terms

Base - A metal fitting that connects a pole to the foundation.

Beacon - A traffic signal designed for flashing operation only.

Cabinet - A dust-proof and weather-proof enclosure for housing the controller and associated equipment.

Cam Shaft - See cam unit.

Cam Unit - The device that receives timing information from the dial unit and rotates to open and close contacts to energize the signal indicators.

Center Line - A line indicating the division of the roadway between traffic moving in opposite directions.

Clearance Interval - The time of display of the signal indication following the right-of-way interval.

Computer - A device that processes information based on a pre-stored program of instruction.

Controller - See Traffic controller.

Controller Module - Normally is a unit that is plug or jack connected to the internal wiring of the controller and associated with a particular phase or function.

Coordination - The establishment of a definite timing relationship between traffic signals.

Cross Walk - A section across a roadway officially marked to indicate a walkway for pedestrians.

Curb - A vertical or sloping member generally along and defining the edge of a roadway.

Cycle - See time cycle.

Data Processing - A method of storing information, either mechanically or electronically, so as to make it available at a later time in a usable form.

Delineator - A light-reflecting device mounted at the side of the roadway, in series with others, to indicate the alignment of the roadway.

Detector - A sensing device used to register the passage or presence of a vehicle or pedestrian.

Detector Amplifier - A device capable of intensifying the electrical energy produced by a detector to a degree sufficient to affect a traffic controller.

Dial Unit - The rotating, calibrated dial mechanism on controller equipped with adjusting pins or keys and contacts to establish and divide the time cycle in percent of cycle length for the required number of intervals. The dial unit may also include pins or keys and contacts to perform interlocking of the dial unit in step with the cam unit and/or pins or keys and contacts to provide offset.

Digital Timing - The technique of adding relatively small and accurate segments of time to total the desired time period.

Disconnect Hanger - A device using a plug and socket means for readily attaching or disconnecting a signal head to a span wire or mast arm.

Drip Loop - A turn of cable at an entrance fitting installed to prevent drops of water from entering the fitting.

Dwell Interval - The period of time in which a controller may stop to resynchronize with a master controller or rest until receipt of a traffic actuation.

Edge Line - A line which indicates the edge of the roadway.

Electro-Mechanical Controller - An electrically operated device using motors, solenoids or relays to perform timing functions to govern traffic signal indications.

Electronic Controller - A device that accomplishes timing functions by other than mechanical means.

Expansible Controller - A controller with the capacity built in to accept additional features later in the field.

Extendible Interval Portion - That portion of time in which a minimum interval may be extended in a traffic actuated controller.

Fixed Time Controller - See pre-timed controller.

Flasher - A device for alternating an electrical circuit on and off.

Flash Switch - A manual switch for placing a controller in flashing operation.

Flash Terminals - Special terminals in a controller so wired that by an interchange of jumpers, flashing operation may be arranged to give either yellow or red on the major or minor street.

Foundation - A poured concrete footing to support a pole.

Gore - The center area immediately past the point where two traffic ways divide at an acute angle; usually where a ramp leaves a roadway.

Grounding - The act of electrically fastening an earth ground to a point in an electrical system.

Initial Interval Portion (minimum green) - The first part of an interval which is timed-out by a traffic actuated controller before the extendible portion of the interval takes place.

Instruction Panel - The face plate of a controller mechanism on which the adjustable controls and their associated indicators are mounted.

Integrated Circuit - A combination of components that are processed at the same time from common materials.

Interconnect - A means of remote controlling some or all of the functions of a traffic signal.

Interval - Any one of the divisions of the time cycle during which signal indications do not change.

Island - An area whthin a roadway in which vehicular traffic is excluded.

Lane Line - A line separating two lanes for traffic moving in the same direction.

Load Relays - Magnetically operated contacts energized from low amperage controller circuits to switch higher amperage signal indication circuits.

Logic Diagram - A block chart showing the inter-relationship of reason functions.

Loop - One or more turns of insulated wire installed to establish a zone of influence to detect the passage of vehicles when used in conjunction with a loop amplifier.

Magnetometer - A detector that produces its own magnetic field of influence which when disturbed by the passage of a vehicle provides a current flow capable of being amplified to register a call to a traffic actuated controller.

Major Street - The roadway approach or approaches at an intersection normally carrying the major volume of vehicular traffic.

Mast Arm - A supporting arm designed to hold a signal head in an extended position.

Maximum Interval (maximum) - A setting on the instruction panel of a controller that cuts off the extendible portion of the interval at the end of a prefixed time,

Median - The portion of a divided highway or street separating the traveled ways for traffic in opposite directions.

Minor Street - The roadway approach or approaches at an intersection normally carrying the minor volume of vehicular traffic.

Occupancy - One or more units of traffic in a given area.

Offset - The percent of the time cycle that the beginning of the major street green interval on a controller differs from a certain instant used as a time reference base.

Optical Unit - An assembly of lens, reflector and light source with supporting parts used to illuminate a single signal indication.

Passage Period - The time allowed for a vehicle to travel at a selected speed from a detector or stop line through a controlled area.

Pedestal - See pole.

Pedestrian Head - An assembly of one or more signal faces attached to one mounting displaying a special message to pedestrians.

Phase - A traffic movement or movements receiving simultaneous right-of-way during one or more intervals.

Pole - A verticle support.

Pre-Timed Controller - (fixed time) - An electrically operated device for governing the timing of traffic signal indications in accordance with preset, fixed timing.

Printed Circuit - A conductive material plated or etched on a surface to provide a path for interconnection of electronic parts.

Progressive Signal System - A system in which various signals controlling a given street provide green indications in accordance with a time schedule to permit continuous operation of groups of vehicles along the street at a planned rate of speed.

Program Device - A drum, rotating dial or other device designed to preselect the sequence of operations of one or more controllers.

Rake - To incline, from the perpendicular, usually away from the direction of pull or strain.

Ramp - A traffic way usually inclined, over which traffic passes to make connections with other ways.

Recall Switch - A manual switch in a traffic actuated controller which will cause the automatic return of the right-of-way to a street regardless of the operation of a detector in that street.

Reset - An adjustment mechanism applied to an automatic controller providing the setting of the timing arrangement for the start of the green signal indication.

Sag - The distance of droop of a a wire or cable at the center between points of suspension.

Schematic Diagram - A drawing using symbols to indicate the point to point connection of all electrical or electronic parts.

Semi-Actuated Controller - A controller that provides for a combination of pre-timed control and response to vehicle or pedestrian detection to supervise signal indications.

Sequence - The order of appearance of signal indications during successive intervals of time cycle.

Signal Face - The part of a signal head that provides signal indications for traffic at one approach.

Signal Head - An assembly of one or more signal faces attached to one mounting.

Signal Indication- The illumination of a traffic signal lens or combination of several lenses at the same time.

Signal Section - The part of a signal face that contains one complete optical unit.

Signal Switch - A manual switch for disconnecting the electrical power from all signal indications.

Solid State Controller - A controller designed to utilize electronic components in a manner precluding the use of vacuum tubes or moving parts of any description.

Solid State Load Switch - An electronic device or circuit with no moving parts or contacts in which signal indication circuits are turned on and off by lower amperage control circuits.

Split - The percent of a time cycle allocated to a particular traffic phase.

Stop Line - A line which indicates where vehicles should stop when directed to do so by a traffic control device.

Synchronization - Coordination.

Synchronous Controller - An automatic controller operated by a synchronous motor which will keep in step with the frequency of the power supply circuit.

System - Two or more traffic signalized intersections operating in coordination.

Terminals - Devices for connecting electrical wires or leads to controllers or accessary panels.

Time Cycle - The number of seconds required for one complete revolution of the dial unit or one complete sequence of signal indications.

Timer - That portion of a controller that performs timing functions.

Time Switch - A device that can be mechanically set to provide switch operation at pre-determined times.

Through-Band - The time in seconds elapsed between the passing of the first and last possible vehicle in a group of vehicles moving in accordance with the designed speed of a progressive signal system.

Traffic-Actuated Controller - A controller that supervises signal indications in accordance with varying demands of vehicle or pedestrian detection.

Traffic Button - An object extending above the roadway surface for the purpose of channelizing traffic movement.

Traffic Controller - A device that governs the timing of signal indications.

Traffic Lane - A strip of roadway intended to accommodate the forward movement of a single line of vehicles.

Traffic Markings - All lines, patterns, words or other devices except signs, set into the surface of, applied upon or attached to the pavement or curbing or to objects within or adjacent to the roadway, officially placed for the purpose of regulating, warning or guiding traffic.

Traffic Signal - An electronically operated device that presents a visual indication to traffic.

Traffic Signs - A device mounted on a fixed or portable support whereby a specific message is conveyed by means of words or symbols, officially erected for the purpose of regulating, warning or guiding traffic.

Vacuum Tube - An electronic tube having its components encased in a vacuum used primarily in timing circuits and power supplies in electronic controllers, and as amplifiers in detector circuits.

Volume - The quantity in units of traffic.

Volume-Density - The quantity in units of traffic in a given area.

SECTION II

TYPES OF CONTROL

Theory of Operation of Various Types of Intersection Controllers

Electro-Mechanical Pre-Timed

There are two general catagories of pre-timed electro-mechanical controllers, single dial and multi dial (two or three dial units).

Single Dial

In the simplest form the pre-timed controller consists of a single motor driven dial unit and a signal switching device commonly referred to as the cam shaft. The dial unit is divided on its circumference into one hundred increments of one percent. Pins or keys inserted in these spaces mechanically open or close electrical contacts to provide control of various timing operations. One of these contacts controls electrical power to rotate the cam shaft and vary the signal indications displayed to the motorist. A second contact also activated by a dial key acts as an interlock or re-synchronizing circuit to insure that the dial unit and cam shaft remain in step at all times. Placement of the keys on the circumference of the dial governs the length of each interval or color sequence in the total cycle.

The length of the cycle is controlled by the size of the cycle length gear in use. This gear is a part of the dial unit gear train located behind the dial unit itself. It is driven by the small pinion gear on the motor shaft and is readily recognized by the number stamped on its face. This number indicates the gear size in seconds. Provision is normally made for reading the cycle length from the front of the dial unit.

Signal indications are controlled by rotating the cam shaft or signal switching unit. The sequence of the signal indicztions is pre-determined by breaking out of segments or placing lobes on the cams of the cam shaft. There is one cam for each independent signal indication (major street green, amber, red and minor street green, amber, red) in addition to the various interval control circuits (drum lock, etc.).

The cam shaft may be driven by a solenoid, or momentary acting motor connected through an indexing mechanism. When the key on the dial unit closes the appropriate contact, power is momentarily applied to the cam shaft drive device causing the cam shaft to rotate. In this manner the signal circuit contacts are opened or closed.

Signal circuit contacts consist of one fixed and one movable or hinged contact for each independent signal circuit. The fixed contacts are located on the bus bar adjacent to the cam shaft. The movable contacts are arranged so that the contact arm rests on the associated signal cam segment. When the cam shaft is rotated to a position where either a lobe or segment is omitted, the movable and fixed contacts meet providing power from the bus bar which is always energized from the positive side of the line voltage to the individual signal circuit.

The foregoing description was used only to provide the basic theory of operation of a pre-timed controller. The unexpansible single dial controller has little application in the ever increasing complexity of present day traffic problems.

Multi-Dial

The multi-dial controller is identical in its operation to the single dial controller, with the exception that two or three dials are available for operating the cam shaft. Only one dial exercises control over the cam shaft at any one time, however, control of the cam shaft is transferred from one dial to another either locally at the controller, or from some remote location by any of three methods: 1. Manual closure of a dial selector switch, 2. Switch closure by time clock, 3. Switch closure by program device.

Additional Features

There are many features available in pre-timed controllers which, if used, will afford much greater flexibility and efficiency of operation. These features can be included in the original controller or added at a later date if the original purchase specifies Expansible equipment. The theory of operation of these features follows:

Extra offsets can be provided on single or multi-dial controllers by the addition of dial keys and switches and the necessary relays. The offset feature interupts power to the dial motor to permit selective re-synchronization to any of three offsets on each dial unit when the controller is in a system. This feature is further explained later in this section.

Flashing control is accomplished through the use of a switching device designed to alternate on and off power to pre-selected signal circuits. When either a manually operated switch at the controller or a remotely operated relay is actuated, power is removed from the cam shaft bus bar and applied to flasher circuits.

Manual Operation is effected by removing power from the cam shaft advance circuit and the associated dial contact and transferring it to a manually operated switch. This is done by the use of a single pole double throw switch.

Electro-Mechanical Actuated Controllers are basically a single dial non-expansible controller modified to include a dwell interval during the last portion of the major street green interval. In this interval, power is removed from the dial motor and is restored only as a result of registering of a vehicle or pedestrian actuation. Timing of these intervals is accomplished through the use of the dial unit in conjunction with special purpose relays.

The basic theory of actuated equipment is further explained in later paragraphs of this section.

Electronic - Vacuum Tube Type

This class of machine is representative of the earlier attempts to produce electronic traffic control devices. However, the machines are more accurately classed as electro-mechanical with electronic timing. Many of these machines employ some form of cam shaft for signal lamp switching or for proper sequencing of the controller operation. The machines may also be characterized by the use of line, rotary or stepping switches and relays, frequently for the same purpose of proper sequencing and/or signal lamp switching.

These machines are most often of an actuated type responding to the properly registered presence or passage of vehicles and/or pedestrians. They are produced in three general forms as follows:

Pre-timed - normally used only in traffic responsive signal systems as more fully described later in this section.

Semi-actuated - a machine where one of the phases is pre-timed and the other or others are responsive to vehicle and/or pedestrian actuations. This type of controller will have one phase which has a guaranteed minimum green time, each time it is displayed. This phase will appear during each traffic signal cycle and will be the phase where the machine rests in the absence of any vehicle or pedestrian activity at the intersection which it controls.

The other phases of this machine will appear in the traffic signal cycle in response to properly registered vehicle or pedestrian demand. The duration of these phases will be determined by timing adjustments provided on the controller. In the case of multi-phased controllers the phases will appear only when a vehicle or pedestrian call is properly registered and will be omitted from the traffic signal cycle when such calls are not registered.

Fully-Actuated - a machine where all phases are responsive to vehicle and/or pedestrian actuations. All phases of this controller will be responsive to properly registered pedestrian or vehicle demands. In the absence of vehicle or pedestrian activity at the intersection, the controller will rest on the last phase called.

Timing - The adjustable controls provided on the instruction panel of the controller will be used to establish the proper interval timing. The adjustable controls normally vary the resistance of an RC (resistance - capacitance) circuit to determine the point at which a thyraton or an equivalent type of vacuum tube will conduct and advance the controller to the next interval in the timing cycle. The resistance determines the amount of time it will take to charge or discharge a capacitor to the critical voltage at which the tube will conduct the necessary current to advance the controller into the next interval in the timing cycle.

Timing in the semi-actuated controller will have one or more phases with adjustable controls for minimum green interval timing at the phase plus pedestrian interval clearance, where used and vehicle clearance intervals. The fully-actuated controllers will have adjustable controls to determine the length of an initial green interval, a vehicle passage or extention time interval, a maximum extention interval, pedestrian clearance interval where used and vehicle clearance intervals. The actuated phase or phases of the semi-actuated controllers will have the same adjustable controls as the phases of the fully-actuated controllers. More sophisticated fully-actuated controllers will have additional intervals with adjustable controls for establishing the length of each.

Normally each actuated phase of the semi-actuated and fully-actuated controllers will be provided with a recall switch. The function of this switch will be to insert the associated phase into each traffic signal cycle regardless of the vehicle or pedestrian demand.

The semi-actuated and fully-actuated controllers will often utilize lamp load relays external to the controller housing in order to keep the relatively large current flows out of the controller housing.

The proper setting for all adjustable controls should be determined on an engineering basis by a qualified traffic engineer.

Solid State

This class of machines is representative of the latest evolutionary stage in the development of traffic signal controllers at the time of this writing. They are electronic in nature and functionally are identical in operation to those described under earlier paragraphs of this section. Distinguishing characteristics of this class of equipment are the absence of moving parts and the absence of vacuum and gaseous tubes.

All timing and switching functions are accomplished through the use of discrete components such as transistors, diodes, resistors, capacitors and other parts usually mounted on a plug-in printed board or boards. Later models of solid state controllers utilize integrated circuits in place of discrete components, however, functionally the operation is identical.

Accessory Equipment

Accessory equipment is normally used with semi-actuated and fully-actuated controllers to provide movements or phases not available with the use of the controller alone. Accessory equipment is also used with semi-actuated and fully-actuated controllers to provide for the expansion of the controller as new functions, traffic movements and traffic phases are required for addition to the local intersection control equipment.

General description

There are several types of accessory equipment available, some for very specific and unique applications. It is the intent of this manual to describe only the more commonly used devices and their operating characteristics.

The equipment normally is supplied with its own wiring harness which must be added to the controller cabinet in accordance with the instructions supplied with the device. Many of the devices require the use of their own vehicle or pedestrian detectors which must also be added to the installation along with amplifiers, if required.

The accessory devices to be considered will be discussed in two catagories as follows: 1. Those which complement the controller and are required for proper operation such as time switches, pedestrian push buttons and detectors; and 2. those which add functions, movements or phases to the controller.

Theory of Operation

Time Switches - An electro-mechanical device driven by a synchronous electrical motor. The time switch may also have a mechanical clock carryover mechanism to retain the correct time during periods of power failure. The mechanical carryover mechanism will normally be rewound by the synchronous motor through a spring loaded clutch.

Time switches are usually furnished with one or two circuits which are actuated by keys or pins on the periphory of a twenty four hour dial driven by the synchronous motor. Different keys are usually furnished for the "on" actuation than those for the "off" actuation.

Pedestrian Push Buttons - These are normally electro-mechanical momentary contact switches used to place a pedestrian call into an actuated controller. They are designed to operate on a twelve volt circuit to minimize the danger of electrical shock. The switches are extremely rugged and are designed to resist the ravages of weather, abuse and vandalism.

Vehicle Detectors - There are five types in general use. They are: 1. pressure sensitive, 2. magnetic, 3. radar, 4. ultrasonic, and 5. inductive loop. A sixth type is being introduced with some success and is known as a magnetometer.

Detectors are functionally classified as point or passage detectors and presence detectors. The difference lying in the capability of the device to respond only to vehicles moving past or through their zone of influence or in the ability to respond both to vehicles moving or at rest in the zone of influence.

The point or passage detectors are exemplified by the pressure, sensitive, the magnetic and the radar. The presence detectors are the ultra sonic, inductive loop and magnetometer. The presence detectors generally combine the ability to be presence and point detectors with some versions of each being point detectors only.

Pressure Detectors are best described as momentary contact switches imbedded in the roadway surface. They are normally open switches that are closed by the action of a wheel load as it traverses the surface of the detector. The closure energizes a circuit which is translated by the controller and recorded as a vehicle call.

Magnetic Detectors consist of a coil of wire around a soft iron core which is placed in a non-metalic conduit under the roadway surface. The coil of wire is connected by a two conductor cable to an amplifier. The movement of a vehicle within the zone of influence of this detector disturbs the earth's magnetic field and causes a small current to be induced in the coil. This small current is transmitted to the amplifier, generally solid state in construction, where it is translated into a pulse which is then transmitted to the controller and recorded as a vehicle call.

The magnetic detector amplifier will normally have a provision for adjusting its sensitivity and may have a pilot lamp which illuminated to indicate a vehicle call.

Radar Detectors consist of transmitters and receivers which are capable of responding to the passage of vehicles by recognizing the frequency shift of the signal being returned to the receiver. The change of signal frequency is amplified and translated into a pulse which is then transmitted to the controller and recorded as a vehicle call. This detector is produced in two basic forms, one of which has the transmitter and receiving antennas mounted over the lane or lanes to be detected with the amplifier mounted in a roadside cabinet, the other form is self contained and mounted overhead, with only test jacks and a sensitivity control mounted in a condulet housing at the roadside. These devices are not totally solid state since the final stage of the transmitter circuit is a vacuum tube. Maintenance work on these devices requires the services of FCC licensed personnel.

Magnetometer - The magnetometer is a relatively new device in the traffic control field. However, its principle has been known for many years. The device, in operation is very similar to the magnetic detector except that instead of relying on a disturbance of the earth's magnetic field, it produces its own magnetic field which when disturbed by the passage of the vehicle produces a current flow which when amplified i nsmitted and registered in the controller as a vehicle call. magnetometer is normally installed in the center of the vehicle lane by drilling with a rotary drill a three-inch diameter hole vertically in the street surface. The leads are installed in a slot sawn in the street surface. These devices are normally fully solid state in construction.

Minor Movement Controllers - This device in its present form is virtually a controller in itself and is normally manufactured as a solid state device.

Functionally it would be added to an existing controller where it was necessary to provide for a minor vehicle movement from an infrequently used leg of an intersection or possibly a driveway of some sort. It has also been extended to be used for providing leading green movements at intersections to facilitate left turns. The device is normally provided with its own wiring harness which is connected to the cabinet wiring in accordance with the manufacturer's instructions.

In operation the vehicle call would be registered in the minor movement controller which would in turn then register a demand with the parent controller which could be either an actuated or a pretimed device. At the proper point in the traffic signal cycle, the parent controller would yield to the minor movement controller which would then provide its sequence of operation assigning the right of way to the minor traffic movement. During the sequence of operation of the minor movement controller, the parent controller would be held in a stop timing position until the minor movement had completed its cycle at which point it would return control to the parent controller.

Many of the earlier versions of this machine required that when it was used with a fully actuated controller that a phase other than the one to which it was connected would be called prior to the operation of the minor movement. This was a very inefficient form of operation and has since been corrected sometimes by the use of an auxiliary phase skipping device which simply prevented the display of the second phase to be called.

These devices are normally provided with their own external lamp relays which must be added to the controller cabinet at the time of installation. The minor movement controller is always connected as part of a specific phase of the parent controller. Obviously, the same function can be provided in the controller itself in an original installation which is superior to the addition of a minor movement controller.

Advanced Green Unit (Leading Green) - This device again is one which is designed to be installed as an addition to an existing controlled intersection to provide for an advanced left turn movement. It is available in either an actuated or a pretimed form with the actuated version requiring the use of a detector in the left turn slot.

Functionally the advanced green unit is designed to connect to a specific phase of the controller where the left turn movement is required. When properly wired into the controller, with the harness provided by the manufacturer, the advanced green unit, upon registration of a vehicle call and the advancing of the parent controller to the phase with which it is associated will provide a signal display including a left turn arrow for a protected left turn movement.

In operation, the advanced green unit, stops timing in the controller and holds the signals red in the movement in opposition to the left turn movement. The advanced green unit, in the actuated version is provided with an initial period and vehicle interval much the same as an actuated phase of any other controller. The device provides a proper clearance upon the expiration of the timing for the left turn movement and then releases the controller to resume its normal operation.

Double Interval Timer - (Double Clearance Timer) - This device is very similar to the advanced green unit except that it provides the protected left turn movement at the end of a phase that is lagging left.

Functionally, the device provides a fixed interval rather than extendible and most often is used with a permissive-protected turn, that is the vehicles are permitted to make their left turn during the full green period, when it is safe, however, if they cannot accomplish this a protected period is provided at the end of the green.

Pedestrian Interval Timer - The pedestrian interval timer is normally designed for use with actuated equipment only and is designed to respond to the operation of a pedestrian push button. Functionally, the equipment either lengthens a phase associated to allow adequate pedestrian crossing time or it will illuminate a pedestrian walk indication and then provide a sufficient clearance interval for the pedestrian. The device is designed to put a call into the phase with which it is associated in an actuated controller and then hold that phase, when it is displayed, for the pedestrian walk interval and protection period. These devices have been primarily electromechanical in design, however, they may be available as solid state machines at this time.

Sonic Detectors - Sonic detectors consist of transmitters and receivers which are capable of responding to the passage of the presence of the vehicle within or through their zone of influence. This is normally accomplished by the transmission of sound energy at a frequency sufficiently high to be almost inaudible to the human ear. The transmitted signal is reflected back by the presence or passage of vehicles within the zone of influence and is recognized and transmitted to the controller where it is registered as a vehicle call.

The detector has many variations, one of which combines the transmitter and receiver into a single transducer which in appearance is very similar to a high fidelity tweeter. In the service the detector can be mounted either overhead or by the roadside with the same effective operation. The transmitter and amplifier are normally mounted in a roadside cabinet regardless of the location of the detector head and it is normally provided with controls which adjust the zone of influence of the detector. These devices in their most recent form are solid state in construction with the only mechanical device being the transducer or speaker which is the active part of the detector head.

Loop Detectors (Inductive Loop Detectors) - Loop detectors are by far the most popular in use today and they are becoming even more so. A great deal of work is being undertaken by users of these devices to determine the loop configuration for various types of traffic control problems. The detector configuration consists of a loop which may be one or more turns of wire in a slot sawn in the street surface in the exact area where the vehicle is to be detected. The ends of this loop are connected to an amplifier and charging circuit which in combination produce an electronic field which is disturbed by the presence or passage of a vehicle in such a fashion that it can be recognized the amplifier, translated into a pulse and transmitted to the controller as a vehicle call.

The loop in the street surface can be designed in almost any shape or size to accomplish the specific task required. The loop by its ability to be either a presence or a passage type has created a whole new theory of vehicular traffic controller operation. For example, it is possible to use a long loop, say sixty feet in length and four feet wide, installed just behind the stop line and extending sixty feet back at the intersection in such a fashion that the memory circuit of the controller is not required. Another example would involve bending the loop around the corner in a left turn slot in such a fashion that the presence of the vehicle unable to make a left turn against opposing traffic would be detected and a phase provided for this movement. These devices are normally produced in a fully solid state form and are extremely simple in operation and maintenance.

Synchronous Systems - This type of system may consist of two or more intersection controllers each of which has a timing unit driven by a synchronous motor. This system offers one offset, one cycle length, and one split, with no capability for program changes except by manual means. They will not be interconnected in the hard wired sense but instead depend upon the controlled frequency of the utility supplying the power to maintain offset relationships which must be set manually.

This type of system requires frequent monitoring to reestablish offsets in the event of power failures or similar outages.

The system will normally consist of preprogram type controllers, however, it is possible to use semi-actuated types with synchronous devices to provide the yield points which will permit the controller to release the green to the side street on demand.

Such systems today are not recommended except as an interim measure or for temporary signals on detours.

Interconnected Systems - The majority of the signal systems in service today fall into this category with the hard wire connecting the controllers to each other and frequently to some sort of programming device. There are an infinite variety of systems which will be discussed below in the order of their complexity starting with the simplest form.

Single Dial Systems- This type of system will consist of synchronous motor driven local intersection controllers, interconnected by a minimum of a single pair of wires. The wires will consist of one hot wire and ground return.

Normally, the hot wire will have a voltage at all times except for three percent of the cycle which is known as the resynch pulse. The offset keys on all of the dial timing units should go through their closure period during this three percent time when the voltage is not present. If this occurs all units are in step and continue running, however, a unit which is out of step would go through its offset closure period at a time when the voltage is present on the wire which would stop the motor through a relay device causing it to wait until the voltage disappears at which time it will be instep and be released to run normally. The resynch pulse is normally supplied by one of the controllers in the system which acts as the master by being furnished with a normally closed contact which is opened to provide the resynch pulse.

This type of system may also be provided with three offsets whose operation is controlled by two time switches located in the master controller cabinet. The time switches would be designated as a. m. peak and p. m. peak and would be provided with on-off switches to effect the switching in of the preferential offsets. When both time switches are off the controller would revert to the base period offset.

As in the synchronous system discussed above the controllers are normally synchronous motor preprogrammed devices, however, they could be semivehicle actuated units or they could be preprogrammed mixed with semivehicle actuated units. Synchronous motor driven single or multiple offset devices would have to be provided in the semivehicle actuated units to provide a circuit which permits the controllers to yield to side street demand at the proper point in the cycle.

Multiple Dial Systems- This type of system is very similar to the single dial system except that it provides two or three dials and obviously the capability for different cycle length for each dial and a different split for each dial along with the three offsets on each of the dials. The operation is basically the same as for the single dial unit except that the master will contain an additional two time switches capable of placing second and third dials in service.

The capability exists for nine offsets, three on each of the dials, however, in normal practice offset switching is only for three offsets regardless of which of the dials is in service. That is not to say that Offset 1 must be in the same position in each of the three dials and the same for Offsets 2 and 3, thus the capability for nine offsets is frequently utilized.

Switching from one dial unit to another normally takes place at the beginning of mainstreet green regardless when the command is transmitted from the time switch. This is a technique designed to prevent short greens in other apparent erratic signal timing.

Again it is possible to intermix semivehicle actuated controllers with a synchronous motor driven units normally used in such a system, however, this is rarely done due primarily to the complexity of the synchronizing equipment required. More sophisticated systems, however, do employ semivehicle actuated controllers as is discussed later.

Induction Motor Systems - There are still in use today a number of systems which are designed to operate using the variable speed potentials of induction motors. Such systems employ a master controller with two or more precept variable voltage devices which regulate the speed of the timing motor at the local intersection controller. These particular controllers normally offer but one split and a number of cycle lengths dependent on the number of voltage sources provided by the master controller. The number of offsets can be as many as three as in the synchronous systems.

This type of system is little used today due to the basic speed instability of the induction motor which is affected by voltage changes in the local area.

Traffic Responsive Signal Systems - The discussion on this type of system will be somewhat more general than those previously covered. The wide variety of equipment being offered in this general category requires a detailed study of the system being maintained. The intersection control equipment ranges from electromechanical through machines built of integrated circuitry.

The interconnect facilities ranges from hard wiring through leased telephone circuits to radio all of which accomplish the same basic function of transmitting information on command and control from the master device to the local intersections and senser information from the field back to the master controller. It is important here to recognize that radio in this context is simply a device for communicating and is roughly equivalent to a pair of wires.

The master controller will vary from a simple programmed tape through analog computers, digital computers, and combinations of analog digital computers. The analog computers are normally special purpose devices designed specifically for traffic control purposes and are capable of being maintained by the average electronic technician. The digital computers on the other hand normally require the services of highly trained personnel and are therefore usually maintained under contract by the supplier of the equipment.

The sensing equipment provides information on traffic flow conditions to the master controller and is normally some form of detector as discussed in the previous section of this manual.

SECTION III

INSTALLATION

Scope: It is the intent of this section of the I.M.S.A. Manual on Installation Practices and Maintenance Procedures to recommend accepted installation techniques. This manual will identify typical methods currently in general use.

The user should be aware that local conditions may require deviations in specific areas of installation. Varying subsoil conditions will dictate particular foundation and grounding requirements. Differences in atmospheric conditions--high dust areas--proximity to salt water--man made airbourne contaminants will effect types of material to be used and maintenance procedures adopted.

The installing and/or maintaining agency has the responsibility for recognizing local conditions and for establishing acceptable aternatives to these procedures.

Many state highway departments have developed specifications and standards governing the installation and use of traffic control devices. It is strongly recommended that these publications be referred to for determining local requirements.

This I.M.S.A. manual will not attempt to establish equipment or hardware standards. For this information the user is referred to the Uniform Manual on Traffic Control Devices published by D.O.T.* and to various equipment standards and specifications established and published by the I.T.E.*

The installation of traffic control devices of all types and particularly of traffic signals and controllers requires special care and attention to accepted good practices. No installation should be considered which has not been investigated and approved by a qualified traffic engineer.

Conduit - Conduit should be installed at least 24" below a roadway surface and 18" below a sidewalk surface.

Excavation and backfill should be performed in accordance with local Codes and Ordinances. In the absence of such information certain precautionary measures should be adhered to:

(a) Ascertain the location of all other underground facilities; electric, telephone, water, gas, etc. prior to excavating or jacking operations.

(b) In backfilling excavations or trenches be certain to adequately tamp and compact the soil frequently to insure against undesirable settling later.

(c) It is incumbent upon the agency performing the work to provide for the safe movement of vehicles and pedestrians in the work area and to protect them from hazards.

(d) Wherever possible openings parallel to the edge of the slab in a concrete roadway should not be installed less than three feet from the roadway.

(e) Lateral conduit runs parallel to the curb line or edge of roadway should be made inside the curb line in the grass belt or sidewalk area wherever possible.

(f) Jacking, pushing, or boring rigid conduit under the roadway may be permitted for distances up to 75' without an inspection pit.

(g) A minimum number of bends should be permitted in any cable run. Not more than three 90° bends should be permitted in runs of less than 100 ft.

(h) Underground conduit should be of adequate size to accept present and future contemplated cable installations. Nothing less than 1" conduit should ever be used underground and this only for pedestrian push buttons, detector leads, or service runs. Under roadway installations should be not less than two inch. Larger sizes should be considered where multiple cable runs are planned.

(i) When making up joints in rigid conduit, the ends of conduits should be painted with pipe joint compound and threaded into the couplings so as to butt together.

(j) The ends of plastic conduit should be painted with an appropriate sealer as recommended by the conduit manufacturer prior to insertion in the coupling.

(k) Conduit runs terminating in controller bases, pole or pedestal bases or in pull or splice boxes, should be brought two inches above the finished grade of the base or two inches beyond the inside wall of the box and eight inches below the top of the box.

(l) Care should be taken during the installation of conduit to protect the ends from damage.

(m) The terminating ends of all metalic conduit shall be fitted with an O-Z type GB grounding bushing.

Pull and Splice Boxes - Pull and splice boxes should be of an open bottom reinforced concrete design. In most applications, rectangular boxes are preferred and offer a more acceptable installation. If circular boxes are used, they should be of a cubic size comparable to rectangular boxes.

The box should be provided with at least one knockout per side or per quadrant in the case of circular boxes.

Dimensions of the box should permit easy access and adequate area for dressing cables without crowding. Recommended sizes are shown as follows. All measurements are O.D.

	MIN. (2.35 cu. ft.)	MAX. (7. 1 cu. ft.)
Length	24"	36"
Width	14"	24"
Height	12"	14"

Reinforced concrete boxes are commercially available within this range of sizes.

Covers should be either reinforced concrete, cast iron or heavy guage steel. The top of the cover should be of a design which presents a non-slip surface to pedestrians. The cover should be fitted so as to be flush with the sidewalk surface.

Lifting slots and pins should be required in concrete covers. Flush seating hold down bolts are optional.

Lifting holes and flush seating hold down bolts should be required with metal covers.

Locate rectangular boxes with the long dimension (side of box) parallel to the curb line.

Drainage should be provided at the time of installation by setting the box on a bed of crushed rock (3/4" max. aggregate) at least 12" in depth.

<u>Wire and Cable</u> - Field wiring is that wiring performed in the field and consists of all wire runs both overhead and underground such as interconnecting cables between controllers and the wire and/or cable between the various items of equipment at an intersection.

Type and size of wire and cable to be used and installation methods employed should conform to the requirements of the National Electrical Code as a matter of good practice and to IMSA Cable Specifications.

Number 14AWG should be the smallest wire size used in field wiring. The choice of stranded or solid wire should depend on the particular application. Solid conductors are generally easier to work where making splices or terminal connections. Stranded conductors are more adaptable for underground applications because of their greater flexibility.

Wire or cable of a special type or size is sometimes recommended by manufacturers of particular items of equipment. In such instances, the installation should be made accordingly in order to insure proper functioning of the equipment.

Cable runs should be installed so as to permit proper functioning and efficient servicing of equipment. Consideration should be given in the planning stage for future requirements. At least two spare leads should be provided in each signal cable and interconnect cable run.

Cable and wire installed overhead should be supported by messenger cable of an appropriate size. This may be integral to the cable itself (commonly called figure 8) or a separate messenger.

Messenger cable used to support electrical cables exclusively and not employed as a part of a signal suspension network or guy, can be 3/16 galvanized. In many instances however, the signal supporting messenger network may also serve as the support for electrical cables i.e. signal, detector, push buttons, etc.

Pole line hardware should be carefully selected and properly used throughout the installation; which will prevent damage to cable due to chafing or improper support.

Attaching cable to messenger can be accomplished by means of preformed lashings, cable rings, or wrapping. The latter is practical only for exceptionally long runs of several hundred feet and where wrapping machinery is on hand or can be economically employed.

Preformed lashing wire greatly speeds the installation, is neat in appearance, and insures long trouble free cable life.

Cable rings, while relatively easy to install, are time consuming, require spot lashing at end of runs, and are estheticly less acceptable.

Vertical runs of cable should always be routed in metal conduit equipped with entrance fittings (weather heads) or routed inside metal poles, concrete poles, or pedestals.

Drip loops should be formed in all cables at the entrance fitting to insure that water will not run along the cable into the conduit or pole. The loop should be formed in a manner so that it does not chafe against other cables, poles or adjacent hardware.

Cable runs may be separated by function. Traffic signal cables, inter-connect cables, detector and pedestrian push button leads may be in separate sheaths or jackets. If one prime cable is used for all circuits, color code should be established for future proper identification. In addition, separate cable runs may be made to each approach or side of the intersection.

Cable routing should be planned so as to eliminate aerial splices if at all possible.

Signal cables can be routed from the controller into the nearest signal head, splicing within the head and running to the next lead in line until all heads have been connected, a more satisfactory method is to use disconnect hangers at each head. These serve the dual purpose of splice boxes for the cable and quick disconnects for signal, permitting easy servicing, painting, etc.

Detector and pedestrian push button leads should be routed directly from each detector or push button to the controller cabinet field terminals. This is necessary to permit proper service and trouble shooting at a future date.

Pedestrian push button circuits may be routed to the controller cabinet through extra leads in the signal cable if desired.

Detector circuits must be routed to the controller cabinet through separate cables than those used for other functions. Particular attention must be given to any special installation instructions and/or cable requirements provided by the detector manufacturer.

Interconnect cable should be routed directly from one controller cabinet to another.

Underground cable runs in excess of 500' between pull boxes, should be avoided. Cable continuing through a pull box should have two complete turns laid up in each box it passes through. Identification tags of a permanent type should be attached to each cable or wire in each pull box, splice box, or hand hole.

Splices in both aerial and underground cable must be electrically sound and waterproof.

Wire connections in splices must be soldered and individually wrapped with electrical tape to insure good electrical continuity and separation. While pressure connectors may have been generally acceptable in the past, the use of solid state electronic apparatus now makes soldered connections mandatory. These devices operate at very low voltage levels and minimum current loads. Because of this, they are susceptible to even slight voltage drops which occur where poor electrical connections cause high resistances in a circuit.

Waterproofing the completed splice and proper wrapping of the connections within the splice is vital to satisfactory operation of the equipment. A satisfactory splice can be accomplished by the use of any of several splice castings kits commercially available.

Elimination of most splices is possible through good advance planning of the installation. When a splice cannot be avoided, however, it should be located at a readily accessable point in the cable run. Aerial splices snould be located at or very close to a pole. Underground splices should be located in a pull or splice box or in the base of poles or pedestals. Splices must never be located within a conduit run or within a pole or pedestal in a manner so as not to be readily accessable through the handhole.

Circuit drawings or Wire maps should be prepared in advance of the installation. It is most important that all utilities agencies be contacted at this point in the installation. Location of electric, telephone and fire alarm cables together with the location of gas and water lines must be known and recorded prior to beginning the stringing of cables or installation of conduit.

These wire maps should be corrected as the installation progresses so as to provide a record of the "as built" installation upon completion of the work.

These drawings should show the location of all cable runs. For aerial cables, it is important to show the point of attachment on poles, location, and identification of adjacent cables and location of all splices with newly installed cable. Underground cable information should show: the location of all conduit runs; average depth below surface; location and direction of all bends of 45° or more; location of pull or splice boxes; location of all splices and location and identification of adjacent conduit and/or cable.

Controller cabinet wiring should be planned at the time the controller and acessory equipment is purchased. Easy access to field terminals and an orderly layout of the wiring in the cabinet insure quick and efficient field servicing where it becomes necessary.

Terminals and terminal strips should be located well clear of the bottom of the cabinet, at least 3" in pole and pedestal mounted cabinets and 6" in base mounted cabinets.

Terminal locations may be entirely on the rear of the cabinet in smaller less complex controllers provided that sufficient room remains for proper installation of accessory equipment.

Terminal locations in cabinets of the more complex controllers may be located on both the back and sides of the cabinet or sides only, leaving the rear surface for installation of accessory equipment.

Sub panels of waterproof plywood on both sides and rear of the cabinet of the more complex controllers affords easier field wiring, servicing and greater protection in the event of knock-downs.

Field wiring within controller and other equipment cabinets should be dressed and routed in the corners of the cabinet to the various terminal boards secured by lacing or preformed plastic spiral wrapping harness and fanned out neatly from the harness to each terminal.

Individual leads should be long enough to permit re-routing to different terminals at a later date should this be required.

Bends of more than 45° should be avoided.

Wire lugs of either the spade or bayonet type should be soldered to individual leads prior to making up the terminal connection. Spade type lugs are used under flat head or round head screws. Bayonet type are used where headless screws are employed in the terminal connectors.

Identify each field wire entering a cabinet with tags of a permanent design.

Field wiring diagrams of each cabinet should be prepared at the completion of the installation. Copies should be kept with other field service information and on file with the permanent records of the intersection.

Grounding and Bonding of all electrical equipment in a prescribed manner is of the utmost importance for reasons of safety and proper operation. Poorly grounded equipment constitute a very definite safety hazard to both the public and maintenance personnel.

Solid state electronic equipment is especially susceptible to spurious electrical "noise" and even slight voltage leakages caused by poor or inadequate grounding procedures.

Grounding practices can vary with equipment complexity and local conditions. It is important that these be thoroughly considered at the time of installation.

A ten ft. ground rod, or longer if necessary, located in close proximity to the controller cabinet, driven into soil of good moisture content and extending well below the normal water table level will generally prove satisfactory in the installation of a controller and signals when there is no accessory equipment remotely installed in the intersection area.

A grounding network of as many as 3 rods spaced at least six feet apart bonded by at least a #8 awg copper wire may prove necessary for the same installation in dry or sandy areas.

Individual grounding of all remotely located accessory devices and cabinets and of all metal poles and pedestals with at least a #8 awg wire in the manner described above is mandatory for the foregoing reasons of safety and satisfactory oper

A ground network must be provided whi [illegible] ll grounds to one common source. This network must include the grounded or neutral side of the A.C. power supply.

Ground rods should be driven as closely as possible to the pole or cabinet. Ground leads which may be subject to accidental damage or vandalism should be encased in metal conduit or wooden molding.

The size (awg) of the grounding leads or bonds will depend on the anticipated total electrical load in the circuit or network, the length of the cable runs and their location. An undersized ground lead or bond can be the source of serious equipment malfunctions.

Ground leads for individual signal circuits between each group of heads and the grounding buss in the controller cabinet should be #14 awg minimum.

Underground conduit runs must be properly grounded and bonded to each other.

Metal conduits should be bonded to each other with at least a #8 awg bond at each terminating point and in each pull or splice box where the run is interrupted.

Plastic conduit runs must be provided with a grounding network at the time the conduit is installed. This should consist of a bare copper #8 awg lead routed through each conduit run. These leads must be bonded together in each splice or pull box and connected to a driven ground at termination points of each run.

An additional 10 ft. driven ground rod should be installed in intermediate pull or splice boxes used in long conduit runs and where soil conditions indicate a need for additional grounding.

Electric service installation procedures may vary in different localities. For this reason, it is imperative that utility company requirements be ascertained prior to the installation.

Electric service is brought directly into the controller cabinet by some utility companies and connections made to the terminals provided.

A service meter installed external to the controller cabinet is required by some utilities with their service terminating at the line or field side of the meter.

Service leads terminating within pigtail distance (usually 18" to 36") of an aerial service are called for by some utilities.

When an installation of this nature is made on a metal pole, the service leads should be well separated from other cables. The service entrance cap or weather head should be above and on the opposite side of the pole than other cables.

Installation on a wooden pole should be made in a separate conduit.

Size of service leads should be #8AWG minimum.

Interconnect cables should be #14AWG minimum and #12AWG for runs in excess of 1000 ft. between controllers. An exception to this would occur only when a low voltage interconnect system is employed using a single pair of leased or private lines. If leased lines are employed, the installer and/or user of the control equipment will have the responsibility for providing proper facilities to the point of connection to the leased lines. In this instance, the leasing agency will indicate the AWG wire size to be supplied and it will be necessary to employ system equipment designed to operate satisfactorily under these conditions.

Repeater stations should be considered in any major system. Anticipated voltage drops should be computed prior to the installation and if a drop in excess of 10% is calculated, repeater stations (voltage regulators) should be installed.

This becomes increasingly important as more sophisticated control equipment is used, when the master controller may be located at some point far removed from the actual system and as systems grow larger in the number of intersections under control.

Splicing of connectors in interconnect cable is of critical importance. It is imperative that electrically clean, "noise" free splices be accomplished. Modern day, solid state equipment cannot tolerate less than perfect splicing techniques.

Wire ends should be thoroughly cleaned immediately prior to making the actual splice. If soldered, the solder connection must be properly done. If commercial splice kits are employed, the manufacturers instructions must be rigidly adhered to.

Complete check-out of each interconnect cable run should be made before placing it in service. Any indication of poor continuity or high resistance connections should be investigated and cleared before using the cable.

Identify all cables as to function and routing at all controller and splice box locations.

Prepare a complete "as built" wire map at the completion of installation of the cable. This should show: routing; function splices, and any other information which might later prove helpful to maintenance and repair personnel.

Foundations - Poles and Pedestals - Pole and pedestal foundation requirements are generally spelled out by the manufacturers of the equipment. The manufacturers instructions should be carefully followed at the time of installation.

It is important to remember that soil conditions vary greatly and one should familiarize himself with his local area of operation.

In areas of firm compacted soil it is possible to pour a concrete foundation without the use of forms, and is preferred in some instances.

In loose soil where forms are employed, be sure to remove the forms after the foundation has set and completely compact back fill.

Anchor bolt locations and projection above grade is shown on instructions furnished by the pole manufacturer. Be certain to check these instructions and verify that the template to be used in positioning the anchor bolts is the one for the pole type being installed. Permanent templates of marine plywood or galvanized sheet can be made up for repeated installations. Be sure to properly mark and identify each template as to pole type, size, etc.

Underground conduit should be brought into the excavation and capped at least 3" above the finish line of the foundation before pouring concrete.

Spare conduit bends should be considered wherever space permits. These can be capped off in an adjacent splice box or dead ended, underground. Be certain to record their location (depth below grade and direction of run) on wire map.

Foundations for trolley type poles can sometimes be poured in advance by using a sleeve slightly larger than the diameter of the pole. After the foundation has cured, the pole can be lowered into the pocket formed, skimmed for proper rake, and grouted. Be certain to properly tamp grouting when pouring in order to avoid air pockets.

Poles and Pedestals - Poles used in traffic signal installations are of four general types: wood, steel, aluminum, and concrete.

Wood poles for new installations are rapidly losing favor because of their unsightliness and [illegible]e requirement that they must be adequately guyed against [illegible]. When necessary to replace a knockdown, however, it is necessary to know the height and class of pole to be ordered. This information will be found about 5 ft. above ground level by an indication such as: 30/5 (meaning 30 ft., class 5).

Wood poles used in traffic signal installations will usually be 30 to 45 ft., class 2 to 5. If there is any doubt as to the size or class to be used, a phone call to the construction department of the local utility company will solve the problem.

Setting a wood pole requires that a hole of slightly larger diameter than the base of the pole be dug to the proper depth. Hole diameter should be approximately 4 in. greater than the pole base. Depth of the hole will vary with the height of the pole and type of soil. A good rule of thumb is one foot in depth for each five feet above ground. Add one foot for loosely compacted earth.

Proper backfilling and tamping is imperative. With one man backfilling, a second should be continuously tamping the backfill into the excavation while both rotate around the pole. A good indication of a properly set wood pole is little or no left over fill.

Guys are required on wood poles when they are used to support mast arm or span wire suspended signals. The size of the guy should be the size of the messenger, but not less than 3/8" min.

Guy anchors vary in design and are dependant on the type of soil. Minimum length of the anchor rod should be six feet for smaller poles and eight feet for the larger poles.

Anchors should be installed so that not more than 18 inches of the rod is above the ground. The back-fill requirements are the same as for pole installations.

Sidewalk arm guys must be employed when the guy crosses over a sidewalk area. The sidewalk arm consists of a piece of 2" pipe and appropriate hardware. The length of the pipe is dependant on the distance between pole and anchor when the anchor is set a safe distance from the sidewalk line.

Final tie-off of back guys should not be accomplished until all signals and cable are in place and poles plumbed.

Metal poles are available in either aluminum or steel.

Steel poles are of two basic designs: (a) trolley base with the base section being an integral part of the pole and set in the concrete foundation, and (b) shoe or transformer base, both of which utilize anchor bolts embedded in the foundation.

Aluminum poles are available in either shoe base or transformer base. One manufacturer offers a slip base, the pole being separate from the transformer base so that the pole is rotatable on the base at the time of installation. Aluminum poles are rarely used for spare wire installations since such an application would require the use of back guys.

Base selection will depend largely upon the application.

(a) Shoe base offers less space for cable splicing. (A covered hand hole is provided if specified near the bottom of the pole.) The shoe base is more acceptable in some locations where sidewalk area is at a premium.

(b) Transformer base provides large, above ground splicing capabilities.

Metal poles may be further classified by application and type in various combinations: (a) span wire; (b) mast arm; (c) double mast arm for multiple signal installations and (d) signal and street light combinations.

Steel poles are available, galvanized or not galvanized, tubular (one piece) or sectional galvanized.

Sectional galvanized poles have the advantage of being assembled easily and quickly at the site, are easily handled, and installed by two men with a minimum of equipment and if hit are often salvagable or replaceable by sections.

Sectional galvanized poles are available for span wire or mast arm installations with mast arms of up to 45 ft. as standard with longer arms available on special order.

Tubular steel poles (one piece) are also available for these same applications.

Proper selection and installation of aluminum or steel poles either tubular or sectional will eliminate the need for back guys and provide an esthetically pleasing appearance.

Height of poles will depend on the type of installation: mast arm or span wire; length of mast arm or distance to be spanned and number and configuration of signals to be hung.

(a) It is obvious that a 4 or 5 section head is longer than a three section and must therefore be hung higher in order to meet minimum clearance distances above the roadway.

(b) Hand spand and/or multiple signals on a span will require higher and heavier guage poles than a simple two signal installation spanning a 40 ft. roadway.

(c) Rake of pole (angle of deflection from the verical) will depend on length of mast arm, length of span configuration and weight of signals to be hung.

Manufacturers of aluminum and steel poles usually provide this information in general form in their specifications and installation instructions. Final adjustments are made after all signals and cable have been installed. This is done through the use of adjusting nuts which are placed on the anchor bolts under the pole base before the pole is set. Pole should be plumb when installation is completed. Upon completion of final plumbing exposed area at the base of the pole should be granted and trowel finished to prevent vandalism and present a pleasing appearance.

Wood poles are generally raked 6" to 8" away from the angle of strain when they are set. Final adjustments for plumbing are made by taking up or slacking off on back guys after all signals and cable are in place.

Concrete poles are gaining in use in some areas. Transportation costs are presently a major factor in limiting their wider use.

These poles are of pre-stressed design and can be provided for messenger spans in excess of 200 ft. without back guys. They are available in several lengths and classes (diameters) depending on the requirements of the intersection. It is most important when ordering that all installation details are made available to the pole manufacturer. This will include length of messenger span; number and weight of signals and any special characteristics of the intersection such as an unusually high crown, or lateral slope of the roadway.

Installation of concrete poles generally follows the procedures for setting trolley type poles, as previously outlined. More detailed information is available from the manufacturers.

Mast arms of varying design, styles, and lengths, are available in galvanized or ungalvanized steel or in aluminum. The choice will depend, first, on the arm length required for satisfactory signal placement, and secondly, on the number, location, and configuration of signal heads to be installed. The type of pole to be used for support will be a factor only if the first two requirements can first be satisfied.

The design styles and their major characteristics are listed below.

Tubular arms consist of a single arm either one piece or sectional, rigidly attached to the support pole. They may be steel or aluminum. The physical characteristics of the arm (diameter, shape, cross sectional view) will vary with the manufacturer and the length of the arm. This design requires no bracing or guys.

Signals may be suspended either vertically or horizontally from the end or at any point along the arm by use of appropriate mounting hardware. Cable from the controller to the various signal locations is run inside the pole and arm.

A modification of this type is the rigid single member truss which spans the entire roadway and is supported at each end.

Also falling into this category is the now obsolete 2" tubular or pipe arm which required both lateral and vertical guying to prevent sway and to support the outer end of the arm.

Truss type arms are made up of two longitudinal members with vertical braces or stringers of varying lengths between. Individual design configurations vary with the manufacturers.

Wiring to the signals is usually carried through the top longitudinal member. Signals are mounted vertically.

Trombone type arms are similar to the truss type except that the two longitudinal members are parallet throughout their length. Signals are mounted horizontally, usually between the members.

Mast arm attachment will vary with the manufacturer. Some are bolted to a fixed plate on the pole, others clamp to the pole while a third type slip fits over the top of the pole.

Mast arm alignment must sometimes be considered even before the pole foundation is poured as in the case of steel poles with fixed mast arm attachment plates. In other instances, the pole may be rotated on the foundation in 90° increments on the anchor bolts for proper alignment of the mast arm. In every case, check the pole manufacturers instructions before pouring the foundation.

Mast arm height will vary with the number, weight, and configuration of the signals to be hung. This information must be passed to the supplier of pole and mast arm when ordering.

Rigid stay guys are required on some mast arms mounted on aluminum or steel poles and on all mast arms mounted on wood poles. These guys support the outer end of the arm and prevent lateral sway.

Pedestals may be either tubular aluminum or 4" O.D. iron or steel pipe. Bases which are either cast aluminum or grey iron may be integral to the shaft as in the case with aluminum or they may be leaded or threaded to the shaft as with pipe.

Pedestal bases are available in shoe base or miniature transformer base, this configuration varying with the manufacturer.

Pedestal classifications fall into three general categories by use:

(a) Traffic signal pedestals which may vary from 8 to 14 ft. in height.

(b) Controller pedestals, which may be 30" to 42" high.

(c) Pedestrian detector pedestals which are usually 42" high and are used at a location where there is no other point of attachment for the pedestrian detector.

Pedestals are attached to their foundations almost without exception by the use of three anchor bolts embedded at the time of pouring the foundation.

Plumbing of the pedestal is accomplished by shinning and granting at the time of installation.

Conduit should be brought into the foundation, to a point 3" above grade and capped prior to pouring concrete. Where possible, a spare conduit bend should be installed.

Cabinets - Controller cabinets may be classified in three general categories: (1) base mounted; (2) pole mounted; and (3) pedestal mounted. All are available, depending on size, in cast aluminum or fabricated construction. Most fabricated cabinets use a cast top and bottom section and a cast door.

Accessory cabinets, used for housing detector amplifiers or similar related equipment are almost always of cast aluminum construction and are generally pole mounted.

Base mounted cabinets of the type commonly referred to as meter cabinets are also of cast aluminum construction.

Controller cabinet style and size will depend primarily on the type and size of control equipment to be used. In some instances a compromise must be made when sidewalk space is at a premium in built-up areas. In this case, a pedestal mounted type controller cabinet can often be mounted on top of a meter cabinet. The meter cabinet can then serve as a splice cabinet and housing for accessory items.

Controller cabinet size should be adequate for housing all control equipment and accessories including detector amplifiers where used if these are not remotely located in separate cabinets. Space should be provided for necessary shifting of equipment during servicing or repair operations. Space should be provided for satisfactory routing and splicing of wires and cables within the cabinet.

Controller cabinet location should be planned so as to provide ease of service and maintenance with a minimum of inconvenience to pedestrians. It should provide service personnel a maximum of protection from vehicles while servicing the equipment. It should afford service personnel the best possible view of the intersection during service operations.

<u>Accessory cabinets</u> if used should be located in close proximity to (meter cabinet below) or on the side or back of the main cabinet except in the case of remotely located detector amplifiers which by design must be located as close as possible to the detector.

Pole mounted cabinets should be mounted in a manner to prevent twisting or turning. This can be accomplished by drilling the mounting bracket and the cabinet and installing a "keeper screw" through the bracket into the cabinet.

Mountings should be accomplished in a waterproof manner as should the entrance of all conduits into the cabinet from the top or sides. A small piece of gasket material installed between the top of the cabinet and the mounting bracket will waterproof this area.

Vent all cabinets both top and bottom. Size of intake and exhaust vents will depend on the area of installation, size of cabinet and type of equipment in use.

(a) Air intakes at the bottom of the cabinet should always be larger in overall area than the exhausts at the top.

(b) Intake and exhaust vents should be located so as to provide for a maximum passage of air around and over the equipment.

(c) Intake and exhausts should be screened to prevent the intrusion of bugs.

(d) Dust filters should be used on intakes in high dust areas and in all areas where electronic equipment is used.

(e) Exhaust fans should be required on all cabinets housing electronic equipment. One four inch diameter fan is usually adequate for pole mounted or the smaller base mounted cabinets. Larger cabinets will require two four inch or a single larger diameter unit.

Thermostaticly controlled [illegible] are the most efficient for this application.

(f) Door stops should be provided on all base mounted cabinets. These should be of a design that will secure the door in an open position to protect the door from wind damage and service personnel from physical injury during servicing operations.

(g) Service records should be maintained at the controller site. A rack holding a heavy plastic envelope will provide adequate storage space for intersection maps, cabinet wiring diagrams, timing charts and where applicable, controller and accessory prints. It is not recommended that complex electronic or solid state repairs be attempted in the field. For this reason, controller prints for this type of equipment need not be stored in the field. Controller function diagrams should be on hand, however, to facilitate trouble shooting and locating of defective modules or assemblies.

Pedestrian Push Buttons - There are two general types of pedestrian push buttons available for use with actuated controllers. One is a pressure (finger) operated single pole single throw, normally open switch. The second uses a magnet activated reed switch. When the pedestrian presses the button on this unit, a sliding magnet operates the internally positioned reed switch. Both of these units require a two wire circuit from the controller. The pressure operated switch is also available in an illuminated version. In this unit, the switch operation is identical to the pressure type described above. In addition, however, when actuated by a pedestrian, a relay in this unit closes a circuit which energizes a circuit, thus providing a lighted indication to the pedestrian that his call has been recorded at the controller. When the controller responds to the call, the relay opens and the light is extinguished. These units require a four wire connection to the controller.

Locate pedestrian buttons immediately adjacent to the pedestrian cross-walk for the phase they are intended to control as close to the curb line as is practical.

Install the button approximately 42" above sidewalk level. If possible use existing street light pole, traffic signal pole, or pedestal, etc. for mounting the button. This reduces clutter in the sidewalk area.

Signs of an approved type and size should be installed at the button location to guide the pedestrian.

Conduit to the button should be 1/2" O.D.

Detectors - No attempt will be made here to offer specific installation instruction for the many varied applications and types of detectors currently available; instead, only general construction and installation details will be offered.

Almost without exception, installation instructions are available from each manufacturer of detectors. In most instances, they are shipped with the units. If you are not installing detectors as a regular function, it is strongly recommended that prior to attempting an installation, you read and become thoroughly familiar with the instructions for the particular detector and the specific application for which it is to be used.

Detector placement, distance from the stop line, with relation to adjacent driveways, number of lanes to be detected, all enter into the installation. A poorly placed detector, a loot of the wrong width, or length, or an improperly installed detector, particularly with loop detectors, can have a serious effect on the efficient operation of a controller. In the worst instance, such a condition could make the controller completely inoperative. There are five broad classifications of detectors: Pressure sensitive; magnetic; radar; sonic; and loops. Each of these may be further classified by function and/or application and method of installation.

The selection and installation of detectors should be made with strict adherence to manufacturers instructions. There are many factors to be considered in their selection. Some of which are: type and speed of traffic, method of control, physical conditions at the intersection and availability of technically qualified installation and service personnel.

Pressure detectors are rubber mats or pads placed in a metal frame in the roadway. Vehicles passing over the pad close one or two sets of contacts and places a "call" on the appropriate phase of the controller. A non directional unit contains one set of contacts in the pad and will record passage of a vehicle in either direction. A directional unit contains two sets of contacts connected to the controller through relay logic so that only vehicles traveling in the desired direction places calls on the controller.

Installation of pressure detectors requires that a pit be dug in the roadway approximately 24" deep with an additional 6" depth at the splice box end of the frame for a drainage dry well. The pit must be 12" longer and at least wider than the detector to be installed. Pressure detectors are either 6 or 8 ft. in length. The choice depends on the width of the roadway or lane where the detector is to be used. The detector must be long enough and placed in such a position so as to insure that a vehicle cannot pass between it and the curb, centerline or a detector in an adjacent vehicle lane operating on the same controller phase.

Place the detector frame or housing in the pit after removing rubber detector unit so that the top of the frame is flush with the roadway surface. Detector manufacturers normally supply wooden hangers to insure proper placement.

Make up all conduit and splice box drains prior to pouring concrete. If two or more detectors are placed in adjacent lanes, it is a good practice to bring separate conduit runs from each detector to a curb side splice box. In the event of future failures, it is then only necessary to block off one lane of traffic at a time while trouble shooting.

Prior to pouring concrete, fill the detector pad area with sand to insure that no concrete gets into the pad area or bolt holes. Pour concrete from both sides of the excavation, tamping from the opposite side to protect against the possibility of voids while filling. When the concrete has cured, sand should be swept and-or blown from the frame before placement of the pad.

Wiring of pressure detectors requires two wires for non-directional and three wires for a directional detector. These should be 14 AWG. These provide a direct connection between the pressure pad and the detector circuits in the controller.

Magnetic detectors are of three general types; non compensated, compensated, and the magnetometer or spot detector. In each instance, the magnetic field of a moving vehicle passing over or close to the zone of infulence of the detector induces a very small voltage in the coils of the detector. This voltage is then increased by the detector amplifier and fed to the detector circuits of the controller.

Selection of a particular type of magnetic detector will again depend on the application and the function it is required to perform. The compensated magnetic detector has reasonably good directional characteristics while the non-compensated and magnetometer do not. The magnetometer has a sometimes desired advantage of being a "spot" detector. Its zone of influence is very small, a requirement in certain applications.

Installation of magnetic detectors varies with the type.

(a) The non-compensated detector is placed in non metallic conduit 6" to 18" under the surface of the roadway. A stiff wire is attached to the curbside end of the detector and brought into a hand hole at the curb. This permits easy relocation of the detector within the conduit, should this prove necessary. The detector itself is pre-wired with a pair of leads usually 35 ft. in length. These can be spliced in the hand hole for connection to the detector amplifier which should be located with the intersection controller.

(b) The compensated magnetic detector consists of two detectors precisely positioned in a prebuilt frame. This frame is installed in the roadway in much the same manner as is a pressure sensitive detector frame. Wiring is done in much the same manner as in the case of the pressure detector.

(c) The magnetometer is installed in the surface of the roadway by cutting or boring a circular hole large enough to receive the unit (usually 3" to 4") backfill is accomplished with epoxy. Wiring is again similar to the other types of magnetic detectors.

(d) Unusual Installations - On infrequent occasions, non-compensated have been installed vertically on the side of a wooden pole near its base, adjacent to a narrow roadway and have proven satisfactory for detecting single lane movement in one direction. Non compensated units mounted vertically just below the surface of the roadway have also operated fairly well as a spot detector.

Radar detectors using the doppler principle, transmit an electronic signal which is reflected from a passing vehicle, causing the detector to place a call at the controller. Early models of this detector were entirely self contained and installed overhead as a single unit. A later modification, however, have the sensitivity control mounted in a small weathertight box which is located on the pole at any convenient height for easy access.

Installation of the antenna (dome) is almost always overhead, most frequently directly over the lane to be detected or between lanes so as to detect two lanes of traffic moving in the same direction. Reasonably good results can be had in some instances, however, by mounting the antenna on a pole inside the curb line 10 to 14 feet above the roadway surface, but at an angle to the roadway in a side fire effect so as to cover one or two lanes. It is most imperative that the manufacturer's instructions be followed in the installation of this type of detector. The type and size of wire used mounting adjustments, etc. are all critical to the satisfactory operation of the detector. Some electronic servicing and adjustment may be performed only by an FCC licensed technician.

Sonic detectors are functionally the same as radar detectors. Instead of utilizing the doppler radar principle, however, they transmit an extremely high frequency sonic note or beam which when reflected from a vehicle places a call on the controller. The sonic detector is adjustable for beam, length, and width, however, and can be readily used to detect two lanes of traffic. By adjustment of beam length, a limited application vehicle classification function can be accomplished. The sonic transceiver unit and the amplifier/ power supply chassis are separate units.

Installation of the transceiver can be overhead or side of the road mounted in the same manner and for the same application as radar units. The amplifier/power supply is mounted at a convenient location for servicing on the pole supporting the transceiver. Again, as in the case of radar, strict attention should be given to the manufacturer's instructions to assure satisfactory results.

Loop detectors consist of a loop of wire placed in the surface of the roadway connected to an electronic amplifier which in turn is connected to detector terminals in the controller. There are several types of amplifiers available to suit the many varied loop applications. Loop amplifiers are described elsewhere in this manual by type and application. This section will discuss only the installation of the wire loop in the roadway surface.

Loop installation is accomplished by saw cutting the roadway surface to a depth of approximately 2 inches in the size and shape of the loop to be installed. Size, shape, and location of the loop will depend on the application, i.e., multi-lane coverage, left turn pocket, single lane presence, demand loop, etc.

Be sure to cut across all four corners at an angle of 45° to prevent sharp bends in the loop wire and cut a lead slot to the curb line. Fill 1/2" of the slot with sand and lay the wire in. The wire used should be #12 or #14 single conductor solid type TW-THW or UF. The number of turns in the loop will once again depend on the manufacturer's recommendations for the particular loop size and application. When the recommended number of turns have been installed, and the leads carried to the curb, lay in a piece of oakum and pack lightly with a blunt object such as a piece of dowel rod to 1" below the roadway surface. Test the loop at this point for continuity and operational quality.

These tests can be accomplished with a loop test meter which will check all loop characteristics including field strength. If all tests prove satisfactory, backfill the roadway slot with epoxy, plastic, asphalt, cement, or other proven substance, flush to the surface.

Traffic Signal Heads - Traffic signals are available in 8" or 12", what is commonly referred to as, heads. The housing is usually of die cast aluminum, however, a new plastic construction has been used in some 8" signal head designs. Signal body sections are rectangular in design. The size used will depend on intersection location, vehicle approach speeds, and sight distances.

Individual sections may be nested together to form various combinations of indications or in two or more indications (1 way 3 section, 1 way 4 section, 2, 3, or 4 way, etc.) The indication shown to any single direction of traffic or the combinations assembled together for viewing by more than one direction will depend on the physical design of the intersection and the engineered traffic pattern. Care should be exercised to insure that the signal size (diameter), combination of sections, and placement of signals is in accordance with standards set forth in the Uniform Manual on Traffic Control Devices. An improper indication or configuration or a poorly located signal can cause motorist confusion and adversely affect the flow of traffic through an intersection.

Signal lamps are an important factor in providing satisfactory signal indications. The physical size, light center, lumen output, rated wattage and voltage are controlled at the time of manufacture of the lamp.

A lamp selection chart is provided in Section IV of this Manual.

Location of the filament opening is adjustable in the field. This is accomplished by screwing the bulb firmly into the socket and then rotating the socket in the reflector until the filament opening is at the top position.

Lamp focus (distance of filament from base of reflector) is fixed in all signals manufactured since 1959. Older signals, some of which are still in use, permitted focusing adjustment by moving the lamp back or forth in the socket holder. When signals of this type are used, it is important that the lamp socket be properly checked and positioned each time a lamp is replaced.

Signal lens positioning also has an effect on the signal indication and must be checked at the time of signal installation. The design of a traffic signal lens is such that, when properly positioned in the signal with the lamp and reflector, it provides a maximum light output in the proper distribution pattern. Failure to install the lens in the signal with the "TOP" indicator which is cast in the rim of the lens, at the top of the signal body, will provide an unsatisfactory indication.

There are various methods of mounting signal heads. Two or more methods are often used at a single intersection in order to provide the motorist with the best possible indication. Ideally, each lane of traffic should have a distinct indication. Individual signals for each lane cannot always be installed due to restrictions in the method of mounting or the intersection layout. There should always be two indications for each through movement, and a separate indication for each turning lane. The different methods of signal mounting are described below.

Span wire installations are accomplished by supporting a messenger cable or network between two or more poles in a way so as to provide a means of attachment of the signal at the desired location over the roadway.

The span wire should be 3/8" high tensile messenger cable. This and the necessary messenger cable hardware is available from any of several manufacturers of pole line hardware and fittings. The type of hardware will be a matter of individual choice. Messenger dead ends, cable clamps, or spiral wrappings are equally satisfactory.

Referral to a pole line hardware catalog should provide the information required to guide you in your selection.

Either of two means of assembling and hanging the messenger may be used. This choice will depend on the intersection location, volumes of traffic and general work area available.

The actual measurements of each span can be made at the intersection. If existing poles are to be used, their locations must be taken into account, as to final placement of heads.

Signal locations can be spotted on the pavement and the messenger network designed, laid out, and fitted to insure that, when hung, the signals will in fact be where desired.

The messenger network can sometimes be laid out and assembled in a field or open space adjacent to the intersection.

If work conditions will not permit the use of this method, the messenger, if a single span, can be assembled at roadside. This practice can also be employed with multi-legged spans. Each leg is assembled at roadside, the main span installed and additional legs or tie backs installed after the main span is in place.

If conditions will not permit layout at the site, measurements can be taken at the site, or scaled from an accurately drawn intersection plan. The span assembly can then be made up in sections and installed in a similar manner.

In each instance, no messenger end should be permanently tied-off until all signals and cable are in place. Messenger legs should be cut approximately 3 ft. longer than plans indicate to allow for final adjustment and positioning.

The minimum height of the messenger above the roadway must be measured at the crown or highest point of the roadway surface. An allowance of 5% should be made for messenger sag with the messenger drawn up taut. The overall length of each signal, including hardware, and its position on the messenger must also be figured in these calculations in order to insure the required clearance from the roadway to the bottom of the signal.

After the messenger is in place, signals should be hung from the center of the span back towards the poles. The signal or signals nearest the center are hung first.

The bottoms of all signals should be at the same height above the roadway. This is accomplished by the use of pipe extenders on some of the signals between the wire entrance fitting and the signal body. The signal at the center of the span or the first one on eigher side of center will not require an extender provided the messenger is hung at the proper height. From this point back towards the poles on each side of center, however, each signal in line will take a longer extender than the previous one.

The length of these extenders can readily be found. Install the center signal on the span if one is required at this location. If not, hang the first signal each side of center. Draw the messenger up until these are at the desired height above the roadway. At the point of attachment of each of the other signals on this span, measure the distance from roadway to messenger. Allowing for the height of the signal and hardware, subtract this measurement from the messenger height at this point, and the difference is the length of the extender required at this signal location,

When all signals have been installed, re check all hangers and signal attachments to make certain that locknuts and/or other pins are in place.

Signal control cable may be hung on the messenger by the use of spiral wrappings, cable rings, or weather-proof tape. Leave a drip loop in each cable to insure against water traveling along the cable jacket and into the wire entrance fitting on the signal or at the pole. A proper drip loop is one which accomplishes its intended purpose, but which is not so long that it chafes on the top of the signal.

If rings are used to support the signal cable, the cable should be secured to the messenger at the pole end and the signal end of the messenger with a wrapping of tarred lineman's twine or special clamp to insure that the signal cable will not shift.

It is a fairly common practice, in many areas, to lay up two complete turns of signal cable at the point where the drip loop is formed. This permits relocation of the signal along the messenger at a future date, should it be desirable due to road widening or change in traffic patterns at the intersection.

If the messenger is supported on wooden poles, either existing or newly installed, back guys should be installed at the point of attachment to the pole of the signal messenger and against the angle of strain. These should be in place before the signals are hung. Final tie-off of the guy wire should not be done until the entire installation has been completed and all height adjustments made.

Span wire signals are almost always mounted in a vertical manner. For special applications, however, where there might be height restrictions, special mounting hardware is available for horizontal mountings.

There is a growing practice of securing the bottom of all span wire mounted signals with a small diameter messenger cable (usually 3/16" or 1/4") to prevent objectionable swinging of the heads in high wind. This messenger is strung after all signals have been hung and final height adjustments made.

Mast Arm Installations are, as the name indicates, signals suspended from a rigid mast arm. The mast arm itself, as explained in the Pole and Mast Arm portion of this manual, may be either steel or aluminum and may be installed on either a steel, aluminum, or wooden pole.

There are several means available for attaching signals to the mast arm. These vary with the type of arm used, the location of the signal on the arm, the signal configuration, desired height, and if at the end of the arm, whether the signal will be rigidly mounted or free swinging.

End of arm hangers which support the signal at the end of the mast arm vary in design, dependent upon the arm design. In some instances, the end of the arm is turned down to form an integral wire entrance. If so, the signal is suspended from a hanger already attached under the arm.

In other cases, the hanger slips over the end of the arm and is locked in place with set screws. This type hanger includes a wire entrance fitting.

A third type known as an elevator plumbizer, slips over the end of the mast arm and provides a rigid mounting for the signal. This device is used when additional roadway clearance is required. One or more signal sections are mounted above the mast arm, the plumbizer being fitted between signal sections.

There are bracket assemblies available from all manufacturers for mounting multiple head assemblies (2, 3, 4 way) on mast arms. When used, the signal assembly is first completed and then hung from the arm.

Signal mountings along the length of the arm may be rigid or free swinging. Exceptions would be those mounted between or against longitudinal members of truss type arms or on trombone arms. In most cases, pipe fittings for inboard mounting on truss type arms must be made up at the installation site. Only if exact signal heights and measurements are known can this hardware be made up in advance. Hardware for trombone arm installations is available from most signal manufacturers.

Bracket mounted signals are those which are mounted on the side of poles or pedestals of all types. Bracket assemblies are available from most manufacturers for two, three and four way assemblies on wood, metal, or concrete poles and pedestals.

An increasingly common practice is to secure these assemblies to the pole with stainless steel banding. This simplifies the installation and affords an installation which is neat in appearance. If this method of installation is to be used, mounting plates designed for this purpose will be required.

Extreme care should be exercised in the placement of bracket mounted signals. The motorist and pedestrian must have an unrestricted view of the indication or indications which are intended to control their movement. In addition, the signals must be located so as to insure against physical damage from passing vehicles.

Mounting hardware may be either 1-1/2 pipe or cast aluminum brackets, both types being readily available.

Pedestal mounted signals are supported on top of the pedestal by means of a slip fitter device. This may be cast aluminum, malleable iron, or bronze, drilled and tapped for standard hardware. Some manufacturers offer an integral slip fitter which provides a terminal compartment.

When ordering signals for this method of installation, it is important to include the slip fitter and identify the type in any equipment description. The signal manufacturer may not supply one if you fail to do so.

Care should be taken to insure good signal visibility, adequate clearances for passing vehicles, and over sidewalk clearances for pedestrians.

Standard 1-1/2" pipe hardware is normally used. Cast aluminum hardware fittings are available if desired.

Pedestrian Signals - Pedestrian signals may be classified generally, as either incandescent or neon. Within these two broad classifications, there are several variations with regard to physical size, body construction and light source details.

One incandescent pedestrian signal, now considered obsolete, could be affected by removing the vehicle signal lens from either an 8" or 12" signal section and substituting a round WALK, or DON'T WALK lens in its place.

Incandescent pedestrian signals still popular in some areas are a further modification of standard 8" or 12" vehicle signal bodies. These offer a square 9" or 12" pedestrian indication and are offered as complete units by signal manufacturers.

Both of the above types require two standard traffic signal bodies to provide a complete pedestrian (Walk-Don't Walk) indication and use standard traffic signal lamps, color of the particular indication being a function of the lens.

Pedestrian signals of a later design and more widely accepted are those which incorporate both indications (Walk-Don't Walk) in a single body. These may be either incandescent or neon lighted in several size combinations up to 14" x 24".

Legend control (Walk-Don't Walk) and color of this type of signal is accomplished by alternately lighting various combinations of incandescent lamps or neon grids. WALK indications require the lighting of a single incandescent lamp or neon grid of the appropriate color in the lower section of the signal. A DON'T WALK indication requires the lighting of lamps or grids of appropriate colors in both top and bottom sections.

Electrical interconnection of WALK and DON'T WALK indications prevents false indications.

There are variations of this pedestrian signal which employ formed neon letters and neon grid with lettered lenses.

Lane Control Signals - Lane control signals are used for directing the flow of traffic into specific lanes at times when there is an exceptionally heavy flow in one direction on a two-way street while the opposing flow is relatively light. As an example, a three-lane roadway might be used to provide two lanes in one direction and a single lane in the opposite direction at certain periods of the day. The signals used for this application may be adaptations of the various types of vehicle or pedestrian signals described above or they may be a single body matrix signal designed especially for this use. This signal provides either a green arrow indicating "lane open" or a red "X" indicating "lane closed".

Lane signals must be installed over the individual lanes which they control and in strict accordance with the Manual on Uniform Traffic Control Devices.

In addition, any lane control system should incorporate advisory signing well in advance of the beginning of the system to condition the vehicle operator for the situation ahead.

Signal Hardware and Accessories - All manufacturers provide standard 1 1/2" pipe hardware and fittings for signal assembly. Some supply similar fittings in aluminum. In addition, there are several variations of signal brackets and fittings available in cast aluminum. Many of these, especially pedestal or bracket mountings, offer integrally cast terminal compartments for ease and neatness in wiring signals.

There are many special hardware and accessory items available from signal manufacturers. Some of which offer easier installation or servicing procedures. The more widely used of these items are listed herein and are shown in detail in other parts of this Manual.

(a) Back plates are available for use withall 8" or 12" signals. They add to the visibility of the signal by increasing its target value when viewed against a background of bright sunlight or skyline, high intensity street lighting or in areas of brightly lighted advertising signs.

(b) Balance adjuster linkage is used with free hanging span wire or mast arm mounted two, three, or four-way signals when the weight distribution is uneven due to various combinations of signal sizes or sections.

(c) Disconnect hangers incorporate a means of quickly removing span wire or mast armmounted signals, two cable entrances and a terminal compartment. They are standard equipment in some areas which experience frequent hurricanes.

(d) Elevator plumbizers are used on the ends of mast arms to provide greater road way clearance under signals than can be accomplished by normal means. The unit slips over the end of the mast arm and signal sections are attached both above and below the fitting.

(e) Hardware fittings, crosses, elbows, tees for 1 1/2" pipe hardware, are available in various combinations of one or more slip-fit (no thread) ends. These simplify hardware make-up and installation. Others are available with serrated ends to provide a positive locking surface for signal positioning.

(f) Louvers of several configurations are available in varying degrees of cut-off. These slip inside a tunnel visor and when properly positioned limit the lateral viewing angle of a signal indication. They are especially useful when it is necessary to restrict the view of a turning lane indication.

(g) Pole clamps of either ornamental or plain design are available with single hubs or with various combinations of dual hubs and for several pole diameters.

(h) Pole flanges or saddles are also available for flat or curved surfaces, wood or metal poles, and can be bolted, clamped, or strapped to the pole.

(i) Signal visors of several configurations and lengths are also available for special applications.

Traffic Signal Controllers - All traffic signal controllers and controller accessories from the simplest 2-phase, pre-timed intersection controller to the most complex 8-phase (quad left turn) controller should be thoroughly inspected and electrically tested in the shop before it is placed in operation at the intersection. For electromechanical controllers, the visual inspection should include a check of all major components for any obvious signs of possible mechanical mage or malfunction. Dial units and cam shafts should be rotated manually before electric power is applied and with the dial gear train disengaged in accordance with the manufacturer's instructions. A similar visual examination should be made of accessories such as time switches, special purpose timers, etc.

Electronic control equipment should undergo similar visual inspections to detect any signs of physical damage. Examination of solid state equipment will be limited to a check of printed circuit boards, connectors, and various plug-in modules for visual evidence of damage.

Electrical inspection and run-in of the equipment should begin only after visual checks have been completed.

The controller and any accessory items of a control nature, such as minor movement timers, overlap timers, pedestrian interval timers should be placed in the controller cabinet and connected.

With power applied all controller functions should be tested to ascertain that the controller operation is in accordance with specifications and the intersection requirements. Instruction manuals, controller warning diagrams and intersection diagrams should be on hand for ready reference. Electrical loads should be applied on all signal circuits to simulate anticipated field conditions as closely as possible.

In the case of actuated equipment, detectors or detector amplifiers should not be connected at this time, but should be tested separately. Detector applications can be simulated by the use of an automatically timed switching device. Placing the various controller phases in a "Recall" condition will not accurately reproduce field conditions in all types of actuated equipment. If the controller is to be operated as an interconnected unit within a system, the controller should be tested for satisfactory performance of all system functions.

In the case of actuated equipment to be used in a system, the coordination equipment should be tested with the controller at this time to insure satisfactory field performance.

Several manufacturers offer items of test equipment which can be extremely helpful in performing these tests.

After all electrical operational tests have been completed, timing accuracy tests should be performed. The settings of the timed intervals of each phase of the controller should be checked. With pretimed electro-mechanical equipment, this requires a visual check of the various dial keys for proper placement and another to insure that the desired cycle gear is in place in each dial unit and that there is no binding in the gear train.

Actuated equipment requires more extensive timing accuracy tests. Each timed interval must be checked through several settings with a stop watch. The results of these checks should be written down so that comparisons can be made both for total timing accuracy and accuracy at various settings.

Solid state equipment is generally accepted as being the most accurate of all electronic timing devices. This acceptance should not preclude testing for timing accuracy, however, since these tests may provide an early disclosure of possible serious field troubles at a later date.

After all electrical spot testing and timing checks have been completed, the equipment should be placed in a fully operating condition uninterrupted for at least 48 hours or longer, if possible, before installing in the field. Again, dummy loads should be placed on all signal circuits to simulate field conditions. During this period, the equipment should be observed as frequently as possible to make certain that it is operating as required.

For these tests, a light board or panel should be used. This panel should depict as closely as possible the intersection layout and traffic movements (controller phases). Individual boards of this type may be purchased from the equipment manufacturers or they may be made up in the shop.

When all shop tests have been completed, the controller and accessory equipment should be placed in the previously installed cabinet or cabinets at the intersection. After all field wiring has been thoroughly checked, the control equipment should be plugged into the cabinet wiring and power applied. Final field tests must then be run by checking all controller functions.

At the more complex actuated intersections, these checks may require that several personnel be on hand in order that all functions and signal indications may be observed simultaneously.

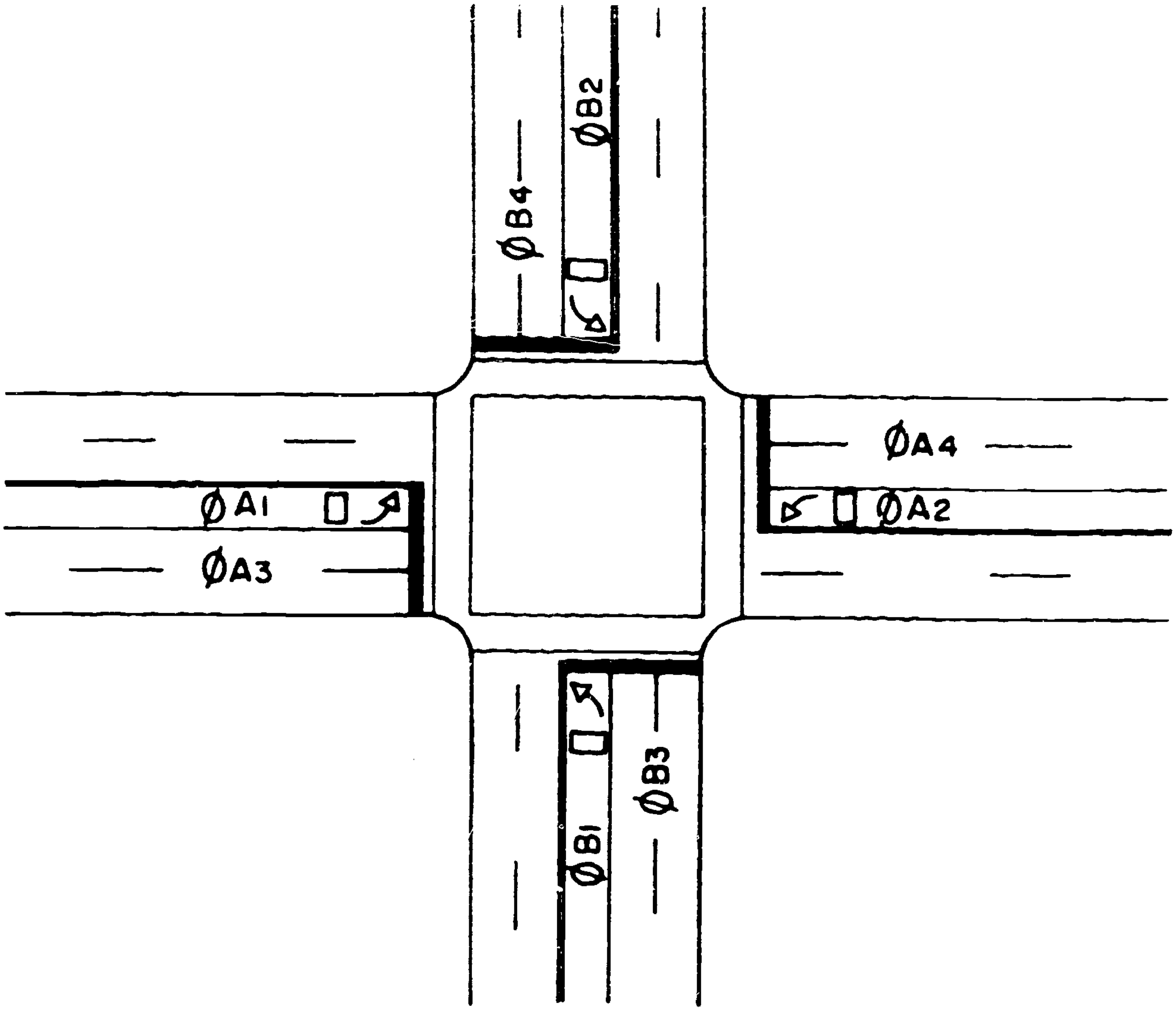
Good practice requires that for several days after the installation has been completed, spot checks be made at various times of the day to see that the equipment is functioning satisfactorily in accordance with design requirements and that it is moving traffic safely and efficiently. It may be found during this period, that minor timing adjustments are possible to further improve the equipment's effectiveness.

TYPICAL LEGEND

DESCRIPTION	EXIST.	PROP.
Signal pole	○	●
Pedestal	◌	○
Mast and arm	○═══	●═══
Traffic signal	□▷	■▶
Pedestrian signal	□▷	■▶
Pedestrian detector on pole	→▷○	→▶●
Vehicle detector (pressure)	▨	▨
Vehicle detector (loop)	⬚	⬚
Controller	⊠	⊠
Traffic sign	⊤	⊤
Signal section	R	R
Material item number	⑥	⑥
Signal face number	[5]	[5]
Pole number	⟨A⟩	⬡A
Fire hydrant	♉	♉
Power pole	─◇─	─◆─
Telephone pole	─○─	─●─
Combination pole	─◆─	─◆─
Light standard	☼	☼
Water meter	◻	□
Guy and anchor	------)	——)
Manhole or Pullbox	◎	●
Catch basin or inlet	☐ ⌒	[D] ⌒
Pavement markings	------	——
Signal cable on spanwire	═══	═══
Signal cable in conduit	—.—.—	—.—.—
Electric cable , overhead	---OE---	—OE—
Electric cable , underground	---BE---	—BE—
Electric duct	≡≡EL≡≡	≡≡EL≡≡
Telephone cable , overhead	---OT---	—OT—
Telephone cable , underground	---BT---	—BT—
Telephone duct	≡≡TEL≡≡	≡≡TEL≡≡
Gas main	---6"GM---	—6"GM—
Water main	---6"WM---	—6"WM—
Storm sewer	==◀12"==	——◀12"
Sanitary sewer	---6"SAN---	—6"SAN—

TYPICAL LEGEND

DESCRIPTION	EXIST.	PROP.
Centerline (physical)	—— - ——	—— - ——
Right-of-way	—— -- ——	—— -- ——
Limited access	-/-/-/-	-/-/-/-
Edge of pavement	—— —— -	————
Sidewalk	= = = = =	═════
Curb and gutter	≡ ≡ ≡ ≡ ≡	≡≡≡≡≡
Curb	= = = = = = =	═══════
Driveway or turnout	- - - - - - - -╯ - - - - - - - -╮	————╯ ————╮
Loop terminal cabinet	◪	■
Right of way		R/W
Controller phase		Ø
Clearance		CL
Green indication		G
Yellow indication		Y
Red indication		R
Don't Walk		DW
Walk		W
Flashing signal		F
Green arrow (Left Turn)		←
Green arrow (Right Turn)		→
Thru arrow		↑
Turn sign		T
No Left Turn sign		NL
No Right Turn sign		NR
No Turn sign		NT
Low Point Clearance		LPC 0.00
Signal face number with Programmed Optics	◁8	◀8

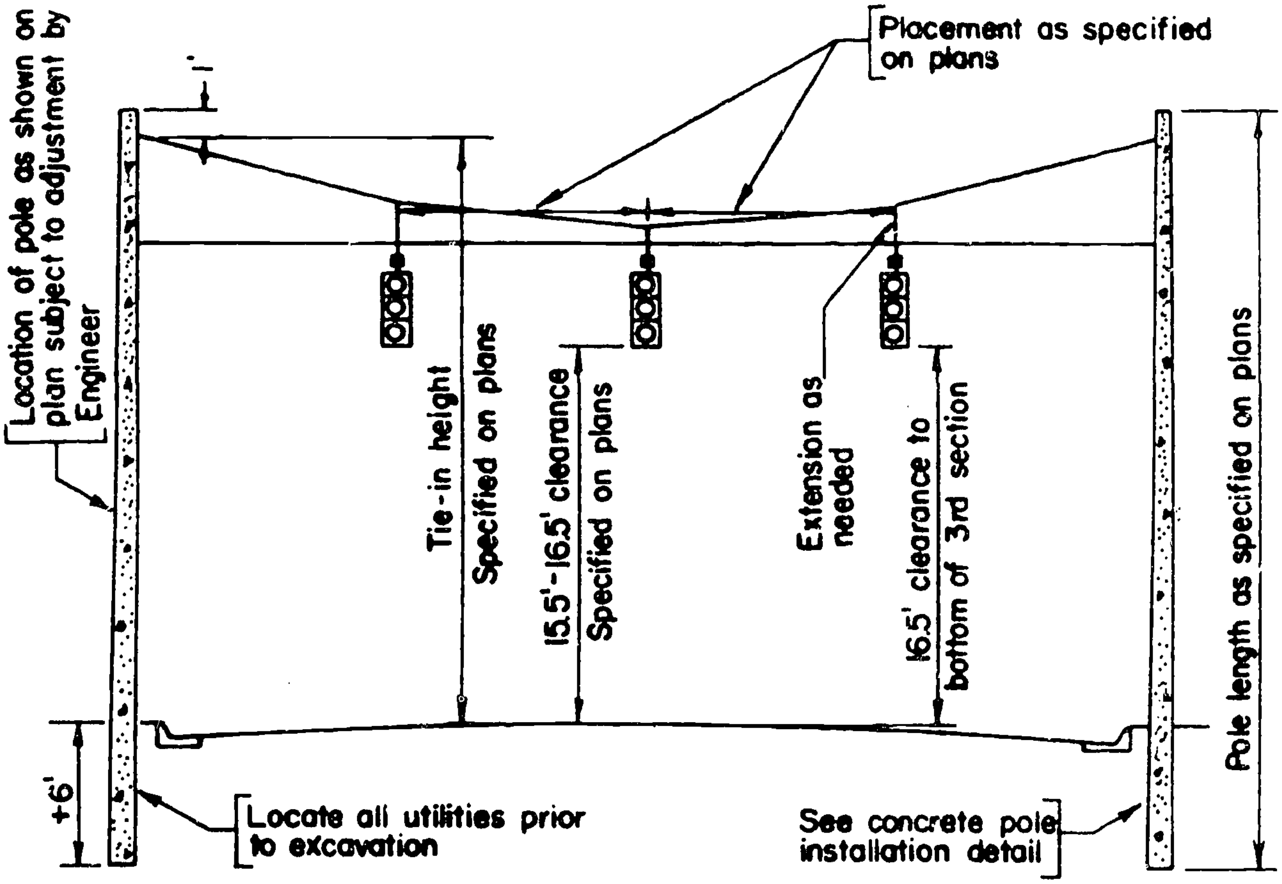


Note

When an exclusive pedestrian phase is specified it will follow phase A and be indicated as phase B.
If this occurs the minor street will be indicated as phase C.

TYPICAL PHASING DETAIL

NO SCALE



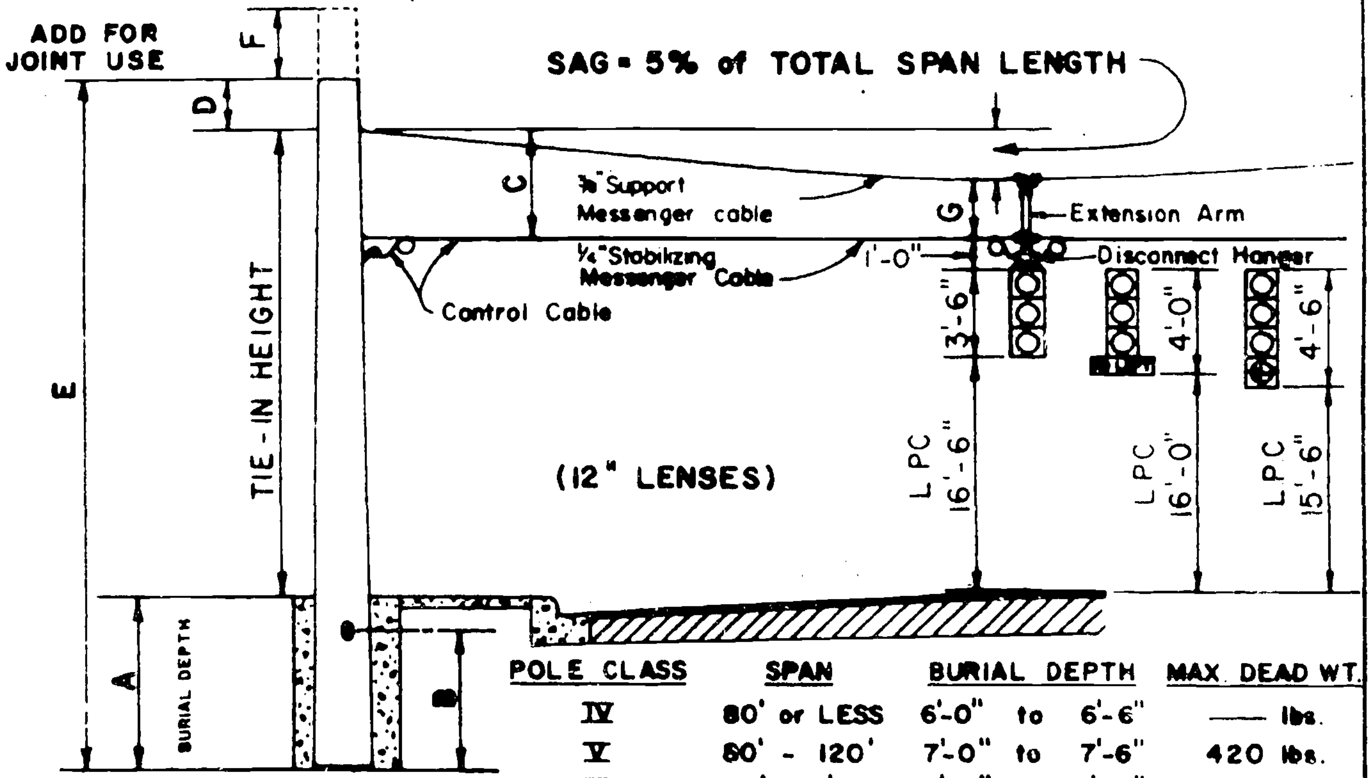
Notes

1. Tie-in height based on 5% sag.
2. Poles to be raked according to manufacturer's recommendations.

DEFINITION OF DIMENSIONS

NO SCALE

CALCULATIONS FOR SPAN WIRE SUSPENSION AND POLE PLACEMENT



POLE CLASS	SPAN	BURIAL DEPTH	MAX. DEAD WT.
IV	80' or LESS	6'-0" to 6'-6"	—— lbs.
V	80' - 120'	7'-0" to 7'-6"	420 lbs.
VI	120'-160' max.	8'-0" to 8'-6"	600 lbs.

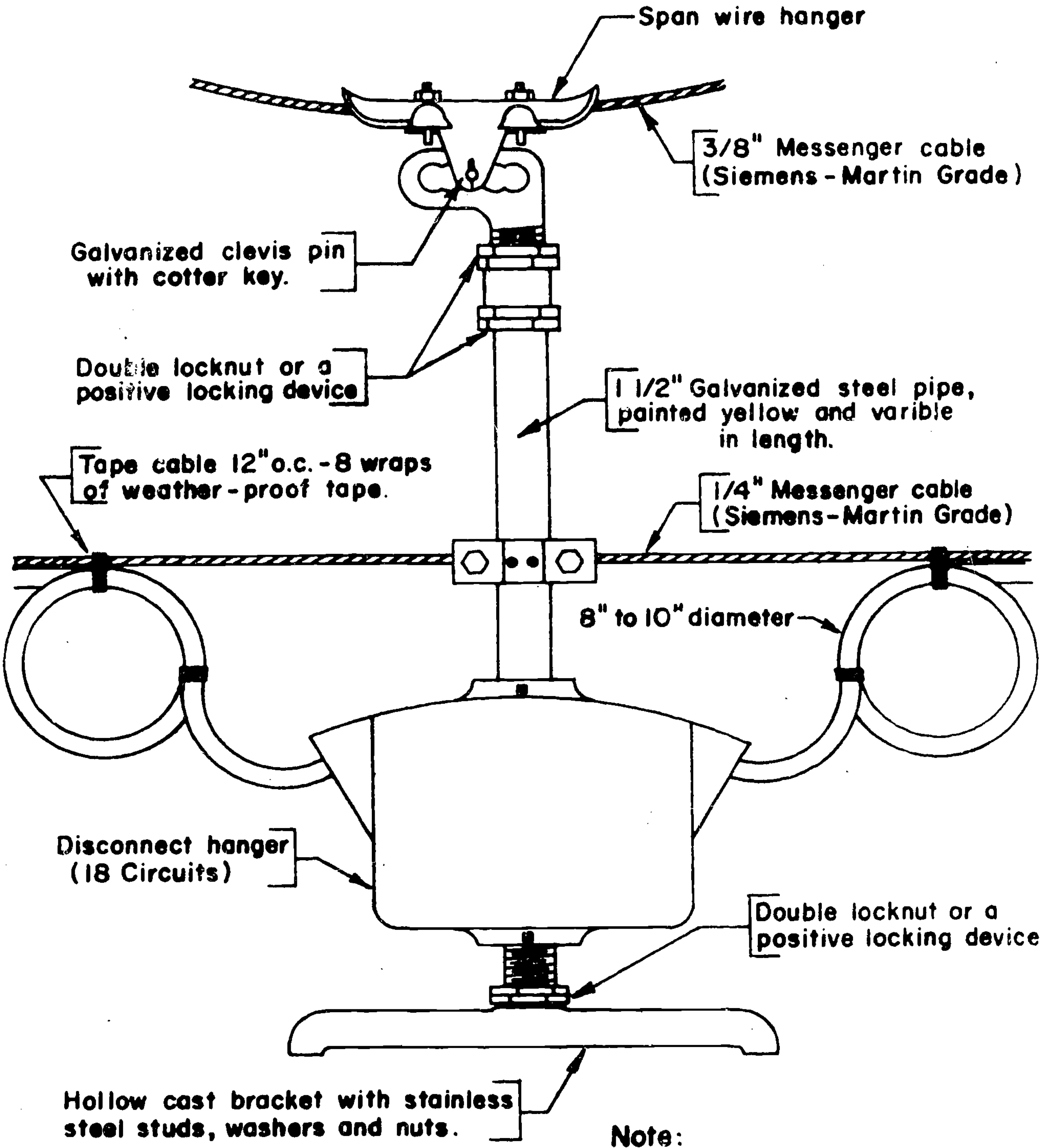
CALCULATION DATA

TO DETERMINE TIE-IN HEIGHT ABOVE STREET: ADD 22'-0" to 5% of TOTAL SPAN LENGTH

TYPE OF SIGNAL (12" LENSES)	LOW POINT CLEARANCE	LENGTH OF SIGNAL	DISCONNECT HANGER	EXTENSION ARM at L.P.C.	TIE-IN HEIGHT ABOVE STREET
3 SECTION	16'-6"	3'-6"	1'-0"	1'-0"	22'-0" + 5% of TOTAL SPAN
3 SECTION WITH TURN RESTRICTION SIGN	16'-0"	4'-0"	1'-0"	1'-0"	22'-0" + 5% of TOTAL SPAN
4 SECTION	15'-6"	4'-6"	1'-0"	1'-0"	22'-0" + 5% of TOTAL SPAN

LEGEND

A = BURIAL DEPTH
B = A MINUS 1.5'
C = SAG PLUS 1.0'
D = VARIES 1.0' to 2.0'
E = TIE-IN + A + D (EVEN LENGTH USING D)
F = VARIES 2.0' to 5.0' TO BE DETERMINED BY UTILITY COMPANY CLEARANCE REQUIRED.
G = 1.0' - IN EXTREME CASES EXTENSION CAN BE REDUCED TO 6".



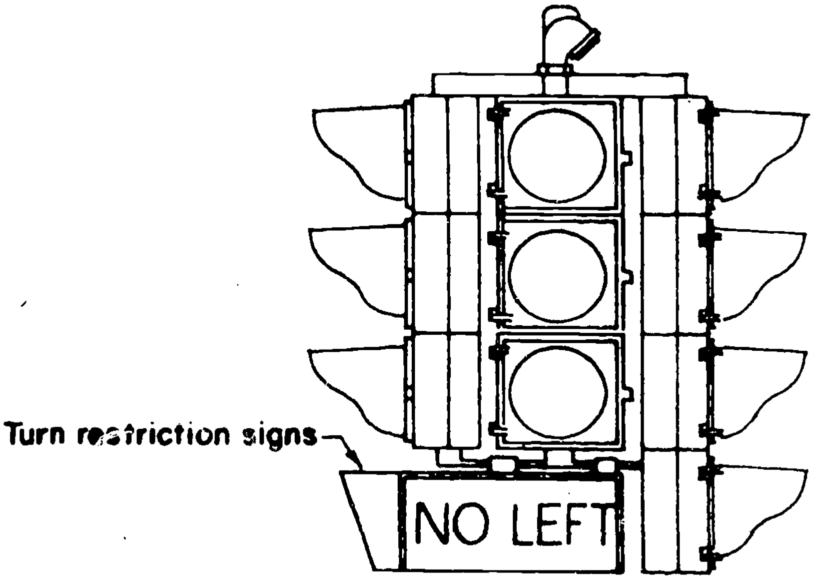
Note:

1. Assemble according to manufacturers recommendations.

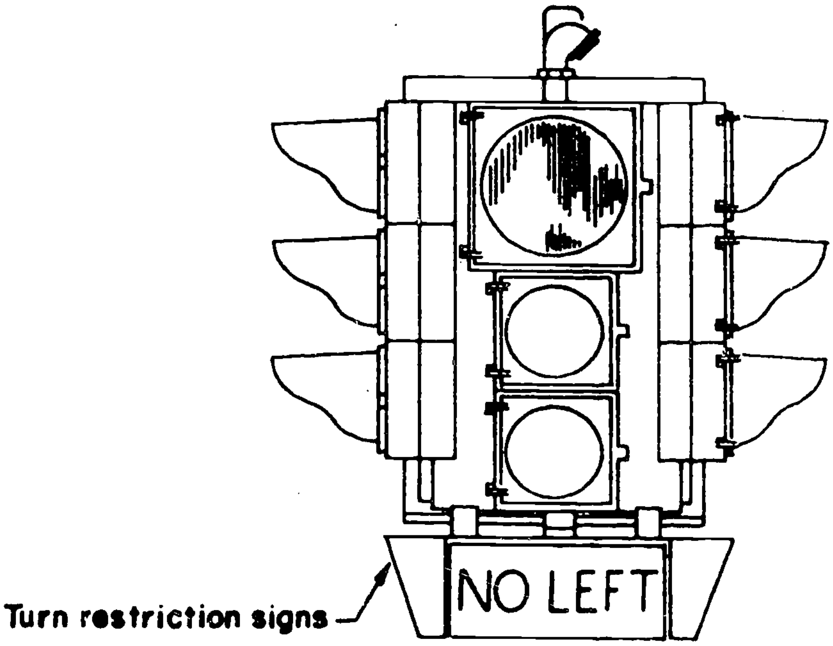
TYPICAL MESSENGER CABLE SIGNAL MOUNTING

NO SCALE

4 WAY 3 SECTION SIGNAL WITH 1 EXTRA SECTION 1 WAY

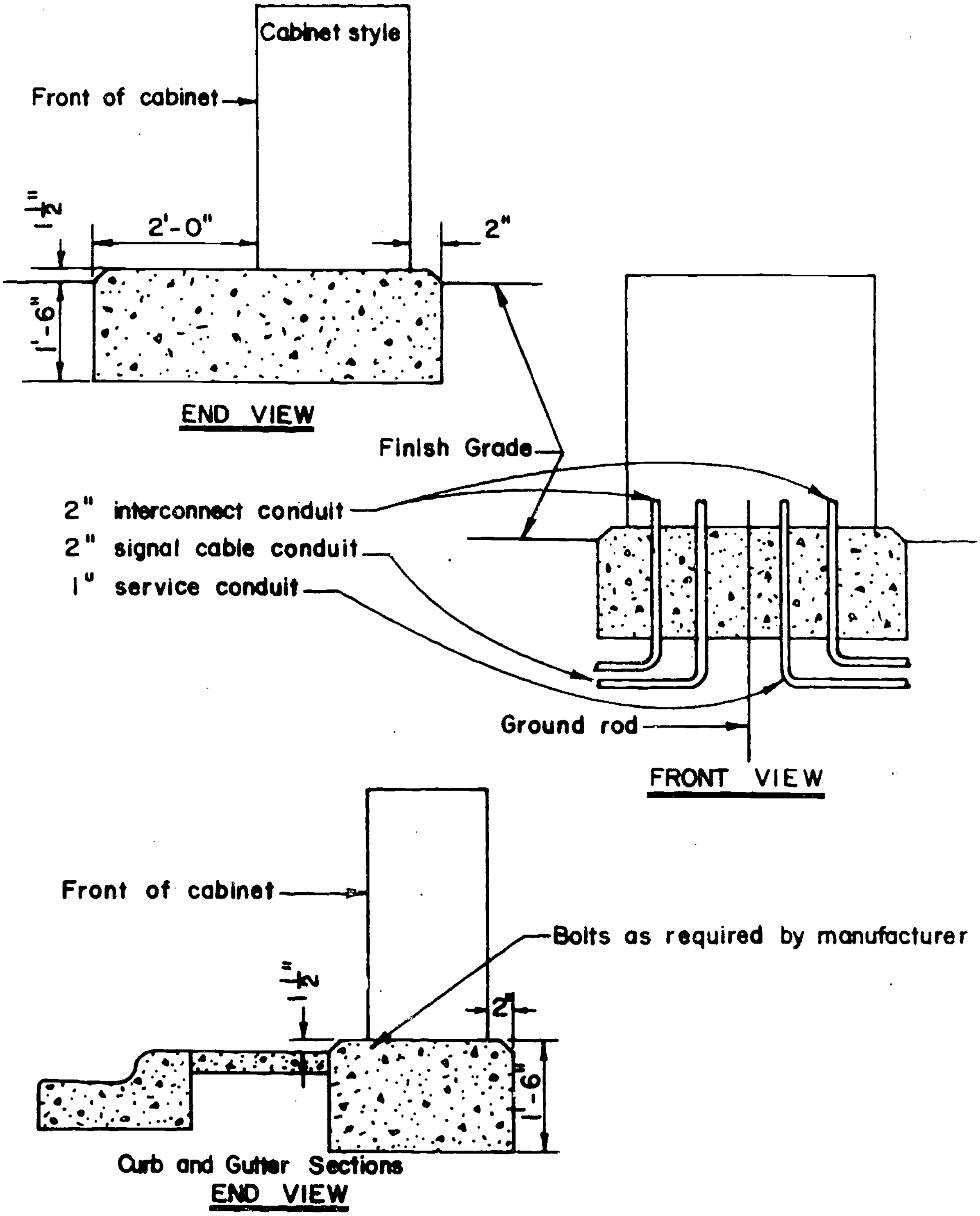


4 WAY 3 SECTION SIGNAL WITH 12" RED SECTION



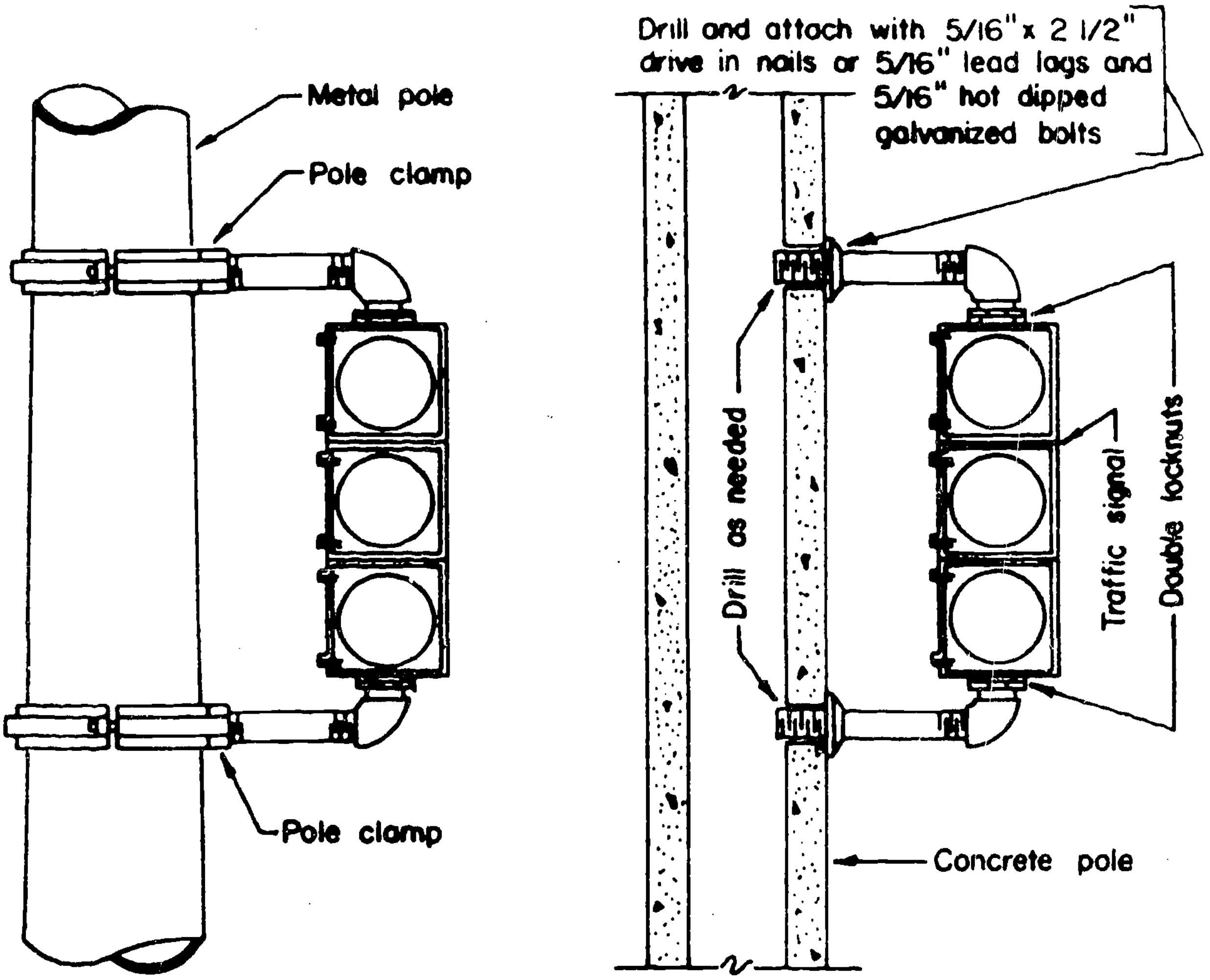
TYPICAL RESTRICTION SIGN ASSEMBLY

NO SCALE



TYPICAL CONTROLLER MOUNTING FOUNDATIONS

NO SCALE



STEEL POLE MOUNTED TRAFFIC SIGNAL

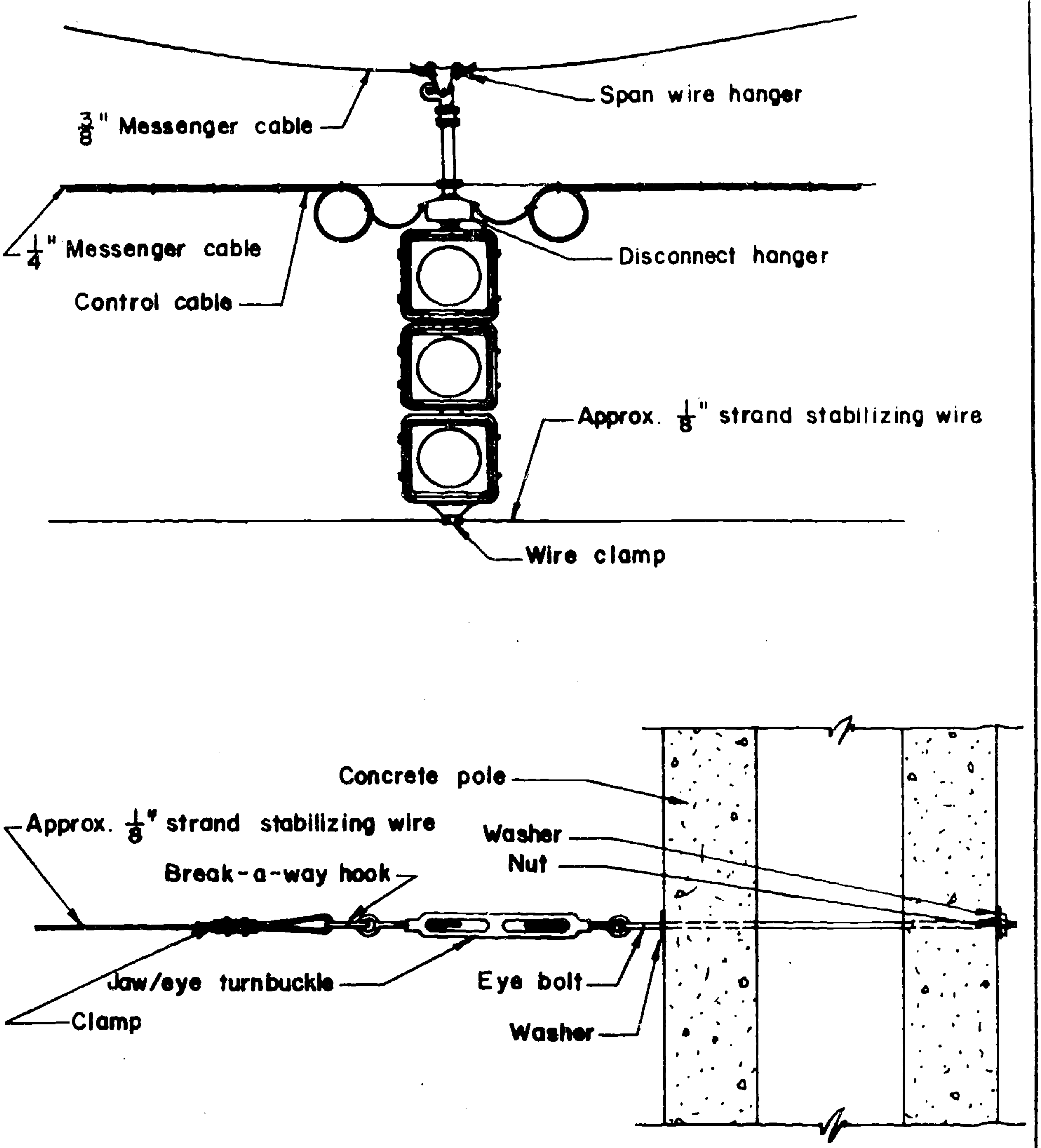
CONCRETE POLE MOUNTED TRAFFIC SIGNAL

Notes:

1 - Provide 8' to 10' clearance from signal to surface.
2 - Ramset installation not acceptable on poles.
3 - Assemble signal according to manufactuer's recommendations

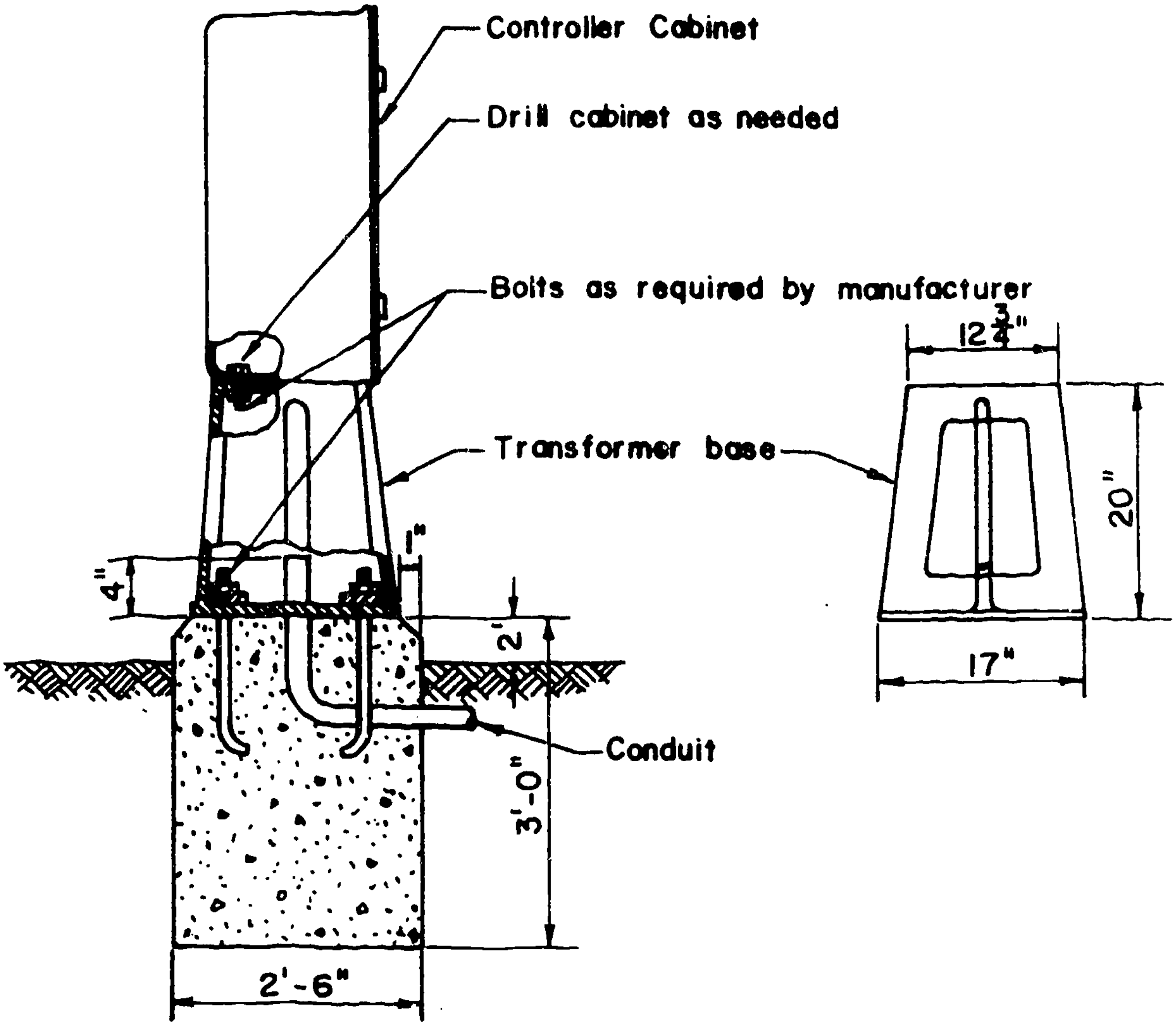
TYPICAL TRAFFIC SIGNAL MOUNTING

NO SCALE



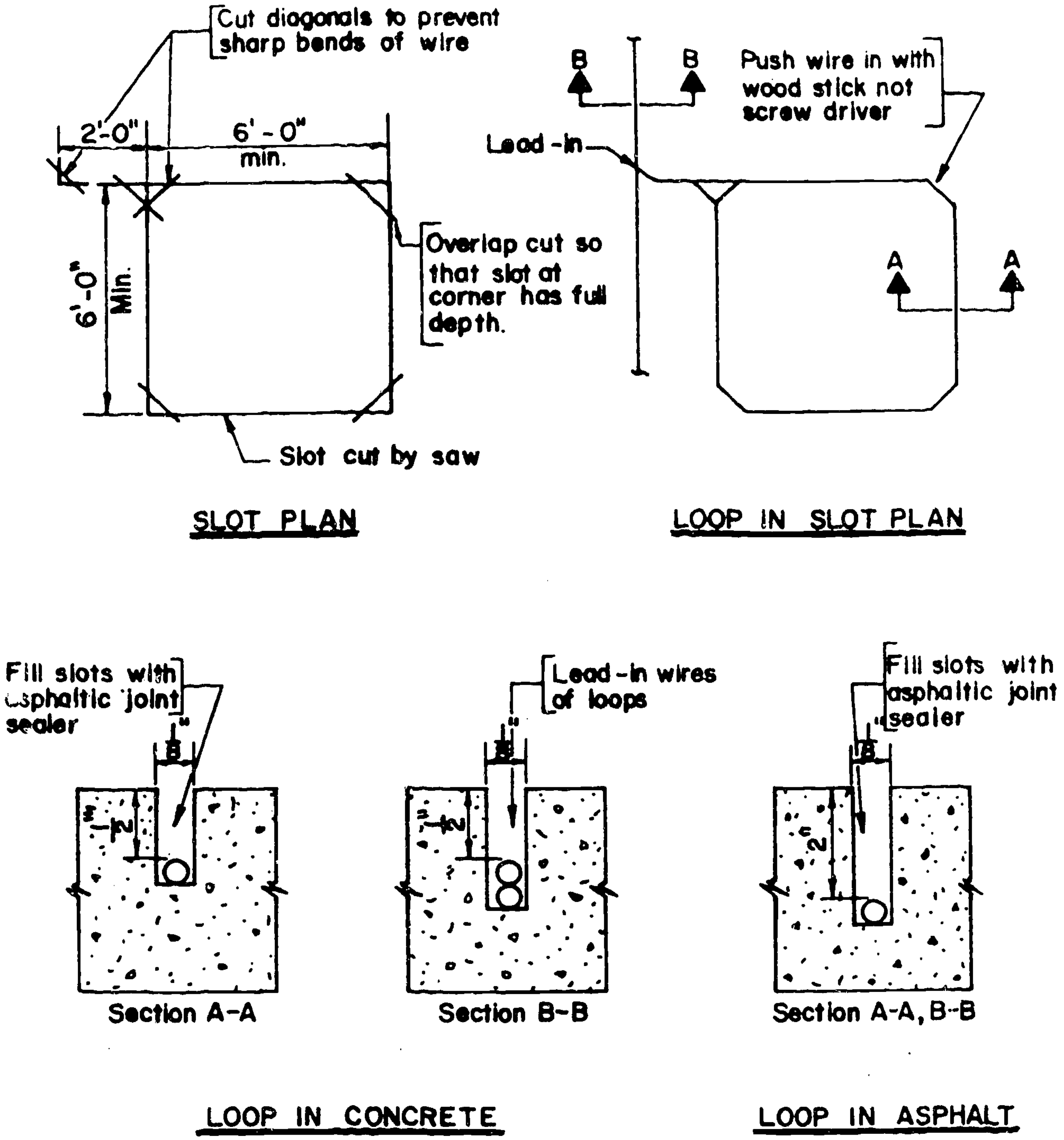
TYPICAL SUSPENSION DETAILS FOR OPTICALLY PROGRAMMED TRAFFIC SIGNAL

NO SCALE



TYPICAL CONTROLLER MOUNTING FOUNDATION

NO SCALE

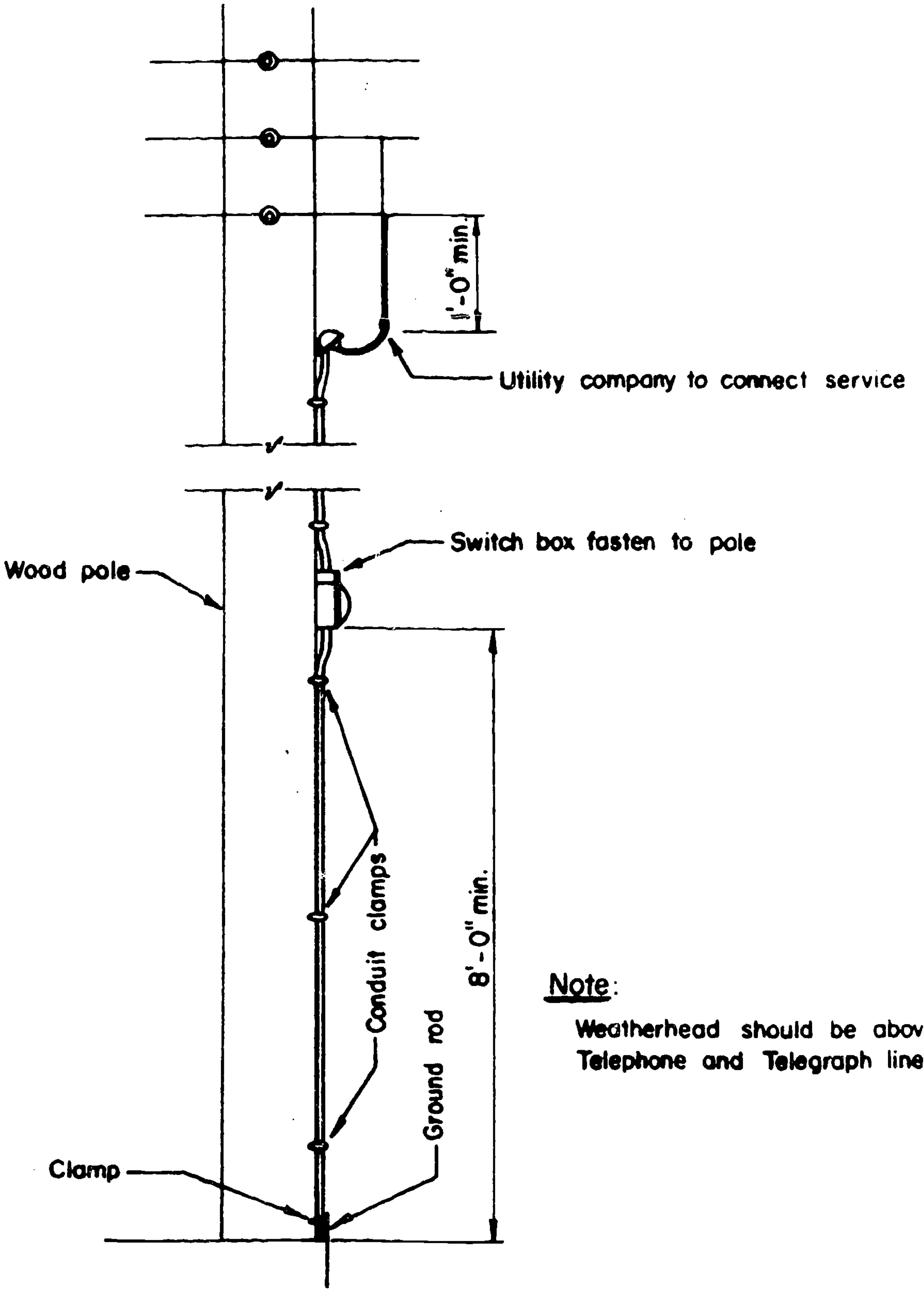


Note:

1. Number of loops according to manufacturer's recommendations.

TYPICAL LOOP DETECTOR INSTALLATION

NO SCALE

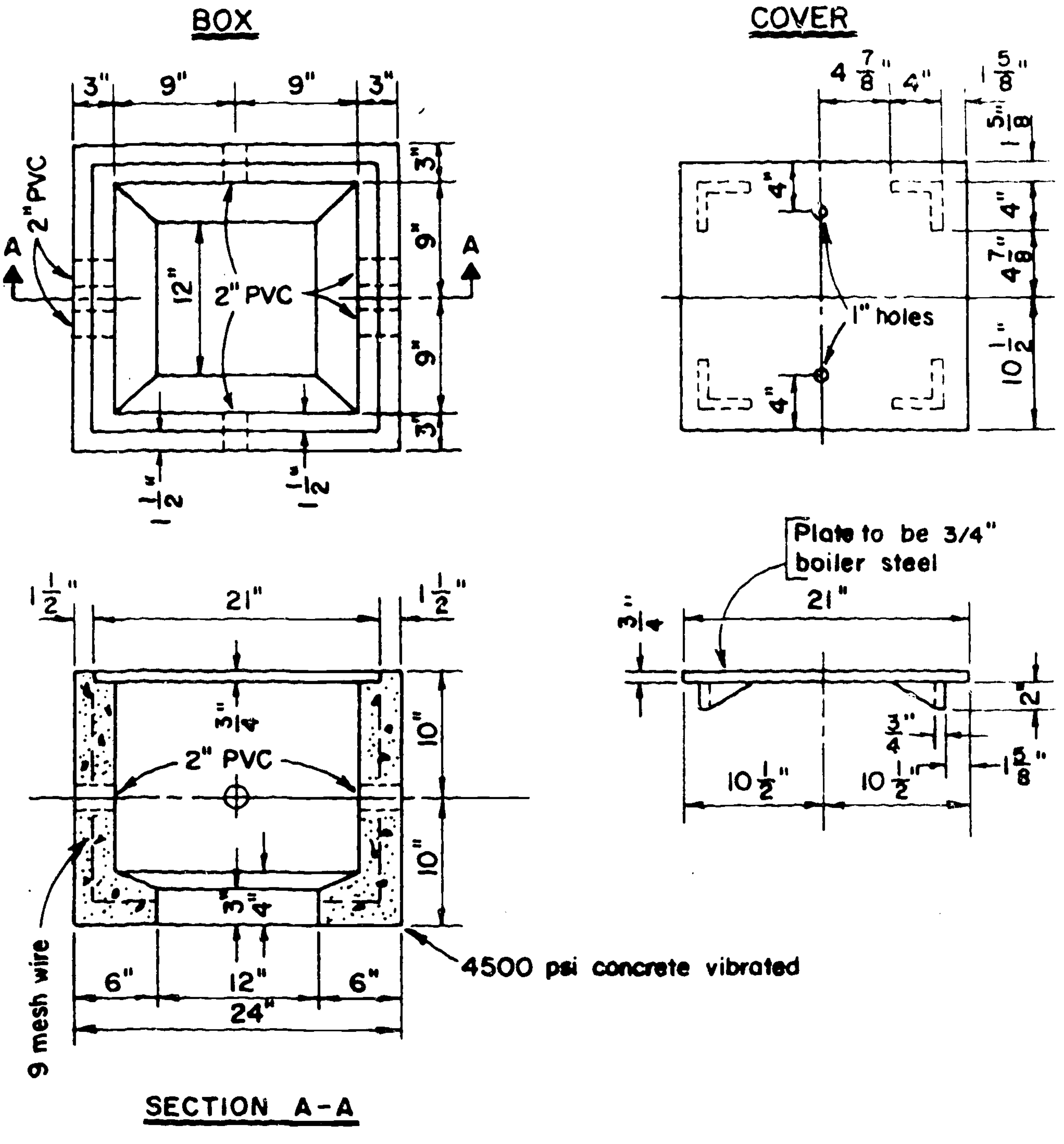


Note:

Weatherhead should be above Telephone and Telegraph lines.

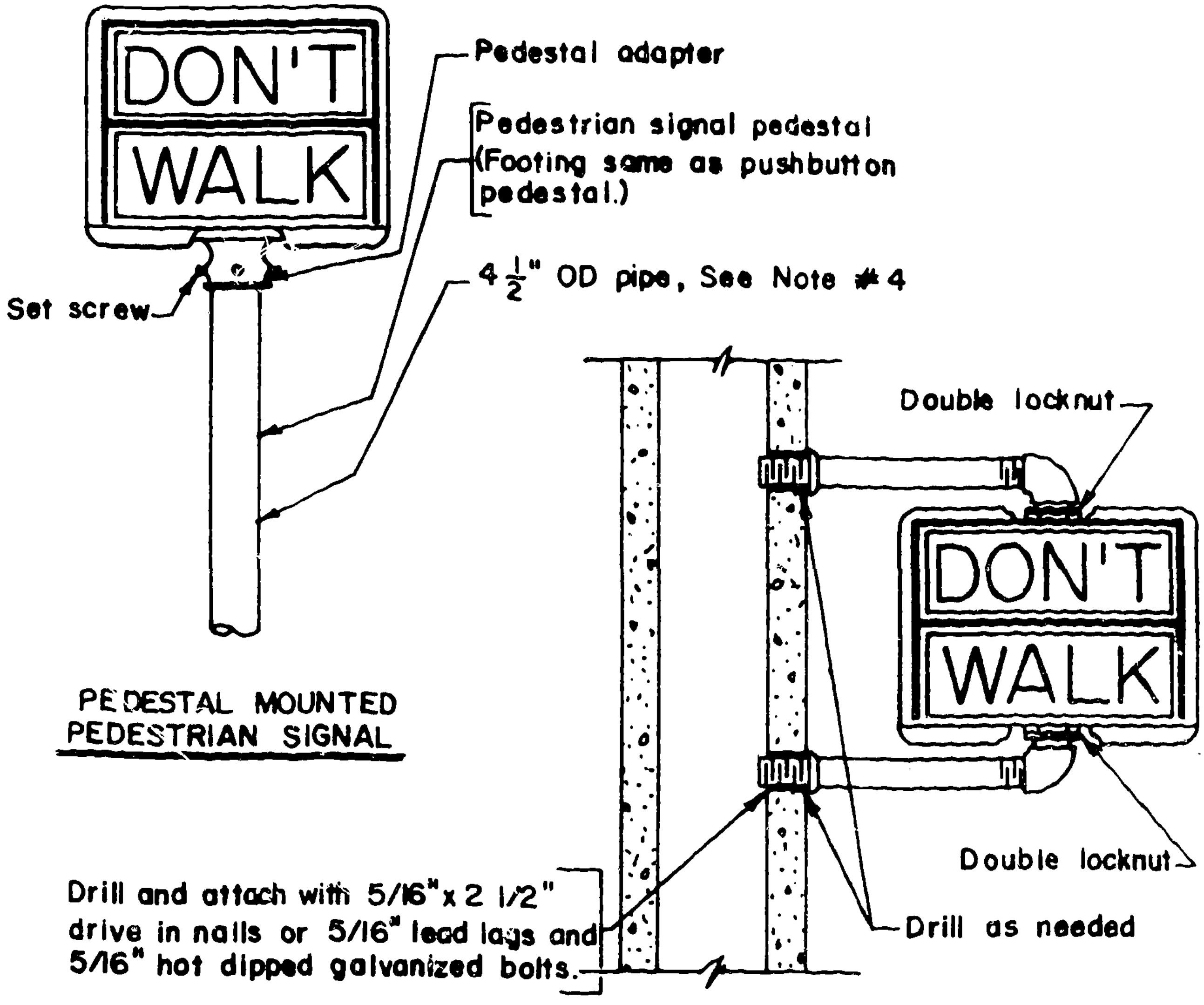
TYPICAL ELECTRICAL SERVICE INSTALLATION

NO SCALE



TYPICAL TRAFFIC TYPE PULL BOX DETAIL

NO SCALE



PEDESTAL MOUNTED PEDESTRIAN SIGNAL

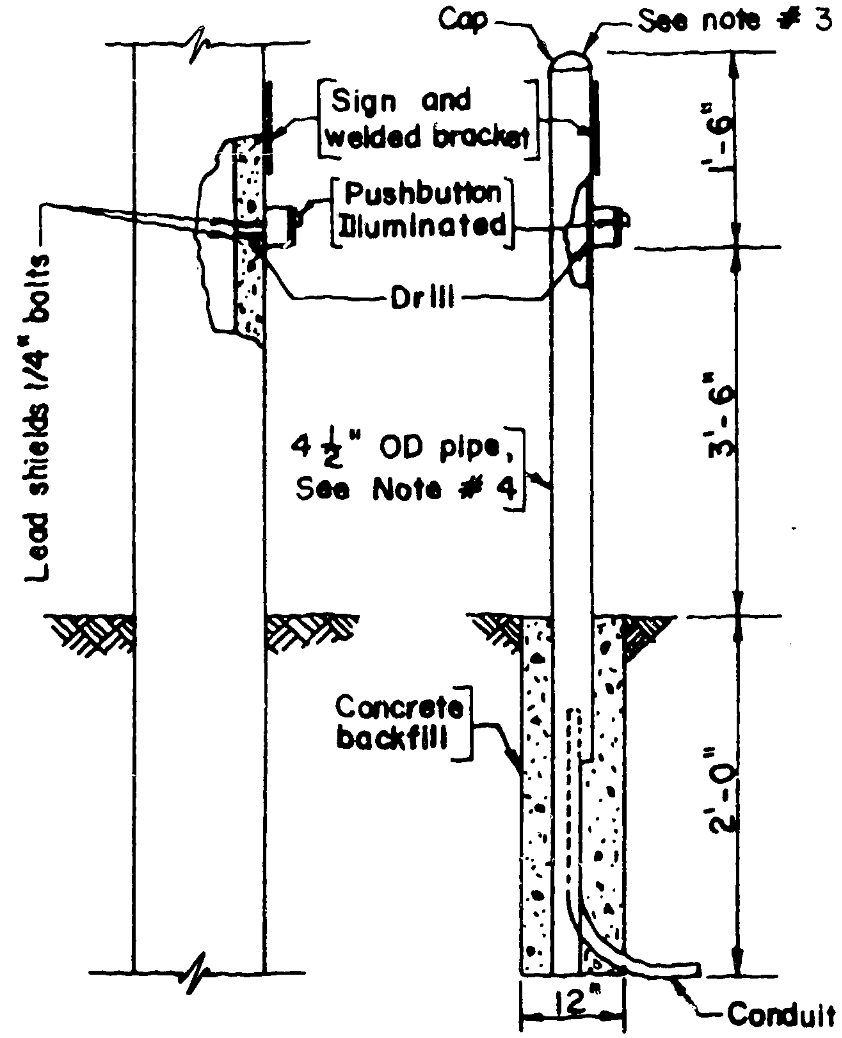
CONCRETE POLE MOUNTED PEDESTRIAN SIGNAL

Notes:

1. Provide 8' clearance from signal to surface.
2. Ramset installation not acceptable on poles.
3. Assemble signal according to manufacturer's recommendations.
4. Untested water pipe, one coat of magnum primer and two coats of aluminum paint.

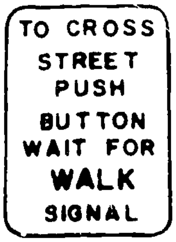
TYPICAL PEDESTRIAN SIGNAL MOUNTING

NO SCALE

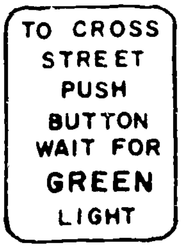


CONCRETE POLE

PUSHBUTTON PEDESTAL



Sign with Pedestrian Signal



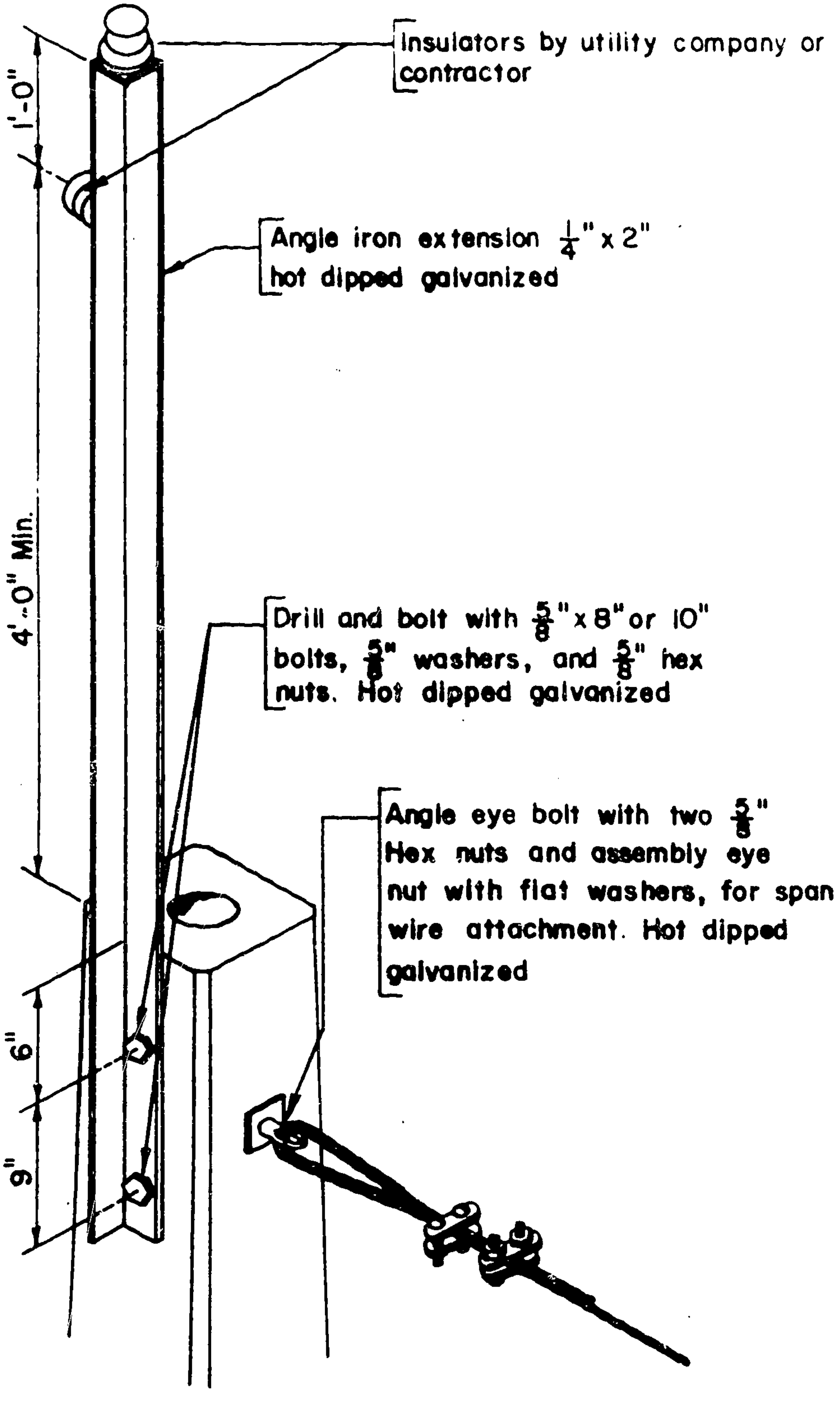
Sign with No Pedestrian Signal

Notes:

1. Fasten pushbutton and sign with appropriate fastener, drilling, etc. as necessary.
2. Ramset installation not acceptable on poles
3. Extend for pedestrian signal as required
4. Untested water pipe, one coat of magnum primer and two coats of aluminum paint.

TYPICAL PUSHBUTTON INSTALLATION

NO SCALE



Insulators by utility company or contractor

Angle iron extension $\frac{1}{4}$" x 2" hot dipped galvanized

Drill and bolt with $\frac{5}{8}$" x 8" or 10" bolts, $\frac{5}{8}$" washers, and $\frac{5}{8}$" hex nuts. Hot dipped galvanized

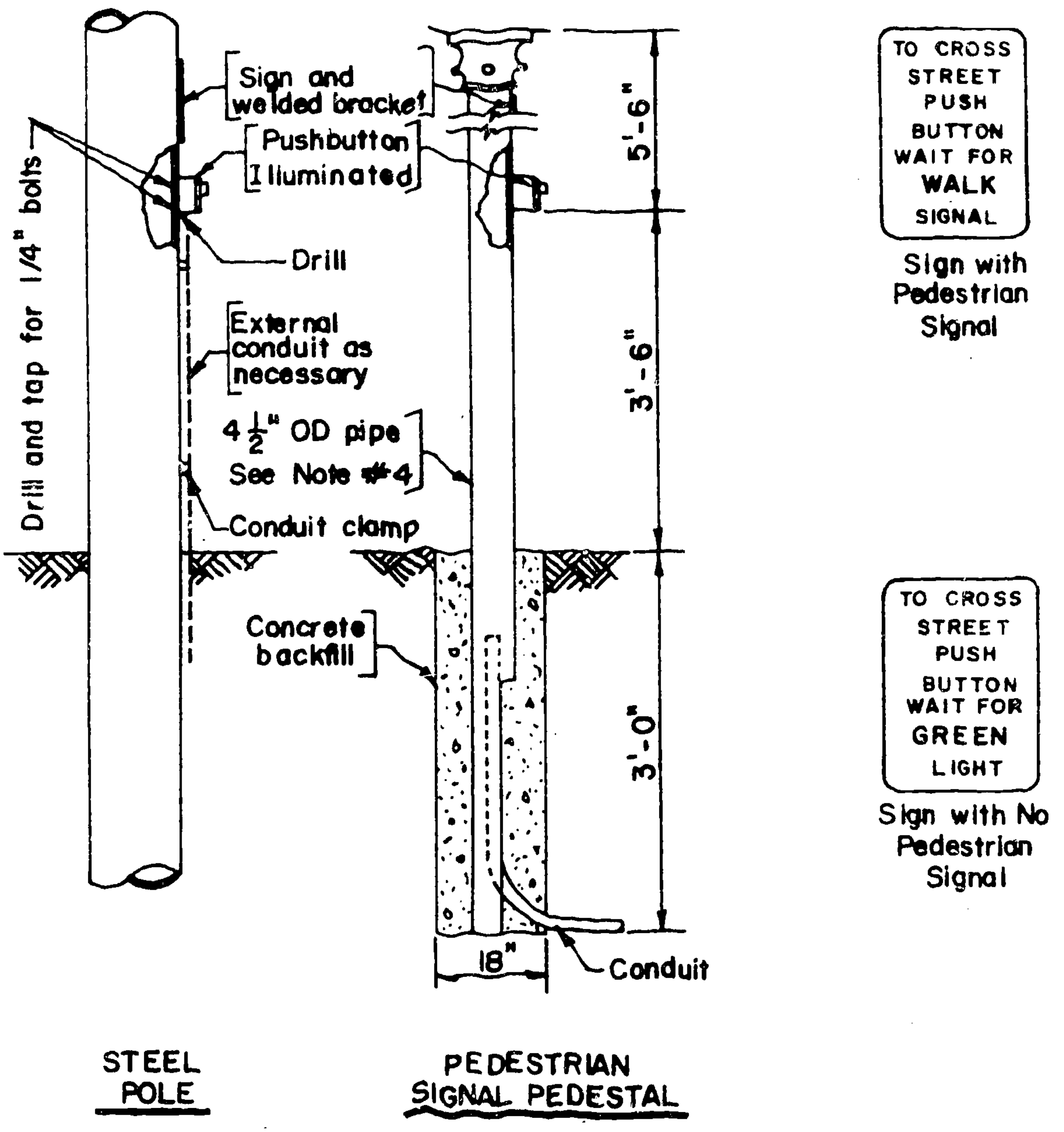
Angle eye bolt with two $\frac{5}{8}$" Hex nuts and assembly eye nut with flat washers, for span wire attachment. Hot dipped galvanized

TYPICAL POLE EXTENSION

NO SCALE

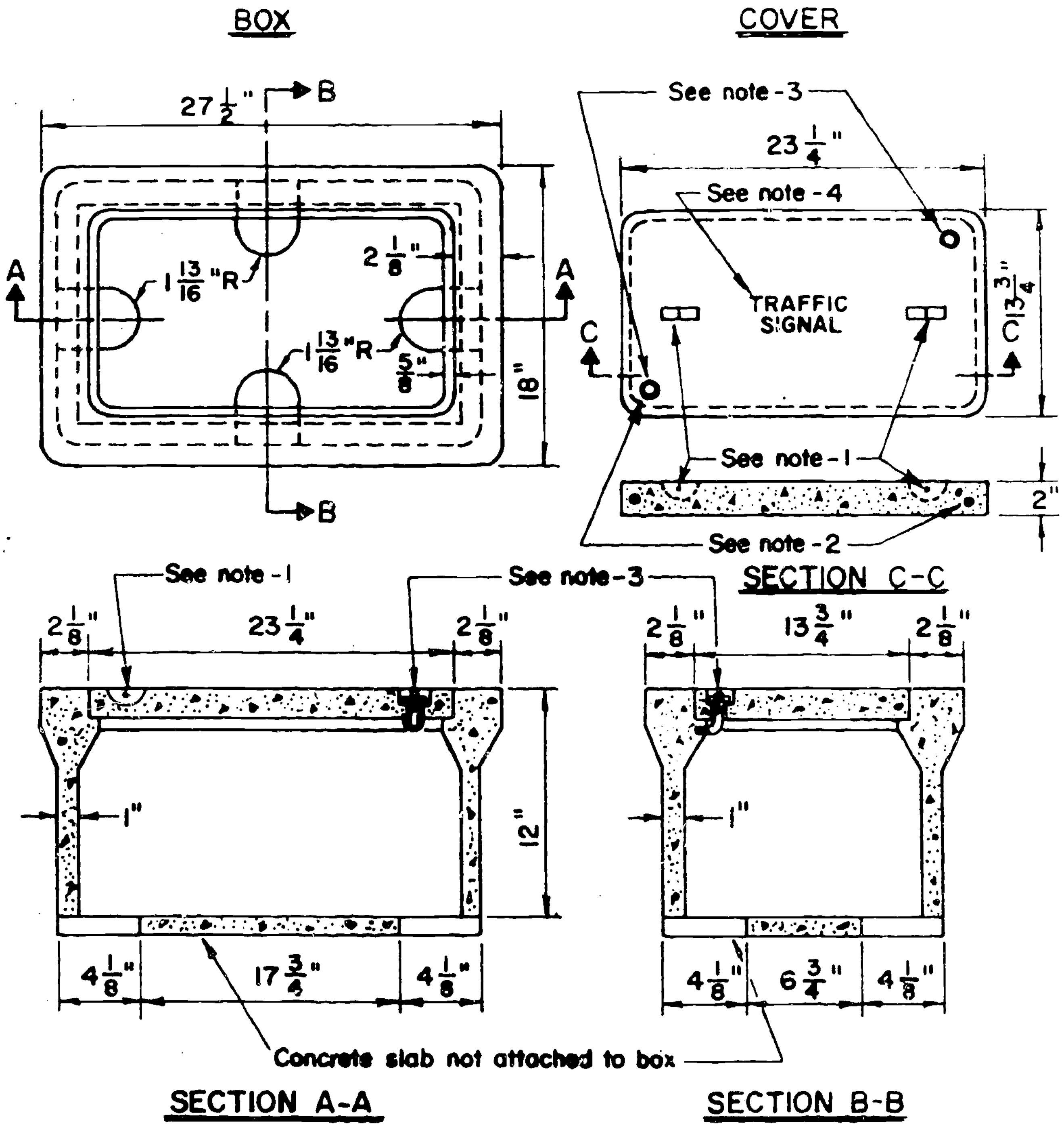
Notes

1. Fasten pushbutton and sign with appropriate fastener, drilling, etc. as necessary.
2. Ramset installation not acceptable on poles.
3. Extend for pedestrian signal as required.
4. Untested water pipe, one coat of magnum primer and two coats of aluminum paint.



TYPICAL PUSHBUTTON INSTALLATION

NO SCALE



Notes:

1- Two galvanized lift eyes per cover required.

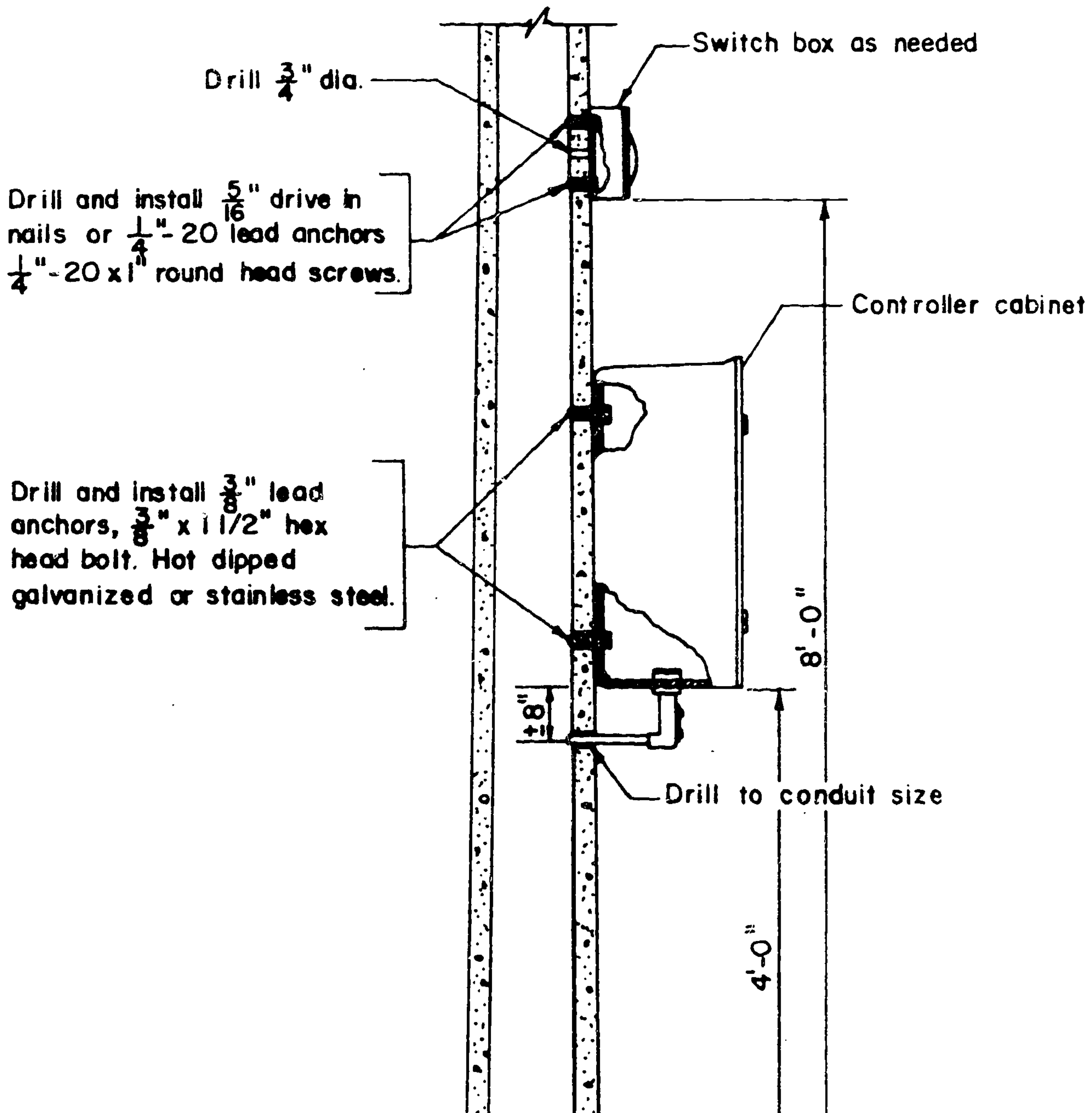
2- Cover to have 6 guage welded wire frame.

3- Brass "L" bolts and nuts in diagonal corners, two required

4- Cover to be marked "TRAFFIC SIGNAL".

TYPICAL JUNCTION TYPE PULL BOX DETAIL

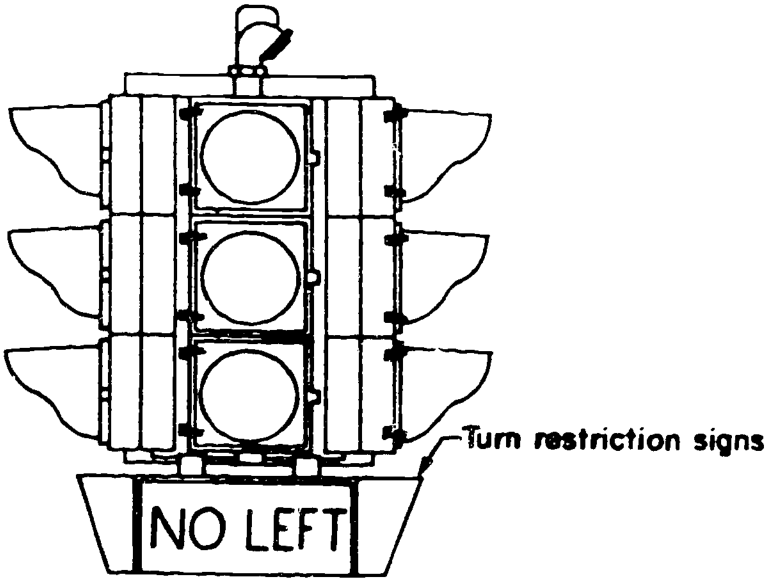
NO SCALE



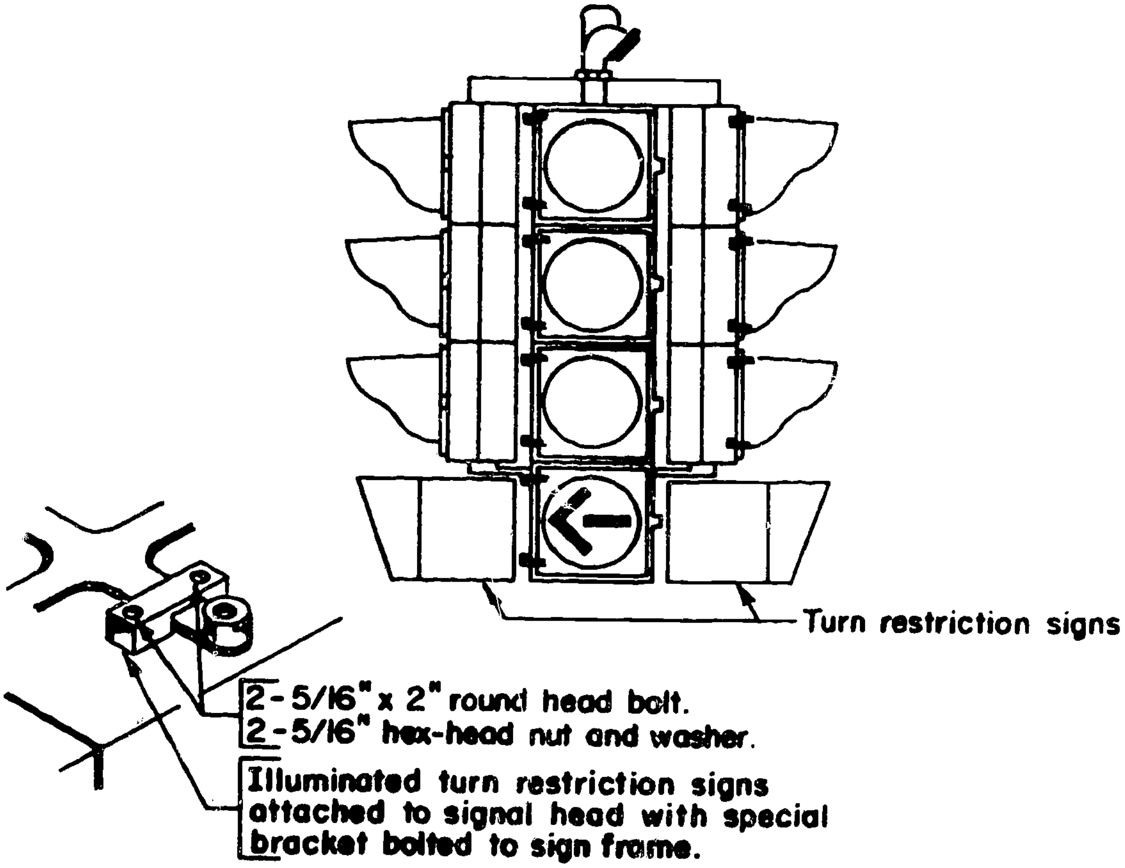
TYPICAL CONTROLLER MOUNT ON CONCRETE POLE

NO SCALE

4 WAY 3 SECTION SIGNAL

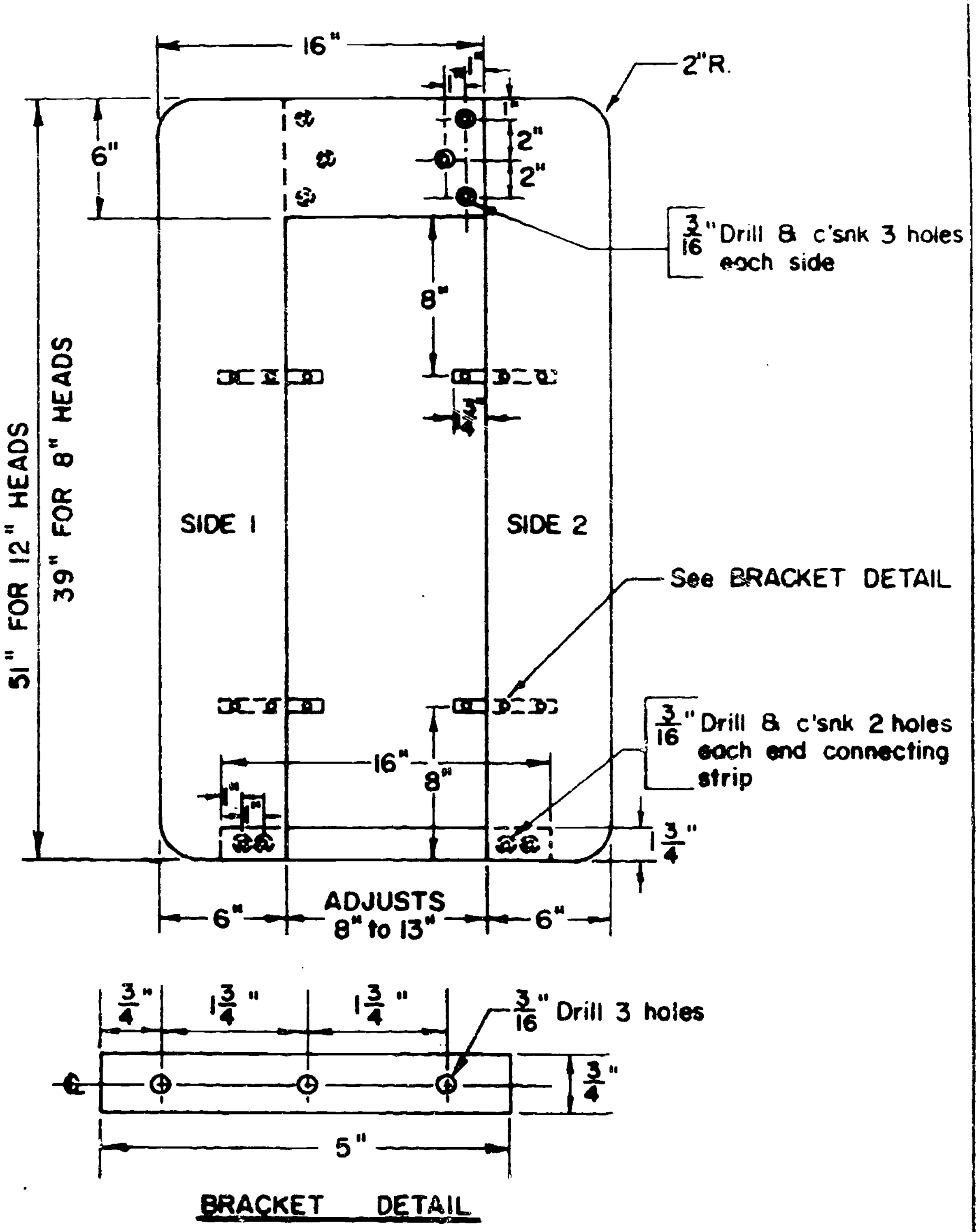


4 WAY 3 SECTION SIGNAL WITH EXTRA SECTION TO OPPOSITE DIRECTIONS



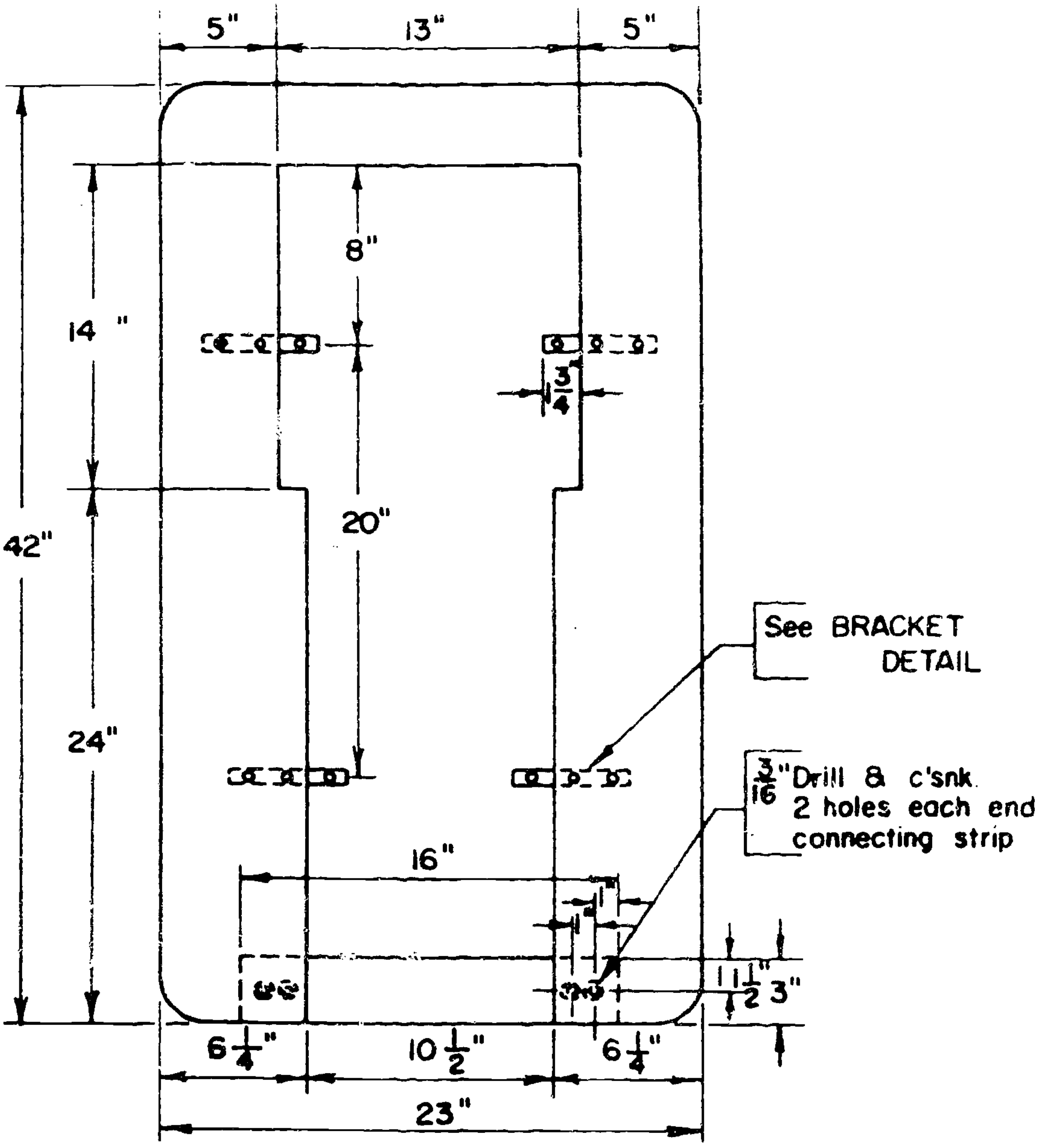
TYPICAL RESTRICTION SIGN ASSEMBLY

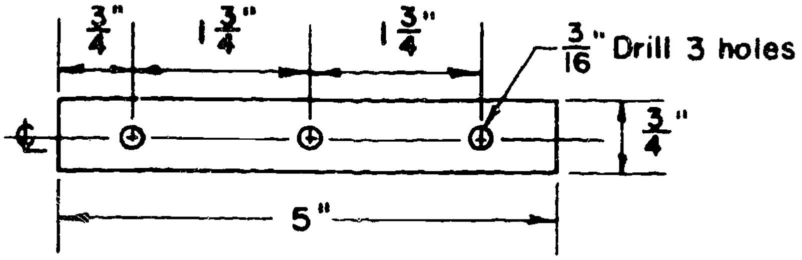
NO SCALE



TYPICAL BACKPLATE FOR TRAFFIC SIGNAL

NO SCALE

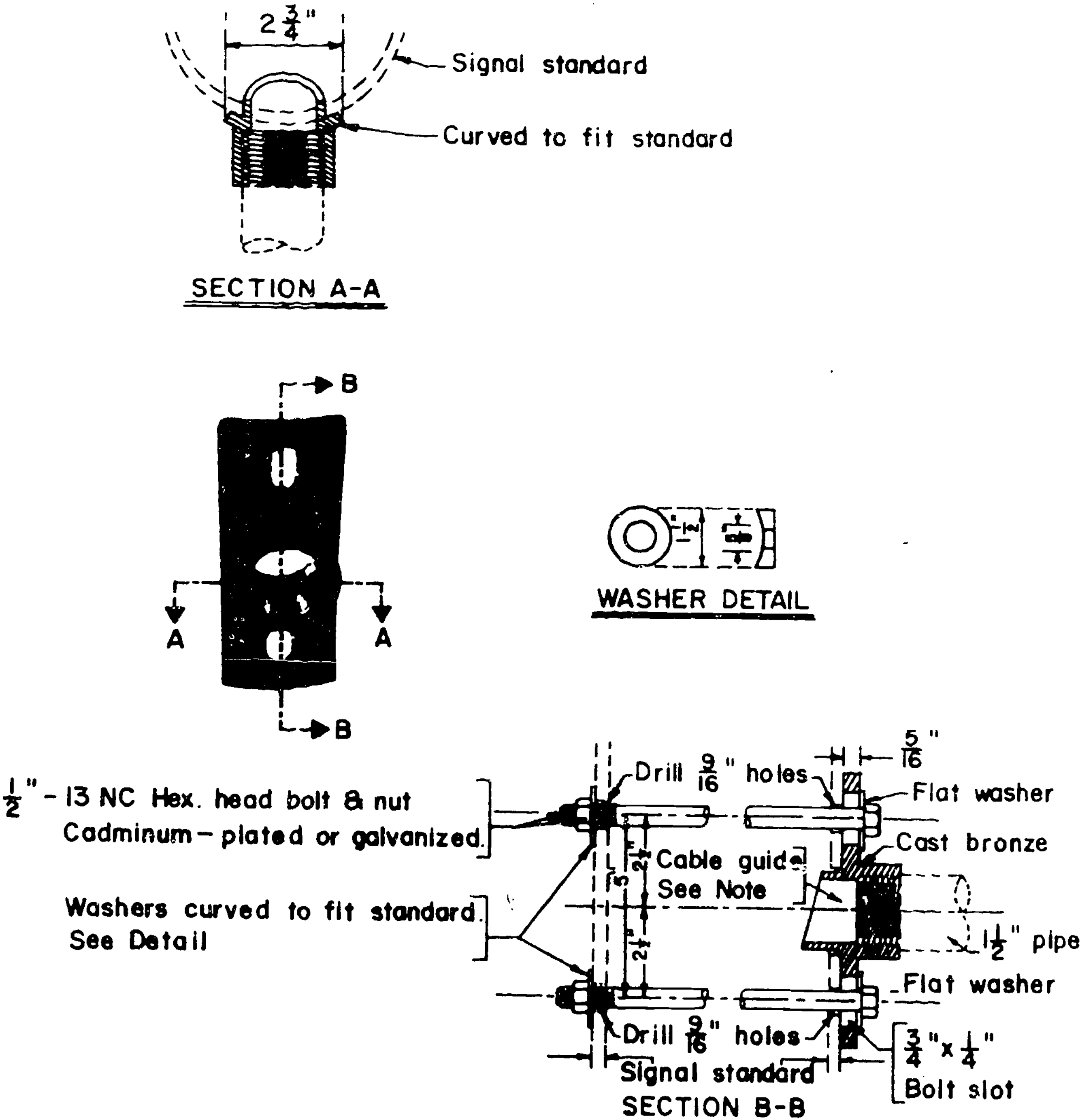




BRACKET DETAIL

TYPICAL BACKPLATE FOR
1-12" AND 2-8" TRAFFIC SIGNAL HEADS

NO SCALE



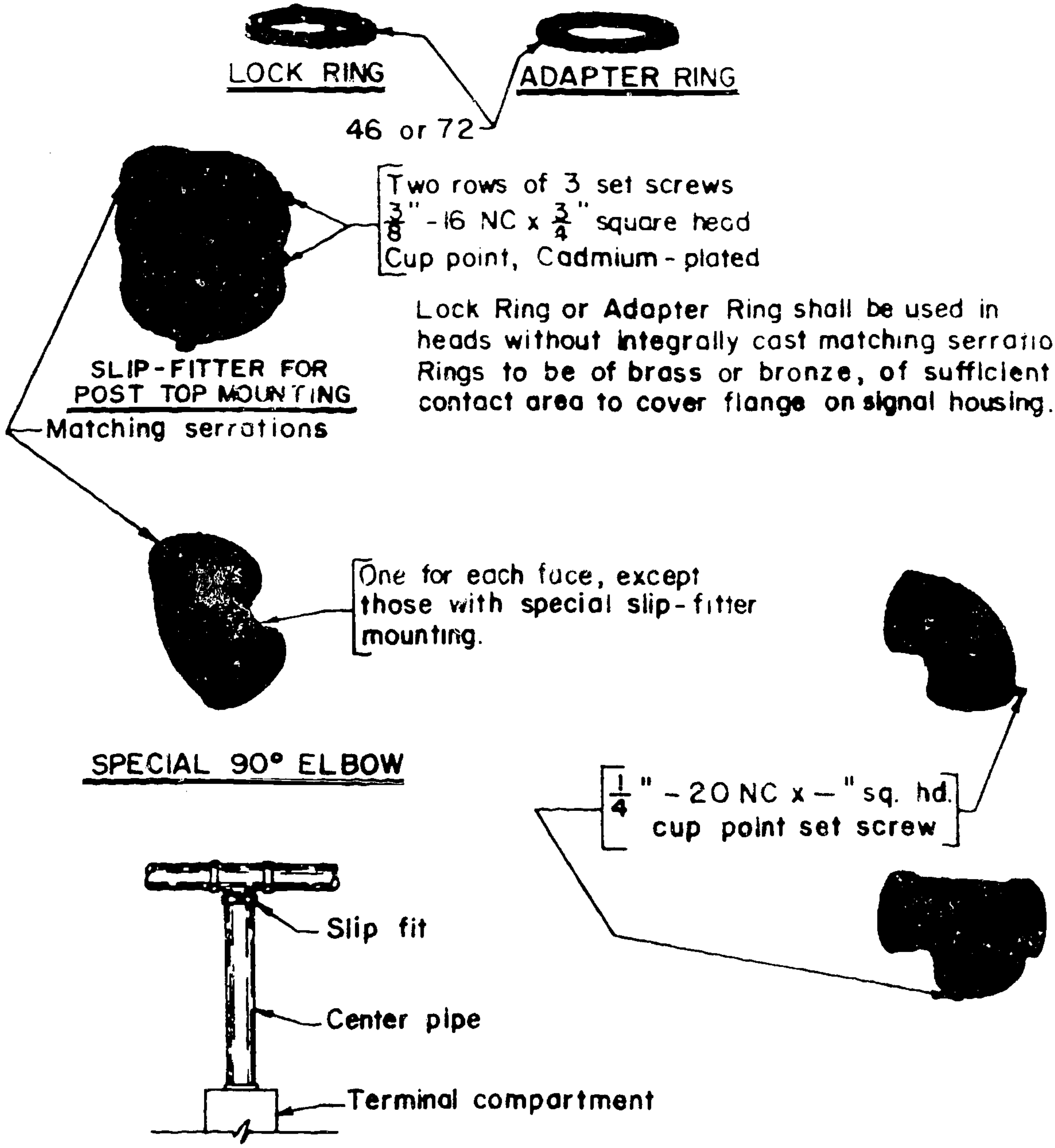
Note:

Lower bracket - Drill 2-" Center hole in standard for cable guide.
Upper bracket - Omit cable guide and center hole in standard.

POLE PLATE

SIGNAL ATTACHMENT DETAILS

NO SCALE



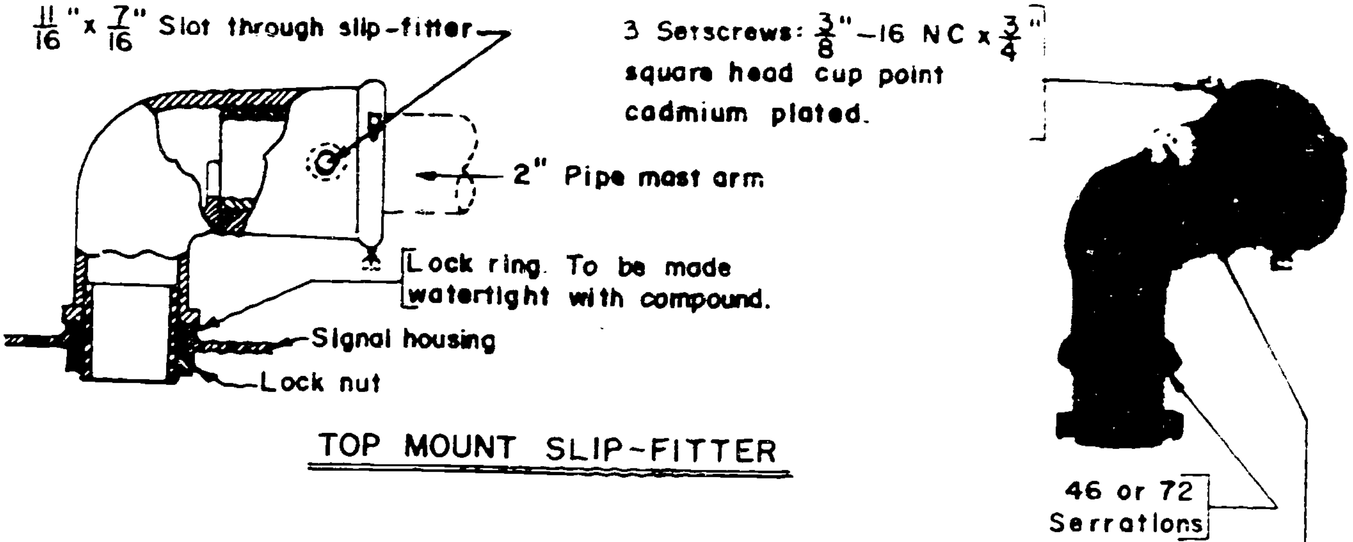
Lock Ring or Adapter Ring shall be used in heads without integrally cast matching serrations Rings to be of brass or bronze, of sufficient contact area to cover flange on signal housing.

TEE & ELBOW FOR CENTER PIPE

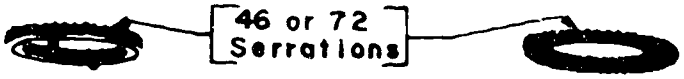
FITTINGS

SIGNAL ATTACHMENT DETAILS

NO SCALE



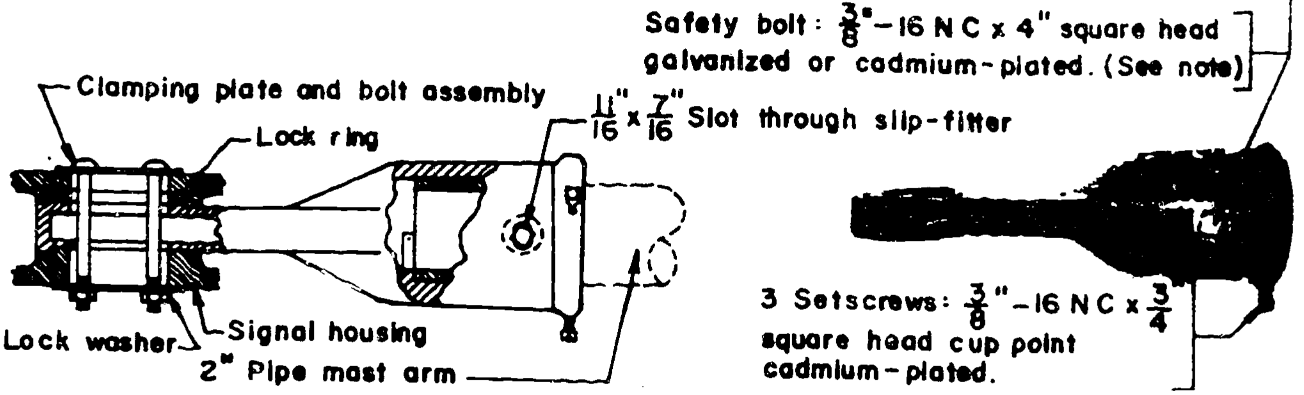
TOP MOUNT SLIP-FITTER



LOCK RING

ADAPTER RING

Lock Ring or Adapter Ring shall be used in heads without integrally cast matching serrations.
Rings to be of brass or bronze, of sufficient contact area to cover flange on signal housing.



SIDE MOUNT SLIP-FITTER

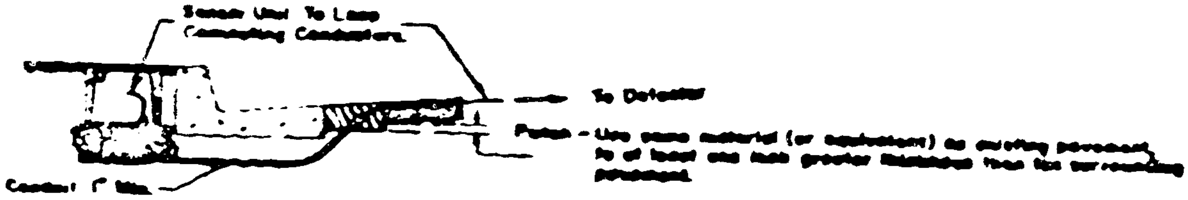
Note: Safety bolt

After signal has been plumbed and secured, drill $\frac{7}{16}$" hole through mast arm in line with slot through slip-fitter. Place bolt with washer under head through holes and secure with two nuts and a washer.

MAST ARM PLUMBIZERS

SIGNAL ATTACHMENT DETAILS

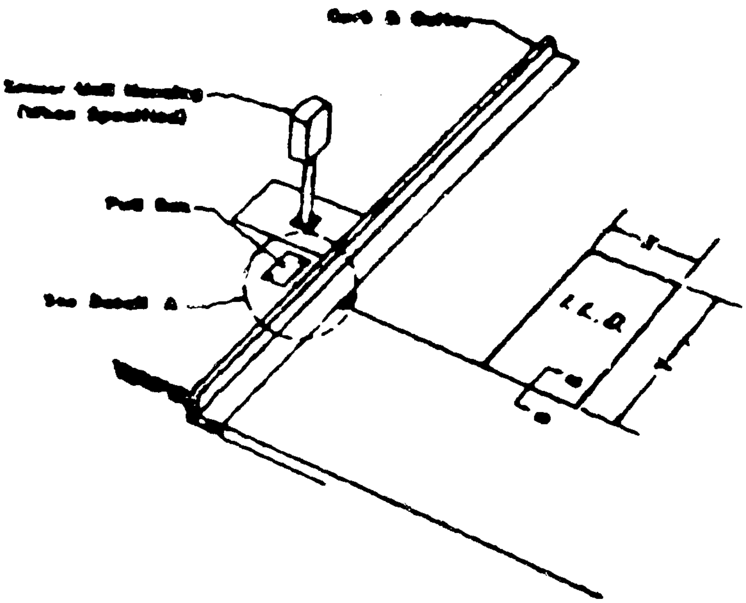
NO SCALE



DETAIL A

SECTION B-B

NOTE:
Epoxy material shall be a resin base type that when mixed with a hardener component shall form a rigid, non-shrinking material capable of bonding to pavement.
The material shall be pourable during placement.
All epoxy materials shall be approved as to type by the Engineer before placement.

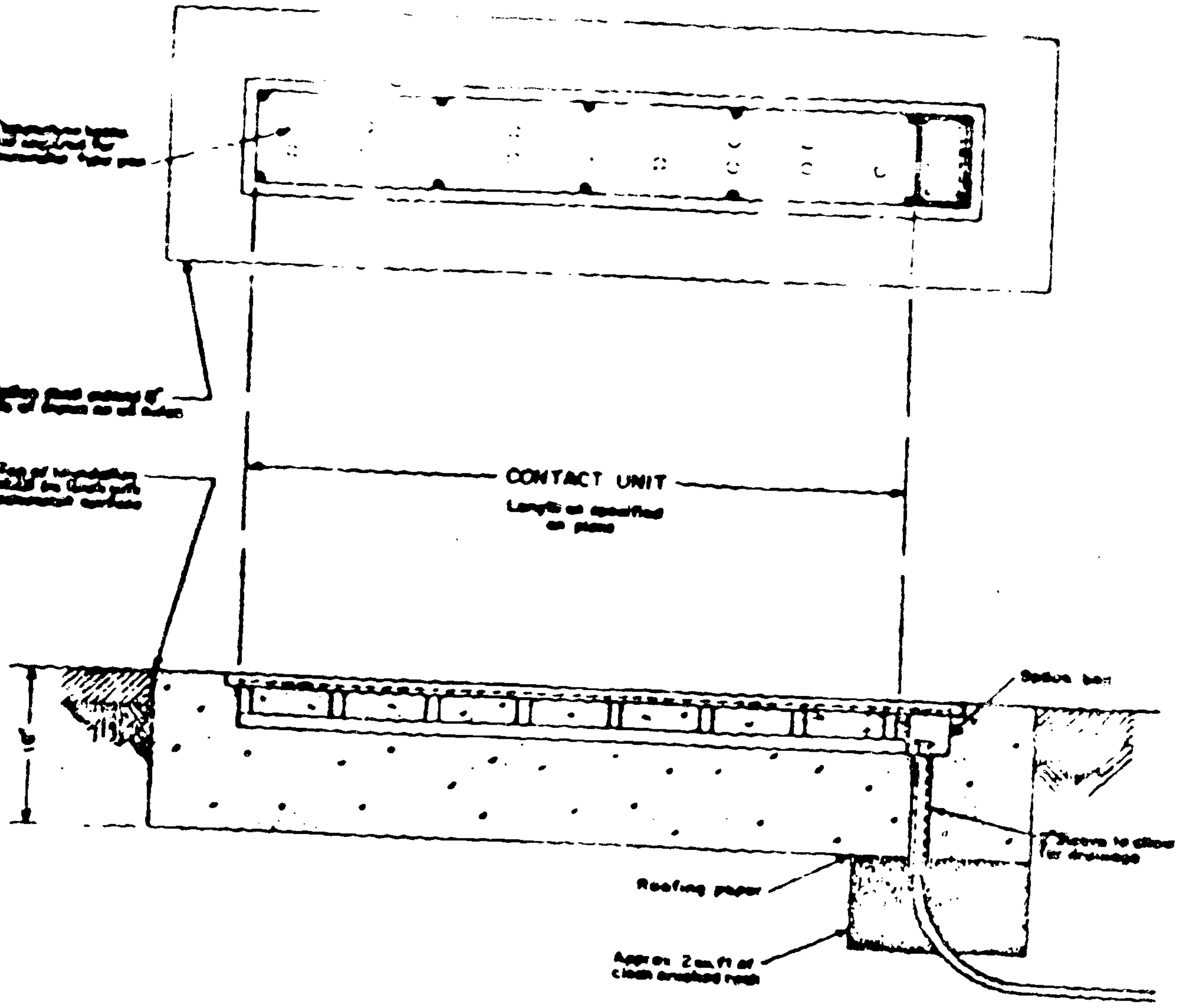


Note:
Dimension X And Dimension Y
As Specified On The Plan

TYPICAL INSTALLATION

VEHICLE DETECTOR

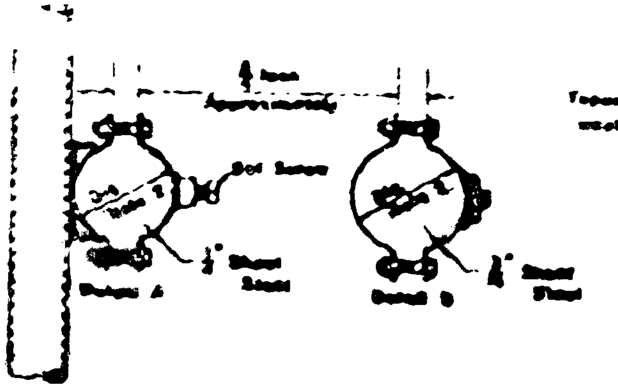
INDUCTIVE LOOP TYPE



Note:
Detector position dimensions shown on plans refers to the contact unit.

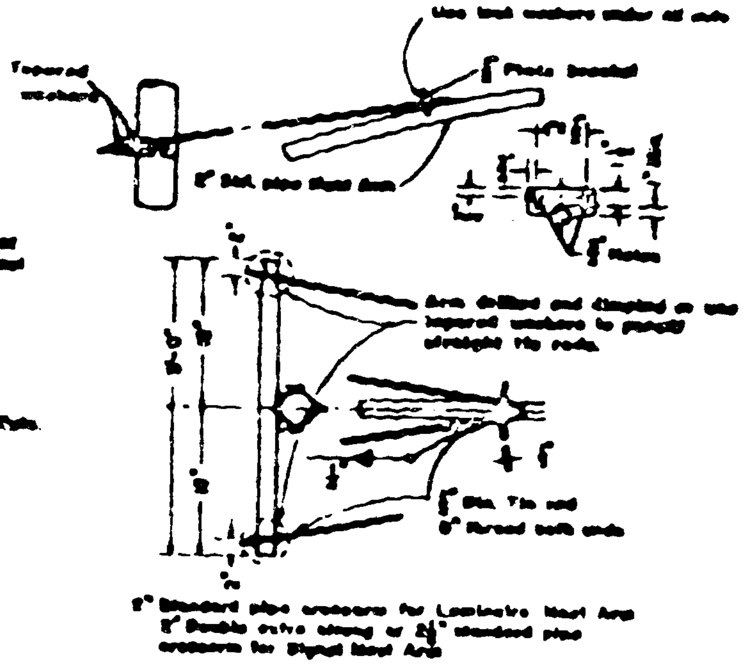
VEHICLE DETECTOR

PRESSURE TYPE

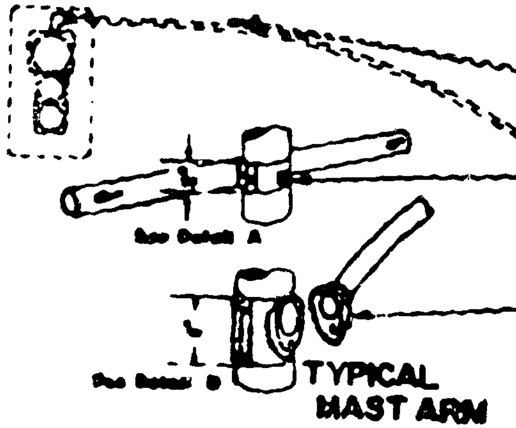


Notes
1. Clamp Bolts - ½"-13NC [illegible] Hex Head Bolts with Hex. Head Nuts.
Set Screw - ⅝"-11NC x 1¼" Sq. Head Cap Screw.
2. Diameter as required for Mounting Height specified.

TYPICAL CLAMP DETAIL

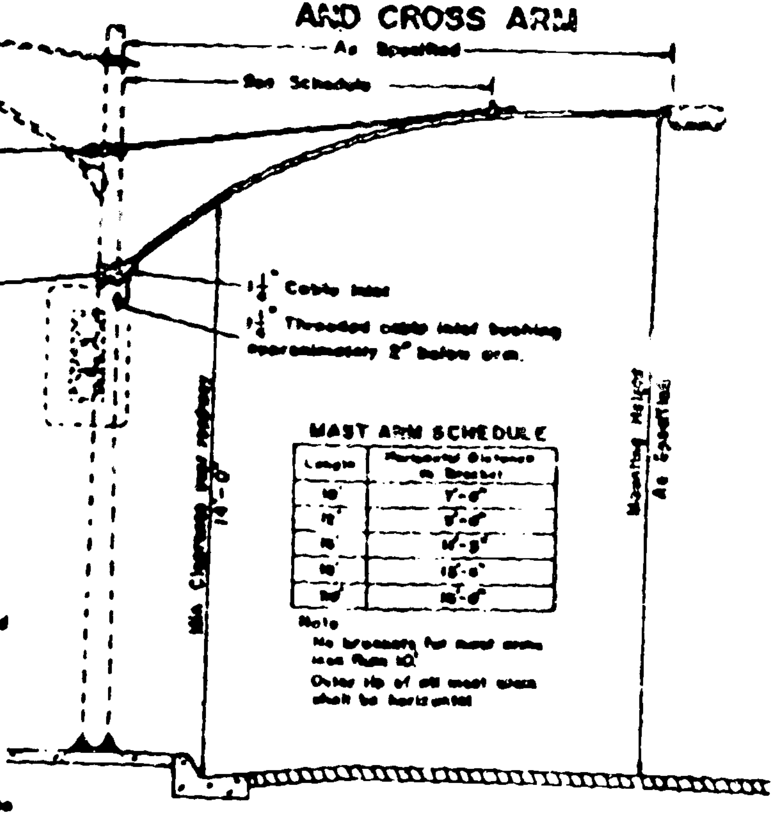


MAST ARM TIE RODS AND CROSS ARM



TYPICAL MAST ARM CONNECTOR

POLE CLAMPS



MAST ARM SCHEDULE

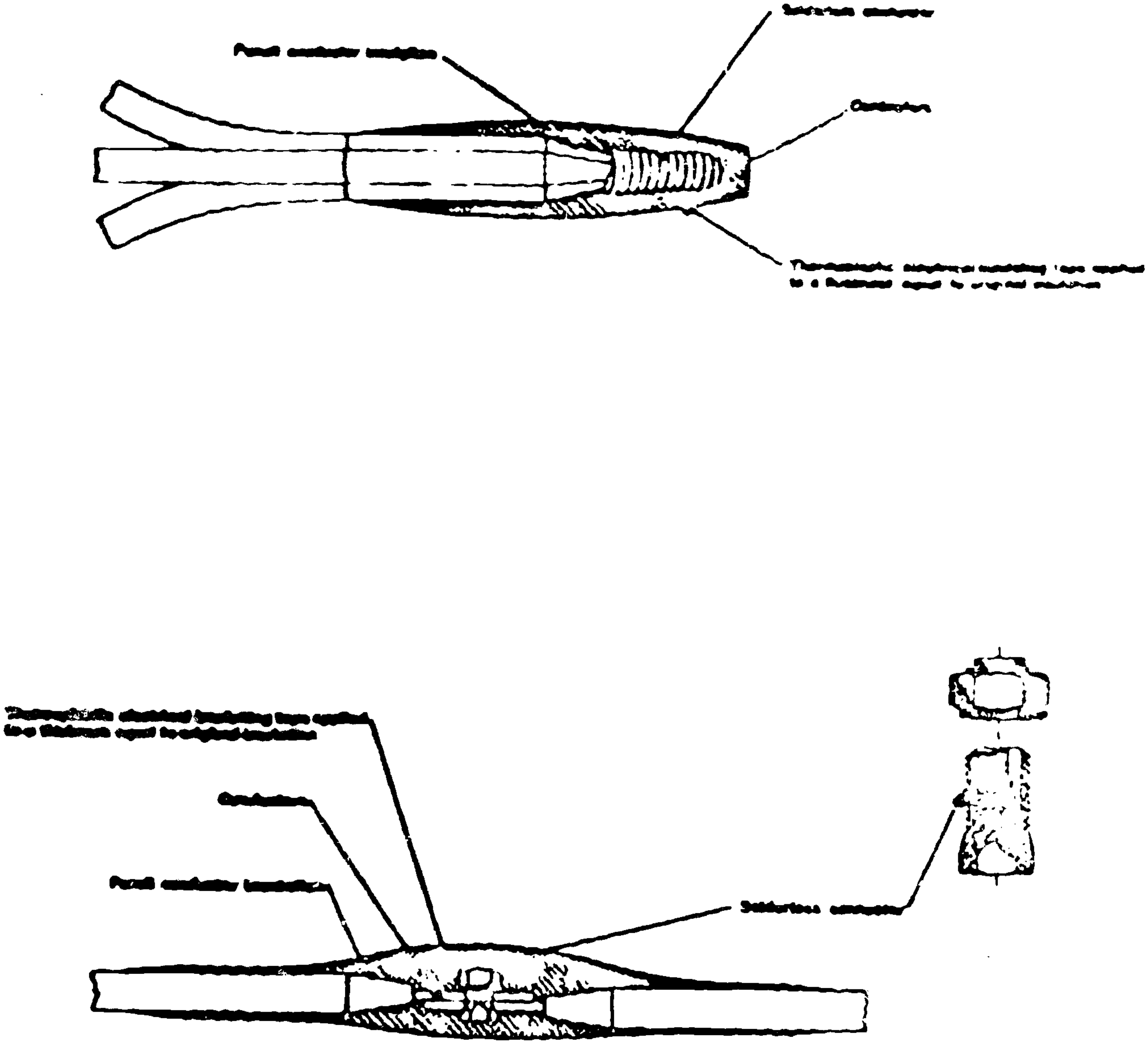
Length	Horizontal Distance to Bracket
10'	7'-0"
12'	8'-0"
15'	10'-3"
18'	12'-0"
20'	15'-0"

Note
No bracing for mast arms less than 10'.
Outer tip of all mast arms shall be horizontal.

Notes
1. Electrical conductors or cable passing from the standard to the mast arm shall be provided with a drip loop, and shall be protected against the deterioration of outdoor exposure by an approved method.
2. Cable inlets shall be sealed with an approved type non-hardening sealing compound.
3. All fittings shall be galvanized or stainless steel.
4. Mast arm orientation shown on the plans is approximate only. Final orientation to be determined in the field.

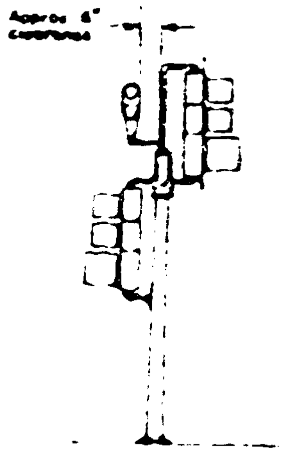
STANDARDS

AUXILIARY MAST ARM

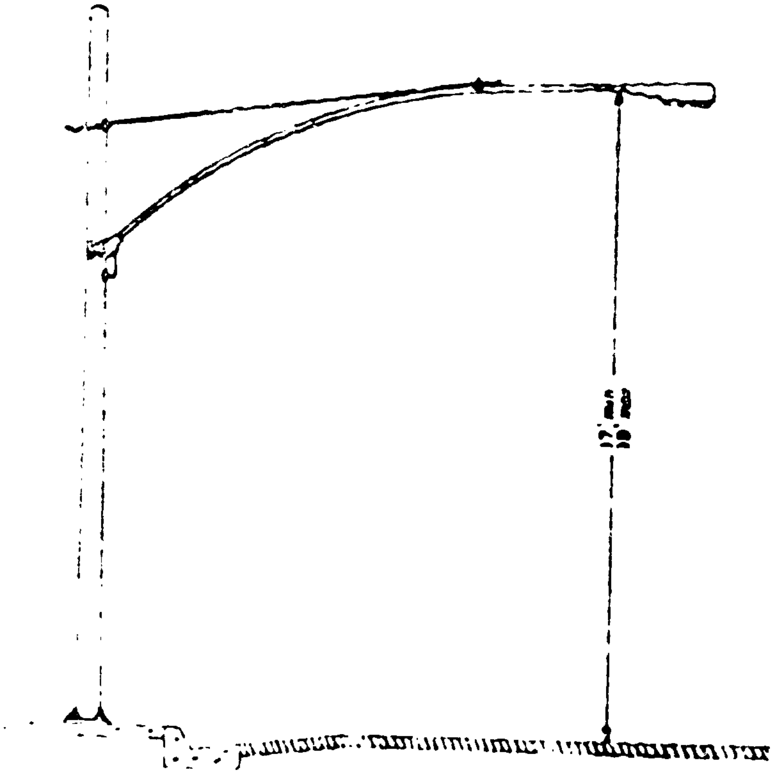


TYPICAL
CONDUCTOR SPLICING DETAIL

SPLICE



SIDE MOUNTING



MAST ARM MOUNTING

Notes

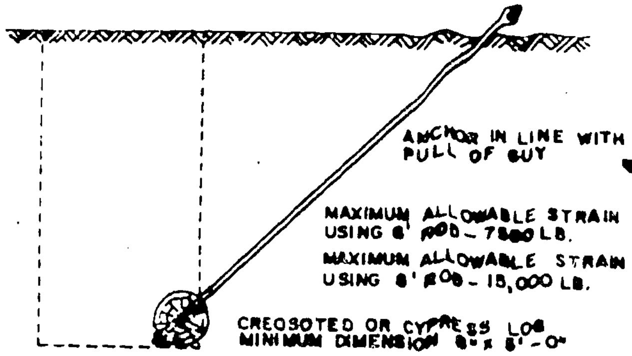
1 Mountings shown are typical. Alternate mountings shall be as indicated on the plans or as directed by the engineer.

2 Where detector orientation is shown on the plan it is approximate only. Final orientation shall be determined in the field.

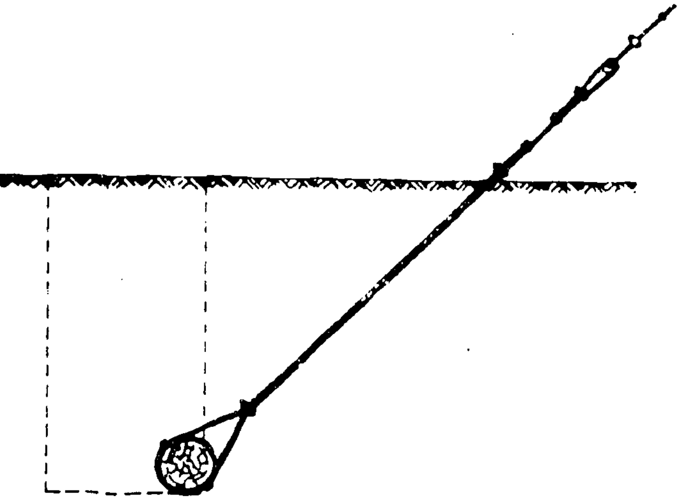
TYPICAL MOUNTING

VEHICLE DETECTOR

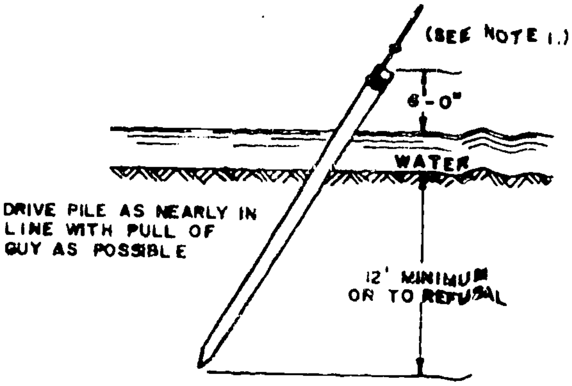
ULTRA-SONIC TYPE



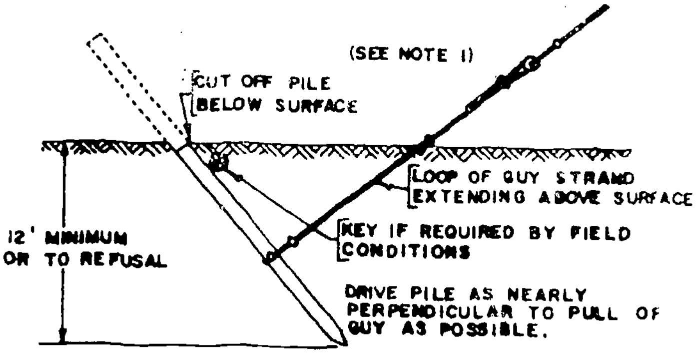
LOG ANCHOR



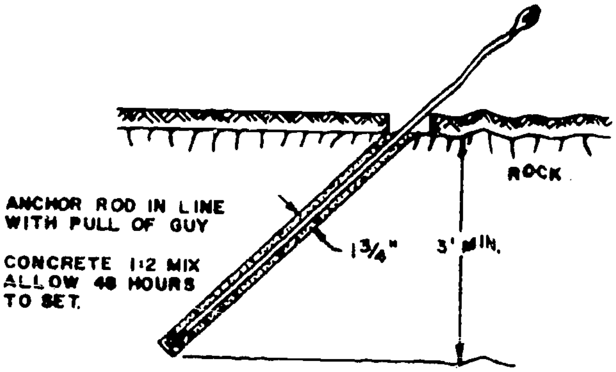
USING HARD DRAWN BARE COPPER STRAND INSTEAD OF ROD IN LOCATIONS EXPOSED TO SALT WATER



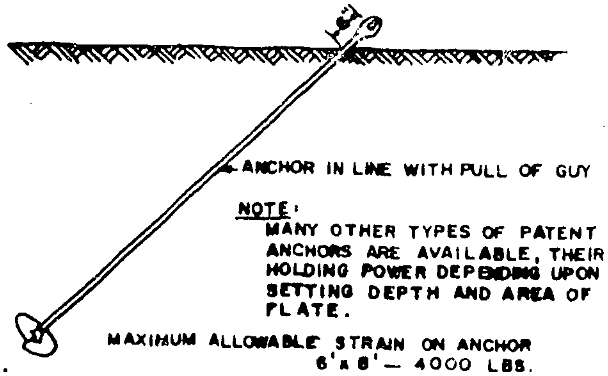
PILE ANCHOR IN WATER OR QUICKSAND



PILE ANCHOR IN MUCK



ROCK ANCHOR



NOTE:
MANY OTHER TYPES OF PATENT ANCHORS ARE AVAILABLE, THEIR HOLDING POWER DEPENDING UPON SETTING DEPTH AND AREA OF PLATE.

MAXIMUM ALLOWABLE STRAIN ON ANCHOR
6' x 8' — 4000 LBS.
8' x 10' — 6500 LBS.

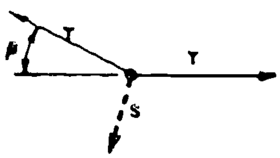
SCREW ANCHOR

NOTE:
1. IN LOCATIONS EXPOSED TO SALT WATER USE HARD DRAWN BARE COPPER STRAND INSTEAD OF GUY STRAND. STRAIN ON HARD DRAWN BARE COPPER STRAND USED FOR GUYS SHALL NOT EXCEED VALUES SHOWN ON ANGLE GUYING – STRAIN DATA PAGE, TABLE 2, UNDER MAXIMUM TENSION PER CONDUCTOR – LONG SPAN CONSTRUCTION.

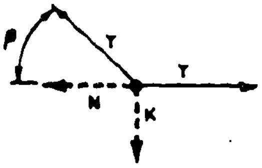
TYPICAL INSTALLATION OF ANCHORS

NO SCALE

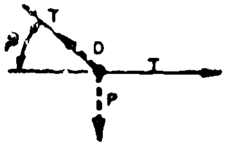
THE ANGLE GUYING CHART BELOW (CHART 2) PROVIDES BOTH FOR SITUATIONS WHERE THE ANGLE CAN BE SPLIT, AND WHERE A GUY MUST BE SET AT RIGHT ANGLES TO ONE OF THE LINES. THE ANCHOR GUY CHART (CHART 1) CONVERTS HORIZONTAL TENSION TO DOWN-GUY TENSION.



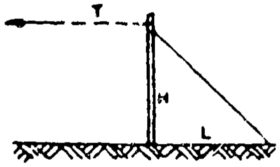
CASE 1
(SEE CHART 2)



CASE 2
(SEE CHART 2)



CASE 3
(SEE CHART 2)



CASE 4
(SEE CHART 1)

T = TENSION IN CONDUCTORS

β = ANGLE TURNED

S = GUY TENSION SPLITTING THE ANGLE

K, P = SIDE TENSION PERPENDICULAR TO ONE SECTION OF POLE LINE

N, D = IN-LINE TENSION TO HOLD UNBALANCE CAUSED BY K OR P

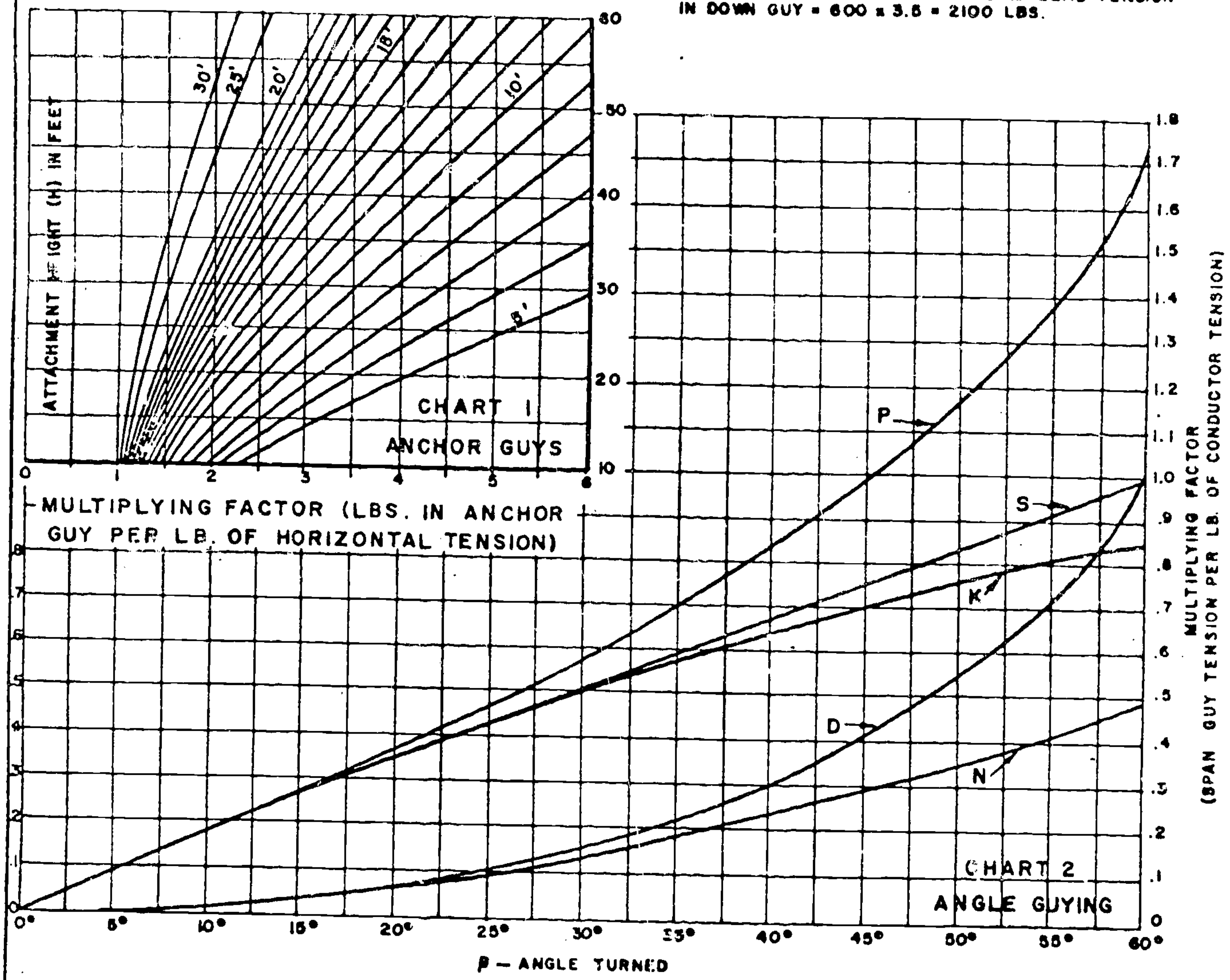
H, L = HEIGHT OF ATTACHMENT ON POLE, AND ANCHOR LEAD, RESPECTIVELY

NOTES:

1. TENSIONS SHOWN ARE HORIZONTAL, AND MUST BE CONVERTED FOR ANCHOR GUYS. (SEE CHART 1)
2. ANY UNBALANCED STRAIN OF LESS THAN 200 LBS. NEED NOT BE GUYED.
3. SPAN GUYS MAY BE USED IF UNBALANCE (AS AT "D" IN CASE 3) IS BETWEEN 200-1000 LBS.

EXAMPLE

SPLIT ANGLE, HOLD SIDE STRAIN WITH ANCHOR GUY. CONDUCTOR TENSION = T = 1000 LBS., β = 35°. FROM CHART 2, S = .6T = 600 LBS. FROM CHART 1, WITH 35' ATTACHMENT HEIGHT AND 10' LEAD TENSION IN DOWN GUY = 600 x 3.5 = 2100 LBS.



ANGLE GUYING — STRAIN DATA

NO SCALE

SECTION IV

PREVENTATIVE MAINTENANCE

Preventative maintenance is time and energy spent to intercept a need, so as not to suffer, to fail, or decline.

Any preventative maintenance program is only as good as YOU make it. The interest you engender in formulating a good, round program of preventative maintenance will benefit every citizen in your community. The following is an attempt to outline some of the basics required for such a program.

INVENTORY - Inventory of all equipment that you are responsible for is perhaps the first important undertaking in starting your preventative maintenance program. If this is already accomplished, or such information is available to you, you are well on your way.

It will be to your advantage to list all equipment at a signalized intersection, not just the control or auxiliary units or signal heads, but specifically every piece of equipment that makes up the complete signalization.

Values - The value of an inventory such as herein described, will prove to be an asset to your whole organization. Some of the following are but a few of the assets:

Perpetual Permanent Evidence of Repairs and Maintenance
Permanent Record
Cost Accounting
Court Proceedings
Citizen Inquiries
Other

Forms - The form that you design for use in your inventory should be as simple and to the point as possible. (See suggested form (Field Sheet) for commencing such a program). The information from this form can be used to record data on appropriate cards for your preventative maintenance program.

The following items for control equipment are suggested:

Control Equipment; Parent - Auxiliary

Manufacturer
Type
Model and serial
Age - Purchase
Age - Installation
Other

Signals
- Signal Heads - 8", 12"
- Pedestrian Signals
- Neon Turn Restriction
- Reversible Lane Signals
- Incandescent Turn Restriction
- Other

Support Style
- Span Wire
- Mast arm
- Post-Pedestal Mount
- Bracket Mount
- Overhead Structure Attachment
- Other

Support Poles; Type - Class
- Wood
- Steel
- Aluminum
- Prestressed Concrete
- Other

Signal Cable
- Manufacturer
- Type - I.M.S.A. Specification
- Number of Conductors
- Size of Conductors
- Overhead - Footage
- Underground - Footage
  - (a) Direct Burial
  - (b) Duct - Type and Size of
- Other

Service - Electrical
- Location - Reference Intersection
- Size - Amperage
- Conductors - Size
- Overhead
- Underground
- Bonded
- Ground - Type Driven - Water Pipe Power Co.
- Other

Cost Asset Valuation - The total cost of original equipment and its performance from time of installation to obsolescence, will prove not only to yourself, but to your government agency, that you are concerned with each dollar spent and the progress and return on that investment. Prices of equipment have more than doubled, and in some cases tripled, over the last five years, and only with proper records and inventory, can you prove that the cost of your operation is within budgetary allotment and operating efficiently.

Permanent Records - All records should be under your personal care or that of a very competent person. All entries or deletions to any record form should be made justifiably and initialed for future reference.

Records may often times be subpoenaed for court cases. In the event the court retains these records for an indefinite period, copies should always be made so that your permanent files are complete.

Frequently, attorneys, investigators, and other citizens will request to see or desire copies of your records. Never permit these records to be removed from your custody on a pretext that they will be returned. You could lose a very valuable record.

TRAFFIC SIGNAL FIELD SHEET

LOCATION ______________________ CITY ____________ COUNTY ____________ DATE ______

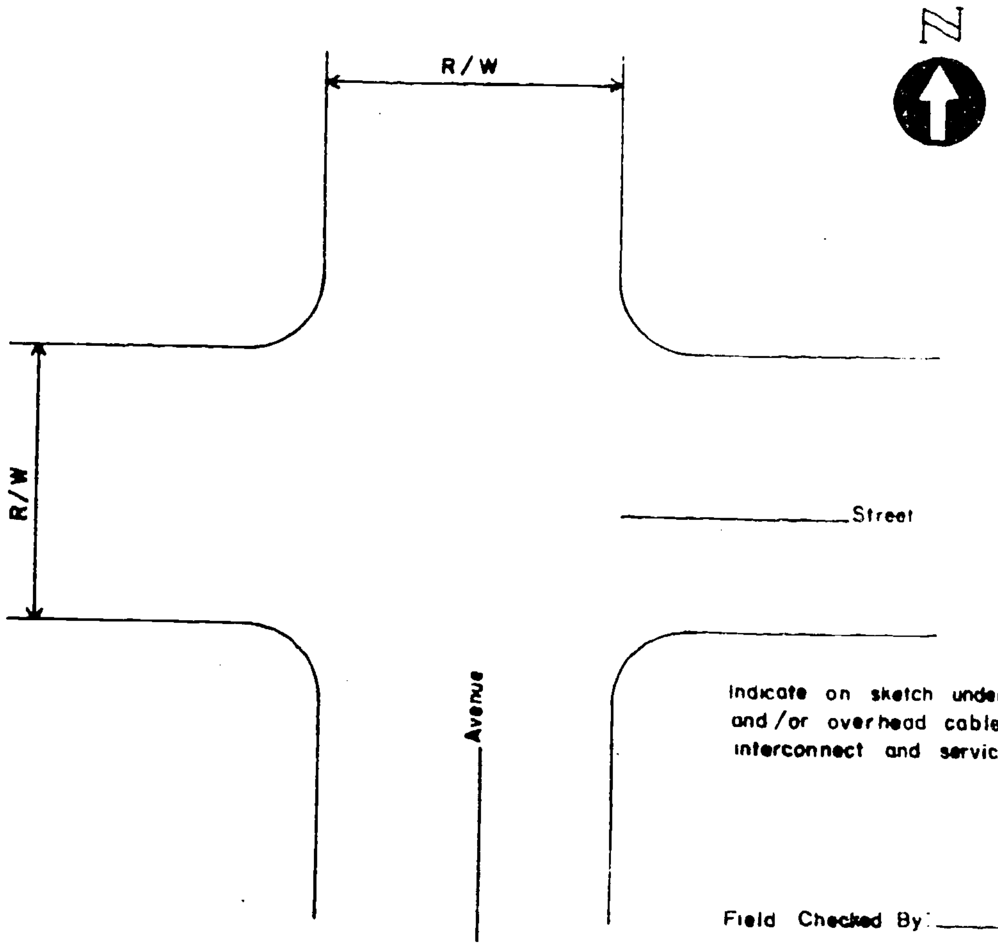
Indicate No Poles	Concrete	Wood	Steel	Aluminum	Others
Type Mounting	Span Wire	Mast Arm	Pedestal	Others	

Type Cable				No. Conductors				

Type and No. Detectors	Loop	Pressure	Radar	Sonic	Push Buttons	Others

Signal Indications	Sections	1 Way	2 Way	3 Way	4 Way	5 Way	Arrow	Pedestrian Signals	No
	1								
8 inch	2								
12 inch	3								
	4								
	5								
Turn Restriction Sign									
Signal Wattage								Wattage	

Controller (Manuf.)	Type	Model	Wattage
Auxiliary Units			



Indicate on sketch underground and/or overhead cable for signal, interconnect and service location

Field Checked By: ____________

PROCEDURES

- Time Determinant
- Field Maintenance
- Shop Maintenance
- Final Inspection - Field, Shop

Time Determinant - Time determination as here used, shall mean the time gap between actual checks and repairs during your preventative maintenance program. It shall be your determination to ascribe the time gaps that each type of equipment shall be checked or overhauled.

It is fully understood that these check periods are dependant upon the size of your operation, budget, and personnel allotment for such a program.

Three-Six Month Check: See Manufacturer's Bulletins
- Pre-timed Equipment
- Electro-Mechanical Equipment
- Contacts - Various
- Bearings
- Expand
- Other

Six-Twelve Month Check: See Manufacturer's Bulletins
- Electronic Equipment
- Potentiometers - Timing
- Signal Lamps
- Positioning of Heads
- Pedestrian Signals
- Expand
- Other

Twelve-Eighteen Month Check: See Manufacturer's Bulletins
- Total Intersection
  - Controllers
  - Signal Heads
  - Cables
  - Messengers
  - Poles
  - Clearance
  - Services - Bonding, Grounding
  - All Connections
  - Expand
  - Others

Field Maintenance - Field Maintenance is partially self-explanatory meaning that portion of maintenance which can be done efficiently in the field. A periodic maintenance check as previously described, will prove that the majority of electro-mechanical equipment can be maintained at the site of installation without having to be returned to the Shop. In some instances, where a small number of intersections are being maintained in a relatively small area, this would not be true; but where a number of pieces of equipment are involved, the time saving factor must be considered.

Every technician, electrician, or maintenance repairman doing field maintenance work must have the necessary supplies and equipment for an efficient job.

Supplies as referred to in the above paragraph, meaning repair parts, oil, relays, lamps, cable, wire, tape, hardware, etc., as required for the particular type or types of equipment in his area.

Equipment - as referred to in the above paragraph, meaning the proper truck or trucks (aerial), ladders, proper lighting for night maintenance, etc. (Tools as required, see Section III, Proper Tools.)

SHOP MAINTENANCE - Shop maintenance as referred to in Field Maintenance, is partially self-explanatory, meaning the equipment that cannot be readily maintained or repaired in the field and must be returned to the shop.

Equipment returned to the shop on a periodic basis or for emergency repair, should be tagged as to location, date, and time of removal from intersection.

Your permanent record, as referred to under Section I, Inventory, will indicate to you the last time this controller was in for repair or complete shop overhaul. (See Manufacturer's list of check points and inspections to be made). It may be that the manufacturer has suggested certain parts or items be replaced after so many hours of operation. This should be done in all cases where it has been recommended.

After the unit has been completely overhauled and inspected per the manufacturer's suggested listing, the unit should be put on test, in the shop, for a minimum of twelve hours before returning it to the intersection. A longer period of time for testing may prove to be advantageous, depending upon the type of equipment.

FINAL INSPECTION--FIELD, SHOP - A final inspection is necessary in every case following repair to prove to yourself that the unit is once again operating correctly, displaying the correct color sequence and timing accurately. In many instances, a final inspection will be made by personnel other than the one doing the actual check or repair. This is a good procedure in that occasionally some minor difficulty or correction will be determined that was inadvertently overlooked.

PROPER TOOLS--FIELD MAINTENANCE

1. Side Cutting Pliers 6 1/4" - 7 1/4"

2. Oblique Cutting Pliers, Short Nose 5"

3. Oblique Cutting Pliers, Narrow Nose 5 1/2"

4. Oblique Cutting Pliers with .052 skinning hole 6"

5. Long Nose side Cutting Pliers 5 1/2"

6. Long Nose Needle 1/16 Cutting Pliers 6 1/2"

7. Curved Nose Pliers 6"

8. Duck Bill Plier 5 3/4"

9. Relay Spring Adjusting Plier 5 3/4"

10. Special Skinning Plier 5 1/4"

11. T-Type Wire Stripper #10 - 18 gage

12. Hack Saw

13. Job Saw

14. Channellock Tongue Plier 6 1/2"

15. Adjustable Wrench, Plastic Curved Handles 4", 6", 8"

16. Cushion Grip Nut Driver: Shank; 3 1/8" - 3 1/2"
    Nut Size; 3/16" - 1/2"

17. Standard 6' Wood Rule

18. Scratch Awl

19. Insulated Shank Screw Driver; 3" x 3/16, 4" x 1/4,
    6" x 5/16, 8" x 3/8.

20. Fish Tape 50' x 1/8", 100' x 1/8"

21. Ideal Voltage Tester or Volt Ohm Meter

32. Electrician Scissors, Knife, and Hammer, 16 oz.

23. 1/4" Electric Drill, Bits Steel 1/16", 1/4"

24. Mfg."s Recommended Special Tools for Certain types of Equipment

PROPER TOOLS--FIELD MAINTENANCE--SAFETY EQUIPMENT

1. Rubber Gloves
2. Leather Glove Protectors
3. Fiberglass Head Gear
4. Weatherproof Lantern

PROPER TOOLS--ELECTRONIC SHOP - Expediency and efficiency are two very necessary items in any preventative maintenance program. Tools are of the utmost importance in such a program and the cost to secure the necessary tools for such a job should be of last importance. A generalization of tools used in traffic signal preventative maintenance program--for Electronic Shops, Field Maintenance and Construction--are listed below. See photographs and additional information on following pages.

1. Burnshire Diamond Spatula from .011 to .019
2. Relay Adjustment Tool Set
3. Stripper and Trimmer VACO 12-24 Gage
4. Midget Dikes Normal Open Spring
5. Offset Cutter Normal Open Spring
6. Midget Extra Long Nose Normal Open Spring
7. Midget Long Nose Normal Open Spring
8. Midget Offset Long Nose Normal Open Spring
9. Midget Channel Locks 5"
10. Four Inch Crescent Wrench
11. Spin Wrench 1/16" - 3/8"
12. Bristow Spin Wrench 1/32" - 1/4"
13. Volt Ohm Meter, 20,000 Ohms Per volt
14. Spin Wrench 1/4" - 1/2"
15. Allen Spin Wrench 1/32" - 1/4"
16. De-solder Tool (Electric), Endemo Model 300
17. Seizer Heat Sync Clamp

18. Seven Inch Offset Tweezer
19. Four Inch Offset Rachet Wrench
20. De-solder Tool with Wire Brush
21. Electric Solder Gun

PROPER TOOLS--CONSTRUCTION

1. High Leverage Pliers 8 1/2" - 9 1/4"
2. Side Cutting Pliers 7 1/2" - 8 1/2"
3. High Leverage Oblique Cutting Pliers 8"
4. Cutting Pliers, Oblique H.D. 6"
5. Channellock Tongue and Groove Pliers 9 1/2" - 12"
6. Wire Master Plier 9"
7. Griplock Clamping Tool 10" Curved
8. Hacksaw 10" - 12"
9. Handsaw Cross Cut 8 Pt.
10. Handsaw Rip 8 Pt.
11. Cushion Grip Screw Driver 6" x 5/16
12. Heavy Duty Square Shank 8" x 3/8
13. Super Hard Phillips Screwdriver 6" x 3/16, 8" x 3/8
14. Insulated Shank Screwdriver 6" x 5/16, 8" x 3/8
15. Power Return Tape Rule 10' - 12'
16. Metallic Woven Tape 50'
17. Heavy Duty Extension Rule 6'
18. Crestoloy Wrench Single End 8" - 12" - 18"
20. Rigid Conduit 1/2" - 3/4", 1" - 1 1/2"

21. Electrician Hammer 16 oz.

22. Super Steel Lineman Hammer 36 oz.

23. Fish Tape Reels and Pullers 50' x 1/8, 100' x 1/4, 200'x 1/4

24. Unispur Electricians Auger Bits, 5/8", 3/4", 7/8", 1", 1 1/4"

25. Auger Power Bits 1/2", 5/8" 7/8:, 1", 1 1/2", 2"

26. Pipe Bit Set 7/8" - 2 1/2", Cyclo-Core Bits 1/2", 1 1/2"
Carbide Tipped Masonry Bit 1/4", 1"

27. Bit Extension - For Brace Shank

28. Electrician Knife 3 3/4"

29. Coffing Hoists 3/4 - 6 Tons.

30. Holesaw Arbors & Adapters 1/4" - 3"

31. Ratchet Threading Device 1/2" - 2"

32. Straight and End Pipe Wrenches 8" - 12" - 18"

33. Universal Pulling Grips for Cable Diameter In. 3/4" - 1",
1" - 1 1/2"

34. Chicago Grips for Messenger, Guy Strand & Conductors up to
1/2" in diameter

35. Chicago Grips for PVC Covered Conductor Max Opening .46" -
.56" - .83" - 1.04"

36. Heavy Duty Cable Cutters

PROPER TOOLS--CONSTRUCTION--ELECTRIC

1. 1/4" All-Insulator Drill

2. 3-8" Heavy Duty 2-speed Drill

3. 1/2" Heavy Duty 2-speed Drill

4. Heavy Duty Rotary Hammer

5. Portable Electric Saw 8"

PROPER TOOLS--CONSTRUCTION--SAFETY

1. Rubber Gloves
2. Leather Glove Protectors
3. Fiberglass Head Gear
4. Weatherproof Lantern

SPARE PARTS - The transition from electro-mechanical and electronic equipment to that of solid state, does not mean the elimination of spare parts. The up-dating of equipment to that of solid state will ultimately reduce the spare parts required, but will never eliminate them. The spare parts that you may be required to stock will be dependant upon the types and amount of equipment under your jurisdiction. It is surely a waste of funds when a person is under some false apprehension that he must have a complete spare unit for every three or four units installed.

Your preventative maintenance program will reduce to a minimum the number of spare parts you will be required to keep, thus reducing the cost of your operation.

VALUE--NECESSITY - The value of spare parts cannot be overly stressed. A correct number of spare parts is a necessity in any operation, regardless of the number of units you may have.

To attempt to purchase spare parts after the need arises, could reduce the efficiency of your operation to a point of having no signalization or perhaps only a flashing operation. Often times, a manufacturer will indicate that spare parts are available for immediate delivery and that you should not have any concern relative to parts that you may need hurriedly. In that it is your prime responsibility to see that signal equipment operates on a continuous twenty-four hour a day basis, you will be the one to determine the number and types of spare parts readily available to you in your shop. Generally, a year or two of experience with each type of equipment, will reveal the number of spare parts or spare units required for your operation.

QUANTITY - In an attempt to determine somewhat of a national average for the number of spare units required for number of units installed, and for ratio of dollars spent on spare parts, the following was found.

Pre-Timed - one for ten
Electronic - one for ten
Solid State - one for fifteen

Even though it has not proven to be accurate in all cases, the following rule of thumb can generally be used. A ratio of $1 for spare parts for every $10 spent on control equipment.

Example: For control equipment (controllers and auxiliary units) that are at least three years old and cost originally $25,000--using the rule of thumb as explained in previous paragraph, you would be justified in carrying $2,500 inventory of spare parts.

SHELF LIFE - Shelf life is an element that must be considered in the purchase of all spare parts, particularly solid state parts.

Generally speaking, shelf life of most electro-mechanical parts is not considered, even though a dry, secure location is of importance.

Solid state parts should remain in the enclosure (box, with wrapping), until that part is actually removed for use. Again, a very dry, secure place should be found for the storage of all such parts.

No different than a supermarket securing merchandise on a daily basis and attempting to push its oldest merchandise first, the same consideration should be given to spare parts; the oldest one on the shelf should be used first.

SAFETY - In any preventative maintenance program, safety must be considered a valuable asset. Your protection as well as the public's and the equipment you use, is vital to the continuance of an efficient program. The following phrase, "IF YOU CANNOT DO IT SAFELY, DON'T DO IT", will help you and your personnel considerably towards your efforts in safety.

Common sense and good judgment should be exercised at all times, and the fact that safety rules may not cover every case will in no way relieve those responsible from using good judgment in carrying out work.

If there are conditions that are not fully understood by the men performing the work, they should consult with their immediate supervisor regarding the safest way to handle the particular problem. Under no condition should a man start to work until he understands what work he is to do.

Every employee must make a conscientious effort to eliminate all unsafe actions, habits or attitudes from his work. It is also the duty as well as a privilege to every employee to promptly report conditions or equipment to his appropriate supervisor, which are hazardous to employees or the general public.

PROTECTION--PERSONAL - Traffic signal technicians or repair personnel are generally working within a portion of a traveled roadway. It is incumbent upon each individual that he afford at least the minimum protection to himself.

Never leave the cab of service equipment without first determining that all traffic is clear. "Men Working" signs, cones, barricades, etc., should be placed appropriately within the immediate work area.

In many instances, governmental agencies will provide safety vests or other bright colored clothing to afford protection to the employee working in a traveled roadway. It will generally only take a few extra minutes for you to afford protection to your person. It could save you from bodily injury, or even death.

PROTECTION--TRAFFIC - Just as it is your responsibility to protect yourself, you must protect other drivers (traffic) approaching the work area. Generally, the driver of a motor vehicle is anxious to arrive at a destination. Any deterrent which could cause him to slow up, avoid or detour, in many cases becomes an aggravation. Do not unnecessarily block a portion of a lane that you do not need, be it curb lane, moving lane, etc. Do not void an area to vehicular or pedestrian traffic larger than your immediate needs. Make sure that all warning devices are clearly visible to all vehicular traffic from all directions. The driver and pedestrian is depending upon you to guide him safely through any abnormal situation which you may have created because of your preventative maintenance program, construction, etc.

PROTECTION--PUBLIC - In the previous sub-section, we described in part some protection to the pedestrian; however, we will attempt to describe in more detail what we feel protection to the general public should afford.

In many instances, truck doors, tool lockers, cabinet doors, hand hole box lids, etc., are left open or not sufficiently closed, which affords a hazard to the general public. It may seem to you that these items are trivial and incidental to the public safety. However, in every large metropolitan area, there are continual liability claims involving accidents caused by just the hazards that we have described. The proper barricades, traffic cones, or warning lights, again around a control cabinet or truck or any area where you may be working, will take but a few moments to place properly. A conscientious public servant will always afford protection to those he serves.

PROTECTION--ELECTRICAL - In most cases, the traffic signal cannot be turned off in order to effect some minor repair. When working any electrical apparatus that has power on, you should wear the necessary rubber gloves and use other safety apparatus to prevent an electrical shock. Particularly when damage to public property occurs, you will want to be positive all the power is removed before attempting any correction of the situation. In many instances where poles are used jointly (Electric power companies and traffic departments using the same pole), very high electrical voltage is often times involved and will necessitate you contacting the power company to assist you or to disconnect the power source before any work is started.

PROTECTION--EQUIPMENT - As previously stated in this section, traffic signal control equipment is very expensive. You, as a representative responsible to protect this equipment, particularly when removing or installing or repairing, should use the utmost care possible. Some traffic controllers weigh as much as 70 pounds and have known to have been dropped because of this weight. Measure voltage with your voltmeter before energizing control device.

It is a known fact that traffic control equipment has been inadvertently connected to street light circuits, the high leg of a three phase four wire system, 480 volt single phase circuits, etc.

When transporting control equipment from the field to the shop for overhaul, secure the control equipment properly in the truck to prevent damage in transit.

SECTION V

EMERGENCY REPAIR PROCEDURE

Establish Definite Location - There are many useful procedures which may be developed to establish the location of the area and/or intersection where the trouble may be located, and also to establish as well as possible the type of trouble concerned. This requires cooperation and understanding from the reporting means. Mostly, the police officers are the group who are able to make the reports. They are well trained and competent to make very intelligent and helpful conclusions. There are some reports received from other sources, but the police are mostly the group we must rely on.

It is necessary for the police to fully understand the type of information which is helpful and this will require a clear and accurate set of zones, codes, and communications. With these established, the police officer is then equipped to relay a complete report very simply. Some areas will require more or less of these but the following suggestions may be helpful:

Zoning - The size of the area serviced will determine the need for the use of zoning. In many large areas, some intersections may have the same or similar names. With the use of zoning, an error of this type is mostly eliminated. Police department zones are very acceptable as they convey the same message to the police as they do to the traffic signal technician. They immediately establish the section concerned. This is helpful to know at once as the technician who may be concerned will immediately know the call is for his area. If the traffic signal department has its own communication system the setup used will, of course, be established to meet its own needs.

Codes - A central communication center that can provide the initial screening of all trouble calls, can insure that all calls are assigned to the proper repair unit and that duplicate calls are not dispatched.

Well trained dispatchers who are familiar with the requirements of traffic complaints. It should be the duty of the dispatcher or the complaint desk to obtain all of the needed information from the complainant to insure that the trouble technician will have all the information needed for his reports and to allow him to give the call proper priority.

Radio and telephone being the common type of communication for trouble calls, the use of codes simplify the calls and give clear understandable advice. Starting with the intersection, a number for a north-south street, and a letter for the east-west street, such as "I-7" will convey a simple and understandable means of conveying a location of an intersection. They may be used over an entire area covered, or each zone may be separately designated. This has proven helpful ~~in~~ intersection location.

Summary - With the establishment of the type of the emergency trouble and the means of knowing the location, time is saved in knowing what equipment may be needed and to plan the best route to reach this location. The thoughts presented represent some being used and may be expanded or deleted to meet your needs.

The use of a standard trouble report form (see sample copy in this section) to enable the technician to record the information given by the dispatcher as fast and accurately as possible. This form will also give the dispatcher a basic format as to the order to dispatch the given information.

Establish Emergency Control of Traffic:

Use of Police - When an emergency call for a traffic signal failure has been received and traffic direction is required, the police department should be alerted to the problem at once, even though they have relayed the message of failure to the technician. At times police officers may be working an emergency which requires their full interest. This makes it helpful when they are reminded to take proper precautions to protect moving traffic until the failure is either corrected or substitute equipment actuated in the intersection.

When repairs require the use of trucks and equipment in the traffic lanes, it is necessary at times to protect the workers and also moving traffic, depending on the type of congestion created. Police may be required to direct traffic to assure safety during work.

When emergency repair may require a long period of time, the police may arrange for a special police officer to handle the traffic when available.

Police may check the Power Company if there is an apparent power failure.

Use of flasher - On arriving at a traffic signal failure, the flashing equipment should be actuated as soon as practical while the controller is being examined or until police arrive to direct the traffic and do not require flashers.

If the traffic signal failure requires a substantial period of time to correct the trouble, flashers may be used to control traffic in intersections during this period. Police should always be alerted to the situation.

Use of portable stop signs:- Portable "Stop Signs" should be placed in the proper location in the case of traffic signal trouble at an intersection if police or flashers are not available. They should be removed immediately when the signal is replaced in service. If the trouble is to be of long duration a permanent stop sign should be installed.

Proper Location - The value of establishing a system of definite signal locations is important. One of the problems encountered by any technician working trouble calls is that of establishing the location of the trouble reported and then choosing the shortest route to that location. It is easy to see that if a highway running through an area for several miles, and having as many as four or five different designations that many problems can arise in the dispatching of calls along that highway.

If you have two of the above type highways that intersect, the combinations of possible location addresses would increase greatly. This problem requires extra training of the technicians to recognize these locations and can cause delays in responding to trouble calls by causing improper locations to be given by the dispatcher.

It is of great value to establish a system by which each signalized intersection will have only one location address. This will require that a single location address be chosen for each signalized location and that a copy of this intersection code be given to all agencies working with traffic within this area.

It would be the duty of the dispatcher or the complaint desk to screen all incoming calls, being certain to get the exact location from the complainant and then to dispatch the trouble call using the standard location code address.

On arriving at location, the situation should be surveyed, using caution to cover all the implications involved in the traffic signal failure. Remember to place safety warning signs if required.

If the failure is simple, such as a signal lamp or a slight adjustment, this might be performed and the traffic signal placed in service. If traffic should demand it, a police officer may be called to direct traffic while the work is being completed.

If the trouble is controller trouble of a serious nature, a spare controller may be put in service. If a spare controller is not available and the flasher is placed in service, police should be alerted to the situation.

If the trouble is power failure, the police should be alerted and the power source should be checked to see if there is a power supply failure. Switches, fuses, contacts, and wiring may be checked to locate the failure. Care should be used in case a high tension wire is causing the failure and creating a temporary high voltage condition on part of the system.

In case the trouble is a vehicle detector, the controller may be placed on recall, which permits pretimed operation and allows traffic to proceed until the repair may be completed.

Make sure the equipment is working properly before leaving the intersection.

Alert the police to the repair so they may observe the operation in case of further trouble.

Remove any warning signs used during the repair work.

Safety:

Drive to the location in a reasonable manner, observing the traffic regulations.

On arriving at the intersection, make certain of the best way to safely work on the failure. If police protection is needed, try to obtain it.

Park vehicles in such a way as to cause the least obstruction to oncoming traffic.

Use safety belts where needed.

Make sure of electric power conditions when making the repair, using rubber gloves if needed.

Proper safety signs should be placed to warn traffic when work location requires them.

Consider weather conditions as to apparel and if raining or storming. the electrical hazard which might exist.

Observe the condition of ladders as they are constantly in the weather and may deteriorate.

Workers should use care in placing themselves in the traffic lanes. Necessity to be there does not assure them that a driver may fail to see them.

In all cases when using hi-lift equipment, be cautious about overhead wires, signs, vehicular traffic, etc., that might be involved.

<u>Emergency Control</u> - There are three basic steps to establish emergency control of an intersection. These are:

On arrival at the intersection, the technician should evaluate the problem and estimate the time needed to complete the repair. In many cases, minor repairs such as blown circuit breakers, or fuses, may be repaired before any emergency control could be established.

The technician should also evaluate the type of intersection, the type of traffic and pedestrian movements, to determine if any control problem or dangerous conditions exist.

The next step is to select the type of emergency control needed for the intersection. There are four basic types of emergency control that can be used. These basic control elements may be used in combination at times to increase the safety. The four basic types of emergency control are:

(a) Use of a flasher unit--this type of control finds its widest use on signals that are located at minor volume intersections with low pedestrian and low turn movements; at intersections having medium volume on the main street, low side street volume, low pedestrian and low turn movement. The flasher unit should flash yellow on the main street phase and red on the side street or streets. A flasher may also be used with a fail-safe unit which is actuated by a controller or power failure.

(b) Use of portable stop signs--this type of control like the flasher unit should be limited to intersections where only one phase is working with medium volume and where the side street volume, pedestrian and turn movement are low. Portable stop signs may also be used in conjunction with a flasher to increase the level of safety. The stop signs shall always be on the phase or phases having the flashing red signals.

(c) Police assistance--if the traffic volume, heavy pedestrian movement or heavy left turns, reach a level deemed to cause an unsafe condition if portable stop signs or a flasher were used, the traffic signal technician must request traffic assistance from the police department to insure the public's safety while the traffic signal is repaired.

In general, a well trained technician, familiar with his zone of responsibility, will know in advance by the nature of the trouble reported and the location's inherent traffic problems, the safest type of emergency control that can be used. If the technician determines that police assistance will be required, he can advise his dispatcher to request that a police officer meet him at the location. This pro cedure insures that the police will arrive at the location as soon as possible to assist in the movement of traffic.

Care must be taken within the local community not to abuse the right to request traffic assistance. This can be done by remembering to complete all repairs as soon as possible to allow the police officer to return to his other duties.

(d) Use of a traffic signal--a portable traffic signal can be used when a traffic accident has knocked down one or more concrete signal poles. This signal would be installed in the center of the intersection and a temporary electrical service would be run overhead to the unit. This would allow the new poles to set before the signals are reinstalled.

Safety While At The Intersection - The technician must always keep his own safety and safety of the general public in mind. He must always operate his service truck in a safe manner when enroute to the location and while working there. When in the intersection while changing lamps and making repairs to the signal heads or control cable he must always park his truck so as not to block any more traffic than is necessary.

When working on the controller or on underground cable, the technician must use cones and flags to protect pedestrians in the area.

Use of Replacement Controllers - There are two classes of replacement controllers. These classes are:

Exact Replacement Spare Controller-- this class of replacement controller should be used when a controller needs to be replaced at a volume density intersection or at an intersection within a coordinated system such as a PR or TM System.

Emergency Replacement Controller-- this class of replacement controller can be used to replace almost any two or three phase controller through the use of jumper cables between the controller and cabinet wires.

SECTION VI

TROUBLE SHOOTING

Trouble shooting and repair consists of locating the fault and correcting it.

Repairing the trouble usually involves the replacement of defective parts, but locating trouble is often a more tedious job, requiring knowledge of the system or equipment plus mechanical know-how. Efficient trouble shooting requires an orderly and systematic procedure.

As a traffic signal technician, much of your time will be spent trouble shooting the equipment you are required to maintain. This is reason enough for you to become a proficient trouble shooter. Much of the equipment you are required to maintain is quite complex, and you may feel that it is beyond your ability to keep it operative. However, the most complex job will usually become much easier if it is first broken up into successive steps.

Before attempting to make adjustments or correct faults in a circuit, you must first know at least the following:

(a) What the circuit is supposed to do in normal operation, and how to operate it.

(b) What each part or piece of equipment in the circuit contributes, and how each functions.

(c) The location of every part, and routing of conductors.

(d) The most likely cause of any given malfunction.

(e) The best places to "get into" the circuit for making tests.

In the more complex problems with controllers, detectors, preemptors, etc., you must have the publications pertaining to that specific piece of equipment. These publications usually contain operational instructions, complete description, wiring and schematic diagrams, and other pertinent information helpful in efficient trouble shooting procedure. After the purpose and operation of a particular controller, detector, etc., is understood, these diagrams are extremely useful in analyzing the details of its installation and operation. They show actual electrical connections between various parts and points in the circuit. When using these diagrams, you can start at the source of power for a particular circuit, trace along the conductors through control devices such as resistors, coils, capacitors, switches, connecting plugs, terminal points, the load, and finally back to the source. Thus, you gain a mental picture of the whole circuit before attempting to work on it. By thoroughly analyzing the schematic or wiring diagram for a controller, etc., and then operating it to observe the fault, you should have a pretty good idea of WHAT and WHERE a trouble is before you ever pick up a tool.

The main points to remember when trouble shooting any controller, unit, or system, are: Know how and why the unit operates as it does. make use of wiring diagrams, schematics and technical publications, to give you a better understanding of the circuit. Troubles or faults usually come in one of the following forms: opens, shorts, grounds, and don't forget, low voltage.

Verify Malfunction - In order for the traffic signal technician to establish priority in answering calls, he should verify the exact malfunction.

All signal lights out
Short green time on "A" phase
Conflicting greens
Lights stuck, not cycling
Northbound red out

After arrival at the troubled intersection:

(a) If an officer is not at the intersection directing traffic, determine if one is needed.

(b) Temporarily put out stop signs, put intersection signals on flash, take reasonable precautions to prevent an accident until the traffic signal can be repaired and put back into normal operation.

Observe Malfunction - Analyze malfunction to isolate trouble. Determine if trouble is a burned out bulb, stuck controller, trouble in minor movement. etc.

If trouble is in the controller or unit, determine if it is applicable for on-site repair or should be returned to the shop for repair.

If spare is available, install and return intersection into service.

If spare is not available, make use of an ERC or emergency controller, to temporarily get intersection back into operation until original unit can be repaired.

Records - The time of receipt of trouble call, time of arrival, and time intersection was put back into operation is important to log. These times may be important in law suits, court action, etc.

Record all parts used or equipment used to get intersection working.

Record actual work done.

IN-SHOP REPAIR - Establish and maintain a systematic record system by intersection, manufacturer, type of equipment, etc. Note such items as date unit came into shop, time for repair, parts used in repair, etc. These records will be invaluable to establish reliability, noting re-occuring troubles, etc.

Make use of established trouble shooting procedure.

Try to locate the trouble by observing the unit's faulty operation.

Try to locate the trouble by using eyes and nose.

Localize the trouble at the faulty section by testing techniques.

Localize the trouble at the faulty stage by testing techniques.

Localize the trouble at the faulty circuit or part by testing techniques.

Replace or repair the defective part.

Test the operation of the unit.

Put to use the invaluable publications made available by the manufacturer.

Utilize all test equipment available such as "o" Scopes, V.T.V.M.'s, Frequency Counters, Mock-Ups, etc., to facilitate repair.

TROUBLE REPORT

TRAFFIC AND TRANSPORTATION DEPARTMENT

TRAFFIC OPERATIONS DIVISION – SIGNAL

Truck No. ______ Radio No. ______ Date ______

Section ______

Location ______ City-County ______

Time Call Received ______ A.M. P.M.

Time Notice Received ______ A.M. P.M.

Time Arrived ______ A.M. P.M.

Time Completed ______ A.M. P.M.

	Traffic Signal				Pedestrian Signal						
	Red Out	Amber Out	Green Out	Signal Out	Don't Walk Out	Walk Out	Not Operating	Power Failure	Check Timing	Other	No Trouble Found
Trouble Reported											
Trouble Found											

Indicate direction of lamp out on traffic signal or pedestrian signal. – If dual indication, indicate which head.

Description of Work Performed or Remarks. ______

Materials Used This Call – Use Back If Required

Storekeeper ______

Speedometer Reading End of Shift ______

Speedometer Reading Start of Shift ______

Total Miles Driven ______

SPARE CONTROLLER INSTALLED – LIST TYPE

Type	E R C	Set for Operation as.
		Fixed Time
		Semi-Actuated (Sync)
		Semi-Actuated (Co-ord)

Set Temporary Timing on Spare:

Cycle Length	Split – % and Direction

By Technician ______

APPROVED BY:

Maintenance Foreman ______ Date ______

Construction Foreman ______ Date ______

man ______ Date ______

SECTION VII

SIGNAL SYSTEMS

When traffic signals operate in such close proximity to each other that there is an interaction of the traffic they control, responsible authorities frequently conform such signals into a coordinated system to provide for the best overall movement of traffic. Although such systems vary widely in their composition with respect to number of signals and operational characteristics, they are all directed toward the reduction of delay, number of stops, travel time, conflicts and collisions.

System Types - Systems of signals may be as simple in composition as a few pretimed controllers oparating signals along a one-way street; or as complicated as a computerized, interconnected conglomeration of controllers operating a multitude of signals on a grid of major urban roads. As urban centers grow in size and complexity and the need for the efficient use of urban roadways develop concurrently, signal systems proliferate and become larger and more sophisticated. Systems of all levels of complexity, matching the situations they control, must however, be effectively used and understood accordingly.

The "Traffic Engineering Handbook", Third Edition (1965), recognizes four principal signal systems and discusses them as follows:

Simultaneous System - In the simultaneous signal system, all signals along a given street always display the green indication at essentially the same time.

Under this system, all traffic on the artery is moving at one time and a short time later the artery traffic is stopped at the signalized intersections and the cross traffic is free to move. This program is repeated throughout the time that the signals are operating on a cycle basis.

Alternate System-- Under this system, signals or groups of signals give opposite indications to a given street at the same time. If each signal on an artery alternates with those immediately adjacent, the system is called "signal alternate". If pairs of signals alternate with adjacent pairs, the system is termed "double alternate" and so forth.

Limited Progressive System - In this system, which is also known as simple progression, a common cycle length is used and the various signal faces controlling a given street provide green indications in accordance with a time schedule to permit (as nearly as possible) continuous operation of groups of vehicles (platoons) along the street at a designated rate of speed (which may vary in different parts of the system).

Flexible Progressive System - This method is a refinement on the limited progressive system in that the signal offsets, splits (division of time cycle), and/or length of the common time cycle are changed to suit the needs of traffic throughout the day.

Traffic Adjusted System - By supervising pretimed and/or semi-traffic-actuated local controllers with a traffic-actuated master controller which selects cycle lengths and offset times according to detected traffic volumes a signal system referred to as "traffic adjusted" is obtained. In this system, if the local controllers are semi-traffic-actuated, the duration of the minor-street phase within the selected cycle length is determined by actuations from detectors installed on the minor street.

In addition to the traffic adjusted control, the "Manual on Uniform Traffic Control Devices", Bureau of Public Roads, 1961, makes note of other applications of traffic-actuated equipment in coordinated operation of a series of related signalized intersections as follows:

"Supervisory background cycle. A supervisory background cycle can be imposed upon a series of semi-traffic-actuated controls by a master timer sending out impulses to each semi-actuaged controller, or by local synchronous-motor control at each intersection.

"The background cycle and offsets are determined in the same manner as for pretimed control to give the maximum travel band through the area. The function of the supervisory cycle is to assure that the local semi-traffic-actuated controllers provide at least the minimum main-street green interval in a time relation best suited to main-street progression. Each semi-traffic-actuated controller adds to its main-street green interval all time not required by traffic-actuated demand on the minor street, thereby providing the widest possible travel band".

"Mutual Coordination - Mutual coordination is the coordination of two isolated semi-traffic-actuated controllers located at adjacent or nearby intersections in such a way as to minimize the stopping of traffic on the main artery. This is done by interconnecting the controllers so that there is an offset between side street actuations."

Coordinated Actuated System - This system interconnects along an artery a series of full-actuated controllers to insure a progression of arterial green time while simultaneously allowing full flexibility of assignment of green time at the intersection according to vehicle detections received from the intersection approaches. This system works particularly well when side street volumes are heavy and all volumes are irregular. During peak hours, this system not unusually performs like a "simple progressive system employing pre-timed controllers". During off-peak hours, however, it utilizes its flexibility to provide for greatest efficiency. This is of particular value in off-peak hours when although volumes of traffic are extremely light, flashing operations are not acceptable.

Computerized System - The more recent developments in interconnected coordinated signal control is represented by this system. In general, the computer functions to gather traffic data from the vehicle detectors throughout the area to be controlled. It then analyzes the data and selects an appropriate strategic control plan to minimize delay. The computer controls the signal lights via the local controllers in accordance with the selected plan and monitors the traffic to determine the effectiveness of the plan. It also monitors the signals to assure that the plan is being followed and modifies the plan or implements a new plan as required. A computerized system can be thought of as having unlimited pattern capability which is responsive to actual traffic demand.

This system is adaptable to any number of signals either along arterials or in grid patterns. Important factors affecting the capabilities of this system are the size and nature of the computer, the program (software) written for the computer, the nature of the data collection techniques, and the nature of the intersection controllers.

The system computer is usually a high speed, general purpose digital computer. A high speed computer is needed to solve the complex control equations rapidly enough to effectively control the traffic. A general purpose computer is required to interface to the communications system, solve complex equations, evaluate the overall system performance and effectiveness, and be able to accomodate system expansion.

The hardware will not control traffic until the computer has been programmed. The programs or software, are the detailed set of instructions for the computer. The two major functions of the software are to calculate traffic surveillance parameters and to calculate traffic control commands. The surveillance programs determine how well the system is operating. The raw data as measured by the detectors, is used to calculate various system parameters such as travel time and delay. The detectors are monitored continuously to get a complete description of the traffic flow over the entire network.

The control Programs are designed to control the traffic to minimize network wide travel time while striving for maximum flow smoothness. This goal can be achieved by calculating network parameters to obtain the desired overall control of the vehicles in the network, and then making continuous adjustments at every intersection to accomodate second by second fluctuations in demand.

The method of interconnecting signals, detectors, and computers is a matter of major concern. Cost, reliability, and compatibility are factors which must receive major consideration. On line traffic surveillance and control systems make use of wire lines for transmission of data and commands between detectors, computer, and controllers. Three techniques which have been employed to transmit vehicle data over the wire lines are direct wire, frequency division multiplexing, and time division multiplexing.

The direct wire system utilizes a separate pair of wires from every detector to the central computer. Frequency Division Multiplexing (FDM) uses tone generators and receivers to multiplex several signals over one line. Time Division Multiplexing (TDM) uses gating and clocking circuitry to compress several signals onto one line.

The data communications system must efficiently collect random-event data from widely separated sources at low cost and with a high degree of reliability. It should be modular in nature permitting system expansion by incremental hardware expansion and be simple to operate and maintain.

The direct wire system, although simplest in concept, is the most expensive to install. The FDM and TDM systems are more complex in design, installation, and operation but are less costly systems because of the large savings in cable costs. To achieve the most cost effective system, tradeoffs are made between the hardware costs and the cable costs.

The intersection controllers used in a computerized system can be of any type. Although the simplest type will suffice, more sophisticated controllers are sometimes used to act as a backup system in the event of a total system failure.

System computers can be large central units or small "area" or "sub master" units. They can be "on-line" "real time" units which directly program the intersection signals; or they can be "off-line" or "shared" units which program devices directly controlling the signals.

Systems of this nature because of their great sophistication, high cost per intersection for small numbers of signals, and their need for highly developed technical competence would not be readily adaptable to small systems of signals in relatively small communities (under 50,000 people).

Effective signalized grid control on a large scale invariably involves great amounts of data which can only be handled realistically by a computer.

The method of interconnecting signals, detectors, and computers is a matter of major concern. Cost, reliability, and compatibility are factors which must receive major consideration.

Which signal system is appropriate to a particular situation should always be considered a major application engineering decision. All significant aspects of the problem should be considered. The cost of the system, both initial and anticipated future cost, should be carefully balanced against the anticipated benefits.

SECTION VIII

INDEX

VT 016 730
INSTRUCTOR'S GUIDE FOR ADVANCED SCHOOL BUS DRIVER'S COURSE.

OHIO STATE DEPT. OF EDUCATION, COLUMBUS. DIV. OF VOCATIONAL EDUCATION.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - ND 6P.

DESCRIPTORS - *TEACHING GUIDES; *STUDENT TRANSPORTATION; *JOB TRAINING; *TRAFFIC SAFETY; ACCIDENT PREVENTION; DRIVER EDUCATION; BUS TRANSPORTATION; PUPIL PERSONNEL SERVICES
IDENTIFIERS - *SCHOOL BUS DRIVERS; *SHORT COURSES

ABSTRACT - THIS TEACHING GUIDE IS SPECIFICALLY DESIGNED FOR USE IN AN ADVANCED TRAINING COURSE FOR SCHOOL BUS DRIVERS. THE COURSE CALLS FOR 32 CLASS HOURS AND TOPICS ARE DIVIDED INTO INSTRUCTIONAL UNITS WITH LEAVE TIME LIMITS INDICATED FOR EACH. THE AREAS TO BE DEALT WITH IN THE COURSE INCLUDE: (1) PUBLIC RELATIONS, (2) SAFETY AND EMERGENCY EVACUATION, (3) FIRST AID, (4) DEFENSIVE DRIVING, (5) THE DRIVER'S ROLE IN THE MAINTENANCE PROGRAM, (6) THE SPECIAL CHILD, AND (7) LAWS AND REGULATIONS. THE LAST SECTION OF THIS OUTLINE CONTAINS INFORMATION REGARDING THE INSTRUCTOR'S CLOSING DUTIES. (SN)

OHIO STATE DEPARTMENT OF EDUCATION

DIVISION OF VOCATIONAL EDUCATION

INSTRUCTOR'S GUIDE
for
ADVANCED SCHOOL BUS DRIVERS' COURSE

4041

UNIT I - PUBLIC RELATIONS (Time required = 5 hours)

A. Materials needed

1. Copy of local board policy

2. Suitable film or filmstrip on public relations

B. Points to emphasize

1. Discuss importance and need for teamwork

2. Discuss the driver's relationship with the pupils

   a. Stress need for mutual respect to exist between the driver and the pupil

   b. Good pupil control (behavior) is a must

      (1) No one solution is applicable to solve every problem

      (2) Tips on pupil control A-Z

   c. Refer to local board policy as needed

3. Explain the need for drivers and parents to develop good relationships and spirit of cooperation

   a. The driver must understand the parents' point of view

   b. The driver must take the initiative to build these relations and educate the parents as to his duties and responsibilities

   c. Discuss the role of the supervisor of transportation in driver-parent relations

   d. Stress the value of a booklet or brochure (prepared by local administration) which discusses responsibilities of drivers, parents, pupils, etc.

4. Discuss the need for drivers and other school personnel to work together

   a. Mutual respect of ideas

   b. Avoid criticism of other school personnel

   c. Discuss importance of knowing and following local board policy

5. The driver and the community

   a. Discuss "public image"

   b. Driving courtesy

   c. Drivers impact on total school program

4042

UNIT II - SAFETY & EMERGENCY EVACUATION (Time required = 3 hours)

A. Materials needed

   1. One properly equipped school bus

   2. Chalk board, eraser and chalk

B. Points to emphasize

   1. Safety at all times

   2. Try to be prepared for any situation

   3. The driver must be in charge at all times

   4. Good communication with the students is a must

   5. The driver is responsible for the safety of the students and the bus

UNIT III - FIRST AID (Time required = 6 hours)

A. Materials to be used

   1. First aid kit

   2. Bandages

   3. Splints

B. Points to emphasize - (Instructor may seek assistance of local first aid instructor or emergency rescue squad personnel)

   1. Preserve life

      a. Controlling heavy loss of blood

         (1) A tourniquet should be used only in case of extremities, such as a severed limb

         (2) Moving of an unconscious or injured person

         (3) The driver must maintain complete control

      b. Maintain breathing

         (1) Recognizing the need for artificial resuscitation

            (a) Mouth to mouth breathing

            (b) Manual methods of artificial resuscitation

         (2) Recognize and use caution in administering artificial resuscitation on children

4043

c. Treatment of shock

(1) Recognizing the symptons of shock

(2) Prevention of shock

2. Treatment of physical injuries

a. Treatment of bone injuries

(1) Care should be taken when attending a person with spine or neck injuries. Do not move unless absolutely necessary

(2) Fractures

(a) First aid to broken bones should be no more than to prevent further injury

(b) Do not move an injured person, until all broken bones have been splinted, unless absolutely necessary

b. Head injuries

(1) Consider anyone unconscious to have a head injury and take precautions

(a) Call physician immediately

(b) Keep lying down

(c) Move only if necessary

(2) Look for identification tag on an injured person

c. Other common injuries or illnesses that may be encountered

(1) Eye injuries - drivers should never attempt to treat an eye injury

(2) Vomiting

(3) Mouth or face injuries

(4) Fainting

(5) Falls

3. Moving the injured

a. Move only if absolutely necessary, otherwise, wait for the arrival of a physican or an experienced ambulance crew

(1) If victim must be moved, it should be either feet first or head first

(2) Every part of the body should be supported

b. Moving an unconscious person could cause further injury

UNIT IV - DEFENSIVE DRIVING (Time required = 6 hours)

A. Material needed - none

B. Points to emphasize

1. What is defens

2. Why defensive driving is needed

   a. Number of school bus accidents during past school year

   b. Cause code

   c. Bus driver at fault

   d. Other driver at fault

3. Defensive driving skills

   a. Drivers physical condition

   b. Adverse weather conditions

   c. Children's play areas

   d. Intersections

   e. Being passed

   f. Following traffic

   g. Stopping

   h. Backing at turn around

UNIT V - THE DRIVER'S ROLE IN THE MAINTENANCE PROGRAM (Time required = 4 hours)

A. Materials needed

1. Slides of components developed specifically for this chapter

2. Working models of chassis components

3. Slide projector

4. Screen

B. Points to emphasize

1. Entire bus is the product of many systems and subsystems

2. The driver should utilize all senses in detecting malfunctions or early signs of trouble

3. The drivers' habits greatly influence the economy of operation of a bus

4. The driver should use proper channels and forms in communicating with supervisors, mechanics, etc.

5. Emphasize driver tips

6. Safety of the pupils must be the first consideration at all times

UNIT VI - THE SPECIAL CHILD (Time required = 2 hours)

A. Material needed - none

B. Points to emphasize

1. Transportation of the handicapped has been of great concern to educators for years

2. There are many problems dealing with the transportation of the handicapped

3. Local board policies should be explained

4. Explain parents' responsibilities

5. Explain teachers' responsibilities

6. Explain child's responsibilities

7. Explain bus driver and assistant's responsibilities

8. Various types of handicapped

9. Suggested requirements for the handicapped vehicle

UNIT VII - LAWS & REGULATIONS (Time required = 6 hours)

A. Materials needed - none

B. Points to emphasize - all

Closing

A. Instructor completes attendance record in triplicate

1. Send one copy to driver training consultant

2. Send one copy to the sponsoring school

3. Instructor keeps one copy

B. Send 3" x 5" information cards to driver education consultant

C. Send course evaluation sheets to driver education consultant

D. Complete payment request sheet and send to the sponsoring school

VT 016 747
CROOK, CARLA;GRIFFITH, MARY
A GUIDE FOR ESTABLISHING A HOME ECONOMICS
RELATED OCCUPATIONS PROGRAM.

KANSAS STATE UNIV., MANHATTAN. DEPT. OF ADULT
AND OCCUPATIONAL EDUCATION.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 72 75P.

DESCRIPTORS - *RESOURCE GUIDES; *REFERENCE MATERIALS; *PROGRAM DEVELOPMENT; *CURRICULUM PLANNING; INSTRUCTIONAL MATERIALS; RESOURCE MATERIALS; UNIT PLAN; *OCCUPATIONAL HOME ECONOMICS; BIBLIOGRAPHIES

ABSTRACT - INTENDED FOR USE AS A REFERENCE FOR THE ESTABLISHMENT OF HOME ECONOMICS PROGRAMS, THIS RESOURCE PAPER PRESENTS DEVELOPMENTAL INFORMATION OF A GENERAL NATURE AND IDENTIFIES APPROPRIATE BIBLIOGRAPHIC REFERENCES AND MATERIALS ON PROGRAM PLANNING AND IMPLEMENTATION. A STUDENT LEARNING UNIT AND SCRIPT FOR AN ACCOMPANYING SLIDE SERIES ON OCCUPATIONAL HOME ECONOMICS DESIGNED FOR USE WITH THIS GUIDE ARE INCLUDED. THESE MATERIALS MAY BE ALTERED OR EXTENDED TO FIT INDIVIDUAL NEEDS AND/OR GROUP SITUATIONS. COURSE SUGGESTIONS, EVALUATIVE CRITERIA, STUDENT SELECTION PROCEDURES AND A SET OF GENERAL OBJECTIVES CONSTITUTE A MAJOR PORTION OF THIS PUBLICATION. (SN)

A Guide for Establishing
a
Home Economics Related Occupations
Program

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1972

Authors' Intentions

This resource paper is compiled to serve as a reference for the person desiring information about occupational home economics. It provides guidelines for the establishment of an occupational home economics program. The information presented is of a general nature; if more specific information is desired the reader should refer to the references in the bibliography. The annotated instructional materials section serves as a guide to useful materials for reference and for help in actual program development and implementation. A student learning unit developed for use with the reference paper has been included; it may be used as is or altered to fit individual or group situations.

In addition to the resource paper and the student learning unit, a slide series was created to serve as an introduction to the area of Occupational Home Economics. The script for the series has been included here for interested persons to use as a guide in developing their own such slide series.

Introduction

"The ability of society to afford economic security to people with varying levels of educational attainment and occupational experience lies near the heart of sustaining a safe and sane society. It is vital, therefore, that educational planners examine carefully the basic relationship of school programs to the needs of all individuals for occupational preparation and to the nature of the preparation which schools should and can provide." (25, pp 3)

Vocational Education, Occupational Education, and Career Education are titles used to discuss that field of education which educates people for an occupation. Realization of the truth of the above paragraph, of the importance of the individual, and of the fact that only about 20% of the jobs in the U.S. today require a college degree has forced education to become more concerned about how its curriculum is meeting the needs of the people it serves. Most authorities agree that vocational education as a part of every student's curriculum is the answer to making education relevant. A truly comprehensive program should be available to all; all ages, all socio-economic levels, all cultures, and both sexes.

"Education is the vehicle by which man can cope and interact with his total environment in a rational manner." (27, pp 2) Career orientation and the study of the world of work is imperative for all. We must act now so that every student will have a salable skill, so that the drop out exit from school is closed, leaving only higher education or an occupation as the exits from formal education. Occupational education for all is the dream of many, but it will come true only if there is flexibility and constant evaluation of educational programs.

A word of caution, vocational education does not take the place of general education but grows out of it, supplements and enhances it. Vocational education is thus an essential part of a well planned total educational program. General education needs to precede and accompany vocational education.

Vocational Education - Its Purposes and Goals

1. Helps the individual find satisfactory employment so as to maintain his self-respect and dignity
2. Helps the individual adjust to all aspects of work so that he can succeed in a chosen occupation
3. Provides the means of meeting the psychological, sociological, and economic needs of the individual, thus providing for the total growth of the individual
4. Develops pride in good workmanship regardless of the type of career
5. Produces skilled responsible young adults who are prepared to accept a productive place in today's society
6. Stimulates desirable attitudes towards work
7. Provides flexibility which allows people to enter and leave training when ready to do such
8. Assists persons in making appropriate choices of occupational specialization consistent with their interests and abilities
9. Develops the individual's ability to make wise decisions in accordance with changing socio-economic conditions
10. Provides skills needed to secure a job, perform successfully on the job and plan for advancement
11. Develops awareness of the legal aspects of work
12. Develops the ability of the individual to get along with fellow workers and employers

Although this is not an exhaustive list, these are recognized as the main purposes and goals of vocational education. Such a list will prove to be of great value to the person or group which is initiating a vocational education program or course.

Types of Vocational Education

Vocational education programs now are at the elementary and junior high level serving as pre-vocational programs. These orient the student to the general world of work concepts. Secondary schools, junior colleges, area-vocational-technical schools, colleges, adult and continuing education programs become more specific and usually provide work experience as a part of the occupational class. In addition, there are vocational rehabilitation programs and private programs such as training programs provided by industry for its employees.

The established subject matter divisions currently used are:

1. Vocational Agriculture
2. Office and Business Occupational Education
3. Trade and Industrial Education
4. Vocational Home Economics
5. Technical Education
6. Distributive Education
7. Health Occupations

Cooperative Education

All of the purposes of vocational education, except the training for a specific skill, are essential commonalities in the training of an individual regardless of his chosen occupational emphasis. Cooperative education programs teach all students the basic factors related to the world of work in one core class with specialization skills taught after the core course. This allows for better utilization of teachers through the use of team teaching and the elimination of duplication in each occupational class. Facilities and instructional material are utilized more efficiently and because there is one course for all, fewer copies of materials are needed. Included in cooperative education is the needed general education such as math, social science, health education and science--all based on the application to the world of work.

The one essential in a cooperative program is a good director who can work with all persons involved in order to identify commonalities and unique aspects of the various area and thus organize a productive program.

In cooperative programs much of the technical and specific occupational skills are taught during the students work experience phase of the program. This means that cooperative programs are relatively inexpensive to establish because the school has very little major equipment to purchase. Therefore, advocators of cooperative education feel that it can better serve the needs of its students, and at less cost, while utilizing instructors and materials more efficiently.

Before deciding upon a cooperative education program the disadvantages should be considered. In small towns or rural areas, where there may be insufficient business and industry to provide work experience, cooperative education may be impossible. Lack of cooperation can also limit the program where ever it is established. Diversity of occupations, educational levels, types of programs, groups served, geographic locations, and the wide number of occupations make cooperative education difficult to employ.

Cooperative education just plain "makes sense" if minor difficulties can be overcome. Even in rural areas cooperative education can be used in order to teach the commonalities in the world of work to all as a core course.

Mason (4) identifies the elements of a cooperative plan:

-- Related instruction in school
-- Selected training stations for work experience
-- Student - Leader with a career objective
-- Preparatory curriculum
-- Step-by-step training plan
-- On the job supervision
-- Qualified teacher coordinator
-- Adequate time for coordination
-- Suitable class facilities and instructional materials
-- Well defined school policies
-- Well organized program records
-- Use of an advisory committee.

Occupational Home Economics

How can we provide education in homemaking and consumer education and at the same time develop programs in home economics related occupations?

Encouraged by state and federal support the employment aspect of home economics is becoming an important and vital area. The increased demand for occupational education presented numerous questions to those in home economics education. Can provision be made for education for homemaking as always and integrate employment programs? What will be the relationship between the two emphasis; what new material, facilities, and teacher preparation will be needed?

The 1963 Vocational Education Act was the first time in the history of home economics any purpose other than training for homemaking was identified by law. The act created the dual role purpose of home economics, namely, training for homemaking and for a career.

Part F of the 1968 Vocational Amendments, entitled Consumer and Homemaking Education, provided more funds for the H.E.R.O. programs, state programs, curriculum development, teacher education, and for research. More emphasis was given to the dual role of home economics. Stipulations were included that 1/3 of all funds under Part F must be spent for programs in economic depressed areas or areas of high unemployment. Part F also states that consumer education be a part of occupational education programs.

The dual role function of home economics must be taught at all levels and in all areas with the homemaking and occupational aspects working together to help the women and the increasing number of men home economics serves to better understand the total scope of their roles in society today. Care must be taken, however, to distinguish between the courses for homemaking and those for occupations. Appropriate titles for home economics related careers need to be formulated and materials and facilities created to fit the new occupation courses.

Lawson in Contemporary Issues states that wage earning programs should consider these five facts:

1. Courses planned for employment preparation differ from those prepared for homemaking.
2. Occupational education programs in home economics can be effectively built on basic homemaking courses.
3. The way in which home economics is taught influences the extent of carryover to occupational preparation.
4. Personal qualities, work attitudes, and job skills are among the competencies required for success on the job and thus are the basis for curriculum development.
5. Some types of home economics employment preparation can be taught more effectively when coordinated with another phase of vocational education or a related discipline.

H.E.R.O.

H.E.R.O. (Home Economics Related Occupations) is the terminology currently being used for occupational home economics programs. These programs must consider socio-economic factors and the changes affecting employment if the programs are to serve the individual.

Current factors identified as which affect H.E.R.O. are:

-- Move from rural to urban
-- Increased mobility
-- Development of social conscience
-- Ecology movement
-- Technological advances
-- Change from family as a producing unit to a consuming unit
-- Industrialization
-- Population explosion
-- Longer life span
-- Affluence and poverty existing together
-- Mass communication and transportation
-- Increasing number of women working
-- Automation
-- Shorter work week
-- More leisure time
-- Increased productivity by business
-- Increased foreign competition
-- Demand for skilled labor with jobs for unskilled labor rapidly decreasing
-- More education needed for work
-- Families eating out more often
-- More demand for child care
-- Increased demand for clothing alterations
-- More nursing homes
-- People travel more and to farther places
-- Largest growth in careers is in information industries as a result of the knowledge explosion
-- Fewer jobs being created for private profit
-- More total job opportunities
-- More variety in family patterns
-- Social tensions, more mental and physical stress
-- Racial problems
-- More young workers
-- Shortage of experienced workers in some careers
-- Increased unemployment among youth, older people, minority groups, and women
-- Womens liberation movement
-- Drastic change in the goals of youth
-- New products, especially food products

Specific factors to consider when actually setting up a H.E.R.O. program in addition to current factors previously cited are:

- -- Economic resources of the community
- -- Size of the city or community the program will serve
- -- Low income groups within the area
- -- Community support
- -- Public opinion
- -- Power structure
- -- Mobility of persons the program will be serving
- -- Labor and management practices and policies
- -- Educational facilities and materials available
- -- Cultural values
- -- Employment opportunities (needs and trends) in the area
- -- Employment projections and census data
- -- Money available for the program
- -- Geographic location
- -- Capabilities of instructors and resource people
- -- Special items related to the subject matter field

Every program should vary somewhat to meet the specific needs of the individuals and the community it serves.

H.E.R.O. Programs

The list which follows is compiled from a wide number of references; some gave only one or two programs, others such as the various volumes of *Illinois Teacher* provided a good variety of programs and even some descriptions of the programs. The list includes a number of *Dictionary of Occupational Titles* listing. The list serves as a guide to one who is interested in what H.E.R.O. offers and provides help for one who is establishing a H.E.R.O. program at the secondary, junior college or adult education level. The list does not include jobs requiring college degrees.

Child Care Services

child care attendant or assistant
day care center leader or aide
children's matron
assistant in pediatric ward of hospital
manufacturer of or employee in a place which makes children's toys, clothes, accessories, etc.
child monitor
children's clothing maker
sales clerk in children's department in a store
community or private nursery school leader or aide
community recreation aide
employment in a home to care for children
assistant in a children's home
dietitian or cook for places which feed children
elementary school teacher aide
preparation for becoming a teacher
baby sitter
a mother's helper

Food Services

quantity cook in institutions such as hospitals, colleges, nursing homes, school lunches, restaurants
food service supervisors
catering service manager or cook
family dinner service specialist
waitress
short order cook
salad girl
pastry assistant
cake decorator in a shop or at home
cook for private homes
fountain service worker
grocery store cashier, stocker, meat dept. worker
advisor on use of food commodities
food testor
dietitians
hostess
sandwich maker
work in bakery
dishwasher
work in private home

Feast programs are being established which mean food education and service training programs

Community Services

bridal consultant
companion to the elderly in nursing homes or private home of the elderly person
companion aides
management aide in federal low rent housing
homemaker assistant
housekeeper
home nurse
hotel/motel housekeeping aide
nursing home housekeeping aide
homemaker/home health aide
family health assistant
home economics teachers aide
tourism

Clothing and Textiles Services

apparel specialist
designing clothing
modelling
fashion careers and retailing
clothing teachers aide
interior designers assistant
fabric maintenance
upholstery work
trade tailoring
costume construction
fabric coordinator
millinery aide
textile testing
clothing store alteration lady
institutional seamstress
presser

Work in: bridal shops
clothing stores
women's apparel shops
cleaners
laundries
linen services
fabric stores
sewing machine stores

Working as: buyer
tailor
week worker
service worker
seamstress
processors
spotters
piece workers
salesperson
delivery
clerk
marker, presser, or finisher
shirt operator
washer
maid

sewing for others in own home

Housing and Home Furnishings Services

gift wrapper
florist helper
window display or helper
drapery hemmer, drapery construction
floral designer
home furnishing aide
testor of equipment
floor covering consultant

Work in: drapery stores
interior design shops
equipment and furnishing stores
upholstry shop
furniture stores
floral shops
refinishing shops
Work as: salesperson
displayman
supervisor
consultant
installment person
delivery person

factories which produce home furnishings
upholstry and refinishing in own home

General

Before the specific career is taught courses which are general in nature are taught and are entitled as occupational home economics in most cases. Special occupational courses are also taught in home economics for the slow learners, the handicapped, correctional schools, in some places courses for the migrants, the mentally retarded, and the deaf.

<u>Steps to Follow in Establishing [illegible] Program</u>

1. Establish a need. Become familiar with local employment security office, business organizations, lay leaders and the community. Get the administrator's approval to continue.

2. Organize a local advisory committee. Set tentative objectives.

3. Do a community survey and job analysis.

4. Begin and continue a public relations program including publicity about the proposed program.

5. Develop a curriculum. Look at materials available, visit other programs, gather materials to use, set tentative plans and schedules. Get final administration approval.

6. Determine student selection and interests. Do this as a part of number five.

7. Determine final materials and facilities needed. This happens as the final step of part five.

8. Determine the instructor if it is not the one planning the program. This is suggested to be done at several points but it would be most helpful if the instructor could be in on as much of the planning as possible if it is not the one who is directing the planning.

9. Plan work experience and the needed training stations.

10. Select the forms to be used.

11. Plan for evaluation. Initial steps for this will be considered during step five.

12. Implement the program. Plan for continuous updating and improvements.

Establishing Need

The initial step to take in any program planning is establishing if there is a need and if so what exactly is it. If there is no need for a program then it should not be set up. If the need ceases to exist the program should be discontinued.

Before beginning to investigate the need get the approval of the administration. In a large system a director or city supervisor may do this work but usually it is the home economics instructor who becomes the leader in program establishment.

In determining the need a community survey of some type is done. Before doing a formal survey an advisory committee should be formed to help in these initial steps. They can investigate what has already been done in the community that will provide helpful information, talk with the local employment security office, the Chamber of Commerce, business organizations, and labor groups in order to make them aware of what is being proposed and to gather information that already exists.

If through these steps not enough information can be gathered a community survey should be set up using the advisory committee to assist with organizing and doing the survey.

The Advisory Committee

The importance of an advisory committee cannot be stressed enough. If properly utilized the committee can serve to be the single most important resource in an occupational program. When a new program is being formed one of the first steps should be the formation of an advisory committee. If selected early in the planning they can provide a wealth of assistance and will function more effectively later because they understand the program. Many like to select an overall advisory committee when planning a program and then select smaller committees that are responsible to the overall committee. The smaller committees work with one particular area of the total program.

Because the teacher is the one who works most directly with the committee, she should play a major role in the selection of the committee and in its organization. Selection is usually done by first asking persons if they would be interested in serving on an advisory committee and then sending letters to formally ask the persons to serve.

An advisory committee can be as small or as large as felt needed. The average number recommended is from 4 to 7 persons because larger groups become too diversified in opinions. For H.E.R.O. programs suggested members are housewives with sincere interest in the program, home economics related business personnel, women who have a home [illegible] in the [illegible]. For [illegible] students, parents [illegible] interested [illegible] with a sincere interest in the program. Because the committee [illegible] the major link to the community it is wise to select respected persons from diversified areas so all the community feels their interest is represented. To keep a continuous link the members should serve on a rotating basis so that only part of the committee will be new each year.

The functions of an advisory committee are:

- --aid in publicity, program promotion and interpretation of the program to the public
- --identify areas into which home economics can expand
- --help to determine criteria for selection of training stations
- --review and revise training plans
- --sign all training plans
- --recommend a minimum wage for the purpose of preventing exploitation of students
- --provide supplementary instructional materials
- --assist with the evaluation of the program
- --advise on criteria for selection and recruitment of students
- --advise as needed in relation to program objectives, course content, and competencies expected
- --help obtain information about job opportunities
- --help broaden contact with the people in the community
- --bring community feedback to the rest of the committee and the school personnel
- --provide continuity and stability in the program from year to year even with a change in teachers
- --acquaint the board of education with program objectives and needs
- --sponsor classes and FHA
- --study other programs and materials and recommend new ideas
- --a very important job --PUBLIC RELATIONS

Advisory committees cannot make policy they only [illegible] recommendations which the officials will then consider. In other words, the advisory committee has NO administrative functions. The most important contribution they make is the link they create with the community.

When meetings are held a well planned agenda is necessary. Members are serving on a voluntary basis so their time should be valued. Aug.,Nov.,Feb., and May are suggested as times for major meetings with others held when there is an important matter of business that must be considered. The committee should have a president and a secretary. The teacher(s) of the program attend the meetings but should not be in charge.

Use but don't abuse the committee. Make them realize their effort counts. They are the vital link with the community which supports the program.

Course Objectives

Objectives [illegible] clear to all involved the purposes of the planned activities and course. It is recommended that objectives be formulated as concise behavioral objectives. Course objectives are formulated first and from these more specific objectives are formulated for each area within the course. A wise teacher will seek the aid of her advisory committee in formulating the objectives and in continuous updating of them in order to keep abreast with the changes in society and the needs of the students.

Tentative objectives established at the initial step of implementing a program, and continual revision of them, gives guidelines to follow throughout the planning and provides continually to the public a rationale for all that is being done.

[illegible]

A community survey [illegible] relative to the actual needs in the community for an occupational program and for the content of such a program. It serves as a public relations technique to involve the people from the very conception of the idea and also to gather their support. While taking the survey, information and resource materials can be collected to help in planning the course content and in establishing possible work stations. The survey identifies the job opportunities within the community, the annual turnover and anticipated increases and decreases in number of employees needed. Resource people for use in the program are identified. Not to be overlooked in the reasons for a survey is the identification of students, their needs and interests.

Before attempting to conduct a survey review with the advisory committee the fundamentals of a survey and determine precise objectives for it. Publicize the fact that a survey will be taken and its purposes. Carefully construct the questionnaire so that all information needed is obtained and no additional surveys are needed. One exception to this is that after a community survey identifies the needs then a job analysis to determine curriculum may be taken.

Job Analysis

After the community survey is taken and has established the needs, a job analysis may be done to determine the content of the curriculum. If there is reasonable assurance that a need does exist and it can be identified before the community survey is taken, then the job analysis may become a part of the survey. Keep in mind that this may make the survey very complicated and not all the needs may be foreseen so that a second analysis is still needed. However, if it can be done with the survey it will save time, energy, and money.

A job analysis identifies:

--job titles and the number of people employed in each
--job prerequisites
--promotions
--characteristics of the job and availability of the job
--personal characteristics needed
--competencies needed and skill level for entry level
--defines the worker
--determines facilities
--how vacancies are filled
--opportunities and requirements for advancement
--age of employees
--working conditions
--fringe benefits

The findings of a job analysis should be incorporated into the curriculum. Continual analysis after the initial one will help keep the curriculum up to date.

Job Clusters

Job clusters are becoming an essential part of every occupational program. They are simply a grouping of similar jobs into one package for students to study and explore for the purpose of making decisions about their career choices. By using job clusters in preparing students for work they learn skills needed for a group of related occupations and thus have more opportunities than if just trained for one specific job. Clusters should include: occupations related on the basis of similar work performed, materials used, products produced or services rendered; be broad enough to include a variety of occupations requiring different skills and knowledge; involve occupations that require not more than a high school education or a 2 year post secondary program; occupations capable of being readily implemented in a school program. The occupations within the cluster should: have favorable employment outlook; have numerous skills and knowledge required for performance of the occupation; provide opportunities for job entry after graduation; provide opportunity for advancement through further schooling, apprenticeship, or on the job training; provide employment in various sections of the country.

Public Relations and Publicity

No matter how good the program is it will not function at its best unless the community it serves is supporting it. Public relations must be continuous from the initial establishment of a need. The advisory committee can serve an important function in public relations; but the teacher needs to keep in touch with the community, especially with the cooperating work stations. Public Relations includes working with the school administration, with the community, with other teachers, and with the students and their parents. When a community is aware of a program and "sold" on its merits financial support comes much easier. A community that supports a program helps to keep it growing, provides ideas and materials that otherwise may not be available. The teacher's job is much easier if she has the cooperation of businessmen in providing work experience. During every phase of the initial planning, and throughout the program, the community should be informed as to what is occurring and the purpose for each activity. This gives the community the feeling that the program is theirs. Be aware of the fact that public relations is vital to the ultimate success of your program.

Often overlooked in the public relations program are the legislators that represent the area. Knowing these persons and convincing them of the program's merits will serve to make it easier to get funding.

Materials and Facilities

Begin a file at the initial point of program development, gathering materials whenever possible. It is difficult to find materials to use so the instructor, with the help of the advisory committee, must develop much of what is used. Business and industry can provide some worthwhile materials relative to their specific areas. Current emphasis on career education is resulting in more curriculum materials becoming available.

With regard to facilities, most often the instructor will need to use existing facilities and then work toward acquiring additional ones over a period of time. Until a pilot course is taught and proven to be successful there is reluctance to invest in major items. Many suggest that rental plans are better than purchasing because equipment soon becomes obsolete. A small but significant part of materials and facilities is provision for file folders and a file, envelopes and stamps, stationery, reference books and magazines, a-v materials and the upkeep cost of repair and replacement of equipment and texts.

Most complain of inadequate facilities and insufficient funds which indicates that it is important that a teacher be creative and resourceful enough to sell the school and the community on her program in order to get more funds.

The Curriculum

A well planned curriculum, incorporating the multi-media approach, will enable the vocational-technical teacher to provide the kinds of learning experiences and opportunities which will allow students to achieve the educational objectives most effectively and efficiently.

Courses of occupational nature should incorporate the characteristics of women workers, trends in family living and employment, values of wage earning preparation, and the problems of managing the dual role of homemaker-wage earner. Discussion of the questions why women work and what causes the decision to be made is a necessary part of the curriculum. Costs of employment should be realistically pointed out. Resources available to the working mother for child care and conveniences in food preparation should be discussed with students. Money management is an especially important facet of the curriculum because many women have not had previous contact with financial matters and many families are unable realistically to determine the value of the second income. Married women must move with their husbands so mobility of the occupations needs to be considered, even when working with junior high students. Curriculum in H.E.R.O. courses must reflect the changing status of women and seek to alter the poor self image some girls have of themselves as a woman.

Materials and ideas obtained from sources used while establishing the need and during the community survey and job analysis is the starting point for the formulation of the actual course content. The advisory committee can help gather materials from industry and business and can assist in obtaining materials already published in the area. Reading current literature, talking with other teachers, attending related workshops and visiting with college personnel are also ways of gathering ideas for the content. All content must be based on reliable information which is continually gathered to add to the curriculum.

Prerequisites need to be identified early in the planning stage. The background and nature of the students will effect the way in which course content is taught. Activities should be incorporated which will foster the development of desirable attitudes and work habits. Because students change the curriculum will need to be flexible and open to continual revision.

The nature of the institution in which the program is to be implemented will affect the scheduling. The time available must be identified early in the curriculum planning so that program's objectives can be effectively accomplished. Program scheduling is a difficult task requiring time to ascertain the best possibilities.

After ideas have been discussed with the advisory committee and local administration, the teacher should put in writing a suggested course outline, teaching procedures to be employed, media to be used, an outline of related information, and a suggested time schedule all for final administrative approval. After receiving final approval specific units including the unit objective, learning experiences, study questions, assignments, tests, references, resources, media and other related information can be planned in detail. A work experience schedule must be worked out. Also, forms to be used during the work experience will have to be developed.

Suggested standards to incorporate when planning the curriculum include the use of methods, materials, and equipment similar to current working conditions. Before any actual decisions are made relative to curriculum the state guidelines should be checked carefully.

Suggested Core Curriculum Content

- Broad Orientation
- Concepts of work, values and benefits of work
- Personal qualities for job success
- Clusters of occupations related to Home Economics
- Worker requirements and restrictions
- Appraisal of working conditions
- Occupational outlook
- Vocational decision making and decision making in general
- Educational planning
- Personal credentials
- Entrance into an occupation
- Legal aspects of work
- Management of money
- Social security and other benefits
- Income tax
- Management of time and energy
- Relationships on the job
- Business ethics
- Health protection for self and others
- Safety at work
- Worker's organizations
- Provisions for transportation
- Living arrangements away from home
- Friendships in a strange community
- Management of home, personal, and occupational life
- Self-respect and self-worth
- Personal habits needed for success on the job
- Specialized Home Economics subject matter

Students: Method of Selection, Determining Interests

It is important to pay attention to what individual students say and do if the program is to be relevant to them. The occupational objectives of the students should serve as a major part of the basis for determining course content. Age and educational level of the student will also effect the curriculum content.

How the students will be selected should be considered along with determining their interests. A few sources suggest that only seniors, with one or more previous years of home economics, be allowed to enroll in occupational home economics, but most authorities feel that it is unfair to limit the courses to seniors. However most favor limiting the actual work experience phase to 16-18 year old students because of the legal aspects. Many feel that previous home economics experience is a valuable asset but not an essential. Student's interest in the program is believed to be of major importance in the final selection. Selection is necessary in this type of course in order to control the number enrolled and to insure the validity of its purposes.

The following are suggested criteria to be used in selecting students for the work experience program:

--interest in receiving training
--physical suitability
--disciplinary record
--school attendance record
--hobbies
--past work experience
--personality characteristics -ones which will affect
    their ability to function on the job
--recommendations especially ones from past employers
--other school activities

The Instructor

The occupational home economics instructor is the key to the success of the program as well as to the image of occupational home economics within the community. She must therefore be dedicated to her own occupation, with a strong personal belief in the purposes of home economics. Enthusiasm will begin with the instructor and spread throughout the class and into the community. Personal qualities, in addition to enthusiasm, that help contribute to the program are ability to coordinate, communication skills, leadership abilities, understanding of students from all levels of life, occupational experience, self-reliance, refinement, poise, ability to organize, and an understanding of occupational programs and the laws which affect them.

Of vital importance to the instructor is the continual self updating related to content and methods. This can be done through in-service training, graduate courses, seminars, workshops, and contact with business and industry.

The job of the instructor is not an easy one but a very rewarding one. There is a satisfaction for the instructor when students enter the world of work as a result of your program or when a potential drop out remains in class because the material is relevant to her real world. In addition to classroom activities it is often the job of the instructor to serve as the director for the development of a new program. Time must also be found to supervise all students on the job. However most instructors feel the rewards far outweigh the disadvantages.

Work Experience

A part of every occupational program is valid work experiences that give the students an opportunity to experience what it is actually like in the world of work. The experience must be real and the student must earn a wage. The actual experience is more important than is the specific job. Work experience should not be confused with work observation or with work study. Work observation is used in occupational courses before the actual experience in order to provide insight into what it will be like. Observations are discussed as part of class work. Work study provides work for students so they may earn the funds to remain in school. Work study does not relate the work to classroom activities and should not be a part of an occupational course. Work experience is used in the class and is related to its activities.

Work experience provides the students with job knowledge, supervised learning of skills, awareness of work environments, development of work attitudes, and job aspirations. Social expectations and personal adjustments related to work are also a part of the learning that results from work experience. Keep in mind that work experience must be real and a wage must be involved.

Training Stations

As soon as the initial need has been established and approval for the program has been received the work experience stations should be selected. The selection may begin during the community survey by asking the businesses if they would be willing to serve as training centers. The advisory committee can provide help in suggesting businesses to use for work centers and in contacting them to get their signed approval to cooperate.

Factors to consider when selecting training stations:

--consider employer and employee attitude about home economics and about serving as a center
--the respectability and reputation of the employer
--competence of the employees
--standards of workmanship
--adequacy and appropriateness of equipment
--volume of business
--policies of company towards occupational training
--existing employer-employee relationship
--safety
--will allow for task rotation
--fair wages
--ability of students to get to the center from the school
--working conditions and environment
--availability of instructional materials for the occupational level
--state laws which may affect use of the center

Orientation is important for the employers in order that they have an understanding of the objectives of the program. The counselor and the teacher should work together to present the program to the employers in training centers. A copy of the handbook, given to the students in the program, should be given each employer. Every aspect of the handbook should be carefully explained with time provided for questions. Expectations of the employer and the means of student evaluation needs to be thoroughly explained by the program personnel. An activities calendar for the employer, which tells when the work experience activities will occur, is a must. Public relations is extremely important in maintaining cooperation with the training centers and in assuring effective work experiences for the students.

Forms and Reports

The state vocational educational office has forms which must be filled out and returned at various stages of the program. As soon as initial steps have been taken to begin a program obtain a copy of all the forms and then file them for reference. Although each state will vary some in the format used and information desired the basic information is similar. In addition to the forms that need to be completed the state will have a state plan which serves as a very useful planning guide. In the state plan the meaning and intent of vocational education is given, the organization and personnel involved are explained, types of programs are clarified, state guidelines for establishing programs are listed, and teacher qualifications are identified. The way a program is reimbursed, the procedure for obtaining state approval, and the services the state agencies provide are also included. Monthly travel reports, program plans for the semester, organization reports, training plans, closing reports, follow up reports of enrollees, and work policies are among the usually required reports.

In some programs parental consent may be required, if so the form used should clearly explain the program to the parent. The signed form then should be carefully filed and retained until the student is no longer enrolled in the program.

At the end of the year send letters of appreciation to the sponsors, to the advisory committee, and to the training station employer. Students are given a training certificate stating that they have completed the program. Inventories are taken at the end of the year and should be filed for reference. Also in the files should be a proposed plan for the next year, the advisory committee minutes, class rolls, correspondence, and prospective student applications.

Evaluation

Evaluation help to keep a program current and to motivate students to achieve. The techniques to be used in evaluation should be established at the initial program planning stages because these effect the way the program will be taught. When objectives are formulated the ways by which they will be evaluated should be considered.

It is especially important to determine how work experiences will be evaluated. This should be discussed with the work station personnel and a definite form established for uniformity throughout the work stations in the program.

Student follow up studies are emphasized as a major means of evaluating the success of a program. The competencies the student has acquired, work experience results, employability, amount of earnings, and services rendered are the major factors to consider in the study. An evaluation must be in terms of student performance and their ability to secure and hold a job.

Items also suggested to be evaluated are:

--administration and educational leadership
--program organization
--adequacy of program coverage
--supervision of instruction
--the curriculum and instruction
--adequacy of staff in numbers, preparation and experience
--adequacy of instructional supplies, devices and materials, facilities, and equipment
--placement and follow up of students as mentioned above
--student admission policy
--extent of upgrading of services and employed persons that is needed
--guidance counselling and student advisement
--effective use of the advisory committee
--finances

Evaluation of the entire program is stressed because it serves as the major means of keeping the program current and relevant to the students and to the needs of business and industry. Evaluation should not just come at the end of the year. Continual evaluation throughout the year keeps a program running smoothly. The advisory committee should help with the evaluation process and make recommendations based on findings.

Conclusions:

Everyone, with few exceptions, is employed at sometime in their lives. The reality of this statement is growing as more women are moving into the labor force and as it becomes more profitable for women to work. Home economics is designed for the women of today and therefore must meet the challenge to provide occupational training for the women it serves. Furthermore an increasing number of men are enrolling in H.E.R.O. programs, which creates another responsibility for home economics. Preparation in home economics related occupations is a new phase in education which we must be aware of and act upon if we truly are educating students to live and function in today's society.

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63. ___________. "The Vocational Purposes of Home Economics Education with a Focus on Education for Employment," Illinois Teacher, 8: 87-93, No. 2, 1964-65.

64. ___________. "Women's Lib is Here to Stay," American Vocational Journal, 45:18-20, Dec., 1970.

65. Thomas, Virginia F. "Functions? Job Title: Home Economics Teacher," American Vocational Journal, 43:23-24, May, 1968.

66. White, Mrs. Eli E. "Home Economics for Living and Earning a Living," American Vocational Journal, 43:57-58, Sept., 1968.

D. Unpublished Materials

67. Neiman, M. Arthur. "The New Life Style and the New Home Economics," Address delivered to the American Vocational Assoc., Home Economics Divi., New Orleans, La., Dec. 7, 1970. (Mimeographed)

E. Periodicals Used the Entire Issue for Reference

American Vocational Journal Vol. 45, Dec., 1970. "Women's Rights in the World of Work"

Illinois Teacher
Vol. 7, No. 4, 1963-64 "Occupational Training"
Vol. 8, No. 3, 1964-65 "Relevance Through Vocational Education"
Vol. 8, No. 4, 1964-65 "Spotlighting Employment Education --"
Vol. 12, No.1, 1968-69 "Feasibility Studies"
Vol. 14, No. 4, 1970-71 "Accent on Home Economics Occupations"

The Bulletin of NASSP

Vol. 48, Nov., 1964 "Education and Automation"
Vol. 48, Dec., 1964 "A New Look at Home Economics"
Vol. 49, May, 1965 "Vocational Education: Time for Decision"

Instructional Resources

A Handbook for Home Economics Cooperative Education Teacher Coordinators. Dept. of Home Economics Education, College of Home Economics, Texas Tech Univ., Lubbock, Texas. 1970.

Excellent resource for anyone working with occupational home economics. Provides guidelines for setting up a program. Table of contents included at the end of this resource list to give the reader an idea of the exact contents.

Final Report: Preparation for a Dual Role: Homemaker-Wage Earner with Adaptation to Inner City Youth Vol. 1 & 2. Resource Curriculum Materials, Dalrymple, Lowe, and Nelson. Office of Education Grant Project. Washington, D. C. Feb., 1970.

Vol. 1 gives the research results. Vol. 2 services as a source of curriculum and media ideas. It gives lists of films and filmstrips with ordering addresses, suggestions for evaluation, units for teaching including the learning experiences and references for each unit. The appendix has guidelines for working with the culturally disadvantaged, federal legal requirements, forms to use, advisory committee set up, case studies, bulletin board ideas, and other materials.

Programs for Career Opportunities in Child Development Division of Vocational-Technical Education, Office of Education, Washington, D. C., Oct., 1969.

Dr. Berenice Mallory talks about Atlanta, Georgia programs and the procedures used. Many related articles appear in other journals. Gives the reader insight into what is involved in establishing and carrying out an occupational program.

A Guide for Vocational Education Curriculum Development U.S. Office of Education Grant Project, Oregon State Univ., Corvallis, Oregon, 1967-68?

Excellent source for step-by-step guidance in vocational education curriculum development. Explains each step and gives samples of forms to use.

Curriculum Materials, [illegible] The State University [illegible] Nov., 1966. [illegible] which are related [illegible] from 1969 list.

The Budget	50¢
Finding a Job	50¢
Installment Buying	[illegible]
[illegible] and trade information	$2.00
How to Make it Bakery Book	$1.75
Beauty Culture-Theory of	$2.25
Math for	$3.00
Industrial Needle Trades	$2.50
Math for	$2.25
Pattern Making and Design 1	$2.25
Power Sewing	$2.25
Related Art for Dress Design	$1.50
When You Go to Work-A Book for the Needle Trades	$1.75
Teacher Guide-Dry Cleaning and Pressing	$1.00
Commercial Foods Math for	$1.75
Food Sciences	$2.00
Teachers Guide Cooks, Suggested Training Course	$1.00
Health and Personal Hygiene	$1.50
Our 1st Foods Book-for the deaf but ok for any class of slow learners	$2.00
Our 2nd" "	$2.25
Our 3rd " "	$3.25
Sketching and Design for Upholsterers	$1.75
Science for Upholsterers	$1.75
Teacher's Guides	
Guidelines for Home Economics Education in Secondary Schools	$3.00
Homemaking in Elementary Schools	$2.75
Homemaking Education -Resource Materials for the Play School	$2.75
Teaching Home Economics to the Educable	$1.00
Waiter-Waitress	$1.00
Hospitality-A Suggested Guide for Training Program	$1.00

Note: These were not available to review so cannot give any information about them.

[illegible] Florida.

[illegible] samples of [illegible] with [illegible].

Kansas [illegible] Teachers [illegible] "Home Economics [illegible] Occupational Home Economics [illegible]" Vol. 1, Feb., 197[illegible].

Talks about setting up a program and the requirements, then gives examples of programs in the state, bulletin board ideas, and resource ideas. Included in this Newsletter is an article by Glenda Couchman at Clay Center, Ks. She discusses how she set up her program and samples of the forms she uses.

Employment in Home Economics June Cozine, Director.
Vol. 1 Pilot Study for Gainful Employment in Home Economics
Vol. 2 A Suggested Curriculum Guide for Preparing Child Care Workers for Entry Level Jobs
Vol. 3 A Suggested Curriculum Guide for Clothing
Vol. 4 A Suggested Curriculum Guide for Food Services
Extension Service, Oklahoma State Univ., Stillwater, Okla.

Gives background on research done for the study then gives curriculum guides with objectives, concepts, learning experiences, evaluation, resources for each unit. Forms to use and specific suggestions for setting up each course area are included. A general bibliography of resources is given.

A Guide for Cooperative Vocational Education Free from Edwin L. Nelson, Senior Program Officer, Work Experience Education, Division of Vocational and Technical Education, U. S. Office of Education, Washington, D. C.

For people who are planning and implementing programs under the 1968 amendments. Tells what cooperative education is and what it will do. Discusses how to determine form and type of program best for a school, how to meet student and manpower needs, staffing, administration relations, program maintenance and improvement.

Occupational Clothing Services A Home Economics Curriculum Guide Curriculum Division, Wichita Public Schools U.D. 359. Department of Home Economics, Wichita, Ks. 1968.

Gives philosophy, suggestions for use, concepts, broad objectives and generalizations, generalizations, learning experiences, resources, bibliography, books, pamphlets and audio-visual materials. Curriculum guides with the same type of information for other occupational classes are also available as is a ditto sheet describing all H.E.R.O. classes offered.

[illegible] Curriculum [illegible]
[illegible] Ft. Worth, Texas. 1968.

[illegible]

Orientation to the World of Work Occupational Home Economics [illegible]. State of Missouri, Univ. of Missouri, Columbia, Mo.

The guide discusses an orientation course which is designed to serve as a prerequisite to other occupational courses. The course gives basic information relative to securing, keeping and advancing in a job. The guide gives concepts, anticipated competencies, and content and participation for each concept. A bibliography is also included.

Child Care Instruction Laboratory A Facilities and Equipment Guide. Prepared by Kansas State Univ. from a seminar June 12-24, 1966, for Home Economics Education, state Vocational Department, Topeka, Ks. 1967.

Describes the child care lab. then relates planning needs for physical environment and child activity areas. Gives description of play equipment to be made by trainees. The appendix gives Kansas regulations, sources with addresses for equipment for home economics dept., and a bibliography.

Child Care Services A Tentative Teaching Guide. Prepared by Kansas State Univ. from Occupational Home Economics Seminar June 12-24, 1966. Home Economics Education, State Vocational Department, Topeka, Ks. 1967.

Gives course objectives, clusters related to child care, factors to consider in planning units. 6 units are then given with concepts, objectives, generalizations, sub-concepts, learning experiences, evaluation techniques, and resources for each unit. The appendix gives lists of books, bulletins, agencies, and films with addresses for ordering. Form samples for use in the course are included.

Programs for Career Opportunities in Child Development Division of Voc-Tech Education, Office of Education, Washington, D. C. Oct, 1969.

Suggests different types of classes to hold related to child development careers stating need for basic and specialized courses for people of all age levels. Advisory committee funding and staffing and sources of information for class use are also given.

Articles reviewed from [illegible] which dealt with specific topics [illegible] education.

"[illegible]," Mildred Weigley Wood. Vol. 37:[illegible], April, [illegible].
Gives [illegible] to consider in working with this subject.

"Home Economics [illegible] Illiteracy," Jean Warren. Vol. [illegible].
Talks [illegible] the inclusion of consumer education in vocational programs.

"Homemaking Education for Needy Families," Jerline Kennedy and Ruth Huey. Vol. [illegible]:20-21, April, 1963.
Helpful to those working with adults, especially those with low incomes.

"Visiting Homemaker Services: Oklahoma Project," Charlyce R. King. Vol. 40:27-28, April, 1965.
Gives the steps taken in establishing the program. Good reference if setting up a similar program or any other type of program because information is of general nature.

"A Sound Approach to Training Food Workers," Herman A. Breithaupt. Vol. 44:14-16, April, 1966.
Describes the commercial foods dept. at Chadsey High School in Detroit, Mich. Expresses the idea that their success is related to the enrollment of students at an early age and the use of a school-to-work experience.

"A High School Program in Child Care," Katherine R. Conafay. Vol. 41:33-34, April, 1966.
Describes the steps taken in setting up a child care program in Arlington County, Va.

"From Research to Curriculum in Child Care," Ruth E. Whitmarsh Midjaas. Vol. 41:38-39, Oct, 1966.
Reviews steps taken to develop a program in child care occupations. Suggests that mothers of the students can help interview people to identify concepts, principles, and topics to be included in the curriculum.

"Food Services Training Makes Its Debut in Orange County," Jeanne Brindley. Vol. 41:33-34, Dec, 1966.
Helpful ideas on establishing a food services program.

Articles and Issues Reviewed in Illinois Teacher. The issues and articles described below are only the major ones reviewed. There are many other small articles which are valuable and many articles not listed here which refer to specific Programs.

Vol. 12, No. 6, 1968-69. "An Undergraduate Course in Employment Education; Plan for Instruction," Bessie Hackett. pp 328-354.
Describes a course planned to help prepare future teachers for their role in employment education. Gives major course objectives, a topical outline and a block plan indicating concepts to be explored in each of three weekly class sessions during the course of a semester. Detailed unit plans, teaching aids and resources are also given.

Vol. 8, No. 4, 1964-65. "Spotlighting Employment Education in Home Economics Around the Country"
Describes programs in Calif., Colo., Ks., Mich., N.Y., and Maine.

Vol. 10, No. 3, 1966-67, pp 74-98. Gives forms to use in an employment program.

Vol. 11, No. 4, 1967-68. Introduces the development of curriculum guides for coordinated occupational home economics programs.

Vol. 11, No. 4 & 5, 1967-68. Gives grades 7 & 8 curriculum guides discussed in above reference.

Vol. 12, No. 4, 1968-69. Continues the curriculum guide for grades 9 & 10.

Vol. 8, No. 1, 1964-65. "Commonalities in Vocational Education," Donna M. VanCamp. Gives a topical outline of Commonalities in vocational education which is very helpful if setting up a core course on occupational education.

Vol. 14, No. 4, 1971. Provides splendid information and guides relative to occupational programs.

ERIC   The Eric system has a vast number of resourses which apply to occupational education and to specific program. The list below provides a starting point on ERIC references.

ED 16-772 773 774 775 776 777	Deals with Alabama's Occupational Home Economics Courses Outlines.
ED 17-631	The Employment Aspect of Home Economics Education, A selective bibliography with annotations. 1965. Excellent place to start looking for resources.
ED 23-915	National Survey of Wage Earning Home Economics Course Development
ED 026 458 026 524	Reports on Institute for Home Economics Teachers on Intitiating Development and Evaluating
ED 037 524 528 529 530 531 532 533	Deals with programs in Vocational Home Economics set up by Texas Tech
ED 038 519	Review and Synthesis of Research on Home Economics Education
ED 043 728	Home Economics Research Abstracts 1967.
ED 044 506	Bibliography of Home Economics Documents as Listed in Abstract of Instructional Materials in Vocational and Technical Education 1967-69.
ED 045 825	Current Developments in Vocational Home Economics Education 1970.

Periodicals of interest

Adult Leadership

Shop Talk

Educational Forum

Phi Delta Kappan

American Vocational Journal

Occupational Outlook Quarterly

Industrial Arts and Vocational Education

Journal of Industrial Arts Education

Technical Education News

Journal of Home Economics

Illinois Teacher

Individual Learning Unit

Occupational Home Economics

Instructions to the Student

This unit is designed to increase your awareness of the role Home Economics plays in occupational education and to give you an opportunity to explore the facets involved. The resource paper is provided to serve as background material which must be supplemented with further reading for in-depth information on any of the facets. Some of the questions can only be answered by your own research. You are to read the materials and then summarize them in your own words to answer the question. Special instructions will be given throughout this package. Your grade will be based on the quality and accuracy of your answers to the questions and the quality of the learning activities completed. As you will note later in the package you are required to do certain activities while there are some which may be done at your option for extra credit. Keep in mind this is designed to benefit you, not the instructor, so do your work in the manner most beneficial to you. If you have any questions feel free to contact the instructor.

Read the reference paper and any of the resources needed to answer the following questions. Record your answers on a separate sheet of paper identifying the question by the number it is given as follows. Do not copy material, summarize it in your own words. Quotes and lists of importance may be included to add meaning to the answer and which will be of use to the writer. Read all the questions in section A <u>before</u> answering any of them.

A.-1 You are interviewing for a teaching job, you select the level, and the interviewer asks you to defend the need for occupational education in home economics. What would be your answer?

A.-2 After you give your answer he says, What is your definition of vocational education? What would be your answer?

A.-3 In the course of the conversation he becomes confused by all the terms you use which all seem to have the same meaning. What are the terms you would be using that mean about the same as vocational education? Is there any difference in the meaning of the terms or in the manner of usuage.

A.-4 The interviewer then tells you that at the present time the school has no occupational home economics but they would like for the new teacher (you if you take the job) to implement a pilot program. Are there any questions you would ask him before you tell him yes or no to the idea?

B.-1 Assume that your answer to A.-4 said that you would accept the opportunity to implement a program and act as the director for planning it. What would be your first step?

B.-2 Assuming that the program was decided upon to be comprehensive in nature teaching basic factors related to the world of work and providing a variety of work experiences because the town is rather small, how would you set up your advisory committee and what general suggestions would you give as to who should be on the committee?

B.-3 What other general steps would you take in planning the program? This answer does not need to go into detail about each step.

Optional Questions Must answer 2, may do more for extra credit.

11. What problems might occur in an occupational program?

12. What would you consider in the selection of students for participation in the program?

13. What factors do you think are important to consider in selection of work stations?

14. What problems could arise in relation to the advisory committee?

15. What problems might occur with community acceptance of the program?

Activities Select one.

20. Visit an Area Vocational school and report on how home economics fits into their program. If they have no program make a list of proposals for implementing a home economics related program.

21. Visit a program in a secondary school which has a HERO program. Gather literature used, a copy of the curriculum and other materials that are available. List the reference materials in use. Record your observations.

22. Make a list of the possible work stations available in your community or a community similar to one you would like to work in.

23. Interview business people in a community to discover their attitude about home economics and occupational education.

24. Do research on and visit places other than public education that provide occupational education if possible. What is the role of home economics?

Other areas to explore. Do research, interview or other as needed. Present findings in manner of your selection. Must do 9.

30. Teachers time and scheduling to allow time for the teacher to supervise on the job work experiences.

31. How do students get to their work stations?

32. What training does a HERO teacher need?

33. The importance of public relations.

34. Federal and state legislation related to occupational home economics.

35. The state vocational plan.

36. Why are women always asked why they work and men are not asked?

37. What indications do we have that education is not meeting the needs of its students?

38. Referring to #37, how can vocational education help make education more revelant?

39. What should the teacher-administration relationship be in relation to the planning and implementation of a vocational program?

40. How can a program be funded?

41. What needs to be included in the budget for a program?

42. What organizations in the community, the state, and nationally are available to help vocational education place emphasis on listing those related to home economics.

43. What types of occupational information are needed when doing a community survey?

44. What factors should one consider in the selection of a home economics occupational program staff?

45. What is the role of extension service in home economics occupational programs?

46. What is the best level of education for occupational education? Support your answers.

47. What are job clusters and what is their role in HERO programs?

48. What is the role of the guidance counselor in vocational education?

49. What are extended learning experiences and what is their role in HERO programs?

Research Project

Below are suggested project's or topics to explore in depth. Each member of the class will be required to do one in-depth project and report on her findings to the class. The project will be done under contract, which means that you, the student, decide on what you want to do and the grade you want to receive. The student and the teacher then sign the contract which obligates the student to do the work described and obligates the teacher to give the grade asked for upon completion of the project. The following are only suggestions, please feel free to discuss other ideas with the instructor.

Develop a curriculum for a specific school situation for a HERO class.

Develop a list of resource people and organizations for HERO programs.

Develop job cluster units for the HERO student to study on an individual bases.

Develop an audio-visual program for use in a HERO program.

Develop a brochure to use for the purpose of interesting students in HERO.

Develop a plan for PR (Public Relations) for a specific situation.

Explore the role of FHA in HERO programs. Prepare a handout for the rest of the class that summarizes your findings. Report findings in the manner you feel best state on contract.

Develop a plan for the guidance office of a school to provide guidance needed for HERO.

What can Home Economics do in adult and continuing education in relation to occupational education?

Develop the steps for a community survey for a HERO program.

What is the role of Home Economics in cooperative education.

What can Home Economics provide to other areas to help with their occupational programs?

Establish a list of equipment and facilities needed for a specific HERO program.

What can HERO programs do or how can they be set up to provide for special students such as the slow learner, the handicapped and the disadvantaged student?

Occupational Home Economics

A Slide Series

Prepared by
Mrs. Carla Crook
Kansas State University
Spring, 1972

Intended Use

This slide series was prepared to serve as an introduction on occupational home economics. It will be used in Occupational Home Economics class at Kansas State University, Manhattan, Kansas, first as an introduction to the course and then it will be available for individual study. Handouts will supplement the series. A resource paper and an individual learning unit for the student on Occupational Home Economics previously prepared by the author will be used with the slide series.

The slide series could also be used with any group of people desiring information on Occupational Home Economics and how to establish a program. It is not designed for a student enrolled in an occupational program because it deals mostly with program establishment from the teacher's view point.

Administrators and people in other occupational areas could gain insight on Occupational Home Economics by viewing the slides.

The handouts for the slides are enclosed as is the script.

Pictures of actual programs were taken in the public high schools at Wichita, Kansas and at Clay Center, Kansas. The other slides are from art work produced by the author.

cript: Occupational Home Economics

.

Collage
Pictures of
Trends

Trends in a society affect its educational system.

.

Chart
Showing
Local
Manpower
Needs

Rapid increases in technology and changing work patterns affect the types of education people need and want.

.

CARTOON
LEARNING
FOr THE
SaKE OF
LEARNING

Increased recognition of the need for relevant, meaningful education has brought about public awareness of the need for occupational education.

.

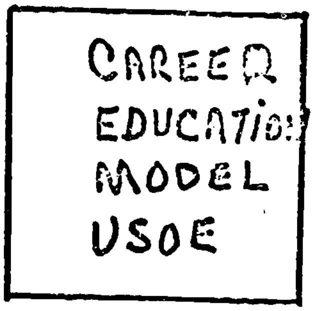
TERMS

CAREER
vocational
occupational

Education related to preparation and retraining for the world of work is commonly refered to as career education, occupational education or vocational education. Although these terms are used interchangable each has a somewhat different meaning. Career educatio is a broad term dealing with total awareness of the world of work; occupational education provides for exploration in a variety of related careers; vocational education trains for specific skills for a specific job.

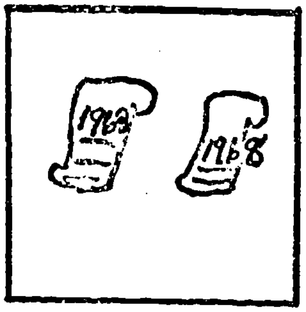
(Handout - definition of terms)

5.



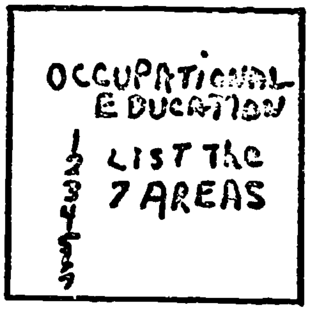
Sidney Marland of the U.S. Office of Education brought to public attention the career education movement. Career education begins with career awareness; then moves to career orientation and exploration. Specific training then follows. Retraining is also included.

6.



Two of the most recent outstanding federal laws pertaining to occupational education are the Vocational Act of 1963 and the Vocational Amendments of 1968.

7.



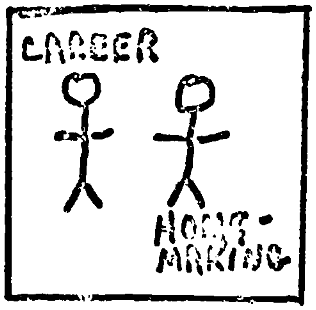
Occupational Education is divided into 7 areas:

1. Vocational Agriculture
2. Office and Business Education
3. Trade and Industrial Education
4. Vocational Home Economics
5. Technical Education
6. Distributive Education
7. Health Occupations Education

8.

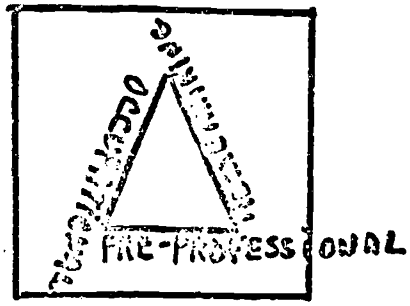
This slide series introduces the concept of carrer, vocational and occupational education and provides an overview of occupational home economics.

9.



The 1963 Vocational Act defined the dual role of Home Economics as combining the traditional training for homemaking with training for occupational home economics related careers.

10.



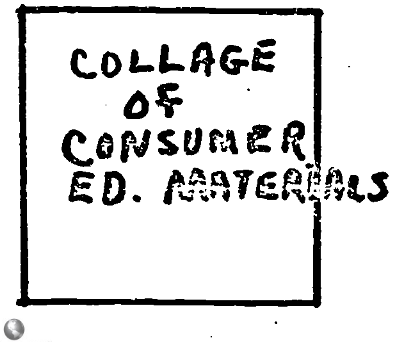
The three currently recognized purposes of Home Economics education are to:

1. Contribute to the individual for home and family life.
2. Prepare students for employment in occupations requiring Home Economics skills.
3. Motivate and recruit college bound students for professional careers in Home Economics.

11.

Part F of the 1968 Vocational Amendments is entitled Consumer and Homemaking Education. Provisions are made for money for home economics related occupations programs, state programs, curriculum development, teacher education and research. Increased emphasis was placed on the dual role of Home Economics.

12.



Consumer education was identified in Part F as a necessary part of occupational Home Economics programs. Consumer and Homemaking Education is now a widely used title for such programs.

13.

H.
E.
R.
O.

H.E.R.O. means Home Economics Related Occupations. The term refers to occupational Home Economics classes serving both men and women.

14.

PICTURE
OF
HERO-FHA
HANDBOOK

Also, HERO is today a part of FHA. HERO-FHA is the youth organization for students who are involved in or interested in Home Economics Related Occupations.

15.

PUBLIC [illegible]
AVTS [illegible]
JUCO [illegible]
ADULT [illegible]

Occupational Home Economics programs can be established at any level of education and in programs for those with special needs. Occupations requiring a college degree are considered professional careers; HERO deals mainly with preparation of persons for entry level and pre-professional careers and retraining opportunities.

16.

PICTURE
OF
IOWA STATE'S
CLUSTER
PAMPHLET

Occupational programs are most often based on the cluster concept. Careers having commonalities are placed in a cluster or job family. By training for a career cluster the student is prepared for a broad range of job opportunties.

17, 18, 19, 20, 21,

PICTURES OF STUDENTS IN OCCUPATIONAL PROGRAMS

The next 5 slides depict actual occupations programs in Kansas. HERO programs are commonly classified into the following areas:

(17) Child Care Services
(18) Food Services
(19) Clothing Services
(20) Housing and Home Furnishing Services
(21) Community Services

22.

CHART LISTING STEPS

This chart lists the general steps to follow in setting up a HERO program.

(Also a handout - chart on slide)

23.

PICTURE OF COMMUNITY SURVEY FORM

The initial step in any program planning is the establishment of the need. A community survey reveals needs, interests, attitudes, and possibilities for occupational work stations. Analysis of job tasks can be done in conjunction with the survey or later when actual stations are established.

24.

ADVISE

ADVISE

ADVISE

Advisory committees set up for occupational programs usually have from 5 to 7 members. Former Home Economics students, homemakers, Home Economics related business representatives, the occupational students parents, and other interested persons may serve as members. In addition to advise the committee can help gather materials, obtain information needed, and carry out public relations programs.

25.

CARTOON
ABOUT
OBJECTIVES

Objectives make clear to all involved, the purpose of the planned activities and of the total program. Objectives should be stated in terms of the desired behavioral change in the student.

26.

CHART
CHECKLIST
FOR
P.R.

Public relations programs help provide community support necessary for a program to function effectively.

(Also a handout - chart on slide)

27.

PICTURE
OF
MATERIALS
ASSORTMENT

Curriculum guides, state and federal government materials, related journals, and commerically published materials are examples of helpful sources of information.

28.

PICTURE
OF TEACHERS
DESK OF
MATERIALS

A teacher needs to utilize a variety of materials in planning and teaching occupational programs.

29.

PICTURE
OF
ADMINSTOPS
OFFICE

The teacher needs to work closely with the school administration at all stages of an occupational program development and implementation to help assure support and success of the program.

30.

PICTURE
OF
STUDENT
ON THE
JOB

Federal labor laws limit actual work experience to youth 16 years of age or over. Such laws need to be carefully considered in program planning.

31.

PICTURE
OF STORE
USED FOR
O.J.T.

Identification of training stations at local businesses and job analysis of the tasks the job involves is done after the initial plans are begun.

32.

EXAMPLES
OF
FORMS

Occupational programs require many types of forms. Forms are needed to record work experience for parents approval for contact with cooperating businesses, for evaluation and for required state department information. Letters of appreciation and training certificates are also utilized.

33.

EVALUATION
FORMS

Forms to evaluate the student should be formulated prior to the implementation of a program. The objectives of the program need to be evaluated as well as the individual students progress. Placement and follow up records help in program evaluation.

34.

SLIDES OF
ACTUAL
PROGRAMS

The next few slides show examples of actual HERO programs in action. (Separate page describing slides used here)

35.

EXAMPLES
OF
JOURNALS

The periodicals shown are examples of helpful sources of information available to you on occupational education.

36.

2 ILLINOIS
TEACHERS
JOURNALS

The Illinois Teacher provides excellent articles and useful ideas related to HERO programs.

37.

?

The future is always a question. Present trends indicate that career education will become an important part of the educational system. Continued changes in the role of the woman and changing family life patterns will continue to influence HERO programs.

38.

PICTURE OF MAN IN OCCUPATIONAL CLASS

Although HERO currently serves mainly women trends show more men are becoming involved in HERO.

39.

Elizabeth Koontz of the Department of Labor, Women's Bureau has stated that occupational education is woman's main tool to improvement. Elizabeth Simpson, well known Home Economist, states that Home Economics is an excellent vehicle for the needed occupational education of women.

Handout for slide #4

Terms Defined

CAREER EDUCATION--a recently developed term refering to the lifelong process of education related to the world of work. It encompasses the total picture from career awareness to career orientation and exploration, to career training. Of the three terms this term is the broadest, the other two are a part of the total career education system.

OCCUPATIONAL EDUCATION--involves orientation and exploration to the world of work and work habits. Training is provided in a cluster of related jobs.

VOCATIONAL EDUCATION--when used in this sense deals with specific training for specific jobs.

Vocational and Occupational education are frequently used interchangeably in a "loose sense". Vocational education frequently is used to refer to any education which prepares people for a career.

Handout for slide #22

Steps to Follow in Program Development

1. Establish a need. Become familiar with local employment security office. business organizations, lay leaders and the community. Get adminstrations approval to continue.

2. Organize a local advisory committee. Set tentative objectives.

3. Do a community survey and job analysis

4. Begin and continue a public relations program including publicity about the proposed program

5. Develop a curriculum. Look at materials available, visit other programs, gather materials to use, set tentative plans and Schedules. Get final adminstration approval.

6. Determine student selection and interests. Do this as a part of number 5.

7. Determine final materials and facilities needed. This happens as the final step of part 5.

8. Determine the instructor if she is not the one planning the program. This is suggested to be done at several points but it would be most helpflu if the instructor could be in on as much of the planning as possible if she is not the one who is directing the planning.

9. Plan work experience and the needed training stations.

10. Select the forms to be used.

11. Plan for evaluation. Initial steps for this will be considered during step 5.

12. Implement the program . Plan for continous updating and improvements.

Handout for slide #26

PUBLICITY CHART[1]

MEDIA OF PUBLICITY	Before school opening	At school opening	Each semester	Once during year	At end of school
Newspaper articles	X	X	X		
School publications			X		
School assembly program				X	
Talks to civic clubs	X		X		
Future Homemaker activities			X		
Talk to Parent-Teacher groups				X	
Interpret program to homemaking teachers and students				X	
School exhibits and posters		X	X		
School public address system				X	
Free radio and television time				X	
Section in school yearbook				X	
Letters to students and parents	X				
Employer-employee banquet				X	
Letters of appreciation to employers and parents					X
Appreciation certificates to employers				X	
Pictures		X	X		

Figure 40

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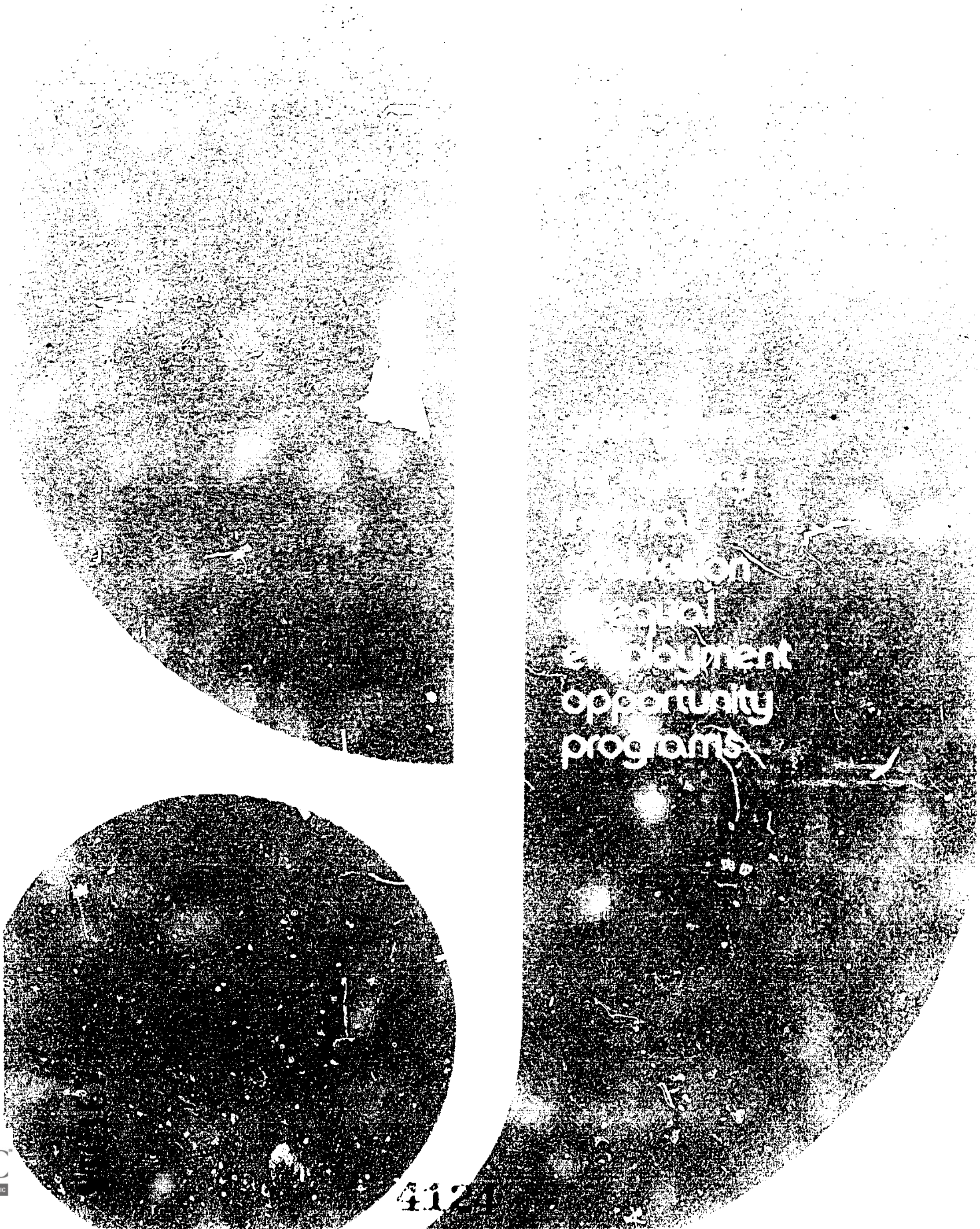
[1] Adapted from Industrial Cooperative Training Handbook. College Station, Texas. Texas A & M University. May, 1968. p. 104.

VT 016 758
GUIDELINES FOR AGENCY INTERNAL EVALUATION OF
EQUAL EMPLOYMENT OPPORTUNITY PROGRAMS.

CIVIL SERVICE COMMISSION, WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
PMS-24
SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT
PRINTING OFFICE, WASHINGTON, D.C. 20402
(0600-0613, $.20)
PUB DATE - JAN72 20P.

DESCRIPTORS - *PAMPHLETS; *EVALUATION
METHODS; EMPLOYMENT SERVICES; *AGENCY ROLE;
*GUIDELINES
IDENTIFIERS - EEO; EQUAL EMPLOYMENT
OPPORTUNITY; ADMINISTRATIVE AGENCIES; *SELF
EVALUATION

ABSTRACT - THIS PAMPHLET, CONTAINING INTERNAL EVALUATION GUIDELINES, WAS DESIGNED TO HELP AGENCIES EVALUATE THEIR INDIVIDUAL EQUAL EMPLOYMENT OPPORTUNITY (EEO) PROGRAMS FOR PRODUCTIVITY AND MANAGEMENT EFFECTIVENESS. THE INFORMATION PRESENTED IS BASED ON ALREADY FORMULATED GOVERNMENTAL POLICIES CONCERNING EQUAL EMPLOYMENT OPPORTUNITY. USE OF THESE EVALUATION GUIDELINES IS OPTIONAL; HOWEVER, EACH AGENCY MUST DEVELOP SOME SYSTEM FOR PERIODICALLY REVIEWING ITS POLICIES AND PROGRAMS TO ASSESS THEIR EFFECTIVENESS. THE CONTENT COVERED INCLUDE: (1) AN INTRODUCTION, (2) EVALUATION OBJECTIVES, (3) APPROACHES TO EEO EVALUATION, (4) EEO PROBLEM IDENTIFICATION-SOLUTION PROCESS MODEL, (5) SPECIAL EMPHASIS AREAS, AND (6) EVALUATION METHODS. (SN)



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equal
employment
opportunity
programs

Guidelines
for
Agency Internal Evaluation of Equal Employment Opportunity Programs

Personnel Management Series No. 24

January 1972

4125

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 20 cents
Stock Number 0600-0613

Contents

I. Introduction

This pamphlet contains internal evaluation guidelines designed to help agencies evaluate their own EEO programs. These guidelines reflect the new direction in equal employment opportunity called for by Executive Order 11478 and by the memorandum for heads of departments and agencies, subject: Equal Employment Opportunity, both documents issued by President Nixon on August 8, 1969. The President's memorandum also endorsed a report to the President from the U.S. Civil Service Commission, subject: Equal Employment Opportunity in the Federal Service, which contains more detail on the new direction.

The policy and position of the Federal Government on equal employment opportunity without regard to race, color, religion, sex, or national origin is further explained in chapter 713 of the Federal Personnel Manual and has been clearly and strongly asserted in many documents and issuances. This pamphlet is not intended to recapitulate or expand the program position presented in those documents. It is meant to focus agency attention on agency use of evaluation as a necessary step in determining whether decisions are being carried out as intended and whether the agency is meeting its EEO objectives.

These guidelines present basic information on the thrust and methods of program evaluation and are structured in the following manner:

First, general evaluation guidelines are given. Next, an explanation is given of evaluation objectives followed by approaches to achieve these objectives. Then, an EEO problem identification-solution process model is pictorially presented to aid the evaluator in understanding the interactions in EEO problem identification and solution.

Next, attention is directed toward two special interest program areas—equal employment opportunity for women and equal employment opportunity for Spanish-speaking Americans. Finally, evaluation methods are suggested to accomplish internal evaluation.

Use of the evaluation guidelines is optional. Their issuance does not mean that each agency and installation must have a centralized survey system. Nor does it mean that each item in the guidelines must be used in an agency's system. Every agency must, however, have some system for periodically reviewing its EEO policies and program to determine the agency's effectiveness at all management levels in its continuing affirmative program. Furthermore, agencies should assure that these evaluation principles are made a part of their EEO program. Additionally, it is desirable to coordinate agency EEO program evaluations with ongoing or planned internal evaluations of other personnel management program areas, since EEO is a part of general managerial activity.

II. Evaluation Objectives

The major objectives of EEO evaluation are to assess the effectiveness of management in identifying the factors and problems bearing on equal employment opportunity, and developing and implementing action programs to meet and overcome obstacles to full equality of opportunity. Another objective is to provide agency management with any needed recommendations or directions for remedial action. Further, the evaluation process must include followup to assure that action is taken on recommendations and directions.

III. Approaches to EEO Evaluation

Results-Orientation

The evaluation should be directed at results, not only efforts. In some situations the agency may have done an excellent job in identifying its EEO problems and it may be making great efforts to solve these problems. Further, the action plan, which is a *vehicle* for reaching the agency's EEO goals, may appear to be what is exactly needed to reach these goals. However, there may not be any evidence of results, which are the ultimate measure of program success or failure. This does not mean that consideration is not to be given for efforts taken to advance the program. The evaluation should not lose sight of such factors as reductions in force and hiring freezes. In the latter situations, consideration should be given for efforts which will generate future benefits. Thus, in using the results-oriented approach, there is also a need to take into account the potential for results.

Problem Solution

The evaluation should focus attention on problem identification and solution rather than problem identification and recommendations alone. This may be achieved best in a consultative environment, i.e., evaluators and managers jointly diagnosing problems and preparing action plans leading to solution. The involvement of line managers increases the success of the evaluation since it insures that the evaluation is realistic and the findings implemented.

Motivation for Improvement

After pursuing problem causes and aiding management in developing a plan of action for solving those problems, the evaluator should assure that there is agency motivation for improvement and that there is a willingness to follow through on problem resolution. Some suggestions for assuring that there is motivation for improvement include:

—Closely integrating EEO with general management and services so that the impact of managerial activities and decisions on EEO can be readily identified.

—Establishing priorities in the action plan so that those problems which block fulfillment of the organization's goals the most are highlighted.

—Including the greatest possible involvement of line managers to ensure that the findings are realistic and that they are implemented.
—Following through on the agency's adherence to the action plan to determine whether there is observable improvement.

Managerial Support and Leadership

The evaluation should assess managerial support and leadership for the program. The involvement and commitment of management officials is absolutely essential for the success of the program since they have the responsibility of leadership. Program success will depend considerably on the acceptance, understanding, determination, and positive direction given by managers, supervisors, and program staff personnel. Associated with managerial support and leadership is the system established by each agency to evaluate supervisory performance in the EEO area. Assessment should be made of the agency EEO performance evaluation system and the results therefrom. Such evaluations can be invaluable in determining the relative commitment of the several managerial levels, and in some cases, individuals.

Effectiveness of Key EEO Officials

The evaluation should assess the effectiveness of key EEO officials, such as the director of equal employment opportunity, EEO officers and deputies, and EEO counselors. Inquiry should be made into their qualifications, training, attitudes, methods, effectiveness, and commitment. Evaluators should also give close attention to available indications of employee attitudes toward the trust, acceptance, interest, availability, sensitivity, responsiveness, and effectiveness of these officials.

Another factor which sometimes affects the effectiveness of key EEO officials is the organizational location of these officials. While evaluators should not have preconceived ideas of where EEO officers and counselors should be located in the organization, many agencies have found it impracticable or less effective to utilize supervisors and personnel office employees in these positions because of their frequent involvement—either incidentally or as initiators—in the kinds of personnel actions and practices which give rise to EEO complaints. However, each situation depends on the individual employee and his working environment.

The above traits, and sometimes the organizational location, have a critical bearing on the success or failure of these officials. The evaluation may provide a basis for suggestions for better organizational location of officials or recommendations to management regarding selection, retention, and further training.

Relation of EEO Program to Mission Accomplishment

The evaluation should relate EEO program aspects to what most managers conceive as their primary concern as managers--mission accomplishment. A major problem is that EEO, and other special emphasis programs, are considered to be unrelated to accomplishing the agency's mission objective when in fact they are a part of the agency's mission.

When the manager does not understand the importance of these special emphasis programs, the evaluator must impress upon him that he is a public manager in a public organization and that his mission includes full support and achievement of results on public policy issues. Furthermore, the evaluator should relate EEO program aspects to operational personnel management problems, especially if there is significant impairment of mission accomplishment. Here, the evaluator should aid the manager in seeing that EEO is good personnel management and that his involvement in EEO will contribute, in a positive way, toward solving or alleviating some of his operational personnel management problems such as staffing, utilization of the work force, development, and position management.

Quantitative Employment Goals and Timetables

In a memorandum from the Chairman of the Civil Service Commission to heads of departments and agencies, dated May 11, 1971, subject: Use of Employment Goals and Timetables in Agency Equal Employment Opportunity Programs, the Commission discussed the appropriate use of goals as a means of achieving managerial action toward equal employment opportunity and the assurance that goals are not construed as employment quotas by race, color, ethnic origin, or sex, which would, in effect, constitute a violation of basic merit principles. Evaluators should become familiar with and fully understand Commission policy in this area and if merit system violations are noted, should bring them to top management's attention for corrective action. If the manager has established quantitative goals, the evaluator should examine them to determine if they are reasonable, realistic, and obtainable. If the goals are not reasonable, realistic, or obtainable, the evaluator has a responsibility to help the manager think through to how the goals were developed and what adjustments may be needed. Not every organization should or needs to establish quantitative goals. If, however, the manager has not established quantitative goals, but the evaluator in his judgment believes that the program would benefit from their establishment, then the evaluator should recommend the use of goals (without recommending what they should be) along with other needed actions to improve the EEO program.

Major Program Action Elements in Executive Order 11478

The evaluation should include an assessment of how agency efforts are directed toward the following major program action elements in Executive Order 11478.

Assignment of resources

To what extent have sufficient resources been assigned and organized to administer and carry out the program in an effective manner?

Recruitment activities

To what extent have recruitment efforts been designed to reach all sources of job candidates, with special emphasis on the identification and development of sources of minority group members and women for positions in which few are now employed?

Utilization of skills

To what extent are employees with underutilized skills being systematically identified in the work force and channeled into available job opportunities both within and outside the installation?

Upward mobility

To what extent are opportunities being made available to employees for enhancement of skills, performance at their highest potential, and advancement in accordance with their capabilities?

Assurance of supervisory and management understanding and support

To what extent do communications, training, incentives, and performance evaluation actually motivate supervisory and management efforts to achieve program objectives?

Participation in community efforts to improve conditions which affect employability

To what extent does the installation initiate, support, and cooperate with community efforts to eliminate long- and short-range barriers to equal employment opportunity?

Resolution of complaints

To what extent are discrimination complaints promptly, fairly, and impartially processed with special emphasis on informal resolution through equal opportunity counseling?

Special programs for the disadvantaged

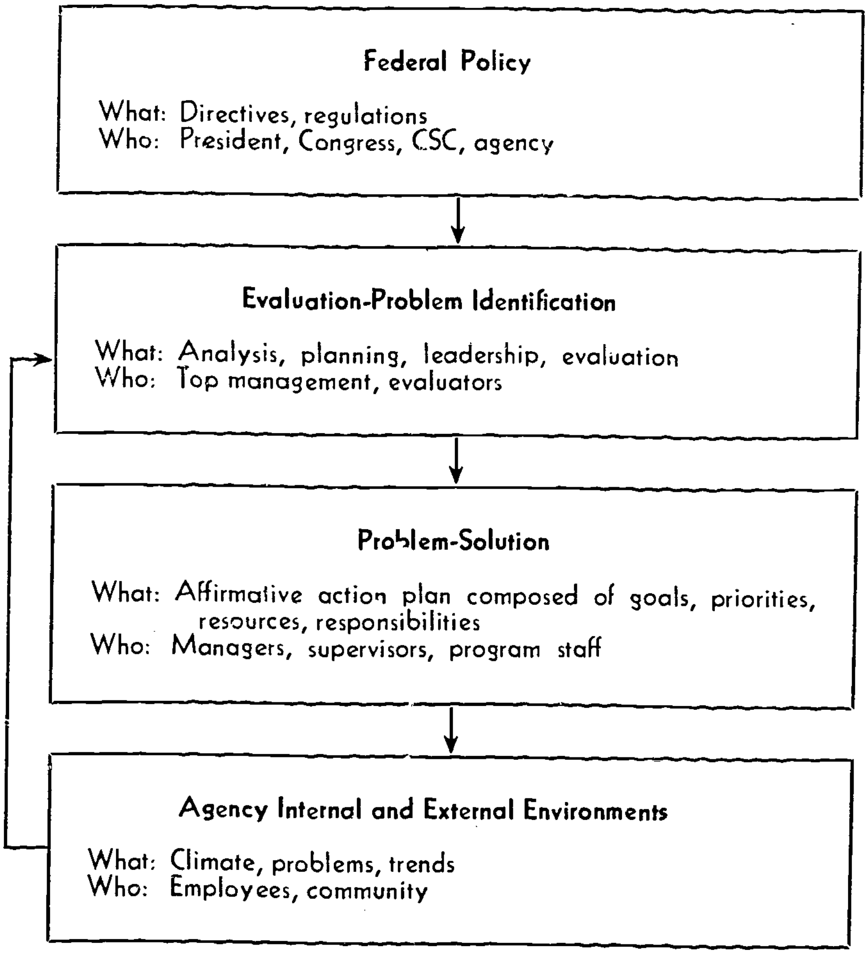
To what extent is there participation in Summer Aid, NYC, Work-Study, WINS and other economic opportunity programs?

IV. EEO Problem Identification—Solution Process Model

The evaluation effort, as explained in part III, should be centered on results and the progress being made in EEO. Since results depend on the effectiveness of the program, an assessment should be made of management's effectiveness in analyzing the factors and problems bearing on equal employment opportunity, and planning and implementing an action program designed to solve those problems and achieve equal opportunity for all employees and applicants. In order to aid the evaluator in assessing the interrelationships of the problem identification and problem solution process, an EEO problem identification-solution process model has been developed.

The model presents a frame of reference for the problem identification and solution process as it applies to EEO. It is a conceptual framework which conveys a way of thinking about identifying problems and alternative solutions, making choices, setting priorities, mobilizing resources, and evaluating results. The model is not a checklist of items to be studied and analyzed during surveys. Its purpose is to increase the evaluator's understanding and use of the problem-solving process and to examine the effectiveness of managers, supervisors, and staff involved in that process. The model applies to all agency levels—departmental, bureau, region, field, and the organizational unit.

The EEO problem identification-solution process ideally operates in this circular pattern:



Federal policy step

—Does top management understand and accept broad EEO policy and specific responsibilities?

—Has this policy been communicated downward in the organization and out to the field?

Problem identification step

Top management should list all short- and long-term EEO problems that management perceives it faces, determine solutions, and allocate resources on a priority basis.

—Does top management begin with an identification of real organizational and community EEO problems?

—Is the review of problems a continuous process or is it only done on a formal periodic basis?

—In identifying problems, is consideration given to new and existing Federal and departmental policy which must be carried out?

—Are alternatives identified for problem solution and real decisions made on what is to be done?

—After deciding what can or cannot be done, is a plan of action developed to solve priority problems?

—Does top management carry out its responsibility of setting and achieving goals, developing policies, and coordinating activities?

—Is planning adequate and timely?

—Does top management seek the views of minority group members and women in planning, development, coordination, and evaluation?

Problem solution step—the action plan

Top management should develop an affirmative action plan composed of goals, priorities, resources, and responsibilities to solve specific problems.

The EEO action plan should not merely contain philosophic concepts or policy declarations but should be a living document based on a meaningful assessment of real problems and identification of positive programs to tackle those problems. Review and evaluation of the action plan will reveal not only those areas which management has identified as problem areas but also what management is doing to improve those areas. Although evaluators will assess the use made of the plan and tailor criticism to individual agency needs and inadequacies, they should be careful to avoid placing too much emphasis on the formal plan and not enough on action and results

—Is there an effort to make the plan appropriate and relevant to the identified problems?

—Does the plan devote sufficient human and other resources to accomplish the goals?

—Is there evidence that the plans are brought up to date and changed to coincide with current needs and new problems as they emerge? Are the plans viewed as flexible guides for accomplishing the job or as constraining documents which must be followed literally?

—Is the emphasis on equality of opportunity for women extensive and intensive enough? Although there usually is no need for separate action plans for specific ethnic groups, does the plan include items which deal with the special problems of specific ethnic groups (e.g., efforts to overcome the language barrier of Spanish-speaking people)?

—Does the plan provide for guidance and direction at all levels? Does it have adequate provision for staff support services (e.g., planning coordination, evaluation, and research)? Does it provide for continuing feedback and analysis?

—Does the action plan list projects, in a priority order, which the agency hopes to accomplish within a given time frame? Are there compliance provisions to assure that goals and target dates are met?

—How effective are the people involved (managers, supervisors, program staff)?

Do they carry out established policy?

Do they collect and analyze data and assist top managers in making policy?

Do they ask and answer questions which are relevant to the problems? Are they alert to EEO problems in the organization and the community and do they bring them to the attention of top managers?

Application of program to agency environments

Here is where effective performance is directed toward positive change in both the organizational and community environments of the agency. Here is where managers, supervisors, and program staff carry out responsibilities for action plan items (recruitment, special programs for the disadvantaged, complaints, etc.). Here is where the manager must have strong follow-through to assure that results are being achieved. The environments, in turn, determine the EEO problems and should be considered during problem identification and evaluation.

Evaluation—problem identification step

Top management should place heavy emphasis on evaluation as an integral part of the process. Although evaluation has been placed at the end of the model, it should not be restricted to the end of the process. It actually begins with the identification of problems and is critical in the establishment of goals and in planning strategy.

—Are periodic reports required on activities?

—Does evaluation attempt to assess results of past actions, trends, appropriateness of goals and objectives, relevance of solutions to problems, and adequacy of the plan of action? Are adjustments made as needed?

—Does evaluation lead to followup; feedback to managers, supervisors, and program staff; modification of action plan; realignment and reallocation of resources; recognition for achievements, disciplinary action for discriminatory acts?

V. Special Emphasis Areas

The following areas are not highlighted for preferential treatment. Nor are they considered as being divisive of the total EEO program. They are singled out for special emphasis because of problems peculiar to these areas.

Equal Employment Opportunity for Women

The Federal Women's Program is now an integral part of the total strengthened EEO program. This does not mean that it is being de-emphasized. It was made a part of the EEO program because it is believed that equal employment opportunity for women can be best assured by integrating it with the agency's overall EEO program. It is still the responsibility of the agency head to provide the same leadership to the agency's program for assuring equal opportunity for women as he provides for persons of different racial, religious, and national backgrounds.

There are unique concerns involving equal opportunity for women which require special attention. Evaluation has a vital role in the overall drive to get further action and progress. Evaluators should assess the understanding, support, and leadership for equal employment opportunity for women at all managerial and supervisory levels. While the Federal Women's Program should be closely coordinated with the overall coverage of the EEO program, evaluation should focus on the specific factors and circumstances affecting employment opportunity for women.

—Are women at the college and high school levels given guidance on occupational opportunities and related educational requirements?

—Are achievements of women publicized to the community to provide incentives to other women?

—Has there been adequate counseling and information on Federal job opportunities for trained women?

—Has the agency developed job designs and employment practices which will aid in the employment and advancement of women such as part-time employment and liberal maternity leave?

—Does managerial and supervisory training relate the utilization of women to the attainment of agency objectives and solution of manpower problems?

—Are efforts made to advance the careers of women in dead-end positions? Is career counseling available?

—Has the agency reviewed its job structure and management practices to identify any organizational or occupational areas where traditional thinking limits the utilization or progression of women (e.g., apprentice training, skilled trades, technicians)?

—Are women afforded opportunities for top-level positions through training, job rotation, and special assignments?

—Are there job patterns or other conditions which create barriers to the employment and advancement of women?

Equal Employment Opportunity for Spanish-Speaking Americans

On November 5, 1970, the President announced the initiation by the Civil Service Commission of a 16-point program to assist Spanish-speaking American citizens who are interested in joining the Federal civilian service. Below are unique concerns based on the 16-point program, involving equal opportunity for Spanish-speaking persons, which require special evaluation attention.

—Is there an intensified drive to recruit Spanish-surnamed persons, particularly for identified public contact positions, in areas of heavy Spanish-speaking population (in addition to Southwestern cities and States, such cities and States as Chicago, New York, Detroit, Florida, etc.)?

—Do recruitment teams include Spanish-speaking persons, particularly at colleges with heavy Spanish-speaking enrollments?

—Have efforts been made to recruit for the Cooperative Education Program at colleges with significant numbers of Spanish-speaking students to permit entry from FSEE registers without the necessity of written examination?

—Is the agency aware of the availability of selective placement on a bilingual basis so that Spanish-speaking persons may be reached for appointment to positions dealing with the Spanish-surnamed population?

—Does the agency work with high schools in Spanish-speaking areas to make known job opportunities in the Federal Government and to counsel and to encourage students to stay in school?

—Has the agency hired for summer employment high school and college teachers from schools serving Spanish-speaking students to give them an understanding of the Federal Government which they can relate to students?

—Have special efforts been made to inform Spanish-surnamed veterans of the availability of noncompetitive appointments for Vietnam era veterans?

—Do EEO action plans include action items for the problems of the Spanish-surnamed population?

—Is there management understanding of the special problems of the Spanish-speaking?

—Do training programs on EEO include the problems of the Spanish-speaking population?

—Are the needs of the Spanish-speaking considered in planning upward mobility programs?

—Are there any Spanish-surnamed persons on the EEO program staff?

VI. Evaluation Methods

The desirability of using line managers as an important part of the evaluation process and of blending the EEO program evaluation with planned internal evaluation of other personnel management program areas has already been pointed out in the preceding text. Agencies are encouraged to use these approaches when their use will permit separate consideration of EEO factors and will contribute to effective evaluation of the total EEO program.

Agencies must view each program goal, plan, action, and followup, as well as related employment and personnel policies and practices as subjects for searching inquiry and evaluation; EEO principles are applicable to all personnel management areas. The review, analysis, and evaluation must be of sufficient depth and detail to assure management that all program areas reviewed are:

—In line with all merit system principles;

—Carried out in full accord with public policy so that all minority group members, women, economically disadvantaged persons, or members of other groups in which membership holds potential for any form of employment discrimination are given true equality of opportunity in employment.

Management should be alert to the need for keeping internal evaluation efforts current. Specifically:

—Management should be aware of changes in the program or in operations (new requirements, employment decreases, job realignments, etc.).

—Subordinate level reports should keep top management aware of EEO developments, problems, and advancement.

—Evaluation should be timely to permit early attention, restudy, further reports, change in approach, or corrective actions as needed.

—Information on program results should be current with provision for effective followup.

The choice and use of one or a combination of analysis methods follow careful determination of which approach will best meet the spec needs and circumstances. Possible methods include:

—Onsite visits by management and program staff.

—Special task force for overall or specific area review.

—Program committees with continuing review and report responsibility.

—Written reports by subordinate levels.

—Periodic review and analysis of statistical studies.

—Periodic review of the adequacy of the EEO complaint process.

—Continuing review of personnel programs (recruitment, promotion, training, etc.) and related actions (information to employees, details, etc.).

—Interviews with employees, supervisors, and management.

—Administration of voluntary questionnaires to sample of workforce.

—Assessment of results of employee EEO committee activities.

—Review of contributions from community sources (civic organizations, minority groups and leaders, women's organizations, other special interest groups, local government employment offices, etc.).

U. S. GOVERNMENT PRINTING OFFICE : 1972 O - 450-527

VT 016 760
RECORDKEEPING REQUIREMENTS UNDER THE
WILLIAMS-STEIGER OCCUPATIONAL SAFETY AND
HEALTH ACT OF 1970.

DEPARTMENT OF LABOR, WASHINGTON, D.C.
OCCUPATIONAL SAFETY AND HEALTH
ADMINISTRATION.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 71 31P.

DESCRIPTORS - *GOVERNMENT PUBLICATIONS;
*EMPLOYERS; EQUAL PROTECTION; FEDERAL LAWS;
*PUBLIC HEALTH LAWS; *LEGAL RESPONSIBILITY;
EMPLOYEES
IDENTIFIERS - OSHA; OCCUPATIONAL SAFETY AND
HEALTH ACT OF 1970; *RECORDKEEPING

ABSTRACT - THIS BOOKLET CONSISTS OF A BATTERY OF INFORMATION RELATIVE TO THE RECORD KEEPING RESPONSIBILITIES OF EMPLOYERS UNDER THE WILLIAMS-STEIGER OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970. THE ACT WAS DEVELOPED PRIMARILY TO ENSURE MAXIMUM SAFETY AND HEALTH PROTECTION IN THE LINE OF DUTY TO EMPLOYEES. THEREFORE, IN AN EFFORT TO PROVIDE EMPLOYERS WITH ENOUGH DATA ON THE SUBJECT, THIS PUBLICATION WAS DESIGNED. INCLUDED IN IT ARE THE FOLLOWING: (1) A SUMMARY OF THE ACT, (2) ACCIDENT AND FATALITY FORMS TO BE COMPLETED WHEN AND IF EITHER SHOULD OCCUR, (3) A CHART LISTING CONDITIONS OF THE ACT REQUIRED TO BE IN EASILY ACCESSIBLE VIEW AT ALL TIMES, (4) A LETTER OF SPECIAL INTEREST TO EMPLOYERS, AND (5) A DETAILED EXPLANATION OF THE RULES AND REGULATIONS. (DN)

Recordkeeping Requirements

under the Williams-Steiger Occupational Safety and Health Act of 1970.

U.S. DEPARTMENT OF LABOR

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

U. S. DEPARTMENT OF LABOR
OFFICE OF THE SECRETARY
WASHINGTON

Employers:

On December 29, 1970, the President signed into law the Williams-Steiger Occupational Safety and Health Act of 1970, which became effective April 28, 1971. The purpose of this landmark legislation is to assure safe and healthful working conditions for the nation's wage earners.

The law provides that each employer has the basic duty to furnish his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm.

Although this duty is one which employers have long accepted as a moral obligation inherent in the conduct of their business, the Williams-Steiger Act places specific responsibilities on each employer and subjects him to penalties if he fails to discharge them.

It is important that each employer be aware of these specific responsibilities. We urge you to review the contents of this booklet that you may know and respond to your obligations under this new Act. Included are a guide to the provisions of the Act, regulations and forms for injury and illness records to be kept from July 1 on, and a poster which must be prominently displayed in your establishment.

Safe and healthful working conditions are a goal worthy of the best efforts of employers, employees and all levels of government. This new law confirms the Federal commitment to this goal and we are ready to do our part. I am confident that the American business community fully shares in this commitment and will also work actively to provide safe and healthful employment to employees.

J D Hodgson
Secretary of Labor

INTRODUCTION

This booklet contains important information regarding the recordkeeping responsibilities of employers under the Williams-Steiger Occupational Safety and Health Act of 1970.

Beginning July 1, 1971 every employer who is covered under this Act must keep occupational injury and illness records for his employees in the establishment at which his employees usually report to work.

Every employer must maintain in each establishment:

- a log of recordable occupational injuries and illnesses, and
- supplementary records of each occupational injury or illness.

Every employer must keep the records up to date, have them available to government representatives, and post a summary of all occupational injuries and illnesses at the conclusion of the calendar year. In addition, employers must report to the Secretary of Labor within 48 hours each accident or health hazard that results in one or more fatalities or hospitalization of five or more employees.

The forms necessary to keep these records are contained in this booklet. Instructions for completing the forms are printed on the back of each form. Additional forms are available from the regional offices of the Bureau of Labor Statistics or the Occupational Safety and Health Administration. Their addresses are printed on the inside of the back cover. Request forms are available on the last page in this booklet.

Posting Requirement: The law requires that employees be informed of the job safety and health protection provided under the Act. The centerfold of this booklet is a poster which must be posted in a prominent place in the establishment to which the employees usually report to work. The poster briefly states the intent and coverage of the Act and the responsibilities of employers and employees to maintain safe and healthful working conditions.

Exclusions: Employers whose employees' occupational injuries and illnesses are required to be recorded under the following Federal Statutes:

(1) Federal Coal Mine Health and Safety Act (30 U.S.C. 821) (a) and (b); and

(2) Federal Metal and Nonmetallic Mine Safety Act (30 U.S.C. 732)

are not required to comply with the recordkeeping requirements under the Occupational Safety and Health Act (OSHA), to the extent that so complying would result in duplicating information.

Section 24 of the Occupational Safety and Health Act provides for a broad statistical program which extends even to employers to whom the Act's enforcement provisions do not apply. Therefore, the fact that an employer must comply with the recordkeeping and reporting provisions under OSHA does not necessarily mean that he would be subject to the enforcement provisions of OSHA.

Additional information about the responsibilities of employers and employees under the Occupational Safety and Health Act can be found in the summary of the Act, which follows.

A HANDY REFERENCE GUIDE TO THE WILLIAMS-STEIGER OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

PURPOSE OF THE LAW

The declared Congressional purpose and policy of the Act is "to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources."

COVERAGE

The provisions of the law apply to every employer engaged in a business affecting commerce who has employees. The law applies in all 50 States, the District of Columbia, Puerto Rico, the Virgin Islands, American Samoa, Guam, the Trust Territory of the Pacific Islands, Wake Island, the Outer Continental Shelf Lands, Johnston Island, and the Canal Zone. Federal, State and local government employees are specifically excluded from coverage, but they may be covered by equally effective requirements. See Section 19 for programs covering Federal employees and Section 18(c)(6) for potential coverage of State and local government employees.

In addition, the Act specifically provides that its terms shall not apply to working conditions protected under other Federal occupational safety and health laws (such as those under the Federal Coal Mine Health and Safety Act; and under the Atomic Energy Act of 1954, as amended, including State agreements under that Act).

DUTIES OF EMPLOYERS AND EMPLOYEES

Each *employer* under the Act has the general duty to furnish each of his employees employment and places of employment, free from recognized hazards causing, or likely to cause, death or serious physical harm; and the employer has the specific duty of complying with safety and health standards promulgated under the Act. Each *employee* has the duty to comply with these safety and health standards, and all rules, regulations, and orders issued pursuant to the Act which are applicable to his own actions and conduct.

The Act takes effect on April 28, 1971.

ADMINISTRATION

Administration and enforcement of the Act are vested primarily in the Secretary of Labor and in a new agency. The Occupational Safety and Health Review Commission, a quasi-judicial board of three members appointed by the President. Research and related functions are vested in the Secretary of Health. Education and Welfare whose functions will, for the most part, be carried out by the new National Institute for Occupational Safety and Health established within HEW.

The Secretary of Labor is responsible for both promulgating and enforcing job safety and health standards. Occupational safety and health inspections will be made by inspectors located in offices to be established in many communities throughout the country.

OCCUPATIONAL SAFETY AND HEALTH STANDARDS

In general, job safety and health standards consist of rules for avoidance of hazards which have been proven by research and experience to be harmful to personal safety and health. They constitute an extensive compilation of wisdom which sometimes applies to *all* employees. An example of this would be fire protection standards. A great many standards, however, apply only to workers while engaged in *specific types of work*—such as handling compressed gases.

Two of the many thousands of occupational safety and health standards are listed here to familiarize covered employers and employees with the form of such standards:

> One typical standard.—Aisles and passageways shall be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard.
>
> Another typical standard.—In any operations such as chipping, caulking, drilling, riveting, grinding, and pouring babbit metal, in which the eye hazard of flying particles, molten metal, or liquid chemical exists, employees shall be protected by suitable face shields or goggles . . . .

It is the obligation of all employers and employees to familiarize themselves with those standards which apply to them and to observe them at all times.

The Act authorizes the Secretary of Labor until April 28, 1973, to promulgate as occupational safety and health standards any existing Federal Standards (such as those presently applying to Federal contractors under the Walsh-Healey Act) or any national consensus standards (such as those issued by the National Fire Protection Association). He may do this without complying with the rule-making requirements of the Administrative Procedure Act.

In addition, the Secretary of Labor may, upon the basis of information submitted by the Secretary of Health, Education and Welfare, advisory committees and others, revise, modify or revoke existing standards as well as promulgate new ones. The promulgation of standards under this section of the Act must be done under the procedures set forth in the section itself, including various time limitations, and also under the procedures of the Administrative Procedure Act. Any person adversely affected by a standard issued by the Secretary may challenge its validity by petitioning the United States Court of Appeals within 60 days after its promulgation. Unless otherwise ordered by the Court, filing such petition does not operate as a stay of the standard.

Also, the Act provides for the establishment of emergency temporary standards, effective immediately upon publication in the Federal Register, where it is found that employees are exposed to grave danger. The Act also contains provision for standards which may require:

- That no employee dealing with toxic materials or harmful physical agents will suffer material impairment of health or functional capacity, even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life.
- Development and prescription of labels or other appropriate forms of warning so that employees are made aware of all hazards to which they are exposed.
- Prescription of suitable protective equipment.
- Monitoring or measuring employee exposure to hazards at such locations and intervals and in such manner as may be necessary for the protection of employees.
- Prescription of the type and frequency of medical examinations or other tests for employees exposed to health hazards. At the request of an employee, the examination or test results shall be furnished to his physician.

The Secretary, after a hearing on an employer application therefor, is authorized to grant temporary variances from standards to give the employer sufficient time to come into compliance if he can show a need for certain time-extension and has a protective plan of action. Variances may be granted without time limits if the Secretary finds that an employer is using safety measures which are as safe as those required in a standard. Affected employees shall be given notice of each such application and an opportunity for hearing.

COMPLAINTS OF VIOLATIONS

Any employees (or representative thereof) who believe that a violation of a job safety or health standard exists which threatens physical harm, or that an imminent danger exists, may request an inspection by sending a signed written notice to the Department of Labor. Such a notice shall set forth with reasonable particularity the grounds for the notice and a copy shall be provided the employer or his agent. The names of the complainants need not, however, be furnished to the employer. If the Secretary finds no reasonable grounds for the complaint and a citation is not issued, the Secretary is required to notify the complainants in writing of his determinations or final disposition of the matter. Also, the Secretary is required to set up procedures for informal review in a case where a citation is not issued.

ENFORCEMENT

In enforcing the standards, Labor Department safety inspectors may enter without delay, and at any reasonable times, any establishment covered by the Act to inspect the premises and all pertinent conditions, structures, machines, apparatus, devices, equipment, and materials therein, and to question privately any employer, owner, operator, agent or employee. The Act permits the employer and a representative authorized by his employees to accompany the inspector during the physical inspection of any workplace for the purpose of aiding such inspection. The Secretary of Labor also has power, in making inspections and investigations under the Act, to require the attendance and testimony of witnesses and the production of evidence under oath. The Secretary of Health, Education and Welfare is also authorized to make inspections and question employers and employees in order to carry out those functions assigned to HEW under the Act.

Where an investigation reveals a violation, the employer is issued a written citation describing the specific nature of the violation. All citations shall fix a reasonable time for abatement of the violation and each citation (or copies thereof) issued by the Department must be prominently posted at or near each place where a violation referred to in the citation occurred. Notices, in lieu of citations, may be issued for de minimis violations which have no direct or immediate relationship to safety or health.

No citation may be issued after the expiration of six (6) months following the occurrence of any violation.

Notification of Proposed Penalty

Within a reasonable time after issuance of a citation for a job safety or health violation, the Labor Department shall notify the employer by certified mail of the penalty, if any, which is proposed to be assessed. The employer then has 15 working days within which to notify the Department that he wishes to contest the citation or proposed assessment of penalty. If the employer fails to notify the Department within such time that he intends to contest the citation or proposed assessment of penalty, the citation and the assessment shall be final, provided no employee files an objection to the time allowed for abatement (see *below* "Time for Abatement of Hazards"). If the employer notifies the Department within such time that he does wish to contest, the Secretary of Labor will so advise the Occupational Safety and Health Review Commission and the Commission shall afford an opportunity for a hearing. The Commission then will issue orders affirming, modifying or vacating the citation or proposed penalty. Orders of the Commission are final 30 days after issuance. Review of Commission orders may be obtained in the United States Court of Appeals.

The Review Commission's rules of procedure shall provide affected employees (or representatives thereof) an opportunity to participate as parties to hearings under Section 10(c).

Time for Abatement of Hazards

A citation issued by the Department shall prescribe a reasonable time for elimination or abatement of the hazard. This time limit may also be contested if notification of such is filed with the Department within 15 days. The time set by the Department for correcting a violation shall not begin to run until there is a final order of the Review Commission, if the review is initiated by the employer in good faith and not solely for delay or avoidance of penalties.

Employees (or representatives of employees) also have the right to object to the period of time fixed in the citation for the abatement of a violation. If, within 15 days after a citation is issued, an employee files a notice with the Department alleging that an unreasonable time was allowed for abatement, review procedures similar to those specified above apply.

Failure to Correct Violation Within Allowed Time

Where time for correction of a violation is allowed, but the employer fails to abate within such time, the Secretary of Labor shall notify the employer by certified mail of such failure and of the proposed penalty. Such notice and assessment shall be final unless the employer contests the same by notice to the Secretary within 15 days.

Upon a showing by an employer of a good faith effort to comply with the abatement requirements of a citation, but that abatement has not been completed because of factors beyond his reasonable control, an opportunity for a hearing will be afforded, after which an order affirming or modifying the abatement requirement will be issued.

PENALTIES FOR VIOLATIONS

Willful or repeated violations of the Act's requirements by employers may incur monetary penalties of up to $10,000 for each violation. Citations issued for serious violations incur *mandatory* monetary penalties of up to $1,000 for each violation, while penalties in the same amount *may* be incurred where non-serious violations are cited. A serious violation exists where there is a substantial probability that death or serious physical harm could result. Any employer who fails to correct a violation for which a citation has been issued within the period prescribed therein may be penalized up to $1,000 each day the violation persists.

A willful violation by an employer which results in the death of any employee is punishable by a fine of up to $10,000 or imprisonment for up to six months. A second conviction doubles these criminal penalties.

Criminal penalties are also included in the Act for making false official statements and for giving unauthorized advance notice of any inspections to be conducted under the Act.

RECORDKEEPING REQUIREMENTS

In order to carry out the purposes of the Act employers are required to keep and make available to the Labor Secretary (and also to the HEW Secretary) records on certain employer activities under the Act.

Employers are also required to maintain accurate records (and periodic reports) of work-related deaths, injuries and illnesses. Minor injuries requiring only first aid treatment need not be recorded, but a record must be made if it involves medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job.

Employers can also be required to maintain accurate records of employee exposures to potentially toxic materials or harmful physical agents which are required to be monitored or measured under Section 6(b)(7), and to promptly advise any employee of any excessive exposure and of the corrective action being undertaken. The Secretary of Labor, in cooperation with the Secretary of Health, Education and Welfare, is authorized by the law to issue regulations in this area which shall provide employees or their representatives with an opportunity to observe such monitoring or measuring, to have access to the records thereof and to such records as will indicate their own exposure to toxic materials or harmful physical agents.

For recordkeeping purposes, the Secretary's regulations may also require employers to conduct their own periodic inspections.

The Secretary is directed to issue regulations requiring employers to keep their employees informed of their protections and obligations under the law through posting of notices or other appropriate means. The information which employers may be required to give their employees may also include the provisions of applicable standards.

STATISTICS

The Secretary of Labor, in consultation with the HEW Secretary, is required to develop and maintain an effective program of collection, compilation and analysis of statistics on work injuries and illnesses. In so doing he may make private grants or contracts and grants to States or political subdivisions thereof. The Secretary may also require employers to file such reports of work injuries and illnesses required to be kept under the Act as he shall deem necessary.

Existing agreements between the Department of Labor and a State for collection of OSH statistics are preserved under the Act until replaced by other arrangements under grants or contracts made under the Act.

GENERAL NOTICE REQUIREMENT

The Secretary of Labor is required to publish in the Federal Register a statement of his reasons for any action he takes with respect to the promulgation of any standard, the issuance of any rule, order or decision, the granting of any exemption or extension of time, as well as any action he takes to compromise, mitigate or settle any penalty assessed under the Act.

IMMINENT DANGERS

Any conditions or practices in any place of employment which are such that a danger exists which could reasonably be expected to cause death or serious physical harm immediately or before the imminence of such danger can be eliminated through normal enforcement procedures, may be restrained by order of a United States district court upon petition of the Secretary of Labor. If the Secretary arbitrarily or capriciously fails to seek action to abate an imminent danger of such kind, a *mandamus* action to compel him to act may be brought in the U.S. district court by any employee who may be injured by reason of such failure. A Labor Department safety inspector who concludes that such imminent-danger conditions or practices exist in any place of employment is obligated to inform the affected employees and employers of the danger and that he is recommending to the Secretary of Labor that relief be sought.

PROTECTION AGAINST HARASSMENT

No person shall discharge or in any manner discriminate against any employee because he exercises any right under the Act or files a complaint or other proceeding or because he testifies or is about to testify in any proceeding under the Act. Any employee who believes that he has been discharged or otherwise discriminated against in violation of this provision may, within 30 days of such illegal action, file a complaint with the Secretary of Labor. The Secretary is authorized to investigate the matter and to bring action in the U.S. district court for appropriate relief, including rehiring or reinstatement of the employee to his former job with back pay. The Secretary must notify the complainant of his action on the complaint within 90 days of its receipt.

STATE PARTICIPATION

The Act encourages the States to assume the fullest responsibility for the administration and enforcement of their occupational safety and health laws by providing grants to the States for the purposes listed later in this guide. A specific disclaimer of Federal pre-emption is included in order to permit any State agency or court to assert jurisdiction under State law over any occupational safety or health issue with respect to which no Federal standard is in effect under this law.

In addition, any State may assume responsibility for the development and enforcement of occupational safety and health standards relating to any job safety and health issue covered by a standard promulgated under Section 6 of the OSH Act. if such State submits an approved plan for so doing to the Secretary of Labor. The Secretary shall approve such a plan under the following conditions:

1. An agency, or agencies, of the State must be designated or created to carry out the plan.
2. The State standards (and enforcement thereof) must be at least as effective as the counterpart Federal standards in providing safe and healthful employment.
3. There must be effective provisions for rights of entry and inspection of workplaces, including a prohibition on advance notice of inspections.
4. Enforcement capacity must be demonstrated.
5. Adequate funds for administration and enforcement must be assured.
6. Effective and comprehensive job safety and health programs for all public employees within the State will be established to the extent permitted by the particular State's law.
7. The State, and employers within the State, will make such reports as may be required by the Secretary of Labor.

Following approval of a State plan for the development and enforcement of State standards, the Secretary of Labor may continue to exercise his enforcement authority with respect to comparable Federal OSH standards until he determines on the basis of actual operations that the criteria set forth above are being applied. Once he makes such determination (but he cannot do so during the first 3 years after the plan's approval), the Federal standards and the Secretary's enforcement of them become inapplicable with respect to issues covered under the plan.

However, the Secretary is required to make a continuing evaluation of the manner in which each State plan is being carried out and to withdraw his approval thereof whenever there is a failure to comply substantially with any provision thereof. Such a plan shall cease to be in effect upon receipt of notice by the State of the Secretary's withdrawal of approval.

The Secretary of Labor is authorized, after consultation with the Secretary of Health, Education and Welfare, to make grants to States for experimental and demonstration projects consistent with the objectives of the Act, for administering and enforcing approved programs, for assisting them in identifying their needs, or in developing their plans, in establishing systems for collection of information concerning the nature and frequency of occupational injuries and diseases, for developing and administering programs dealing with occupational safety and health statistics, and otherwise improving the expertise of personnel or the administration and enforcement of State occupational safety and health laws consistent with the objectives of the Act.

If the Secretary of Labor rejects a State plan for development and enforcement of State standards, he shall afford the State submitting the plan due notice and opportunity for hearing before so doing. The subsequent withdrawal of an approved State plan or the rejection of a State's plan is subject to review in the U.S. Courts of Appeals.

The law also permits the Secretary of Labor to enter into an agreement with any State under which the State will be permitted to continue to enforce its own occupational safety and health standards until approval of its plan for development and enforcement of OSH standards or until December 29, 1972, whichever comes first.

EDUCATION AND TRAINING PROGRAMS

The Act provides for programs to be conducted by the Secretary of Labor, in consultation with the Department of Health, Education and Welfare, for the education and training of employers and employees in the recognition, avoidance, and prevention of unsafe and unhealthful working conditions, and in the effective means for preventing occupational injuries and illnesses. The Act also makes provision for educational and training programs to provide an adequate supply of qualified personnel to carry out the law's purposes and for informational programs on the importance of and proper use of adequate safety and health equipment to be conducted primarily by the Department of Health, Education and Welfare, but also to some extent by the Secretary of Labor.

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

The Act establishes within HEW a new National Institute for Occupational Safety and Health primarily for the purpose of carrying out the research and educational functions assigned to the HEW Secretary under the Act.

In addition to these functions, the Institute is authorized to develop and establish recommended occupational safety and health standards; to conduct research and experimental programs determined by the Institute's Director to be necessary for developing criteria for new and improved job safety and health standards; and to make recommendations to the Secretaries of Labor and HEW concerning new and improved standards.

Among the HEW functions which may be carried out by the Institute is the one which calls for prescribing regulations requiring employers to measure, record, and make reports on the exposure of employees to potentially toxic substances or harmful physical agents which might endanger their safety and health. Employers required to do so may receive full financial or other assistance for the purpose of defraying any additional expense so incurred. Also authorized are programs for medical examinations and tests as may be necessary to determine, for the purposes of research, the incidence of occupational illness and the susceptibility of employees to such illnesses. These examinations may also be at Government expense. Another HEW function will be the annual publication of a list of all known toxic substances and the concentrations at which toxicity is known to occur. There will also be published industry-wide studies on chronic or low-level exposure to a broad variety of industrial materials, processes, and stresses on the potential for illness, disease or loss of functional capacity in aging adults, and also authorized is the making of determinations by HEW, at the written request of any employer or authorized representatives of employees, as to whether any substance normally found in the place of employment has potentially toxic effects. Such determinations shall be submitted to both the employer and the affected employees as soon as possible.

Information obtained by the Departments of HEW and of Labor under the research provisions of the Act is to be disseminated to employers and employees and organizations thereof.

WORKMEN'S COMPENSATION

The Act does not in any manner affect any workmen's compensation law or enlarge or diminish or affect in any other manner the common law or statutory rights, duties, or liabilities of employers and employees under any law with respect to injuries, diseases, or death of employees arising out of, or in the course of, employment. Provision is made in the law, however, for a 15-member National Commission on State Workmen's Compensation Laws to evaluate State workmen's compensation laws in order to determine if such laws provide an adequate, prompt, and equitable system of compensation for injury or death arising out of or in the course of employment.

ASSISTANCE FROM SMALL BUSINESS ADMINISTRATION

The law includes amendments to the Small Business Act which provides for financial assistance to small firms for alterations in its equipment, facilities, or methods of operation to comply with standards established by the Department of Labor or by any State pursuant to the Act if the Small Business Administration determines that such a firm is likely to suffer substantial economic injury without such assistance.

OTHER PROVISIONS

ADVISORY COMMITTEES. The Act creates a 12-member National Advisory Committee to be appointed by the Secretary of Labor (including 4 designees of the Secretary of HEW) to advise, consult, and make recommendations on matters relating to the administration of the Act, and permits the establishment of *ad hoc* advisory committees to assist the Secretary in his standard-setting functions.

NON-OBSTRUCTION REQUIREMENT. Any information obtained by any agency under the Act shall be obtained with a minimum burden upon employers, especially those operating small businesses. Unnecessary duplication of efforts in obtaining information shall be reduced to the maximum extent feasible.

OCCUPATIONAL SAFETY AND HEALTH REVIEW COMMISSION. The Act establishes a new independent Federal agency, called the Occupational Safety and Health Review Commission. This Commission is a quasi-judicial body whose functions are: (1) to hear and review cases of alleged violations brought before it by the Secretary of Labor; and, where warranted, (2) to issue corrective orders, and (3) to assess civil penalties. The Commission is to be composed of three members, appointed by the President (with the approval of the Senate) to serve six-year staggered terms. The members will be chosen from among persons who are qualified by reason of training, education, or experience to perform their duties. One of the members shall be appointed by the President to serve as Chairman.

LABOR DEPARTMENT LEGAL REPRESENTATION. The Solicitor of Labor is authorized to appear for and represent the Secretary in any civil litigation brought under the Act subject to the direction and control of the Attorney General.

TRADE SECRETS. Any trade secrets revealed to Labor Department personnel during the course of their duties under the Act shall be considered confidential for the purpose of 18 USC 1905.

NATIONAL DEFENSE TOLERANCES. The Secretary of Labor may allow reasonable variations, tolerances, and exemptions from any and all of the Act's provisions, if he finds these necessary to avoid serious impairment of the national defense.

FEDERAL PROTECTION FOR LABOR DEPARTMENT INSPECTORS. The Act broadens the provisions of Title 18 of the United States Code, which make it a Federal Criminal offense to assault, kill or otherwise interfere with certain law enforcement officials in the course of their assignments, by extending this protection to all employees of the Department of Labor assigned to perform investigative, inspection, or law enforcement functions.

ANNUAL REPORTS. Comprehensive annual reports on the Act must be prepared and submitted to the President for transmittal to the Congress by both the Secretary of Labor and the Secretary of Health, Education and Welfare. Reports are also required from the Secretary of Labor on the grants program, from the Director of the National Institute for Occupational Safety and Health on the operations of that Institute, and from the Secretary of Labor on OSH programs for Federal employees.

NEW ASSISTANT SECRETARY OF LABOR. The law adds an additional Assistant Secretary in the Department of Labor to head the new Occupational Safety and Health organization within the Department.

APPROPRIATIONS AUTHORITY. Congress has authorized such funds to be appropriated to administer and enforce this law as Congress shall from time to time deem necessary.

ADDITIONAL INFORMATION

Additional information concerning this law may be obtained by contacting the Acting Regional Administrator, Occupational Safety and Health Administration, U.S. Department of Labor, with appropriate jurisdiction, or you may contact the Office of Information Services, Occupational Safety and Health Administration, U.S. Department of Labor, Washington, D.C. 20210.

LOG OF OCCUPATIONAL INJURIES AND ILLNESSES

Each recordable occupational injury and occupational illness must be entered on a log of cases (OSHA Form No. 100) within two working days of receiving information that a recordable case has occurred. Logs must be kept current and retained for five (5) years following the end of the calendar year to which they relate.

Logs are to be maintained for three purposes:

1) Logs for the prior five (5) year period must be available in the establishment without delay and at reasonable times for examination by representatives of the Department of Labor or the Department of Health, Education and Welfare, or States accorded jurisdiction under the Act.

2) The log will be used in preparing the annual summary of Occupational Injuries and Illnesses (OSHA Form No. 102) which must be posted in every establishment.

3) Those establishments selected to participate in a statistical program will be required to prepare a report based on entries in this log.

In addition, the log will aid you in reviewing the occupational injury and illness experience of your employees.

INSTRUCTIONS FOR COMPLETING LOG OF OCCUPATIONAL INJURIES AND ILLNESS (OSHA Form No. 100)

Column 1 - CASE OR FILE NUMBER

Any number may be entered which will facilitate comparison with supplementary records.

Column 2 - DATE OF INJURY OR ILLNESS

For occupational injuries enter the date of the work accident which resulted in injury. For occupational illnesses enter the date of initial diagnosis of illness, or, if absence occurred before diagnosis, the first day of the absence in connection with which the case was diagnosed.

Column 3 - EMPLOYEE'S NAME

Column 4 - OCCUPATION

Enter the occupational title of the job to which the employee was assigned at the time of injury or illness. In the absence of a formal occupational title, enter a brief description of the duties of the employee.

Column 5 - DEPARTMENT

Enter the name of the department to which employee was assigned at the time of injury or illness, whether or not employee was actually working in that department at the time. In the absence of formal department titles, enter a brief description of normal workplace to which employee is assigned.

Column 6 - NATURE OF INJURY OR ILLNESS AND PART(S) OF BODY AFFECTED

Enter a brief description of the injury or illness and indicate the part or parts of body affected. Where entire body is affected, the entry "body" can be used.

Column 7 - INJURY OR ILLNESS CODE

Enter the one code which most accurately describes the nature of injury or illness. A list of codes appears at the bottom of the log. A more complete description of occupational injuries and illnesses appears below in "definitions."

Column 8 - FATALITIES

If the occupational injury or illness resulted in death, enter date of death.

Column 9 - LOST WORKDAYS

Enter the number of days the employee would have worked but could not because of occupational injury or illness. The number of lost workdays should not include the day of injury. The number of days includes all days (consecutive or not) on which, because of the injury or illness:

1) the employee would have worked but could not, or
2) the employee was assigned to a temporary job, or
3) the employee worked at a permanent job less than full time, or
4) the employee worked at a permanently assigned job but could not perform all duties normally assigned to it.

For employees not having a regularly scheduled shift, i.e., certain truck drivers, construction workers, farm labor, casual labor, part-time employees, etc., it may be necessary to estimate the number of lost workdays. Estimates of lost workdays shall be based on prior work history of the employee AND days worked by employees, not ill or injured, working in the department and/or occupation of the ill or injured employee.

Column 10 - PERMANENT TRANSFER TO ANOTHER JOB OR TERMINATION OF EMPLOYMENT AFTER LOST WORKDAYS

Complete only if the employee did not return to his previous assignment after lost workdays.

Column 11 - NONFATAL CASES WITHOUT LOST WORKDAYS

Enter a check in Column 11 for all cases of occupational injury or illness, which did not involve fatalities or lost workdays but did result in:

—Transfer to another job or termination of employment, or
—Medical treatment, other than first aid, or
—Diagnosis of occupational illness, or
—Loss of consciousness, or
—Restriction of work or motion, enter a check in Column 11.

Column 12 - TRANSFER TO ANOTHER JOB OR TERMINATION OF EMPLOYMENT WITHOUT LOST WORKDAYS

If the check in Column 11 represented a transfer to another job or termination of employment with no lost workdays, enter another check in Column 12.

INITIALING REQUIREMENT

Each line entry regarding an occupational injury or illness MUST BE INITIALED in the right hand margin by the person responsible for the accuracy of the entry. Changes in an entry also must be initialed in the affected column.

CHANGES IN EXTENT OF OR OUTCOME OF INJURY OR ILLNESS

If there is a change in an occupational injury or illness case which affects entries in Columns 9, 10, 11, or 12, the first entry should be lined out and a new entry made. For example, if an injured employee at first required only medical treatment but later lost workdays, the check in Column 11 should be lined out and the number of lost workdays entered in Column 9.

In another example, if an employee with an occupational illness lost workdays, returned to work, and then died of the illness, the workdays noted in Column 9 should be lined out and the date of death entered in Column 8.

An entry may be lined out if later found to be a nonoccupational injury or illness.

OSHA NO. 100

LOG OF OCCUPATIONAL INJURIES AN

Case or file no.	Date of injury or initial diagnosis of illness. If diagnosis of illness was made after first day of absence enter first day of absence. (mo./day/yr.)	Employee's Name (First name, middle initial, last name)	Occupation of injured employee at time of injury or illness	Department to which employee was assigned at time of injury or illness	DESCRIPTION OF INJURY O Nature of injury or illness and part(s) body affected (Typical entries for this column might Amputation of 1st joint right forefinge Strain of lower back Contact dermatitis on both hands Electrocution—body)
1	2	3	4	5	

Company Name ____

Establishment Name _______________________________________

Establishment Location _____________________________________

Injury Code
10 All occupational injuries

21
22
23
24

CCUPATIONAL INJURIES AND ILLNESSES

Form Approved
OMB NUMBER 44R 1453

	DESCRIPTION OF INJURY OR ILLNESS		EXTENT OF AND OUTCOME OF INJURY OR ILLNESS				
			Fatalities	Lost Workday Cases		Nonfatal Cases Without Lost Workdays	
	Nature of injury or illness and part(s) of body affected (Typical entries for this column might be: Amputation of 1st joint right forefinger Strain of lower back Contact dermatitis on both hands Electrocution—body)	Injury or illness code *See codes at bottom of page.*	Enter date of death (mo./day/yr.)	Enter workdays lost due to injury or illness (see *instructions on back*.)	If, *after* lost workdays, the employee was permanently transferred to another job or was terminated, enter a check in the column below	If no entry was made in columns 8 or 9, but the injury or illness did result in: Transfer to another job or termination, or; medical treatment, other than first aid, or; diagnosis of occupational illness, or; loss of consciousness, or; restriction of work or motion; Enter a check in the column below	If a check in column 11 represented a transfer or termination, enter another check in column 12
5	6	7	8	9	10	11	12

njuries

Illness Codes

21 Occupational skin diseases or disorders
22 Dust diseases of the lungs (pneumoconioses)
23 Respiratory conditions due to toxic agents
24 Poisoning (Systemic effects of toxic materials)
25 Disorders due to physical agents (other than toxic materials)
26 Disorders due to repeated trauma
29 All other occupational illnesses

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LOG OF OCCUPATIONAL INJURIES AND ILLNESSES

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Logs are to be maintained for three purposes:

1) Logs for the prior five (5) year period must be available in the establishment without delay and at reasonable times for examination by representatives of the Department of Labor or the Department of Health, Education and Welfare, or States accorded jurisdiction under the Act.

2) The log will be used in preparing the annual summary of Occupational Injuries and Illnesses (OSHA Form No. 102) which must be posted in every establishment.

3) Those establishments selected to participate in a statistical program will be required to prepare a report based on entries in this log.

In addition, the log will aid you in reviewing the occupational injury and illness experience of your employees.

INSTRUCTIONS FOR COMPLETING LOG OF OCCUPATIONAL INJURIES AND ILLNESS (OSHA Form No. 100)

Column 1 - CASE OR FILE NUMBER

Any number may be entered which will facilitate comparison with supplementary records.

Column 2 - DATE OF INJURY OR ILLNESS

For occupational injuries enter the date of the work accident which resulted in injury. For occupational illnesses enter the date of initial diagnosis of illness, or, if absence occurred before diagnosis, the first day of the absence in connection with which the case was diagnosed.

Column 3 - EMPLOYEE'S NAME

Column 4 - OCCUPATION

Enter the occupational title of the job to which the employee was assigned at the time of injury or illness. In the absence of a formal occupational title, enter a brief description of the duties of the employee.

Column 5 - DEPARTMENT

Enter the name of the department to which employee was assigned at the time of injury or illness, whether or not employee was actually working in that department at the time. In the absence of formal department titles, enter a brief description of normal workplace to which employee is assigned.

Column 6 - NATURE OF INJURY OR ILLNESS AND PART(S) OF BODY AFFECTED

Enter a brief description of the injury or illness and indicate the part or parts of body affected. Where entire body is affected, the entry "body" can be used.

Column 7 - INJURY OR ILLNESS CODE

Enter the one code which most accurately describes the nature of injury or illness. A list of codes appears at the bottom of the log. A more complete description of occupational injuries and illnesses appears below in "definitions."

Column 8 - FATALITIES

If the occupational injury or illness resulted in death, enter date of death.

Column 9 - LOST WORKDAYS

Enter the number of days the employee would have worked but could not because of occupational injury or illness. The number of lost workdays should not include the day of injury. The number of days includes all days (consecutive or not) on which, because of the injury or illness:

1) the employee would have worked but could not, or
2) the employee was assigned to a temporary job, or
3) the employee worked at a permanent job less than full time, or
4) the employee worked at a permanently assigned job but could not perform all duties normally assigned to it.

For employees not having a regularly scheduled shift, i.e., certain truck drivers, construction workers, farm labor, casual labor, part-time employees, etc., it may be necessary to estimate the number of lost workdays. Estimates of lost workdays shall be based on prior work history of the employee AND days worked by employees, not ill or injured, working in the department and/or occupation of the ill or injured employee.

Column 10 - PERMANENT TRANSFER TO ANOTHER JOB OR TERMINATION OF EMPLOYMENT AFTER LOST WORKDAYS

Complete only if the employee did not return to his previous assignment after lost workdays.

Column 11 - NONFATAL CASES WITHOUT LOST WORKDAYS

Enter a check in Column 11 for all cases of occupational injury or illness, which did not involve fatalities or lost workdays but did result in:

—Transfer to another job or termination of employment, or
—Medical treatment, other than first aid, or
—Diagnosis of occupational illness, or
—Loss of consciousness, or
—Restriction of work or motion, enter a check in Column 11.

Column 12 - TRANSFER TO ANOTHER JOB OR TERMINATION OF EMPLOYMENT WITHOUT LOST WORKDAYS

If the check in Column 11 represented a transfer to another job or termination of employment with no lost workdays, enter another check in Column 12.

INITIALING REQUIREMENT

Each line entry regarding an occupational injury or illness MUST BE INITIALED in the right hand margin by the person responsible for the accuracy of the entry. Changes in an entry also must be initialed in the affected column.

CHANGES IN EXTENT OF OR OUTCOME OF INJURY OR ILLNESS

If there is a change in an occupational injury or illness case which affects entries in Columns 9, 10, 11, or 12, the first entry should be lined out and a new entry made. For example, if an injured employee at first required only medical treatment but later lost workdays, the check in Column 11 should be lined out and the number of lost workdays entered in Column 9.

In another example, if an employee with an occupational illness lost workdays, returned to work, and then died of the illness, the workdays noted in Column 9 should be lined out and the date of death entered in Column 8.

An entry may be lined out if later found to be a non-occupational injury or illness.

OSHA NO. 100

LOG OF OCCUPATIONAL INJURIES AN

Case or file no. 1	Date of injury or initial diagnosis of illness. If diagnosis of illness was made after first day of absence enter first day of absence. (mo./day/yr.) 2	Employee's Name (First name, middle initial, last name) 3	Occupation of injured employee at time of injury or illness 4	Department to which employee was assigned at time of injury or illness 5	DESCRIPTION OF INJURY OR Nature of injury or illness and part(s) o body affected (Typical entries for this column might Amputation of 1st joint right forefinger Strain of lower back Contact dermatitis on both hands Electrocution—body)

Company Name --

Establishment Name -------------------------------------

Establishment Location ----------------------------------

Injury Code
10 All occupational injuries

21
22
23
24

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UPATIONAL INJURIES AND ILLNESSES

Form Approved
OMB NUMBER 44R 1453

	DESCRIPTION OF INJURY OR ILLNESS		EXTENT OF AND OUTCOME OF INJURY OR ILLNESS				
	Nature of injury or illness and part(s) of body affected Typical entries for this column might be: Amputation of 1st joint right forefinger Strain of lower back Contact dermatitis on both hands Electrocution—body)	Injury or illness code *See codes at bottom of page.*	Fatalities	Lost Workday Cases		Nonfatal Cases Without Lost Workdays	
			Enter date of death (mo./day/yr.)	Enter workdays lost due to injury or illness (*see instructions on back.*)	If, *after* lost workdays, the employee was permanently transferred to another job or was terminated, enter a check in the column below	If no entry was made in columns 8 or 9, but the injury or illness did result in: Transfer to another job or termination, or; medical treatment, other than first aid, or; diagnosis of occupational illness, or; loss of consciousness, or; restriction of work or motion; Enter a check in the column below	If a check in column 11 represented a transfer or termination, enter another check in column 12
5	6	7	8	9	10	11	12

ries

Illness Codes

21 Occupational skin diseases or disorders
22 Dust diseases of the lungs (pneumoconioses)
23 Respiratory conditions due to toxic agents
24 Poisoning (Systemic effects of toxic materials)
25 Disorders due to physical agents (other than toxic materials)
26 Disorders due to repeated trauma
29 All other occupational illnesses

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RECORDKEEPING REQUIREMENTS

Regulations issued under the Occupational Safety and Health Act of 1970 require all establishments subject to the Act to maintain records of recordable occupational injuries and illnesses occuring on or after July 1. 1971. Such records must consist of: a) a log of occupational injuries and illnesses; b) a supplementary record of each occupational injury and illness; and c) an annual summary of occupational injuries and illnesses.

Recordkeeping requirements under the Occupational Safety and Health Act may differ from your State workmen's compensation requirements. Please review the definitions contained in this form to be sure that records are being maintained for all recordable cases.

DEFINITIONS

OCCUPATIONAL INJURY is any injury such as a cut, fracture, sprain, amputation, etc., which results from a work accident or from exposure in the work environment.

OCCUPATIONAL ILLNESS of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with his employment. It includes acute and chronic illnesses or diseases which may be caused by inhalation, absorption, ingestion, or direct contact, and which can be included in the categories listed below.

The following listing gives the categories of occupational illnesses and disorders that will be utilized for the purpose of classifying recordable illnesses. The identifying codes are those to be used in Column 7 of the log. For purposes of information, examples of each category are given. These are typical examples, however, and are not to be considered to be the complete listing of the types of illnesses and disorders that are to be counted under each category.

(21) Occupational Skin Diseases or Disorders
Examples: Contact dermatitis, eczema, or rash caused by primary irritants and sensitizers or poisonous plants; oil acne; chrome ulcers; chemical burns or inflammations; etc.

(22) Dust Diseases of the Lungs (Pneumoconioses)
Examples: Silicosis, asbestosis, coal worker's pneumoconiosis, byssinosis, and other pneumoconioses.

(23) Respiratory Conditions Due to Toxic Agents
Examples: Pneumonitis, pharyngitis, rhinitis or acute congestion due to chemicals, dusts, gases, or fumes; farmer's lung; etc.

(24) Poisoning (Systemic Effects of Toxic Materials)
Examples: Poisoning by lead, mercury, cadmium, arsenic, or other metals, poisoning by carbon monoxide, hydrogen sulfide or other gases; poisoning by benzol, carbon tetrachloride, or other organic solvents; poisoning by insecticide sprays such as parathion, lead arsenate; poisoning by other chemicals such as formaldehyde, plastics and resins, etc.

(25) Disorders Due to Physical Agents (Other Than Toxic Materials)
Example: Heatstroke, sunstroke, heat exhaustion and other effects of environmental heat; freezing, frostbite and effects of exposure to low temperatures; caisson disease; effects of ionizing radiation (isotopes, X-rays, radium); effects of noniozing radiation (welding flash, ultraviolet rays, microwaves, sunburn), etc.

(26) Disorders Due to Repeated Trauma
Examples: Noise-induced hearing loss; synovitis, tenosynovitis, and bursitis; Raynaud's phenomena; and other conditions due to repeated motion, vibration or pressure.

(29) All Other Occupational Illnesses
Examples: Anthrax, brucellosis, infectious hepatitis, malignant and benign tumors, food poisoning, histoplasmosis, coccidioidomycosis, etc.

RECORDABLE OCCUPATIONAL INJURIES AND ILLNESSES are any occupational injuries or illnesses which result in:

1) FATALITIES, regardless of the time between the injury and death, or the length of the illness; or
2) LOST WORKDAYS CASES, other than fatalities that result in lost workdays; or
3) NONFATAL CASES WITHOUT LOST WORKDAYS, which result in transfer to another job or termination of employment, or require medical treatment (as defined below), or involve loss of consciousness or restriction of work or motion. This category also includes any diagnosed occupational illnesses which are reported to the employer but are not classified as fatalities or lost workday cases.

MEDICAL TREATMENT includes treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does NOT include first aid treatment (one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care) even though provided by a physician or registered professional personnel.

ESTABLISHMENT: A single physical location where business is conducted or where services or industrial operations are performed. (For example: a factory, mill, store, hotel, restaurant, movie theater, farm, ranch, bank, sales office, warehouse, or central administrative office.) Where distinctly separate activities are performed at a single physical location (such as contract construction activities operated from the same physical location as a lumber yard), each activity shall be treated as a separate establishment.

For firms engaged in activities such as agriculture, construction, transportation, communications, and electric, gas and sanitary services, which may be physically dispersed, records may be maintained at a place to which employees report each day.

Records for personnel who do not primarily report or work at a single establishment, such as traveling salesmen, technicians, engineers, etc., shall be maintained at the location from which they are paid or the base from which personnel operate to carry out their activities.

WORK ENVIRONMENT is comprised of the physical location, equipment, materials processed or used, and the kinds of operations performed by an employee in the performance of his work, whether on or off the employer's premises.

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The following listing gives the categories of occupational illnesses and disorders that will be utilized for the purpose of classifying recordable illnesses. The identifying codes are those to be used in Column 7 of the log. For purposes of information, examples of each category are given. These are typical examples, however, and are not to be considered to be the complete listing of the types of illnesses and disorders that are to be counted under each category.

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Examples: Silicosis, asbestosis, coal worker's pneumoconiosis, byssinosis, and other pneumoconioses.

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Examples: Pneumonitis, pharyngitis, rhinitis or acute congestion due to chemicals, dusts, gases, or fumes; farmer's lung; etc.

(24) Poisoning (Systemic Effects of Toxic Materials)
Examples: Poisoning by lead, mercury, cadmium, arsenic, or other metals, poisoning by carbon monoxide, hydrogen sulfide or other gases; poisoning by benzol, carbon tetrachloride, or other organic solvents; poisoning by insecticide sprays such as parathion, lead arsenate; poisoning by other chemicals such as formaldehyde, plastics and resins, etc.

(25) Disorders Due to Physical Agents (Other Than Toxic Materials)
Example: Heatstroke, sunstroke, heat exhaustion and other effects of environmental heat; freezing, frostbite and effects of exposure to low temperatures; caisson disease; effects of ionizing radiation (isotopes, X-rays, radium); effects of noniozing radiation (welding flash, ultraviolet rays, microwaves, sunburn), etc.

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2) LOST WORKDAYS CASES, other than fatalities that result in lost workdays; or
3) NONFATAL CASES WITHOUT LOST WORKDAYS, which result in transfer to another job or termination of employment, or require medical treatment (as defined below), or involve loss of consciousness or restriction of work or motion. This category also includes any diagnosed occupational illnesses which are reported to the employer but are not classified as fatalities or lost workday cases.

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ESTABLISHMENT: A single physical location where business is conducted or where services or industrial operations are performed. (For example: a factory, mill, store, hotel, restaurant, movie theater, farm, ranch, bank, sales office, warehouse, or central administrative office.) Where distinctly separate activities are performed at a single physical location (such as contract construction activities operated from the same physical location as a lumber yard), each activity shall be treated as a separate establishment.

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Records for personnel who do not primarily report or work at a single establishment, such as traveling salesmen, technicians, engineers, etc., shall be maintained at the location from which they are paid or the base from which personnel operate to carry out their activities.

WORK ENVIRONMENT is comprised of the physical location, equipment, materials processed or used, and the kinds of operations performed by an employee in the performance of his work, whether on or off the employer's premises.

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Employers:

This centerpiece is the poster which must be displayed in a prominent place in the establishment to which your employees normally report to work.

To avoid tearing it, remove the staples carefully.

SAFETY AND HEALTH PROTECTION ON THE JOB

The Williams-Steiger Occupational Safety and Health Act of 1970 provides job safety and health protection for workers. The purpose of the Federal law is to assure safe and healthful working conditions throughout the Nation.

The U.S. Department of Labor has primary responsibility for administering the Act. The Department issues job safety and health standards, and employers and employees are required to comply with these standards.

BY LAW: SAFETY ON THE JOB IS EVERYBODY'S RESPONSIBILITY!

EMPLOYERS: The Williams-Steiger Act requires that each employer furnish his employees a place of employment free from recognized hazards that might cause serious injury or death; and the Act further requires that employers comply with the specific safety and health standards issued by the Department of Labor.

EMPLOYEES: The Williams-Steiger Act also requires that each employee comply with safety and health standards, rules, regulations, and orders issued under the Act and applicable to his conduct.

COMPLIANCE WITH SAFETY AND HEALTH REQUIREMENTS

To ensure compliance with safety and health requirements, the U.S. Department of Labor conducts periodic job-site inspections. The inspections are conducted by trained safety and health compliance officers. The law requires that an authorized representative of the *employer and a representative of the workers be given an opportunity to accompany the inspector for the purpose of aiding the inspection.* Workers also have the right *to notify* the Department of Labor *and request an inspection* if they believe that unsafe and unhealthful conditions exist at their worksite. In addition, employees have the right to bring unsafe conditions to the attention of the safety and health compliance officer making the inspection. If upon inspection the Department of Labor believes that the Act has been violated, *a citation of violation and a proposed penalty is issued to the employer.*

Citations of violation issued by the Department of Labor must be prominently dis-

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Citations of violation issued by the Department of Labor must be prominently displayed at or near the place of violation.

The Act provides for *mandatory* penalties of up to $1,000 for each serious violation and for *optional* penalties of up to $1,000 for each non-serious violation. Penalties of up to $1,000 are required for each day during which an employer fails to correct a violation within the period set in the citation. Also, any employer who willfully or repeatedly violates the Act is to be assessed civil penalties of not more than $10,000 for each violation.

Criminal penalties are also provided for in the Act. Any willful violation resulting in death of an employee, upon conviction, is punishable by a fine of not more than $10,000 or by imprisonment for not more than six months, or by both. Conviction of an employer after a first conviction doubles these maximum penalties.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or otherwise exercising their rights under the Act.

For assistance and information, including copies of the Act and of specific safety and health standards, contact the employer or the nearest office of the Department of Labor.

J D Hodgson
Secretary of Labor

OSHA No. 101
Case or File No __________

Form approved
OMB No. 44R 1453

Supplementary Record of Occupational Injuries and Illnesses

EMPLOYER
1. Name __________
2. Mail address __________
(No. and street) (City or town) (State)
3. Location, if different from mail address __________

INJURED OR ILL EMPLOYEE
4. Name __________ Social Security No. __________
(First name) (Middle name) (Last name)
5. Home address __________
(No. and street) (City or town) (State)
6. Age __________ 7. Sex: Male__________ Female__________ (Check one)
8. Occupation __________
(Enter regular job title, *not* the specific activity he was performing at time of injury.)
9. Department __________
(Enter name of department or division in which the injured person is regularly employed, even though he may have been temporarily working in another department at the time of injury.)

THE ACCIDENT OR EXPOSURE TO OCCUPATIONAL ILLNESS
10. Place of accident or exposure __________
(No. and street) (City or town) (State)
If accident or exposure occurred on employer's premises, give address of plant or establishment in which it occurred. Do not indicate department or division within the plant or establishment. If accident occurred outside employer's premises at an identifiable address, give that address. If it occurred on a public highway or at any other place which cannot be identified by number and street, please provide place references locating the place of injury as accurately as possible.
11. Was place of accident or exposure on employer's premises? __________ (Yes or No)
12. What was the employee doing when injured? __________
(Be specific. If he was using tools or equipment or handling material, name them and tell what he was doing with them.)
____
13. How did the accident occur? __________
(Describe fully the events which resulted in the injury or occupational illness. Tell what happened and how it happened. Name any objects or substances involved and tell how they were involved. Give full details on all factors which led or contributed to the accident. Use separate sheet for additional space.)

OCCUPATIONAL INJURY OR OCCUPATIONAL ILLNESS
14. Describe the injury or illness in detail and indicate the part of body affected. __________
(e.g.: amputation of right index finger at second joint; fracture of ribs; lead poisoning; dermatitis of left hand, etc.)
15. Name the object or substance which directly injured the employee. (For example, the machine or thing he struck against or which struck him; the vapor or poison he inhaled or swallowed; the chemical or radiation which irritated his skin; or in cases of strains, hernias, etc., the thing he was lifting, pulling, etc.)
____
____
16. Date of injury or initial diagnosis of occupational illness __________
(Date)
17. Did employee die? __________ (Yes or No)

OTHER
18. Name and address of physician __________
19. If hospitalized, name and address of hospital __________
____

Date of report __________ Prepared by __________
Official position __________

SUPPLEMENTARY RECORD OF OCCUPATIONAL INJURIES AND ILLNESSES

To supplement the Log of Occupational Injuries and Illnesses (OSHA No. 100), each establishment must maintain a record of each recordable occupational injury or illness. Workmen's compensation, insurance, or other reports are acceptable as records if they contain all facts listed below or are supplemented to do so. If no suitable report is made for other purposes, this form (OSHA No. 101) may be used or the necessary facts can be listed on a separate plain sheet of paper. These records must also be available in the establishment without delay and at reasonable times for examination by representatives of the Department of Labor and the Department of Health, Education and Welfare, and States accorded jurisdiction under the Act. The records must be maintained for a period of not less than five years following the end of the calendar year to which they relate.

Such records must contain at least the following facts:

1) *About the employer*—name, mail address, and location if different from mail address.

2) *About the injured or ill employee*—name, social security number, home address, age, sex, occupation, and department.

3) *About the accident or exposure to occupational illness*—place of accident or exposure, whether it was on employer's premises, what the employee was doing when injured, and how the accident occurred.

4) *About the occupational injury or illness*—description of the injury or illness, including part of body affected; name of the object or substance which directly injured the employee; and date of injury or diagnosis of illness.

5) *Other*—name and address of physician; if hospitalized, name and address of hospital; date of report; and name and position of person preparing the report.

SEE *DEFINITIONS* ON THE BACK OF OSHA FORM 100.

OSHA No. 101
Case or File No. ___________

Form approved
OMB No. 44R 1453

Supplementary Record of Occupational Injuries and Illnesses

EMPLOYER

1. Name ______________________________
2. Mail address ______________________________
(No. and street) (City or town) (State)
3. Location, if different from mail address ______________________________

INJURED OR ILL EMPLOYEE

4. Name ______________________________ Social Security No. ______________
(First name) (Middle name) (Last name)
5. Home address ______________________________
(No. and street) (City or town) (State)
6. Age ____________ 7. Sex: Male__________ Female__________ (Check one)
8. Occupation ______________________________
(Enter regular job title, *not* the specific activity he was performing at time of injury.)
9. Department ______________________________
(Enter name of department or division in which the injured person is regularly employed, even though he may have been temporarily working in another department at the time of injury.)

THE ACCIDENT OR EXPOSURE TO OCCUPATIONAL ILLNESS

10. Place of accident or exposure ______________________________
(No. and street) (City or town) (State)

If accident or exposure occurred on employer's premises, give address of plant or establishment in which it occurred. Do not indicate department or division within the plant or establishment. If accident occurred outside employer's premises at an identifiable address, give that address. If it occurred on a public highway or at any other place which cannot be identified by number and street, please provide place references locating the place of injury as accurately as possible.

11. Was place of accident or exposure on employer's premises? ____________ (Yes or No)
12. What was the employee doing when injured? ______________________________
(Be specific. If he was using tools or equipment or handling material, ______________________________ name them and tell what he was doing with them.) ______________________________
13. How did the accident occur? ______________________________
(Describe fully the events which resulted in the injury or occupational illness. Tell what ______________________________ happened and how it happened. Name any objects or substances involved and tell how they were involved. Give ______________________________ full details on all factors which led or contributed to the accident. Use separate sheet for additional space.)

OCCUPATIONAL INJURY OR OCCUPATIONAL ILLNESS

14. Describe the injury or illness in detail and indicate the part of body affected. ________________
(e.g.: amputation of right index finger ______________________________ at second joint; fracture of ribs; lead poisoning; dermatitis of left hand, etc.)
15. Name the object or substance which directly injured the employee. (For example, the machine or thing he struck against or which struck him; the vapor or poison he inhaled or swallowed; the chemical or radiation which irritated his skin; or in cases of strains, hernias, etc., the thing he was lifting, pulling, etc.)
____
____
16. Date of injury or initial diagnosis of occupational illness ______________________________
(Date)
17. Did employee die? __________ (Yes or No)

OTHER

18. Name and address of physician ______________________________
19. If hospitalized, name and address of hospital ______________________________

____

Date of report ______________ Prepared by ______________________________
Official position ______________________

SUPPLEMENTARY RECORD OF OCCUPATIONAL INJURIES AND ILLNESSES

To supplement the Log of Occupational Injuries and Illnesses (OSHA No. 100), each establishment must maintain a record of each recordable occupational injury or illness. Workmen's compensation, insurance, or other reports are acceptable as records if they contain all facts listed below or are supplemented to do so. If no suitable report is made for other purposes, this form (OSHA No. 101) may be used or the necessary facts can be listed on a separate plain sheet of paper. These records must also be available in the establishment without delay and at reasonable times for examination by representatives of the Department of Labor and the Department of Health, Education and Welfare, and States accorded jurisdiction under the Act. The records must be maintained for a period of not less than five years following the end of the calendar year to which they relate.

Such records must contain at least the following facts:

1) *About the employer*—name, mail address, and location if different from mail address.

2) *About the injured or ill employee*—name, social security number, home address, age, sex, occupation, and department.

3) *About the accident or exposure to occupational illness*—place of accident or exposure, whether it was on employer's premises, what the employee was doing when injured, and how the accident occurred.

4) *About the occupational injury or illness*—description of the injury or illness, including part of body affected; name of the object or substance which directly injured the employee; and date of injury or diagnosis of illness.

5) *Other*—name and address of physician; if hospitalized, name and address of hospital; date of report; and name and position of person preparing the report.

SEE *DEFINITIONS* ON THE BACK OF OSHA FORM 100.

OSHA No. 102

Form Approved
OMB No. 44R 1453

Summary

Occupational Injuries and Illnesses

Establishment Name and Address:

Injury and Illness Category		Fatalities	Lost Workday Cases			Nonfatal Cases Without Lost Workdays*	
Code 1	Category 2	3	Number of Cases 4	Number of Cases Involving Permanent Transfer to Another Job or Termination of Employment 5	Number of Lost Workdays 6	Number of Cases 7	Number of Cases Involving Transfer to Another Job or Termination of Employment 8
10	Occupational Injuries						
	Occupational Illnesses						
21	Occupational Skin Diseases or Disorders						
22	Dust diseases of the lungs (pneumoconioses)						
23	Respiratory conditions due to toxic agents						
24	Poisoning (systemic effects of toxic materials)						
25	Disorders due to physical agents (other than toxic materials)						
26	Disorders due to repeated trauma						
29	All other occupational illnesses						
	Total—occupational illnesses (21-29)						
	Total—occupational injuries and illnesses						

*Nonfatal Cases Without Lost Workdays—Cases resulting in: Medical treatment beyond first aid, diagnosis of occupational illness, loss of consciousness, restriction of work or motion, or transfer to another job (without lost workdays).

Summary
Occupational Injuries and Illnesses

Every employer is required to prepare a summary of the occupational injury and illness experience of the employees in each of his establishments at the end of each year within one month following the end of that year. The summary must be posted in a place accessible to the employees. The form on the reverse of this sheet is to be used.

Before preparing the summary, review the log to be sure that entries are correct and each case is included in only one of the classes identified by columns 8, 9, and 11. If an employee's loss of work days is continuing at the time the summary is being made, estimate the number of future work days he will lose and add that estimate to the work days he has already lost and include this total in the summary. No further entries need be made with respect to such cases in the next summary.

Occupational injuries and the seven categories of occupational illness are to be summarized separately. Identify each case by the code in column 7 of the log of occupational injuries and illnesses.

The summary from the log is made as follows (for occupational injuries, code 10—follow the same procedure for each of the illness categories):

Fatalities. For cases with code 10 in column 7, count the number of entries (date of death) in column 8.

Lost Workday Cases, Number of Cases. For cases with code 10 in column 7, count the number of *entries* in column 9.

Number of Cases Involving Transfer or Termination. For cases with code 10 in column 7, count the number of check marks in column 10.

Number of Lost Workdays. For cases with code 10 in column 7, *add* the entries (lost workdays) in column 9.

Nonfatal Cases Without Lost Workdays, Number of Cases. For cases with code 10 in column 7, count the checks in column 11.

Number of Cases Involving Transfer or Termination. For cases with code 10 in column 7, count the checks in column 12.

Total each column for occupational illnesses and then, on the last line for occupational injuries and illnesses combined.

Compare the sum of entries in the total line for columns 3, 4, and 7 with the total number of cases on the log. If the summary has been made correctly, they will match.

U.S. DEPARTMENT OF LABOR | WASHINGTON, D.C. | JULY 1972

OSHA RECORDKEEPING ADDENDUM NUMBER 2

To the Employer:

Coverage under the Occupational Safety and Health Act of 1970 has been clarified.

You can avoid common errors in keeping OSHA records.

There are changes in OSHA recordkeeping rules not covered in the booklet or on the forms.

Details are given below:

The Federal Register of January 21, 1972, contained a clarification on coverage of employers under the Occupational Safety and Health Act of 1970. In general, this regulation states that any employer employing one or more employees would be an "employer engaged in a business affecting commerce" and is covered by the Act. The only exclusions: Household domestics and farm family workers are not considered to be covered under the Act's definition of employees. Church and religious employees are not covered when directly engaged in the performance of religious services. Specifically named as covered: Employees of the professions (physicians, attorneys, etc.), agricultural workers except family members, employees of Indian groups, employees of nonprofit and charitable organizations, and employees of churches and religious groups except as noted above.

These reminders should help you avoid common errors in keeping OSHA records:

*OSHA 100. 1) In column 7, use code 10 for injuries. Codes 21-29 are for illnesses. 2) Cases without lost workdays are checked in column 11. No entries for these are made in columns 8 or 9. 3) Lost workdays are whole numbers, not fractions. Count partial days as whole lost workdays. 4) First aid cases are not recordable, even though a doctor gives the first aid.

*OSHA 101. 1) Describe fully the events that led to the injury or illness (not just "fell down"). 2) Describe fully the injury or illness (not just "cut hand").

*OSHA 102. 1) Enter the establishment name and the year covered. 2) Sign the summary or attach a certification. (See the other column of this addendum.)

*OSHA 100, 101 AND 102 ARE RECORDKEEPING FORMS, NOT REPORTING FORMS. If your establishment is selected for the annual survey, you will be mailed a report form and instructions.

Modifications of Part 1904, Title 29, of the Code of Federal Regulations dealing with the OSHA recordkeeping system were published in the January 18, 1972, Federal Register. The major changes:

*Any employer may maintain the log (OSHA 100) at a place other than the establishment and/or by means of data processing equipment, if

a) there is available at the place where the log is maintained sufficient information to complete the log to a date within 6 working days after receiving information that a recordable case has occurred; and

b) at each establishment there is available a copy of the log which reflects separately the injury and illness experience of that establishment complete and current to a date within 45 calendar days.

*The employer must have available for inspection at each establishment within 6 working days after receiving information that a recordable case has occurred, a supplementary record (OSHA 101 or its equivalent) for each occupational injury or illness for that establishment.

*The annual summary (OSHA 102) must be posted by February 1 of the following year and remain in place for 30 consecutive calendar days thereafter. (This is interpreted to mean that the summary must remain in place until March 1.)

*The employer or the employee who supervises preparation of the summary must certify that it is true and complete by signing in the lower right corner or appending a certification.

*Individual entries on the log no longer need to be initialed.

In addition, employers must report to their Area Office of the Occupational Safety and Health Administration within 48 hours each accident or health hazard that results in one or more fatalities or hospitalization of five or more employees.

REQUEST FOR ADDITIONAL FORMS

The regulations under the Occupational Safety and Health Act require that records be maintained in each establishment. Firms with multiple establishments may need additional copies of this booklet or forms; if so, please indicate number needed on the form below.

Number
Needed

--------------Recordkeeping Booklets

Individual Forms May be Ordered Separately

--------------Log of Occupational Injuries and Illnesses
(OSHA Form 100)

--------------Supplementary Record of Occupational Injuries and Illnesses
(OSHA Form 101)

--------------Summary, Occupational Injuries and Illnesses
(OSHA Form 102)

--------------Poster: Safety and Health Protection on the Job

Please send this order to the Regional Office for your area. See inside back cover for address. Complete reverse side of this form for a return mailing label.

Cut on Line

REQUEST FOR ADDITIONAL FORMS

The regulations under the Occupational Safety and Health Act require that records be maintained in each establishment. Firms with multiple establishments may need additional copies of this booklet or forms; if so, please indicate number needed on the form below.

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(OSHA Form 102)

--------------Poster: Safety and Health Protection on the Job

Please send this order to the Regional Office for your area. See inside back cover for address. Complete rse side of this form for a return mailing label.

Name ____

Firm ____

Address ______________________________________

City, State and Zip ________________________________

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Name ____

Firm ____

Address ______________________________________

City, State and Zip ________________________________

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REGIONAL OFFICES

REGION 1—Boston
Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

REGION 2—New York
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New York
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Kentucky
Mississippi
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South Carolina
Tennessee

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OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGIONAL OFFICES

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Donald A. Mackenzie
John F. Kennedy Federal Bldg.
Government Center 1700-C
Boston, Massachusetts 02203
617—233-6712

REGION 2—New York
Joseph G. Barkan
341 Ninth Avenue
Room 920
New York, New York 10001
212—971-5754

REGION 3—Philadelphia
Joseph Perzella
Penn Square Building
Room 410
Juniper and Filbert Streets
Philadelphia, Penna. 19107
215—597-4102

REGION 4—Atlanta
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Room 311, 1371 Peachtree St., N.
Atlanta, Georgia 30309
404—526-3573

REGION 5—Chicago
Edward E. Estkowski
848 Federal Office Building
219 South Dearborn Street
Chicago, Illinois 60604
312—353-4716

REGION 6—Dallas
John Barto
Room 730-C, Mayflower Building
411 North Akard Street
Dallas, Texas 75201
214—749-2477

REGION 7—Kansas City
Joseph Reidinger
1906 Federal Office Bldg.
911 Walnut Street
Kansas City, Missouri 64106
816—374-5249

REGION 8—Denver
Howard J. Schulte
Denver Federal Center, Rm. 21-S, Bldg. 53
Kipling & 6th Avenue
Denver, Colorado 80225
303—233-6187

REGION 9—San Francisco
Warren Fuller
10353 Federal Building
450 Golden Gate Avenue
Box 36017
San Francisco, California 94102
415—556-0584

REGION 10—Seattle
Marl Chain Robbins
1804 Smith Tower Bldg.
506 Second Avenue
Seattle, Washington 98104
206—442-5930

BUREAU OF LABOR STATISTICS
REGIONAL OFFICES

REGION 1—Boston
Mr. Wendell D. Macdonald
Regional Director
1603-A Federal Office Building
Boston, Massachusetts 02203
Phone: 617—223-4541

REGION 2—New York
Mr. Herbert Bienstock
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341 Ninth Avenue
New York, New York 10001
Phone: 212—971-5915

REGION 3—Philadelphia
Mr. Frederick W. Mueller
Regional Director
Penn Square Building, Room 406
1317 Filbert Street
Philadelphia, Pennsylvania 19107
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REGION 4—Atlanta
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1317 Peachtree Street NE.
Atlanta, Georgia 30309
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219 S. Dearborn Street
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Regional Director
1100 Commerce St., Rm. 6B7
Dallas, Texas 75202
Phone: 214—749-1781

REGIONS 7 and 8—Kansas City and Denver
Mr. Elliott A. Browar
Regional Director
Federal Office Building
911 Walnut Street
Kansas City, Missouri 64106
Phone: 816—374-3685

REGIONS 9 and 10—San Francisco and Seattle
Mr. Charles A. Roumasset
Regional Director
450 Golden Gate Avenue
Box 36017
San Francisco, California 94102
Phone: 415—556-8980

U.S. GOVERNMENT PRINTING OFFICE : 1971 O - 429-570

VT 016 761
VERMONT PERIODIC INSPECTION MANUAL.

VERMONT STATE DEPT. OF MOTOR VEHICLES,
MONTPELIER. DIV. OF INSPECTION.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - ND 49P.

DESCRIPTORS - *MANUALS; *INSPECTION;
*VEHICULAR TRAFFIC; *STATE STANDARDS;
EQUIPMENT STANDARDS; FACILITY REQUIREMENTS;
*STATE AGENCIES
IDENTIFIERS - INSPECTION STATION OPERATORS

ABSTRACT - THIS MANUAL CONTAINS BASIC INFORMATION FOR AND ABOUT INSPECTION STATION OPERATORS IN THE STATE OF VERMONT. PROCEDURES FOR THE ESTABLISHMENT OF SUCH STATIONS AS WELL AS REQUIREMENTS FOR OBTAINING A LICENSE TO MAN THEM ARE EXPLAINED IN ONE OF THE FOLLOWING TOPICS: (1) VERMONT LAW REGARDING MOTOR VEHICLE INSPECTION, (2) REQUIREMENTS FOR APPOINTMENT: SPECIFICATIONS, (3) GENERAL PROVISIONS, (4) DETAILED INSTRUCTIONS: PROCEDURES, REQUIREMENTS, ETC., AND (5) CHANGE IN INSPECTION MECHANICS' REQUIREMENTS FOR CERTIFICATION. INCLUDED AS SUPPLEMENTS ARE A STATE MAP AND ILLUSTRATIONS DEPICTING SOME OF THE CONCEPTS PRESENTED. (SN)

TO INSPECTION STATION OPERATOR:

THE PROCEDURE OUTLINED HEREIN SHOULD BE CAREFULLY STUDIED AND FREQUENTLY REVIEWED BY YOUR ENTIRE ORGANIZATION. BE THOROUGHLY FAMILIAR WITH ALL THE PROVISIONS, REGULATIONS AND LAWS CONTAINED HEREIN, AS FULL COMPLIANCE WILL BE REQUIRED BY ALL CONCERNED.

FAILURE TO COMPLY WITH ALL THE PROVISIONS, REGULATIONS AND LAWS PERTAINING TO MOTOR VEHICLE INSPECTION MAY RESULT IN SUSPENSION OF INSPECTION STATION APPOINTMENT AND/OR MECHANIC'S INSPECTION CERTIFICATE.

IT IS THE RESPONSIBILITY OF THE STATION OWNERS AND/OR OPERATORS TO MAINTAIN THIS MANUAL IN AN UP-TO-DATE MANNER AT ALL TIMES FOR THE USE OF APPROVED INSPECTION PERSONNEL. EXAMINE ALL CORRESPONDENCE IMMEDIATELY, UPON ARRIVAL FROM THIS DEPARTMENT, AS THIS IS OUR PRIME METHOD OF KEEPING YOU INFORMED OF IMPORTANT CHANGES OR ADDITIONS TO THE REGULATIONS.

STATION NUMBERS SHOULD BE PLACED ON ALL CORRESPONDENCE PERTAINING TO INSPECTION STATIONS AND SUCH COMMUNICATIONS SHOULD BE ADDRESSED TO:

DEPARTMENT OF MOTOR VEHICLES
INSPECTION DIVISION
MONTPELIER, VERMONT 05602

VERMONT OFFICIAL PERIODIC INSPECTION MANUAL

EFFECTIVE APRIL 1, 1968

4178

Any inspection station requesting information relative to station appointments, inspection procedures and regulationa and all matters pertaining to the inspection program, may obtain such information by contacting the following personnel by letter or by telephone between the hours of 8:00 A.M. and 4:30 P.M. on Monday's through Friday's:

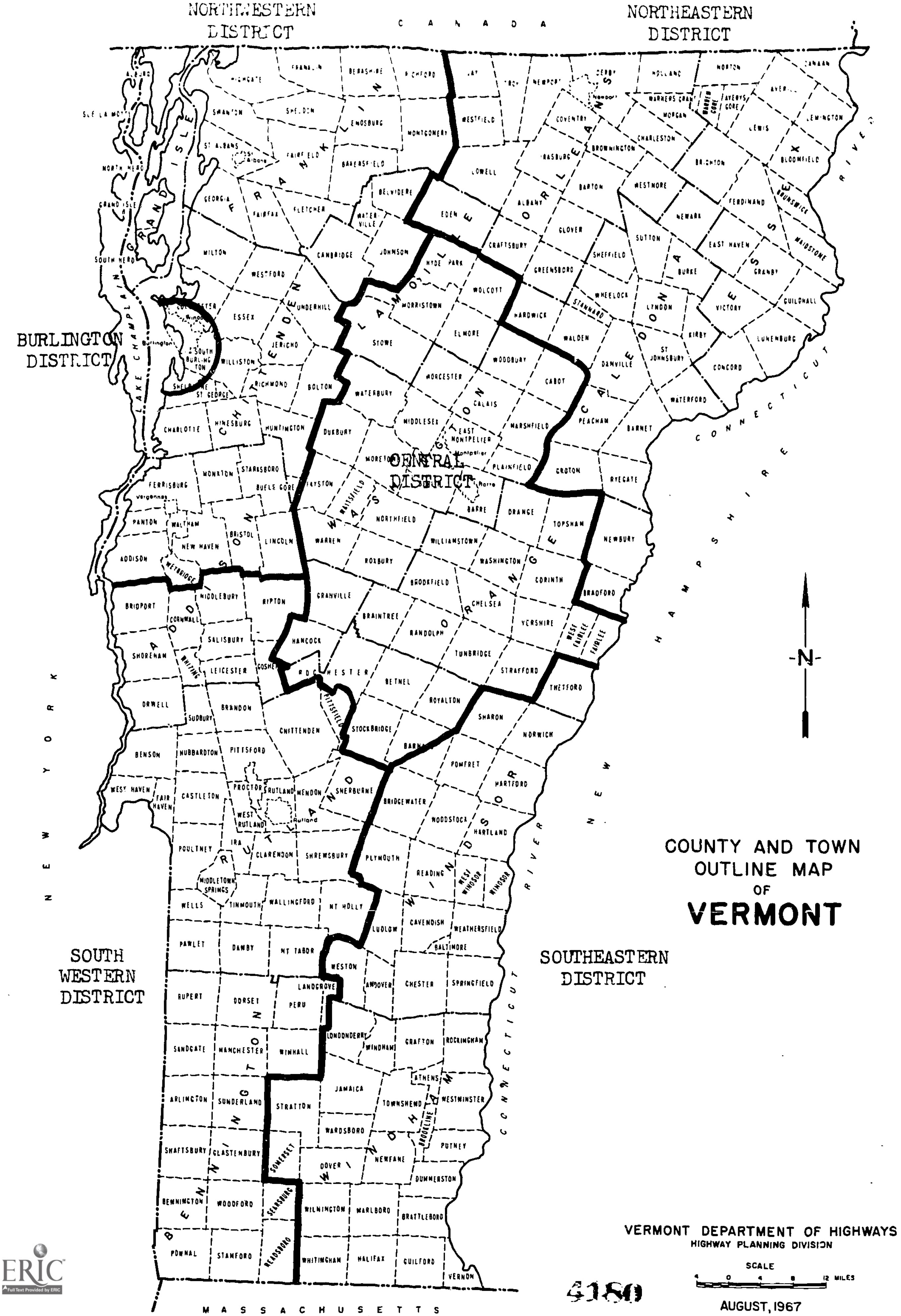
Donald C. Dolliver - Chief Inspector
Ernest D. Mathews - Asst. Chief Inspector
Clara Sole - Inspection Clerk

Dept. of Motor Vehicl
Inspection Division
Montpelier, Vt. 0560

Telephone 223-2311
Extension 501

Listed below, <u>for emergency use only</u> are the names, addresses and telephone numbers of Motor Vehicle District Inspectors and the areas which they supervise. District Inspectors may be contacted by telephone on Mondays through Fridays prior to 8:00 A.M. and after 5:30 P.M.

Inspector O.V. George Star Route St. Johnsbury, Vt. Telephone 748-3298	Northeastern Area of Vermont
Inspector Harold Carroll P.O. Box # 97 No. Springfield, Vt. Telephone 886-2479	Southeastern Area of Vermont
Inspector Norman Emmons P.O. Box 232 Rutland, Vt. Telephone 775-4401	Southwestern Area of Vermont
Inspector L.G. Ferguson 183 Hickok Street Winooski, Vt. Telephone 863-5268	Greater Burlington Area of Vermont (including Winooski, Essex Jct. and South Burlington)
Inspector Harold Cone 129 Iroquois Avenue Essex Jct., Vt. Telephone 878-5563	Northwestern Area of Vermont
Inspector Raymond Blow East Montpelier, Vt. Telephone 223-6510	Central Area of Vermont



COUNTY AND TOWN OUTLINE MAP OF VERMONT

VERMONT DEPARTMENT OF HIGHWAYS
HIGHWAY PLANNING DIVISION

AUGUST, 1967

4180

VERMONT LAW REGARDING MOTOR VEHICLE INSPECTION:

T. 23 V.S.A. SECTION 1222

All motor vehicles, trailers and semi-trailers registered in the state shall be periodically inspected during the months of May and October in each year at garages or qualified service station, designated by the Commissioner as inspection stations, for the purpose of determining whether they are properly equipped and maintained in good mechanical condition. Effective July 1, 1967 all motor vehicles must be inspected within 15 days from the date of registration, by an authorized inspection station. The charges for such inspection made by garages designated to conduct periodic inspections shall be subject to the approval of the Commissioner of Motor Vehicles, and the charges made for such inspection shall be credited toward charges made for necessary repairs, provided the cost for repairs exceeds the minimum inspection fee. The Commissioner may suspend the registration of any motor vehicle until the owner thereof complies with the requirements of such inspection. A person who violates a provision of this section shall be fined not more than $100.00 or imprisoned not more than thirty days, or both.

SECTION 1223. - Prohibitions

An owner of a motor vehicle shall not affix or cause to be affixed thereto a certification of inspection that was not assigned by an official inspection station to such motor vehicle. A person shall not knowingly operate a motor vehicle to which a certification of inspection is affixed if the certification of inspection was not assigned by an official inspection station to that vehicle.

GENERAL INFORMATION:

1. <u>Inspection of registered vehicles</u>:

Every motor vehicle registered in this state shall be inspected by a certified inspection mechanic, at a station designated as an Official Inspection Station by the Commissioner of Motor Vehicles; and if found to be unsafe or unfit for operation, or improperly equipped, it must be put in a safe condition and properly equipped before an official sticker is <u>placed on the windshield</u>, or an official inspection seal is <u>attached to the left side of the rear number plate bracket</u>.

2. <u>Motor Vehicles registered out-of-state</u>:

If a non-resident temporarily in the State of Vermont presents his motor vehicle with out-of-state plates on it for inspection, you may inspect the same and attach a sticker or seal if the vehicle meets our inspection requirements.

3. Where can repairs be made:

It must be understood that any motor vehicle owner is free to select his own Official Inspection Station, AND IS NOT OBLIGED TO HAVE NEEDED WORK DONE AT THE STATION WHERE THE INSPECTION WAS MADE UNLESS HE SO DESIRES.

4. Inspection of Vehicles for Sale--Owner Certificate

Effective September 1, 1967, owner certificates, each bearing a distinguishing number, shall be issued only to registered Vermont motor vehicle dealers requesting same at no fee. The front of such certificate shall be orange in color with black lettering, and such certificate shall be triangular in shape. The back of such certificate shall require make and serial number of the vehicle acquired, registered dealer number and the date such vehicle is acquired. Owner certificates shall be attached to the inside lower right corner of the windshield of a motor vehicle owned by the dealer. The back of all owner certificates shall be correctly filled out in ink or ball-point pen before attaching such certificate to any motor vehicle owned by the dealer.

A registered Vermont motor vehicle dealer may attach an owner certificate issued to him, to any uninspected motor vehicle owned by him on the date of vehicle acquisition, provided such motor vehicle is in good mechanical condition and properly equipped.

Title 23 (VSA) Section 454 is attached hereto and a permanent part of this bulletin

An uninspected motor vehicle owned by a registered Vermont motor vehicle dealer, while being operated with a valid Vermont motor vehicle dealer number plate assigned to such dealer and provided an owner certificate issued to such dealer is thereon displayed, shall not require an official Vermont inspection sticker to be attached thereto until after five (5) consecutive days from the date such motor vehicle is acquired, as shown on the attached owner certificate, PROVIDED the use of such motor vehicle is in accordance with Title 23 (VSA) Section 454, (1) and (2) only.

An owner certificate shall be void and unauthorized when such motor vehicle is operated in accordance with Title 23 (VSA) Section 454, (3), (4), (5), (A), (B).

TITLE 23 (VSA) SECTION 454

"A motor vehicle owned by a dealer may be operated, while so owned, under the distinguishing number assigned to him as provided in this subchapter, for the following purposes and uses:

Authorized use of owner certificate	(1) For the purpose of testing or adjusting such vehicle in the immediate vicinity of his place of business;
Authorized use of owner certificate	(2) For some purpose directly connected with the business of purchasing, selling or exchanging motor vehicles by such dealer;
UNAUTHORIZED use of owner certificate	(3) For a demonstration when the prospective purchaser is operating such vehicle and is not accompanied by the dealer or his employee, and then only for a period not to exceed three days;
UNAUTHORIZED use of owner certificate	(4) For the temporary accommodation of a customer of the dealer when a motor vehicle properly registered under the law of this state of the customer, because of accident or wear, is disabled and is left with the dealer for repairs and then only for a period not exceeding seven days;
UNAUTHORIZED use of owner certificate	(5) In addition a pleasure car, while so owned, may be operated under the distinguishing number assigned to him;
UNAUTHORIZED use of owner certificate	(A) For the private pleasure or business use of the dealer and members of his immediate family, residing in the same household;
UNAUTHORIZED use of owner certificate	(B) For the use of such vehicles at funerals or in public parades when no charge or rental is made for such use. "

5. Fees for Inspection:

The maximum fee for inspection of a motor vehicle shall not exceed one dollar ($1.00). If the time spent on inspection, adjustments and repairs made on the vehicle exceeds one dollar, based on your hourly charge, then the one dollar fee shall be disregarded and the charge will be on your hourly basis. The hourly rate charged shall be prominently posted and displayed just below the Official Inspection Station Certificate.

6. Reports, Certificates, and Supplies:

Official Certificates, windshield stickers, inspection seals, official display posters and report forms will be furnished by the Department after such appointments have been made, and additional supplies will be forwarded upon request for same.

7. Standard Equipment and "Properly Equipped":

As applied to a motor vehicle shall include: adequate tires, headlamps, tail lamps, lenses, reflectors, brakes, muffler, rear view mirror, windshield wiper, horn, windshield, number plate brackets and if manufactured or assembled after January 1, 1955, directional signals of a type approved by the Commissioner of Motor Vehicles.

All pleasure cars, beginning with the manufacturer's model year of 1964, must be equipped with seat belts or harnesses in the left and right front seats. Belts and attachments must be a type approved by the Commissioner of Motor Vehicles. All pleasure cars, motor trucks and motor busses, beginning with the manufacturer's model year of 1964, must be equipped with an adequate windshield defroster of a type approved by the Commissioner of Motor Vehicles. The Commissioner has ruled that he approves any standard defroster installed by the manufacturer of the vehicle.

8. Report of Rejections

Any Official Inspection Station may report, on the back of a Weekly Report Sheet, any motor vehicle which has been disapproved for inspection. The following information must be listed:

Registration Number____________________
Date Rejected__________________________
Reason for rejection___________________

REQUIREMENTS FOR APPOINTMENT: SPECIFICATIONS

1. Inspection stations are appointed solely for the benefit of the motoring public. Before a certificate of appointment as an Official Inspection Station will be issued, an applicant must have an approved place of business. Recommendation for approval as an Official Inspection Station shall be made by a Motor Vehicle Inspector.

2. All appointments are provisional, and are conditioned on a proper conduct of the work and compliance with Department regulations. Upon approval your certificate of authorization must be prominently displayed under glass or plastic.

3. In accepting appointment, Official Inspection Stations obligate themselves to the following requirements:

   A. Make thorough inspections and affix official inspection stickers or seals only on those vehicles that meet ALL requirements, and then only in the space designated by the Commissioner of Motor Vehicles.

   B. Make weekly reports to the Department of Motor Vehicles on each Monday during April and May and again during September and October. Otherwise, reports must be made monthly on the first Monday of the month. If no vehicles are inspected during the month, simply state so on a postal card.

   C. Return the stubs of each Inspection book as soon as completed.

   D. STICKERS SHOULD BE KEPT UNDER LOCK AND KEY AND IN A SAFE PLACE. THE OPERATOR OF AN INSPECTION STATION SHALL BE RESPONSIBLE FOR THE SAFEKEEPING OF THESE STICKERS. All losses of stickers must be reported at once to the Department of Motor Vehicles.

4. Each Official Inspection Station shall have a minimum of one certified inspection mechanic.

   A. A certified inspection mechanic is defined as follows: A person 18 years of age or older holding a valid Vermont operator's license, with experience in making adjustments and repairs to motor vehicles and a thorough working knowledge of the rules and regulations set forth in the Official Inspection Manual.

   B. A mechanic may be certified only after examination by the Department of Motor Vehicles. If an operator's license is revoked or suspended (for any reason or period of time) the mechanic will cease inspections during the suspension period and shall not be authorized to inspect Motor Vehicles until privileges have been fully restored. The Department of Motor Vehicles, Inspection Division, must be notified of any suspensions involving a certified mechanic, and such mechanic shall return his Inspection Certificate immediately.

C. Owners and/or Operators of Official Inspection Stations may request examination of new employees by contacting the Department of Motor Vehicles, Inspection Division, Montpelier, Vermont.

D. Owners and/or Operators of Official Inspection Stations shall notify the Department of Motor Vehicles upon hiring or releasing any certified inspection mechanic. Information required shall include the mechanic's name and address, and in addition, the mechanic's inspection certificate number. No mechanic shall be authorized to inspect motor vehicles at any Official Inspection Station, until such station has notified the Department of Motor Vehicles of his employment.

E. The use of an uncertified mechanic for inspecting or approving vehicles for inspection is sufficient cause for immediate suspension of the appointment of that Inspection Station.

F. Certified Inspection mechanics are subject to re-examination at any time, by the Department of Motor Vehicles, to determine that they have full knowledge of current Official Inspection Rules and Regulations.

G. A certified inspection mechanic's certificate may be recalled for any infraction or violation of the rules and regulations governing the inspection of vehicles.

5. A company or business may be approved as an Official Fleet Inspection Station, provided they have ten (10) or more motor vehicles registered in the name of the company or business, and meet all requirements for approval as an Official Inspection Station.

6. Space Requirements:

A. Available level space within the garage for inspection and repairs is one of the most important factors in making and continuing appointments. All inspections must be conducted in the approved area, unless specific regulations state otherwise.

B. "Inspection Area" is defined as the designated space approved for inspection purposes. Approval cannot be granted, nor permitted to continue, unless full compliance of the following requirements are maintained.

1. A station using an approved headlamp testing machine or an approved mechanical aimer shall have at least 25 feet of adequate floor within the garage. An adequate floor must not slope other than to the front or rear as the vehicle would set to be inspected. The rate of slope shall be uniform and no greater than 2 inches in 25 feet.

2. Where a standard headlamp testing screen is to be used there must be at least 45 feet of floor space within the garage. The first 25 feet shall be an adequate floor and not slope other than to the front or rear as the vehicle would set to be inspected. The rate of slope shall be uniform and no greater than 2 inches in 25 feet.

3. Floors must be a hard surface of a type approved by the Department of Motor Vehicles.

4. Lifts are permissible. Exception: Drive-on types (hoist which lifts the vehicle by the wheels) are not permitted in the inspection area.

5. A center drain is permitted providing the sloped area does not exceed two (2) feet square.

6. Door tracks cannot be included in the space requirements.

7. An inspection area or bay, equipped with an authorized lift, may use ramps of an approved type within the same inspection area or bay.

C. Any trailer, semi-trailer or trailer coach may be inspected outside of the inspection station's building, and need not be inside the building for inspection purposes.

D. All motor trucks such as truck cranes, trucks with permanently mounted well drilling machines, or any type of motor truck which is not able, due to its height, to enter an inspection station's building, may be inspected outside of the inspection station's building on the station's property, PROVIDED THE STATION'S PROPERTY HAS AN APPROVED AND PROPERLY MARKED LEVEL SURFACE AREA FOR SUCH INSPECTION.

All inspection stations using mechanical type headlight aimers which attach to the headlights, or floor mounted type headlight aimers such as Bear, Bean, etc., will be required to have at least 25 feet of level surface area outside of the building. Inspection stations using a headlight aiming screen will be required to have 45 feet of surface area outside of the building, 20 feet of which must be level.

An exterior adequate level surface may be either concrete or blacktop, and must not slope other than to the front or rear as a vehicle would set to be inspected. The rate of slope must be uniform and no greater than 2 inches in 25 feet.

7. Inspection Stations shall be ready to conduct inspections during normal business hours at any time during the year. This means that the floor area used for inspection must be clean and clear of obstructions; guide lines painted; and all necessary equipment in place and ready for use.

8. All inspection stations with ramps, formerly approved for headlamp aim prior to January 1, 1967, shall be issued a provisional official inspection station certificate. Such station shall have an approved floor (without ramps) as stated in the revised inspection manual by April 1, 1971, or the provisional official inspection station certificate shall be cancelled.

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GENERAL PROVISIONS

1. Any change in name, ownership or in location of any Official Inspection Station cancels the appointment of that station, and the Department of Motor Vehicles, Inspection Department must be <u>notified immediately</u> in writing.

2. Inspection stations upon going out of business shall immediately return to the Department of Motor Vehicles, the certificate of appointment with all unused inspection seals and/or stickers and completed final reports on all inspections.

3. Stations should anticipate the necessity for additional supplies of inspection seals or stickers. If it becomes necessary to request additional seals or stickers, they must be obtained through the Montpelier office by phone or mail.

4. Foreign make motor vehicles must comply with all inspection requirements.

DETAILED INSTRUCTIONS:

1. Serial Number: Re

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DETAILED INSTRUCTIONS: PROCEDURES, REQUIREMENTS, ETC.

1. Serial Number: Registration Certificate.

A. When any part of a serial number, including letters used in the prefix, is incorrect or transposed, the certificate does not properly identify the vehicle and must be corrected. This may be accomplished by having the owner return the original certificate, furnishing the correct serial number and enclosing a fee of fifty (50¢) cents to the Department of Motor Vehicles, Montpelier, Vermont 05602. An official inspection sticker or seal shall not be attached until the owner has obtained such corrected registration certificate. An official inspection station shall, however, be authorized to collect a fee of fifty (50¢) cents from the owner, and forward with the original certificate and the correct serial number to the Department of Motor Vehicles, Montpelier, Vermont 05602. An official inspection sticker or seal may then be attached to the vehicle, provided it meets all other inspection requirements.

B. Whenever a registration certificate has been lost, the owner shall request a duplicate certificate from the Department of Motor Vehicles, Montpelier, Vermont 05602, enclosing a fee of fifty (50¢) cents for such duplicate certificate. An official inspection sticker or seal shall not be attached until the owner has obtained a duplicate certificate. An official inspection station shall, however, be authorized to attach an official inspection sticker or seal to the vehicle, provided it meets all other inspection requirements, and upon compliance with the following procedure:

1. Verification of registration by telephone with the Department of Motor Vehicles, Montpelier, Vermont, and collection from the owner of a fee of fifty (50¢) cents. Request for a duplicate registration together with the fifty (50¢) cent fee, shall be mailed immediately to the Department of Motor Vehicles, Montpelier, Vermont 05602 by the Official Inspection Station.

C. Beginning with the 1964 registration year, all registration certificates for vehicles powered by other than gasoline will be marked "non gasoline". If any vehicle is presented with a certificate not marked "non gasoline" and you find it powered by other than gasoline, inspection must be denied and you must notify immediately the Department of Motor Vehicles, Montpelier, Vermont 05602.

2. Rear View Mirrors:

All motor vehicles other than trailers shall be equipped with a mirror so attached that the operator shall at all times have a reflected view of the highway to the rear of such vehicle. All mirrors must be in good condition and securely mounted so as to maintain adjustment under ordinary conditions of travel.

In addition to the above all motor trucks shall be equipped with a mirror not less than (5) five inches in diameter or a mirror with at least 16 square inches of reflective area.

3. Horns:

Every motor vehicle other than trailers, semi-trailers and trailer coaches, shall have a horn that gives adequate warning. Horn buttons must be located so as to be readily accessible to the driver, and function without the use of excessive pressure.

Audible warning devices of any type other than horns are not permitted except as otherwise specified in this manual.

4. Windshield Wipers & Defrosters:

A. Every motor vehicle except motorcycles, trailers, semi-trailers and trailer coaches, shall have at least one windshield wiper and same shall be on the driver's side. If vehicle was originally equipped with two wipers, both must be in good operating condition. Wiper and/or wipers shall be set in motion during inspection, and shall not be approved unless they are in good condition and function so as to keep the wiped area of windshield clear under ordinary rain or snow conditions.

B. Every 1964 or later model pleasure car, motor truck or motor bus must be equipped with an adequate windshield defroster in proper operating condition.

5. Glass:

A. Clouded windshields are dangerous. No windshield shall be passed when it has:

   1. A clouded area that obstructs the driver's vision.

   2. Any cloudiness along the left edge (viewed from driver's seat.)

   3. Any cracks, checks, stone bruises or other flaws within the wiper area which might materially affect an operator's vision.

B. A clouded strip not to exceed 2" in width is permitted along the top, bottom or right hand edge of the windshield.

C. On a divided windshield, no clouding is permitted along the divider strip.

D. Any glass in doors or windows that has been broken so that a cutting or jagged edge is exposed shall be replaced.

E. All glass replacements shall be SAFETY GLASS if the vehicle was manufactured after 1935. On any vehicle manufactured before 1936, glass replacements shall be of SAFETY GLASS, if the original glass was of that type. Trailer coaches are not required to be equipped with Safety Glass.

Replacement safety glass must meet the American Standards Safety Code for Safety Glazing Materials, and such glass must be so marked.

AS-1 For all Glazing, including windshields
AS-2 For all glazing, except windshields

On 1952 and older model vehicles, glass marked with initials ASWS may be used in any windshield or window. Glass marked AS may be used anywhere except in the windshield. Vehicles after 1952 are marked with AS-1, to be used in any windshield or window, and AS-2 anywhere except in the windshield.

F. Glass in the rear window and the doors of the driving compartment shall be clear enough so that the driver has unobstructed vision of the highway and all objects on it.

G. Material which is used in the rear window of soft top convertibles must be replaced when it becomes scratched, clouded, or deteriorated to such an extent that vision is impaired.

H. Stickers, Posters, Placards, Ornaments, etc. T23, 1050: Obstructing windshield.

"A person shall not paste, stick or paint advertising matter or other things on or over any transparent part of a motor vehicle, except in a space not over four inches high and twelve inches long in the lower right hand corner of the windshield, or in such space as the Commissioner of Motor Vehicles may specify for location of any sticker required by governmental regulation, and further shall not hang any object in back of the windshield of a motor vehicle." The Commissioner rules

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that all periodic inspection stickers shall be placed in the lower right hand corner of the windshield, in the above provided space of not over four inches high and twelve inches long.

Any vehicle displaying a sticker of a governmental agency such as the Interstate Commerce Commission. Public Utilities Commission, Turnpike Authority or military base may display such sticker as required. All other stickers or signs [illegible] on any transparent portion of a motor vehicle not in the space four inches by twelve inches in the lower right hand corner of the windshield must be removed, and also any object hanging in back of the windshield must be removed before attaching the inspection sticker.

This latter provision does not apply to a plastic strip sunshade (not more than three inches wide) placed along the inside top edge of a windshield.

6. Brake Equipment Required:

Every motor vehicle, except a trailer, semi-trailer, or trailer coach, when operated upon a highway shall be equipped with brakes adequate to control the movement of and to stop and hold such vehicle, and except for tractors, shall include two separate means of applying the brakes to at least two wheels.

7. Brake Performance Requirements:

A. Emergency Brake (Commonly referred to as parking or hand brake)

Shall be adequate to hold the vehicle on any grade upon which it is operated, both with the vehicle headed up the hill or down the hill; and shall stop the vehicle within 55 feet from a speed of 20 miles per hour.

B. Pleasure Cars: Reserve travel of the service brake (foot) pedal. In all cases there shall be a reserve between the bottom of the brake pedal and the floor board of the vehicle, when the foot brake is applied, of not less than 25% (¼) of the maximum possible pedal travel. Any vehicle or combination of vehicles (equipped with four wheel brakes) shall stop within its length from a speed of 20 miles per hour. Any vehicle or combination of vehicles (equipped with two wheel brakes) shall stop within 1½ times its length from a speed of 20 miles per hour.

C. Trucks: The service brakes upon any motor truck, truck-tractor or combination of vehicles shall be adequate to stop such vehicle or vehicles when travelling 20 miles per hour within a distance of 30 feet when upon dry asphalt or concrete pavement surface free from loose material where the grade does not exceed one (1) percent.

D. Brake Test, Procedure:

Emergency brakes and service brakes shall be tested for stopping distance on the highway, and not within a building. An Official Inspection Station may conduct off the highway emergency brake and service brake tests provided such station has a concrete or asphalt paved area of sufficient length and required grade to comply with brake testing requirements.

EXCEPTION: Any brake testing instrument, mechanical or otherwise, may be used for the testing of brakes, provided such instrument has been approved for the testing of brakes by the Vermont Department of Motor Vehicles.

8. Hydraulic System

A. Visual Inspection Procedure

1. Check master cylinder for leakage. Also, check fluid level in the reservoir chamber.

2. Inspect wheel cylinder for leaks at connections, bleed screws and dust boots.

3. Inspect hydraulic hoses, tubes and connections for leaks, cracks, chafing and flattened or restricted sections.

B. Causes for rejection:

1. Fluid level in master cylinder reservoir below half-full point.

2. Leak at master cylinder or wheel cylinders.

3. Hydraulic hoses, tubing or connections leaking, chafed, restricted, crimped, cracked or broken.

C. Mechanical Linkage - Visual Inspection

1. Inspect for worn pins and missing or defective cotter pins.

2. Inspect for weak, broken or missing springs and worn cables.

3. Inspect for frozen, rusted or inoperative connections, missing spring clips, and for defective grease retainers.

4. Check pedal shaft and bearings for high friction, wear, and misalignment.

D. Causes for rejection:

1. Mechanical parts missing, broken or badly worn.

2. High friction in pedal and linkage or in brake components.

3. Brake operating levers improperly positioned or misaligned.

E. BRAKE SPECIFICATIONS FOR TRAILERS OR SEMI-TRAILERS, SEE SECTION 22.

F. Brake Fluid Requirements

The Statutes provide that after January 1, 1964 no person may distribute or provide any fluid for use in the hydraulic brake system of a motor vehicle unless it meets the Society of Automotive Engineers Standards of 70 R1 or better and any container must bear a statement of its classification such as SAE 70 R1 or SAE 70 R3.

9. Front Lights:

A. Lighting Requirements:

A motor vehicle, except a motorcycle, shall be equipped with at least 2 lighted headlamps of substantially the same intensity. A motorcycle shall be equipped with at least 1 headlamp. The light from the headlamps of a motor vehicle other than a motorcycle shall render any substantial object on the ground clearly visible at least 150 feet ahead of such vehicle.

The light from the headlamp of a motorcycle shall render any substantial object on the ground clearly visible at least 100 feet ahead of such motorcycle.

All light and/or lamps used and/or mounted on the exterior of a motor vehicle must be approved by the Department of Motor Vehicles for the purpose for which it is intended to be used.

No lights other than standard equipment are permitted on the interior of a vehicle which are visible from the exterior unless authorized by permit. This includes lights in stuffed animals, statues, colored lights, etc.

B. Lamp Inspection Requirements:

Lamp inspection includes the following types of lamps: head, tail, stop, license plate, clearance, signal, marker, fog, parking and back-up.**

Any of the following defects shall be corrected by either repair or replacement.

1. Any bulb in any lamp which fails to function properly.
2. An improperly connected circuit which does not light the proper filaments for the different switch positions.
3. A cracked, broken or missing lens; or a lens that is rotated, upside down, wrong side out, or is otherwise incorrectly installed.
4. A headlamp or fog lamp with dirt or moisture inside.
5. A lamp which is not securely fastened to the vehicle.
6. A lamp showing a beam of color contrary to law or regulations.
7. Any defects in wiring or lighting equipment that would be likely to influence adversely the effectiveness of the lighting performance.
8. Any auxiliary equipment placed on, in or in front of any lamp which is not a part of the original approved equipment.
9. Beam indicator lamps which do not indicate the proper beam to the driver and which do not function properly.
10. Unequal intensity of the illumination from lamps functioning in groups of two or more.
11. All headlamps shall show a clear white light, and no colored headlamp lens shall be permitted.

C. Beam Indicators or Tell-tales:

On all motor vehicles originally designed with a beam indicator or tell-tale as an integral part of the lighting system, and also on all cars not so designed but having installation of headlights other than the original design,

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**NOTE: Fog and back-up lights may also be corrected by removal.

such beam indicators or tell-tales shall be in working order before approval during inspection.

D. Fog and Auxiliary Lamps:

Fog lamps are lamps which may be used with the lower beam headlamps to provide road illumination under conditions of rain, snow, dust, or fog.

Aiming - Symetrical beams shall be aimed straight ahead with the top of the beam 4 inches below the lamp center level at 25 feet.
Asymetrical beams shall be aimed with the left edge of the high intensity zone straight ahead and the top of the beam 2 inches below the level of the lamp center at 25 feet.

Auxiliary lamps are units intended to supplement the lower beam from headlamps, including sealed beam.

Aiming - The left edge of the stray light immediately to the left of the high intensity zone shall be aimed at the vertical line through the lamp center at 25 feet. The top of the high intensity zone shall be aimed at the level of the lamp center at 25 feet, car unloaded.
These units should be turned off when traveling winding roads and in congested areas. They should be wired so that they can be turned on or off only with the lower beam of the regular headlamps.

Not more than two fog or auxiliary lamps shall be permitted on any vehicle.

E. Spot Lamps:

Spot lights are permissible on motor vehicles; no aiming or adjusting required by inspection stations.

Vermont Statute T.23 §1246....When vehicles are approaching each other from opposite directions, spot lights shall not be used except when projecting their rays directly on the ground and at a distance not exceeding thirty feet in front of the vehicle.

F. Parking Lights:

If vehicle was originally equipped with parking lights, same must be in good operating condition.

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March 13, 1970

G. COLORED LIGHTS AND SIREN FOLLOW THESE DIRECTIONS EXACTLY

Commencing July 1, 1968, no motor vehicle shall be operated upon a highway of this state equipped with a siren or colored signal lamp visible from the front of the motor vehicle unless a permit authorizing such equipment, issued by the COMMISSIONER OF MOTOR VEHICLES, is carried in the vehicle.

(1) SIRENS AND/OR BLUE OR BLUE AND WHITE SIGNAL LAMPS FOR ALL LAW ENFORCEMENT VEHICLES.

(2) SIRENS AND/OR RED OR RED AND WHITE SIGNAL LAMPS FOR ALL AMBULANCES, FIRE APPARATUS, VEHICLES OWNED BY VOLUNTEER FIREMEN AND VOLUNTARY RESCUE SQUAD MEMBERS, AND MOTOR VEHICLES USED SOLELY IN RESCUE OPERATIONS.

(3) AMBER SIGNAL LAMPS (NO SIRENS) FOR ALL ROAD MAINTENANCE VEHICLES, SERVICE VEHICLES, WRECKERS AND SNOW REMOVAL EQUIPMENT.

All permits for sirens and/or colored signal lamps shall be checked with the REGISTRATION CERTIFICATE to verify that the vehicle make, year, type and serial number is identical with the motor vehicle being presented for inspection.

For the expiration date of all permits, see sections (1) and (2) as printed on the front center of each permit.

All siren and/or colored signal lamp permits shall be valid only when officially stamped and dated in the upper right corner of such permits.

Permits issued by the commissioner shall be carried in some easily accessible place in the vehicle authorized to use said equipment, and shall be available for inspection during the inspection of vehicles by the certified inspection mechanics of any official inspection station. No inspection sticker may be issued for a vehicle equipped with a siren or colored signal lamp or both, unless a current or valid permit for such siren or colored signal lamp or both is produced for inspection.

NOTHING IN THE ABOVE SECTION shall restrict the lawful use of approved clearance and marker lights on commercial vehicles, or approved amber directional signals on the front or rear of any motor vehicle, or flashing red signal lamps on the front and rear of school buses.

10. Headlamp Aiming and Adjustment Requirements:

All devices used to test the aim of headlamps shall be of a type approved by the Commissioner of Motor Vehicles. This includes mechanical aimers, headlamp testing machines and headlamp testing screens.

A. Preparation for Aiming

Beam aim shall be checked with no passengers in the vehicle. Before checking beam aim, see that all tires are properly inflated; rock the vehicle sideways.

B. Beams should be inspected for focus and aim, either on a standard headlight testing screen at a distance of 25 feet ahead of the headlamps, or a headlamp testing machine or mechanical aimer which gives essentially equivalent results. Multiple beam lamps are always checked for aim when they are on the high or country beam except, sealed beam headlamps with the figure 2 molded into the top of the lens, as described on the following pages, are aimed when on low beam.

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28 May 1968

C. When the screen is used the lamps are aimed straight ahead and with the center of high intensity area two inches below the bulb centers at 25 feet.

D. When a headlight testing machine or mechanical aimer is used, extreme caution should be exercised so that the instructions, furnished by the manufacturer for the proper use thereof, are complied with.

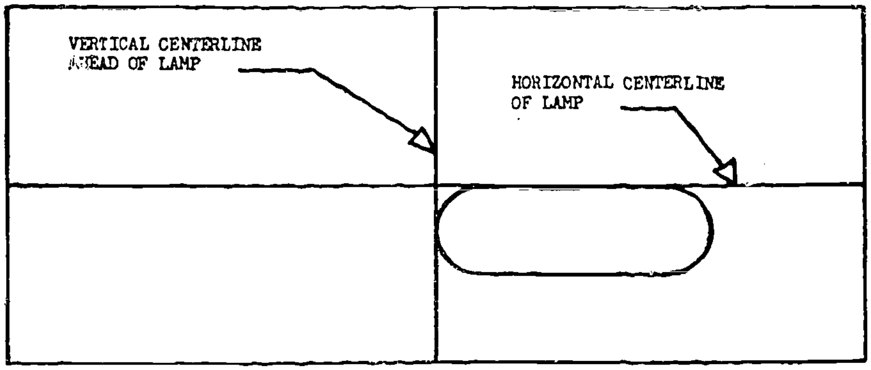
E. In checking dual sealed beam headlamps the department recommends that these lamps be checked for aim by the use of mechanical aimers as the lamps were designed and built with three aiming pads on the face of the lens for that purpose. The aiming must, however, be done in pairs, namely, by mounting the aimers on the No. 1 units and checking their aim and then proceeding to check the No. 2 units in the same manner. The aimer settings are exactly the same with all 5 3/4 inch units, a two inch drop at 25 feet.

When a machine or headlamp aiming screen is used, the following diagram with instructions, outlines the correct procedure for proper aiming. In all cases where the machine or screen is used it will be necessary to cover the No. 2 units while checking the aim of the No. 1 units.

Headlamp testing machines provide a visual screen upon which the beam pattern is shown. When the correct aim is obtained it will appear on the screen exactly as shown in the following two diagrams.

All lamps with a figure 2 appearing on the lens face must be aimed while on LOWER BEAM in the same manner as the 5 3/4 inch type 2 sealed beam units. See diagrams and aim instructions on following page.

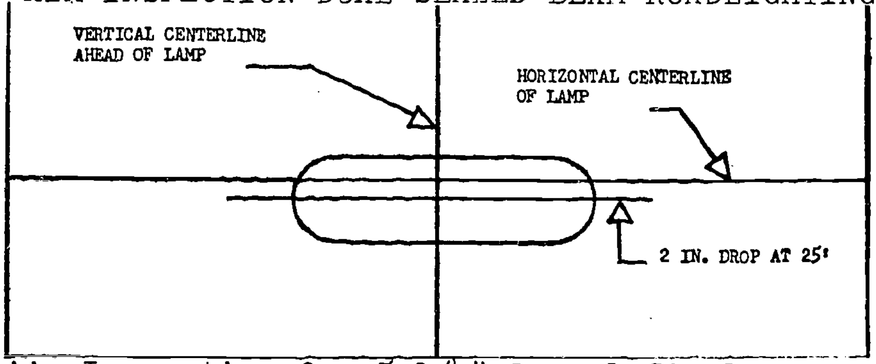
LAMP AIM INSPECTION DUAL SEALED BEAM ROADLIGHTING



Aim Inspection for Lower Beam of 5 3/4" Type Sealed Beam Unit (Top or Outside Unit)

5 3/4" Type 2 two beam units shall be aimed with the top of the high intensity zone of the LOWER BEAM at the level of the lamp centers and the left edge of the high intensity zone straight ahead of lamp centers.

LAMP AIM INSPECTION DUAL SEALED BEAM ROADLIGHTING



Aim Inspection for 5 3/4" Type 1 Single Beam Sealed Beam Unit (Lower or Inside Unit, High Beam Only)

5 3/4" Type 1 single beam units shall be aimed with the geometric center of the high intensity zone 2" below the level of the lamp centers and straight ahead of the lamp centers.

NOTE: The above aiming instructions apply with a 25 ft. distance between the vehicle headlights and the aiming chart.

F. Accurate adjustment of headlights on trucks is difficult unless the vehicle is loaded to the weight limit for which it is registered.

When inspecting headlights for proper adjustment on trucks that are not so loaded, you must adjust and aim the headlights so that the high intensity beam shall be at least five (5) inches below the bulb center at 25 feet.

When inspecting headlights for proper adjustment on light duty pickup trucks, adjust and aim the headlights so that the high intensity beam shall be at least three (3) inches below the bulb center at 25 feet.

11. Stop Lights:

Any stop lights functioning singly or in combination with other lights must be in good condition and function only when the service brake is applied.

A. Rear lights:

The Vermont Law requires one tail lamp on the rear of every motor vehicle. This is in addition to any clearance lamp required because of vehicle width. If the vehicle was originally equipped with dual rear lights, both must function properly.

All rear or tail lamps must have a red lens. The number plate lamp or lamps must be positioned above or at both sides of the rear number plate, and shall show a clear white light in such a manner that the numerals or letters on the number plate can be plainly read at a distance of 50 feet.

Alternate mounting of rear number plate and number plate light:

> On trucks it is often difficult to mount the rear number plate where it is visible at all times and where it will not be subjected to continual breakage. It is permissible in such cases to mount the rear number plate and number plate light on the cab or cab protector as far to the left and as high up as is practicable. Any number plate so mounted shall be plainly visible from the rear at all times. When the number plate and number plate light are so mounted it will be required that a red tail lamp be placed at the rear of the vehicle and clearly visible at all times. This will be in addition to any clearance lamp required because of vehicle width.

12. Directional Signal Lamps:

Any pleasure car, pleasure car with trailer coach attached, motor truck, truck-tractor in combination with a trailer or semi-trailer, motor bus or school bus registered in Vermont manufactured or assembled after January 1, 1955 must be equipped with directional signals of a type approved by the Commissioner of Motor Vehicles, on front and rear of such vehicle or combination.

Each vehicle shall have two directional signal lamps mounted on the front at the same level and two directional signal lamps mounted on the rear of the vehicle at the same level. All directional signal lamps shall be spaced not less than two feet apart; except, directional signal lamps on motor operated vehicles of the bicycle or tricycle type shall be not less than one foot apart. Trailers described above are required to have directional signal lamps mounted as specified only on the rear thereof.

Every signal system will be so arranged on each vehicle or combination that when actuated front and rear signals will be given only on the side toward which the turn is to be made.

The signal system shall provide a visible or audible means of giving a clear and unmistakable indication to the operator that the signal system is in operation.

Nearly all passenger cars are equipped with amber lenses or amber bulbs in the Combination Front Parking Lamps and Turn Signals. The only lamps approved have an amber colored lens or an amber bulb coated at the factory. No other colored lamps are permitted on the front of a passenger car. All painted lenses, plastic coverings inside or outside of the lens, etc., are not approved for use in Vermont and no vehicle shall be passed for inspection unless such items are removed.

MISCELLANEOUS OR EXTRA LIGHTS--All lights and/or lighting devices mounted on the exterior of a motor vehicle must be approved by the Department of Motor Vehicles for the purpose for which it is intended to be used. This means that Fog Lights are approved as Fog Lights only, Clearance Lights as Clearance Lights only on vehicles eighty (80) inches or over in width, etc. Any light mounted or used for any purpose other than the purpose intended is illegal and must be removed.

13. Steering

A. Steering should be inspected to determine that steering linkage is not worn or jammed; wear and adjustment of the steering system can be checked by measuring lash. Lash is the condition where the steering wheel can be turned through some part of a revolution without wheel motion. The vehicle with more than 2 inches lash measured at the rim of the steering wheel should be corrected; on cars equipped with power steering, power should be on. The car should be rejected when it is impossible to turn the wheels from full right to full left without jamming, or when play at any point in the steering arms is excessive.

B. Alignment

While specific measurements for caster, camber and tow-in are not required, improper alignment causes tire wear and if far enough out of line to affect steering, it must be corrected.

C. Suspension

Suspension systems generally fall into three categories:

Vehicles with leaf springs in which steering linkage, wheel lash, bushings, shocks, springs and pins may be checked by jacking the vehicle in front center.

Vehicles with coil springs, bushings and pins must be jacked from the coil springs at which time an inspection is to be made of steering linkage, wheel lash, shocks and springs.

Vehicles with ball joints of which there are two general types: Those in which the spring is mounted on the lower control arm including those using torsion bars and those in which the spring is supported by the upper control arm.

Steering and suspension inspection of ball joint vehicles must include two procedures:

1. Inspect the complete steering and suspension system. Load the ball joints normally by using the jacking procedure shown in Figures 1 and 2 below. Observe steering wheel lash. Determine the condition of the springs, shocks, steering linkage and stabilizer links. Inspect for proper adjustment of wheel bearings as looseness will prevent proper evaluation of ball joint inspection.

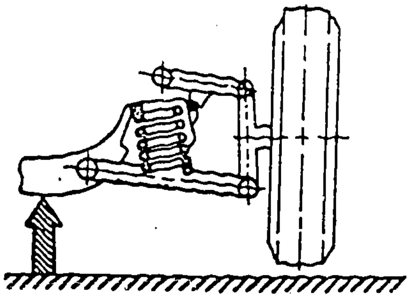


Figure 1

When the spring is supported on the lower control arm, the vehicle must be jacked from the frame or cross member.

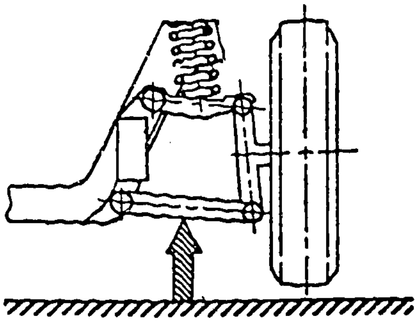


Figure 2

When the front spring is supported by the upper control arm, the vehicle must be jacked at the lower control arm.

2. For inspection of ball joints themselves, they must be inspected with the <u>ball joints unloaded</u> as shown in Diagrams 3 and 4 with the manufacturer's recommended tolerance limits. In the case of radial play, all vehicles with up to 16" wheels are permitted a tolerance of .250 or ¼ inch. Wheels with diameter of 16" to 18" are permitted 3/8 inch tolerance. Wheels of over 18" diameter are permitted a tolerance of ½ inch. Any vehicles not meeting the above standards must be corrected. In case of axial play, the manufacturer's recommendations are to be followed as shown in Diagrams 3 and 4.

Diagram 3 - When the spring is supported on the lower control arm, the vehicle must be jacked at the lower control arm.

Diagram 4 - When the spring is supported by the upper control arm, the vehicle must be jacked from the frame or cross member.

DIAGRAM 3

TABLE I

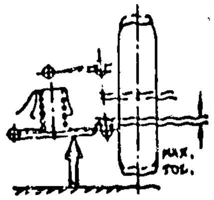
BALL JOINTS - MANUFACTURER'S TOLERANCES WITH SPRING OR TORSION BAR ON LOWER ARM

Hoist vehicle at lower arm as shown to unload ball joints.

1. Install floor stands under both RH and LH lower control arms, outboard as far as possible. Car must be stable.
2. Upper arm must be free from rubber bumper.
3. Wheel bearings must be properly adjusted.
4. Check ball joints according to chart.

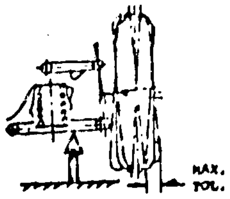
LOWER BALL JOINT

Vertical Movement



Replace if vertical movement exceeds tolerances listed below.

Horizontal Movement



Replace if horizontal movement exceeds tolerances listed below.

MODEL	YEAR	LOWER BALL JOINT	
		Vertical Movement	Horizontal Movement
CHRYSLER	57-64	.050"	.250"
	65-69	.070"	
DESOTO	57-61	.050"	
DODGE	57-67	.050"	
	68-69	.070"	
IMPERIAL	57-66	.050"	
	67-69	Zero	
PLYMOUTH	57-67	.050"	
	68-69	.070"	
VALIANT (BARRACUDA)	60-67	.050"	
	68-69	.070"	
DART (LANCER)	60-67	.050"	
	68-69	.070"	
EDSEL	58-60	.200"	.250"
FORD	54-56	Zero	.250"
	57-6/61	.200"	
	7/61-69	Zero	
LINCOLN	52-56	Zero	.250"
	57-69	.200"	
MERCURY	54-56	Zero	.250"
	57-6/61	.200"	
	7/61-69	Zero	
THUNDERBIRD	55-57	Zero	.250"
	58-60	.200"	
	61-66	See Table 11	
	67-69	Zero	
BUICK	57-60	.150"	.250"
	61-69	.100"	
BUICK SPECIAL	61-63	.080"	
	64-68	.060"	
	69	.070"	
CADILLAC	57-69	.062"	.250"
ELDORADO	67-69	.125"	.125"
CHEVROLET	55-63	.093"	.250"
CHEVROLET	64-69	.060"	
CHEVELLE	64-69	.060"	
CORVAIR	60-63	.093"	
CORVAIR	64-69	.060"	
CORVETTE	55-63	Not Applicable	
CORVETTE	64-69	.060"	
CAMARO	67-69	.060"	
SUBURBAN CARRYALL	60-69	.093"	
OLDSMOBILE	57-69	.125"	.250"
OLDSMOBILE F85	61-63	.090"	.250"
	64-69	.125"	.250"
TORONADO	66-69	.125"	.250"
PONTIAC	58-64	.060"	-*
PONTIAC	65-69	.050"	-*
TEMPEST	61-63	.093"	.250"
TEMPEST	64	.060"	.250"
TEMPEST	65-69	.050"	-*

*Do not test ball joints by reading horizontal movement of tire.

DIAGRAM 4

TABLE II

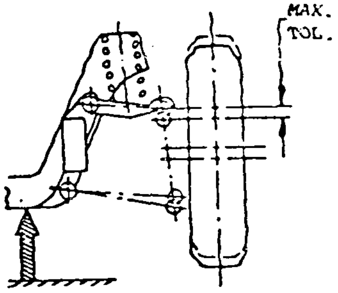
BALL JOINTS - MANUFACTURERS' TOLERANCES WITH SPRING OR TORSION BAR ON UPPER ARM

Hoist vehicle as shown to unload ball joints.

1. Hoist vehicle on frame crossmember or side rails.
2. Wheel bearings must be properly adjusted.
3. Check ball joints according to chart.

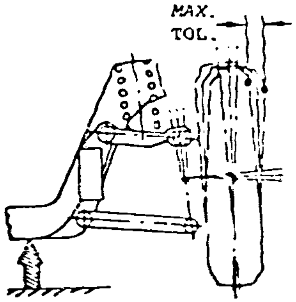
UPPER BALL JOINT

Vertical Movement



Replace if vertical movement exceeds tolerances listed below.

Horizontal Movement



Replace if horizontal movement exceeds tolerances listed below.

MODEL	YEAR	Vertical Movement	Horizontal Movement
COMET	60-62	.200"	.250
COMET	63-69	Zero*	
METEOR	62-63	Zero*	
FALCON	60-62	.200"	.250
FALCON	63-69	Zero*	
FAIRLANE	62-69	Zero*	
MUSTANG	65-69	Zero*	
COUGAR	67-69	Zero*	
THUNDERBIRD	61-66 67-69	Zero* See Table 1	.250
CHEVY II	62-63	.093"	.250
CHEVY II	64-69	.060"	
INTERNATIONAL TRAVELALL	60-69	.095"	.250
RAMBLER	62-69	NO UPPER BALL JOINT	

*.200 inch vertical movement is allowable if upward force at center of tire exceeds 75 pounds

Replaces page 26

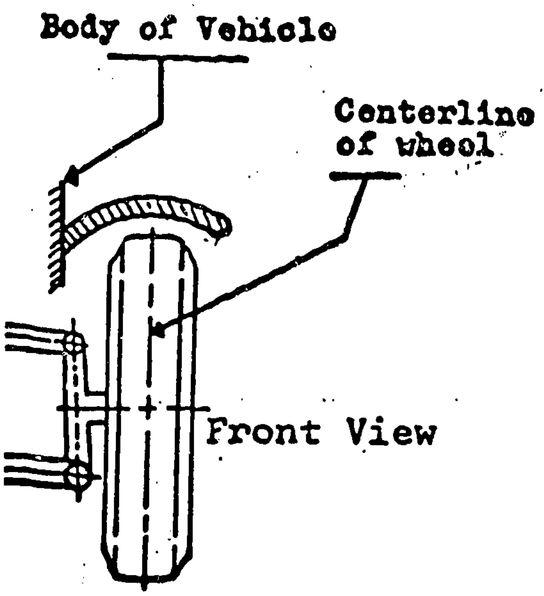
13A. Fenders

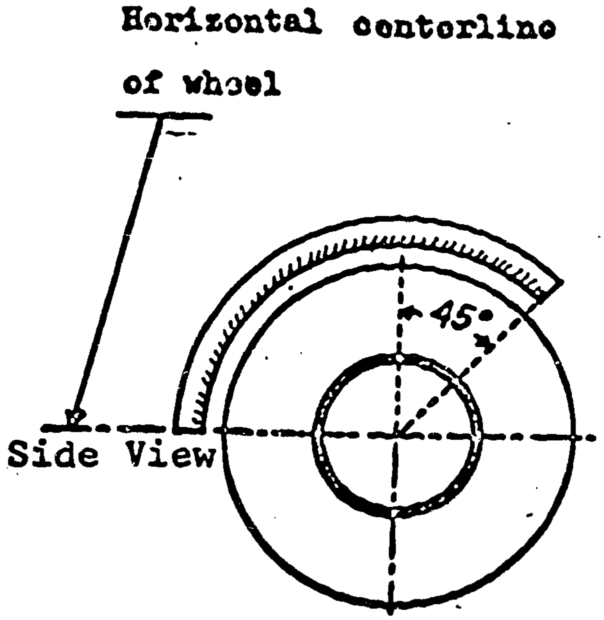
Fenders on vehicles shall be free from tears or jagged edges, and must be securely fastened to the vehicle's body.

The front and rear fenders must cover a sufficient portion of the wheel extending from the outer edge of the wheel inward to the body of the vehicle.
(See figure below, left)

The front and rear fenders must cover from at least the centerline (horizontally) of the wheel toward the rear and at least within 45 degrees of the horizontal centerline of the wheel toward the front.
(See figure below, right)

The front and rear fenders shall not be extended to compensate for tire or suspension changes.





13B. Speedometer and Odometer

The vehicle must be equipped with a speedometer and odometer so connected to the vehicle as to render both operable. The dial and calibrations on such speedometer and odometer shall be legible and unobstructed from the view of the operator of the vehicle. The speedometer must be calibrated in miles per hours.

130. Bumpers

The vehicle shall be rejected if the bumpers are missing or have abnormal protrusions extending beyond the normal vehicle extremities, or has sharp edges or any other condition which would render the bumpers hazardous to any person that may come in contact with them. The vehicle shall also be rejected if the bumpers are not adequately mounted with the capability of absorbing a reasonable degree of impact. The bumpers must extend to the extreme sides of the vehicle and shall be the original equipment or the equivalent thereto. Such bumpers shall not:

> Be modified or extended to compensate for suspension alterations;
>
> Be higher from the ground, on which the vehicle stands, than originally designed.

14. Body and Sheet Metal

In general, body exterior elements and sheet metal are subject to rejection if a condition is present which is hazardous to occupants, pedestrians, or other vehicles.

Specifically, the following constitutes reasons for rejection until the hazardous conditions have been corrected.

A. Bumpers, fenders, exterior sheet metal and moldings having broken, sharp edges or abnormal protrusions extending beyond normal vehicle extremities that would be hazardous to any person likely to come in contact.

B. Front or rear fenders that have been removed on account of being hazardous or unserviceable must be replaced. If replacement of a front or rear fender removes a required lighting device, re-installation or replacement of such device must br provided.

C. Doors with inoperative latches, handles, hinges, doors wired shut or otherwise secured in the closed position, door posts broken away from upper or lower body.

D. Hood Latch operation -- manually attempt to open fully closed hood without disengaging catch. Open hood to safety catch and inspect for full and proper engagement. Close hood with minimum force necessary to give apparent full closure from a visual inspection, then manually check again to determine whether hood can be opened without disengaging catch.

E. Floor pans including trunk floor rusted through, so as to present a hazard to occupants, or which permit passage of exhaust gases into car body.

F. Gas tank and filler -- tank improperly secured to body or chassis; cap missing on filler.

G. All seats must be attached firmly to the body of the vehicle.

H. All motor vehicles equipped with bumpers by the manufacturer as standard items of equipment, shall not be inspected unless bumpers are attached.

15. Exhaust System:

An exhaust system consists of the manifold, exhaust pipe, muffler, and (if required by the manufacturer's standard specifications) a tail pipe. It shall be a closed system and shall emit all exhaust gases at the same point as the manufacturer's standard or optional equipment.

No muffler or exhaust pipe shall be passed that has breaks, open seams or perforations. All joints shall be tight and the entire system shall be firmly attached to the vehicle.

The use of flexible pipe in any exhaust system is not permitted unless such tubing was factory installed as original equipment. Any replacement must be equivalent to the manufacturer's original equipment.

The use of muffler repair jackets is prohibited. No patches shall be approved other than those that are WELDED securely and completely around the entire perimeter.

Any exhaust system performs two functions, the first to provide protection for the occupants against carbon monoxide gas, and the second to prevent excessive, unusual or obnoxious noise. A so-called hollywood muffler is not permitted in the State of Vermont. A glass packed muffler that makes an obnoxious sound either through manufacturer design or as a result of tampering is also not permitted.

16. Tires, Wheels, and Rims

No tire shall be passed and certified to be in safe operating condition unless it meets the visual and tread depth requirements set forth in these standards.

A. DEFINITIONS

1. Tread depth - the amount of tread design on the tire. Tread depth includes both original, retread and recap tread design; and, in respect to special mileage commercial tires, recut, regrooved and siped tread design.

2. Special mileage commercial tire - a tire manufactured with an extra layer of rubber between the cord body and original tread design, which extra layer is designed for the purpose of recutting or regrooving and which tire is specifically labelled as a special mileage commercial tire.

B. VISUAL REQUIREMENTS. No tire shall be deemed to be in safe operating condition if such tire has:

1. A fabric break, or a cut in excess of one inch in any direction as measured on the outside of the tire and deep enough to reach the body cords, or has been repaired temporarily by the use of blowout patches or boots; or

2. Any bump, bulge or knot related to separation

or partial failure of the tire structure; or

3. any portion of the ply or cord structure exposed; or

4. a portion of the tread design completely worn, provided such worn portion is of sufficient size to affect the traction and stopping ability of the tire.

C. METHOD OF MEASURING TREAD DEPTH. Tire tread depth shall be measured by a tread depth gauge which shall be of a type calibrated in thirty-seconds of an inch. Readings shall be taken in a major tread groove of the tire nearest the center at two points of the circumference not closer than fifteen inches. Readings for a tire which has a tread design running across the tire or for a siped tire, where such tread design is permitted, shall be taken at or near the center of the tire at two points of the circumference not closer than fifteen inches.

D. TREAD DEPTH REQUIREMENTS. No tire shall be deemed to be in safe operating condition if such tire is worn to the point where less than two thirty-seconds (2/32) of an inch of tread design remains at both points at which gauge readings are obtained.

E. No wheel or rim shall be passed when it has:

1. Visibly loose, missing or defective bolts, nuts, or lugs.

2. Visibly bent, loose, cracked or damaged wheel or defective rim or wheel flanges.

17. Registration Plates:

A. One plate shall be attached at the front and one at the rear.

B. They shall be securely fastened to the brackets provided.

C. They shall be clearly legible and are NOT TO BE OBSCURED BY BUMPERS, TRAILER HITCHES, EMBLEMS, ACCESSORIES OR ANY OTHER THING.

D. The rear plate shall be adequately lighted for night use.

E. DEALERS AND REPAIRERS, motorcycles and trailers having a single plate shall have plate attached to the rear of such vehicle and shall meet the requirements of B, C, and D above.

18. Clearance Lights:

Clearance lights are required on all motor vehicles having a width at any part of 80 inches or over, except for pleasure cars not over 82 inches in width. Vermont Law calls for a green clearance light on left front, and a red clearance light on left rear.

However, amber lights are required on the front of a vehicle by the I.C.C. Therefore, any motor vehicle that is equipped to comply with the Safety Regulations of the Interstate Commerce Commission Motor Carrier Act shall be deemed to have complied with the Vermont requirements.

A clearance light with a green or amber lens shall be mounted facing to the front to mark the extreme left front outer edge of the vehicle and a clearance light with a red lens shall be mounted facing to the rear to mark the extreme left rear outer edge of the vehicle.

19. Side Marker Lights, Reflectors:

Side marker lights and/or reflectors installed by the manufacturer on 1968 and later model vehicles must be operative. Broken or missing side marker lights and/or reflectors shall be replaced before inspection is approved.

20. Flares and Flags:

All trucks, including those registered as agricultural vehicles, busses, and school busses (except of the pleasure car type) must carry three flares; these may be oil burning, electric or reflector type; but whatever the type, they must be approved by the Department of Motor Vehicles. In addition, trucks, busses and school busses (except of the pleasure car type) must also carry at least two red flags at least 12 inches square and mounted on standards.

21. Mud Flaps:

All busses, school busses, trucks, including those registered as agricultural vehicles, trailers and semi-trailers shall be equipped with suitable metal protectors or substantial flexible flaps behind the rearmost wheels to prevent, as far as practicable, the wheel from throwing dirt, water or any other material on the windshield of vehicles following or approaching.

If the fender, mud guard or overhang on the vehicle is long enough so that the distance from the ground to the bottom edge of such device or overhang is not over one-third (1/3) the distance from the bottom edge of such device or overhang to the center line of the rearmost axle, no flaps will be required.

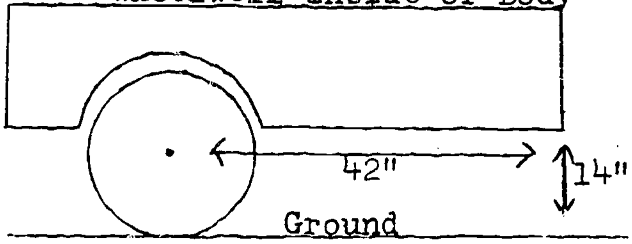
If a flap is required, the following standards will be followed:

> The splash and stone throw protection device shall extend laterally for at least the width of the tires and shall be composed of metal or flexible materials substantial enough to withstand ripping or tearing

by ordinary means, and also shall be long enough so that the clearance from the ground to the bottom edge of the device shall be not more than one-third of the distance from the bottom edge of the device to the center line of the rearmost axle of the vehicle. However, the bottom edge of such device need be no closer to the road than six inches when loaded.

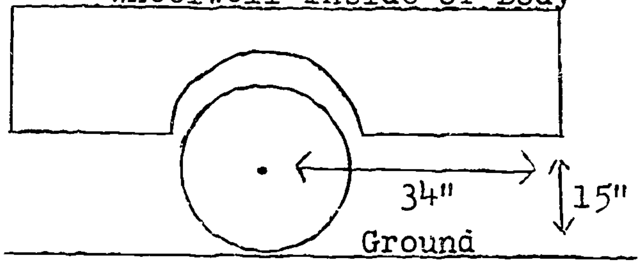
The following are several examples which should help to determine if flaps are required.

Pickup Truck - Fender or Wheelwell Inside of Body



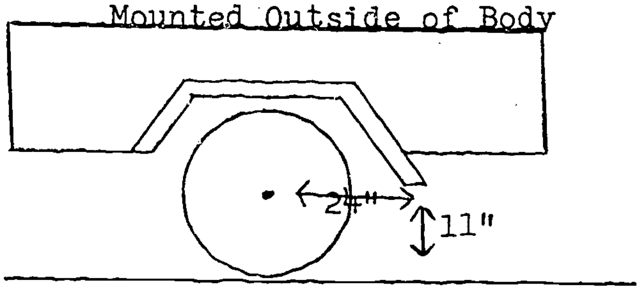
Flaps not required, as the distance from rear edge of truck body to the ground is not over one-third (1/3) the distance from center of rearmost axle to rear edge of body.

Pickup Truck - Fender or Wheelwell Inside of Body



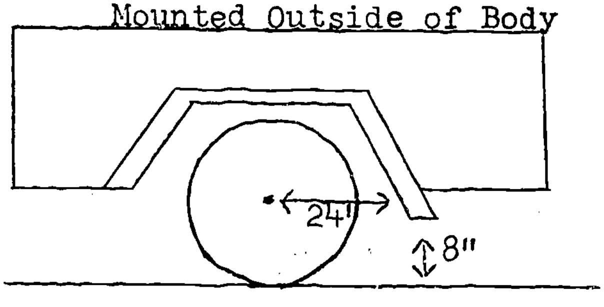
Flaps required, as the distance from rear edge of truck body to the ground is over one-third (1/3) the distance from center of rearmost axle to rear edge of body.

Pickup Truck - Fender Mounted Outside of Body



Flaps required, as the distance from rear edge of fender to the ground is over one-third (1/3) the distance from center of rearmost axle to rear edge of fender.

Pickup Truck - Fender Mounted Outside of Body



Flaps not required, as the distance from rear edge of fender to ground is not over one-third (1/3) the distance from center of rearmost axle to rear edge of fender.

21A. RECONSTRUCTED VOLKSWAGENS OR SO CALLED DUNE BUGGIES

The above type vehicle will be inspected in the same manner as any other vehicle, however, particular attention will be given to the following items:

1. DIRECTIONAL SIGNALS - must be equipped with properly functioning directional signals regardless of the year of the chassis or engine. Such signals must be of a type that has been approved by the Department of Motor Vehicles.

2. SEAT BELTS - must be equipped with two sets of seat belts for the front seats of the vehicle. The belts must be of a type that has been approved by the Department of Motor Vehicles.

3. BUMPERS - must be equipped with front and rear bumpers equivalent to original equipment. All bumpers must be securely attached to the vehicle with the capabilities of absorbing a reasonable degree of impact, and must extend to the side extremeties of the vehicle. A two piece bumper is acceptable provided it meets all of these requirements.

4. ENGINE ENCLOSURE - must be equipped with an enclosure providing coverage for all pulleys, belts and external moving engine parts. The cover must be made of rigid material and completely cover all moving parts. If a flat cover is used, it must extend at least 1 inch beyond all parts being covered. If the cover encases the moving parts, it need not extend the required 1 inch beyond all edges. Engines with pulleys, belts and other moving parts encased need only enclose the air intake with rigid mesh material. The openings in the mesh shall not exceed $\frac{1}{4}$ inch.

5. FENDERS - must be equipped with fenders that provide sufficient coverage of the wheel and tire. (See diagrams on page 26B). All additions or modifications must be of rigid material and be securely attached to the body of the vehicle.

22. Trailers

A. Safety Chains - Every trailer, semi-trailer, and trailer coach shall, in addition to an adequate hitch of a rigid type, have a safety chain or cable to prevent breakaway from the towing.vehicle. Each chain or cable shall have an ultimate strength of at least equal to the gross weight of the trailer and load being towed.

EXCEPTION: This provision shall not apply to truck-tractors and semi-trailers equipped with fifth wheel mechanisms.

B. Every trailer with a gross weight of less than 1500 pounds towed by a pleasure car shall be equipped as follows:

1. Rear light mounted on the rear of the trailer.

2. Number plate light and number plate bracket.

3. If 80 inches or over in width a clearance light with a green or amber lens shall be mounted facing to the front to mark the extreme left front outer edge of the trailer, and a clearance light with a red lens shall be mounted facing to the rear to mark the extreme left rear outer edge of the trailer.

Mud flaps or fenders if necessary. See section 21.

C. Every trailer with a gross weight of 1500 pounds or more towed by a pleasure car shall, in addition to the above, be equipped with adequate brakes that function properly when applied by the driver of the towing vehicle from the driver's seat. Mud flaps or fenders if necessary. See section 21.

D. Every trailer or semi-trailer with a gross weight of 3000 pounds or less towed by a motor truck or truck-tractor shall be equipped as follows:

1. Rear light mounted on the rear of the trailer.

2. Number plate light and number plate bracket.

3. If 80 inches or over in width a clearance light with a green or amber lens shall be mounted facing to the front to mark the extreme left front outer edge of the trailer, and a clearance light with a red lens shall be mounted facing to the rear to mark the extreme left rear outer edge of the trailer.

4. If manufactured or assembled after January 1, 1955, directional signal lamps (red lens) mounted on the rear of the trailer at the same level and shall be spaced not less than 2 feet apart. Mud flaps or fenders if necessary. See section 21.

E. Every trailer or semi-trailer with a gross weight of over 3000 pounds towed by a motor truck or truck-tractor shall, in addition to Number D above, be equipped with adequate brakes on each axle that function properly when applied by the driver of the towing vehicle from the driver's seat, and such brakes shall be so designed and connected that in case of accidental breakaway of the towed vehicle the brakes thereon shall be applied and remain applied for not less than ten minutes.

F. Trailer COACHES shall be equipped as follows:

1. Rear light mounted on the rear of the trailer.

2. Number plate light and number plate bracket.

3. If 80 inches or over in width a clearance light with a green or amber lens shall be mounted facing to the front to mark the extreme left front outer edge of the trailer, and a clearance light with a red lens shall be mounted facing to the rear to mark the extreme left rear outer edge of the trailer.

4. If manufactured or assembled after January 1, 1955, directional signal lamps (red lens) mounted on the rear of the trailer at the same level and shall be spaced not less than 2 feet apart.

5. There shall be carried on each trailer coach at least one fire extinguisher of a type approved by the State Fire Marshal, in good usable condition and easily accessible. The extinguisher shall be of not less than five pounds capacity, if it is of a CO_2 type, and not less than two and one half pounds capacity, if it is of a dry chemical type.

6. Every trailer coach with a gross weight of 1500 pounds or more shall be equipped with adequate brakes that function properly when applied by the driver of the towing vehicle from the driver's seat.

7. All parts used in connecting a trailer light system or a trailer brake system to the towing vehicle must be in good condition. This includes tubing, hoses, gaskets, couplings, wiring, connectors, plugs, etc.

8. In addition to adequate brakes and lights required on trailers all other equipment must be in good mechanical condition.

9. THE ABOVE LIGHT AND BRAKE REQUIREMENTS DO NOT APPLY TO POLE DINKEYS OR POLE SEMI-TRAILERS USED IN THE TRANSPORTING OF POLES, TIMBERS, PIPES OR STRUCTURAL MEMBERS, ETC.

23. The Vermont Statutes now require that every pleasure car designated by the manufacturer as 1964 or later models shall, as standard equipment, be equipped with safety seat belts or harnesses in the left and right front seats and such equipment shall be of a type approved by the Commissioner of Motor Vehicles. A list of approved belts has been furnished and supplements will be sent as additional belts are approved.

24. Specialized Vehicles:

Registration may be required on a variety of vehicles such as bucket loaders, road making appliances, highway building equipment, tractors and others. The act of registration requires that these vehicles be inspected. Due to the fact that these vehicles are not equipped with passenger carrying facilities and often not for nighttime use, the complete requirements need not be met unless the vehicle came so equipped. However, these vehicles must meet these minimum requirements; they must have adequate tires, brakes, muffler, number plate bracket and the complete vehicle be in good mechanical condition. If the vehicle is equipped with lights, they must be of an approved type and in good operating condition.

- - - - - - - - - - -

VIOLATION OF INSTRUCTIONS

VIOLATION OF ANY OF THE INSTRUCTIONS ISSUED BY THIS DEPARTMENT FOR YOUR GUIDANCE WILL BE DEEMED SUFFICIENT CAUSE FOR REVOKING YOUR AUTHORIZATION AS AN OFFICIAL INSPECTION STATION AND/OR MECHANIC's INSPECTION CERTIFICATE.

INDEX FOR INSPECTION MANUAL

September 13, 1968

CHANGE IN INSPECTION MECHANICS' REQUIREMENTS FOR CERTIFICATION

Effective immediately, delete the word "Vermont" from 4. A. Line 3 on page 5 of the Vermont Periodic Inspection Manual.

This change will enable the Department to issue Mechanics' Certificates to any employee of an Inspection Station who is a nonresident of the state of Vermont provided the employee holds a valid operator's license issued by the state of his residence.

Inspection Mechanics' Applications are available from District Motor Vehicle Inspectors as well as from the Department office.

Donald C Dolliver
Donald C. Dolliver
Chief Inspector

INSPECTION BULLETIN #6

J. E. MALLOY
COMMISSIONER

R. E. GROUT
DEPUTY COMMISSIONER

STATE OF VERMONT
DEPARTMENT OF MOTOR VEHICLES
MONTPELIER
05602

May 1, 1969

TO ALL VERMONT OFFICIAL INSPECTION STATIONS

Chrysler Corporation has made available, as an optional lighting device on 1969 Dodge Polara and Monaco models, a new type of light or lamp called "SUPER-LITE". This light or lamp is mounted in the left center of the radiator grille and is controlled by the motor vehicle operator.

NO VERMONT CERTIFIED INSPECTION MECHANIC SHALL ATTACH AN OFFICIAL VERMONT INSPECTION STICKER TO ANY MOTOR VEHICLE WHICH HAS THE "SUPER-LITE" INSTALLED THEREON, UNLESS SUCH MECHANIC HAS CORRECTLY AIMED THE "SUPER-LITE" ON AN AIMING SCREEN DEVELOPED AND DISTRIBUTED BY CHRYSLER CORPORATION FOR THIS PURPOSE ONLY.

It is the Official Inspection Station's responsibility to so notify all Certified Inspection Mechanics.

Donald C. Dolliver
Chief Inspector

INSPECTION BULLETIN #9

May 1, 1969

TO ALL VERMONT OFFICIAL INSPECTION STATIONS

All 1969 Ford Mustang models are equipped with four (4) headlamps, with the #2 headlamp units mounted outboard in the fender area.

Listed below are mechanical type headlamp aimers which must use extension adaptors (furnished with each 1969 Ford Mustang) to adjust the #2 headlamps for horizontal aim.

AC T3 TYPE H SPLIT IMAGE HEADLAMP AIMER

ATLAS HEADLAMP AIMER, MODEL 140 (SPLIT IMAGE)

GUIDE T-3 SAFETY AIMER, TYPE B

LEV-L-LITE SPLIT IMAGE HEADLAMP AIMER, MODEL 130

****

NO PORTABLE FLOOR MOUNTED HEADLAMP TESTER IS AUTHORIZED FOR CHECKING AND/OR AIMING HEADLAMPS ON 1969 FORD MUSTANGS, DUE TO THE DIFFICULTY ENCOUNTERED IN MAINTAINING PROPER ALIGNMENT OF THE TESTER WITH RESPECT TO THE VEHICLE WHEN MOVING FROM THE #1 UNIT TO THE #2 UNIT.

All track mounted headlamp testers and headlamp aiming screens (excluding Chrysler Corporation's " Super-Lite" aiming screen) are authorized for use.

****

It is the Official Inspection Station's responsibility to so notify all Certified Inspection Mechanics.

Donald C. Dolliver

Donald C. Dolliver,
Chief Inspector

INSPECTION BULLETIN #10

J. E. MALLOY
COMMISSIONER

R. E. GROUT
DEPUTY COMMISSIONER

STATE OF VERMONT
DEPARTMENT OF MOTOR VEHICLES
MONTPELIER
05602

22 December 1969

TO ALL VERMONT OFFICIAL INSPECTION STATIONS

On November 7, 1969, the United States Second Circuit Court of Appeals reversed a previous decision of the United States District Court for the District of Vermont, relative to restraining the sale of manufacturers' automobiles equipped with certain auxiliary headlamps.

Therefore, Inspection Bulletins #8 and #9 are hereby void and cancelled and this bulletin shall be effective February 1, 1970.

CHRYSLER CORPORATION'S "SUPER-LITE" IS NOT APPROVED FOR USE IN VERMONT, AND NO OFFICIAL VERMONT INSPECTION STATION SHALL BE AUTHORIZED TO ATTACH AN OFFICIAL VERMONT INSPECTION STICKER TO ANY MOTOR VEHICLE WHICH HAS THE "SUPER-LITE" INSTALLED THEREON.

The complete removal of the "Super-Lite" from any motor vehicle is required before an Official Vermont Inspection Sticker may be attached thereto.

NOTIFY ALL CERTIFIED INSPECTION MECHANICS

Donald C Dolliver
Donald C. Dolliver
Chief Inspector

INSPECTION BULLETIN #11

Deposited with Secretary of State, December 22, 1969
Effective Date - February 1, 1970

J. E. MALLOY
COMMISSIONER

R. E. GROUT
DEPUTY COMMISSIONER

STATE OF VERMONT
DEPARTMENT OF MOTOR VEHICLES
MONTPELIER
05602

8 April 1970

TO ALL VERMONT OFFICIAL INSPECTION STATIONS

Your attention is directed to the last sentence on page 26B of the Vermont Periodic Inspection Manual, which reads as follows: The speedometer must be calibrated in miles per hour.

Effective this date, the above underlined sentence shall be deleted and is therefore no longer in effect.

NOTIFY ALL CERTIFIED INSPECTION MECHANICS TO MAKE THIS CHANGE IN THEIR INSPECTION MANUALS.

Donald C Dolliver
Donald C. Dolliver,
Chief Inspector

INSPECTION BULLETIN # 12

Effective Date - April 13, 1970

J. E. MALLOY
COMMISSIONER

R. E. GROUT
DEPUTY COMMISSIONER

STATE OF VERMONT
DEPARTMENT OF MOTOR VEHICLES
MONTPELIER
05602

April 15, 1970

TO ALL VERMONT OFFICIAL INSPECTION STATIONS

The 1970 Adjourned Session of the General Assembly has enacted into Statute an increase in fee for a duplicate or corrected registration certificate, such fee is now $2.00.

Therefore, on page 9 in the Vermont Periodic Inspection Manual, wherever, the words "fifty (50¢) cents" appear, the new fee of $2.00 shall apply.

Also enacted into Statute is an increase in fee for a lost or duplicate registration plate, such fee is now $3.00 per plate.

NOTIFY ALL CERTIFIED INSPECTION MECHANICS TO INSTALL THIS BULLETIN IN THEIR INSPECTION MANUALS.

Donald C Dolliver
Donald C. Dolliver
Chief Inspector

INSPECTION BULLETIN # 13
Effective Date - April 13, 1970.

VT 016 762
POLICIES AND PROGRAMS. TAD PROJECT REPORT.

NATIONAL SAFETY COUNCIL, CHICAGO, ILL.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - ND 32P.

DESCRIPTORS - *REPORTS; *RECORDKEEPING; *TRAFFIC ACCIDENTS; *LAW ENFORCEMENT OFFICERS; *PROGRAM PROPOSALS
IDENTIFIERS - TAD PROJECT; TRAFFIC ACCIDENT DATA PROJECT

ABSTRACT - PROPOSED IN THIS PUBLICATION DEVELOPED BY THE TRAFFIC ACCIDENT DATA (TAD) PROJECT, IS A NEW SYSTEM OF ACCIDENT REPORTING---THE "BI-LEVEL" CONCEPT. THIS RECENT INNOVATIVE IDEA REPRESENTS A CONCERTED EFFORT TO LESSEN THE BOOKKEEPING DUTIES OF LAW ENFORCEMENT OFFICERS INVOLVED IN THIS TYPE WORK, WHILE STILL INSURING THE COMPILATION OF A COMPREHENSIVE SUMMARY OF THE INCIDENT WHICH HAD OCCURRED. CONTAINED IN THIS REPORT ARE THE FOLLOWING: (1) BACKGROUND INFORMATION, (2) DETAILS OF THE NEWLY DEVISED REPORTING, "BI-LEVEL" CONCEPT, (3) A MODEL OF THE FUNCTIONAL STRUCTURE OF THE PROPOSED REPORTING SYSTEM, (4) SEVERAL REPORT FORMS, (5) A SEVERITY SCALE, AND (6) AN APPENDIX WHICH PROVIDES BASIC TRAFFIC ACCIDENT INFORMATION REQUIREMENTS. (SN)

4226

PROJECT
REPORT

Published
by the
TRAFFIC
ACCIDENT
DATA
PROJECT
National Safety Council
425 N. Michigan Ave.
Chicago, Illinois 60611

POLICIES & PROGRAMS

4227

Foreword

The Traffic Accident Data Project was created in 1965 as a successor to the Committee on Uniform Traffic Accident Statistics of the National Safety Council's Traffic Conference. Unlike its predecessor, the TAD Project has a full-time staff whose activities are guided by a seven member steering committee. Included in this committee are representatives of the American Association of Motor Vehicle Administrators, International Association of Chiefs of Police, and the Institute of Traffic Engineers. The principle objective of the TAD Project is the generation of new procedures and techniques for use by governmental agencies responsible for operation of traffic accident data systems.

This report presents an approach to broadening the scope of traffic accident reporting by police without adding appreciably to the total task. Essentially the concept proposed by TAD Project is one under which reporting would be undertaken in two stages, basic and supplementary. The term "bi-level reporting" was adopted to give the system a descriptive identification.

Background

Emphasis on highway safety programs generated by the Highway Safety Act of 1966 has created demands for more and better traffic accident data. "* * * No other part of the state traffic program (traffic records) is as basic to ultimate success, nor as demanding of complete cooperation at every jurisdictional level. * * *" Report No. 1700, House of Representatives, 89th Congress, second session, July 15, 1966, pages 10 and 11. This implies additional burdens on reporting agencies that are already inadequately staffed and equipped. Following is the position of the TAD Project Steering Committee on basic issues involved in the conflict between need for more and better data and the less than promising prospects for adequate resources in terms of manpower and equipment that would be available to traffic accident data systems:

A. Utility of an accident record system can be judged only by its capability for identifying problems and suggesting and evaluating those activities which reduce traffic accidents and their effects. If accident records are not useful, their collection cannot be justified.

B. Collection of all information potentially valuable to all users about all accidents is an unattainable and economically unsuportable objective. The reporting system should be capable of furnishing only certain basic information on all reportable accidents, and yet be flexible enough to produce special data on any selected aspect of accidents when the need arises. The basic structure of the reporting system should contain only that information which:

1. Can be obtained with acceptable accuracy.
2. Cannot be feasibly obtained at a later time, by another means or from other records.
3. Will be utilized in all or a large percentage of cases, or
4. Will, when aggregated, give a statistically reliable measurement of the total population of traffic accidents.

C. Minimum information that should be collected in a basic accident report on all accidents above a minimum severity threshold should consist of:

1. Identification of drivers.
2. Identification of vehicles.
3. Identification of persons killed or injured and a scalar rating of severity.
4. Identification of property damaged and a scalar rating of severity.
5. Precise identification of accident site.
6. Identification of the time of accident occurrence and transient environmental conditions.
7. Generalized description of accident events and circumstances.

8. Identification of investigator and official actions taken (including citations issued).

9. Identification of witnesses.

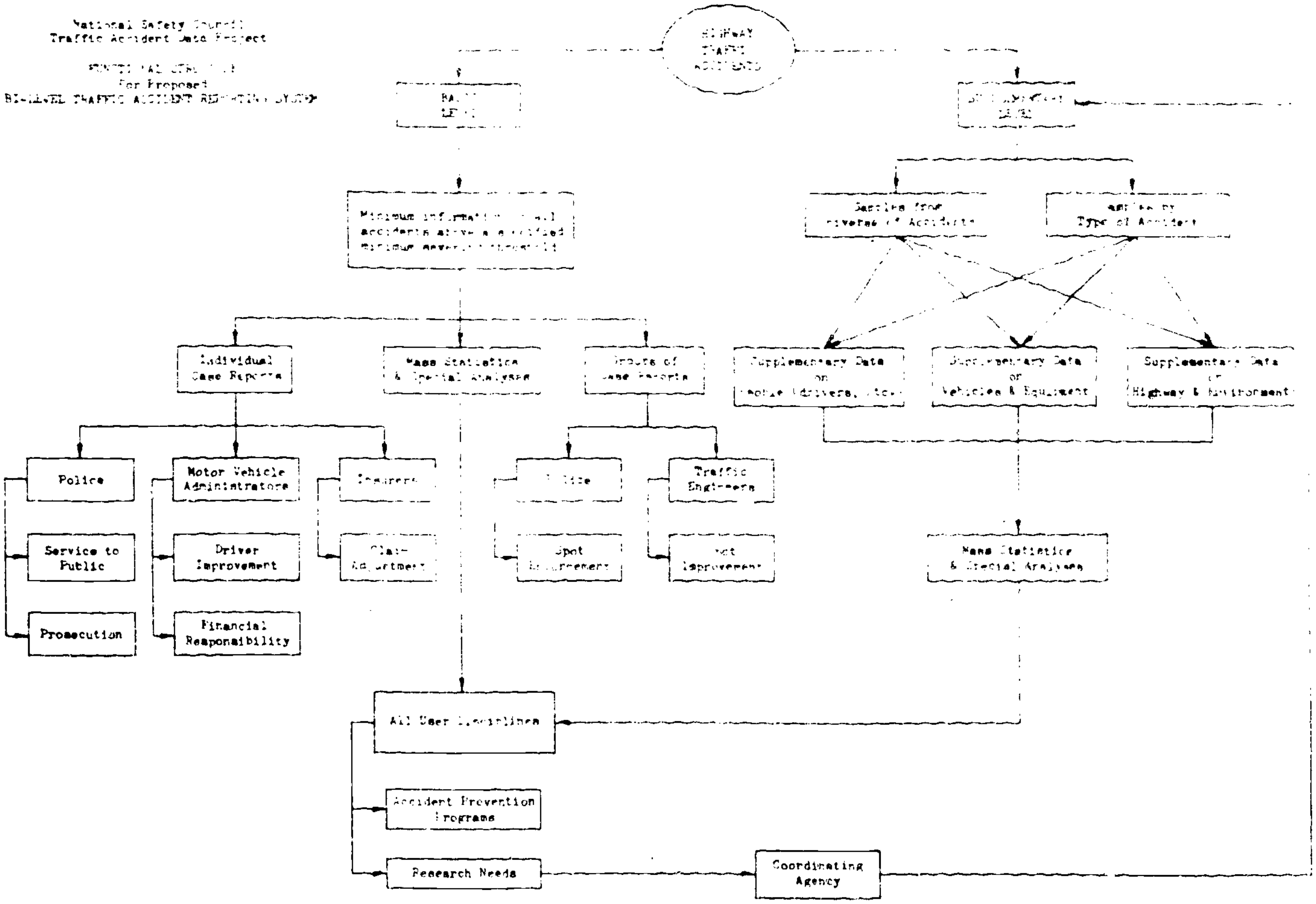
D. A legitimate need exists for accident information for research purposes that cannot be met by the basic accident report. The accident record system should, therefore, be designed so that supplemental information can be obtained on a sampling basis. The sampling process and the information obtained should be designed to meet a specific need and should be discontinued when the need is satisfied.

Bi-Level Reporting Concept

Consistent with the foregoing policies, the Traffic Accident Data Project has adopted the bi-level structure for police reporting on traffic accidents. Under this concept, a prescribed minimum amount of information would be collected on every legally reportable accident and a sampling procedure would be used to report on certain phases of the event. No one accident would be reported completely with respect to all subject matter details, but over a period of time some information would be collected on many aspects of the traffic accident event.

The bi-level structure is designed to furnish sufficient data at the basic level to satisfy the routine needs of users of individual case reports and users of groups of case reports. In addition, information collected at the basic level would be sufficient to generate mass statistics to perform the following functions:

1. Measure magnitude of the traffic accident problem.
2. Define major problem areas.
3. Suggest lines of preventive action.
4. Measure effectiveness of preventive efforts.
5. Define areas in which research is needed.



National Safety Council
Traffic Accident Data Project

FUNCTIONAL STRUCTURE
For Proposed
BI-LEVEL TRAFFIC ACCIDENT REPORTING SYSTEM

At the supplementary level, the system would service the requirements of the many disciplines involved in the traffic accident problem by furnishing greater detail on specific driver, highway and vehicle factors. Supplementary reports would be brief and simple. Hopefully, with a small amount of training, investigators could report accurately and completely on a small, but relevant, part of a contributing or attendant circumstance under which an accident occurred.

Taking into account the numberous variables associated with people, vehicles, highways and environment, under pre-impact and post-impact conditions, there is a potential of several hundred subject headings for supplementary reporting. However, in order to benefit from this enormous potential, it will be up to all disciplines involved in accident prevention to make their needs for data known.

The philosophy underlying the bi-level reporting concept is that it can be accomplished without adding appreciably to the investigator's task. However, in order to realize this objective, it is necessary to pare from the reporting task all unnecessary or redundant information requirements. For example, a police officer should not be required to list or show on his report all physical facilities and appurtenances at the site of the accident. If he is able to describe the geographic location of the accident precisely, information on the physical facilities can be added or related to the accident report at a later date by reference to engineering records. Modern computers can accomplish this collation in a fraction of the time that would be required by a police officer to list or diagram physical facilities in the accident report.

Likewise, there is no need for an officer to obtain any information on the driver and vehicle beyond the minimum that is necessary for positive identification. Additional supporting data should be available from driver licensing and motor vehicle registration records. Obviously, temporary conditions such as malfunctioning traffic control devices, vehicle defects and temporary driver impairments will always have to be reported by the officer.

Elimination of reporting on items that may be retrieved from other official sources should save time that may be profitably used in supplementary reporting. If properly designed and scheduled, bi-level reporting should not require more man-hours than conventional reporting with built-in redundancies.

To a considerable degree, the success of the bi-level reporting system will depend on coordination and communication. Without these means, there would be wasteful duplication of effort and pressing problems might be overlooked. Fortunately, many states are currently moving to organize state highway safety agencies and highway safety research centers in order to perform effectively under the terms of the National Highway Safety Act of 1966. The task of coordinating and communicating on the state level may be undertaken by the highway safety agency or assigned to the research center. Either agency may function as a clearing house which would receive requests from local and national sources for special data and instigate supplementary reporting to acquire data. The state

Accident Report — Police ☐ FATAL STATE OF ☐ INJURY ☐ PROP. DAMAGE ______________ NO. ______

Location of accident

Date and time of accident

CODE FOR INJURY
Use only the most serious one in each space for injury
K - Dead before report made

A - Visible signs of injury, as bleeding wound or distorted member, or had to be carried from scene
B - Other visible injury, as bruises, abrasions, swelling, limping, etc.

No visible injury but complaint of pain or momentary unconsciousness
No indication of injury

Unit No. 1 - Motor Vehicle

Driver data:
Name & address
Operator license no., type, state issuing
Date of birth, sex

Severity of injury in code
Safety devices available & usage
Arrest or citation information

Vehicle occupant data:
Seat position
Name & address, if injured
Age, sex

Severity of injury in code
Safety devices available & usage

Vehicle data:
Type of vehicle
Make, model & body style
Model year

Registration no., year, state
Damage rating
Operable or not?

Owner's name & address
Disposition

Unit No. 2 - Motor Vehicle or Other

Driver (pedestrian, bicyclist or other) data:
Name & address
Operator license no., type, state issuing
Date of birth, sex

Severity of injury in code
Safety devices available & usage
Arrest or citation information

Vehicle occupant data:
Seat position
Name & address, if injured
Age, sex

Severity of injury in code
Safety devices available & usage

Vehicle data:
Type of vehicle
Make, model & body style
Model year

Registration no., year, state
Damage rating
Operable or not?

Owner's name & address
Disposition

Environment data:
Weather
Road surface condition

Light condition

Care of injured:
First aid given
Where taken

By whom taken

Administrative data:
Witnesses name & addresses
Investigator's identity

Actions taken
Etc.

Figure 1

DESCRIPTION & DIAGRAM OF ACCIDENT

Description:

What happened?

Defects or malfunctions pertinent to accident (drivers, vehicles and highway facilities included).

Diagram:

Identification of vehicles and roadway and orientation.

Paths of vehicles before and after collision, point of impact.

Evasive action, if any (skidmarks, etc.)

Unusual or temporary physical conditions.

Obstructions to visibility.

SUPPLEMENTARY REPORT

Figure 1

clearing house would be responsible for publication of reports ment of a library for such reports, and maintenance of liai designated national clearing house.

A prototype form developed for bi-level reporting would accommodate both basic and supplementary data on a letter-size sheet. The basic portion of the form covers the entire front of the sheet and approximately one-half of the reverse side of the sheet. Figure 1 is a block outline of the form adopted by the Traffic Accident Data Project Steering Committee.

The block outline is intended to be used as a guide only. User agencies may make adjustments to satisfy local conditions and administrative requirements. The only restrictions on the design of the basic part of the form are that it meets the minimum data requirements and that its content be compatible with statistical requirements of the National Highway Safety Bureau.

A blank space in the report form outline for describing accident events, suggests reliance on narrative rather than a series of closed questions which are common in many forms in current use. While there is a trend toward narrative form for describing events, the blank space in the mock-up should not be interpreted as intent on the part of the Traffic Accident Data Project to preclude use of closed questions. This applies particularly to "weather," "road surface condition" and "light condition" items that can be easily categorized. However, there is much divergent opinion on the efficacy of reliable description of accident events through use of closed questions. While advocates of the narrative form concede that it is much easier to convert answers to closed questions to machine language, they insist that better data obtained in the narrative are worth additional effort.

The format of the supplementary section of the report form may vary considerably. In some cases, the supplementary section of the form would be printed on the blank half of the reverse side of the form by office machines. In other cases, that part of the form would be left blank and entries in it sould be made in accordance with departmental directives. For example, a state highway department concerned about performance of its guardrails in collisions may want detailed data and a sketch on events preceding the collision, approach path of vehicle, angle of incidence, distortion or rupture of guardrail members, path of vehicle after impact and terminal event. In this case, the department may develop a report form format or an instructional directive for police investigators.

Oregon Test

During the summer of 1967, the Oregon Legislative Assembly passed House Bill 1741 that requires all police, state and local, to submit written reports of every motor vehicle accident investigated on a form approved by the Department of Motor Vehicles. As a result of this legislation, the Department requested the Traffic Accident Data Project to assist in development of a statewide traffic accident reporting system.

STATE OF OREGON

Accident Report — Police

☐ FATAL ☐ INJURY ☐ PROP. DAMAGE ______________ DEPARTMENT NO. ______________

DATE OF ACCIDENT	TIME OF ACCIDENT ☐ A.M. ☐ P.M.	ARRIVED AT SCENE ☐ A.M. ☐ P.M.	CITY	COUNTY	SHEET ___ OF ___ SHEET(S)
OCCURRED ON (Route Number or Name)			AT INTERSECTION OF (Route Number or Name)		DO NOT WRITE IN THIS SPACE

IF NOT AT INTERSECTION ☐ FEET ☐ MILES N S E W ☐☐☐☐ OF (Intersecting highway or street, landmark, or house no.) MILE POST

NEAREST CITY MILES N S E W ☐☐☐☐ OF

ACCIDENT INVOLVED

☐ PEDESTRIAN ☐ OTHER MV ☐ RR TRAIN ☐ BICYCLE ☐ ANIMAL ☐ OVERTURNED IN ROAD ☐ RAN OFF ROAD ☐ OTH SION ☐ FIXED OBJECT ☐ OTHER OBJECT ☐ CITY, COUNTY OR STATE PROPERTY DAMAGED

CODE FOR INJURY
(Use only the most serious one in each space for injury)
K - Dead before report made.
A - Visible signs of injury, as bleeding wound or di torted member; or had to be carried from scene
B - Other visible injury, as bruises, abrasions ing, limping, etc.
o visible injury but complaint of pain or momentary nsciousness.
indication of injury.

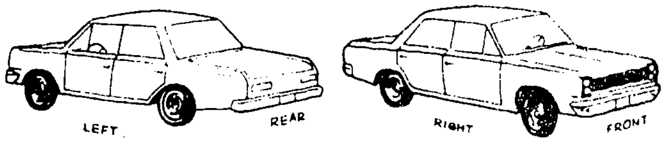
UNIT No. 1 - MOTOR VEHICLE

DRIVER'S FULL NAME (last) (first) (middle)		ADDRESS						
OPERATOR LICENSE NO.	STATE	☐ REGULAR ☐ OTHER	SPECIFY TYPE	DATE OF BIRTH	Place an O under SEAT BELT if not installed, X, if installed, XX, if in use. ⇨	SEAT BELT	AGE	SEX	INJ

SEAT POS.	OCCUPANTS' NAMES	OCCUPANTS' ADDRESSES	SEAT BELT	AGE	SEX	INJ.
FRONT CENTER						
FRONT RIGHT						
REAR LEFT						
REAR CENTER						
REAR RIGHT						

VEHICLE MAKE & MODEL	BODY STYLE	YEAR
LICENSE PLATE NUMBER	STATE	YEAR
OWNER'S NAME AND ADDRESS		
VEHICLE REMOVED BY/TO		

DAMAGE SUSTAINED



IS VEHICLE DRIVABLE? ☐ YES ☐ NO

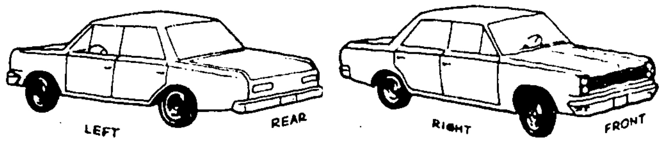
UNIT No. 2 - MOTOR VEHICLE, PEDESTRIAN, BICYCLIST, OR OTHER

DRIVER'S (PEDESTRIAN'S, BICYCLIST'S OR OTHER) FULL NAME		ADDRESS						
OPERATOR LICENSE NO.	STATE	☐ REGULAR ☐ OTHER	SPECIFY TYPE	DATE OF BIRTH	Place an O under SEAT BELT if not installed, X, if installed, XX, if in use. ⇨	SEAT BELT	AGE	SEX	INJ.

SEAT POS.	OCCUPANTS' NAMES	OCCUPANTS' ADDRESSES	SEAT BELT	AGE	SEX	INJ.
FRONT CENTER						
FRONT RIGHT						
REAR LEFT						
REAR CENTER						
REAR RIGHT						

VEHICLE MAKE & MODEL	BODY STYLE	YEAR
LICENSE PLATE NUMBER	STATE	YEAR
OWNER'S NAME AND ADDRESS		
VEHICLE REMOVED BY/TO		

DAMAGE SUSTAINED



IS VEHICLE DRIVABLE? ☐ YES ☐ NO

WEATHER (Check one)	ROAD COND. (Check one)	LIGHT COND. (Check one)		UNIT 1	UNIT 2
☐ CLEAR	☐ DRY	☐ DAYLIGHT	SKIDMARKS TO IMPACT (ft)	___	___
☐ RAINING	☐ WET	☐ DAWN OR DUSK	DISTANCE TRAVELED AFTER IMPACT (ft)	___	___
☐ SNOWING	☐ SNOWY	☐ DARKNESS, LIGHTED	STATED SPEED BEFORE IMPACT (MPH)	___	___
☐ FOG	☐ ICY	☐ DARKNESS, UNLIGHTED	DESIGNATED SPEED FOR AREA (MPH)		
☐ OTHER..........	☐ OTHER...........	☐ OTHER.............			

FIRST AID GIVEN BY

INJURED TAKEN

TO ....

BY ....

WITNESSES
NAME: .... ADDRESS: ....
NAME: .... ADDRESS: ....

ACTIONS TAKEN (Arrests, etc.)

REPORTING OFFICER

/67

4239

Figure 2

DESCRIPTION & DIAGRAM OF ACCIDENT

Describe what happened; including actions of vehicles and pedestrians, if any, prior to key event; contributing actions of drivers; evasive maneuvers, including skidmarks; description of impact; unusual circumstances; temporary highway conditions; highway defects, if any; traffic control defects, if any; vehicle defects, if any; and driver and pedestrian condition, if other than normal. Use "Unit 1" and "Unit 2", etc. to identify vehicles. Also describe damage to property, other than vehicles.

Draw a sketch of the roadway arrangement, with "North" at the top. Include all structures involved in accident as well as any obstruction to visibility. Show unusual or temporary conditions (hole in pavement, barricades in construction area, etc.). All dimensions are to be estimated, except as directed in departmental orders.

NORTH

SUPPLEMENTARY REPORT

Figure 2

After consultation with the TAD Project and an advisory committee, consisting of police and highway officials, the Department agreed to undertake a test of a new reporting system which included the TADP Vehicle Damage Scale for Traffic Accident Investigators (Technical Bulletin No. 1). Accident report forms and instruction manuals were prepared by the TADP staff and three police agencies were enrolled to participate in the test: Oregon State Police, District 1; city of Eugene Police; and the Jackson County Sheriff's Police. Purpose of the test, which commenced on October 1, was to lay the groundwork for statewide use of the new system in 1968.

State Police District 1 covers an area immediately south of the city of Portland. Officers attached to this district are responsible for patrolling state highways and freeways which have urban as well as rural characteristics. The city of Eugene, located approximately 110 miles south of Portland, is the seat of the University of Oregon. Jackson County is in the southwest corner of the state abutting the California state line. Sheriff's Police have jurisdiction over all rural highways not patrolled by the state police.

Figure 2 is a reproduction of the form designed for statewide use in Oregon. While the form appears to require listing names and addresses of occupants of vehicles involved, whether injured or not, instructions for preparing the report require only seat belt, age, and sex data for uninjured occupants. Collection of this information is desirable to obtain measurement of the occupant population at risk. Illustrations of automobiles are for the purpose of indicating damage in terms of the TADP Vehicle Damage Scale. The upper half of the reverse side of the form was left undivided so that a reporting officer may orient his diagram to suit geometry at the accident site and write a verbal description of the events in the space that remains.

Three subjects were selected for supplementary reporting, one for each of the last three months of 1967. The subjects were:

1. Collisions with roadside obstacles.
2. Emergency treatment and transfer of injured.
3. Windshield impact injuries.

Purpose of this selection of subjects was to demonstrate versatility of the system and adaptability of police officers to reporting on a variety of subjects with a relatively small amount of training. However, one of the subjects, emergency treatment and transfer of injured, did produce statistics that indicated need for repetition on a longer-term basis and, perhaps, statewide coverage.

One innovation that was tried in the Oregon test was the use of different colors of form to indicate the differences in supplementary report subject content. In October, a yellow form bearing a questionnaire on collisions with roadside obstacles was used by the three police agencies.. Instructions that accompanied this form were also printed on yellow paper. Colors used in November and December were pink and green, respectively. The main purpose of the different colors was to simplify directives to police personnel.

All of the forms used in the Oregon test were identical except for color and the lower half of the reverse side. Figures 3, 4 and 5 are reproductions of the backs of the three forms used.

In actual practice an agency operating under the bi-level concept would print large quantities of the basic part of the form, leaving the lower half of the reverse side blank. Then as demand developed for special information, standard office machinery could be used to imprint a supplementary questionniare. An alternative to this procedure would be to do no imprinting on the lower half of the reverse side of the form and to have special questions answered in accordance with a directive to reporting personnel. For example, a directive issued to police officers may require answers to questions listed on all accidents involving motorcycles.

Vehicle Damage Scale

In current reporting systems it is customary to require a short description of damage sustained by vehicles or an estimate of repair costs. Neither of these bits of information is satisfactory for purposes of determining how great the risk of injury might be. Without adequate measurement of damage sustained, it is extremely difficult to determine how vehicle design integrity relates to injury production. There may be vehicles that produce only moderate injuries in severe impacts and, conversely, there may be vehicles which produce severe injuries in moderate or slight impacts. These would be rated as successes and failures, respectively.

DESCRIPTION & DIAGRAM OF ACCIDENT

Describe what happened; including actions of vehicles and pedestrians, if any, prior to key event; contributing actions of drivers; evasive maneuvers, including skidmarks, description of impact; unusual circumstances; temporary highway conditions, highway defects, if any; traffic control defects, if any; vehicle defects, if any; and driver and pedestrian condition, if other than normal. Use "Unit 1" and "Unit 2", etc. to identify vehicles. Also describe damage to property, other than vehicles.

Draw a sketch of the roadway arrangement, with "North" at the top. Include all structures involved in accident as well as any obstruction to visibility. Show unusual or temporary conditions (hole in pavement, barricades in construction area, etc.). All dimensions are to be estimated, except as directed in departmental orders.

NORTH

SUPPLEMENTARY REPORT

Collisions with Roadside Objects

a. Did any vehicle strike an object off the road? ☐ Yes; ☐ No.

b. How did vehicle strike object? ☐ Head-on; ☐ Sideswipe; ☐ Lateral skid; ☐ Spin; ☐ Rollover; ☐ Other

c. What was probable cause for vehicle to run off road?

1. ☐ Collision with other vehicle
2. ☐ Avoiding other vehicle
3. ☐ Avoiding pedestrian
*4. ☐ Avoiding animal
*5. ☐ Avoiding other
6. ☐ Driver asleep or drowsy
*7. ☐ Driver ability impaired
*8. ☐ Driver confused
*9. ☐ Driver distracted
10. ☐ Roadway slippery
*11. ☐ Roadway defective
*12. ☐ Vehicle defective

d. Explain each asterisked (*) item checked. (Use item no.) ____________________

____

e. Describe damage to object struck by vehicle ____________________

____

f. If any part of object penetrated vehicle passenger space, explain ____________________

____

Profile at Point of Impact:

Close-up Sketch of Fixed Object.

Figure 3

DESCRIPTION & DIAGRAM OF ACCIDENT

Describe what happened; including actions of vehicles and pedestrians, if any, prior to key event; contributing actions of drivers; evasive maneuvers, including skidmarks; description of impact; unusual circumstances; temporary highway conditions; highway defects, if any; traffic control defects, if any; vehicle defects, if any; and driver and pedestrian condition, if other than normal. Use "Unit 1" and "Unit 2", etc. to identify vehicles. Also describe damage to property, other than vehicles.

Draw a sketch of the roadway arrangement, with "North" at the top. Include all structures involved in accident as well as any obstruction to visibility. Show unusual or temporary conditions (hole in pavement, [illegible] in construction area, etc.). All dimensions are to be [illegible], except as directed in departmental orders.

NORTH ↑

SUPPLEMENTARY REPORT

EMERGENCY TREATMENT & TRANSFER OF INJURED

Record time ➧ for each event	1. Accident occurred.	2. Accident detected.	3. Accident reported to police.	4. Non-police first-aid given.	5. Police dispatched to site.
6. Police arrive at site.	7. Ambulance(s) requested.	8. Police first-aid given.	9. Ambulance(s) arrive(s).	10. Ambulance(s) or other depart(s).	11. Ambulance(s) or other arrive(s) at hospital.

1. How did you determine time of accident?

3. Who reported accident to police? How?

5. Did anyone give first aid to injured before you arrived? Who?

5a. What type of aid was given?

7. Was an ambulance service required? Who called for ambulance? How?

8. Did you give anyone first aid? .... What type of aid? ....

9. What company(s) or agency(s) provided ambulance(s)? How Many?

10. Did any ambulance make more than one trip? Explain.

10a. If vehicles other than ambulances were used, explain.

Figure 4

DESCRIPTION & DIAGRAM OF ACCIDENT

Describe what happened, including actions of vehicles and pedestrians, if any, prior to key event, contributing actions of drivers; evasive maneuvers, including skidmarks, description of impact; unusual circumstances; temporary highway conditions, highway defects, if any; traffic control defects, if any; vehicle defects, if any, and driver and pedestrian condition, if other than normal. Use "Unit 1" and "Unit 2", etc. to identify vehicles. Also describe damage to property, other than vehicles.

Draw a sketch of the roadway arrangement, with "North" at the top. Include all structures involved in accident as well as any obstruction to visibility. Show unusual or temporary conditions (such as pavement, barricades in construction area, etc.). All dimensions are to be estimated, except as directed in departmental orders.

NORTH

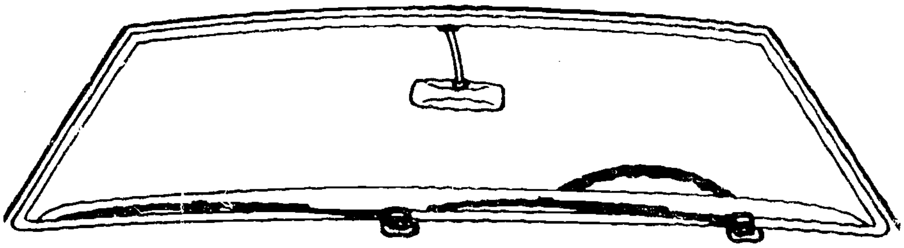
SUPPLEMENTARY REPORT

WINDSHIELD IMPACT INJURIES - Did any vehicle occupant strike windshield? ☐ Yes ☐ No

If "Yes", indicate damage to glass; describe and show injuries on figures below.

Damage to Glass

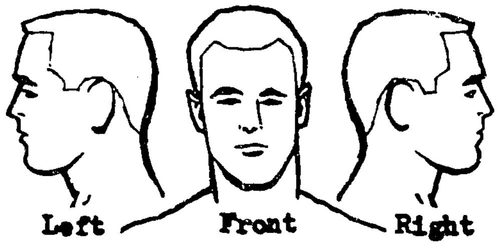
☐ None
☐ Simple Crack
☐ Web Cracked
☐ Web Broken
☐ Grid Cracked
☐ Grid Broken



Damage to Glass

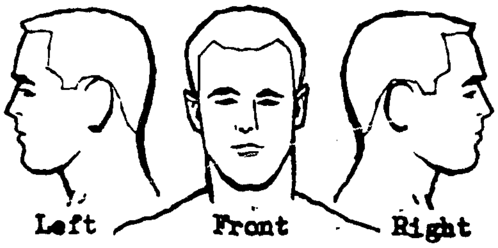
☐ None
☐ Simple Crack
☐ Web Cracked
☐ Web Broken
☐ Grid Cracked
☐ Grid Broken

☐ Windshield popped or knocked out.



In Unit ____, Seat Pos. ____, Age ____

☐ Conscious, ☐ Unconscious, Sex ___

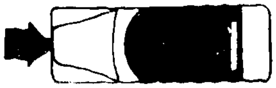


In Unit ____, Seat Pos. ____, Age ____

☐ Conscious, ☐ Unconscious, Sex ___

Figure 5

Severity Scale FC - Front End Damage
Concentrated Impact

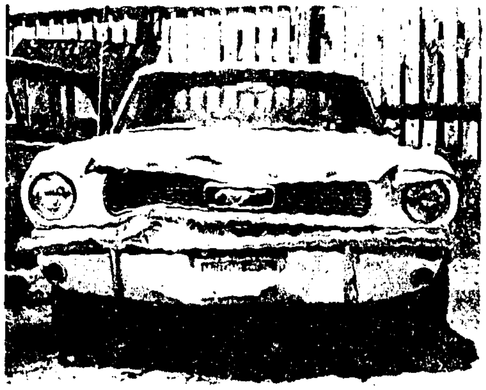


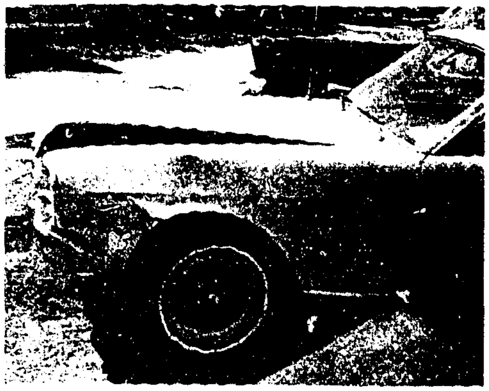
FC

This scale is applicable to damage to midsection of front of subject vehicle resulting from a collision with a tree, utility pole or other narrow fixed object.

Damage Rating

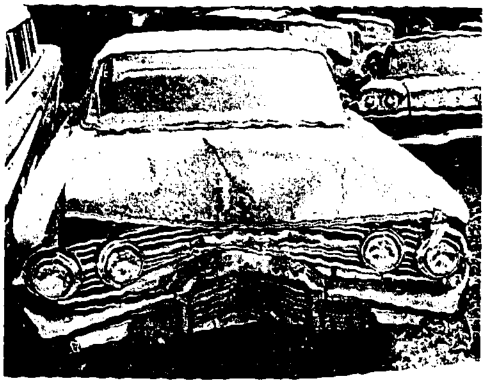
◀ FC-1

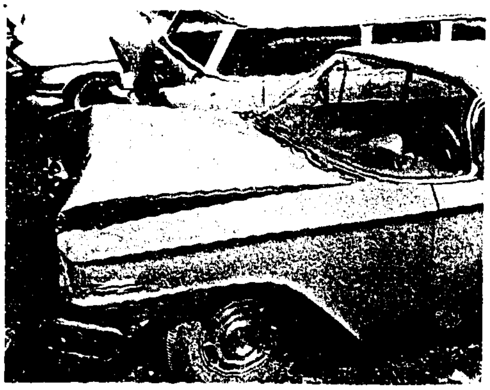




◀ FC-2

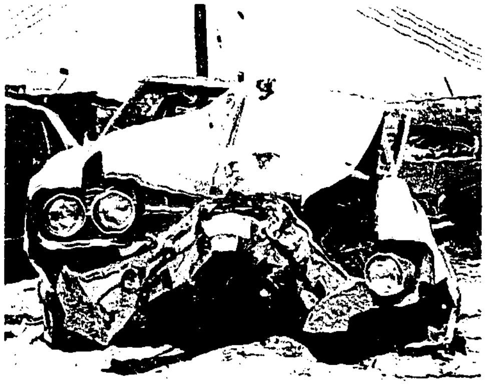
◀ FC-3





◀ FC-4

◀ FC-5



◀ FC-6

◀ FC-7

In order to produce more meaningful data on damage to vehicles, the Traffic Accident Data Project developed a photographic guide for investigating officers. It should be pointed out that such guides have been used previously by the Cornell Aeronautical Laboratory and the British Road Research Laboratory. However, in both cases, photographs were used by research personnel. The TAD Project Vehicle Damage Scale is designed for use at the scene of the accident by police or other personnel with considerably fewer scientific skills.

Essentially, the TADP guide consists of several pages of pictures, one page for each type of collision impact or roll-over. On each page there are three photographs, or three two-view sets of photographs, showing automobiles damaged in traffic accidents. To the right of the photographs and intervening spaces, is a numerical damage rating scale. Figure 6 is a typical page out of the TADP Vehicle Damage Scale.

Damage in the top photographs, or sets of photographs, is minor and generally limited to dents and gouges in body sheet metal and trim. The damage rating corresponding to these photographs is "2". The second photographs, show automobiles that have been moderately damaged, with considerable crumpling of body sheet metal, but little or no distortion of the basic structure or frame. The damage rating in this case is "4".

In the photographs at the bottom of each sheet, vehicles are severely, but not totally damaged. Sheet metal is badly torn or crumpled; the basic structure of the car is dostorted somewhat; and there is usually some penetration of the passenger compartment. The damage rating is "6".

The reason for the "2, 4 and 6" ratings is that it may not be possible to match damage on the vehicle with any of the photographs. In that case, "1, 3, 5 or 7" ratings may be used for damage less or greater than shown in the photographs. Thus with the three photographs, an investigator should be able to select any one of 7 degrees of severity to indicate how badly a car was damaged.

In order to make a damage rating, the reporting officer must first select the proper page of pictures. This procedure is facilitated by an index which is keyed to small impact diagrams that appear at the top of each page of pictures. Having determined which of the impact diagrams relates to the collision under investigation, the officer then turns to the appropriate page of photographs. For example, if he is reporting on an angle collision which occurred at an intersection where the front end of one vehicle struck the side of the other vehicle in the vicinity of the passenger compartment, he selects pages showing front end damage and side damage to rate damage on the two vehicles, respectively. The final step is comparison of damage on vehicles with damage shown in photographs to select a rating number.

The TADP Vehicle Damage Scale was adopted by Oregon as an integral part of the bi-level reporting system. During the three-month test, officers rated damage on nearly 1,000 vehicles using the photographic guide which was incorporated as a part of the instructional manual prepared for the new reporting system.

Reception to the scale was most enthusiastic, and in view of the small amount of training that the TADP staff was able to accord supervising officers, the performance of reporting officers was extremely gratifying. In 9 out of 10 times, the reporting officers selected the proper page in the photographic guide. Happily, it was possible to correct virtually all page selection errors in a relatively simple office procedure by review of the officer's narrative and collision diagram.

Statistical analyses performed on the damage ratings indicate that the scale behaved as expected. The entire vehicle damage scale and its performance in the Oregon tests is available in a separate TAD Project report.

Processing Data

Prior to the advent of magnetic data storage devices, most data processing was geared to the capacity of an 80- or 90-column punch card. This was especially true among agencies that preferred to avoid difficulties encountered in handling of trailer cards. Result of this limitation was that all user agency needs could not be satisfied in any one processing procedure. State highway departments found that their needs differed from those of the motor vehicle registrar and those of the driver licensing administrator. So it was not uncommon to find accident reports processed by two or more agencies, with each extracting only those data which were regarded essential to their operations. Even in single purpose use of punch cards, as in the case of highway engineering, an 80- or 90-column punch card presented severe restrictions on the amount of data that colld be stored on any accident.

After allocating columns for accident serial number; location identification; date and time of occurrence; two, or perhaps three, items of information on drivers and vehicles involved; weather; surface condition; light condition; and a few essential administrative items; there was little space left to describe the accident. Generally, the highway or traffic engineer had to settle for a description that included the following items: severity of accident, type of accident (ran-off-road, collision with other vehicle in traffic, collision with fixed object, etc.), a directional analysis which did not give compass direction but did express relative movements in such terms as, "both vehicles in same direction, one standing and one moving," etc. Under these limitations, listings prepared for selected highways could be used for reconnaisance purposes only, and the production of any analysis that might suggest remedial measures required reference to source documents - the accident report forms.

Availability of magnetic storage devices such as tape, discs and data cells make it feasible to process and store virtually all of the data that appear on an accident report form. Some of the more sophisticated systems which employ direct keyboard input or retinal readers are capable of accepting words as well as digital representations. These systems are capable of storing in a single file data required for all user agencies.

Expansion in data storage capability has been sorely needed to permit fuller description of events preceding, during and after impact. Frequently an accident is a series of events, but with limitations in data storage capacity, only one event is usually recorded. For example, a minor sideswipe between two vehicles may result in loss of control by one of the drivers and terminate in a collision with a roadside object. If definitions in the MANUAL ON CLASSIFICATION OF MOTOR VEHICLE TRAFFIC ACCIDENTS are strictly applied, the accident is classified as a "collision with another vehicle in traffic," but the terminal event, which could be far more disastrous, might not even be mentioned. Only by recourse to the original source document would an analyst discover that there was a series of events.

The TAD Project Steering Committee takes the position that development of useful traffic accident data requires trained and experienced personnel. Agencies having responsibility for accident records should be staffed by persons who are skilled in research methods and statistical techniques and are responsive to data user needs.

Key Word Principle:

A traffic accident report recently received from a city police department included the following narrative (except for changes in proper names):

> "Mr. Blank stated that he was proceeding east on Shady Road and Doe was driving west on same. Just prior to meeting of the two cars, the hood flew up on Car 2 (Doe) obstructing the driver's vision. Blank stated that he moved over to the shoulder and the Doe car crossed to the left, struck Car 1, left rear."

In the space headed "Vehicle Condition," there was an "X" in the box under vehicle 2, opposite "other defective equipment" and a short note, "hood flew up".

While the narrative is succinct and to the point, chances are that, when the description of this accident is converted into machine language for storage purposes, the key event will be lost completely or obscured under "other vehicle defect".

In data systems employing the 80- or 90-column punch card as the basic storage unit, it is difficult, if not impossible, to store a complete description of a traffic accident. As a result, key events described in narratives and in spaces opposite "Other, specify . . . ." become virtually irretrievable. On the other hand, modern systems employing magnetic storage devices can accommodate the entire description of a traffic accident. However, there are some problems still to be solved.

It is not feasible to design a report form which would contain questions to cover all possible contingencies in a traffic accident. This means, that to a large degree, reliance must be placed on the narrative and diagram for descriptions of events and circumstances that cannot be formatted into one or two words or an "X" in a box. While an experienced coder can convert to a digital code description of events more or less common to all accidents, he might not even have a place for some events and circumstances.

One possible solution to this dilemma is the application of the "key word" indexing principle to the narrative part of the accident report. This principle is currently being used in information retrieval systems operated by libraries and research institutions.

In the adaptation to traffic accident data, an interpretive clerk or reader would underline, key words in the narrative. Key words would then be coded and stored along with the rest of the data pertaining to the accident. For sophisticated data systems that can accept and retrieve English words, no coding would be necessary. However, there would probably be need for a computer program to group synonyms. Less sophisticated systems would require an alphabetical thesaurus which would give numeric codes for words, synonyms and phrases.

With the key word system in operation, it would be possible to store and retrieve much information that currently dead-ends in paper files or microfilm reels. The case of the hood that flew open may not be important as an isolated case. However, it could be, if related to others that involved the same make and model of automobile.

APPENDIX

Appendix 1

BASIC TRAFFIC ACCIDENT INFORMATION REQUIREMENTS

The Steering Committee recommends that the following information be recorded on all accidents resulting in deaths or injuries, accidents resulting in sufficient impairment to any vehicle to render it inoperable, and to all other accidents in which a probability that a hazardous violation of traffic laws was committed by one or more persons involved:

a.	Location	- at least to the following accuracy (1) to 100 feet for any accident occurring within 0.1 mile of an intersection. (2) to 0.1 mile at all other places
b.	Time	- month, day, year, hour (local time)
c.	Vehicle Identification	- registration number (state issuing, year) - make, year, body style (type, including description of towed vehicles) - owner's name and address - extent of damage (descriptive scale) - is vehicle operable or not? - disposition of vehicle

d. Driver Identification	- name and address - driver license number (state issuing, type) - date of birth - sex - arrest and citation information
e. Narrative	- what happened - defects or malfunctions pertinent to accident (drivers, vehicles and highway facilities)
f. Diagram	- identification of vehicles and roadways and orientation - paths of vehicles before and after collision, point of impact - evasive action, if any (skid marks, etc.) - unusual or temporary physical conditions - obstructions to visibility (all dimensions would be estimated)
g. Environmental Factors	- weather - road surface condition (dry, wet, etc.) - light condition (daylight, darkness, etc.)

h.	Damage to Other Property	- description - owner's name and address
i.	Identity of Injured Person	- name - age - address
j.	Classification of Injury	- a, b, c or k
k.	Relation to Accident	- in which vehicle? - pedestrian or bicyclist
l.	Disposition	- where taken? - by whom?
m.	Administrative Items	- investigator's identity, etc.
n.	Witness Identification (if available)	- name - address

VT 016 776
APPROVED ARTICULATION COMMITTEE REPORT.

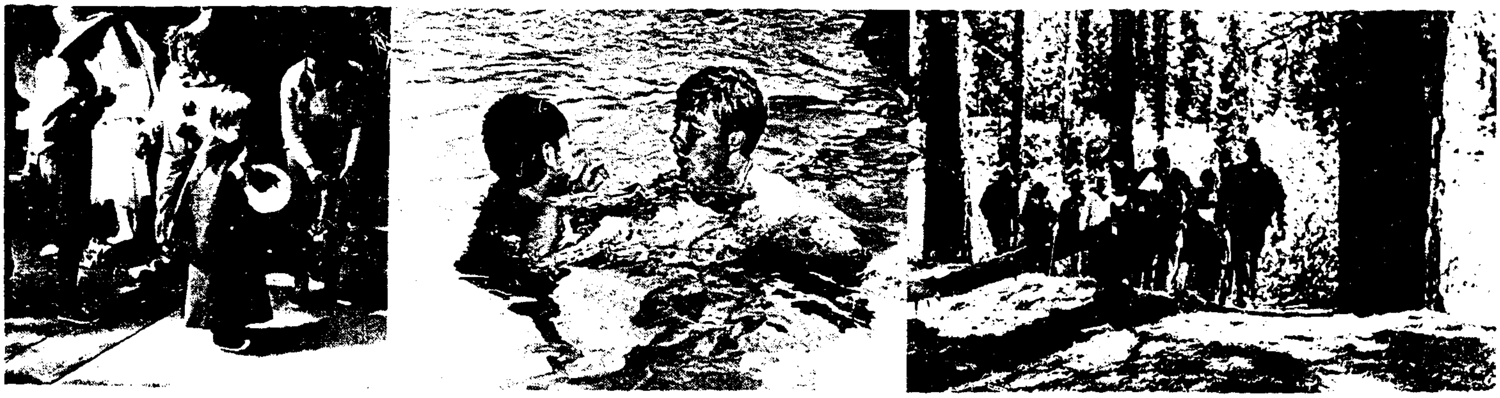
CALIFORNIA SOCIETY OF PARK AND RECREATION
EDUCATORS, SACRAMENTO.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 04MAR72 35P.

DESCRIPTORS - CURRICULUM GUIDES; *COMMUNITY COLLEGES; *RECREATION; *PARKS; RECREATIONAL PROGRAMS; EDUCATIONAL PROGRAMS; *ARTICULATION (PROGRAM); *TECHNICAL EDUCATION

ABSTRACT - REALIZING THE SUDDEN UPSURGE IN PROFESSIONAL RECREATION AND PARK PREPARATION SINCE THE INVOLVEMENT IN THIS EFFORT ON THE PART OF COMMUNITY COLLEGES, THE ARTICULATION COMMITTEE, IN THIS REPORT, PROPOSES WAYS OF CLARIFYING OBJECTIVES AND SUGGESTS METHODS FOR ASSISTING JUNIOR COLLEGE STUDENTS IN MAKING SMOOTHER TRANSITIONS TO SENIOR INSTITUTIONS. TO IMPROVE CURRICULUM CONTENT, FIVE COURSES MEETING 5 HOURS A WEEK AND ONE MEETING 3 HOURS FORM THE CORE OF THE PROPOSED INSTRUCTIONAL DESIGN. COURSE DESCRIPTIONS, GOALS, ACTIVITIES AND REQUIREMENTS ARE LISTED IN THE COURSE OUTLINES PROVIDED FOR EACH OF THE SIX COURSES. A CAREFUL REVIEW OF ALL CONTENTS IS RECOMMENDED BEFORE APPROVAL IS GIVEN TO IMPLEMENT THE PROGRAM BECAUSE IN ORDER TO BE EFFECTIVE EACH ORGANIZATIONAL LEVEL OF THE INSTITUTION MUST SUPPORT THE NEW PROGRAM. (SN)

CALIFORNIA SOCIETY OF
PARK AND RECREATION EDUCATORS

ARTICULATION COMMITTEE
REPORT



APPROVED MARCH 4, 1972

4260

APPROVED

ARTICULATION COMMITTEE

REPORT

Adopted March 4, 1972

CALIFORNIA SOCIETY OF PARK
AND RECREATION EDUCATORS

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COURSE OUTLINES

CALIFORNIA SOCIETY OF PARK AND RECREATION EDUCATORS

4700 COLLEGE OAK DRIVE ● SACRAMENTO, CALIFORNIA 95841 ● PHONE (916) 484-8231

WE, THE CALIFORNIA SOCIETY OF PARK AND RECREATION EDUCATORS, AGREE TO ACCEPT, WITH INTENT TO SUPPORT, THE REPORT FROM THE ARTICULATION COMMITTEE. FURTHER, WE PLEDGE TO IMPLEMENT THE PROVISIONS OF THE REPORT AT OUR RESPECTIVE INSTITUTIONS.

THIS REPORT CAN SERVE AS GUIDELINES FOR ALL MEMBER SCHOOLS TO FOLLOW. THE COURSE OUTLINES ARE CONCISE AND COMPREHENSIVE, AND INTENDED AS A FRAME OF REFERENCE, RATHER THAN AS SPECIFIC, INFLEXIBLE INSTRUCTIONAL UNITS.

Dr. James Bell
CAL-SPRE President
California State Polytechnic College
(Pomona)

Donald C. Weiskopf
CAL-SPRE Secretary-Treasurer
American River College
(Sacramento)

Dr. Marilyn Jensen
CAL-SPRE Vice-President
California State College
(Long Beach)

FOREWORD

Acceptance of the report of the Articulation Committee by the recreation educators of both the community colleges and four-year institutions of California can offer a new dimension in the professional preparation in recreation and parks.

During the past decade, there has been a dramatic and sudden growth in professional preparation in recreation and parks. Indeed, one of the most significant trends has been the emergence of community colleges offering associate degrees in recreation. This development reflects two factors:

1. The rapid expansion of two-year colleges on the American educational scene.
2. The need to prepare individuals for direct leadership and program services, with the recognition that most graduates of four-year programs are now moving directly into supervisory and administrative roles.

The Articulation Committee has recognized a need to clarify the objectives of professional preparation in recreation and parks, and to improve curricular content, organization, and staffing. In addition, it has been the aim of the Articulation Committee to assist community college students in making a smoother transfer to the four-year school.

Approval alone, however, will not accomplish the purpose of the report. What is needed is effective implementation of the report by all levels of administration. To be successful, it must have the full support of both the administrators and the faculty of higher education institutions.

Therefore, the Articulation Committee of the California Society of Park and Recreation Educators urges all Deans of Admission, Instruction, Division Chairmen, and those responsible for Articulation between 2-year and 4-year schools, to read carefully the contents and provisions of this report.

INTRODUCTION

The following report was submitted to the California Society of Parks and Recreation Educators at the California Parks and Recreation Society Conference, March 4, 1972, in San Diego. After discussion, the members voted to adopt the report with full intent to implement suggestions and recommendations at the earliest date.

1. The Society accepted the following: Six courses, if taught, should be taught at the lower division, or Community College level:

	Units
Introduction to Community Recreation	3
Program Planning and Organization	3
Recreation Group Leadership	3
Outdoor Recreation (Foundations of)	3
Social Recreation	3
Performing Arts in Recreation	3

2. Students who plan to transfer to 4-year institutions will be encouraged to complete their General Education requirements.

3. The 4-year institution is encouraged to explore ways in which a portion of lower division Field Work experience can be credited on a transfer basis.

4. Basic to the whole issue of Articulation is effective communication between Community Colleges and 4-year colleges and universities, particularly in the local area.

5. The Introduction to Community Recreation course should be made available to non-majors as a general service course.

6. The role of the Community College is to teach skills, techniques, face-to-face leadership, while the four-year college should emphasize theory, supervision, management, and administration.

7. Skill courses should be eliminated at the Upper Division.

Last January, members of the Articulation Committee of CAL-SPRE met at two different locations with the purpose of reviewing the titles and content of the existing course outlines of both 4-year and 2-year schools in California. Suggestions were presented as to the role of the Community Colleges and 4-year institutions in the preparation of professional recreators. Further, they made recommendations for minimum requirements and competencies for Community College Recreation Educators.

Northern Section (American River College)
Robert McBride, San Francisco State
Dale Swire, Chico State College
Norman Olsen, Chabot College
Don Weiskopf, American River College
Mary DeMure, Office of the Chancellor, Calif. Community Colleges

Southern Section (San Fernando Valley State College)
Jean Tague, San Fernando Valley State
Dorothy Goodwin, Pasadena City College
Robert Mortenson, Compton College
Lynn Haffly, San Diego State College
James Bell, California Poly (Pomona)

Dr. Robert McBride, Chairman of the Articulation Committee, requested that Don Weiskopf, Secretary-Treasurer of CAL-SPRE, in cooperation with the Office of the Chancellor, California Community Colleges, compile a concensus report of the available recommendations, information, and data. Course outlines from both the 4-year and 2-year schools were examined, and concensus outlines were prepared to serve as guides for recreation curricula in the State of California to follow. Although these outlines are concise and comprehensive, they are intended as guides rather than as specific, inflexible instructional units. Individual schools may approach these courses in line with local area resources and needs.

To assure that the course content of the six courses is satisfactory, questionnaire forms were sent on March 11 to each member of the Articulation Committee. After careful study of the report, they were requested to indicate additions, deletions, or corrections. Their suggestions and comments have increased significantly the effectiveness of the outlines.

ROLE OF THE COMMUNITY COLLEGE AND 4-YEAR INSTITUTIONS IN THE PREPARATION OF PROFESSIONAL RECREATORS

COMMUNITY COLLEGES - To prepare students for direct face-to-face leadership or technical jobs in the field of recreation and parks. This role involves the preparation of the student for both early entry into the field and/or transfer to a 4-year program to continue their education towards a Bachelor's or Master's degree. The two-year school provides occupational training programs in specific areas of personnel shortages. Many California Community Colleges are developing curricula to educate and train leadership personnel in the recreation and parks field.

Philosophy of a Community College Program

The basic philosophy of the 2-year college recreation program is twofold:

1. To train persons for para-professional entry-level jobs in leisure service agencies. A major objective of the associate degree program in recreation leadership is focused on the preparation of associate professional personnel for early entry into the field. With a growing number of career opportunities available to qualified associate professionals, particularly those at the program leader level, the community college is justified in providing a career-oriented recreation curriculum. To achieve this end, the curriculum must contain the basic knowledge and training skills to prepare the student to function effectively in a face-to-face leadership capacity in a variety of recreational settings.

2. To provide for a smooth transfer of those who may elect to continue an education toward a baccalaureate or 4-year program. This implies an understanding and effective articulation on the part of the community college administration of senior college policies, course acceptance, curriculum changes, admission requirements, etc. Closer relationships and open dialog must exist between both institutions.

FOUR-YEAR COLLEGES AND UNIVERSITIES - To provide the field of recreation and parks with the personnel to fill administrative or high-level supervisory positions. Depending on the size and scope, a recreation department needs competent personnel in such areas as: supervision and administration of program services, evaluation, planning, design, and construction. Also the maintenance of facilities; the recruitment, hiring, training, and evaluating of personnel; budgetary procedures and reporting; working effectively with municipal councils or boards and civic groups; and effective public relations and departmental promotion.

In situations involving a tight job market, four-year degree graduates have found themselves competing for entry-level jobs in leisure service agencies. Therefore, it is essential that graduates be prepared to handle first-line operating roles, as well as supervisory levels.

GOALS OF A COMMUNITY COLLEGE PROGRAM

To present the:

1. Basic recreation skills for employment at the Associate Degree entry level; and/or transfer to a 4-year program so students may continue their education towards a Bachelor's degree.
2. Basic knowledge required in the field of recreation, parks, and leisure services: A foundation of recreation philosophy and principles, plus a basic general education (a broad education in human relations).
3. Methods, principles, and techniques in planning and organizing and directing recreation programs in a variety of settings.
4. Understanding and application of the basic principles and techniques in face-to-face leadership, including the theories, principles, and practices of leadership.
5. Awareness of the importance of the role of recreational lifetime activities.
6. Nature and role of leisure in contemporary society.
7. Knowledge and appreciation of all outdoor activities, including natural resources, conservation, and organized camping.
8. Practical knowledge in the field of recreation and parks, on-the-job training under qualified supervision (to relate theory to practical experience).
9. Abilities needed to relate to others the nature, role, and importance of recreation in today's society.

SUGGESTED EDUCATION AND COMPETENCIES FOR THE RECREATION PROGRAM COORDINATOR OR DIRECTOR OF THE COMMUNITY COLLEGE PROGRAM

__ A master's degree in recreation and at least two years of occupational experience in a recreational setting.

SUGGESTED EDUCATION AND COMPETENCIES FOR TEACHING FACULTY

__ The minimum of a bachelor's degree or equivalent in recreation and at least three or more years of occupational experience in a recreational setting.

CONCLUSION

In Recreation and Parks, the fully trained and qualified professional person in an administrative or top supervisory role may be assisted by a Community College-trained technician or program assistant, who can assume a direct program leadership role in various activity areas.

Based on current Civil Service codes, if job classifications indicating the hiring of only professionals are continued, individuals taking the Associate degree program in recreation are unable to move into positions of higher pay and responsibility.

However, with a growing number of career opportunities available to qualified professionals, particularly those at the program leader level, the Community College is encouraged to provide a career-oriented recreation curriculum to prepare the student for early entry into the field.

Thus, the curriculum must contain the basic knowledge and training skills to prepare the student to function effectively in a face-to-face leadership capacity in a variety of recreation settings.

COURSE OUTLINE *

INTRODUCTION TO COMMUNITY RECREATION 3 Units

HOURS PER WEEK

Class, 3

Course Description

For recreation majors and non-majors, a general orientation to the field of recreation and parks, including a history of the development of the recreation profession, a survey of recreation and leisure services, description and interpretation of recreation as a form of community, service and the nature and scope and significance of leisure and recreation as a social force in contemporary society. Emphasis is on the role of the professional leader in a variety of settings

Major Divisions

- I. Recreation - Its Nature, Extent, and Significance
- II. Recreation and Government
- III. Recreation in Other Settings
- IV. Recreation Leadership
- V. Operation of Recreation Areas and Facilities
- VI. The Recreation Profession
- VII. Goals and Problems in Recreation Service
- VIII. The Future

Course Goals

To introduce:

1. The historical and philosophical foundation of leisure and recreation and implications of the recreation movement in the United States.
2. The development of concepts concerning recreation; the meaning of leisure and recreation; and the socio-economic movements which have affected the growth and development of recreation.
3. A basic understanding of the total field of recreation and leisure and its interrelationship with other forces in society.
4. Activities which comprise the recreational field.

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* Recommended by the California Society of Parks and Recreation Educators, March 4, 1972.

Course Goals (Continued)

5. The role of the professional; public recognition of the field, and careers in recreation and parks.

6. The varied types of agencies which provide leisure, with emphasis placed on the interrelatedness of special agencies and institutions which serve the needs of society.

7. An understanding of the goals and problems in recreation services in rural and urban areas.

Student Performance Objectives and Evaluation

The student will:

1. Present a short historical sketch of the recreation movement in the United States.

2. Review a magazine article: subject pertaining to leisure time, recreation and parks; suggested periodicals: "Parks and Recreation".

3. Complete quizzes and unit assignments covering questions relating to specific chapters or areas.

4. Participate in hour examinations and final exam.

5. Give oral reports (individual, panel, debate, etc.)

6. Observe recreation programs, activities, and special events in the community.

7. Make a term report: a comprehensive written presentation on a related subject pertaining to recreation and parks, using standard term report precedure and format.

8. Participate on a panel or debate: to help prepare a printed outline presentation to members of class.

Units of Work

I. <u>Recreation - Its Nature, Extent, and Significance</u>

   1. What is recreation? Leisure?
   2. The importance of recreation; objectives of recreation?
   3. The history of Municipal Recreation in the U.S.
   4. The theory, philosophy, and principles of leisure, play, and recreation; recreation as a social force.
   5. The sociology of leisure.
   6. The economics of recreation
   7. Psychological aspects of play
   8. Recreation potentials and unequal situations
   9. Brief overview of Recreation and leisure in America

II. Recreation and Government

- A. Local Government
- B. County and District
- C. State Government
- D. Federal Government
- E. World (recreation among nations)

III. Recreation in other Settings

- A. Recreation and the Community (types of agencies or organizations providing leisure services)
    1. The family
    2, The school
    3. The church
    4. Voluntary organizations
    5. Commercial recreation
    6. Private agencies
    7. Employee recreation
    8. Organized camping and outdoor recreation
    9. Special interest organizations

- B. Recreation for Special Groups

    1. Therapeutic recreation
    2. Recreation for the handicapped
    3. Recreation for the disadvantaged
    4. Recreation for the mentally retarded
    5. Recreation for senior citizens
    6. Recreation in correctional institutions

IV. Recreation Leadership

- A. Recreation Leadership

- B. Recreation Department personnel

- C. Education and training the leadership staff

- D. Needs and opportunities in the recreation profession

V. Operation of Recreation Areas and Facilities

- A. Operation of playgrounds

- B. Operation of buildings and indoor centers

- C. Operation of recreation facilities

VI. The Recreation Profession

- A. The professional
- B. The role of the professional
- C. Public recognition of the field
- D. Careers in recreation and parks
- E. Professional preparation
- F. Recruitment of recreation and park professionals
- G. Certification of professionals
- H. Civil Service procedures
- I. Professional associations
- J. Periodicals and references

VII. Goals and Problems in Recreation Service

A. Goals to improve the quality of community life
B. Human values
C. Problems and key issues

VIII. The Future

A. Challenges facing society
B. Leisure...a major factor in our society
C. What the recreation movement needs
D. What tomorrow will bring

Texts and References

Butler, George. Introduction to Community Recreation. New York: McGraw-Hill Book Company, 1967.

Carlson, Reynold E., Deppe, Theodore R., and MacLean, Janet R. Recreation in American Life. Belmont, California: Wadsworth Publishing Company, 1963.

Kraus, Richard. Recreation and Leisure in Modern Society. New York: Appleton-Century-Crofts Educational Division, 1971.

Meyer, Harold D., Brightbill, Charles K., and Sessoms, H. Douglas. Community Recreation, A Guide to Its Organization. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1969.

COURSE OUTLINE *

PROGRAM PLANNING AND ORGANIZATION 3 Units

Hours Per Week

Class, 2; Laboratory, 3

Course Description

A theory and activity course for recreation majors, involving a study of essential elements and basic principles of organization, supervision, promotion, and evaluation of various types of recreation programs, including the methods and materials used in planning and conducting organized recreation programs in public and private agencies. Emphasis is on the role of the face-to-face leader in organizing recreational programs in a variety of settings.

Major Divisions

I. The Recreation Professional

II. Program Planning Principles and Methods

III. Planning for Specific Populations

IV. Recreation Program Areas

V. The Operation of Playgrounds

VI. The Operation of Recreation Buildings, Indoor Centers, and Facilities

VII. Publicity and Public Relations

VIII. Records, Reports, and Accountability

IX. Evaluation Techniques

X. Adapting Recreation Programs to Varied Settings.

Course Goals

To introduce:

1. The basic knowledge of program planning principles and methods for planning, organizing, staffing, directing, and controlling a recreation program in contemporary society.

2. The recreation needs and interest of various groups.

3. A practical laboratory experience in the planning, organization, promotion, and evaluation techniques of various types of programs, with emphasis on a community center.

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* Recommended by the California Society of Park and Recreation Educators, March 4, 1972.

Course Goals (continued)

4. Experience in planning events for specific populations.
5. Stimulate and develop student leadership through committee action.
6. Study and discussion of the operation of playgrounds, recreation buildings, indoor centers, and other recreation facilities.
7. Organizational skills for a variety of recreational activities and special events.
8. An opportunity for leadership of recreation activities.
9. Illustrative examples of successful programs.

Student Performance Objectives and Evaluation

The student will:

1. Complete unit assignments, covering specific chapters or areas.
2. Participate in hour examinations and final exam.
3. Develop a group term project. The class will be divided into committees or teams that will be responsible for the planning and operation of a program or special event (for an agency or organization in the community, or a co-recreation program on campus.
4. Write a term report: Each student will compile a typed report on a program or special event, preferably on his group project.
   a. The program report: introduction, objectives, schedules or plans, staff chart, budget, publicity, evaluation, references, etc.
   b. Presentation of report (oral), "Selling program to the Board."
5. Demonstrate proficiency in attendance, class promptness, and oral and written contributions.
6. Demonstrate effectiveness in face-to-face leadership and program operation skills as described in the texts.

Units of Work

I. The Recreation Professional
   A. Trends in Organized recreation service
   B. The recreation profession today
   C. Leadership and Group Dynamics

II. Program Planning Principles and Methods
   A. Factors in Planning Recreation Programs

B. Pitfalls in Planning

C. Guiding Principles for Program Planning

D. Methods of Organization

E. Implementing a Program Survey

III. Planning for Specific Populations (Programming for)

A. Recreation needs and interests of children

B. Recreation programming for Teen Age boys and girls

C. Recreation needs and interests of adults

D. Recreation for the Aging (Senior Citizens)

IV. Recreation Program Areas

A. Arts and Crafts
  1. Scope
  2. Values
  3. Characteristics of a good program
  4. Settings for Arts and Crafts
  5. Exhibits and festivals
  6. Relationship to other program areas

B. Dance

C. Drama

D. Literary, Mental and Linguistic Activities

E. Music

F. Outdoor Recreation

G. Social Recreation

H. Sports and Games

I. Hobbies

J. Special Events
  1. Definition and scope
  2. Values in special events
  3. Types of special events
  4. Organizational skills for special events

V. The Operation of Playgrounds

A. Function of the playground

B. Playground organization

C. Program Planning

D. Playground programs
   1. Daily program
   2. Weekly program
   3. Summer program
   4. Programs for other seasons

E. Safety

F. Problems of conduct and operation

G. Supplies

H. Maintenance

VI. The Operation of Recreation Buildings, Indoor Centers, and Facilities

A. Buildings and Centers
   1. Building activities
   2. A summer building program
   3. Fall and winter building program

B. Recreational Facilities
   1. Bathing Beach and Swimming Pool
   2. Golf Course
   3. Stadium
   4. Municipal Camp
   5. Winter Sports Facilities
   6. Other facilities

VII. Publicity and Public Relations

A. Interpreting the Recreation program
   1. Writing newspaper articles
   2. Photography for Newspapers
   3. Radio and TV as public relations tools
   4. Planning live demonstrations in Recreation
   5. Display types
   6. Publicity check list
   7. Typical promotion campaign

VIII. Records, Reports, and Accountability

IX. Evaluation Techniques

A. Measuring the effectiveness of program techniques

B. Evaluation of participants

C. Evaluation of loaders

X. Adapting Recreation Programs to Varied Settings

A. Recreation in Treatment Centers

B. Recreation for the Ill and Handicapped in the community

C. Recreation in the Armed Forces

D. Religious sponsorship forces of recreation

E. Industrial Recreation programs

F. The Role of Voluntary Organizations

G. Research and Evaluation in Recreation

Texts and References

Kraus, Richard. Program Planning and Organization. New York: Appleton-Century-Crofts Educational Division, 1966

Second National Workshop on Recreation. The Recreation Program. Chicago: The Athletic Institute, 1963.

Corbin, Dan H. Recreation Leadership. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970.

Carlson, Reynold E., Deppe, Theodore R., and MacLean, Janet R. Recreation in American Life. Belmont, California: Wadsworth Publishing Company, 1963.

COURSE OUTLINE *

RECREATION GROUP LEADERSHIP 3 Units

Hours Per Week

Class, 2; Laboratory, 3

Course Description

The principles of human dynamics as they apply to effective face-to-face and group leadership. Emphasis is on the identification of various types of groups and the application of leadership techniques to various group situations.

Major Divisions

I. Introduction to Recreation Leadership

II. The Meaning of Leadership

III. Recreation and the Leadership Function

IV. The Leadership Process

V. Principles of Effective Leadership

VI. Recreation Needs and Interests of People

VII. Leadership Techniques

VIII. Leadership Personnel in the Recreation Department

IX. Personnel Practices and Policies

X. Supervision

Course Goals

To introduce:

1. A study of ways to enhance the results of recreational group activities.

2. Ways to translate what is known about individual and group behavior on a practical basis so that it can be used by recreation leaders in democratic groups; to make the group action more efficient and effective from the recreation program standpoint.

3. Insight into human group behavior, particularly the everyday problems of group living in the various recreation settings.

4. The logic of individual behavior in the recreation group setting.

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* Recommended by the California Society of Park and Recreation Educators, March 4, 1972.

Course Goals (continued)

5. Study, analysis, and practice of the many group techniques to facilitate group action toward goals.

6. Realistic and attainable leadership techniques to those who wish to improve their human relations skills and assume greater responsibilities.

7. Effective group membership techniques.

8. Methods to help the student realize that the leader must understand the individual in the group as a total person. . . . his needs, motives, abilities, aptitudes, and his behavior, as a basis for facilitating his growth.

9. The basic requirements for developing a recreation program that will contribute to the needs and growth of the members of the group.

10. An awareness of the need for continuous appraisal and evaluation of the program, its leadership, and the growth of individual participants, as a constructive means of improving both the program and leadership ability.

Student Performance Objectives and Evaluation

The student will:

1. Prepare a notebook, covering all class assignments and lectures.

2. Participate actively in the presentation of all units by reading the suggested references, entering into class discussions and answering pertinent questions.

3. Participate in a term project. Committees will be expected to solve one of the pressing problems on public recreation through the use of any method in section VII of this outline.

4. Demonstrate and evaluate individual leadership abilities by participating in three group situations.

5. Complete two examinations, midterm and final.

Units of Work

I. Introduction to Recreation Leadership.

   A. Where are you now?

   B. What makes an effective recreation leader?

   C. Professional Leadership - What the Profession is?

   D. Professional affiliations

II. The meaning of leadership

- A. Definition of leadership
  - 1. Informal leadership
  - 2. Formal leadership

- B. Theories of leadership
  - 1. Trait theory
  - 2. Situational theory
  - 3. Functional theory
  - 4. Composite theory of recreation leadership

III. Recreation and the leadership function

- A. The nature and types of groups
  - 1. Functions in the work-oriented group
  - 2. Functions in the program-oriented group
  - 3. The small group

- B. Fulfilling the individual's group needs in recreation
  - 1. Communication and involvement within the group
  - 2. Responsibility for group identity
  - 3. Responsibility for cohesiveness

IV. The leadership process

- A. Sources of leadership
  - 1. Conditions which promote the creation of leadership
  - 2. Types of leadership

- B. Styles of leadership

- C. Concepts of leadership

- D. The challenges of leadership
  - 1. Creation of a favorable climate
  - 2. The leader as a target

- E. Misconceptions of leadership

- F. Participation in group dynamics
  - 1. Organizing planner teams and formulating proposals
  - 2. Performing under stress
  - 3. Competition
  - 4. Effect of group membership on the individual
  - 5. Barriers to communication
  - 6. Effect of group action on behavior of individual
  - 7. Demonstrating effect of group attitude on individual's behavior
  - 8. Managing a situation in which nothing is resolved.
  - 9. Improving interviewing skills
  - 10. Debriefing session

V. Principles of Effective Leadership

- A. Roles of the leader
- B. Principles for recreation leaders
- C. Impersonal skills

VI. Recreation needs and interests of people

- A. Children
- B. Teen-age youth
- C. Adults
- D. Senior Citizens

VII. Leadership techniques

- A. Small group discussion
- B. "Buzz Group"
- C. Symposium
- D. Panel discussion
- E. Dialogue
- F. Interview
- G. The committee method
- H. Role playing
- I. Others

VIII. Leadership personnel in the recreation department

- A. Characteristics of a leader
- B. The park and recreation staff, duties and responsibilities

IX. Personnel practices and policies

- A. Recruitment, selection, and placement
- B. Employment policies

X. Supervision

- A. Concepts
- B. Techniques
- C. Functions of the supervisor
- D. Employee morale and motivation

Texts and References

Danford, Howard. Creative Leadership in Recreation. Boston: Allyn and Bacon Inc., 1964.

Beal, Bohlen, and Raudabaugh. Leadership and Dynamic Group Action. Ames, Iowa: Iowa State University Press, 1967.

Corbin, Dan H. Recreation Leadership. Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1970.

Shivers, Jay. Leadership in Recreation Service. Toronto, Canada: The MacMillan Co., 1970.

COURSE OUTLINE *

OUTDOOR RECREATION (Foundations of) 3 Units

Hours Per Week

Class, 2; Laboratory, 3

Course Description

History, development, principles and trends of organized camping, nature and conservation, and outdoor recreation. Laboratory and field trips, including camping and hiking activities. Practical skills in firecrafts, outdoor cooking and backpacking. Leadership training in camp counseling. Required for recreation majors.

Major Divisions

I. Outdoor Recreation in American Life

II. Background of Outdoor Recreation in the United States

III. Organized Camping

IV. Outdoor Recreation Skills

V. Nature Education

VI. Conservation and Outdoor Recreation

VII. School Camping and Outdoor Education

VIII. What the Future Holds

Course Goals

To introduce:

1. The Scope of outdoor Recreation
2. Basic information relating to camp organization, program planning, and leadership.
3. Training in Camp Counseling.
4. Practical skills of campcraft.
5. An awareness of nature and conservation.
6. An appreciation of our natural resources, and outdoor heritage.
7. The identification and recognition of problems facing our country in outdoor recreation.

* Recommended by the California Society of Park and Recreation Education, March 4, 1972.

8. The development of a dedicated desire to improve the outdoor recreation opportunities in America.

Student Performance Objectives and Evaluation

The student will:

1. Present a short written paper or term report on an Outdoor Recreation topic.
2. Teach camping or program skills to class.
3. Take a 2-day backpacking trip.
4. Demonstrate campcraft, nature, and conservation skills.
5. Complete quizzes and unit assignments.
6. Participate in mid-term and final examinations.

Units of Work

I. Outdoor Recreation in American Life

    A. Definition of outdoor recreation
    B. The need for outdoor recreation
    C. Scope of outdoor recreation
        1. Sightseeing and touring
        2. Picnicing, outings, cookouts
        3. Hiking, mountain climbing, hosteling, horseback riding
        4. Fishing and hunting
        5. Camping
            a. organized
            b. family
            c. day
        6. Nature recreation
        7. Historical and archeological interests
        8. Winter sports
        9. Water related recreation
        10. Motorized vehicles

    D. Extent of outdoor recreation
        1. Commercial outdoor recreation
        2. Agencies concerned with outdoor recreation
            a. municipal
            b. state
            c. federal
            d. county
            e. voluntary organizations
            f. private organizations
        3. Leisure use statistics

    E. Values of outdoor recreation programs

II. Background of Outdoor Recreation in the United States

- A. The American Indian
- B. Exploration and the Colonial Period
- C. The 19th century and westward expansion
  - 1. Characteristics influencing recreation
  - 2. Exploration of natural resources
  - 3. Disappearance of land
  - 4. Growth of the cities
  - 5. Rise of social problems
- D. Rise of State Parks
- E. Development of National parks
- F. Beginning of camping movement
- G. Growth of outdoor recreation programs

III. Organized Camping

- A. Growth and extent of organized camping in the United States
- B. Values and objectives of camping
- C. Types of camps
  - 1. In terms of sponsorship
    - a. private
    - b. organization
    - c. public
    - d. school
    - e. church
    - f. others
  - 2. In terms of groups served
    - a. youth
    - b. family
    - c. adult
    - d. special groups
  - 3. In terms of duration
    - a. resident camp
    - b. day camp
    - c. short-term and overnight camp

- D. Camping as part of the community recreation program
  - 1. Resident, family and day camps sponsored by public authorities
  - 2. Camping programs of community agencies

- E. State and federal assistance to the camping movement
- F. The American Camping Association
  - 1. professional leadership
  - 2. emphasis on standards
  - 3. camping trends
    - a. decentralization
    - b. motivation
    - c. leadership
    - d. others
- G. Day camping
- H. The skills of counseling

IV. Outdoor Recreation Skills

- A. Toolcraft
  - 1. Use of knife, axe, hatchet and saw
  - 2. Maintenance of tools
- B. Firecraft
  - 1. Forest fires - causes, consequences, prevention
  - 2. Campfires

- C. Camp cookery
- D. Ropecraft
- E. Orienteering
- F. Wilderness survival
- G. Tents and shelters
- H. Camp sanitation
- I. Backpacking
    - 1. equipment available
    - 2. planning
    - 3. health and safety

V. Nature Education

- A. Orientation to nature education
- B. Weather
- C. Nature Trails
- D. Astronomy
- E. Rocks and soils
- F. Plants
- G. Animals

VI. Conservation and Outdoor Recreation

- A. Dependence of outdoor recreation upon natural resources
- B. The meaning of terms
    - 1. conservation
    - 2. preservation
- C. Problems of conservation for recreation
- D. Approaches to conservation
    - 1. land reserves
    - 2. legal restrictions
    - 3. improvement of resources management
    - 4. education

VII. School Camping and Outdoor education

- A. Present status
- B. The increase in school camping and outdoor education
- C. Objectives in school outdoor education programs
- D. Problems in development of outdoor education programs
- E. Areas of experience in outdoor education

IX. What the future holds

- A. Outdoor recreation trends
- B. Outdoor recreation problems
- C. Need for new facilities
- D. the need for education
- E. the federal and state role

Texts and References

Mitchell, Viola and Crawford, Ida. *Camp Counseling*. Philadelphia: W. B. Saunders Company, 1970.

Udall, Stewart L. *The Quiet Crisis*. New York: Holt, Rinehart and Winston, 1963.

Allen, Shirley W. and Justin, Leonard W. *Conserving Natural Resources*. New York: McGraw-Hill Book Co., 1966.

Brockman, Frank C. *Recreational Use of Wild Lands*. New York: McGraw-Hill Book Company, 1959.

Outdoor Recreation Resources Review Commission. *Outdoor Recreation in America*. Washington, D. C.: U. S. Government Printing Office, 1962, and later publications.

COURSE OUTLINE *

SOCIAL RECREATION 3 Units

Hours Per Week

Class, 2; Laboratory, 3

Course Description

A theory and activity course designed to present instruction, material, and information necessary to effectively conduct social recreation in clubs, playgrounds, recreation centers, churches and camps. Emphasis is on the social development and integration of individuals into group programs, including planning, programming, and conducting social recreation activities.

Major Divisions

I. The Nature of Social Recreation

II. Specific Leadership Techniques and Nature of Social Recreation Activities

III. Leadership Techniques in Working with People

IV. Planning in Social Recreation

V. Party Planning and Organization

VI. Age Characteristics and Adapting Activities

VII. Special Areas within Social Recreation

VIII. Special Leadership Problems

IX. Recreational Games

X. Evaluation of Social Events

XI. Use of Social Recreation in Various Settings and for Special Groups

Course Goals

To introduce:

1. Experience in leadership situations.

2. Opportunities to practice activity skills in class demonstrations.

3. Techniques and methods of leadership for social events

4. A working knowledge of social games and activities for different age groups.

* Recommended by the California Society of Park and Recreation Educators, March 4, 1972.

Course Goals (continued)

5. The characteristics of age groups and the methods of selecting and adapting materials suitable for different age groups.

6. Experience in planning events for specific populations..

7. An opportunity to practice the planning, leading, and evaluating of social recreation activities.

8. An appreciation and understanding of the values of social recreation.

9. A sound philosophy of recreation and leisure time living.

Student Performance Objectives and Evaluation

The student will:

1. Participate as a group leader in low organized games; present a written or typed description of the game or activity.

2. Prepare a bulletin board display.

3. Participate in a special event: working in a group or committee of 4 or 5, plan and conduct two special events, i.e. a party, show, dance, or some other event, sponsored by local recreation agency, school or organization.
   a. Each event will be planned for a specific age group or special situation group, such as a hospital ward.
   b. Each committee will select a chairman and a secretary.
   c. A typed program plan for each event will be turned in by the secretary one week before the scheduled date.
   d. Each committee will distribute appropriate printed materials to the class.
   e. A written evaluation of each event is required of all members of the committee.

4. Complete two examinations and possible quizzes.

5. Develop a Party Pak featuring a repertoire of games, activities, and songs, which will be turned in the last week of class. Guidelines will be given. Each kit must contain a listing of all supplies, equipment, aids, and suggestions for their use.

6. Complete a term report.: prepare a written (typed) report dealing with the planning and organization of a social event (party, fashion show, swim party, banquet, dance, etc.). Event can deal with a hypothetical situation.

Units of Work

I. The Nature of Social Recreation
   A. Definition of Recreation and Social Recreation
   B. Classification of Social Recreation games.

Course Goals (Continued)

- C. Characteristics of social recreation games
- D. Objectives of social recreation
- E. Goals of social recreation
- F. Values of social recreation
  - 1. Meeting emotional needs
  - 2. Developing new interests
  - 3. Making new friends
  - 4. Others

II. Specific Leadership Techniques and Nature of Social Recreation
- A. General game leadership techniques
- B. Nature of Social Recreation Activities
  - 1. Mixers
  - 2. Defrosters
  - 3. Active games
  - 4. Relays
  - 5. Inactive games
  - 6. Dance mixers
  - 7. Naturettes
  - 8. Brain teasers
  - 9. Sense alerters
  - 10. Mystifiers
  - 11. Stunts
  - 12. Card Games
  - 13. Skits
  - 14. Table Games
  - 15. Singing Games
  - 16. Tricks and puzzles

III. Leadership Techniques in Working with People
- A. Principles of Social games leadership
- B. Signals and Cues to gain attention
- C. Use of Volunteers
- D. Formations for explaining games (circle, line, files, etc.)
- E. Psychological effects of game formations
- F. Techniques for maneuvering groups
- G. Choosing teams
- H. The attributes of the good recreation leader
- I. Responsibilities of the leader

IV. Planning in Social Recreation
- A. Selection of program activities
- B. Facilities
- C. Publicity
- D. Program
- E. Finance
- F. Decorations and refreshments
- G. Others

V. Party Planning and Organization
- A. Pre-party committee of individual work
- B. Mechanics of party-giving
- C. Before the party
- D. During the party
- E. After the party
- F. Progressive parties
- G. Evaluation

VI. Age Characteristics and Adapting Activities

VII. Special Areas within Social Recreation
- A. Banquets
- B. Entertainment
- C. Picnics and Outdoor social events
- D. Progressive dinners and games
- E. Large group programs
- F. Decorations
- G. Skits and Drama
- H. Sources and Resources
- I. Publicity and promotion

VIII. Special Leadership Problems (Discipline and Control)

Course Goals (continued)

- IX. Recreational Games
    - A. Traditional Games
        - 1. Carom
        - 2. Croquet
        - 3. Deck Tennis
        - 4. Horse Shoes
        - 5. Tether Ball
        - 6. Shuffle Board
        - 7. Table Tennis
        - 8. Pocket Billiards
        - 9. Quoits
        - 10. Bocci
    - B. Foreign Games
    - C. Others

- X. Evaluation of Social Events
    - A. Criteria for evaluating the social recreation program
    - B. Methods of program evaluation
    - C. Misconceptions in evaluation

- XI. Use of Social Recreation in Various Settings and for Special Groups
    - A. Young children
    - B. Teenagers
    - C. Adults
    - D. Social Recreation for the Aged
    - E. The Family
    - F. Special Groups (retarded, handicapped, aged, therapeutic, etc.)
    - G. Other

Texts and References

Mitchell, Elmer., and Borst, Evelyne. Social Games for Recreation. New York: Ronald Press Company, 1959.

Harris, Jane., File O' Fun. Minneapolis: Burgess Publishing Company, 1970.

Reader's Digest Association. Book of 1000 Family Games. Pleasantville, New York: The Reader's Digest Association, Inc., 1971.

Wackerbarth, Marjorie., and Graham, Lillian. Successful Parties and How to Give Them. Minneapolis: T.S. Denison, 1962.

Corbin, Dan. H., Recreation Leadership. Englewood Cliffs, New York: Prentice- Hall, Inc., 1970.

COURSE OUTLINE *

PERFORMING ARTS IN RECREATION 3 Units

Hours Per Week

Class, 2; Laboratory, 3.

Course Description

Development of an appreciation for and leadership techniques in the Performing Arts such as music, dance, and drama, all of which have made a deep cultural impression on American society. Course will also include rhythmics, puppetry, and pageantry emphasizing special events and the use of specialists in each field. Instruction will be focused on the organization and supervision aspects of these activities, rather than on the mastery of performance skills.

Major Divisions

I. Introduction to the Performing Arts

II. Effective Leadership in the Performing Arts

III. Recreation Music

IV. Recreation and Dance

V. Drama in Recreation

VI. Story Telling

VII. Pageants, Festivals, and Holiday Drama

Course Goals

To introduce:

1. The Performing Arts as an integral part of a well planned recreation program, including singing activities, musical instruments, rhythmic activities, and music appreciation. Emphasis will be on developing an appreciation of music, rather than mastery of performance skills.

2. Methods and materials of folk, square, and social dance; attention to terminology, fundamental skills, selection and presentation of dances.

3. A survey of the scope, values, and fundamental skills of drama and its role in recreation.

4. Leadership methods and techniques in presenting pageantry emphasizing special events.

5. Laboratory experience to develop skills in the Performing Arts, leadership and teaching experience.

* Recommended by the California Society of Park and Recreation Educators, March 4, 1972.

Student Performance Objectives and Evaluation

The student will:

1. Develop leadership proficiency in the organization and supervision of the Performing Arts.
2. Participate in all areas, suggested reading references, class discussion, and unit assignments.
3. Participate in practical tests dealing (question-answer) with the various Performing Arts skills.
4. Participate in mid-term and final examinations.
5. Make a term report on the organization of a specific program in the Performing Arts field.
6. Attend plays, opera, concerts, dance presentations, and other special events.
7. Participate in class projects, such as writing a play, building a set, or putting on a play; community cultural arts or hobby show.

Units of Work

I. Introduction to the Performing Arts
    A. Overview of the Performing Arts field
    B. The need for recreation in the Performing Arts
    C. Scope of the Performing Arts field
    D. Values of Performing Arts programs

II. Effective Leadership in the Performing Arts
    A. The Leadership Process
    B. Needs and Interests of People
    C. The Nature and Types of Groups
    D. Methods, materials, and techniques

III. Recreation Music
    A. Scope of program in music
        1. Kinds of music for recreation
        2. Value of music
        3. Appreciation of music

    B. Singing in recreation
        1. Informal singing
        2. Community singing
        3. Preparation for Community Singing
        4. Presentation of Community Singing
        5. Methods of Song Teaching
        6. Musical games and rhythms

- C. Recreation through playing an instrument
- D. Recreation through Listening
- E. Trends in Recreation Music

IV. Recreation and Dance

- A. Origin and development of dancing
- B. Folk and square dancing
- C. Social dancing
- D. Modern dance (creative dance, jazz, etc)

V. Drama in Recreation

- A. Why Drama?
- B. Values of Recreation Drama and Creative Play
- C. Kinds of Dramatic Programs
  - 1. Informal dramatics
  - 2. Formal activities
- D. Planning the Program
- E. Fundamental Skills of Informal Dramatic Activities
- F. Puppetry
- G. Shadow Plays and Marionettes
- H. Facilities and paraphernalia

VI. Story Telling

- A. The purposes of story telling
- B. Techniques of story telling
- C. Materials for story telling
- D. Preparation of a story teller
- E. Presentation of the story
- F. Possible outcomes of story hour

VII. Pageants, Festivals, and Holiday Drama

- A. Values of pageants and special events
- B. Organization of events
- C. Leadership and supervision
  - 1. Needs of leadership
  - 2. Special problems
- D. Facilities, equipment, and supplies
- E. Evaluation techniques

Texts and References

Baird, Forrest J. Music Skills for Recreation Leaders. Dubuque Iowa: Wm. C. Brown Co., 1963.

Harris, Jane and Pittman, Anne. Dance a While. Minneapolis: Burgess Publishing Company, 1964.

Hawkins, Alma. Creating Through Dance. Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1964.

Pease, Esther. Modern Dance. Dubuque, Iowa: Wm. C. Brown Co., 1966.

Cheney, Gay and Strader, Janet. Modern Dance. Boston: Allyn and Bacon Inc., 1969.

Hall, J. Tillman. Folk Dance. Pacific Palisades, California: Goodyear Publishing Company, 1969.

Youmans, John G. Social Dance. Pacific Palisades: Goodyear Publishing Co., 1969.

Corbin, Dan H. Recreation Leadership. Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1970.

Walker, Pamela. Seven Steps to Creative Children's Dramatics. New York: Hill and Wang Inc., 1957.

Howard, Vernon. Puppet and Pantomine Plays. New York: Sterling Publishing Co., 1962.

Anderson, Paul. Story - telling with the Flannel Board. Minneapolis: T. S. Dennison and Company, 1963.

Millan, Nina. Children's Festivals From Many Lands. New York: Friendship Press, 1964.

Cummings, Rubard. 101 Hand Puppets. David McKay Co., 1962.

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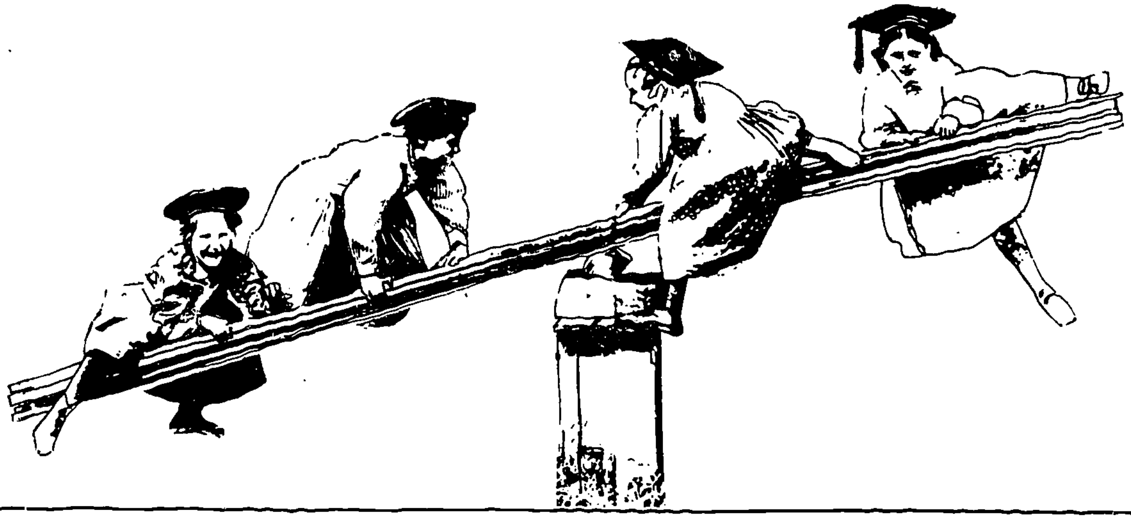
RECREATION EDUCATORS INSTITUTE-WORKSHOP
HIGHLIGHTS: PREPARATION OF RECREATION
LEADERSHIP CURRICULUM.

CALIFORNIA COMMUNITY COLLEGES, SACRAMENTO.
OFFICE OF THE CHANCELLOR.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 25JUN70 54P. PRESENTATION OF
RECREATION EDUCATORS INSTITUTE-WORKSHOP
(SANTA MONICA, CALIF., JUNE 22-25, 1970).

DESCRIPTORS - *RECREATION; *VOCATIONAL
DIRECTORS; *COMMUNITY COLLEGES; BEHAVIORAL
OBJECTIVES; JOB DEVELOPMENT; VOCATIONAL
EDUCATION; POST-SECONDARY EDUCATION;
*INSTITUTES (TRAINING PROGRAMS); *MANPOWER
NEEDS; INSERVICE TEACHER EDUCATION; THERAPY
IDENTIFIERS - RECREATION TECHNICIANS;
*ASSOCIATE PROFESSIONALS; CAREER AWARENESS

ABSTRACT - WRITTEN BY SIX MEMBERS OF A PLANNING COMMITTEE ABOUT A 4-DAY INSTITUTE FOR RECREATION EDUCATORS AT THE COMMUNITY COLLEGE LEVEL, THIS REPORT PRESENTS HIGHLIGHTS OF THIS FIRST INSERVICE TRAINING PROGRAM FOR RECREATION EDUCATORS OF CALIFORNIA COMMUNITY COLLEGES THAT OFFER RECREATION LEADERSHIP TECHNICIAN PROGRAMS. THE PURPOSE OF THE WORKSHOP WAS TO HELP RECREATION EDUCATORS UTILIZE JOB PLACEMENT AGENCIES FOR GRADUATES OF 2-YEAR VOCATIONAL PROGRAMS. A LIST OF SIX OBJECTIVES OF THE INSTITUTE PRECEDES THREE SECTIONS, EACH FOCUSING ON A SEPARATE ASPECT OF MANPOWER NEEDS FOR RECREATION LEADERSHIP. THE THREE PARTS ARE: (1) IDENTIFICATION AND ANALYSIS OF JOB-MARKET NEEDS, (2) RECREATION FOR SPECIAL GROUPS, AND (3) CREATIVITY IN COMMUNICATIONS. (AG)



RECREATION EDUCATORS INSTITUTE-WORKSHOP
SANTA MONICA COLLEGE, JUNE 22-25, 1970

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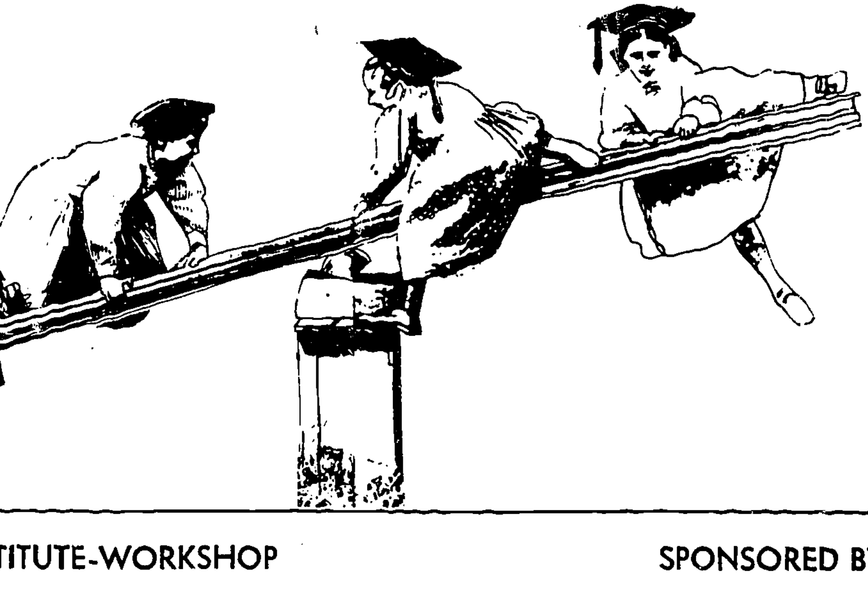

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Herein, we are reflecting upon "yesterday's" conception of recreation as a "force" affecting our total future environment. But we cannot limit nor confine ourselves by the following extractions - they should serve only as guidelines or points of departure. They serve only to bring recreation into sharpest focus and make it a "Living Force."

INTRODUCTION

This four-day Institute was the first in-service training program for Recreation Educators of California Community Colleges that offer Recreation Leadership Technician programs. The purpose of the Institute was to help recreation educators become updated in the techniques and methods of communication skills and interpretation of values and goals of placement agencies that serve the Recreation Leadership Technician students.

Aware of the increasing importance of trained personnel for recreation leadership positions, as identified in national recreation surveys, the California Community Colleges are endeavoring to meet these needs. The District Plans for Vocational Education, 1969, indicated that 15 Community Colleges offered major occupational career programs to train persons for the associate professional position: Recreation Technician. During 1970-71, there have been eight additional programs proposed. Currently over 1,000 students have enrolled as majors. Because of the future predictions for the need for persons with face-to-face leadership skills and basic recreation program knowledges, there is every indication that the number of educational and training programs will increase threefold in the next five years.

The new terminology for graduates of career programs is ASSOCIATE PROFESSIONAL rather than the terms used in the past, such as semi-professional or para-professional. The associate professional indicates that the individual has an associate degree and also that he is working along with, or an associate to, the professional person, and his training has included some of the skills and knowledges needed for a support role in recreation leadership programs.

RECREATION EDUCATORS INSTITUTE-WORKSHOP HIGHLIGHTS

Preparation of Recreation Leadership Curriculum

Introduction

Part One:

    Identification and Analysis of Job-Market Needs

Part Two:

    Recreation for Special Groups

Part Three:

    Creativity in Communications

Acknowledgements

OBJECTIVES OF THE INSTITUTE

1. To identify the job needs of private and public agencies and determine work experience stations open for associate professionals.
2. To practice the skills necessary to serve agency needs.
3. To evaluate course content in relation to agency needs.
4. To survey existing teaching materials and media used in the new recreation core course.
5. To recommend specific new materials that will coordinate the course theory and the job needs as designated by the agencies.
6. To identify and develop potential career ladders that will serve both the college programs and employer needs.

Part One

"IDENTIFICATION AND ANALYSIS OF THE JOB-MARKET NEEDS"

Purpose: To analyze and identify the manpower job-market needs.

Moderator: Dr. Jean Tague, Special Consultant
Tague and Associates
Santa Monica, California

Don L. Neer - Executive Director, California Park and Recreation Society, Fresno.

I am quite pleased to be asked to sit in and learn about the work of the California Community Colleges in the area of Parks and Recreation. You are to be complimented on getting this institute underway.

Thirty-three years ago, in 1937, the first College Conference for Training Recreation Workers was held at the University of Minnesota, Minneapolis, Minnesota.

From it, the first four-year "Recreational Leadership" curriculum was offered by the University of Minnesota and I was lucky enough to be in that first class. Four years later, twenty of us received the first Bachelor of Science Degree in Recreational Leadership. It is interesting to see that your thinking for the two-year Community Colleges is quite similar.

In addition to a heavy program of recreational skill training in the college of education, we were required to take courses in many of the other schools--such as geology, astronomy, psychology, botony, and music--competing against the majors in their field of specialization. It was a broad cross-fertilization of knowledge comparable to many of the "Humanities" courses offered today.

We, also, had strong field work training--in the Settlement Houses, and Minneapolis and St. Paul public agencies. On the Junior College level, the one thing I feel is most vital is that majors get field training such as camping--especially during the summer. We took camping and it included actual experience in the field. One of the things we were encouraged to excel in was to be a specialist in at least one sport, but we were also exposed to ceramics, theatre, music, and other fields. I feel that there should have been a stronger emphasis on business administration skills such as speech and accounting. Those coming into administration will have to be businessmen first, and practitioners second. As far as placement in the industrial recreation field is concerned, industry is looking for someone to augment their personnel staff and then, if they have a background of recreation, they move into the recreation phase of personnel activities.

In the industrial recreation field, there are probably only 200 full-time industrial recreators in the country. This is because management has failed to realize the necessity of full-scale Recreation Departments. I think that you are going to see insurance companies insisting that industry come up with fitness programs--with time off on the job for actual working out on company owned facilities--there are 200 firms that now have their own golf courses. There are company fitness labs, and more and more companies are moving into this type of facility. The average executive today will not work out on his own, so he needs to be programmed and put into a fitness schedule.

In the 1950's, three colleges set up complete curriculums for Industrial Recreation. Purdue led the way, North Carolina State was second, and Indiana third. They have all since dropped it and have gone to what they call a General Recreation Curriculum with only one or two courses in the industrial area. Minnesota today specializes in Medical Recreation. A recreation graduate today should be able to move in any direction--municipal, military, hospital or private agency. CPRS does have a Job Mart and listed over 400 job vacancies last year. The jobs are there for your new two-year graduates. Again, congratualtions on a fine program and do not hesitate to call on CPRS anytime for help you might need.

Glenn Thune - Administrator of Del Rio Convalescent Hospital and Sanitarium.

This meeting is about five years late.

When Medicare came onto this scene, Medicare pointed up the need for Recreational Therapists. There was no place to get them. One had to go out and get someone and then train them. And so it is, with each passing day nursing homes are becoming more and more involved in Recreational Therapy. The problem is that right now we do not have anyone coming out of the schools trained, so that they can walk into jobs that are available.

In Los Angeles County Public Health facilities alone, there are over 500 nursing homes that need at least one Recreational Director and other recreational workers. We have a terrific captive audience for the graduates. These 500 nursing homes represent 39,000 bed patients. The nursing homes, in Los Angeles County alone, can take all of your graduates for the next five to ten years--if you train them the way we need them trained.

The law requires that we have a physical Recreational Therapist--we need them for the welfare of our patients. Medicare requires a planned activity program and records must be kept available for inspection.

You, Junior College Educators, are here discussing curriculum programs--I hope you will not leave the nursing industry out. We are in desperate need of recreation trained students and graduates who can take over. When you plan your program, plan it so that each one of them will visit a nursing home or convalescent hospital to see what they are like. You can teach them all you want in the college, but they need that practical experience--to get in there and work with the patients.

Roxie Schnetzer - Recreation Specialist, Mentally Retarded, Fairview State Hospital, Costa Mesa.

What I was thinking of specifically was the kind of thing that an AA Degree person would need coming out of school--although, in most situations, he would probably be supervised by a four-year person or a Recreational Therapist. He or she would end up dealing indirectly with the patients because they just cannot train enough four-year people to do it. You can consider your AA Degree person a sub-professional, because he is going to be used as a professional, and you are going to have to train him or her with the same quality of training as the four-year person. We need a course in recreation for the handicapped; how to interact with them is important because how you meet them will play a large part in whether they are going to come to your park. If the leaders on the playground, or recreational facility, are not comfortable with handicapped people, the handicapped people are not going to be comfortable in recreation--and they need recreation. Attitudes toward handicapped individuals are important and can be acquired by knowledge gained through properly selected courses in your community college curriculum.

Betsy Hardie - Coordinator of Volunteers, Veterans Administration, Los Angeles.

What might one of your students encounter as he or she goes into a facility or into a communit program working with the physically or emotionally handicapped? The possibilities of working situations are as varied as one can conjure up in one's imagination. Take for example, the ag factor, it is as important as it is varied.

Then, too, terminology can be a very confusing element to any professional going new into a field. New knowledge gained through curriculum can and should be reinforced by doing voluntary service in a treatment facility. Many and varied services welcome the student, whether he or she is on the community college level or four-year college level, to come in and do some volunteer work - or, in some instances, they do have an internship program, where they can get academic credit for field work and be paid.

As to the area of registration, the National Therapeutic Recreation Society has a five-step plan, beginning with the AA Degree and going to the Master's and above.

In Los Angeles County alone, 13 hospitals are involved in Rehabilitation Services, as well as numerous agencies and institutions.

It seems well indicated by surveys and studies that the community college curriculum should definitely include a basic course or courses in the area of Therapeutic Recreation. I recommen that you survey your community to identify the needs in the area of working with the handicappe and then make specific recommendations to your curriculum committee and administrators for their considered action.

Jo Etien - Commercial Recreator - Owner of one of Santa Monica's bowling alleys.

I also am here as Chairman of the Education Committee of the Chamber of Commerce. Part of our education program encompasses a Recreation Program for the special students of the Santa Monica School District, and the Kennedy Child Study Center. Once a year, the businessmen in the area, who are in the recreation business, give of their facilities. We work with two to three hundred children. It is an in-school program and they are taken out during school hours - supervised by their teachers - and bussed to the local recreation facility. This program covers a three-to-four month period and has just completed its fourth year.

Community volunteers (some of whom are Santa Monica College Recreation Majors) teach the children the sport to which they are being exposed. It is an extraordinarily successful activity and we have seen the marvelous results that can be achieved.

Question: How many youngsters do you have in your retarded bowling program?

Answer: We have about forty that bowl every week. Once a year, we have a banquet to which their parents are invited. They get all gussied up and it is a big night in their lives.

Question: Do you feel that bowling establishment or commercial recreation management should be a curriculum consideration?

Answer: Yes, I think that in bowling, as in many commercial establishments, the important thing that is lacking is properly trained personnel who can create a wholesome, people-orientated, recreation atmosphere.

David C. Feldhammer - Graduate Student, San Francisco State College.

Research paper summary: "What the California Community Colleges are Offering in Recreation Curriculum."

I have recently completed a study of the Recreation Curriculum that is being offered or that is planned to be offered in the California Community Colleges. I received over 90 per cent response from the 87 schools I contacted. Of the 80 respondents, 66 offered one or more courses which they classified as recreation. Of the 14 respondents which do not offer any recreation courses, five were planning to offer courses in the near future and nine had no plans. Forty-one of the schools plan to extend their programs. Twenty-seven either now offer or plan to offer an AA Degree in Recreation. Forty-seven offer their recreation courses under the Physical Education Departments, with eleven offered under Recreation Departments. Forty-seven per cent required field work in the curriculum. Of the 81 faculty members involved, 58 were Physical Education Majors, 20 had degrees in Recreation, and 17 had had no recreation work experience. The implications of the study were that the schools that do not have a program are getting one and those that have existing programs are expanding them. Recreation Education is a growing field!

Conclusions and Recommendations:

More courses are necessary. A program which takes into account both the two-year, AA Degree, terminating student and the two-year transfer student is a necessity. A major problem with the four-year colleges is that they will have to revamp their programs to an upper-division level and all but eliminate their lower division course work.

Mary DeNure - Consultant in Public Service Occupations, Office of the Chancellor, California Community Colleges, Sacramento.

The following are notes from the "Swap Shop - Rap Session" held at Santa Monica College.

Question: Many of the morning speakers were concerned with the selection of students for the program. They indicated that students should have vitality and an extrovert personality. The uniqueness of the two-year college is that they try to "screen out." Therefore, do you use a "screening" criteria? How do you obtain extroverts, do you select them or develop them?

Answer: I do not think students, to do well in recreation, necessarily have to be extroverts, but rather they should be excited and enthused about recreation and working with people. If we as teachers are enthused, we pass this on to the students. When they have a chance to be a success they seem revitalized.

Question: It is easy to teach a student who is highly motivated and likes school. However, recreation educators have an opportunity, and a challenge, to help students who have not succeeded in other educational experiences by helping them to succeed through recreation. What kind of experiences can you give students that will help them succeed?

Answer: I think we can help them by getting them jobs and helping them to know various people in the recreation area through field work. Along with their field experiences, they need an opportunity to share these experiences with faculty and other students. This opens avenues of communication. Field work should be offered the first semester and should progress from observations to actual practice under a supervisor, especially in games classes.

Question: How do you relate your two-year program and field experiences with the four-year program?

Answer: Many times students do have to take courses over at the four-year school. However, California State College at Long Beach will accept students who transfer from the recreation leadership program at Compton and are given credit for the courses they have had. San Jose State College recommends as much leadership experience as possible in the first two years and a concentration on philosophy and administration courses in the upper division.

Question: Do the field work courses transfer?

Answer: Right now only as electives. However, when the four-year colleges restructure their program so that there will be a sequence of learning experiences, that include both skills and knowledges, that progress from the freshman to the senior years (or the two-year school through the four-year school) then we will be able to see a true career ladder. One of the strong arguments for the two-year program is that the jobs are available and we are training students to do a good job.

Question: How do you see your program -- as transfer or as terminal?

Answer: The main goal of a vocational program is to train persons for employability. Therefore, the secondary goal is transferability to the four-year school. If we can have both through articulation with the four-year school and a sequence of learning experiences, that is very good. However, we should keep in mind that we are, at the two-year school, an occupational training program.

Question: How do you identify your program in the college catalog?

Answer: The desired identification is to be listed as Recreation Leadership and defined as an occupational major with a core and support courses that add up to at least 20 units. Also, with the separate listing, and not "hidden" under physical education, we are eligible for Vocational Education Act funds.

Question: What other aspects of your program help you to qualify for VEA funds?

Answer: We have an advisory committee of representatives from recreation agencies, county civil service, state colleges, high schools, and our college counselors and personnel placement department. In addition, we have instructors who have had at least two years of occupational experience in recreation.

Question: What are the functions of your advisory committee?

Answer: They not only help keep us up to date on new curriculum materials and the job market and needs of agencies, but they also help us recruit students into the program; they offer field experience stations, articulate transfer problems with the high school and the four-year school, and provide job opportunities for our students. They are a good source of part-time faculty, too.

Question: What options should be included in the recreation curriculum?

Answer: The discussion centered around options in industrial recreation and recreation for special groups (mentally and physically handicapped, teens, and senior citizens). However, we probably won't immediately offer true options to the recreation core, but start with a few classes in each of these areas that provide an orientation to the kind of experiences needed and relevant skills and knowledges that will help the student on the job.

Question: What kind of work experiences do you offer your student and how is your program structured?

Answer: The new state law indicated that students may acquire up to 16 units for work experience if the course is taken each semester for four semesters. Students should be on the job for 15 hours per week and attend a one-hour class per week for a semester to be granted four units. The faculty coordinator and the job supervisor need to structure a sequence of job experiences that relate to the classroom learning experiences. We keep in mind that we are providing education experiences and not supplying the manpower need at this time. However, where the students can provide a real service to the agency we hope they get paid.

Question: How is the field work coordination worked into your teaching load?

Answer: The administration gives release time for the faculty field work coordinator to develop the program with the on-the-job supervisor and for student consultations and evaluations. Each school generally works out their own formula for the field work-teaching load equation. Also, faculty get mileage for visiting field work stations. This can come from the VEA funds.

Question: Is it easy to start a program?

No, it takes a great deal of effort on the part of the faculty member interested in starting a program. The Dean of Vocational Education is of great help and will assist in obtaining the funding; but the main task of determining the feasibility of starting a program begins with the faculty person. He must gather the advisory committee, find the field work stations, and coordinate with other faculty members in the support areas, such as art and music. The faculty person will need to organize the curricula and present it, with a rationale for the program, to the school curriculum committee and, then, see that it is properly identified in the school catalog. Finally, the faculty person recruits students through contacts with counselors at high schools and on his own college campus. Not many people know about recreation leadership, and the new emphasis on job opportunities and expansion. Therefore, the program initiator is not only teaching faculty, but public relations faculty as well.

Question: When is a good time to offer classes -- day, evening, extended day?

Answer: We have found that night classes in recreation leadership are not popular because many are employed in the afternoons and nights. Mornings have proved to be the best time.

Question: Have you had experiences with hiring professional recreation agency personnel as part-time faculty?

Answer: Yes, but many times they are not acquainted with the college atmosphere and jargon, the teaching methods and mechanics of grading, writing course outlines, etc., and require personal instruction in these areas. However, it is worthwhile for us to try to get good agency faculty. Also, the courses offered during the summer by the Vocational School of UCLA that help qualify professional recreation persons to obtain teaching credentials are very helpful.

Conclusion:

Although most of us are merely at the program development stage, there are other issues that also must be addressed, such as: How many programs should there be in the Community College system of California? What courses should be considered in order to expand our curricula? Is the recreation therapist technician our job? Do we want licensing for the recreation therapist technician? These and other items will be discussed later.

THE THERAPEUTIC RECREATION SERVICE PICTURE FOR THE SEVENTIES: PROBLEMS, PRIORITIES AND CHALLENGES

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(The full text of this position paper, including footnotes and references, is available from Dr. Nesbitt.)

Handicapped in the Community Recreation:

In 1961, Mumford conducted a survey of community therapeutic recreation programs.[6] Among forty-nine municipal park and recreation departments responding she found:

1. A total of 2,284 handicapped individuals participated in these programs;
2. Nineteen departments hired full-time leaders to direct the programs;
3. Thirty-eight departments hired part-time leaders;
4. Thirty-eight departments used volunteers;
5. The combined totals for the three leadership categories were: Full-time, 33; part-time, 115; and volunteers, 414 (totals based on the thirty-eight respondents).

A follow-up study in 1970 of seventeen of the former showed that:[7]

1. The population of these 17 communities has increased 35%;
2. The total number of therapeutic recreation service clients in these 17 communities has increased 155%;
3. There has been no gain in the number of full-time or part-time leaders;
4. The number of volunteers has increased 103%;
5. The starting salaries ranged from $598/mo. ($7,176/year) to $693/mo. ($8,316/year);
6. In fourteen out of seventeen communities, park and recreation departments programs for handicapped school age children were offered;
7. In six out of seventeen communities public and/or special schools offered recreation programs for handicapped children.

I. Manpower Projections in Therapeutic Recreation Service:

In an article in the Therapeutic Recreation Journal[9], Verhoven stated that there is a serious deficiency in terms of numbers of qualified personnel providing therapeutic recreation services for ill and handicapped clients.

The following tables were included by Verhoven[10] and illustrate anticipated manpower deficiencies which threaten to reach critical proportions during the 1970's in the field of therapeutic recreation service, and numbers of therapeutic recreation service personnel anticipated to need two or more years of formal academic training on the college level through year 1980.

Table III

Estimated Numbers of New Therapeutic Recreation Service Personnel Needed by 1980

Year	Status Quo	Target	Judgement
1970	1,609	3,963	7,103
1975	3,020	10,938	10,753
1980	3,003	18,786	29,218

Table IV

Projected Estimates of Need for Therapeutic Recreation Service Personnel Requiring Two Years of College Training

Year	Status Quo			Target			
	Supply	Demand	Deficit Need	Supply	Demand	Deficit Need	Supply
1970	4,239	4,859	-620	4,239	5,805	-1,566	4,239
1975	4,102	5,203	-1,101	4,102	8,385	-4,283	4,102
1980	4,685	5,590	-905	4,685	11,933	-7,248	4,685

A similar projection analysis for positions in the supervisory, administrativ and consultative types of positions in therapeutic recreation service which r more years of formal higher education is illustrated in Table V.

Table V

Projected Estimates of Need for Therapeutic Recreation Service Personnel Requiring Four or More Years of College Trainin

Year	Status Quo			Target			Ju
	Supply	Demand	Deficit Need	Supply	Demand	Deficit Need	Supply
1970	6,243	7,232	-989	6,243	8,640	-2,397	6,243
1975	5,825	7,744	-1,919	5,825	12,480	-6,655	5,825
1980	6,222	8,320	-2,098	6,223	17,760	-11,538	6,222

Table III

Estimated Numbers of New Therapeutic Recreation Service Personnel Needed by 1980

r	Status Quo	Target	Judgement
0	1,609	3,963	7,103
5	3,020	10,938	10,753
0	3,003	18,786	29,218

Table IV

jected Estimates of Need for Therapeutic Recreation ice Personnel Requiring Two Years of College Training

		Target			Judgement		
nd	Deficit Need	Supply	Demand	Deficit Need	Supply	Demand	Deficit Need
9	-620	4,239	5,805	-1,566	4,239	6,665	-2,426
3	-1,101	4,102	8,385	-4,283	4,102	10,320	-6,218
0	-905	4,685	11,933	-7,248	4,685	16,125	-11,440

nalysis for positions in the supervisory, administrative and managerial of positions in therapeutic recreation service which require four or igher education is illustrated in Table V.

Table V

ected Estimates of Need for Therapeutic Recreation rsonnel Requiring Four or More Years of College Training

		Target			Judgement		
nd	Deficit Need	Supply	Demand	Deficit Need	Supply	Demand	Deficit Need
2	-989	6,243	8,640	-2,397	6,243	9,925	-3,677
4	-1,919	5,825	12,480	-6,655	5,825	15,360	-4,536
0	-2,098	6,223	17,760	-11,538	6,222	24,000	-17,778

In a study conducted by Stein (11), numbers of students graduating fr therapeutic recreation curriculum nationwide on the bachelors, masters and were ascertained.

For his study Stein used the eight regions which were based upon the Recreation and Parks Association regional plan.

It was determined that in 1969, 531 students were enrolled in therape degree programs. Of these, 381 were working toward a baccalaureate degree pursuring a masters degree and only 15, a doctorate.

The following tables were included by Stein. (12)

Table VI

Distribution of Students Specializing in Therapeutic Recrea

Region	Bachelors (N-28) No.	Master's (N-19) No.	Doctoral (N-6) No.
Northeast	--	6	1
Mid-Atlantic	20	29	9
Southeast	37	37	--
Great Lakes	126	27	3
Mid-West	39	3	--
Southwest	24	7	2
North Pacific	6	--	--
South Pacific	129	26	--
Total:	381	135	15
Mean:	13.6	7.1	2.5
Range:	2 to 40	1 to 29	1 to 8

Table VII

Distribution of Students Graduating in 1969

	Bachelors		Masters		Do
Region	Women	Men	Women	Men	Women
Northeast	--	--	--	--	--
Mid-Atlantic	12	3	11	2	2
Southeast	14	6	13	7	--
Great Lakes	19	5	22	11	1
Mid-West	11	9	2	2	--
Southwest	2	2	2	1	--
North Pacific	--	--	--	--	--
South Pacific	20	8	6	7	--
Total:	78	33	56	30	3

ducted by Stein (11), numbers of students graduating from and enrolled in ion curriculum nationwide on the bachelors, masters and doctoral levels

Stein used the eight regions which were based upon the former National s Association regional plan.

ned that in 1969, 531 students were enrolled in therapeutic recreation f these, 381 were working toward a baccalaureate degree while 135 were degree and only 15, a doctorate.

tables were included by Stein. (12)

Table VI

ribution of Students Specializing in Therapeutic Recreation

helors (N-28) No.	Master's (N-19) No.	Doctoral (N-6) No.	Total No.
--	6	1	7
20	29	9	58
37	37	--	74
126	27	3	156
39	3	--	42
24	7	2	33
6	--	--	6
129	26	--	155
381	135	15	531
13.6	7.1	2.5	
2 to 40	1 to 29	1 to 8	

Table VII

Distribution of Students Graduating in 1969

Bachelors		Masters		Doctorate	
omen	Men	Women	Men	Women	Men
--	--	--	--	--	--
12	3	11	2	2	--
14	6	13	7	--	--
19	5	22	11	1	--
11	9	2	2	--	--
2	2	2	1	--	--
--	--	--	--	--	--
20	8	6	7	--	--
78	33	56	30	3	--

"By compiling information provided in the Manpower Report published by the National Recreation and Park Association in 1968, it may be estimated that over 20,000 persons were employed full time in therapeutic recreation service positions in state and municipal hospitals, Veteran's Administrations, American Red Cross, nursing homes, Easter Seal Camps and so on. Verhoven wrote in 1969 that for 1970 there would be a manpower deficit of 3,963--at the two year level, 1,966, and at the four year level, 2,397. By 1980 there will be a manpower deficit at the two year and four year levels of 18,786. This figure includes 7,248 individuals trained at the associate level and 11,538 trained at the bachelor's level.

The numbers of personnel completing preparation is not keeping pace with manpower projections. Aware of shortages, many agencies do not create new positions or manipulate existing staffing patterns to meet requirements. Others simply are not creating or funding new positions, even though needs are apparent. Still others are hiring personnel under a very broad interpretation of "related" education. The situation serves to downgrade the quality of therapeutic recreation service being provided. Various forms of intervention are called for.

"Manpower is a major problem. At each level of preparation, i.e., associate, bachelors, masters and doctors, the number of graduates is inadequate to meet the needs for teachers, researchers, administrators, supervisors, leaders and assistants. Further, the field has not opened up positions in relation to known needs in the community."

At the Associate of Arts level there has been so little development that figures are not available on the number of matriculated or graduated students. It can be stated without hesitation that Associate of Arts available manpower falls well behind the other levels, B.A., M.A., Doctorates. With no prospect of having employable people available, planners and administrators will not create job positions. An overt move by community college and therapeutic recreation service personnel is called for.

II. Therapeutic Recreation Service Salaries in California:

In 1969, Miss Joanne Dodge, a therapeutic recreation specialist, conducted an informal survey to determine the starting salary and progression for therapeutic recreation specialists in the Bay Area and selected institutions in Southern California.

Her survey was not restricted to any particular type of setting; instead, she was interested in getting a broad look at the overall salary situation. The information obtained is summarized below.

1. County Therapeutic Recreation Specialist Positions (3)

	Starting Salary		Third Year	
a.	$644	($7,728/yr.)	$745	($8,940/yr.)
b.	676	(8,112/yr.)	821	(9,852/yr.)
c.	659	(7,916/yr.)	818	(9,816/yr.)
Mean	$659.66	($7,916/yr.)	$794.66	($9,539/yr.)

2. Hospital Therapeutic Recreation Specialist Positions (6)

	Starting Salary		Second Year		Third Year	
a.	$600	($7,200/yr.)	$750	($ 9,000/yr.)		
b.	800	(9,600/yr.)	840	(10,080/yr.)		
c.	590	(7,080/yr.)				
d.	556	(6,672/yr.)			$676	($8,112/yr.)
e.	700	(8,400/yr.)	850	(10,200/yr.)		
f.	644	(7,728/yr.)	676	(8,112/yr.)		
Mean	$648.33	($7,780/yr.)			$676	($8,112/yr.)

3. Private Therapeutic Recreation Specialist Position (1)

Starting Salary $600 ($7,200/yr.)

4. Veterans Hospital Therapeutic Recreation Specialist Position (1)

Starting Salary $621 ($7,452/yr.) to $916 ($10,992/yr.) for 4-5 years, GS9.

5. Medical Center Therapeutic Recreation Specialist Position (1)

Starting Salary	$637	($7,644/yr.)

6. State Hospital Therapeutic Recreation Specialist Position (1)

Starting Salary	$634	($7,608/yr.)
6 Mos.	$644	($7,728/yr.)
18 Mos.	$676	($8,112/yr.)
30 Mos.	$710	($8,520/yr.)

III. The Need for Statewide Planning:

In the field of recreation, human resources development in general, and curriculum development in particular, suffer from a lack of statewide planning. Over the last year, I have observed that curriculum development is greatly enhanced when statewide leadership is in evidence. In California, although there are a number of state agencies and bureaus that are interested in therapeutic recreation based on their concern for ill or disabled, no one unit has any direct or primary concern for therapeutic recreation service manpower, curriculum development, research, certification, service development, and so on.

IV. Curriculum:

Curriculum in therapeutic recreation service has not kept pace with practice. However, some 15 colleges and universities across the nation are now conducting curriculum development activities in physical education and recreation for handicapped children. This will be a great impetus to the development of all types and aspects of therapeutic recreation service curriculum. Improved course work, selection procedures, field work procedures and so on should result. The findings of these activities will be immediately available to colleges.

Four-Year Program Inadequacies - In many instances, the four-year programs have not kept pace with developments. For the general recreation student, preparation in and for therapeutic recreation service is behind the times, vis-a-vis, the term, "therapeutic recreation service," not "special groups," is official nomenclature. It should be used in communication, in the course titles, and so on. Course work at the four-year level in therapeutic recreation service, from what I can observe, is behind the times. Clinical preparation does not begin to meet with the proposed standards for such training. Often, the teachers of TR Service courses do not hold state or national professional registration in therapeutic recreation service. (A desirable prerequisite for teaching, advising and supervising TR Service Associate Professional students would be the holding of such registration.) Regarding out-of department preparation, all too often course work in sociology and psychology has little bearing on therapeutic recreation service, rehabilitation, or health care. I find particularly objectionable course work in abnormal psychology in lieu of psychology of the handicapped. Finally, there is an attachment to outdated theories of psychotherapy that undermines effective therapeutic recreation service. The Associate Professional Therapeutic Recreation Service Curriculum can start with now, not ten or fifteen years ago. It can look to the future, not back.

Make Training Adequate and Professional - In developing curriculum for the Associate Professional in Therapeutic Recreation Service, you are in an ideal situation to capitalize on developments of the last ten years and to initiate a professionally valid curriculum. You must not ignore the therapeutic part of the therapeutic recreation service and preparation. A rule of thumb to follow is: 50% of the TR Specialist's work is recreation; 50% is therapeutic. Curriculum units should be allocated on the same proportion. Many of the four-year curricula have not demonstrated their awareness of this fact.

Content Necessary for Therapeutic Curriculum - I believe the following courses should be included in your curriculum:

*Introduction to Therapeutic Recreation Service (covers the profession, development of services and programs, therapeutic procedures including assessment and evaluation).

*Programs in Therapeutic Recreation Service (covers sheltered, adapted programs; counseling; remedial teaching; standard programs and activities for basic settings and services).

*Introduction to Exceptionality (medical, physical, educational, vocational, social, psychological and recreational aspects of main categories of diseases and disability groups).

*Introduction to Community Services in Rehabilitation, Health and Welfare (survey of basic disciplines, settings, resources, types and provisions of assistance, interrelationship of disciplines, services).

Students who will work with a special disease or disability group, such as aging or mentally retarded, should have at least one course devoted to the group they will be serving.

Field work is essential to preparation. It should be initiated as early as possible in the training program. It should also be organized with a view to meeting, at a future date, the Clinical Training Standards now being developed.

Development in therapeutic recreation service is thereby impeded. Therefore, somewhere in the state functioning agency, be it private association, research center, or planning agency, must assume responsibility for statewide direction and planning in therapeutic recreation service. The alternative is to plod along as we have been doing which is a disservice to our own profession, to the disciplines and services that look to us for assistance and to the hundreds of thousands of patients and clients who need and should be receiving our services.

V. Closing Remarks:

In an era bringing meaning to life has taken on a new and vital importance, you are or will be preparing people to undertake a satisfying, humanitarian role in society. This role will provide great challenge because of all the hurdles we have to jump. But, it is a role with great opportunity for service because of the number of people who need and deserve help.

There are many problems in the development of therapeutic recreation service. Problems in the sense that obstacles block us from delivering the services we want to provide. We are in the process of reordering many of our priorities, mostly with the aim of overcoming these obstacles. At this time in our history, Therapeutic Recreation Service is especially exciting because of the many challenges that confront us.

Recreation is infinitely more important to our lives than ever before. Recreation participation is greater than ever before. But, the people we serve--the disabled, the ill, the aging, the disadvantaged--are being left out. It is our job to provide them with opportunity to participate. Therapeutic Recreation Service is a satisfying, meaningful, important job. You, as teachers, can take pride in preparing people to do this important job and you may take satisfaction in the fact that this role is one that will be gratifying to your graduates.

Part Two

"RECREATION FOR SPECIAL GROUPS"

Purpose: To identify "Special Groups" and acquire background information and insight pertaining to their programs, problems and priorities.

Moderator: Mrs. Diane Holland, Training Coordinator
Special Services
Los Angeles County Parks and
Recreation Department

TEENS

Nancy Aaron - Recreation Specialist, Head of Teen Unit, Los Angeles County Parks and Recreation Department.

Regarding Leaders of Teen Programs:

Historically speaking, existing, long-term staff often are not interested or are afraid to offer programs for teens. On analysis, the reason for the lack of activities has brought forth some concepts regarding the leadership qualifications of the face-to-face leader as follows:

1. A person, in order to effectively work with this age group, must like teenagers in the ultimate sense of the word. Either a "con", or an apprehensive approach, will be spotted immediately.

2. The leader must be able to communicate (rap) with youth, be flexible, be able to implement programs spontaneously (due to the group's rapidly changing interest patterns), be capable of treating teens with complete integrity--as adults, yet recognize and accept, without prejudice, regression to adolescent behavior.

In order to obtain such empathatic staff, it has become necessary at times to recruit special leaders, capable of coping effectively with the needs of each individual group according to its socio-ethnic-economic background. It is in this sociological area of need that we want to turn to the Community Colleges to be of service to us in training and preparing that empathetic staff person who is so needed in teen programs.

Daisymae Gabriel - Recreation Supervisor, Social Supervisor, City of Torrance.

The City of Torrance has a full-time, professional "principal" Recreation Leader in charge of teen programming in the Socail and Cultural Section. Her main assignment is our successful 7th and 8th grade program. "Co-Rec" has over 1,000 registered members--(cards with pictures are necessary to attend events)--this is 20 per cent of all 7th and 8th grade students. Our facilities will not accommodate more. As an "organized" group, we lose the 9th grade. Various attempts at various programs have been tried for the older age group; however, surveying our entire department's program, we found that we were serving the older teenager with many special interest programs.

In the Sports Division with soccer, wrestling, slo pitch, ski school, archery, golf, basketball, co-ed volleyball, teen softball, tennis, track and field, akido, fencing, total swimming programs, with approximately 3,500 individual participants from summer '69 to January '70.

The Social and Cultural Division has many teenage activities, i.e., guitar, ceramics, jewelry, Imperial Dance Band, dance, basic acting, the annual Teen Musical, fencing, teen modeling, a "Teen Lab" with wheel work, leather, tie-and-dye, guitars and flutes, and a "do your own thing lab" which is very successful at the moment.

The Parks and Playgrounds Division has an organized teen drill team and flag twirlers, a "talent troupe" that entertains at convalescent homes and teen patrons who participate in the "on the spur of the moment" basis with staff guidance.

Special Events involve the teenager--a dinner was given free to the Senior Citizens during Senior Citizen Month. This was funded by "Co-Rec" dance profits and cooked and served by the teens for 250 seniors. One of our Senior Citizens' Centers was recently painted by volunteer teens.

Teen activities can be successful, given the right direction by properly prepared recreation personnel. Community College students have been called upon to serve as recreation aides and have contributed to the success of our teen program.

SENIOR CITIZENS

Question: Do you recommend some type of exercise program?

Answer: Yes, these may be conducted through your Board of Education and/or volunteers. It may include rhythmatic exercise programs, folk dancing, etc. There is also an exercise program which can be done completely while seated in a chair.

Question: What are the suggested qualifications for the Recreation Director working with the senior citizens?

Answer: The Recreation Director in charge of a facility should be a college graduate. There is, in the Los Angeles Department, a new Recreation Leader classification which requires two years of college and an AA Degree.

Question: Is there an entry level position for this AA Degree person now?

Answer: Yes, as of July 1, 1970, Los Angeles City Department of Recreation and Parks budgeted for the Recreation Leader position. Los Angeles County Parks and Recreation Department is presently rewriting its Civil Service descriptions to include this job entry level.

Question: If you were speaking to a class of college students, what would you say in terms of satisfaction derived from working with the senior citizens? Why did you go into this specialized field of recreation?

Answer: Personally, I receive great satisfaction from making the life of seniors a little happier. They respond openly to anything you do for them and they greatly appreciate it. They mainly want love and attention. Some problems may occur at Centers where the Recreation Leaders feel insecure with senior citizens, or where the young, new Director is afraid of them. However, where the Directors become involved and are educated to understand and appreciate the aging process, they receive great personal and professional satisfaction from working in this specialized field of recreation.

Alan Mindell - Recreation Specialist, Los Angeles County Parks and Recreation Department.

Any discussion of senior citizens should include characteristics of this group. Generally, senior citizens are semi-or fully-retired, age fifty or above, have limited income, plenty of time on their hands, and are lonely. Many of them have a definite feeling of being outside of society. Because of these negative characteristics, recreation departments should attempt to get senior citizens back into circulation, helping them regain dignity and identity. Recreation departments should provide or encourage activities which offer recognition, build confidence, and get these people "involved."

There are some 500 Senior Citizen Clubs in Los Angeles County, most of which are serviced in some form by the Los Angeles County Parks and Recreation Department. Since it would be impossible to deal with individual clubs and members, our department works primarily with club leaders, recreation persons, and agency personnel, who are assigned to senior citizens. We have established a training program for these people and it is here, perhaps, that we can most often work with the Community Colleges as they project and initiate cooperative plans for the future to prepare people for the recreation field.

Question and Answer Discussion Period:

Question: Do you notice the difference in attitude of the minority senior citizen as compared to the rest of the senior citizens?

Answer: They are hard to organize since they are family oriented, the grandparents still have a place in the family. The language barrier in some communities is also a problem. Some departments print fliers in both Spanish and Chinese, etc.

Question: Is age a factor in dealing with them? As a Recreation Leader, is younger or middle-age more effective?

Answer: Younger, especially the younger women.

Question: Do you have problems with mixing people who are the same age, who are in wheel chairs--not normal, with those that are mobile--normal?

Answer: One problem the senior citizen does encounter is transportation. A handicapped person has difficulty getting to club meetings. If a person was a member of a club before becoming handicapped, there is a greater chance of continuing involvement. The seniors are not sympathetic to illness.

Question: What are projects that the senior citizens participate in?

Answer: Volunteer work. We use them in the clubs and Recreation Leaders use them in the total recreation program if possible. If no volunteer work is available, at the Recreation Center, they are referred to the Volunteer Bureau.

Question: What is P. R. S. C. A. ?

Answer: Professional Recreators Senior Citizens Association. It meets and discusses programs. It sponsors "LIBERACE" in concert at the Music Center.

Jane A. Rasco - Senior Recreation Director, Area Coordinator, Senior Citizens' Section, Los Angeles City Department of Recreation and Parks.

The Los Angeles City Department of Recreation and Parks has Senior Citizen Clubs which meet at 130 Recreation Centers. The Director-in-Charge of these Centers is responsible for these clubs, but most of the planning, organizing and carrying out of the programs is conducted by the seniors themselves. The City also operates 15 full-time Senior Citizen Centers, with an extensive program at each of these centers.

The Department, also, co-sponsors many clubs which do not meet on our facilities. We will utilize space in churches, temples, savings and loan buildings, and wherever available. Through funding from the California Commission on Aging, we have opened five full-time Senior Citizen Centers on a leased basis.

Education has been found to be a vital part of any program and, through the Adult Division of the Los Angeles City Board of Education, many classes are conducted for the senior citizens at the Recreation Centers. Classes include such topics as Spanish, Stock Market, Painting, Rhythmic Exercise and others. It has been found that the seniors want to learn and are very willing to attend these classes. It is felt that many of the senior citizens are very work-orientated; therefore, frequently the only way to involve them in the program is to give them a volunteer job. The Volunteer Section of this Department gives awards, pins, trophies and etc., in recognition for the hours donated by these volunteers.

The Department has formed their Senior Citizen Clubs into a Federation and, through this organization, there are monthly area meetings which the presidents attend to be informed of up-coming activities. A training session is run through the year. These seminars are conducted on a once-a-month basis for six months. Persons attending five out of the six seminars are eligible for graduation. The Department, also, has obtained an accident insurance policy that is available to the senior citizen for $1.00 per year.

SOCIAL AND CULTURAL

Don Watkins - Superintendent of Recreation, City of Santa Monica.

For the staffing of our cultural programs, we generally hire recreation leaders, recreation aides or specialists. We want the best person available to get the job done in a professional manner. Recently, we have begun a "contract service program," which is using monies we take in as class participation fees to pay the instructor.

We, also, use field work students. We have many students that come to us from nearby colleges and universities. We are happy to have them and we try to work closely with the educators and councelors at the schools. It is a two-way street. We are giving them advice, counseling and meaningful assignments. They are doing a job for us. They are not paid unless there is an opening for a position, then we are happy to have them apply for it. Frequently, we have an open position and find it advantageous to hire students we previously used as "recreation aides," since they are already familiar with the mechanics and philosophy of the Department; also, they are attuned to the program needs and tend to "stay with us" for a longer duration since they are established in surrounding communities.

Recreation, in many communities today, must be presented in a sensitive and sophisticated manner. This demands a creative and highly qualified leader with not only specialized skills, but also the ability to communicate with people. We will continue to look to the Community Colleges for this high calibre leader and will make ourselves and our services available as professionals to enrich your expanding curriculum.

Deane Nuss - Senior Supervisor of Cultural Affairs, Los Angeles City Department of Recreation and Parks.

The Arts and Crafts Section is responsible, as a staff service, to all the arts and crafts programs at over one hundred Recreation Centers throughout the City. In addition, this Section hires the instructors for self-sustaining arts and crafts classes at the Recreation Centers, Rustic Canyon Cultural Center, McGroarty Cultural Center, and Barnsdall Arts and Crafts Center. The Handicraft Training Center, a craft experiment center, and a training center for Recreation Directors in crafts, is also part of this Section.

The Drama and Dance Section is responsible, as a staff service, for all dramatics and dance classes and programs at the Recreation Centers. This Section is also responsible for the Cultural Art Center, where top quality dramatic programs and dance programs are taught and show-cased. This Section is responsible for training Recreation Directors in drama and dance. The Costume Workshop, where 35,000 costumes are made, repaired, cleaned, stored, and issued to Recreation Centers for children's activities, is also under the supervision of this Section.

The Performances Section is responsible for furnishing large City-wide programs in any of the Parks or Centers as desired by the Area Supervisors. This Section is also responsible for working with little theatre groups, adult art groups, college drama departments, college art departments, large music groups and programs, and dance groups. This Section organizes the annual Folk Dance Festival, the summer cultural programs, etc.

The Volunteer Section acts as staff consultant for volunteers from all the Recreation Centers. Presently there are 10,000 registered volunteers. This Section represents the City on volunteer matters, group volunteering, material volunteering, etc. The Volunteer Section is also the staff advisor on Centers' Service Associations.

Part Three

"CREATIVITY IN COMMUNICATIONS"

Purpose:	Not to merely talk about creativity in communications, but to illustrate it as we go along.
Moderator:	Dr. Edwin Staley, Executive Director Recreation and Youth Services Planning Council, Los Angeles.

Donald E. Hawkins - Assistant Executive Secretary, Recreation, Outdoor Education and Research, American Association for Health, Physical Education, and Recreation.

Graphics, Graffiti, and Scenarios: New Approaches to Communications:

Of course, this paper's title is simply an attention-getting ploy, designed to get this audience into a state of communication readiness. Basically, we need to start thinking of communication as the critical factor in maintaining human health in our complex, post-industrial society.

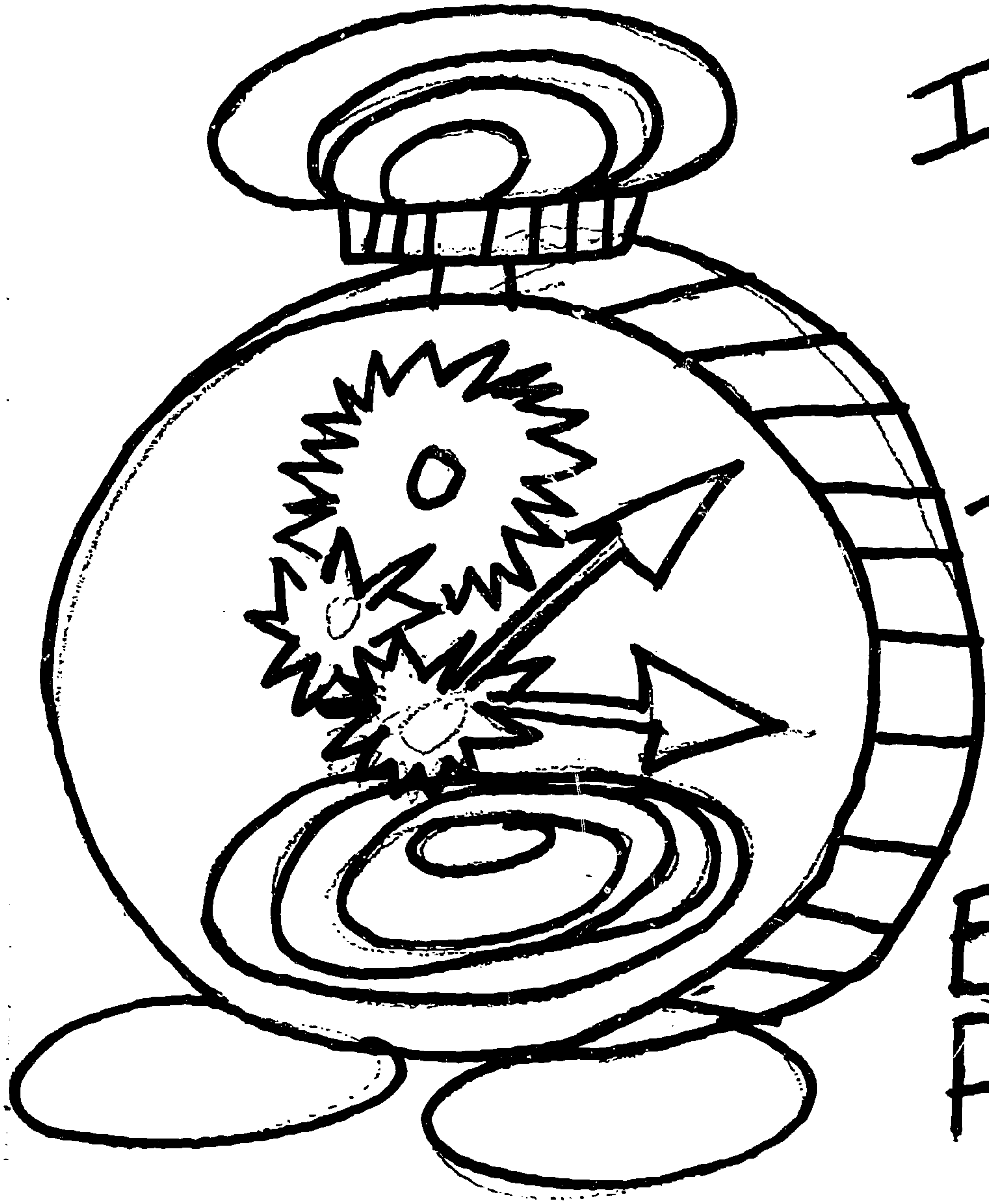
At conferences like this, better ways of communication should be actively pursued. Otherwise, we conveniently slip into the stereotype of listening to "talk down" monologues, called lectures, or fight for the floor to articulate our views in forums and discussion groups. Actually, many of us communicate better in other verbal and non-verbal ways. For example, we use body language--i.e., sensory stimuli, physical movement, emotional expression, etc.--to transmit conscious and subconscious messages.

Communication is an act of transmitting verbal and non-verbal messages, which involves a system in which meanings are exchanged through use of a common set of symbols. Very simply stated, a communication system can be direct (Mohammed to the Mountain) or indirect (Mountain to Mohammed). Direct access to people, places, and things through improved transportation allows man to fulfill his basic biological urge to experience phenomena first hand. Indirectly, however, modern technology allows us to transmit, or simulate, person-to-person, or person-to-object, direct encounters. Transmission resources range from intercontinental telephones to three-dimensional projections of a holographic image. Real life situations can be miniaturized or simulated (e.g., Buckminster Fuller's World Game) for various communication needs. A global village society is resulting from communication strategies which link media with social and political action.

As a practical illustration of a conference communication strategy, let us experiment with the use of a brainstroming technique involving crayons, newsprint, and your initial ideas. I am assuming that most of you have expectations relating to this topic, yet seldom are given the opportunity to ventilate your observations and concerns before the allotted time is programmed. Today, you have that opportunity. Ask yourself questions about communication approaches which will facilitate your role in junior college professional preparation programs--e.g., How can you relate your junior college program objectives with the decision-makers in your institutions and community? How can you build acceptance for your program? In the classroom, how can you design an environment which facilitates effective communication? List your first impressions.

Some of the representative results and graphic illustrations that resulted from this exercise follow this page.

This is but one of many techniques of building effective communication. If we avoid the security blanket and stereotypes used at typical conferences and in the classroom, we can have access to our total cultural, physical, and natural world for study and for recreation.



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Syd Kronenthal - Director, Parks and Recreation Department, Culver City.

Dynamics of Public Information:

No single discipline in the public service is more vital and more necessary than "Getting the Message Across." Call it communications, public relations, promotion, or what-have you, without it, the service rendered will fail.

In the field of Public Recreation, particularly in campus-community leisure time programs, it is imperative that we strive to make this a high priority in our portfolio. We must constantly develop new techniques to appeal in this communicative effort.

The National Park and Recreation Association best outlines and prescribes methods concerned with guidelines.

Publicity - Modern publicity is a major social lubricant in that it plays a fundamental part in making things work. It is the umbrella term which, in its meaning, covers all the techniques employed to get a story across to the public. Every person, when engaged in self-expression--either speaking or writing--is practicing publicity. Basically, publicity is news, that is of interest, to be carried. Its "interest" range may be narrow--confined to one small group or small segment--but, the interest must still exist or it falls flat and makes no impact upon people.

The art of doing publicity consists in taking subject matter which has interest and creatively molding the factor of "being interesting," so that the subject will command the attention of the people or the public it is desired to reach.

Public relations and communications start with you as an individual. The biggest inditement I have against my own profession is the reluctance of professionals to take a firm stand when they are convinced that an idea, a service, or a program is necessary. I have found that if you have the courage, conviction, and evidence, it is much wiser to be honest, forceful, and forthright, than to fear reprisal. I cannot stress too emphatically that public relations starts with your willingness to back up your convictions.

Al Minturn - Vice President for Recreation Division, California Association for Health, Physical Education and Recreation.

Multi-Media Presentations in Recreation:

"Multi-Media" is a recently coined term that describes the display or presentation of two or more audio-visual materials in consort. Combinations of materials might include slides, motion pictures, transparancies, study prints, tape recordings, video tapes and television. Presentations can be very simple--using two or more slide projectors and a tape recorder, or they can be complex extravaganzas requiring considerable equipment and technical personnel.

The chief advantage of the multi-media technique is that it allows the exhibition to present more information in a shorter period of time or give more detail to an idea or concept within a given time.

Visual materials should be selected with care. Simple materials, with careful planning and use, can give you an excellent multi-media program that will more effectively present the activities of your Department to your audience.

Using the multi-media approach to promote recreation is an excellent method of showing your programs and activities to community groups, city commissions, advisory boards, college classes and conference meetings.

Ted Gordon - Coordinator, Youth Services Section, Los Angeles City Schools.

Bob Ingram - Senior, Journalism, Daily Trojan, University of Southern California.

A Conversation on Communication:

Today, we are giving a new word to modern public relations--"Creativity Communication"--it is becoming a way of life.

Everything that every individual does during his working day and his avocational time--by direction of words, by reflection of personality, by attitude, and by a sort of religious zealousness--is transmitted to neighbors, to friends, to students, to editors, to writers, to the public, and to everyone, so that they too become believers.

There is a saying going around which says, "Due to lack of interest, tomorrow has been cancelled." I believe that the interest in tomorrow is going to be in the two-year college.

A University of Chicago newsletter (Spring, 1940) of Phi Sigma Epsilon, of which I am a member, stated that the two-year colleges were springing up at the rate of more than one a week. It also said that by 1971, there should be 1,000 community colleges from coast to coast, enrolling more than two million students. By 1975, these community colleges should be teaching more than half of all the lower division students.

Creative communication refers to the necessity to be able to first create something and then to communicate it.

Let us recognize that the greatest pollutors are in a sense the public media. They are polluting and have polluted education in the past months and years to such a degree that we have become a prejudiced, uninformed, propagandized group of publics.

If there are to be any ecological changes in our society, it may well begin through the attitude and techniques and the transmission of the fate that I am trying to instill in you. It may also begin in the standards of devotion and in the careers of knowledgeable devotion and skills training of you professional recreators and you students who are following in the path of the future to come.

Conversation between Dr. Ted Gordon and Robert Ingram:

Dr. Gordon: I have invited Bob here today because we believe if we are going to have creative communication, let us be different--let us communicate! Bob, what do you do in recreation so far as this group is concerned?

Bob: Actually, I am a part-time worker with Youth Services. One of my main jobs is writing press releases.

Dr. Gordon: Bob, what are some of these ways which a public relations officer provides information to the public?

Bob: There are several ways to communicate to the various publics. But, before you can communicate, you must know to whom you are communicating. You must know exactly who your publics are. Some of the ways to communicate to the various publics are as follows:

1. Send news releases to local newspapers.
2. Use direct communication with fellow employees, administrators, editors, communicators, etc.
3. Use feature stories in newspapers, magazines, etc.
4. Use radio and television spots.
5. Communicate through bulletins, announcements, and posters.
6. Communicate through printed publications.
7. Communicate via newsletters.
8. Use the audio-visual technique of communication with movies and slide shows.

9. Public appearances at conferences and meetings is another "must" in communicating to the publics.
10. Use photographs and display boards.

To be specific, let me give you an example. You are going to be given some of our materials (Publicity Kits; fact sheets) that we have prepared for you. You may notice that we have avoided a look of expensiveness. Much of the material is done by mimeograph and you will also notice that we try to avoid an excessive amount of photography. Also, color photography is avoided.

Dr. Gordon: Bob, how much planning is required for a successful public relations program? Specifically, do we plan for the whole year or do we play it by ear from week to week, or do we compromise?

Bob: Planning is one of the most essential parts of public relations. The four main steps of public relations could be labeled as analyzing, planning, executing, and evaluating.

Since the main theme of this afternoon's session is "Creativity in Communication," what do you think about creativity in publicizing our Youth Services program? Do you think our program should be very creative? Does it lend itself to creativity?

Dr. Gordon: I think we fall in love with new words like infatuation with thrust, or input and output. And we seem to discard the words that have worn well like wine has become bitter with age, like discussion, conversation, understanding, belief, and so forth. I believe we can live with both, and it is the same way for our Youth Services program. We must have both traditional techniques and new tricks of the trade.

To the traditional techniques like releases, interviews, and feature stories, we can now add audio-visual materials, tapes, the multi-media technique, or graphics. We must continue to create a positive effect with the public so that we can gain the momentum that is necessary and desirable to keep recreation moving far ahead.

Bob: What other duties do you perform in communicating to the various publics?

Dr. Gordon: It is impossible to describe. Just this morning, at breakfast in Covina, with Don Hawkins as my guest, we met with a group where we had an opportunity to do some creative communication. As we drove back, we had three municipal men in the car, a national representative, and myself, We discovered we had two mutual problems of concern that we had not discovered we had in common when we started. We began a course of action. Then when we finished, one of the men was talking about retirement. So we brought into the picture, recreation and retirement and how they related to the potentiality of the others.

We come here and introduce new factors. It is a way of life with me. Creative communications is a way of life--it is the way of life that Bob is learning through his courses in class, term papers, and part-time work in the office at the Board of Education. It is the way of life that I did not have the opportunity to learn formally in class, but had to learn on the job.

We, in recreation, are in a strategic field, but we are also in a field quite in danger. We may strive in depression when it comes. During depression, we have to provide food and services for the public. During the previous depression as a social worker, I carried uncashed checks in my pocket, while my clients were starving and begging for food.

Somewhere between us who are graying and you who are growing--somehow between us, we will make recreation a great and wonderful profession.

ACKNOWLEDGEMENTS:

Message from Santa Monica College President: Dr. Wade F. Thomas

Experts from the various professional and academic disciplines have long recognized the value of making worthy use of leisure time.

It is timely and vital that Community College administrators and educators are recognizing and becoming involved with the needs created by an expanding leisure.

Those delegates attending this first Recreation Educators Institute-Worshop, sponsored by the Chancellor's Office, California Community Colleges, were most fortunate in having a number of experts as consultants--consultants who gave willingly and vigorously of their time to make the four days constructive and meaningful.

On behalf of Santa Monica College, I am pleased that our faculty and staff had the opportunity to host this worthwhile endeavor in cooperation with the Chancellor's Office.

Message from the Office of the Chancellor: Mr. Leland Baldwin, Assistant Chancellor for Vocational Education

The staff of the Chancellor's Office, California Community Colleges, commends Santa Monica College for their cooperation and support of this program. Special recognition is given to the program director, Miss Jo Kidd, for her coordination of the Institute activities, and to the members of the planning committee who so willingly offered their time and consultative services that resulted in a very successful training session.

ACKNOWLEDGEMENTS - CONTINUED:

Message from Institute Coordinators: Mrs. Mary DeNure and Miss Josephine Kidd

We feel privileged to have served together as co-organizers of this first Workshop-Institute. It has been exciting to see this endeavor develop as a team effort. The public administrators and educators involved herein have brought us to a new level of awareness regarding the role of recreation in today's world.

We wish to express our indebtedness to all of those who served on the planning committee, with special thanks to Dr. John Nesbitt, who presented his position paper which served as the fulcrum for the Workshop-Institute.

We feel that a "giant" step forward has been taken and that we must continue to communicate as we establish flexible and vital recreation curriculum on the various Community College campuses.

Special Note of Appreciation to
Santa Monica College Student
Recorders and Staff Members.

Cover Design - Donald M. DeVoe.
Editing and typing - Elizabeth Mendly.

PLANNING COMMITTEE MEMBERS

Mrs. Mary DeNure:	Consultant in Public Service Occupations, Office of the Chancellor, California Community Colleges, Sacramento.
Miss Betsy Hardie:	Coordinator of Volunteers, Veterans Administration, Los Angeles.
Mrs. Diane Holland:	Training Coordinator, Special Services, Department of Parks and Recreation, County of Los Angeles.
Miss Josephine Kidd:	Recreation Curriculum Coordinator, Santa Monica College.
Dr. John Nesbitt:	Associate Professor, Coordinator of Rehibilitation Services, Department of Recreation and Leisure Studies, San Jose State College.
Dr. Edwin Staley:	Executive Director, Recreation and Youth Services Planning Council, Los Angeles.
Dr. Jean Tague:	Special Consultant, Tague and Associates, Santa Monica.

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PERIODIC MOTORCYCLE INSPECTION MANUAL.

VERMONT STATE DEPT. OF MOTOR VEHICLES,
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PUB DATE - 20MAR69 21P.

DESCRIPTORS - MANUALS; *MOTOR VEHICLES; *INSPECTION; EQUIPMENT EVALUATION; *STATE LAWS
IDENTIFIERS - INSPECTION STATION OPERATORS; MOTORCYCLE INSPECTION; *VERMONT

ABSTRACT - INFORMATION CONTAINED IN THIS MANUAL IS DIRECTED TO MOTORCYCLE INSPECTION STATION OPERATORS IN THE STATE OF VERMONT. OUTLINED ARE LAWS AND REGULATIONS REGARDING SAFE MOTORCYCLE OPERATION AS WELL AS THE RESPONSIBILITIES OF PERSONNEL CHARGED WITH THE TASK OF ENFORCING THOSE RULES. INCLUDED AS TOPICS ARE: (1) VERMONT'S LAW REGARDING MOTOR VEHICLE INSPECTION, (2) REQUIREMENTS FOR APPOINTMENT: SPECIFICATIONS, AND (3) DETAILED INSTRUCTIONS: PROCEDURES, REQUIREMENTS, AND RECORDS. (SN)

TO MOTORCYCLE INSPECTION STATION OPERATOR:

THE PROCEDURE OUTLINED HEREIN SHOULD BE CAREFULLY STUDIED AND FREQUENTLY REVIEWED BY YOUR ENTIRE ORGANIZATION. BE THOROUGHLY FAMILIAR WITH ALL THE PROVISIONS, REGULATIONS AND LAWS CONTAINED HEREIN, AS FULL COMPLIANCE WILL BE REQUIRED BY ALL CONCERNED.

FAILURE TO COMPLY WITH ALL THE PROVISIONS, REGULATIONS AND LAWS PERTAINING TO MOTORCYCLE INSPECTION MAY RESULT IN SUSPENSION OF INSPECTION STATION APPOINTMENT AND/OR MECHANIC'S INSPECTION CERTIFICATE.

IT IS THE RESPONSIBILITY OF THE STATION OWNERS AND/OR OPERATORS TO MAINTAIN THIS MANUAL IN AN UP-TO-DATE MANNER AT ALL TIMES FOR THE USE OF APPROVED INSPECTION PERSONNEL. EXAMINE ALL CORRESPONDENCE IMMEDIATELY, UPON ARRIVAL FROM THIS DEPARTMENT, AS THIS IS OUR PRIME METHOD OF KEEPING YOU INFORMED OF IMPORTANT CHANGES OR ADDITIONS TO THE REGULATIONS.

STATION NUMBERS SHOULD BE PLACED ON ALL CORRESPONDENCE PERTAINING TO INSPECTION STATIONS AND SUCH COMMUNICATIONS SHOULD BE ADDRESSED TO:

DEPARTMENT OF MOTOR VEHICLES
INSPECTION DIVISION
MONTPELIER, VERMONT 05602

VERMONT OFFICIAL PERIODIC MOTORCYCLE INSPECTION MANUAL

REVISED MARCH 20, 1969

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ments. Although there are those holding no baccalaureate degree, the clinical faculty are experienced in their professions and have the credentials required for teaching the curriculum for national accreditation purposes (see individual study tracks).

The chairman of the AHO Department should have additional qualifications. It is desirable that the chairman have a master's degree; however, he must have a baccalaureate degree, the professional experience and the recognized license or certification of his profession. Most colleges will enter into this type of program with a medical facility that is not a teaching institution. Therefore, the chairman should have the capabilities of teaching the clinical personnel methods of instruction since they possibly have never taught before. The chairman should be able to help with the formation of the curriculum in all the clinical areas and have knowledge of the inherent problems in clinical teaching.

The major areas of responsibility for Departmental Chairmen at Galveston College are:

1. To work with their respective supervisors in the organization and administration of an effective instructional program.
2. To work with their respective supervisors in developing the instructional program budget and to administer the departmental budget.
3. To work with the Director of Student Personnel Services in the development of the student personnel services program.
4. To work with the Director of Adult Education in the operation of the evening program.
5. To supervise the work performance of their individual depart-

Any inspection station requesting information relative to station appointments, inspection procedures and regulations and all matters pertaining to the inspection program, may obtain such information by contacting the following personnel by letter or be telephone between the hours of 8:00 A.M. and 4:30 P.M. on Mondays through Fridays:

Donald C. Dolliver - Chief Inspector Ernest D. Mathews - Asst. Chief Inspector Miss Clara Sole - Inspection Clerk	Dept. of Motor Vehicles Inspection Division Montpelier, Vt. 05602 Telephone 223-2311 Extension 501

Listed below, FOR EMERGENCY USE ONLY are the names, addresses and telephone numbers of Motor Vehicle District Inspectors and the area which they supervise. District Inspectors may be contacted by telephone on Mondays through Fridays prior to 8:00 A.M. and after 5:30 P.M.

Inspector O. V. George Star Route St. Johnsbury, Vt. Telephone 748-3298	Northeastern Area of Vermont
Inspector Harold Carroll P.O. Box #97 No. Springfield, Vt. Telephone 886-2479	Southeastern Area of Vermont
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VERMONT LAW REGARDING MOTOR VEHICLE INSPECTION:

T. 23 V.S.A. SECTION 1222

All motor vehicles, trailers and semi-trailers registered in the state shall be periodically inspected during the months of May and October in each year at garages or qualified service station, designated by the Commissioner as inspection stations, for the purpose of determining whether they are properly equipped and maintained in good mechanical condition. Effective July 1, 1967 all motor vehicles must be inspected within 15 days from the date of registration, by an authorized inspection station. The charges for such inspection made by garages designated to conduct periodic inspections shall be subject to the approval of the Commissioner of Motor Vehicles, and the charges made for such inspection shall be credited toward charges made for necessary repairs, provided the cost for repairs exceeds the minimum inspection fee. The Commissioner may suspend the registration of any motor vehicle until the owner thereof complies with the requirements of such inspection. A person who violates a provision of this section shall be fined not more than $100.00 or imprisoned not more than thirty days, or both.

SECTION 1223 - Prohibitions

An owner of a motor vehicle shall not affix or cause to be affixed thereto a certification of inspection that was not assigned by an official inspection station to such motor vehicle. A person shall not knowingly operate a motor vehicle to which a certification of inspection is affixed if the certification of inspection was not assigned by an official inspection station to that vehicle.

GENERAL INFORMATION:

1. MOTORCYCLE DEFINITION:

"Motorcycle" shall mean any motor driven vehicle having a seat or saddle for the use of the rider and designed to travel on not more than three wheels in contact with the ground, but excluding golf carts, track driven vehicles, tractors and vehicles on which the operator and passengers ride within an enclosed cab.

2. Inspection of registered motorcycles

Every motorcycle registered in this state shall be inspected by a certified motorcycle inspection mechanic, at a station designated as an Official Motorcycle Inspection Station by the Commissioner of Motor Vehicles; and if found to be unsafe or unfit for operation, or improperly equipped, it must be put in a safe condition and properly equipped before an official inspection seal is attached to the left side of the rear number plate bracket.

3. Motor Vehicles registered out-of-state:

If a non-resident temporarily in the State of Vermont presents his motorcycle with out-of-state plates on it for inspection, you may inspect the same and attach a seal if the vehicle meets our inspection requirements.

4. Where can repairs be made:

It must be understood that any motorcycle owner is free to select his own Official Motorcycle Inspection Station, AND IS NOT OBLIGED TO HAVE NEEDED WORK DONE AT THE STATION WHERE THE INSPECTION WAS MADE UNLESS HE SO DESIRES.

5. Fees for Inspection:

The maximum fee for inspection of a motorcycle shall not exceed one dollar ($1.00). If the time spent on inspection, adjustments and repairs made on the motorcycle exceeds one dollar, based on your hourly charge, then the one dollar fee shall be disregarded and the charge will be on your hourly basis. The hourly rate charged shall be prominently posted and displayed just below the Official Motorcycle Inspection Station Certificate.

6. Reports, Certificates, and Supplies:

Official Certificates, inspection seals, official display posters and report forms will be furnished by the Department after such appointments have been made, and additional supplies will be forwarded upon request for same.

7. Standard Equipment

"Standard Equipment" and "properly equipped" as applied to a motorcycle shall include adequate tires, head lamp, tail lamp, lenses, brakes, muffler, rear view mirror, horn, rear number plate bracket, and only such motor fuel tank or tanks as are regularly installed by the manufacturer.

8. Report of Rejections

Any Official Motorcycle Inspection Station may report, on the back of a motorcycle inspection check list, any motorcycle which has been disapproved for inspection. The following information must be listed:

Registration Number ____________________
Date Rejected ____________________
Reason for Rejection ____________________

REQUIREMENTS FOR APPOINTMENT: SPECIFICATIONS

1. Inspection stations are appointed solely for the benefit of the motoring public. Before a certificate of appointment as an Official Motorcycle Inspection Station will be issued, an applicant must have an approved place of business. Recommendation for approval as an Official Motorcycle Inspection Station shall be made by a Motor Vehicle Inspector.

2. All appointments are provisional, and are conditioned on a proper conduct of the work and compliance with Department regulations. Upon approval your certificate of authorization must be prominently displayed under glass or plastic.

3. In accepting appointment, Official Motorcycle Inspection Stations obligate themselves to the following requirements:

    A. Make thorough inspections and affix official inspection seals only on those motorcycles that meet All requirements and then only in the space designated by the Commissioner of Motor Vehicles.

    B. Make weekly reports to the Department of Motor Vehicles on each Monday during April and May and again during September and October. Otherwise, reports must be made monthly on the first Monday of the month. If no vehicles are inspected during the month, simply state so on a postal card.

    C. When reporting, return the bottom section of each completed motorcycle inspection check list.

    D. INSPECTION SEALS SHOULD BE KEPT UNDER LOCK AND KEY AND IN A SAFE PLACE. THE OPERATOR OF AN INSPECTION STATION SHALL BE RESPONSIBLE FOR THE SAFEKEEPING OF THESE SEALS. All losses of seals must be reported at once to the Department of Motor Vehicles.

4. Each Official Motorcycle Inspection Station shall have a minimum of one certified motorcycle inspection mechanic.

    A. A certified motorcycle inspection mechanic is defined as follows: A person 18 years of age or older holding a valid operator's license with experience in making adjustments and repairs to motorcycles and a thorough working knowledge of the rules and regulations set forth in the Official Motorcycle Inspection Manual.

    B. A mechanic may be certified only after examination by the Department of Motor Vehicles. If an operator's license is revoked or suspended (for any reason or period of time) the mechanic will cease inspections during the suspension period and shall not be authorized to inspect Motorcycles until privileges have been fully restored. The Department of Motor Vehicles, Inspection Division, must be notified of any suspensions involving a certified mechanic, and such mechanic shall return his Inspection Certificate immediately.

C. Owners and/or Operators of Official Motorcycle Inspection Stations may request examination of new employees by contacting the Department of Motor Vehicles, Inspection Division, Montpelier, Vermont.

D. Owners and/or Operators of Official Motorcycle Inspection Stations shall notify the Department of Motor Vehicles upon hiring or releasing any certified inspection mechanic. Information required shall include the mechanic name and address, and in addition, the mechnaic's inspection certificate number. No mechanic'shall be authorized to inspect motorcycles at any Official Motorcycle Inspection Station until such station has notified the Department of Motor Vehicles of his employment.

E. The use of an uncertified mechanic for inspecting or approving motorcycles for inspection is sufficient cause for immediate suspension of the appointment of that Inspection Station.

F. Certified Motorcycle Inspection mechanics are subject to re-examination at any time, by the Department of Motor Vehicles, to determine that they have full knowledge of current Official Motorcycle Inspection Rules and Regulations.

G. A certified Motorcycle Inspection mechanic's certificate may be recalled for any infraction or violation of the rules and regulations governing the inspection of vehicles.

5. Space Requirements:

A. Available level space within the garage for inspection and repairs is one of the most important factors in making and continuing appointments. All inspections must be conducted in the approved area, unless specific regulations state otherwise.

B. "Inspection Area" is defined as the designated space approved for inspection purposes. Approval cannot be granted, nor permitted to continue, unless full complianc of the following requirements are maintained.

C. A hard surface floor of a type approved by the Department of Motor Vehciles, entirely within the garage, shall not slope other than to the front or rear as the vehicle would set to be inspected. The rate of slope must be uniform and no greater than 2 inches in 25 feet.

Where a standard headlight testing screen is to be used there shall be at least 32 feet of floor space within the garage, the first 10 feet of which shall be an adequate floor.
Where an approved floor mounted headlight tester is to be used there shall be at least 12 feet of adequate floor within the garage.
UNDER NO CONDITIONS SHALL MECHANICAL TYPE AIMERS WHICH ATTACH TO THE HEADLIGHT BE AUTHORIZED.

6. In addition to an approved headlight testing device each motorcycle inspection station shall have adequate tools and equipment which shall include a tire tread gauge and a stand to hold the cycle upright while adjusting headlights and auxilliary lights.

7. Motorcycle Inspection Stations shall be ready to conduct inspections during normal business hours in season. This means that the floor area used for inspection must be clean and clea of obstructions, and all necessary equipment in place and ready for use.

GENERAL PROVISIONS

1. Official Inspection Stations appointed to conduct inspections on motorcycles shall be designated as Motorcycle Inspection Stations and may perform motorcycle inspections only, unless such inspection station has also been authorized to inspect other types of motor vehicles.

2. Motorcycle Inspection Stations shall display a sign reading "Vermont Official Motorcycle Inspection Station" in a prominent place. Such sign to be furnished by the Department of Motor Vehicles.

3. Any change in name, ownership or in location on any Official Motorcycle Inspection Station cancels the appointment of that station, and the Department of Motor Vehicles, Inspection Department must be notified immediately in writing.

4. Inspection stations upon going out of business shall immediatley return to the Department of Motor Vehicles, the certificate of appointment with all unused inspection seals and completed final reports on all inspections.

5. Stations should anticipate the necessity for additional supplies of inspection seals. If it becomes necessary to request additional seals, they must be obtained through the Montpelier office by phone or mail.

6. Foreign make motorcycles must comply with all inspection requirements.

DETAILED INSTRUCTIONS: PROCEDURES, REQUIREMENTS, ETC.

1. Serial Number: Registration Certificate.

   A. When any part of a serial number, including letters used in the prefix, is incorrect or transposed, the certificate does not properly identify the vehicle and must be corrected. This may be accomplished by having the owner return the original certificate, furnishing the correct serial number and enclosing a fee of fifty (50¢) cents to the Department of Motor Vehicles, Montpelier, Vermont 05602. An official motorcycle inspection seal shall not be attached until the owner has obtained such corrected registration certificate. An official inspection station shall, however, be authorized to collect a fee of fifty (50¢) cents from the owner and forward with the original certificate and the correct serial number to the Department of Motor Vehicles, Montpelier, Vermont 05602. An official inspection seal may then be attached to the vehicle, provided it meets all other inspection requirements.

   B. Whenever a registration certificate has been lost, the owner shall request a duplicate certificate from the Department of Motor Vehicles, Montpelier, Vermont 05602, enclosing a fee of fifty (50¢) cents for such duplicate certificate. An official inspection seal shall not be attached until the owner has obtained a duplicate certificate. An official inspection station shall, however, be authorized to attach an official inspection seal to the vehicle, provided it meets all other inspection requirements, and compliance with the following procedure:

      1. Verification of registration by telephone with the Department of Motor Vehicles, Montpelier, Vermont, and collection from the owner of a fee of fifty (50¢) cents. Request for a duplicate registration together with the fifty (50¢) cent fee shall be mailed immediately to the Department of Motor Vehicles, Montpelier, Vermont 05602 by the Official Motorcycle Inspection Station.

   C. Beginning with the 1964 registration year, all registration certificates for vehicles powered by other than gasoline will be marked "non gasoline". If any vehicle presented with a certificate not marked "non gasoline" and you find it powered by other than gasoline, inspection must be denied and you must notify immediately the Department of Motor Vehicles, Montpelier, Vermont 05602.

2. Inspection Items

   The following items must be thoroughly examined and checked to constitute an official inspection.

   A. *Steering, alignment and suspension.*

B. Tires, wheels and rims.

C. Exhaust and fuel systems.

D. Brakes.

E. Lighting and electrical systems.

F. Windshield or wind screen, and body items.

G. Road test

H. Colored lights and sirens.

I. Affix inspection seal and record inspection on report sheet. The inspection seal number on the report sheet and on the metal inspection seal must be identical.

3. Original Equipment

Unless statutes or regulations provide otherwise, original factory installed equipment, or equivalent replacement equipment shall be on vehicles. Where such equipment is in an unsafe condition, or does not function properly, it shall be repaired or replaced.

4. Any condition, part or assembly that fails to comply with the following requirements, or any other condition, part or assembly not specifically mentioned but in an obviously unsafe condition or which constitutes a hazard to the safe and proper operation of the vehicle, shall be deemed sufficient justification to reject the vehicle for inspection until such condition or hazard has been corrected.

A. Steering, alignment and suspension.

1. Steering and wheel alignment

Steering and alignment items should be checked visually and adjusted according to manufacturers specifications. Check for condition, adjustment, wear or broken and defective parts.

Causes for rejection:

Bent frame.

Wheels out of line.

Broken, loose, or worn components.

Loose, broken, defective or out of adjustment steering head bearing.

Loose, bent, broken or damaged handlebars.

In normal riding position, handlebar grips shall not be higher than 15 inches above the saddle.

2. Suspension

Examine suspension system, check for defective, broken, worn or missing components.

Causes for rejection:

Broken, worn, missing, defective, disconnected, or malfunctioning shock absorbers.

Broken or sagging springs.

B. Tires, Wheels and Rims.

Tires, wheels, and rims should be checked by visual examination. Check for condition and mounting of wheels, condition and adjustment of bearings, wear, play and any broken parts.

Causes for rejection:

Loose, missing or defective bolts, nuts, or lugs.

Bent, loose, cracked or damaged wheel, or defective rim or wheel flange, or missing, broken, bent, loose or damaged spokes.

Wheel runout exceeding 3/16 inch.

Broken or out of adjustment wheel bearings.

Wheels out of balance.

No tire shall be passed and certified to be in safe operating condition unless it meets the visual and tread depth requirements set forth in these standards.

1. Definitions

   A. Tread depth - the amount of tread design on the tire Tread depth includes both original, retread and recap tread design.

2. <u>Visual Requirements</u>. No tire shall be deemed to be in safe operating condition if such tire has:

   A. A fabric break, or a cut in excess of one inch in any direction as measured on the outside of the tire and deep enough to reach the body cords, or has been repaired temporarily by the use of blowout patches or boots; or

   B. Any bump, bulge or knot related to seperation or partial failure of tire structure, or

C. Any portion of the ply or cord structure exposed; or

D. A portion of the tread design completely worn, provided such worn portion is of sufficient size to affect the traction and stopping ability of the tire.

3. METHOD OF MEASURING TREAD DEPTH. Tire tread depth shall be measured by a tread depth gauge which shall be of a type calibrated in thirty-seconds of an inch. Readings shall be taken in a major tread groove of the tire nearest the center at two points of the circumference not closer than fifteen inches. Readings for a tire which has a tread design running across the tire or for a siped tire, where such tread design is permitted, shall be taken at or near the center of the tire at two points of the circumference not closer than fifteen inches.

4. TREAD DEPTH REQUIREMENTS. No tire shall be deemed to be safe operating condition if such tire is worn to the point where less than two thirty-seconds (2/32) of an inch of tread design remains at both points at which gauge readings are obtained.

5. No wheel or rim shall be passed when it has:

A. Visibly loose, missing or defective bolts, nuts, or lugs.

B. Visible bent, loose, cracked or damaged wheel or defective rim or wheel flanges.

C. EXHAUST AND FUEL SYSTEMS.

Examine fuel system, muffler, and exhaust system, paying particular attention to rusted and corroded surfaces.

Causes for rejection:

Fuel leakage at any point in the fuel system.

Fuel tank and piping not securely installed.

Fuel tank not vented.

Throttle not aligned or binding, linkage worn, bent, broken, corroded or missing.

No muffler or exhaust pipe shall be passed that has breaks, open seams or perforations. All joints shall be tight and the entire system shall be firmly attached to the vehicle.

The use of muffler repair jackets is prohibited. No patches shall be approved other than those that are welded securely and completely around the entire perimeter.

Any muffler which is not original factory installed equipment, or equivalent replacement equipment, or any muffler which was not designed for on-highway use.

Any exhaust system shall be deemed defective if any changes, modifications, alterations, deletions or adjustments have been made which would thereby cause any exhaust system to generate a higher or louder sound level than would be generated by the exhaust system customarily installed by the manufacturer as original equipment.

D. BRAKES.

Brake tests on the highway or street should be conducted on a substantially level, dry, smooth, road that is free from loose material, oil, or grease. The driver should stop the vehicle in the shortest possible distance. The brake application should be started at as close to 20 miles per hour as practical. The required minimum performance is for the vehicle to stop within 30 feet from 20 miles per hour.

Cause for rejection:

Failure of the vehicle to stop in the distance equal to or less than specified.

1. Pedal reserve - inspection procedure

With vehicle in standing position, measure the brake travel when 40 to 60 pounds pressure have been applied to the pedal.

Cause for rejection:

Foot and hand levers which do not have at least 1/3 of their travel as reserve after brakes are fully applied.

2. Condition of Mechanical Components

Inspection Procedure

Visually inspect the condition of the mechanical components. Items to be checked specifically include: worn pins, missing or defective cotter pins; broken or missing springs; worn rods, clevises, or couplings; misaligned anchor pins; frozen, rusted or inoperative connections; missing spring clips, improper wheel bearing adjustments; or, defective grease retainers.

Causes for rejection:

Mechanical parts misaligned, badly worn, broken or missing.

High friction in pedal arrangement or brake components.

Brake, operating levers improperly positioned or misaligned.

Any angle greater than 90° between the cam operating lever and the actuating cable or rod.

3. Condition of Hydraulic System

Inspection Procedure

Inspect hydraulic system visually. Specific items to be checked include: wheel cylinders for leakage; binding pistons; hydraulic hoses and tubes for kinks, crack, chafed or flattened or restricted sections, and improper support; and master cylinder for leakage. Check master cylinder rod for proper adjustment and test system for brake fluid leakage by applying moderate foot pressure to pedal and maintaining this pressure for at least 1 minute. Check fluid level in master cylinder.

Causes for rejection:

Leaks in master cylinder or wheel cylinders.

Scraped hydraulic hoses; hydraulic hoses, tubes, or connections leaking, restricted, crimped, cracked, or broken. Connecting lines not properly attached or supported to prevent damage or abrasion by contact with the frame, axle, other lines, or any other part of the vehicle. Pressure hoses not equal to manufacturers original equipment.

Master cylinder rod improperly adjusted.

Tendency of brake pedal to move slowly toward applied position (indicating fluid leakage) while foot pressure is maintained on it 1 minute.

Fluid level in master cylinder perceptible below full mark.

4. Brake Fluid Requirements

The Statutes provide that after January 1, 1964 no person may distribute or provide any fluid for use in the hydraulic brake system of a motor vehicle unless it meets the Society of Automotive Engineers Standards of 70 R1 or better and any container must bear a statement of its classification such as SAE 70 R1 or SAE 70 R3

F. LIGHTING AND ELECTRICAL SYSTEM.

1. Headlamp Testing

Inspection Procedure

Beams shall be inspected for specific aim by using one of the following methods:

Approved screen, placed 25 feet in front of the headlamp;

Approved photoelectric testing machine, which will give essentially equivalent results.

Preparation for Aim Inspection:

Check for proper inflation of tires.

Rock cycle to free and equalize suspension.

Aim with rider in the saddle.

Clean lenses, check for burned out and correct bulbs, proper wiring and switches.

Check headlamp approval. One lamp is required; not more than two are permitted.

2. Headlamp Adjustment

Inspection Procedure

Adjust lamp until hot spot on high beam is aimed straight ahead and dropped the following distance in 25 feet.

Single and double filament lamp - 2 inch drop in 25 feet.

All headlamps shall show a clear white light, and no colored headlamp lens shall be permitted.

Beam Indicators or Tell-tales:
Required on all motor vehicles originally designed with a beam indicator or tell-tale as an integral part of the lighting system.

Causes for rejection:

Lamps not mounted securely to prevent excessive vibration, bad wiring, improper ground or bad switch.

Inoperative dimmer switch on double filament headlamp.

Dimmer switch in an unnatural location.

Beam indicator, if installed, not operational.

3. Additional Lighting Equipment - <u>Required</u>

Inspection Procedure

Inspect for condition, operation, wiring and switching.

Tail lamps

At least one required; 2 are permitted.

Must be of approved type.

Must be red in color.

Stop Signal Lamps

At least one required; two are permitted.

Must be of approved type.

Must be red in color.

Must be activated by application of the brake.

May be combined with other rear lamps.

Must be extinguished when the turn signal lamp is functioning if combined with the turn signal lamp.

License Plate Lamp

One required.

Must be of approved type.

Must be white in color.

Rear plate must be visible under normal atmospheric conditions at night from 50 feet to the rear.

Must be activated by same switch which activates the headlamps.

Number plate light shall clearly illuminate number plate.

Reflectors

None required - 2 are permitted.

Must be of approved type - must show red to rear, and amber to front.

Reflectors cannot be used in lieu of any lights required.

4. Additional Lighting Equipment - Permitted

Fog lamps or auxiliary driving lamps.

Two permitted.

Must be of approved type.

Must be spaced not less than 20 inches apart.

Must be placed at a height not less than 12 inches nor more than 42 inches above the surface upon which the vehicle stands.

Cannot be used in lieu of headlamps.

Must be permanently and rigidly mounted.

May be wired independently of, or in conjunction with, the headlamps.

Auxiliary Driving Lamps

Must be aimed as provided under headlamps.

Must be wired in conjunction with the tail lamps.

Parking Lights:

If vehicle was originally equipped with parking lights same must be in good operating condition.

5. Turn Signal System - Not Required

Two lamps permitted visible from the front and two lamps visible from the rear.

Must be of approved type.

Lamps showing to the front must be amber or white in color.

Lamps showing to the rear must be red or amber in color.

May be Class A or Class B.

6. Hazard Warning Lamps - Not Required

Lamps must be of approved type, if mounted.

Must flash front and rear turn signals simultaneously.

Causes for rejection:

Any cause listed under headlamps above, when applicable.

Any required reflector, lamp or lens that is turned or inclined so that its light is not properly directed.

Any signal lamp, pilot lamp, or operating unit not functioning properly.

Any signal operating unit cancelling mechanism not functioning properly.

7. Wiring and Switches

Inspection Procedure

Inspection for condition and operation.

Causes for rejection:

Switches and operating units not in good condition and functioning properly.

Wiring in poor condition, improperly installed or insulated and so located as to incur damage.

Any connection that is not secure or shows signs of excessive corrosion.

Power source which does not maintain lamps at required brightness for all conditions of operation.

8. Horn

Inspection Procedure

Inspect for condition and operation

Causes for rejection:

Horn not securely fastened to vehicle

Horn not audible under normal conditions

Button placed in an unnatural position

F. WINDSHIELD OR WINDSCREEN AND BODY ITEMS

1. Vehicle Glazing

Inspection Procedure

Windshields or windscreens are not required, but if installed, they must be free of cracks, discoloration or scratches and must be mounted so that the driver's vision is not obstructed.

Causes for rejection:

Any windscreen which obstructs or obscures the driver's vision.

Any crack, discoloration or scratches.

Any support or stiffener device mounted in the driver's line of vision.

2. Body Items

Inspection Procedure

Check for required body items, defective or dislocated parts, and parts projecting from the vehicle.

Causes for rejection:

Seats designed to carry more than one person which are not equipped with hand grips and foot rests for passengers.

Engine mounting frame or brackets cracked or broken.

Fenders and mud guards broken, missing or of insufficient design. Front and rear fenders must be equivalent to the manufacturers original specifications.

Rear number plate bracket not securely fastened

Obscured rear number plate

Foot rests for driver not securely mounted or of insufficient design or improper location.

Seat not equivalent to manufacturers design, improperly or insecurely attached.

When attached, check side car for proper attachment, and compliance with lighting and tire requirements.

Sidecar must display an approved white or amber light showing to the front and mounted on the right side.

Clutch not aligned or binding, linkage worn, corroded, broken or missing.

3. Rear View Mirror

Inspection Procedure

Rear view mirrors must permit a clear view to the rear of the vehicle. Inspect for security of mounting visibility and condition of mirror.

Causes for rejection:

Cracked or discolored mirrors

Improperly installed mirrors

G. ROAD TEST

Inspection Procedure

The station must provide a measured marked area for the brake test, as set forth in item D under brakes. The driver shall stop the vehicle from the prescribed speed in the required distance.

If the road test is conducted on the public highway, the operator must have a motorcycle endorsement

Causes for rejection:

Unable to stop vehicle within required distance of 30 feet at a speed of 20 miles per hour.

H. COLORED LIGHTS AND SIREN FOLLOW THESE DIRECTIONS EXACTLY

Commencing July 1, 1968, no motor vehicle shall be operated upon a highway of this state equipped with a siren or colored signal lamp visible from the front of the motor vehicle unless a permit authorizing such equipment, issued by the COMMISSIONER OF MOTOR VEHICLES, is carried in the vehicle.

1. SIRENS AND/OR BLUE OR BLUE AND WHITE SIGNAL LAMPS FOR ALL LAW ENFORCEMENT VEHICLES.
2. SIRENS AND/OR RED OR RED AND WHITE SIGNAL LAMPS FOR ALL AMBULANCES, FIRE APPARATUS, VEHICLES OWNED BY VOLUNTEER FIREMEN AND VOLUNTARY RESCUE SQUAD MEMBERS, AND MOTOR VEHICLES USED SOLEY IN RESCUE OPERATIONS.

All permits for sirens and/or colored signal lamps shall be checked with the REGISTRATION CERTIFICATE to verify that the vehicle make, year, type and serial number is identical with the motor vehicle being presented for inspection.

For the expiration date of all permits, see sections (1) and (2) as printed on the front center of every permit.

All siren and/or colored signal lamp permits shall be valid only when officially stamped and dated in the upper right corner of such permits.

Permits issued by the commissioner shall be carried in some easily accessible place in the vehicles authorized to use said equipment, and shall be available for inspection during the inspection of vehicles by the certified inspection mechanics of any official motorcycle inspection station. No inspection seal may be issued for a motorcycle equipped with a siren or colored signal lamp or both, unless a current or valid permit for such siren or colored signal lamp or both is produced for inspection.

NOTHING IN THE ABOVE SECTION shall restrict the lawful use of approved clearance and marker lights on commercial vehicles, or approved amber directional signals on the front or rear of any motor vehcile, or flashing red signal lamps on the front and rear of school buses.

. AFFIX INSPECTION SEAL AND RECORD INSPECTION ON REPORT SHEET

Affix metal seal to rear number plate bracket through elongated hole on left side of bracket. DO NOT ATTACH NUMBER PLATE TO PLATE BRACKET WITH METAL SEAL.

AN INSPECTION SEAL THAT BECOMES VOID FOR ANY REASON, MUST BE RETURNED (SEALED) TO THE DEPARTMENT OF MOTOR VEHICLES.

Fill out entire inspection check list with ball point pen and mail the bottom section to the Department of Motor Vehicles, Montpelier, Vermont 05602.

VT 017 212
COORDINATED VOCATIONAL ACADEMIC EDUCATION
FIRST YEAR CURRICULUM.

GEORGIA UNIV., ATHENS. DIV. OF VOCATIONAL EDUCATION.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 71 133P.

DESCRIPTORS - *VOCATIONAL EDUCATION; *ACADEMIC EDUCATION; *EDUCATIONAL COORDINATION; *CURRICULUM GUIDES; BEHAVIORAL OBJECTIVES; SECONDARY GRADES; CONCEPTUAL SCHEMES; TEACHING TECHNIQUES; LEARNING ACTIVITIES; INTERPERSONAL COMPETENCE; DRUG EDUCATION; *INDIVIDUAL DEVELOPMENT; HEALTH
IDENTIFIERS - EDUCATION PROFESSIONS DEVELOPMENT ACT; EPDA; ATTITUDES APPRECIATIONS

ABSTRACT - THIS CURRICULUM GUIDE FOR THE FIRST YEAR IN A COORDINATED VOCATIONAL-ACADEMIC EDUCATION PROGRAM WAS DEVELOPED DURING THE 1970 SCHOOL YEAR BY GEORGIA VOCATIONAL COORDINATORS ENROLLED IN AN INTERNSHIP PROGRAM AT THE UNIVERSITY OF GEORGIA. TOPICAL UNITS FOCUS ON THE FOLLOWING ASPECTS OF PERSONAL DEVELOPMENT: (1) BREAKING THE ICE, (2) IMPROVING PERSONALITY CHARACTERISTICS, (3) DEVELOPING INTERPERSONAL RELATIONSHIPS, (4) PERSONAL APPEARANCE AND HEALTH HABITS, (5) DRUG ABUSE, (6) COMMUNICATIONS, (7) EFFECTIVE USE OF TIME, AND (8) CITIZENSHIP. FOR EACH SUBTOPIC IN A UNIT, BEHAVIORAL OBJECTIVES ARE LISTED AND A CONCEPTUAL OUTLINE WITH SUGGESTED LEARNING ACTIVITIES ARE INCLUDED IN A 2-COLUMN FORMAT. TEACHING TECHNIQUES UTILIZED INCLUDE ROLE-PLAYING, CLASS DISCUSSIONS, AND THE USE OF AUDIOVISUAL AIDS. (AG)

4078

CVAE

Coordinated Vocational Academic Education

First Year Curriculum

Prepared by:
CVAE Coordinators
Division of Vocational Education
University of Georgia
Athens, Georgia
July, 1970 - June, 1971

PREFACE

This is the suggested First Year Curriculum for CVAE. This guide was partially developed by CVAE Coordinators attending a workshop at the University of Georgia, during the summer of 1970, and another group of CVAE Coordinators enrolled in a workshop during the summer of 1971.

It is hoped that this guide will provide the knowledge and methods to successfully interlock academic subject matter with vocational experiences.

ACKNOWLEDGEMENTS

This *CVAE First Year Curriculum* was prepared during the school year 1970-1971 by Georgia C.V.A.E. Coordinators enrolled in an internship at the University of Georgia.

The training of the coordinators was conducted by the Division of Vocational Education, College of Education of the University of Georgia, Athens, Georgia. Funds were made available from the following cooperating agencies:

Division of Vocational Education
Georgia State Department of Education
Atlanta, Georgia

and

Education Professions Development Act, Part F
U.S. Office of Education
Department of Health, Education and Welfare
Washington, D.C.

We are indebted to the following individuals for contributing their special talents:

Mrs. Revonda Williams
Graduate Assistant

Mrs. Virginia Karnas
Typist

Dr. H.R. Cheshire
Project Director

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UNIT: BREAKING THE ICE

TOPIC: Why You Didn't Like School---But Will Like CVAE

BEHAVIORAL OBJECTIVES:

1. The students will give three reasons why he did not like school.

2. The students will give three reasons why he did not drop out of school.

3. The students will give three ways they feel their dislikes for school could have been positive rather than negative.

UNIT: BREAKING THE ICE

TOPIC: Why You Didn't Like School--But Will Like C.V.A.E.

Concept	Suggested Learning Activities
I. Reasons for not liking school	I. Discussion on why we hate school
A. Teachers didn't Care.	
B. Too many snoby students	
C. Classes were boring	
D. Too much homework	
II. Reasons For Not Dropping Out	II. Filmstrip: "For Those Who Quit"
A. Wanted to graduate	
B. Had friends at school	
C. Got a girl friend	
D. Parents wouldn't let me quit	
III. Positive Attitudes Toward School	III. Question and Answer Period
A. Teachers showing more interest	1. field trips
B. Providing meaningful experiences	2. resource persons visit
C. Having more freedom in school	3. Tape "Acres Of Diamonds"
D. Dropping required courses that are not worth while	

UNIT: BREAKING THE ICE

TOPIC: Classroom Procedures

BEHAVIORAL OBJECTIVES:

1. Students will list and be familiar with the basic requirements of local board and school.

2. Students will list five basic requirements expected of each in fulfilling the classroom curriculum.

3. Students will list ten changes that they feel would improve the overall school curriculum and school image.

UNIT: BREAKING THE ICE

TOPIC: Classroom Procedures

Concept	Suggested Learning Activities
I. Familarize student with requirements and how they are to be evaluated.	I. <u>Group Presentation (Counselor)</u> 1. What are the requirements of your school? 2. How many credits are needed for graduation? 3. Why evaluating system? 4. Why are these important 5. What are the state requirements?
II. Role of Student in relation to school curriculum	II. <u>Filmstrips or Slides</u> 1. How students earn credits 2. On-the-job pictures 3. How training takes place 4. Why is training and team work important?
III. Changing of Schools Curriculum 1. Schedules 2. Classes 3. Jobs or work stations 4. Transition from conventional to workable classroom procedures. 5. Extra curricular activities for class credit.	III. <u>Class Discussion</u> 1. What would happen if we changed all morning classes to evening? What changes would each of us have to make? 2. Have students make different class and work schedules. 3. Have students discuss classroom procedures. 4. Have students discuss or act out a <u>tardy</u> scene. 5. Have students evaluated teachers as they relate to and communicate with students.

UNIT: BREAKING THE ICE

TOPIC: Making Friends

BEHAVIORAL OBJECTIVES:

1. The student will demonstrate two ways he makes friends.

2. The student will list two ways he is friends of others.

UNIT: BREAKING THE ICE

TOPIC: Making Friends

Concept	Suggested Learning Activities
I. Making Friends A. Student's introductions to coordinator and each other. B. Students relating their work experience with other students. C. Students are to give 5 examples of true friendship.	I. Filmstrip "Are Friends Really Necessary"
II. Ways You are Friends of Others. A. Showing sympathy and concern for others. B. Showing appreciation for fellow humans. C. Having a pleasing personality	II. Panel discussion on the need for friends. Filmstrip "What is Personal lity"

UNIT: Improving Personality Characteristics

TOPICS:

I. Your Personality and It's Improvement
II. Habits--Your Friends and Your Business
III. Your Success With Others

UNIT: IMPROVING PERSONALITY CHARACTERISTICS

TOPIC: Your Personality and It's Improvement

BEHAVIORAL OBJECTIVES:

1. The student will give three ways he can improve his personality.
2. The student will list three personal components which will make pupils popular with classmates.
3. The students will list some personal traits which can hinder popularity.

UNIT: IMPROVING PERSONALITY CHARACTERISTICS

TOPIC: Your Personality and It's Improvement

Concept	Suggested Learning Activities
I. Improving Personality A. Be friendly with others	I. Discussion: Students group themselves, and each list as many ways as possible he can improve his personality.
B. Be considerate C. Be fair in dealings with others	Role Play: Students will role play meeting a stranger and giving assistance when asked directions.
D. Smile E. Have sense of personal worth F. Have feeling of belonging	Skits: Students will present skits on ways of solving personal problems. Emphasize the desirable ways presented.
G. Have self-reliance H. Refrain from personal traits which can hinder popularity (a) Nervous symptoms (b) Withdrawing tendencies (c) Lack of skill in getting along with others (d) Worry (e) Indifferent (f) Jealously	

UNIT: IMPROVING PERSONALITY CHARACTERISTICS

TOPIC: Habits - Your Friends and Your Business

BEHAVIORAL OBJECTIVES:

1. The student should be able to give a good definition of a habit.
2. The student should be able to list 5 good habits.
3. The student will be able to list 5 habits that are bad or harmful to his health or well being.
4. The student should be able to list 3 reasons why he should feel responsible for helping his friends to eliminate bad or harmful habits.

UNIT: IMPROVING PERSONALITY CHARACTERISTICS

TOPIC: Habits - Your Friends and Your Business

Concept	Suggested Learning Activities
I. What are habits? A. A behavior pattern acquired by frequent repetition or exposure that shows itself in regularity. B. Any act which has been repeated until it has become automatic or involuntary.	I. Questions and answer session about what we mean by habits. Are they necessarily all good or all bad?
II. What are some good habits? A. Good grooming habits: brushing teeth regularly, taking a bath, care of the hair, nails, etc. B. Always listen carefully when someone is speaking directly to you. C. Never interrupt when someone else is talking. D. Always remember to look both ways before crossing a street. E. Always cover your mouth or nose if you have to sneeze or cough. F. Try to plan your time so that you can finish your studying or work and still have some time left for fun and relaxation. G. Never talk with your mouth full of food. H. Always try to find something good in every situation instead of always complaining.	II. Group discussion: Cover areas such as good health habits, study habits, manners, safety habits, and grooming, etc. Film: "You and your habits, do you have them, or do they have you?" (A Guidance film) Role playing: Using some structured situations, showing some good, some bad habits.

UNIT: IMPROVING PERSONALITY CHARACTERISTICS

TOPIC: Habits - Your Friends and Your Business

Concept	Suggested Learning Activities
I. Try to treat others the way you yourself would like to be treated.	
J. Try to keep an open mind about situations until you at least know some facts before forming an opinion.	
III. What are some bad or harmful habits? A. Not getting enough rest B. Not eating a properly balanced diet. C. Smoking too much or at too early an age. D. Grouping or generalizing by age, race, beliefs, social status, etc. E. Drinking alcohol in excess, as a substitute for food or as a crutch. F. Getting involved in sex roles without fully realizing all the risks involved. G. Trying things such as alcohol or drugs, for kicks without knowing the risks or dangers.	III. Pamphlets on all the different kinds of drugs, their affects, etc. furnished by the State Dept. of Education Guest speaker: Special Narcotics Officer for the GBI. Filmstrip with record: "To Smoke or Not to Smoke". American Cancer Society Pamphlets: "Alcoholcaust" by Traveler's Ins. Co. and "Alcohol, Who is Allergic to It?" Guest speaker: County Health Nurse; "Venereal Diseases, unwed mothers, and unwanted pregnancies." Pamphlets: "Venereal Diseases, Facts you should Know" (I can't remember the publisher) 25¢ a copy but well worth it.
IV. Why should you try to influence your friends in their habits? 1. A friend should always try to help in times of trouble.	IV. Panel Discussion: How far or how much should you try to interfere if you see a friend developing some bad or harmful habits?

UNIT: IMPROVING PERSONALITY CHARACTERISTICS

TOPIC: Habits - Your Friends and Your Business

Concept	Suggested Learning Activities
2. If you don't say something, and continue to be seen together, it gives the appearance that you approve of his actions. This can sometimes hurt you.	Guest Speaker: "Getting Along With Others". Role playing: See how effective students could be in trying to influence their friends without seeming to mind their business for them. Give them several different habit problems to cope with.
3. If you don't say anything and they do get into trouble, they'll probably resent you later on.	
4. Sometimes they really don't like what they are doing and are really looking for a way out.	
5. Some habits can be harmful, but many may just be irritating. Your friend might not realize it, and would appreciate your telling him this.	

UNIT: IMPROVING PERSONALITY CHARACTERISTICS

TOPIC: Your Success With Others

BEHAVIORAL OBJECTIVES:

1. The student will list three characteristics of promoting success with others.

2. The student will make an individual plan for improving himself.

3. The student will give five traits which will make them successful with others.

UNIT: IMPROVING PERSONALITY CHARACTERISTICS

TOPIC: Your Success with Others

Concept	Suggested Learning Activities
I. Some Characteristics of well adjusted persons which aid in success with others: (a) Social standards (b) Social skills (c) Freedom from antisocial tendencies (d) Family relations (e) School relations (f) Community relations (g) Good sportsmanship	I. Analysis: Make an individual plan for improving myself. Discussion: Discuss personal components in class. Discuss emotional needs of people; list desirable ways of satisfying emotional needs.

UNIT: TURN ON WITH PEOPLE

TOPICS:

I. Peer Group Relationship

II. Becoming A Part of the Group

III. But to Thine Ownself Be True

IV. Human Relations

V. Marriage and the Family

VI. Home Relationship

VII. School Relationship

VIII. Community Relationship

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Peer Group Relationship

BEHAVIORAL OBJECTIVES:

1. The students will be able to write and identify two factors of social maturity that has been studied.

2. The students will be able to list and relate two ways one might understand self through understanding his peers.

3. The students will be able to list at least 6 ways friendship is built.

4. The students will be able to identify 3 reasons why it is important to get along with others.

5. The students will be able to list at least 5 factors which cause poor peer relations.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Peer Group Relationship

Concept	Suggested Learning Activities
I. Social maturity A. Customs B. Everyday manners C. Social acceptance	I. Bulletin Board: Have the students arrange a bulletin board showing teen-boys and girls who have been over-come by questions concerning understanding himself or herself and acceptable social behavior. Group discussions: Have the students discuss good personal appearance and proper manners. Transparency: Discuss along with showing some social behaviors for boys and girls. Observe the behavior of other students in different school situations. Report information to class with emphasis on behaviors that are desirable or undesirable. Invite Home Economics teacher to discuss "Social Acceptance"
II. Understanding self through understanding peers. A. Wholesome attitudes B. Personality and character C. Personal goals and values	II. Transparency: On things done to improve their personality. Let students list ways of improving personality. Let students describe one of the most admirable characters they know. Field interviews: Let the students interview selected groups to determine traits of different personalities. Group discussion: Have students discuss their personal goals and values.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Peer Group Relationship

Concept	Suggested Learning Activities
III. Building friendship A. Interest in others. B. Willingness to go out of your way to be friendly and helpful toward others. C. Kindliness. D. Flexibility-willingness to sometime do what others want instead of always trying to have your own way. E. Sense of humor. F. Dependability. G. Neatness in personal appearance H. Readiness to do your share of work. I. Sincerity. J. Open-mindedness. K. Willingness to admit being in the wrong. L. Good manners. M. Ability to make others feel worth while. N. The ability to be a good listener as well as a good talker.	<u>Transparency</u>: Let students list ways of building friendship. <u>Panel discussion</u>: Let students discuss the ways of making and keeping friends. <u>Role playing</u>: Let students portray a role where a new student enters the group. Role play techniques and practices in building friendship toward this new student.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Peer Group Relationship

Concept	Suggested Learning Activities
IV. Importance of getting along with others. A. To be successful. B. Interdependence. C. Promote high morals and cheerful atmosphere. D. More consideration for the rights of others. E. Social standard. F. Mere survival.	IV. Group discussion: Let students discuss why it is important to get along with others. Let students list ways to enhance their ability to get along with others. Team Approach: Have coach talk with group about interdependence in sports. Football, basketball, etc.
V. Factors which cause poor peer relations. Lack of interest in others. B. Unwilling to go out of your way to be friendly. C. Not willing to overlook and make allowances for other peoples faults. D. Not willing to do what others want to do. E. No sense of humor. F. Not dependable. G. Sloppy in appearance.	V. Transparency: Let students list ways that cause poor peer relations. Panel Discussion: Let the students discuss personal reasons why they have experienced poor peer relations Define Peer in terms that students understand.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Peer Group Relationship

Concept	Suggested Learning Activities
H. Unwilling to do your share of the work.	
I. Insincere.	
J. Not being able to admit you are wrong.	
K. Close-mindedness.	
L. Bad manners.	
M. Inability to make others feel worth while.	
N. Inability to be a good listener.	

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Becoming a Part of the Group

BEHAVIORAL OBJECTIVES:

1. The student will be able to identify his character weakness and strengths by taking a self inventory of his characteristics.

2. The student will be able to compare methods of interacting in groups by roleplaying.

3. The student will be able to list three group characteristics.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Becoming a Part of the Group

Concept	Suggested Learning Activities
I. Your self-concept A. Personality Characteristics 1. desirable traits 2. undesirable traits B. Role possibilities in groups 1. leader 2. follower 3. dominator 4. submissive	I. Have student list on board suggestions of desirable and undesirable personality characteristics. Have each student take a self-inventory on "How Do I Rate" scale Have group guidance session on "What is a leader" "What is a Follower" Have student write a short paper on which role he can best fill and why.
II. Group Characteristics A. Mutual identification 1. common interests 2. common goals B. Interstimulation 1. individual influence one one another 2. group influences each individual	II. Have group guidance discussion on: 1. "What makes a group form". 2. "How does the group influence an individual or how does an individual influence a group.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Becoming a Part of the Group

Concept	Suggested Learning Activities
C. Intergration 1. adjust to situation 2. become a part of group	Use role-playing situation to show how the student intergrates into a group. Film: How We Cooperate by Coronet Film
D. Assimulation 1. less self assertion 2. controls self	
III. Group and You	III. Student list groups he might join Film: "Feeling Left Out" from the Atlanta Film Library.
A. Common goals	
B. Common Interests	
C. Your Needs	

UNIT: "TURN ON" WITH PEOPLE

TOPIC: But to Thine Ownself be True

BEHAVIORAL OBJECTIVES:

1. The student will gain a concept of healthy personality and be able to list five characteristics of a mature individual.

2. The student will learn when it is wise to submit to the desires of peer groups, adults, and social institutions.

3. The student will be able to write from memory or in his own words a definition of a healthy personality, will know his own personality strengths and one personal problem on which he should work.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: "But to thine ownself be true"

Concept	Suggested Learning Activities
I. Healthy Personality A. Definitions of healthy personality. B. Importance of healthy personality in today's world. C. Importance of healthy personality for abundant living. D. Importance of healthy personality for vocational success.	I. Student reports: Selected students will make individual reports from library resources. (Guided by the teacher if necessary). Field trip: Go to the area mental health center. 1. See facilities. 2. Obtain information in regard to services provided. 3. Hear lecture on mental hygiene. Summation by teacher: Review of student's reports. Concepts of healthy personality discussed would be those of Freud, Alfred Adler, Carl Gustav Jung, Otto Rank, Eric Fromm, Harry Stack Sullivan, (the "courage to be" philosophers) Kierkegaard, Nietzsche, Heidegger, Marcel, Sarte, Tillich, Buber, A.H. Maslow, Carl Rogers, Jurgen Ruesch, William Blatz, Allport, Watts, and Marie Jahoda. View Film: "Personality and Emotions". This film may be obtained through the state film service order number 8630. View Film: "Personal Qualities for Job Success." Order number 2365.
II. Dependence and Independence A. Definition of Terms. B. Healthy and unhealthy dependence. C. Healthy and unhealthy independence.	II. A Panel: Selected students will discuss the terms dependence and independence. Role Playing: Set up family situations in which there are overly dependent children or other family members. Set up situations where individuals submit to unwise peer pressures. Classroom Discussion: When to go

UNIT: "TURN ON" WITH PEOPLE

TOPIC: "But to thine ownself be true"

Concept	Suggested Learning Activities
	II. Personal Experiences: Let class members share experiences of when they or people they know resisted unhealthy pressures to conformity or delinquent acts. Library Project: Have students bring reports to class of people who were true to themselves, moved in opposition to massive pressures to conform and thereby experienced self fulfillment and fame. Audio Visuals to select from: Filmstrips. "Thinking for Yourself." 48 frames, 1969. $6.00. Encyclopedia Britannica, 69D61. "So You Are Not Just Like Everybody Else." 40 frames. 1969. $6.00. Popular Science 6905. "In The Spring and Other Seasons." 1970. $10.00. Friendship Press 70A8. "To Be Somebody." 40 frames. 1969. $6.00. Popular Science 6905. Tapes. Carbon Copy (advantages and disadvantages of conformity). $3.00 Purdue University Audio Visual Center. Lafayette, Ind. Attn. L.D. Miller. "Who's Conforming Now?" (People or Puppets.) University of Colorado, National Tape Repository, Bureau of Audio Visual Instruction, Denver, Colorado
III. Who Am I? A. Who Am I Now? B. Who Am I Becoming?	III. Receive a handout: The student will receive a handout that includes definitions of healthy personality and a summation of descriptions of healthy personality. Written Assignment: Utilizing the handout the student will make a written report on himself, describe in this report where he thinks he is developed mentally and evaluate how mature he is.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: "But to thine ownself be true"

Concept	Suggested Learning Activities
	Take a Test: Be administered a good personality inventory by the teacher or school counselor. (The test and written report can be compared, the students behavior and progress objectively observed. Realistic planning can be accomplished by the student (only if necessary for).
	Audio-Visuals to Select From: Filmstrips. "Developing your Personality." 1969, $44.00, Harcourt and Brace 69A10. "Alan Minds His Manners." 48 frames, 1969., $6.00, International films 69A61. "Michael Finds A Better Way." 49 frames, 1969, $6.00, International Films 69A61. Movie. "He Acts His Age." 1969, Loan, Conn. St. Dept. Health. 69A25.
	Small Group Personality Interaction: The students will share their opinions of each other. Each will make a list of his positive attributes. Each will list a major problem on which he should work. If some student will not admit to a problem the group will give him one.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Human Relations

BEHAVIORAL OBJECTIVES:

1. Students will be able to list five ways in which people depend on others for survival.

2. Students will state some ways in which a peaceful, well ordered society exists in direct proportion to human relations.

3. Students will demonstrate a knowledge of the American Bill of Rights by listing at least 5 rights granted them.

4. Students will demonstrate a knowledge of basic human rights by describing what they are.

5. Students will identify problems caused by historical prejudices toward certain minortiy ethnic groups.

6. Students will demonstrate a knowledge of famous people of minority races and various major religions by listing the names of some of their people.

7. Students will acquaint themselves with the basic beliefs of the major religions of the world.

8. Students will demonstrate their knowledge about major occupational groups and about status levels in American sociaty by listing the groups and telling about their relative place in society.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Human Relations

Concept	Suggested Learning Activities
I. Interdependence of people in society. A. In our society, man cannot live of or by himself. B. People in our society depend on others for survival. 1. Medicine (doctors, scientists, etc.) 2. Food 3. Lodging 4. Transportation 5. Services 6. Education	I. Discussion: How do services performed by people serve us? Bring into account interdependency of different businesses and services, defenses, manufacturers, and research personnel. Survey: Have students bring in news articles to be supplemented by the teacher that show the effects of poor human relations.
II. Good human relations are essential in a well-ordered society. A. The need for defense systems because of poor human relations. B. Wars caused by poor human relations. C. Racial troubles caused by poor human relations.	II. Survey: The historical facts behind wars and domestic strife. Discussion: How could these problems have been avoided through good human relations? Film: "The American Constitution"
III. To show a knowledge of the American Bill of Rights.	III. Discussion: How the historical facts involved led up to the Bill of Rights. Filmstrip: "The American Bill of Rights"
IV. Knowledge and appreciation of human rights. A. The right to be treated equally	IV. Discussion: How the Bill of Rights applies to us and how it can be abused.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Human Relations

Concept	Suggested Learning Activities
B. The right to equal employment	Discussion: If you run a business, do you care what religion or what color your employees is if he can do the job?
C. The right to prove one's self on ability and not to be prejudged.	Discussion: Should one compete on the basis of to whom he was born or on what he can accomplish?
V. To know of problems caused by historical prejudices toward certain minority ethnic groups. A. The Jew B. The Protestant C. The American Indian D. The American Negro	V. Discussion: What is prejudice? Lecture: A brief history of the Hebrew people. Lecture: Historical prejudice between Protestant and Catholic. Film: "The American Indian" Discussion: The decline of the American Indian. (Maps and audio-visual aids will be necessary). Film: "The American Negro" Resource Person(s): Indian (if possible) and Negro community lead to acquaint students with people of different origins.
VI. Show knowledge of famous people of other races and religions, people like: A. Confucius B. Brahman C. Jesus Christ D. Moses, Rabbis Akiba and Maimonedes	VI. Lectures, Transparencies, and Fil School resources

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Human Relations

Concept	Suggested Learning Activities
E. Famous Negroes, such as: 1. Frederick Douglass 2. George Washington Carver 3. Booker T. Washington 4. Martin Luther King F. Famous American Indians	
VII. To be acquainted with the basic beliefs of the major religions of the world. A. Christianity - sects B. Jewish religion - relationship to Christianity and Muslim religion C. Muslim D. Hinduism E. Buddhism F. Confucianism G. Atheism and agnosticism	VII. Film: Major religions of the World Resource Persons: Have a rabbi, a protestant minister, and a Catholic priest present their different beliefs to the students and discuss them. Should not be an attempt to convert students to any one set of beliefs. Discuss: Basic differences in religion and basic differences existing in people of different faiths.
VIII. Know of major occupational groups. A. Professional people in such fields as: 1. Medicine 2. Law 3. Teaching 4. Science B. Businessmen C. Salesmen	VIII. Present: Different occupational levles Resource Persons: On different days have one representative from each group speak to the class and answer questions. Discuss: These points: 1. The need for people to fill all types of jobs. 2. The theory of supply and demand making value.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Human Relations

Concept	Suggested Learning Activities
D. Skilled laborers,	3. The services rendered by people of different occupations
1. Brick mason	
2. Carpenter	
3. Painter	
4. Machinist	
5. Mechanic	
6. Surveyor	
7. Cook	
8. Policeman	
9. Plumber	
10. Others	
E. Semi-skilled laborers	
1. Pipe layer	
2. Clerk	
3. Cab drivers	
4. Others	
F. Laborers	
1. City maintenance	
2. Garbage collectors	
3. Others	

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Marriage and Family

BEHAVIORAL OBJECTIVES:

1. Each student will be able to identify factors that help to make a marriage successful.

2. Each student will form in his mind the essentials of a good home environment and will be able to express these written or orally to the group.

3. Each student will be able to identify the different family roles and the responsibilities of each family members.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Marriage and Family

Concept	Suggested Learning Activities
I. Success in marriage depends on the maturity of the couple. Each partner should be able to demonstrate warmth, affection, concern and friendliness to the other.	I. Group Guidance a) Have students list factors that demonstrate a person's maturity.
II. Age, education, family background, money and religion are important in the marriage and family relationship	II. Talk about the effect of factors in concept 2 to a happy marriage
III. A successful marriage requires as much hard work as a successful business. Marriage and family responsibilities require much preparation	III. Answer questions in small group work such as: 1) Why should every girl prepare herself to earn money? 2) How important are in-laws in marriage? 3) Is marriage a 50-50 proposition? a 75-25 proposition? or a 90-10 proposition?
IV. In the home each person has many responsibilities to the other family members. a) Respect for the other's ideas b) Right to privacy c) Roles of parents in rearing children d) Roles of children	IV. Discuss in groups the responsibiliti of each family member. Try to guide groups to see how important it is for family members to be agreeable and work together. Emphasize the point of being open-minded. Distinguish between fighting and arguing. Role Playing: Divide the group into small groups of 2, 3 or 4 and assign each member a family role. Give each group a family problem to solve and have them act out the successful solution.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Home Relationship

BEHAVIORAL OBJECTIVES:

1. The students will be able to identify at least seven points of good home environment.

2. The students will be able to name at least five reasons why a good home relationship is important for the child.

3. After group discussion the students will be able to list responsibilities of the child to the home.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Home Relationship

Concept	Suggested Learning Activities
I. Rules for Good Home Environment	I. Group Guidance and Discussion: To talk about and evaluate each of those rules and try to name and write as many as can Show Film: "Heredity and Family Environment." McGraw-Hill Book Co., Inc.
A. Each person must learn to give and take	
B. Respect for each other	
C. Affection for one another	
D. Share home responsibility	
E. Share in care of home	
F. Parents must share responsibility for child's education	
G. Parents must share responsibility for child's welfare	
H. Help with physical development of child	
I. Give guidance through adolescent period	
J. All members must show mutual respect love, kindness, and appreciation for each other	
II. Importance of Good Home Relationship	II. Group Discussion: Have students discuss importance of good home relationship to child Show Film: "Emotional Maturity" McGraw-Hill Book Co., Inc.
A. Child feels loved	
B. Child feels secure	
C. Provides basic biological needs: 1. food 2. clothing 3. shelter	
D. Child needs to feel he is a responsible and important member of the family	

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Home Relationship

Concept	Suggested Learning Practices
E. Better equip him to face adulthood	
III. Child's Responsibilities to the Home	III. <u>Group Discussion</u>: Have students discuss the child's responsibilities to the home <u>Role Playing</u>: Have students practice some of the different home situations and have them evaluate each other and give their own ideas as to the problem solved.
A. Respect and obey parents	
B. Perform duties around the home	
C. Appreciation and respect for all members of family	
D. Help with care of home	
E. Respect the ideas and decisions of parents concerning his welfare	

UNIT: "TURN ON" WITH PEOPLE

TOPIC: School Relationships

BEHAVIORAL OBJECTIVES:

1. The student will be able to identify the characteristics of a well behaved student.

2. The student will be able to identify his personal behavior problem, if any, and change his behavior to a pattern that is acceptable to his coordinator and his peers.

3. The student will be able to identify the traits of a good group member.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: School Relationships

Concept	Suggested Learning Practices
I. How to get along with teachers A. Have a positive attitude B. Behavior should be acceptable to school standards C. Always be courteous D. Cooperate by doing what is requested E. Exercise patience in dealing with teachers F. Know something about your teacher	I. Bulletin Board: Have students to interview team teachers for CVAE. Find out things the teachers like to do with their leisure time. Make action pictures of the teachers Display all information and pictures on bulletin boards. In interview students should include: 1. Where do you call home? 2. Married or single 3. Number and ages of children 4. Schools attended 5. What activities did you participate in in school? 6. What was your favorite subject in school? 7. What is your favorite pastime? food? type of movie? T.V. program?, Book?, Sport?, Color? 8. What is your pet peeve? 9. Why did you become a teacher? Role Playing: Divide the class into two groups. The groups will plan and present a skit showing the right and wrong way to behave in a classroom. Role Playing: Have the two groups dramatize how the moods of pupils affect teachers. Rap Sessions: The class will be divided into four groups. Each group will be responsible for a discussion on the topics listed. Conclusions will be illustrated and placed in the classroom.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: School Relationships

Concept	Suggested Learning Activities
	The topics are: 1. How can you cooperate with your teachers so that it will be easier for all to learn? 2. The children and the teacher, not a beautiful building and fine equipment make it easy to learn. 3. How strict should your teacher be? 4. Who should be responsible for good discipline in the classroom, the teacher or the student?
II. How to get along with classmates A. Use a patience attitude in your association with peers. B. Behavior should be acceptable to peer group. C. Always be courteous. D. Be cooperative in group and play activities. E. Respect the opinions and ideas of others. F. Learn something about your classmates.	II. Filmstrip: Show filmstrip "Different may be Nice" Eye Gate. Filmstrip: Show filmstrip "Working Together". Educational Filmstrips. Discussion: Discuss selected topics from these books: 1. Jackson, J. Guide to winning Friends and Popularity. 2. Sterling, C. How to be a Successful Teenager. 3. Strain, F. Teen Days. Rap Session: Students will engage in group discussions to find out things about each other--their likes and dislikes. Discussion: Students will be asked to discuss and draw conclusions from the following situation: Joe Davis is a new boy in class. He is very quiet. The class has organized a social club that meets

UNIT: "TURN ON" WITH PEOPLE

TOPIC: School Relationships

Concept	Suggested Learning Activities
	Discussion: Divide class into groups. Ask the class to select topics for group discussion. Show how topic can help one to make friends. Display results in classroom. 1. a smile and a hello 2. a sense of humor 3. giving-not-taking 4. unselfishness 5. skill in some sport or school activity 6. having a hobby
III. Know characteristics need to be a good group member A. Learn to be a follower as well as a leader. B. Be able to respect opinions and ideas that are different from yours. C. Be cooperative and courteous.	III. Self-Text: Tell children to be a good member of a group, certain characteristics are necessary. Let them list the necessary characteristics, make a self-evaluation check list and rate themselves. Rap Session: Topic for discussion: Some students think that only the elected officers of a class are important. Can you think of ways in which you are important to a group even if you are not an elected officer?

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Community Relationship

BEHAVIORAL OBJECTIVES:

1. The student will be able to identify many of the social agencies of his community.

2. The child will become aware of his responsibility as a citizen by participating in community activities.

3. The child will be able to identify some function of each agency in his community.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Community Relationships

Concept	Suggested Learning Activities
I. The schools is a basic community organization. A. Provides intellectual growth B. Provides social growth C. Aids in physical development D. Provides for good sportmanship.	I. Panel Discussion: Have some former students come to school and discuss how the school has helped them in their community relationship. Show Filmstrip: "Living Together in Your Community" Allyn & Bacon. Interview: Have students interview all school physical education and county recreational personnel for their roles in physical development of the individual. Rap Sessions: Let students attend some sport event. Have them discuss ways in which good sportmanship was displayed. From "rap session" draw conclusions of what makes a person a good sport.
II. Importance of Ministerial Associations A. Provides spiritual growth and aids in establishing values. B. Provides cultural enrichment. C. Helps needy persons. D. Protects citizens and their rights.	II. Trip: Ask students to attend a church and participate in sunday school and morning worship services. Invite a musical or other cultural group to school to perform for the students. Discussion: Invite leaders from P.T.A., Lions Club and other Civic Clubs to discuss their programs and how they help in making a better community. Project: Ask students to help in civic projects such as broom sales. Filmstrip: Show filmstrip "Community Services". Encyclopedia Briticanna.

UNIT: "TURN ON" WITH PEOPLE

TOPIC: Community Relationship

Concept	Suggested Learning Activities
	Observation: Ask some of the county agencies to permit pupils to observe them for a couple of hours on a given day. Discussion: Invite respresentatives from county and state agencies into the school to discuss their programs and ways in which students can help in their endeavors. Ask them to bring free material for the students.
III. How to select the correct agency for assistance? A. Know the name of the agency B. Know what type of service the agency performs	III. Group Assignments: Students will be divided into groups and each group will be named as an agency. When persons representing agencies come to class for presentations, the group representing the agency will be responsible for listing the functions of that agency. Each group will then act as the agency with pupils in class serving as citizens seeking help. Class Activity: Functions of agencies will be listed by the teacher. Students will identify the agency with which performs the function listed. Discussion: Students will discuss the free material brought to class by the representatives of the agencies. Forms and/or applications will be completed by the students and discussed.

UNIT: A MORE ATTRACTIVE YOU

TOPICS:

I. Personal Appearance
II. Cleanliness
III. Care of the Skin
IV. Care of the Eyes
V. Using the Body Effectively
VI. Oral Hygiene
VII. Periodic Physical Examinations

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Personal Appearance

BEHAVIORAL OBJECTIVES:

1. The student will list three reasons why personal appearance is important.
2. The student will be able to name four qualities depicting good personal appearance.
3. The student will name and discuss four factors in proper selection of clothing.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Personal Appearance

Concept	Suggested Learning Activities
I. Reasons for personal appearance being important: A. Others judge by appearance B. It gives one a feeling of personal pride and satisfaction. C. Personal appearance can influence job opportunities. D. Personal appearance can affect one's popularity.	I. Panel Discussion: Should a person be judged by his personal appearance? Buzz Sessions: Should a person's popularity be based on his personal appearance? Class Discussion: Name and discuss groups in the news today who are stereotyped because of their manner of dress and personal appearance in general.
II. Qualities depicting good personal appearance. A. Cleanliness B. Neatness C. Being well-groomed D. Appropriateness of dress.	II. Group Activity: A. Divide class into small groups. Let each group write a checklist for good personal appearance. B. Form one group to compile all lists from groups into one effective checklist. Hand out copies to class. Class Activity: Let one student stand in front of class and then retire to the hall. Then ask classmates to describe this person as to height, weight and clothes. This may lead to discussion of personal appearance through "Someone is always observing you."

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Personal Appearance

Concept	Suggested Learning Activities
III. Factors to consider in choosing clothes: A. Size - weight B. Height C. Figure proportions D. Complexion E. Bone structure F. Posture	III. Guest speakers: A. Merle Norman representative B. Male hair stylist C. Beautician D. Salesman from a men's store Class Activity: Hand out weight charts and let each student figure out his or her ideal weight. Hand out calorie charts and discuss foods and their caloric content. Invite modeling students to give lessons in how to sit, stand and walk. Provide pattern magazines and men's style magazines and let students discuss current styles and appropriateness to individual body structures. Role Playing: Have a student go into a store and attempt to buy a garment not suited to him. Have a sales person tactfully change his mind.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Cleanliness

BEHAVIORAL OBJECTIVES:

1. Students will be able to explain three reasons why personal cleanliness is important.

2. Students will be able to list six rules for personal hygiene.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Cleanliness

Concept	Suggested Learning Activities
I. Reasons to be clean A. Good health B. Make friends C. Get dates D. Get job E. Good appearance F. Morale boost	I. Role Play: Applying for a job looking extremely untidy. Boss explains why he cannot hire you. T.V. Skit: In groups of fours write commercial for T.V. pertaining to personal hygiene and present to class. Role Play: Two girls discuss a new boy in school and how someone needs to tell him about personal hygiene. Discuss: Good health and cleanliness.
II. Rules for personal cleanliness A. Bathe frequently B. Use deodorant C. Keep clothes clean D. Wash hair weekly E. Brush teeth F. Manicures G. Pedicures H. Wash hands before meals I. Wear clean underwear and socks daily	II. Group Discussion: Make up a checklist for personal cleanliness. Bulletin Board: Collect pictures on cleanliness. Film: "A More Attractive You" - Knox Gelatin "Good Grooming for Boys" - McGraw-Hill "Good Grooming for Girls" - Coronet Films. Activities: Practice manicures on each other. Discussions: Germs from dirt. Project: Bring in clothing labels and discuss care.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Care of the Skin

BEHAVIORAL OBJECTIVES:

1. The class member will be able to write and identify two powerful enemies of the body, against which the skin acts as a first line of defense.

2. The individual will be able to list and identify at least three chief functions of the "Bark of the Body", SKIN.

3. The pupil should be able to recognize and understnad at least two factors found in healthy boys and girls.

4. The individual could become able to recognize, understand and recall two fundamental reasons for baths.

5. The girls will become aware that there is usually no IMPORTANT difference, aside from appearance, odor and package between expensive and inexpensive cosmetics.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Care of the Skin

Concept	Suggested Learning Activities
I. Value of the skin as body armor or protection against: A. Dirt B. Bacteria	I. Panel Discussion: Class members discuss what happens when one has (1)crack in skin (2)splinter in finger or (3) sore in the mouth. Visiting Lecturer: Secure a local physician or qualified R.N. to talk to the class about care and treatment of so-called minor skin scratches, rashes, acne, etc.
II. The skin is a very, very important organ of the body. It performs five fundamental functions: A. Regulate body temperature B. Protect underlying structures from injury and bacteria C. Serve as organ of touch D. Help throw off body waste E. Has powers of absorption	II. Show Film: "The Human Skin," Bray Studios, Inc., New York, New York. Let Class Members: List at least five examples of common sense in selecting clothes to aid the skin in two or more of its functions.
III. Attractive boys and girls have healthy skin and healthy skin is dependent on: A. Well-nourished body B. Vigorous physical exercise C. Cleanliness	III. Scrap Book: Have class members secure pictures and paste in book 3 vigorous games good for ages 8 to 88. Visiting Speaker: Have a local dry cleaning and/or laundryman talk to the class about "Clean Clothes." Show Film: "The Wonderful World of You"(sound, 14min., color) Cleveland Health Museum, 1960. Let Individuals: List 10 foods that are satisfactory for growth and development.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Care of the Skin

Concept	Suggested Learning Activities
IV. Frequent baths do good for humans as follows: A. Remove dirt and odor B. Stimulate and soothe the nervous system C. Improve the tone of the skin	IV. Take Baths: Arrange for the girls' and boys' physical ed. teachers to supervise the taking of a hot soapy shower, followed by a cold bath, the water below 70°. Shower vs. Tub: After a very brief discourse on baths from Romans to today, have class members list things for a tub bath and against the tub; list things for and against the shower. Note how many may think of taking first a tub bath, soaking, and then a shower.
V. Cosmetics cannot take the place of good healthy skin. However, females talk about and buy cosmetics as freely as they do candy, ice cream and food. A. With conservative use and when carefully applied, they usually cause no harm. B. Shiny noses will look more pleasant with powder. C. Allergies may occur to any one of the cosmetics, whether it be powder, cream, or nail polish. D. Occasionally a particular brand of nail polish or remover may cause inflamed eyes, headache, and a rash on the face.	V. Have a Committee of 3 to 5 Class Members: Make a study and report back to the class on the following: A. Food and Drug Administration's attempts to control exaggerated claims for things like "Skin Food," and "Nourishing Creams." B. The American Medical Association and its report on "Royal Jelly." Show Film: "Making the Most of Your Face" (sound, 11 min., color), Coronet, 1958. Lecture: Give historical background of the efforts of females to make themselves more alluring, from Tutankhamen through Cleopatra and Jezebel to Liz Taylor.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Care of the Eyes

BEHAVIORAL OBJECTIVES:

1. The student will be able to list six rules for the care of the eyes.
2. The student will be able to name five parts of the eye and identify them on a model.
3. The student will discuss two types of eye specialist.
4. The student will be able to list three ways the eyes are protected.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Care of the Eyes

Concept	Suggested Learning Activities
I. Rules for the care of the eyes A. Correct lighting to read B. Light in room for watching T.V. C. Avoid too much close work without rest periods. D. Have yearly check-up. E. Wear prescribed glasses F. Hold book 18" from eyes to read. G. See doctor if eye is injured.	I. Group Discussion: Let students read available material on eyes, then draw up list of rules for eye care in class. Role Play: Pretend some students are blind. Blindfold. Enter room. Find seat. Listen and identify sounds. Discuss problems. Pamphlets: Many available from local doctors.
II. Parts of the eye A. Retina B. Iris C. Pupil D. Cornea E. Optic nerve	II. Study and Discuss: Model of an eye. Diagram and Label: Individual drawings of eye identifying parts.
III. Eye specialist A. Optometrist B. Optician C. Opthalmologist	III. Dictionary: Look up and define optometrist, optician, opthalmologist. Resource Speaker: Optometrist
IV. Protection of the eye A. Tear ducts B. Eyelids C. Eyelashes D. Eyebrows	IV. Transparency: Cartoons on eye protectors.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Using the Body Effectively

BEHAVIORAL OBJECTIVES:

1. The student will be able to demonstrate the proper way to stand, sit, and walk.
2. The student will be able to list four ways to correct improper posture.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Using the Body Effectively

Concept	Suggested Learning Activities
I. Good posture and how it is secured A. Proper standing position B. Proper walking position C. Proper sitting position D. Proper stooping position E. Proper sleeping position	I. Interview: Invite a competent nurse or physical education specialist to talk to students on how to improve posture. Show Film: "Improving Your Posture." Role Playing: Permit the students to demonstrate proper and improper posture. Project: Prepare a bulletin board, "Posture on Parade" which shows good and bad posture.
II. Correcting postural faults A. Seek advice from orthopedic surgeon. B. Necessary and proper exercises C. Corrective surgery or massage D. Individual endeavors to correct posture E. Regular physical examination	II. Interview: Invite a competent orthopedic surgeon to visit the class to give ideas and suggestions on how to correct improper posture. Exercises: Permit students to take part in physical exercises that help build good posture. Group Discussion: Have pupils discuss how good posture contributes to attractiveness, good health, and a sense of well-being.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Oral Hygiene

BEHAVIORAL OBJECTIVES:

1. The student will be able to list three parts of a tooth.
2. The student will be able to name four types of teeth, and spell them correctly.
3. The student will be able to explain three functions of the permanent teeth.
4. The student will be able to list three foods to avoid in combating tooth decay.
5. The student will be able to demonstrate the proper way of brushing the teeth.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Oral Hygiene

Concept	Suggested Learning Activities
I. Anatomy of a tooth A. Crown B. Neck C. Root D. Tissues 1. Enamel 2. Dentin 3. Pulp 4. Cementum	I. Demonstration: Use model of a tooth so that students can explore its various parts. Class Participation: Draw and label a tooth in class. Show Film: "What Do We Know About Teeth?" (16mm, American Dental Association).
II. Types of teeth A. Central incisors (4) B. Lateral incisors (4) C. Cuspids (4) D. Bicuspids (8) E. Molars (8-12)	II. Group Discussion: Help students learn the names and locations of the teeth by having ten students form a semi-circle representing the teeth. Point to each student and have him give his tooth name and location. Class Demonstration: Have each student count his teeth by looking into a hand mirror. Show Film: "The Teeth (Development and Care)" (16mm, Encyclopedia Britannica Educational Corporation.)

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Oral Hygiene

Concept	Suggested Learning Activities
III. Functions of teeth A. Deciduous teeth 1. Chew food 2. To help afford clear speech 3. To maintain space for permanent teeth B. Permanent teeth 1. Chew food 2. To help afford clear speech 3. Maintain proper facial support 4. Improve personal appearance	III. Class Participation: Demonstrate with tongue-twister sequences of words. Project: Collect pictures of people with pretty teeth and discuss the importance of a pleasant smile. Class Exercise: Draw pictures of people with missing, decayed, or crooked teeth. Also draw a picture of a smiling face.
IV. Diet and dental health A. Nutrition (Four food groups) B. Name foods to avoid C. List foods good to eat following sack lunches, picnics, and snacks.	IV. Proper Food Chart: Make individual charts or a pin-up display of healthy snack foods using magazine pictures of crunchy, fresh fruits and vegetables, milk, or juices. Resource Speaker: Have food specialist prepare chart for discussion. Demonstration: Demonstrate the benefits of a cleansing food by cutting through an apple with a knife, then cutting through a marshmallow. Compare the clean and sticky

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Oral Hygiene

Concept	Suggested Learning Activities
	knives and point out that sweet, sticky foods cling to teeth just as a marshmallow clings to the knife, while self-cleansing foods, like the apple, leave the teeth clean.
V. Diseases of the teeth A. Dental caries--caused by bacterial reaction upon carbohydrates and residue on teeth B. Prevention and control of caries 1. Proper brushing of teeth a. Immediately after eating b. Brush down on uppers c. Brush up on lowers 2. Cut down on sugar foods 3. Fluoridation of community water supply 4. Regular dental examination and care	V. Class Participation: Demonstrate the recommended method of toothbrushing; have one or more students demonstrate. Discuss what to do if brushing teeth is not possible after eating. Role Playing: Act out a visit to the dentist. Students can take the roles of dentist, dental assistant, patient, or patient's mother. The patient and the mother can ask questions, and the dentist can explain good home dental care. Project: Health practice charts will be maintained by each student such as toothbrushing and regular visits to the dentist.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Periodic Physical Examinations

BEHAVIORAL OBJECTIVES:

1. The student will be able to determine and be able to list the purposes and importance of periodic physical examinations.

2. To be able to compare and contrast physical examinations.

3. The student will be able to list practical needs for periodic physical examinations.

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Periodic Physical Examinations

Concept	Suggested Learning Activities
I. Purposes of periodic physical examinations A. Determining health as to good or poor B. Finding possible trouble points C. An aid to continuous good health	I. Lecture: "Getting Acquainted with Terms" Speaker: County Health Nurse Class Discussion: Students discuss points of clarity as well as points that need clarifying.
II. Types of physical examinations A. Observe use B. Compare like tests C. Determine most useful exams for personal cases	II. Show and Demonstrate: A. Vision tests Snellen test Plus sphere test Cover test Color vision test B. Hearing tests Puretone audiometer Phonograph audiometer C. Growth and development Growth charts for periodic check of heights and weights D. Tuberculosis tests Mantoux test Tine or Heaf test Patch test

UNIT: A MORE ATTRACTIVE YOU

TOPIC: Periodic Physical Examinations

Concept	Suggested Learning Activities
III. Practical needs for periodic health examinations A. Employers' needs for employee health exams B. Insurance companies' needs for health exams C. Personal needs for health exams	III. Speakers: Plant manager of local company or local insurance agent. Discussion: "Group look at periodic physical examinations." Role Playing: Opportunity for students to play employer and employee in situations where physical examinations are required but are misunderstood by the employees.

UNIT: TURN OFF TO TURN IN ON LIFE

TOPICS:

I. Drugs and Their Proper Use

II. Understanding Drug Abuse

III. Society, Why the Masses Care

IV. The Most Commonly Abused Drugs

V. Marihuana--A Drug With A Questionable Reputation

VI. The Chief--Power Without Control--LSD

VII. Red Devils Speed Down Rainbows

UNIT TURN OFF TO TUNE IN ON LIFE

TOPIC: Drugs and Their Proper Use

CONCEPT	SUGGESTED LEARNING ACTIVITIES
I. During the past twenty to twenty-five years, we have observed the development of many new drugs.	1. Have the students study the various uses of drugs such as headache remedies, sleeping pills, pep pills, diet pills, pain pills, etc.
II. Most drugs have many different effects and/or side effects on most people.	2. Have the students discuss the decrease in many diseases as the result of such antibiotics as tranquilizers, anthistamines, sulfur drugs, diuretics.
III. Any substance which is taken into the human body by any means then enters into the complex physiological functions which regulate the activities necessary for life.	3. Have students discuss how and why these developments have been of significance to all mankind.
	4. Have available from the food and drug administration any literature and transparencies pertaining to drug use and abuse.
	5. Discuss how TV promotes over the counter sale of drugs.
	6. Have a group of students research out nonprescriptive drugs sold over the counter and used in drug abuse.
	7. Appoint groups of students to prepare diagrams of different systems of the body. Then present to the class how different drugs pass through the body.
	8. Have students prepare a bulletin board displaying drug advertisements.

UNIT: TURN OFF TO TUNE IN ON LIFE

TOPIC: Understanding Drug Abuse

CONCEPT	SUGGESTED LEARNING ACTIVITIES
I. The overdose or excessive use of drugs is called drug abuse.	1. Discuss why people use drugs as crutches instead of acing the problems of life and then trying to find a solution for them. 2. Discuss the following statement. "Drug abuse is a manifestation of personal inadequacy to deal with various facets of life." 3. Discuss the attributes and the characteristics of the ADEQUATE PERSON.

UNIT: TURN OFF TO TUNE IN ON LIFE

TOPIC: Society, Why the Masses Care

CONCEPT	SUGGESTED LEARNING ACTIVITIES
I. The illegal use of drugs is of great concern to our society.	1. Discuss "Drug Dependence." 2. Discuss with the class "How drug dependence often leads to crime." 3. Have consultants from the juvenile authority visit your class and discuss the above topics or any other topic of interest. 4. Discuss "Drug abuse exists at all social levels." 5. Assign to an individual or group of students the following topic, "Drug abuse and Emotional Illness."

UNIT: TURN OFF TO TUNE IN ON LIFE

TOPIC: The Most Commonly Abused Drugs

CONCEPT	SUGGESTED LEARNING ACTIVITIES
I. There are several categories of drug abuse. II. The most commonly abused drugs are as follows: amphetamines, barbiturates, marihuana, LSD, and the narcotics.	1. Define and discuss depressants and the effects which they have on the human body. 2. Discuss the effects of barbiturates and narcotics on the human body. 3. Show films on marihuana or LSD and discuss the difference between physical and psychological dependency. 4. Have a committee of students inform the class about withdrawal symptoms, tolerance to drugs, and emotional addiction. 5. Discuss how marihuana can lead to the use of more dangerous drugs.

UNIT: TURN OFF TO TUNE IN ON LIFE

TOPIC: Marihuana -- A Drug with a Questionable Reputation

CONCEPT	SUGGESTED LEARNING ACTIVITIES
I. The marihuana user may inflict harm on himself as well as others. II. Marihuana is a by-product derived from plants which are grown in all parts of the world. III. Those individuals who use marihuana intice others into using it by saying it is nonaddictive. Whereas, actually marihuana can develop serious cases of drug dependence.	1. Have a group of students discuss the following statement, "The individual on marihuana feels little if any pain." 2. Use a question box concerning marihuana for your students. Have a committee answer them. 3. Have a committee plan and prepare a bulletin board to illustrate how marihuana effects the human body. 4. Assign class reading of periodicals dealing with drug dependency. 5. Have a law enforcement person visit your class and discuss this topic and answer questions. 6. During class have each student write a short paper on some phase of drug abuse. 7. Have groups responsible for reporting to the class on such topics as to how is marihuana grown and marketind, what are the major uses, and which countries use the most. 8. Discuss the following topic, "Is Marihuana Addicting?"

UNIT: TURN OFF TO TUNE IN ON LIFE

TOPIC: The Chief -- Power Without Control-- LSD

CONCEPT	SUGGESTED LEARNING ACTIVITIES
I. LSD is one of the most powerful drugs known to mankind.	1. Review physical and psychological dependency.
II. The use of LSD causes many adverse side effects.	2. Study federal drug abuse laws with the aid of a consultant.
	3. Use atudent wuestion box to aid in abtaining questions about this topic.
	4. Have a group of students collect information about the percentage of young people who are experimenting with LSD.
	5. Have a consultant discuss with the group how LSD effects the human body.
	6. Have students obtain information on the acute and chronic effects of LSD and then report their finding to the class.
	7. Discuss why drug abusers refer to LSD as a "mind expander" or "consciousness expander."

UNIT: TURN OFF TO TUNE IN ON LIFE

TOPIC: Red Devils Speed Down Rainbows (Barbiturates & Amphetamines)

CONCEPT	SUGGESTED LEARNING ACTIVITIES
I. Barbiturates are sedative type drugs commonly used in medicine. II. Amphetamines are drugs which increase the activity of the central nervous system.	1. Discuss the uses of barbiturates in the medical profession. This might call for the use of a consultant. 2. Discuss with the class "Why drug abusers call barbiturates Downers." Continue this discussion. 3. Have a panel of students discuss with the class reasons for the increased use of amphetamines, tranquilizers, and barbiturates. 4. Show the film SPEED SCENE. 5. During a brainstorming discussion discuss why we use stimulates, who abuses amphetamines, and why these drugs are abused.

UNIT: GETTING THE WORD

TOPICS:

I. Gestures and Expressions
II. Writing
III. Telephone Techniques
IV. Mass Media

UNIT: GETTING THE WORD

TOPIC: Gestures and Expressions

1. The student will be able to role play a definite role as a member of a group.

2. The student will be able to read or give from memory a two minute talk without using nervous mannerisms.

3. The student will be able to make facial expressions and gestures to express given emotions or feelings.

4. The student will be able to read the following sentence to illustrate different meanings by emphasizing a different word each time he reads it: "John said Walter hit Sammy."

5. The student will be able to interpret a person's actions or movements through his knowledge of a facial expression and gesture.

UNIT: GETTING THE WORD

TOPIC: Gestures and Expressions

CONCEPT	SUGGESTED LEARNING ACTIVITIES
I. A group if a number of interacting individuals. A. A member of a group shows his feelings with facial expressions and gestures. B. A member of a group can determine how the others think and how they feel.	I. Divide the class into groups of six members each. Give each one a slip of paper telling him how he is to react to the question before the group. He must portray this as a member of the group. After the group discussion, let each one tell what or how he felt the other group members felt about the question. As the group discusses a question, let each one list the facial expressions or gestures he noticed by the other members. Let the group members not involved in the discussion list facial expressions or gestures of the ones in the discussion.
II. "Actions speak louder than words." A. What you do may be louder than what you say. B. Speaking <u>with</u> facial expressions and gestures is natural. C. Speaking <u>without</u> facial expressions and gestures is not natural.	II. Ask the English teacher or speech teacher to present a speech, first using facial expresssions and gestures, and then without them. Let students react to each method of presentations. Ask students to watch TV shows with the sound turned off. Let them "share" the way they could or could not follow them. Ask the English or speech teacher to give a short talk using nervous mannerisms. Then let students list as many different ones as they can and then tell why they detract from the meaning of the talk.

UNIT: GETTING THE WORD

TOPIC: Gestures and Expressions

Concept	Suggested Learning Activities
III. "You Don't Say!" A. Everyday expressions B. Facial expressions C. Gestures	III. Ask students to list all the everyday expressions they can think of. (Ex. "how about that!") Collect several pictures of people with expressions and ask students to tell what the pictures might be saying. Use a cartoon from which the title has been cut to create a contest. After each student has given a likely caption, tell them what the original caption was. Collect a list of facial expressions and gestures (the speech teacher is a good source) and then as you show or do each one, let the students tell what each one means.
IV. "Who did what!" A. Emphasis on words causes different meanings. B. The speaker controls the meaning of what he says. C. The listener can misunderstand what he hears.	IV. Use a sentence such as "John said Walter hit Sammy" to show that we can change the meaning of a sentence. Create a hypothetical situation and then ask students to write a sentence telling "who did what." Then, show meaning changes with emphasis on different words.

UNIT: GETTING THE WORD

TOPIC: Gestures and Expressions

Concept	Suggested Learning Activities
V. "A picture is worth a thousand words." A. What do you see?	V. Act out comic situations which show people doing funny things under what should be serious situations.
B. First impressions are often wrong.	Share with the class what you have read or what you know about the use of "body language."
C. First impressions are often lasting.	Practice situations without the actual materials or things needed to show that we have mental pictures of what people do or don't do.
	Let the class divide into groups. Then each group will select a member to act out a situation they have created to show that first impressions may be wrong. (It may involve sitting, walking, staring, or any other mannerism that carries a stereotyped character wtih it.)

UNIT: GETTING THE WORD

TOPIC: Writing

BEHAVIORAL OBJECTIVES:

1. The student will be able to identify and name orally important uses of writing in his daily life.
2. The student will be able to write letters and fill out forms in an efficient legible manner.
3. The student will be able to take notes at the rate of 50 words per minute.

UNIT: GETTING THE WORD

TOPIC: Writing

Concept	Suggested Learning Activities
I. Importance of writing	I. Class Discussion on what this world would be like if no one could write.
A. Taking notes	
B. Filling out forms	
C. Writing letters	
D. Recording events	
II. Writing legibly	II. Handout-two types of written reports, one neatly done and one sloppily done. Allow the students to decide which one is best and why.
A. Application blanks	
B. Order blanks	
C. C.V.A.E. reports and forms	Handout forms for students to fill out.
D. Letters	Resource Person: Have a personnel manager come in(may serve more purposes than this) and relate how employer first sees an applicant through his writing on a form.
III. Speed in note taking	III. Practice in taking notes with material that is not too difficult.

UNIT: GETTING THE WORD

TOPIC: Telephone Techniques

BEHAVIORAL OBJECTIVES:

1. The student will be able to write and identify at least 3 reasons as to why the telephone is important in our society.

2. The student will be able to use the teletrainer and demonstrate 6 proper techniques in answering a call that will have been studied.

3. The student will be able to locate and list telephone numbers from the telephone directory after an explanation of the directory and practice in using it.

UNIT: GETTING THE WORD

TOPIC: Telephone Techniques

Concept	Suggested Learning Activities
I. Importance of the telephone A. Provides almost immediate contact. B. Technological age necessitates the availability of the phone. C. Businesses depend on phones. D. People depend on phones for personal and social use.	I. Show Film: "If an Elephant Answers." Southern Bell Field Interviews: Let the students interview selected groups of people to determine the use and times of use of their phones. Show Film: "Invisible Diplomat." Southern Bell Panel Discussion: Students discuss personal use of phone and the regularity. Transparency: On the rate of increase in number of phones. Let students list reasons to explain the increase in the number of phones.
II. How to answer a call properly A. Answer phone promptly. B. Greet the caller pleasantly. C. Identify yourself and your office or residence. D. Use caller's name whenever possible. E. Use good manners always. F. Listen attentively. G. Write down any information if in a business.	II. Show Film: "I Rather Like You Mr. Bell." Southern Bell Use a Student Teletrainer: Let students practice answering calls. Establish business and personal (at home) situations. Group Discussion: Have students discuss what constitutes good manners when answering the phone. Role Playing: Let students practice calling their employers to report when they are sick and will not be able to come to work, and other similar situations.

UNIT: GETTING THE WORD

TOPIC: Telephone Techniques

Concept	Suggested Learning Activities
III. The use of the telephone directory	III. Telephone Directories: Let students examine these.
A. Purpose of directory	Discussion: Discuss purpose and functions of the directory. Go through and review each section.
B. How the directory is organized as to contents	Let Students Look: For various numbers of residences and businesses. Stress time element and accuracy.
C. Use of yellow pages	Yellow Pages: Let students use yellow pages to find businesses, phone numbers, and brief overview of services the business performs.

UNIT: GETTING THE WORD

TOPIC: Mass Media

BEHAVIORAL OBJECTIVES:

1. The student will be able to list 3 of the 4 major forms of mass media.

2. The student will be able to list or to name orally 4 ways mass media influences his life.

3. The student will be alle to list or name orally 7 ways advertisements try to appeal to the public.

4. After reading the newspaper, the student will be able to recognize 3 ways a newspaper can benefit its reader.

5. After reading a newspaper, the student will be able to pick out 3 major types of news releases of a newspaper.

6. The student will be able to list 5 reasons why classified ads are important.

7. The student will be able to list 4 ways listening to the radio and/or watching television can benefit a person.

UNIT: GETTING THE WORD

TOPIC: Mass Media

Concept	Suggested Learning Activities
I. Four(4) major forms of mass media A. Newspaper B. Magazine C. Television D. Radio	I. Class Activity: Have students list the following-- A. My favorite T.V. program B. My favorite radio program C. My favorite magazine D. My favorite newspaper Class Discussion: Discuss how the students determine the listings above. Class Drive: On a Saturday (or other suitable day) go out into the community and collect old magazines and/or newspapers. Teacher Activity: Collect old magazines from teachers by placing a box in teachers' lounge with a large sign above the box. Also make an announcement in faculty meeting. Resource Center: Have designated place in classroom to store old magazines. Try to have large enough supply that students can cut pictures from magazines and not deplete supply.

UNIT: GETTING THE WORD

TOPIC: Mass Media

Concept	Suggested Learning Activities
II. Ways Mass Media Influences My Life A. Buying Habits B. Use of leisure time C. Entertainment D. Source of information E. Social standing	II. <u>Class activity</u>: Have students list time spent 1. watching television 2. listening to radio 3. reading magazines 4. reading newspaper This could be done on either a daily or weekly basis <u>Panel Discussion</u>: Divide class into groups and assign one type of influence. Then let class present their discussion to class.
III. Ways magazine advertisements appeal to the public A. Happy Family--shows group of family members enjoying a specific product B. Expert says or professional opinion--shows picture of doctor, dentist, pro athlete C. Youth appeal--shows group of happy teenagers D. Humorous approach--shows a cartoon or funny character E. Sex appeal--shows an attractive person and promises the same result	III. <u>Group Activity</u>: Assign a specific type of appeal to each group and have group to find this type of ad in a magazine. Each ad should be labeled in some fashion. <u>Group Activity</u>: Have class or small group make attractive bulletin board displaying different types of appeals <u>Individual Activity</u>: Each student is to make up a fake product and then do the following: A. Give it an original name B. Tell its usefulness C. How long will this product last? D. What this product can do for user.

UNIT: GETTING THE WORD

TOPIC: Mass Media

Concept	Suggested Learning Activities
IV. The five ways a newspaper can benefit its readers A. Informs B. Gives an opinion of the news: example--editorials C. Teaches household repairs, medical advice, vocabulary D. Advertisements--want-ads, sales, products available E. Entertains--Comics, humorous antecdotes	IV. Guest Speaker: Have editor or reporter come to class. Group Activity: Have groups examine newspaper and find examples of different types of articles. Field trip: Visit newspaper office. Group Activity: List new vocabulary words learned from reading a newspaper.
V. The four major types of newspaper releases A. Local B. State C. National D. International	V. Individual: Have student bring to class and report on two of the major types of news releases. As each report is given let class members identify type of release. Group Activity: Let group choose major type of release and write its own article--These could be read to class and put on bulletin board.

UNIT: GETTING THE WORD

TOPIC: Mass Media

Concept	Suggested Learning Activities
VI. Reasons classified ads are important to a reader A. Lists help wanted B. Lists articles for sale C. Lists housing--sale and rent D. Miscellaneous E. Special Services F. Lost and found G. Situations wanted	VI. Let students collect different types of classified ads Interlocking with English Let students write a letter answering a want-ad Interlocking with Math Learn rates of local newspaper for advertising in paper. Let student determine the cost of different ads for different periods of time. Individual or Group Activity Write a "Situation Wanted" advertisement.
VII. Ways a radio and television can benefit a listener A. Entertainment - music B. News - Instant and scheduled C. Hometown news and events D. Buying and Selling E. Commercials	VII. Class Activity: Bring T.V. to class and let students watch commercials. Then discuss the effect of these commercials. Radio Program: Use tape recorder to record an original radio program that the whole class takes part in creating. Criteria: 1. Program must be a total: of 10 minutes long 2. Must contain an original skit: Examples 1. Soap opera 2. Mystery story 3. Wrestling match 4. Football game

UNIT: TWENTY-FOUR HOURS AIN'T MUCH

TOPICS:

I. Managing Your Time

II. Effective Study

III. Making Your Leisure Time Count

UNIT: TWENTY-FOUR HOURS AIN'T MUCH

TOPIC: Managing Your Time

BEHAVIORAL OBJECTIVES:

1. The student will make a time schedule listing four ways in which he can save time each day.

2. The student will make a daily schedule of his acitvities--class work, recreation.

UNIT: TWENTY-FOUR HOURS AIN'T MUCH

TOPIC: Managing Your Time

Concept	Suggested Learning Activities
I. Where Does the Time Go? A. Elements of time 1. Creative time 2. Preparatory time 3. Productive time 4. Overhead time B. Ways of Losing Time 1. Time lost in getting started 2. Time lost through disorganization 3. Time lost through diversion 4. Time lost through involvement 5. Time lost in paper work	I. Have a group discussion on the elements of time and emphasize their usage. Have students bring examples of the four time elements in the form of pictures or personal experience to class. Have a group guidance session on the question, "What are the reasons for loss of time in our lives?" Have group discussion on the value of planning. How do we plan?
II. Save Time by Looking Ahead A. Role of personal planning 1. The value of looking ahead 2. How far ahead to look 3. Key elements of personal planning B. The Basic Time Budget 1. How to allocate your time 2. How to limit your outside activities 3. Proper use of time	II. Have group discussion on the questions--"Why plan ahead? How far ahead should we plan? How do we plan a procedure that is flexible?" Explain the key elements of personal planning to the class. Have the student keep a record of his school day activities. Let student plan a useful school day that would help him save time. Have a group guidance session--How can I save time? Is it important for me to save time? Have students keep a record of how they spend their time for a week.

UNIT: TWENTY-FOUR HOURS AIN'T MUCH

TOPIC: Effective Study

BEHAVIORAL OBJECTIVES:

1. Students will be able to list 8 good study habits to develop.

2. Students will make their own study budgets after being given instruction in budget making.

3. Students will list three conditions necessary for a good studying environment.

UNIT: TWENTY-FOUR HOURS AIN'T MUCH

TOPIC: Effective Study

Concept	Suggested Learning Activities
I. A system for effective study A. Study Habits 1. Budget time 2. Follow the budget 3. Record assignments 4. Review last lesson before going on to next 5. Know exactly what you are to gain from lesson 6. Except for short breaks, remain with task until finished 7. Keep mind on task at hand 8. Take notes or outline material 9. Reread difficult material 10. Complete all of assignment 11. Look up all new words 12. If you don't understand something, make a note to ask teacher the next day	I. <u>Group Project</u>: Assign class material to be mastered. Have one side of class study material in accordance with prescribed study habits. Have other half disregard study habits. Give a quick check quiz to see which side knows the material best. Discuss results. <u>Transparency</u>: Boy seated at a desk studying surrounded by 12 good study habits. <u>Role Playing</u>: Have a student demonstrate to the class 12 good study habits. When finished, ask if others can add to the demonstration. <u>Filmstrip</u>: "How to Study" <u>Bulletin Board Display</u>: List and illustrate with animations 12 good study habits <u>Transparency</u>: Boy on wagon of learning pulled by horses of study, read, write, work, under control by lines of "plan"

UNIT: TWENTY-FOUR HOURS AIN'T MUCH

TOPIC: Effective Study

Concept	Suggested Learning Activities
II. How to make a Study Budget A. Write down the amount of time you plan to study B. Decide how much time to spend on each subject C. Decide what your goals are for each course D. Don't set your goals too high or too low E. Allow for change as circumstances may dictate F. Keep written budget in easy reach	II. <u>Transparency</u>: Compare total study time with one dollar. How many cents does each part of work get? <u>Group Discussion</u>: Let group discuss the amount of time, on the average, students should study each day.
III. A Good Environment study A. Quietness B. Comfortable surroundings C. Good lighting D. All materials at hand E. Adequate rest F. Health (exercise and diet)	III. <u>Group Discussion</u>: "Where can I study best? How do we compensate if these conditions are not met at the place of study"? <u>Transparency</u>: Picture of a student studying with 6 good study conditions placed around him.

UNIT: TWENTY-FOUR HOURS AIN'T MUCH

TOPIC: Making Your Leisure Time Count

BEHAVIORAL OBJECTIVES:

1. The student will be able to identify at least three types of Vocational clubs, social clubs and community clubs found in your area and participate in at least one.

2. Students will be able to state three purposes for recreational programs within the community that will have been studied.

3. The student will be able to list three reasons for team sports in community.

4. The student will be able to list four types of sports found in school and the community. (teams and individuals)

5. The student will be able to plan a display on hobbies in which the members of entire school can participate.

UNIT: TWENTY-FOUR HOURS AIN'T MUCH

TOPIC: Making Your Leisure Time Count

Concept

I. Types of Clubs

A. Vocational Clubs
1. CVAE
2. FFA
3. FHA
4. DECA
5. VICA

B. School Clubs
1. Letter Club
2. Science Club
3. Band Club
4. Chorus

C. Community Clubs
1. BYF-MYF (church)
2. Boy Scouts
3. Girl Scouts
4. Stamp Clubs, Coin Clubs

Suggested Learning Activities

I. Panel discussion: Have student representatives from each vocational club in school state things to class as to the purpose of club, type of activities of club, and social events of club.

Transparency: Showing organization of clubs.

Group Discussion: Have students discuss ways of elected officers of club and setting goals for club.

Filmstrip: "Clubs and You", free film catalogue.

Group Discussion: Get students opinion as to requirements of special clubs.

Group Guidance: Explain importance of being a part of school club and benefits he receives from the club.

Field Interviews: Let students interview people that lead community groups to find out information concerning club and benefits one gets by joining.

Group Guidance: Help CVAE students plan project that will help serve community as planting trees, etc.

Speaker: Have civic leaders tell how community clubs aid community progress.

UNIT: TWENTY-FOUR HOURS AIN'T MUCH

TOPIC: Making Your Leisure Time Count

Concept	Suggested Learning Activities
II. Importance of Recreational Programs A. To develop physically as mentally. B. To help build self-confidence in the individual. C. To feel a part of the community instead of just living there. D. Teach cooperation with others	II. Guest Speaker: Have city recreation officials come to class and present facts to students about the recreation of community. Role Playing; Have student act out skit showing how being a part of recreation programs have helped him to enjoy life better. He is talking to the little boy that never does anything but play the piano. Questions: Have students make up questions suggesting how they can help make the recreation better, such as; adding new programs to it, etc.
III. Importance of team sports A. Develops leadership B. Develops sportsmanship C. Desire to win D. Accept responsibility E. Team Spirit	III. Speaker: Ask star athlete in school to explain what it takes to be a winner. Film: "What is team Spirit", state film library. Group Guidance: Let students discuss their role as a team member even though he may not be star of team.

UNIT: TWENTY-FOUR HOURS AIN'T MUCH

TOPIC: Making Your Leisure Time Count

Concept	Suggested Learning Activities
IV. Sports Activities A. Team Sports 1. Football 2. Baseball 3. Basketball 4. Track 5. Socker 6. Volleyball B. Individual Sports 1. Fishing 2. Golf 3. Hunting 4. Archery 5. Bowling 6. Skating	IV. <u>Group Discussion</u>: Have students talk about the various sports that they have participated in. <u>Panel Discussion</u>: Let coaches and P.E. teachers come in and explain the purpose of differe type sports and conditioning involved in each. <u>Group Participation</u>: Have students bring in pictures and equipment used in different sports. <u>Group Guidance</u>: Lead students in discussion on how sports help us and why they are needed in community.
V. Types of Hobbies A. Model Building 1. Cars 2. Cycles 3. Ariplanes 4. Ships B. Sewing C. Cooking D. Music E. Collection F. Photography	V. <u>Group Guidance</u>: Help students organize a hobby fair that will be judged. Offer ribbons for winners. <u>Group Discussion</u>: Importance of hobbies types available and how to get started. <u>Transparency</u>: Show different kinds of hobbies to students. <u>Books</u>: Order books for studen on hobbies of interest to them. <u>Social</u>: Through CVAE Club plan a social with students and parents to show hobby display.

UNIT: ACTIVE CITIZENS

TOPICS:

I. Improving Our Environment
II. Obligations as a Member of the Community
III. Being a Good Citizen
IV. You and Our National Defense
V. The Three Branches of Government
VI. Are Laws Necessary?

UNIT: ACTIVE CITIZENS

TOPIC: Improving Our Environment

BEHAVIORAL OBJECTIVES:

1. The students will be able to list some local and national enviornmental problems and discuss ways for correcting them.

2. Students will be able to identify at least two sources of pollution that exist in their community, and give several examples.

UNIT: ACTIVE CITIZENS

TOPIC: Imporving our Environment

Concept	Suggested Learning Activities
I. Identify some local and national environment problems A. Dumping waste in rivers and streams. B. Saturating the air with pollutants C. Contaminating the soil with pesticides, herbicides, and nitrates. D. Littering highways, countrysides, beaches, lakeshores, rivers and parks.	I. Materials: let the class use the following A. **References**: 1. Conservation vs Pollution, U.S.D.A. soil conservation service Athens, Ga. 2. The quality of our environment and some economic approach to some problems in using land, water and air, Resources for the future, Inc. 1755 Massachusetts, Ave. N. W. Washington, D.C. B. **Field Trip**: Plan the field trip so students will be able to observe some major factors that lead to environmental problems.

UNIT: ACTIVE CITIZENS

TOPIC: Improving Our Environment

Concept	Suggested Learning Activities
II. Major source of pollution are: A. Air pollution 1. Automobiles, tractors, and air planes 2. Cigaretts, cigars and pipes. 3. Industrial and commercial plants. 4. Forest fires, burning trash and crop residue. B. Water Pollution 1. Human waste, food particles and disease germs. 2. Industrial waste and chemical residue 3. Chemical fertilizers and herbicides 4. Pesticides and Insecticides C. Solid Waste accumulation 1. Discarded automobiles and farm machinery 2. Empty cans, tires, paper products, glass and plastic.	II. Show Film: "Ecology" U.S.D.A. soil conservation service, Washington, D.C. Reports: Have students to choose various topics on pollution and give reports to class. Speakers: Use speakers from the different departments, Soil Conservation Service, superintendent of City Water Works, County Commissioner and Teachers. Group Discussion: Have students to suggest and discuss ways to improve the quality of their environment.

UNIT: ACTIVE CITIZENS

TOPIC: Obligations as a Member of the Community

BEHAVIORAL OBJECTIVES:

1. The student will be able to state and write three ways one citizen might help another.

2. The student will be able to list 3 ways one must give of himself in order to benefit from society.

3. The student will be able to write three important things about voting.

4. The student will be able to list three things concerning the community in which he should participate.

5. The student will be able to list four different types of communities due to their size and location.

UNIT: ACTIVE CITIZENS

TOPIC: Obligations as a Member of the Community

Concept	Suggested Learning Activities
I. A good citizen helps others A. Through civic clubs B. By holding elective and appointive positions in the community. C. By lending a helping hand in time of need.	I. Speaker: Have an active member of the community speak to the class on how an active community member serves others. Discussion: Why is it important to be active in the community? Film: "Beyond Three Doors"
II. In order to benefit from society, you must also give A. Through your ability to work B. Through your family at home C. Through your beliefs and actions D. Throught your service to your community	II. Speaker: Have officer of local civic club speak to class on why one should give of himself in order to benefit from society. Discussion: The importance of society on the individual.
III. A conscientious citizen will vote A. Understand the issues B. Know the person for whom he is voting C. Know when and where to vote D. Be informed concerning the election results	III. Have students do research on voting procedures and elections. Field trip: Take trip to local voting place. Discussion: The importance of voting and being informed.

UNIT: ACTIVE CITIZENS

TOPIC: Obligations as a Member of the Community

Concept	Suggested Learning Activities
IV. Participation in A. Civic organizations B. School affairs C. Political matters D. Other community projects	IV. Have students make a study of local organizations and their achievements. Panel Discussion: Have president of Chamber of Commerce or businessman, educator, politician form a panel and discuss these matters. Discuss: The importance of participation in the community.
V. All communities are important regardless of financial status of the citizens. A. The large city B. Surburia C. Small town D. Farms	V. Speakers: Have a leader from each type of community visit class and discuss their community. Research: Do a research paper on the kinds of communities. Discuss: Discuss the need for participation in each kind of community.

UNIT: ACTIVE CITIZENS

TOPIC: Being a Good Citizen

BEHAVIORAL OBJECTIVES:

1. The students will be able to list at least three duties of a good citizen.
2. The students will be able to list two types of government.

UNIT: ACTIVE CITIZENS

TOPIC: Being a good citizen

Concept	Suggested Learning Activities
I. The duties of a good citizen A. Are you a good citizen? 1. Register to vote	I. Have a panel discussion on the importance of being a registered voter.
2. Abiding by the law	Invite a law enforcement officer to talk to the class. Show films and have an open discussion law.
3. Paying taxes	Discuss how your taxes are assessed Use state and federal income tax forms. Show slides and films.
B. Being a good neighbor 1. Meeting new neighbors	B1. Let students have a short play. Explain the importance of being a good neighbor.
2. Clean environment	2. Relate the clean environment to good citizenship. Suggest operation clean-up.
3. A clean you	3. Talk about different soaps. Explain why it is difficult for some people to detect odors.
II. Forms of government	II.
A. The democratic process 1. City officials 2. Length of term	1. Let students plan and conduct a city election. 2. Have students make reports on the length of terms of city officials. Discuss the importance of staggering terms.
B. Other forms of government 1. Socialism 2. Autocratic	1. Explaining the operation of a socialistic form of government. 2. The class can compare the different types of government. Show films and slides.

UNIT: ACTIVE CITIZENS

TOPIC: You and Our National Defense

BEHAVIORAL OBJECTIVES:

1. The student will list three reasons for the necessity of armed forces.

2. The student will be able to discuss and understand the aims and objectives of the armed forces.

3. The student will be able to state two ways by which the armed forces accures its personnel.

4. The student will be able to identify the different dress of the 5 services.

UNIT: ACTIVE CITIZENS

TOPIC: You and Our National Defense

Concept	Suggested Learning Activities
I. Wars Have Been - Why? A. Man has spread over the globe B. Civilizations have grown and spread C. Civilizations have fallen D. The 'individual' as viewed in different societies E. Use of force as a mean	I. Discuss with the students the 8 basic wants of life-- food, drink, comfort, freedom from danger, to be superior, attractive to the opposite sex, welfare for loved ones, social approval, live a long life. Relate to the students that an outside force or inside force endangering any of these basic wants of life can and often cause or lead to war.
II. World Cohesion and "National Interests A. Human "sameness" versus human indifference B. An individual and a Nation has rights C. The military in a time of aggression D. The military in a time of peace	II. Resource person to tell how national interest sometimes leads to national conflicts. Panel Discussion on "Is War Justifiable?" Film on Armed Forces in combat Film on training and preparedness operations conducted by various services of the armed forces.
III. Freedom as an active, working, fluid force making for change and progress A. "You" make us free or not free B. Laws to protect our freedom	III. Define term "freedom" and then how to insure that freedom is not taken away. Film on judicial process Transparency on "The U.S. Constitution and Bill of Rights".

UNIT: ACTIVE CITIZENS

TOPIC: You and Our National Defense

Concept	Suggested Learning Activities
IV. Armed Forces A. The Army and Marines as a ground fource B. The Air Force used as a weapon of War C. The Navy's role D. Manpower Needs and their requisition 1. The volunteer 2. The draft 3. Training of the soldier E. Benefits 1. The pay check 2. Promotions 3. Medical 4. Retirement	IV. Transparency show the interrelationship of the various armed Forces and how they would operate in a time of war. Resource Person soldier, airman, or sailor come into the class and have him talk informally with the class, show films relating to his service organizations and have a question and answer period. Show the uniforms, or pictures of the different branches of service. Transparency to discuss the "rank" system of the Armed Forces and have members orally identify the various ranks. Handouts on various benefits of the armed services.

UNIT: ACTIVE CITIZENS

TOPIC: The Three Branches of Government

BEHAVIORAL OBJECTIVES:

1. The student should be able to list the three branches of government and the Article of the Constitution that created each.

2. The student should be able to list two types of powers possessed by our legislative branch of government.

3. The student should be able to list ten ways Congress may use its expressed powers.

4. The student should be able to give a written explanation of how the President of the United States is elected, what limits his term of office and how he is replaced in case of death or disability while holding office.

5. The student should be able to give a written explanation of how the members of the Supreme Court and appointed and how they may be removed from office.

UNIT: ACTIVE CITIZENS

TOPIC: The Three Branches of Government

Concept	Suggested Learning Activities
I. The government is divided into three branches to prevent any branch from becoming too powerful	I. Group discussion on how one branch of government may chec the other branches. Discuss the many plans proposed by the Founding Fathers.
II. Congress must have certain powers in order to perform its duties	II. Discuss the fact that Congress may use its implied power only if it is based on the expressed powers.
III. Congress has certain powers clearly expressed in the Constitution	III. Show film strip "Congress in Action."
IV. The election of a President must follow constitutional procedures as must his replacement in case of death or disability	IV. Discuss the electorial system. Show filmstrip "The Election of a President."
V. The members of the Court are appointed and can only be removed by the cumbersome means of impeachment.	V. Discuss how the Court has increased its powers. Discuss: Should Court members serve a definite term of office and should the court's powers be limited.

UNIT: ACTIVE CITIZENS

TOPIC: Are Laws Necessary?

BEHAVIORAL OBJECTIVES:

1. The student will be able to define the term law and will be able to state two kinds of laws.
2. The student will be able to write two ways laws are made.
3. The student will be able to list 3 things laws do.
4. The student will be able to write two requirements for enforcing laws.

UNIT: ACTIVE CITIZENS

TOPIC: Are Laws Necessary?

Concept	Suggested Learning Activities
I. What is a law? A. Definition B. Kinds of laws 1. Civil 2. Criminal	I. Discussion: Discuss what a law is and the kinds of laws. Speaker: Have a local lawyer speak to the class on different kinds of laws.
II. How laws are made A. By the legislature B. Through the use of the initiative and referendum	II. Speaker: Have a member of the legislature speak to the class on how laws are made. Role Play: How a bill becomes a law. Have class members write a bill and present to class for discussion. Field trip: Take a visit to the capital Film:: "How a Bill becomes a Law"

UNIT: ACTIVE CITIZENS

TOPIC: Are Laws Necessary?

Concept	Suggested Learning Activities
III. Laws are made A. To protect property B. To protect individual rights C. To raise revenue D. For the betterment of society	III. Panel Discussion: Why are laws necessary? Speaker: Have a member of the legislature speak to the class on different ways citizens benefit from laws.
IV. Requirements for enforcement of laws. A. Honest, intelligent, and earnest officials B. The sentiment of the people	IV. Speaker: Have a local policeman or law enforcement officer visit the class and answer the students questions. Discussion: Why is law enforcement necessary? Film: "The Thin Blue Line"

UNIT: MISCELLANEOUS

TOPICS:

I. Solving Personal Problems
II. Safety on the Job
III. Current Events
IV. Community Services

UNIT: MISCELLANEOUS

TOPIC: Solving Personal Problems

BEHAVIORAL OBJECTIVES:

1. The student should be able to name five areas of problem concern that their problems might fit into.
2. The student should be able to name four effects problems could have on himself.
3. The student should be able to list five sources for help in solving problems.
4. The students should be able to list the six steps that should be taken in solving problems.

UNIT: MISCELLANEOUS

TOPIC: Solving Personal Problems

Concept	Suggested Learning Activities
I. Areas of Problem Concerns a. Finding a job b. Educational needs c. Earning money d. Getting along with people e. Health (personal) f. Physical development g. Home h. School i. Religion j. Dating	I. Group Discussion: Have class to name areas that they have or could have problems in. As class leader, include your list of areas, but do not limit.
II. Effects Problems Could Have on You a. Low school grades b. Lack of concentration c. Loss of friends d. Loss of job e. Forgetfulness f. Loss of home privileges	II. Group Discussion: Again have class name effects their problems could have on them. Do not limit your list.
III. Sources of Help for Solving Personal Problems a. Parents b. Counselor c. Teacher d. Friend e. Minister f. Social agency g. Psychiatrist	III. Group Discussion: Discuss and list on board for students a combination of their ideas along with yours of sources of help for personal problems.
IV. Steps that Should be Taken in Solving Problems a. Realize that problem exists. b. Define what the problem is. c. Look for clues that will solve problem. d. On strength of clues, decide on a tentative solution. e. Test solution.	IV. Group Discussion: The teacher should lead them into the correct problem-solving technique.

UNIT: MISCELLANEOUS

TOPIC: Safety on the Job

BEHAVIORAL OBJECTIVES:

1. Students will list, in writing 5 reasons why we need to know about safety.

2. The students will select from pictures, supplies by the instructor 10 safety apparels and identify each of their uses.

3. The student will learn about safety guards, devices and equipment, and will also write several reasons why the guards, devices and equipment are important to the safety of one.

4. The students will learn types of fire and types of extinguishers to use on each.

5. The studnets will be required to readily identify the symbols and safety colors.

6. The students will be taught the first aid course.

UNIT: MISCELLANEOUS

TOPIC: Safety On the Job

Concept	Suggested Learning Activities
I. Why safety is necessary A. Protect the wage earner B. To prevent loss of limb C. To prevent loss of sight D. To prevent injury E. To prevent death F. To prevent loss of time due to injury	I. Why we need to know about safety. How our earnings may be increased by knowing and practicing safety first. Question and answer period after panel discussion.
II. Proper wearing apparel A. Clothing on the job 1. Head dress 2. Rings, watches, bracelets, etc. 3. Loose clothing 4. Shoes B. Hazards of loose clothing, rings, etc. C. Types of clothing for special job and safety apparel 1. Goggles 2. Gloves 3. Helmets 4. Steel-toed shoes 5. Pants and shirts D. Reasons for safety clothing	II. Display the types of clothing for special jobs and safety tools. Demonstration of the special types of safety apparel. Have supervisors of jobs that require particular types of clothing talk with the students, and tell of hazards by wearing improper clothing and jewelry. Show film on "Safety in the Shop."
III. Safety guards, devices, tools, and equipment A. Safety devices 1. Gears 2. Belts 3. Knives 4. Fences B. Safety equipment C. Tools used in safety	III. Demonstrate the use of safety devices and tools and the hazards caused by improper use. Show film on the use of safety equipment.

UNIT: MISCELLANEOUS

TOPIC: Safety On the Job

Concept	Suggested Learning Activities
IV. Fire-fighting equipment and fires A. Extinguishers---types B. Kinds of fires and their control 1. Wood 2. Chemical 3. Electrical 4. Gasoline(fuel)	IV. Teaching proper use of fire extinguishers and the proper way to put out a fire. Talk given by Fire Chief. Demonstration given by salesman of fire-fighting equipment. Field trip visit to local fire department for demonstration of their equipment.
V. Safety symbols and colors A. Standard safety symbols and colors 1. First aid station symbols 2. Signs and posters 3. Zone lines 4. Colors B. Importance of safety symbols and colors	V. Safety engineer will exhibit and teach the proper symbols and colors and why each color and symbol is so important. <u>Resource People</u>; 1. Person from state safety department 2. Safety person from industry 3. Red Cross worker Show film on Safety symbols and colors.
VI. First aid course A. Why first aid B. Types of first aid 1. Burns 2. Cuts 3. Shock 4. Asphyxiation	VI. Course in first aid taught by qualified instructor. Lecture on the importance of everyone knowing first aid First aid films on: 1. Burns 2. Cuts 3. Artificial respiration 4. Shock 5. Bleeding

UNIT: MISCELLANEOUS

TOPIC: Current Events

BEHAVIORAL OBJECTIVES:

1. The students will participate in groups on reporting topics in the news.

2. The students will read in class topics from various newspapers and news periodicals and make oral reports to the class on how it affects the lives of each one.

3. The student will demonstrate that he has read the daily newspaper by periodically reporting on articles which he has read.

4. The student will watch selected news programs on T.V. during the class periods and make reports of what they see.

UNIT: MISCELLANEOUS

TOPIC: Current Events

Concept	Suggested Learning Activities
I. Students will learn how to make and give news reports.	I. Have the students compose together an article for the school paper. 1. Secure articles from local paper which have been distributed the previous day. Let the students compose radio news articles from leading stories. 2. State a radio or T.V. news show using current news stories and material discussed above.
II. How events in the news affect our daily lives A. School news B. Local news C. State news D. National news E. International news	II. Investigate over a period of days the trend of the news and the way this trend has affected the stock market. 1. Let students search the news for all stories which affect their particular type of work. Keep a notebook and see who can secure the most news information about this job. 2. Make reports of findings to class.
III. Report of events to class members A. Provides important training on how to make reports B. Provides important current events to the class	III. Subscribe to various news and business periodicals as well as the daily newspaper. Use these as stimuli for various class discussions.

UNIT: MISCELLANEOUS

TOPIC: Current Events

Concept	Suggested Learning Activities
C. Provides first hand information of current problems and solutions to the student	Use these audiovisual aids for news programs of special importance: 1. Radio 2. Television
D. Related to importance of class study	Break class into groups and give each a news periodical. See which group can give the best news program using the stories the periodical offers.
IV. How to make a report of current news	IV. Visit a radio or T.V. station and observe how news is reported.
A. Written reports B. Oral reports C. Question and answer session	Divide the class into teams and give a point game (like a spelling bee) on questions from the day events. Get questions from the morning's news report on the radio or from the morning paper. Have students make oral and written reports as well as having question and answer sessions.

UNIT: MISCELLANEOUS

TOPIC: Community Services

BEHAVIORAL OBJECTIVES:

1. Students will be able to list five community services available in the local and surrounding communities.

2. Students will be able to identify services offered by agents in the community.

3. Have students list and rate as Excellent, Good, Fair, or Poor, the community recreational facilities.

UNIT: MISCELLANEOUS

TOPIC: Community Services

Concept	Suggested Learning Activities
I. What are the local community services? A. Health Department B. Doctors and dentists C. Family and children services D. Post Office E. Police Department F. Fire Department	I. Community Survey: Groups of students check and make a list of service agents. Panel Discussion: To discuss findings from the survey.
II. What are the services offered by the community agents? A. Health Department 1. Guard against communicable disease 2. Give information to local citizens of health nature B. Dentists and doctors 1. Administer to the sick 2. Care of the teeth 3. Work with the health department C. Family and children services--sees after the welfare of needy families and children 1. Food and clothing 2. Observation of labor laws	II. Resource People: Invite persons from-- a. Health Department b. Police Department c. Family and children services d. Local doctor Films Observation: Court in session.

UNIT: MISCELLANEOUS

TOPIC: Community Services

Concept	Suggested Learning Activities
D. Post Office--coordinates mail services. E. Police Department--protects the law abiding public and tracks down offenders of the law. F. Fire Department--day and night services to protect against fires and other emergencies.	Have Postmaster give a talk on how mail is classified and dispatched. Role Playing: Let students take turns serving as postmaster and preparing and dispatching mail. Group Discussion: On the services of the Police Department.
III. What recreational facilities are available? (Depends on survey.)	III. Have Students Find Out: If there is a recreation committee in the community. Group Discussion: On the recreational needs of the community.

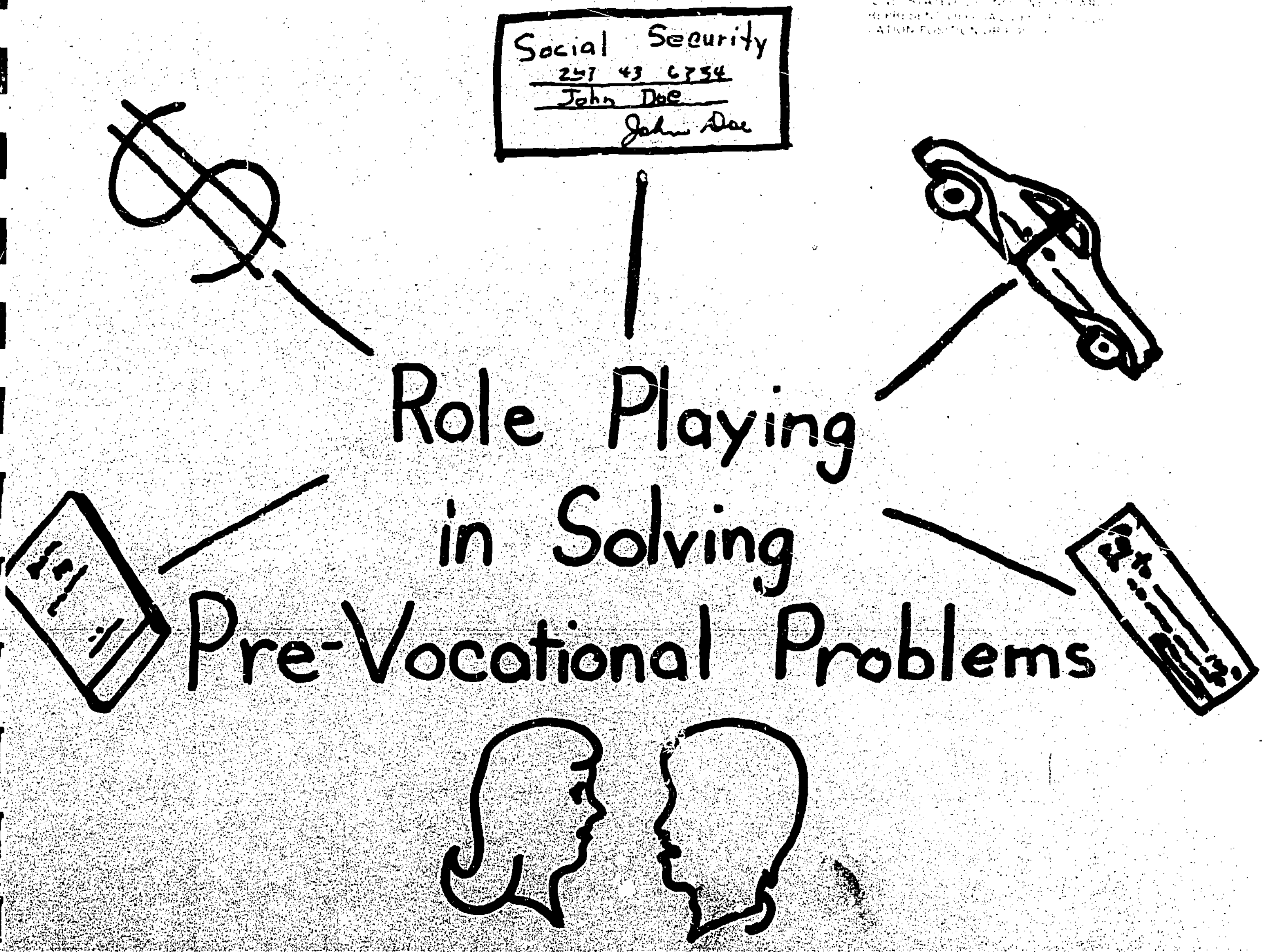
VT 017 213
PORTER, THOMAS L.;SADDLER, DANIEL L.
ROLE PLAYING IN SOLVING PRE-VOCATIONAL
PROBLEMS.

GEORGIA UNIV., ATLANTA.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 72 85P.

DESCRIPTORS - *ROLE PLAYING; *SPECIAL PROGRAMS; *VOCATIONAL EDUCATION; VOCATIONAL DEVELOPMENT; *PROBLEM SOLVING; *SKILL DEVELOPMENT; SECONDARY GRADES; WORKSHEETS; OCCUPATIONAL GUIDANCE; DECISION MAKING SKILLS; HUMANITIES; VISUAL AIDS; ORAL READING; QUESTIONING TECHNIQUES; RESOURCE MATERIALS
IDENTIFIERS - DECISIONS; ATTITUDES APPRECIATIONS

ABSTRACT - THIS SPIRAL-BOUND INSTRUCTIONAL GUIDE WAS DEVELOPED BY TWO PROFESSORS IN THE DEPARTMENTS OF REHABILITATION COUNSELING AND VOCATIONAL EDUCATION AS A SUPPLEMENT TO COOPERATIVE AND SPECIAL PROGRAMS AT THE SECONDARY LEVEL. INTENDED FOR THE USE OF TEACHERS, COUNSELORS, AND VOCATIONAL PROGRAM COORDINATORS, THESE RESOURCE MATERIALS CONTAIN 24 ROLE-PLAYING SITUATIONS CONCERNING VOCATIONAL PROBLEMS, A WIDE RANGE OF STUDENT WORKSHEETS PRESENTED AS CLASS ACTIVITIES, AND VARIOUS RESOURCE LISTS. LINE DRAWINGS ILLUSTRATE THE TEXT. INTRODUCTORY ORAL READING MATERIALS FOR THE TEACHER'S USE ARE GIVEN PRIOR TO EACH ROLE-PLAYING ACTIVITY. (AG)

Role Playing in Solving Pre-Vocational Problems



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University of Georgia
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TO THE TEACHER AND COUNSELOR

Through the efforts of Vocational Education, Special Education, and Vocational Rehabilitation, the students enrolled in special programs are better assured of an education that will provide for their individual needs and to help them meet the demands of the future.

This manuscript is designed to add further to vocational, as well as academic endeavors of the students participating in Cooperative Programs. In order to use this information efficiently, the authors suggest using all appropriate supplementary information that can be obtained as well as competent resource persons when available.

The authors wish to express appreciation to all personnel who suggested changes, and tested these materials with their students. Before this printing, approximately 1200 copies have been used by special educational teachers and C.V.A.E. Co-ordinators in working with their students.

The authors hope that the teachers and counselors will continue to develop their own role-playing sequences with their students and share this information with others. After all, our "role" is to help the student to begin his vocational life with the necessary knowledge to insure him a successful, happy, and self-supporting existence.

Dan Saddler
Tom Porter
UGA 1972

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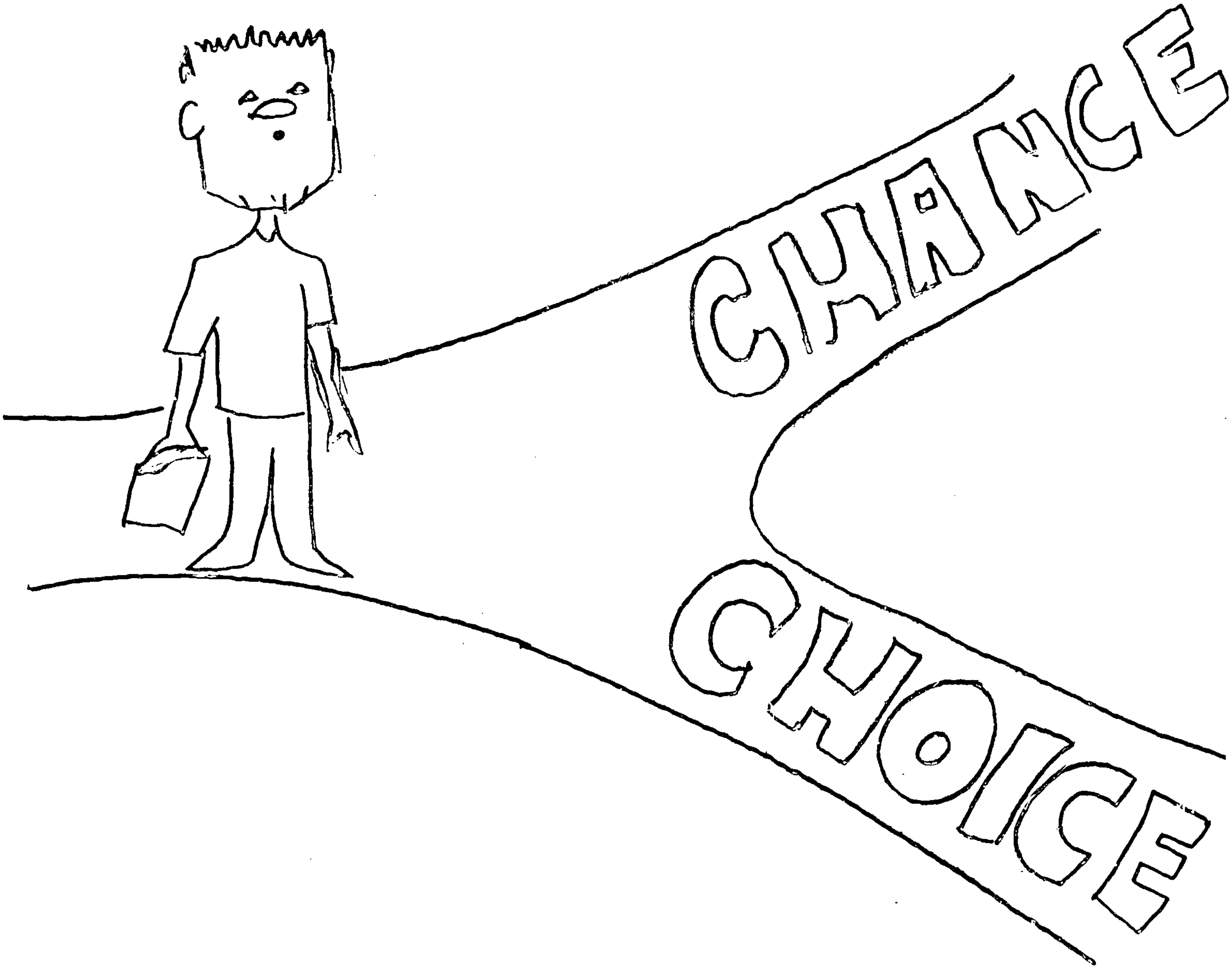
WHICH
ROAD FOR YOU?



SHOULD I STAY IN SCHOOL

Introduction (Read and discuss in class)

Ever feel like dropping out of school, many students do, you know. They give many reasons for quitting such as: (1) I did not like my teacher, (2) the courses are too hard, (3) I need to earn some money, (4) my parents need me to work at home.

Many times the student does not really think through his decision to drop out of school. He may make his decision against his parent's wishes. Often the student does not discuss his problem of wanting to "drop out" with his teacher or counselor. Sometimes the student may be influenced by others who have dropped out of school.

Often a student who drops out of school finds that many jobs are not available to him. He learns that many employers are wanting employees to be at least 18 years of age. The student who drops out of school may find that many employers require an employee to have a high school education to be considered for many of the jobs. Sometimes students who drop out of school find that they miss their friends when they leave school. Drop-outs often find that their salary is very low when they compare their earnings with high school graduate earnings.

Class Activity

(Scene: It was the first day of school at Beaver High, and John was very excited because this was his first day of school since last December. John had been a "drop-out".)

Sam: Hello, John, are you returning to school?

John: Yes, Sam, I'm glad to be back.

Sam: When you left school last December I thought you were really glad to get through with your books, teachers and all, here.

John: I thought that dropping out of school was the thing to do last December, but I've learned differently now.

Sam: What do you mean, John?

John: Well, when I dropped from school last December, I had planned to get a job and buy a car. However, things didn't work out that way. It took me a long time to find a job. I finally found a job at Bill's Janitorial Service . . .but I didn't like it too well. The pay was low.

Sam: The want ad section of the newspaper shows that there are many jobs available and they all seem to offer a good salary.

John: I thought so too, Sam, but when I applied for these jobs the employer stated that you had to be 18 for most of the jobs and many jobs required a high school education.

Sam: What did you do at Bills' Janitorial Service?

John: Most of the time I swept floors and cleaned furniture. My check wasn't even enough to buy a car.

Sam: Gee, I don't believe I want to be a drop-out. I want a better job than the one you had.

John: You're right, Sam. Don't drop out of school. In addition to the difficulty in finding a job, you may find that a drop-out lives a pretty lonely life. I sure missed my friends that I had at school. You know, when you officially withdraw from school it may be that the school won't let you come back. I was very lucky to get back in school.

Sam: Tell me, John, how did you convince your parents to let you drop out of school?

John: It wasn't easy. My parents were against my dropping out of school but I kept telling them that I wanted to drop out. I wouldn't let them forget that they had dropped out of school when they became sixteen.

Sam: I'm glad that I talked with you. Sometimes I feel that I would like to drop out of school . . .but after talking with you I'm determined to graduate. Maybe they are right. . .stay in school and graduate.

Class Activity

(Match the letters with the numbers that have similar meanings)

( ) 1. Drop-out
( ) 2. Reason for dropping out of school
( ) 3. Decision
( ) 4. Employee
( ) 5. Employer
( ) 6. Salary
( ) 7. To influence
( ) 8. 18-years of age

a. age required for many jobs
b. a person leaving school before graduating
c. I don't like my teacher
d. wages or earnings
e. course of action decided upon
f. to have an affect on
g. a person who works for another
h. a person who "hires"

Class Activity II

(Answer the following questions and discuss each one in class).

1. Give four (4) excuses that students may use as to why they want to quit school.

   A.

   B.

   C.

   D.

2. Would wanting to buy a car be a good reason for dropping out of school? Explain.

3. Do you know someone, about your age, who dropped out of school?

   ( ) Yes ( ) No

4. If your answer to No. 3 is Yes, tell briefly what type of job he has.

5. Give three (3) reasons why it may be more important for students in school today to receive a high school education that it was for their father or grandfather to receive a high school education.

   A.

   B.

   C.

6. Give two (2) reasons why you think employers may prefer high school graduates to a high school drop-out when hiring an employee.

   A.

   B.

7. Give two (2) reasons why students who are thinking of dropping out may find it helpful to talk over their problems with their teacher and/or counselor.

A.

B.

8. Give two (2) reasons why you think (or do not think) the school should allow a drop-out to return to his class.

A.

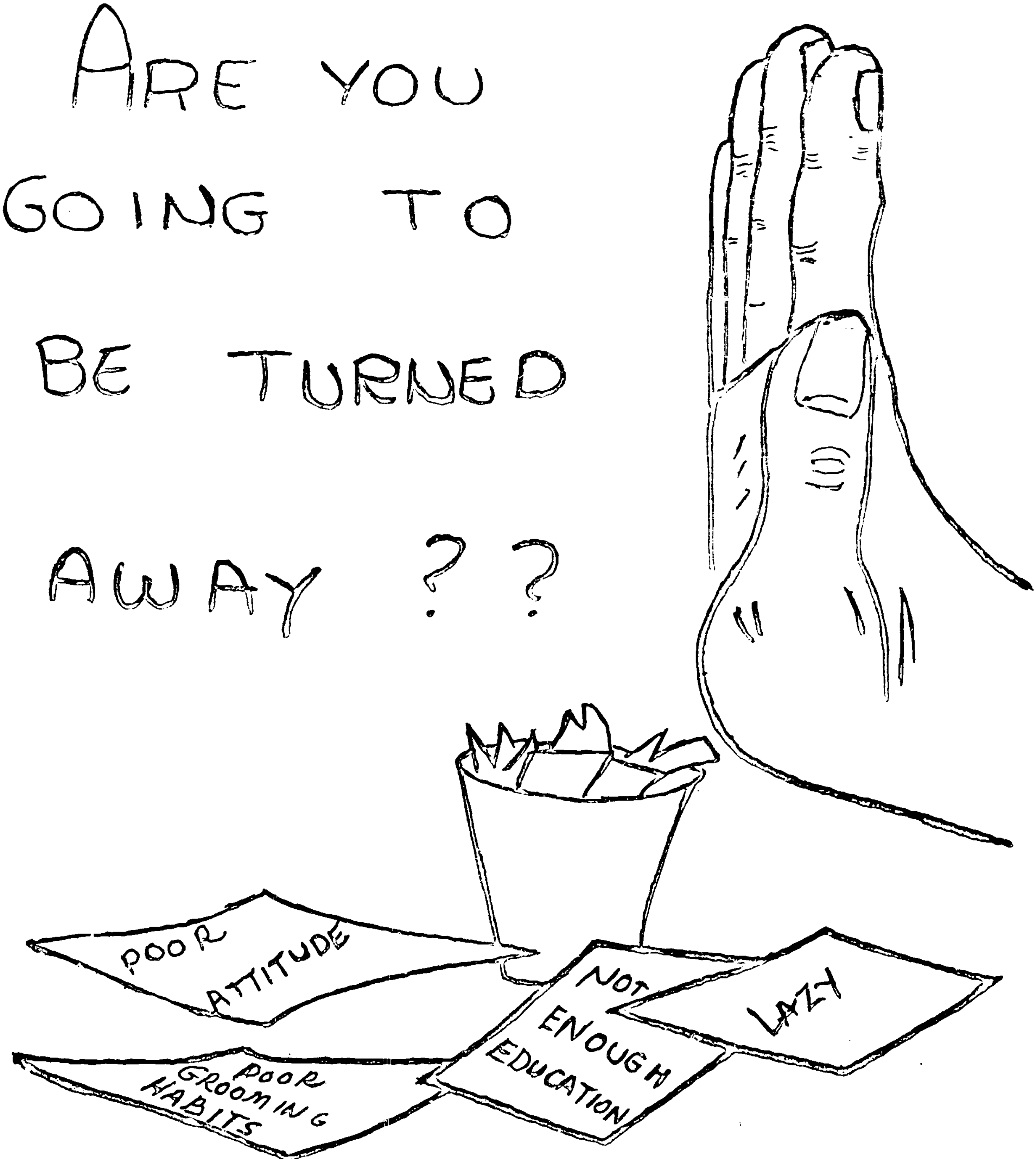
B.

9. Give two (2) reasons why a drop-out may find it difficult to return to school.

A.

B.

ARE YOU GOING TO BE TURNED AWAY ??



SUPPLEMENTARY TEACHING MATERIAL

Booklet: Is It Smart For You to Quit School?

Source: U.S. Army

Film: The Bridge

Source: National Association of Manufacturers
Film Bureau
277 Park Avenue
New York, New York (10017)
(Borrower pays return postage)

This film shows how business and industry can "build a bridge" over which the actual, or potential, high school drop-out can cross to the working world. Interviews with actual high school drop-outs show the reasons why they quit school and the film shows the effectiveness of the work-study program in which students work part-time and go to school part-time until they graduate.

Film: The Road Ahead

Source: Association Films Incorporated
2221 Faulkner Road, Northeast
Atlanta, Georgia (30324)

This film shows the importance of a high school education.

Film: A Morning for Jimmy

Source: Association Films Incorporated
2221 Faulkner Road, Northeast
Atlanta, Georgia (30324)

This film tells the story of Jimmy. a Negro lad, who is discouraged after his encounter with racial discrimination while seeking a part-time job. Wise counsel points out how important an education is and the effect it has on one's career and future.

Film: You Can Go a Long Way

Source: Consulate General of Canada
Suite 2110 International Trade Mart
2 Canal Street
New Orleans, Louisiana (70130)

This film explores the reasons why it is wise to finish school.

Pamphlet: It's A Dead-End Road for the Dropout

Source: The Reader's Digest Association, Inc.,
Pleasantville, New York

(Reprinted from the May 1965 issue)

JOB TRAINING AS PART OF MY SCHOOL WORK

Introduction (Read and discuss in class)

Many school systems are offering an opportunity for students to receive vocational training as part of their school curriculum. This training is designed to enable the student to learn about the jobs that may be available to him. Another purpose of the school vocational training, or the work-study program as it is sometimes called, is to enable the student to learn good work habits.

The vocational class is designed to give the student practical experiences in working. In order to find out what types of work the student can do best, a group of tests may be given. The tests are designed to determine what the student's strong and weak points are, and to find out how well the student can use his hands. Many of the tests given by the teacher and counselor are similar to tests given by employers.

Many school job training programs require the student to secure a medical examination form his family physician. Some of the health areas covered by the examination are: vision, hearing, medical history, blood pressure, and general physical condition. Generally, the medical examination is performed with no cost to the student. Many employers require their employees and prospective employees to take similar examinations.

Class Activity I (match the correct letters with the numbers).

( ) 1. vocational
( ) 2. curriculum
( ) 3. work-study program
( ) 4. family physician
( ) 5. task
( ) 6. examination
( ) 7. vision
( ) 8. medical history
( ) 9. prospective

a. occupational in nature
b. a job to perform
c. school program that includes work in the curriculum
d. seeing
e. a medical record of illness
f. many, or different
g. a medical doctor used most often by a family
h. test
i. the activities provided by the school to prepare the student for the future

( ) 10. various

j. may become part of in the future

Class Activity II.

(Use the above words in discussions during class group to clarify meanings to the students and assist the students in the following exercises)

1. Give two (2) purposes of the work-study program.

   A.

   B.

2. Give two (2) reasons why the student may be given tests to determine their strong and weak points in the work-study program.

   A.

   B.

3. Give two(2) reasons why a physical examination would be helpful to a student.

   A.

   B.

4. Give two(2) reasons why employers may require prospective employees to have a physical examination.

   A.

   B.

5. Give two (2) reasons why employers may require prospective employees to take various vocational tests.

   A.

   B.

Class Activity III

The questions below may be asked by your family doctor. How many can you answer?

1. Name of your family doctor ________________________.
2. Have you ever been admitted to a hospital for treatment?________________________.
3. Have you missed more than 10 days of school at one time due to a certain illness? ________. Kind of illness __________.
4. How do you think your health is? Check one: Good__________. Fair__________, or Poor__________.

5. Is any member of your family under the doctor's care from a serious disease? ( ) Yes ( ) No

Name of disease__________________ __________

6. Do you have any of the followi Place a check by the appropriate blank

a. dizziness_____

b. shortness of breath______

c. constant headaches_______

d. rapid beating of heart_______

e. difficulty sleeping_______

f. excessive daydreaming_______

7. Have you ever been advised by a doctor not to participate in physical education?

( ) Yes ( ) No

If your answer is Yes, what reason was given?

Reason:

WORKING AS A PART OF SCHOOL ACTIVITIES

Introduction (Read and discuss in class)

Work-study programs may permit the student to work part-time during school hours. The purposes of permitting the student to work during the school day are: (1) to allow a student to learn good work habits, (2) to allow the student to learn to work under supervision, (3) to provide specific training for the future, (4) to help the student find what jobs he likes and dislikes, and (5) to help provide an income for some students while they are attending shcool.

Before a student can expect to enter work stations in the community, he must meet the following requirements: (1) he must be at least 16 years of age, (2) he must have proven to his teacher and counselor that he is mature enough to enter employment, (3) he must have demonstrated his ability to get along with his fellow students, and (4) he must attend school regularly.

Many students gain work experience through working in school. This type of training is called "in-school" training. By working at the school the student may (1) demonstrate his readiness, ability, cooperativeness, punctuality, willingness to work, etc., to the school officials, and (2) gain work experience that would prepare the student to enter work stations in the community.

Class Activity I

Below are listed some of the things that a student can do at school to demonstrate that he would make a good worker. If you feel you could improve in any of these areas, place an "X" by the number.

( ) 1. Complete assignments on time.
( ) 2. Attend school regularly.
( ) 3. Take an interest in school work.
( ) 4. Use equipment and tools carefully.

( ) 5. Observe safety rules.
( ) 6. Respect the rights of fellow-students and teacher.
( ) 7. Be friendly.
( ) 8. Wear clean clothing.
( ) 9. Utilize good health habits such as bathing regularly and use proper grooming habits.
( ) 10. Use good manners in dealing with fellow-students and teachers.

Class activity II.

Since the student rec school credit for working part of the school day, the student's employer may be asked to fill out a form each month similar to the one below. How would you rate yourself, using your present job or your activities and behavior in shcool?

(Use form on following page)

Class activity III

1. Give four (4) reasons why working part of the school day may be of benefit to you in getting a job after graduation from school.

A.

B.

C.

D.

2. List five (5) things the student could do at school to show that he is ready to begin work in out-of-school work stations.

A.

B.

C.

D.

E.

WORK TRAINING PROGRESS REPORT

Employee ____________________ Date ______________
Firm Name ____________________ Add. ______________ Ph.# __________
Employer ____________________

	ALWAYS	USUALLY	SOMETIMES	SELDOM	NEVER
Does he follow directions?					
Does he accept constructive criticism?					
Does he sustain routine?					
Does he get along with the supervisor?					
Does he get along with co-workers?					
Does he see things to be done?					
Does he like his work?					
Does he dress appropriately for the job?					
Does he come to work everyday?					
Does he come to work on time?					
Is he a steady worker?					
Can he work by himself?					
Does he meet production schedules?					
Does he take care of tools and other equipment (with which he works?)					
Is he neat and clean when this is required on the job?					
Does he do his share of the work?					
Does he observe safety rules and regulations?					
Does he observe the rules of the company regarding smoking, eating on the job, etc.?					
Is he courteous?					
Is the quality of his work satisfactory?					

Are you satisfied with worker's progress? ______________________________

Can he do his regular job? ______________________________

What is your impression of this worker and the nature of his work? ______________________________

Signed ______________________
Date ______________________

(Further comments may be made on the back of this sheet).

THE VOCATIONAL REHABILITATION COUNSELOR

Introduction (Read and discuss in class)

Many school systems that are taking part in the work-study programs will work with the local Office of Vocational Rehabilitation. There will be a Vocational Rehabilitation counselor assigned to each work-study program. The Vocational Rehabilitation counselor's duties will be to assist the teacher and school administrators in the following areas:

(1) Assist in determining the kinds of training stations for which each student is best qualified.

(2) Assist in locating suitable training stations for each other.

(3) Assist the student in overcoming difficulties he may encounter in his school training station.

(4) Provide a medical examination for each student by his family physician.

(5) In some instances, help provide medical treatment if needed.

(6) Help the student secure additional training after graduation from high school if this type of training is needed.

(7) Provide the student with an opportunity to discuss any part of his school and work training with the counselor.

(8) Visit the home of each student and discuss the student's training program with the student's parents.

(9) Assist the student in locating a job and provide the student with assistance in keeping the job.

Teaching suggestion:

THE VOCATIONAL REHABILITATION COUNSELOR

1. Let your Vocational Rehabilitation counselor speak to the classroom students early in the year.
2. Set aside a specific time for students to discuss problems with the counselor. Make sure the students know the days and the time of the day they can expect their counselor.
3. Prior to visit by counselor, obtain a picture and information on the counselor and center theme for bulletin board around him. Suggested theme titles: "Picture This", "Know Him Better", "And Now Introducing . . . ."
4. Start a suggestion box. This might encourage many questions from the students.
5. Make sure counselor explains the "whys" of the program and show the ways in which he can help students, not only while they are in school, but after schooling.

Class Activity I

1. The name of the Vocational Rehabilitation counselor assigned to my school is __________________________________.

2. The Vocational Rehabilitation counselor's adress is

____

____

His phone number is ___________________ Area Code__________

3. The Vocational Rehabilitation counselor will be in my school on the following schedule ____________________________

____

4. Some of the specific items I would like to discuss with the Vocational Rehabilitation counselor are:

A.

B.

C.

D.

OBTAINING A SOCIAL SECURITY CARD

Introduction

One of the first steps before obtaining employment is to receive a social security card. This card contains the name of the employee and a number. An employer may require the worker to present this card at the time of the job interview. To obtain a card, a form must be filled out as shown in the example (see following page). Care should be taken to keep from losing the card as the number on the card is used in reporting the worker's earnings and social security tax.

Social security tax may be thought of as a type of insurance plan, whereby the employee and employer contribute a certain amount of money each month. Many times the amount of money the employee contributes is withheld from his salary. The employee may receive benefits from social security under certain conditions if he retires or, if he should become disabled.

Class Activity I

(Acquire recent bulletins explaining social security from the local social security office and discuss the answers to the following questions)

1. What are two (2) ways you, as an employee, will profit from paying social security tax?

   A.

   B.

2. Who must pay social security tax?

3. What percentage of a worker's salary will be withheld for social security tax?

4. How much tax will the employer pay in addition to what the employee pays?

5. If a worker's income is $3,000.00 per year, how much social security tax does he pay?

APPLICATION FOR A SOCIAL SECURITY NUMBER
(Or Replacement of Lost Card)

Information Furnished On This Form Is CONFIDENTIAL

DO NOT WRITE IN THE ABOVE SPACE

See Instructions on Back. **Print in Black or Dark Blue Ink or Use Typewriter.**

1 Print FULL NAME YOU WILL USE IN WORK OR BUSINESS (First Name) (Middle name or Initial – if none, draw line ___) (Last Name)

2 Print FULL NAME GIVEN YOU AT BIRTH

6 YOUR DATE OF BIRTH (Month) (Day) (Year)

3 PLACE OF BIRTH (City) (County if known) (State)

7 YOUR PRESENT AGE (Age on last birthday)

4 MOTHER'S FULL NAME AT HER BIRTH (Her maiden name)

8 YOUR SEX MALE ☐ FEMALE ☐

5 FATHER'S FULL NAME (Regardless of whether living or dead)

9 YOUR COLOR OR RACE WHITE ☐ NEGRO ☐ OTHER ☐

10 HAVE YOU EVER BEFORE APPLIED FOR OR HAD A SOCIAL SECURITY, RAILROAD, OR TAX ACCOUNT NUMBER? NO ☐ DON'T KNOW ☐ YES ☐ (If "YES" Print STATE in which you applied and DATE you applied and SOCIAL SECURITY NUMBER if known)

11 YOUR MAILING ADDRESS (Number and Street, Apt. No., P.O. Box, or Rural Route) (City) (State) (Zip Code)

12 TODAY'S DATE

13 TELEPHONE NUMBER

14 Sign YOUR NAME HERE (Do Not Print)

TREASURY DEPARTMENT Internal Revenue Service

Return completed application to nearest SOCIAL SECURITY ADMINISTRATION OFFICE

SS-5

HAVE YOU COMPLETED ALL 14 ITEMS?

INSTRUCTIONS

One Number Is All You Ever Need For Social Security And Tax Purposes
Special Attention Should Be Given To Items Listed Below

Fill in this form completely and correctly. If any information is not known and is unavailable, write "unknown." Use typewriter or print legibly in dark ink.

1 Your social security card will be typed with the name you show in item 1. However, if you want to use the name shown in item 2, attach a signed request to this form.

3 If not born in the USA, enter the name of the country in which you were born.

5 If a stepfather, adopting father, or foster father is shown, include the relationship after name; for example, "John H. Jones, stepfather."

10 If you have ever before filled out an application like this for a social security, railroad, or tax number, check "yes" even if you never received your card. If you check "yes," give the name of the State and the approximate date on which you applied. Also enter your social security number if you did receive the card and remember the number. You may find your number on an old tax return, payroll slip, or wage statement.

11 If you get your mail in the country, without a street address, show your R.D. Route, and Box number; if at the post office, show your P.O. Box No.; if there is no such way of showing your mail address, show the town or post office name. If mail under your name is not normally received at the address which you show, use an "in care of" address.

14 Sign your name as usually written. Do not print unless this is your usual signature. (If unable to write, make a mark witnessed by two persons who can write. The witnesses preferably should be persons who work with the applicant and both must sign this application. A parent, guardian, or custodian who completes this form on behalf of another person should sign his own name followed by his title or relationship to the applicant; for example, "John Smith, father.")

★ GPO : 1969 OF—358-795

FOR DISTRICT OFFICE USE

FOR BUREAU OF DATA PROCESSING AND ACCOUNTS USE

Teaching suggestions:

1. Utilize booklets and films available from local social security office.

2. Invite social security representative to come and explain about social security during or after (not before) study. (This way the students are familiar enough with social security to answer questions as well as ask questions.)

3. Use overhead projector to aid in filling out social security card information.

4. Impress on students the importance of employer's submitting payments and employee's payments to social security.

5. Discuss individual names and the confusion they could cause when not submitted correctly (full names, misspelling, etc.)

6. Emphasize the applying for name changes when the "Miss" becomes a "Mrs."

PAYING INCOME TAX

A worker does not always receive his full salary at payday. Many employers withhold the social security tax and income tax from his paycheck. Almost everyone who works must pay income tax. The amount that is paid depends upon the number of dependents the worker has and the amount of salary that he makes. It is possible that the worker may be due a refund if more than enough income tax is withheld from his salary. The income tax year begins the first day of January and ends the last day of December.

Class Activity I

(Obtain free tax books from the local income tax office and explain the answers to the following questions)

1. What are exemptions?
2. What is a dependent?
3. How much exemption does a person receive for himself? For each dependent?
4. If a person made $600.00 in one year and had no dependents, how much tax would he pay?
5. What is the deadline for filing income tax forms?
6. What is meant by a refund?

Class Activity II

BUT YOU SAID $30.00

Situation: Orville was very disappointed when he received his first check from Acme Construction Company. He had worked each day after school for two weeks. He expected $30.00 for this period of time. However, his check only showed $24.50. He decided to ask his teacher, Mrs Smith, about the check.

Orville: Mrs. Smith, my check was for only $24.50 for the last two weeks work. My supervisor told me that I would receive $30.00 for the two week's work.

Mrs. Smith: Did you talk with your supervisor about the check?

Orville: Yes, Ma'm, but it was late Friday when I received my pay and we didn't have time to discuss it fully. My supervisor said that the reason I didn't get the full $30.00 was because of the various deductions.

Mrs. Smith: Do you have the stub from your check?

Orville: Yes Ma'm, the lady at the bank asked that I tear off the stub before I signed my name on the back of the check. She called this "endorsing the check". Here is my stub, Mrs. Smith.

No. 45227 ACME CONSTRUCTION COMPANY
Green Tree, Georgia

Gross Pay				Deductions				Net Pay
$30.00	Fed. W-H	FICA	State	W-H	Ins.	Retirement	Other	$24.50
	$4.06	$1.44						
Date 11/15/69	EMPLOYEE'S EARNING RECORD - DETACH THIS STUB FOR YOUR RECORD							

Mrs. Smith: You see, Orville, your salary was $30.00. This is known as your gross salary. . . the full amount you earned. However, you received only $24.50 and this is known as your "net" salary ... which is what you made after deductions. The difference between your "gross" earnings and your "net" earnings (or take home) is $5.50. That part of your salary is being held for other purposes.

Orville: I don't understand - if I earned the money, why didn't I get all of my salary?

Mrs. Smith: Most employers take out income tax at the time the salary is earned. The amount deducted depends on the salary you earn and the number of dependents you have.

Orville: Oh, I remember, this was explained to me when my supervisor asked me to sign a paper telling how many dependents I had. Of course, I didn't have any dependents. Could I get any of my income back?

Mrs. Smith: Yes, it may be possible to get part or all of your tax back when you file your income tax form. This is done around the first of the year. At that time you figure out how much you owe in taxes. It may be possible that you do not owe any taxes and you would get all the money back that was withheld. It would depend on the amount of salary you earned.

Orville: My father figures his income tax each year. I think I'll ask him who his dependents are and if he gets back a refund.

Mrs. Smith: That would be a good idea and it may be that your parents will have an extra tax form and instructions booklet that you could bring to class in order that we can discuss it further. There are other deductions listed on your check stub, Orville. One of these is FICA or, as some people call it, social security tax.

Orville: Does it have to do with my social security card?

Mrs. Smith: Yes, Orville everyone working for a salary must obtain a social security card and be assigned a number. This number is yours and that is the way you are identified on many of your records.

Orville: Why don't they use your name instead of a number?

Mrs. Smith: One reason is that there could be several people with the same name and this could present problems to the people having to keep up with all the records. You wouldn't want your earnings credited to someone else, nor their earnings to you, would you?

Orville: No, Ma'm. I remember that you helped me get my social security card before I began work.

Mrs. Smith: Yes, it is simple to obtain a social security card. You must fill out an application blank which may be obtained from the local social security office.

Orville: Why must I pay social security tax?

Mrs. Smith: Social security may be thought of as being a plan that provides an income for you after you retire, or if you should become disabled. It may also help provide income for your dependents if you should die.

Orville: Then the money that was taken out of my salary may go toward my retirement?

Mrs. Smith: Yes, and in addition to the money you pay in, your employer must pay in also and that amount is included in your account.

TEACHERS AREN'T MAGIC . . .

YOU MUST DO YOUR PART, TOO!

HOW DO I GET THE JOB?

Introduction: (Read and discuss in class)

Someday you will be faced with getting a job "on your own". Where do you start? What do you do? Listed below are some ways that have proven helpful to others:

1. Using the classified ads in the local newspaper. Many times an employer will advertise for a worker in a local paper. The following may be an example of such an ad:

> HELP WANTED MALE: Helper in downtown service station - experience helpful but not required. Beginning salary $65/wk. Call 543-0558, ask for manager.

Many times a worker will advertise in the classified ads as to the type of job he is looking for. Below is an example of this type of ad:

> SITUATION WANTED: High school student desires job after school and Saturdays. Have some experience as a service station attendant, but will consider other employment. Call Bob Jones at 543-0558.

Class Activity I

Bring classified ads taken from a local newspaper to class. Identify the different jobs available. Could you qualify for these jobs?

Almost all the help wanted ads contain some basic information. Make a list of the different points covered in the ads.

1.
2.
3.
4.
5.
6.
7.

Class Activity II

Write a situation wanted advertisement for a job you desire. Use at least the following information: type of job desired - age - brief explanation of experience - hours you could work - address and/or phone number. Remember the cost of the ad depends on the number of words and the amount of space used. Therefore, keep the ad short and interesting.

SITUATION WANTED____

____

____

2. Checking the yellow pages of the telephone directory. By checking through the yellow pages you may get an idea of the jobs available in your community. You should especially note the type of businesses - the location of the businesses and the types of jobs you think may be available at a particular business.

Class Activity III

Obtain a copy of a local telephone directory and identify the types of jobs that may be available on a given yellow page.

a.

b.

c.

d.

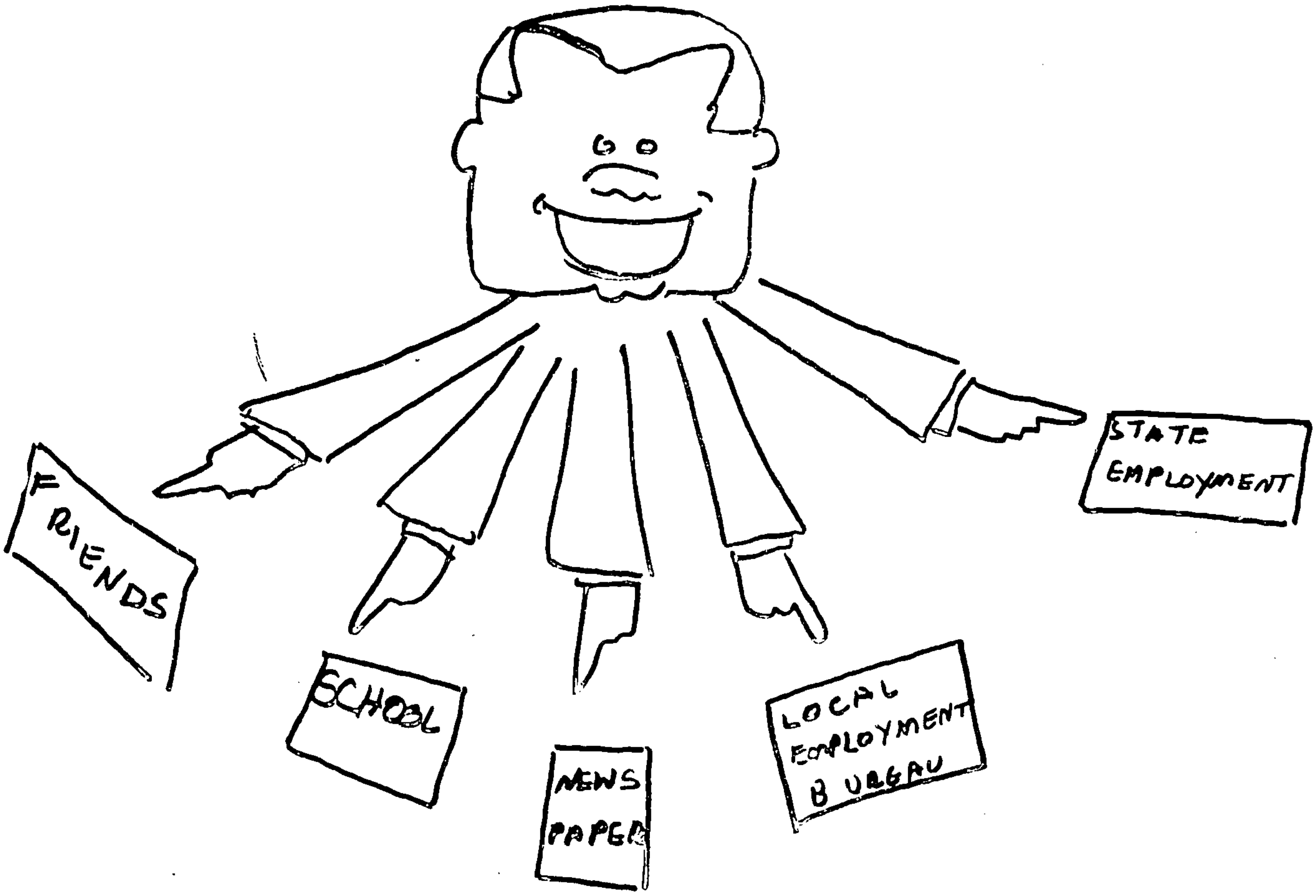
e.

f.

3. Friends and relatives may be helpful to you in locating a job. It may be to your advantage to ask among the people you know and see if they know of any job openings.

4. Employment offices will be discussed in a later chapter.

FIND A JOB...


FRIENDS
SCHOOL
NEWS PAPER
LOCAL EMPLOYMENT BUREAU
STATE EMPLOYMENT

THE EMPLOYMENT SERVICE

Introduction

Each state has a state employment service which is designed to help people find jobs. Employers who need employees use the employment office to find qualified people to fill certain jobs. The employment office uses trained counselors to interview people who need employment. Sometimes tests are used to determine what type of job the applicant (person desiring employment)can do best.

One of the first duties of an applicant desiring a job from the employment service is to fill out an application form. This information is used to determine the kind of jobs the applicant is best qualified for. The interview at the employment office should be conducted in much the same manner as the interview would be if you were applying for a job at any business.

Class Activity I

Henry and Bill had been studying in school about the employment office and now they are ready for their interview. They arrive at the employment office, introduce themselves to the receptionist and state the purpose of their visit.

Receptionist: Please be seated. Mr. Hall, the employment counselor will be with you in a few minutes. While you are waiting would you please complete this application form?

Henry and Bill: Thank you.

Henry: (speaking to Bill and looking at the application). There are many questions on this application that are similar to the oen we filled out in class.

Bill: Yes, they are similar. I might not have known some of the answers if we had not known what to expect.

Receptionist: (introducing Henry and Bill to Mr. Hall). Mr. Hall, this is Henry Jones and Bill Smith. They would like to talk with you concerning employment.

Mr. Hall: I'm happy to meet you. Bill, would you like to come into my office first. Henry, you will be next. (Bill and Mr. Hall enter Mr. Hall's office.)

Mr. Hall: Would you tell me something about yourself, Bill?

Bill: My name is Bill Smith. I am 18 years of age and I have recently graduated from Central High and I really need a job.

Mr. Hall: What type of job would you like, Bill?

Bill: During school I worked part-time in a service station. I really like to do that type of work.

Mr. Hall: Oh, yes, I see on your application that you worked part-time at the City Service Station. Could you tell me about your duties?

Bill: While I was working at the City Service Station, I received some experience in several areas, but my main experience was in cleaning the station and waiting on customers.

Mr. Hall: Would you mind if I checked the references you gave on your application? I would especially like to talk with your teacher and counselor, and your former employer.

Bill: Yes, that would be fine and if you need other information from me, please let me know.

Mr. Hall: We will try to help you find a job, Bill. I will call you within a few days.

Scene: Have the same students play Mr. Hall and Henry. During Henry's interview, permit Henry and Bill to make up questions and answers. The class will act as judges and offer suggestions for improvement.

Class Activity II

Below is a sample application from the State Employment Service Office. Fill in the blanks with information regarding your own history and experience.

(sample on the following page)

APPLICANT: PLEASE COMPLETE ALL ITEMS IN THE NUMBERED SECTIONS ON THIS SIDE.

1. EMPLOYMENT RECORD – BEGIN WITH LAST FULL TIME JOB – INCLUDE MILITARY

DATE STARTED	DATE LEFT	NAME OF COMPANY	ADDRESS	KIND OF BUSINESS
JOB TITLE	SALARY	REASON FOR LEAVING		

DESCRIBE WHAT YOU DID AND LIST ANY MACHINES, TOOLS OR EQUIPMENT USED

DATE STARTED	DATE LEFT	NAME OF COMPANY	ADDRESS	KIND OF BUSINESS
JOB TITLE	SALARY	REASON FOR LEAVING		

DESCRIBE WHAT YOU DID AND LIST ANY MACHINES, TOOLS OR EQUIPMENT USED

DATE STARTED	DATE LEFT	NAME OF COMPANY	ADDRESS	KIND OF BUSINESS
JOB TITLE	SALARY	REASON FOR LEAVING		

DESCRIBE WHAT YOU DID AND LIST ANY MACHINES, TOOLS OR EQUIPMENT USED

2. EDUCATION AND TRAINING		DATES ATTENDED	
NAME OF SCHOOL	SUBJECTS WHICH PREPARED YOU FOR WORK	FROM	TO
HIGH SCHOOL			
COLLEGE OR UNIVERSITY			
VOCATIONAL OR TRADE			

CIRCLE HIGHEST YEAR OF EDUCATION COMPLETED AND GIVE DEGREE

GRADE SCHOOL	HIGH SCHOOL	COLLEGE	DEGREES
1 2 3 4 5 6 7 8	1 2 3 4	1 2 3 4 5 6 7	

[redacted]

☐ ED ☐ N. POV. ☐ NON POOR ☐ DROP OUT ☐ OTHER

3. PRINT NAME: LAST FIRST MIDDLE S S N

4. ADDRESS: NUMBER STREET OR R.F.D. APT.

5. TELEPHONE

6. CITY STATE ZIP COUNTY

7. DATE OF BIRTH MO. DAY YEAR

8. HEIGHT FT. IN.

9. WEIGHT POUNDS

10. MARITAL STATUS SINGLE ☐ MARRIED ☐ OTHER ☐

11. NUMBER IN FAMILY ______ NUMBER OF DEPENDENTS ______ ANNUAL FAMILY INCOME ______ U. S. CITIZEN ☐ YES ☐ NO

12. DRAFT STATUS

13. IF VET., LIST DATES OF LAST ACTIVE SERV. ENTERED MO. DAY YR. RELEASED MO. DAY YR. BRANCH OF MILITARY SERIAL NO. SERVICE CONNECTED DISABILITY YES ☐ NO ☐

14. IF NEEDED FOR WORK, DO YOU HAVE: DRIVER'S LICENSE ☐ WORK TOOLS ☐ CAR OR TRUCK ☐ PROFESSIONAL OR UNIFORMS ☐ TRANSPORTATION ☐ TRADE LICENSES ☐

15. UNION MEMBER YES ☐ NO ☐

16. ARE YOU WILLING TO: TRAVEL ☐ RELOCATE ☐ COMMUTE ☐ NUMBER OF MILES ONE WAY ______ LOCALITY PREFERRED

17. ANY HEALTH PROBLEM? YES ☐ NO ☐ IF YES, LIST NATURE OF PROBLEM.

18. TYPE OF WORK YOU ARE LOOKING FOR

19. MINIMUM WAGE ACCEPTABLE

20. HOURS AVAILABLE FOR WORK WOULD YOU ACCEPT WORK ON SHIFTS? 1ST ☐ 2ND ☐ 3RD ☐

21. WHAT TYPE OF OCCUPATIONAL TRAINING ARE YOU INTERESTED IN? PLEASE LIST.

22. IF YOU ARE CONSIDERING CHANGING YOUR OCCUPATION, PLEASE LIST YOUR REASON.

APPLICANT'S SIGNATURE

TITLES	CODES

SKA	DATE
	E

SOURCE OF INTAKE

SELF	ES	WELFARE	PROGRAMS	OTHER

TEST RESULTS OR DATE

SAT B(S)

GATB

PROF:

OTHER:

REFERRED TO COUNSELOR DATE: INIT:

INITIAL APPLICATION INTERVIEWER

SHOW ESARS CONTROL NO., FORM NO., DATE COMPLETED AND INITIALS

GEORGIA DEPARTMENT OF LABOR – EMPLOYMENT SECURITY AGENCY – TES

APPLICATION CARD

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Class Activity III

1. What are two duties of an employment service?

   A.

   B.

2. Where is the nearest employment office located in your community?

3. What are two duties of a receptionist?

   A.

   B.

4. What is the purpose of filling out an application for employment? Give two.

   A.

   B.

5. What is meant by a "reference"?

6. Why would an employment counselor or employer want to check your references? Give two reasons.

   A.

   B.

7. If you have worked before, tell briefly how you obtained your job.

When you go to that important job interview, you are going with the aim of selling yourself to the prospective employer. There are many "do's" and "don'ts" that you need to remember. Some of these are listed below. Perhaps you can add more. Let's study each carefully.

1. It is very important to be on time for the interview. If you aren't on time for the interview, the employer might wonder if you would be on time for work. Time is money to any employer.

2. Always make an appointment for your interview.

3. In preparation for your interview, remember not to leave your good grooming, manners, or confidence at home. Dress appropriately. Don't chew gum.

4. Never carry your friends with you to a job interview. The employer wants to see you, not your friend.

5. Prepare yourself for any questions the employer might ask. Be sure to carry your social security card and other important papers you might need.

6. As you come into the reception room, be sure to introduce yourself to the secretary and state the purpose of your visit.

7. When the receptionist calls you in for your interview, remember your good manners, shake hands with your prospective employer.

8. Answer all questions honestly.

9. Talk directly to the interviewer and not to your shoes.

10. Whether or not you get the job at this time, be courteous and thank him for letting you come. He may need you at a later time.

11. The interviewer may ask you to fill out an application form. If so, be sure you have your pen with you and all the necessary information. Be prepared.

Suggestions for supplementary information:

Booklet: How to Get a Job: A Handy Guide for Job Seekers

Source: The President's Committee on Employment of
The Handicapped
Washington, D. C.

Pamphlet: Check List for Job Hunters

Source: Georgia Department of Labor
State Office Building
Atlanta, Georgia 30334

Film: Finding the Right Job

Source: Division of Instructional Material and Library
Services
State Department of Education
State Office Building
Atlanta, Georgia 30334

Film: The Big Question

Source: Association Films, Inc.
2221 Faulkner Road, Northeast
Atlanta, Georgia 30324

This film discusses choosing a career.

Pamphlet: How to . . .Prepare Yourself for Job Interviews

Source: The Florida State Employment Service
Tallahassee, Florida

Pamphlet: The Road to the Right Job

Source: Georgia State Employment Service

Pamphlet: Getting the Right Job

Source: Glidden-Durkee
Division of S.C.M. Corporation
900 Union Commerce Building
Cleveland, Ohio 44115

Film: Good Looks

Source: Modern Talking Picture Service

THE FIRST JOBS

Introduction

Usually the first actual job the student obtains depends upon several factors. Below is listed several factors which should be considered when seeking employment. Discuss each in class and tell why they may be important in deciding upon a job.

1. Student's "likes" and "dislikes"
2. Types and number of jobs available
3. Transportation available to and from the job
4. Age of student
5. Student's achievements in school
6. Reputation of firm or business which desires employees
7. Danger involved in the work
8. Wages offered
9. Kind of training expected
10. Other benefits of job: sick leave . .retirement benefits insurance
11. Tools and equipment required

Class Activity I

Almost all the above would be important factors when you start thinking about a job. Place them in order that you consider most important. Tell why you decided upon your answer if asked by the teacher.

1.

2.

3.

4.

5.

6,

7.

8.

9.

10.

11.

Teaching suggestions:

1. Have students develop their own ideas of "the bad interview" into a role-playing situation.

2. Reverse role-playing situation into "the good interview".

3. Back a bulletin board with want ads. Circle potential job situations for the E.M.R. Let students attach their pictures (connected by "yarn lines") to job interests.

4. Write letters to companies of possible occupational areas for free information.

5. Develop unit study on how to write letters.

6. Ask the local State Employment Service counselor to visit the class.

7. Now is a good time to bring in your good grooming unit.

8. Have the secretary who handles work permits visit the class. Prepare transparencies to use during discussion.

9. Have each student pretend to be an employer and list the traits he would look for (good and/or bad) in choosing an employee. Then, compile the list with the students at the blackboard.

10. A unit of study on manners might fit into your work right now. Let students make a chart of the "Do's and Don'ts" of manners.

Confidence Gets The Job

WHY DIDN'T I GET THE JOB?

Class Activity I

Scene: The bell was ringing as Jim and Joe left school to go to their places of employment at Harry's New Car Agency. They had been working at Harry's for the past three months.

Jim: I think I'll take a short cut so I can get to work a little early today.

Joe: Why bother? I bet Mr. Parks will be late to give us our orders. Come with me. We'll stop by the bakery and buy some donuts and a soft drink.

Jim: I don't think that would be right. Besides, Mr. Parks said that he had something important to tell us today and I want to change into some other clothes so these clothes won't get grease and dirt all over them.

Joe: Aw, shucks, Jim. You worry too much and all that my mom has to do is throw the clothes into the washing machine. This is not a real job, it's only part of our school training . . . I'm going to wear what I have on.

* * * *

Questions:

1. Who had the better attitude toward work? Jim or Joe? Explain.

2. Why is being on time a good worker trait? Explain.

3. Why is it important to dress appropriately for a job? How would you dress for the following jobs:

A. Waitress

B. Printer

C. Clerk

D. Plumber

E. Car hop

F. Nurses' aide

Class Activity II

Scene: At the car agency

Mr. Parks: Hello, Joe. Say, you are a little early today.

Joe: Yes sir, there were some things I wanted to do before it was time to begin work. Would you like to give me my assignment now?

Mr. Parks: No. I want to talk with you and Jim together. There is something important that I want to tell you.

Jim: Hello, Joe. I told you there was nothing to worry about. I'm 15 minutes late and no trouble at all. I've been late almost every day for two weeks.

Joe: Mr. Parks is waiting for you to come in, he has something important to talk with us about.

Mr. Parks: Hello, boys. I've been observing your work habits and I want to review what we said, at the time I hired you, about some of the work habits that are important to any job such as being on time, dressing appropriately for the job, taking an interest in your work, and doing every job to the best of your ability. Today, I must make a decision since we are adding an extra worker for the parts department. This is a good job and it will enable the worker to learn about car parts and how to fill orders as well as learn about cars. In this job you will be working directly with the public and it may be a permanent position if the person selected does a good job.

Jim: That does sound like a good job - I could do that work in only a short time each day.

Joe: It sure sounds great, Mr. Parks. I know it would be a good job and would sure help a person to learn a lot about cars. I have enjoyed my work here and I believe I would like to work in this field after I graduate from high school.

Questions:

1. If you were the employer, would you hire Jim and Joe?

2. Compare the worker traits of Jim and Joe.

3. What is meant by dealing directly with the public? Why are good manners and proper dress even more important when dealing directly with the public?

4. What may be other jobs available at a car agency?

5. What may be some duties of a parts department employee?

WHAT WILL I DO WITH MY INCOME?

There are many answers to the question of "what will I do with my income?", but the right answer for your situation may require some planning and thinking. The answer may depend on such things as: How much salary will you make? What kind of expenses will you have such as room and board, transportation, personal articles, and clothing? Another question may be how much of my salary will I spend for recreation? gifts? church offerings? etc.

It will be your choice to make; however, it would be well to consider each expense carefully, especially during the first few years you are working. You may ask yourself such questions as: "Is this expense really necessary?" "Would a cheaper item be better for this situation?" Can I buy this item without sacrificing something I need or want even more?" "Would it be better if I waited to purchase this article?"

You should consider making a budget and set aside a certain portion of your income for things that you need and want. Many people find it difficult to stay on a fixed budget; however, the people who have a budget and stay with the budget may not have financial troubles as often.

Class Activity I

Suppose you had to decide between a $3.00 shirt and a $6.00 shirt. Name four (4) things that may influence your decision.

A.

B.

C.

D.

Class Activity II

Name five (5) items of expense that you may not have during school years that you may have three years after graduation.

A.

B.

C.

D.

Class Activity III

Name two (2) advantages of having a budget. Name two disadvantages.

A.

C.

B.

D.

Class Activity IV

Situation: Helen was about to receive her first check after working at Bell's 5¢ and 10¢ store for one month. She was trying to decide whether or not to spend her first check on a watch she had seen in a local department store. She is discussing this with her friend, Sue.

Helen: Oh, Sue. it is a beautiful watch and I have always wanted a watch like that. I really don't know if I should spend my money for this watch or if I should put most of my money in a savings account.

Sue: Why would you want to put it in a savings account?

Helen: I will be graduating from high school in a few more months and I realize that I must buy my senior ring, invitations, and I will need new clothes during the year. That takes money. If I don't save now, I won't be able to get these things.

Sue: That's right, and also, there is a possibility that you may want to continue your training after graduation and that may be rather expensive. But, remember, there is a possibility that the right boy may come along and you may want to get married.

Helen: There is no chance of that. I don't even know any boys that I would want to marry.

Sue: Neither did our friends Judy and Paula when they were in our grade but they are married now.

Helen: That's right. I guess that must be considered a possibility. There are so many things I need. I think I'll wait until I have saved more money, then I'll decide which needs are more pressing and make my decision then.

Sue: I think you are right, Helen. You've made what our teachers and parents call a "wise decision".

Class Activity V

1. Make a list of five (5) items that you would like most to spend money for.

A.

B.

E.

C.

D.

2. Rate the items in the order which you consider most important and list the reason why you consider each important.

A.

B.

C.

D.

E.

3. What expenses are usually associated with graduation? Make a list of these expenses and indicate who will pay for them when you graduate.

A.

B.

C.

D.

E.

F.

G.

Teaching Suggestion:

Booklet: Making the Most of Your Money

Source: Educational Division
Institute of Life Insurance
277 Park Avenue
New York, New York 10017

Booklet: The Story of American Banking

Source: The American Bankers Association
90 Park Avenue
New York, New York 10016

Booklet: Using Your Money Wisely

Source: The American Bankers Association
90 Park Avenue
New York, New York 10016

Booklet: Using Bank Services

Source: The American Bankers Association
90 Park Avenue
New York, New York 10016

Booklet: Helpful Hints on Managing Your Money

Source: The Savings and Loan Foundations, Inc.
1111 "E" Street, N.W.
Washington, D. C. 20004

Film: Banking in Action

Source: Association Films, Incorporated
2221 Faulkner Road, N.E.
Atlanta, Georgia 30324
This film portrays the role of banking in history.

Film: Paying By Check

Source: Federal Reserve Bank of Richmond
Bank and Public Relations Department
100 North Ninth Street
Richmond, Virginia 23213

Booklet: Tips on Making Change

Source: The National Cash Register Company
Merchants Service Department
Dayton, Ohio 45409

SAVING PART OF MY INCOME

Introduction (Read and discuss in class)

Many students make the decision to start a savings account during their school years. By opening a savings account early, the money saved may be used for the many expenses at graduation time, or expenses after a student finishes school and begins life on his own. Some of the reasons given for opening a savings account include saving for (1) class ring, (2) other graduation expenses, (3) buying a car, (4) additional training after graduation, (5) expenses to begin married life.

A savings account differs from a checking account in that you cannot write checks on the money you have in savings. However, it remains your money and you can withdraw it, if you desire. Your money draws interest when it is left in a savings account. Interest is the amount of money the bank pays you for the use of your money while it is deposited in a savings account. The amount of interest you receive will depend on the amount of money you have in savings. This amount is referred to as the "principal" and the fixed amount of interest paid by the bank, or savings institution, is known as the "rate". Another factor which will determine the amount of money you receive will be how long your money remains in a savings account. How long your money remains in a savings account is referred to as "time." Many banks and lending institutions pay interest yearly (annually), or every six months (semi-annually), or every three months (quarterly).

In trying to decide how much of your salary to save, you should consider such factors as: (1) How much salary do I make? (2) What is the amount of expenses that I must meet from each salary check? (3) What are my reasons for wanting to save money?

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Class Activity

1. Give two (2) reasons why you think it may be easier for some people to save money when they have a savings account than when they place their money in a checking account.

A.

B.

2. Give two (2) ways a checking account differs from a savings account?

A.

B.

3. Give four (4) reasons why you think starting a savings account may be beneficial to you.

A.

B.

C.

D.

4. Draw a line from the word on the left to the sentence on the right that best defines the word.

1. interest
2. rate
3. time
4. principal
5. savings account
6. checking account

a. the amount of money you have in savings
b. how long your money remains in savings
c. the percentage of the principal which the bank pays for use of the money
d. you can write checks on this type of account
e. the type of account on which you receive interest
f. the amount of money the bank pays for using your money

5. If you deposited $200.00 in savings, what amount of interest would you receive at the end of one year at a rate of 4%?

6. Name some other methods of saving money that you are aware of. Give advantages and disadvantages of each.

CONSIDERING A CHECKING ACCOUNT

Introduction (Read and discuss in class)

Many people today find it more convenient to pay by check rather than by using cash. Paying bills by check offers advantages in that: (1) you will have a written record of your payments or purchases, (2) you are not as likely to lose your money if it is in a checking account, (3) many people find it more convenient to use checks rather than cash. Usually a small service charge is charged by the bank for a checking account.

To open a checking account, it is usually necessary to go to the bank where you desire to open an account, and fill out necessary papers including giving the bank a written example of the way you sign your name (signature). You should write your name the same way on each check you write. The sample signature helps prevent someone form forging your name to a check.

An important thing to remember regarding a checking account is not to overdraw the amount of money you have in your checking account. A good way to prevent overdrawing your money is to keep a record of each check you write and keep a record of the amount of money you have remaining. Almost all blank checks have a stub attached to the check which can be used for this purpose.

Class Activity I

Obtain a sample check, practice filling in the check, making it payable to S. R. Jones in the amount of $10.50 for magazine subscriptions.

SAMPLE CHECK

THE FRIENDLY NEIGHBORHOOD BANK
Green Tree, Georgia ________________19____

Pay to the order of____

____$________

Signature__________________________

For:

SAMPLE CHECK STUB

Date	Check Number	Checks issued to or Deposit received from	Amount of deposit	Amount of Check	Balance

Class Activity II

Give two (2) reasons for the bank requiring a sample of your signature when you go to open a checking account.

A.

B.

Class Activity III

What would Bill's checking account be at the end of the month if he wrote the following checks and had a balance at the beginning of the month of $100.00.?

Date	Amount	To	For
12/3	$10.00	Joe's Cleaners	Cleaning of Clothes
12/9	5.00	Harry's Service Station	Gasoline
12/10	20.00	Bill's Used Cars	Auto Payment
12/15	8.00	Charlie Jones	Services rendered

Questions:

1. Why may it be of benefit for the person writing the check to fill in the bottom part of the check where the word "For________ is written?

2. What does the word "financial"mean?

3. What does the word "forgery" mean?

4. Give three (3) advantages of paying bills by check rather than by using cash.

A.

B.

C.

Class Activity IV

Scene: John enters the bank to open his first checking account.

John: Good morning. My name is John Johnson and I would like to open a checking account.

Bank Teller: I'm happy to meet you, John. My name is Mr. Anderson. We would need to fill in some forms in order to begin the account.

John: Would you mind answering some questions about the checking account while we are completing the form?

Bank Teller: I would be glad to answer your questions, John.

John: Is my money safe in the bank?

Bank Teller: Yes, John, the bank takes every precaution to insure that your money is safe and, in addition, most of the banks are insured so that if something happened to the bank you would not lose any money that you have in the bank.

John: What is the difference between a checking account and a savings account?

Bank Teller: A savings account is money deposited into an account especially for the purpose of saving money. You do not write checks on this money. The bank pays you interest on money in your account, according to the amount you have in savings and the length of time the money remains in the savings account.

John: Can't you do this with a checking account?

Bank Teller: You could save your money by using a checking account, however, the bank does not pay you interest on your money and, in most banks, you must pay a small service charge for using a checking account. The service charge is to cover the cost of handling your checks and keeping your balance straight. Remember, you do not write checks on a savings account; also, many people are more tempted to write checks on their money if it is in a checking account.

John: How much interest do you pay for using my money?

Bank Teller: Well, suppose that the bank paid 4% interest per year and you had $100.00 in savings. You would receive $4.00 for the first year, then your $104.00 would earn $4.16 for the second year, etc.

John: If I started a checking account could I write as many checks as I wanted to?

Bank Teller: Yes, you may write as many checks as you want, of course, but you must have enough money in your account to cover each check.

John : On this form it asks whether or not I want a joint checking account. What is meant by this?

Bank Teller: This means that you may want someone else to be able to deposit money or write checks on your account, such as your father or another member of your family. Many times a husband and wife want this type of account.

John: Oh, I see, Mr. Anderson. I believe I will go ahead and complete my form now. I want to begin my checking account with $50.00. I will need to use some of this money soon, but I will soon be able to begin a savings account. You see, this is my first paycheck on my job and I will need to buy some materials and clothes, but, by my next check I'll be able to save some of my money.

Bank Teller: That's fine, John. Next month we will open you a savings account. I can tell that you are thinking ahead.

BUYING A CAR

Often when a boy reaches the age when he is permitted to drive a car, he begins thinking of the day when he can own a car of his own. Purchasing a car can be a large problem for a teenager as this may represent the largest single investment that he may make. Among the decisions that he must make is, "Am I ready for a car?" Perhaps the answer to this question must come from the student; however, he would do well to think of every factor involved and not arrive at a decision too hastily. Some of the questions he may ask himself are:

1. Do I really need a car?

Perhaps the first answer to this question would be "Yes", but one needs to think of things such as (a) Do I have other means of transportation? (b) Why do I really want a car?

2. How does my family feel about me owning a car?

The attitudes of parents are very important factors in your decision of whether or not you should purchase a car. Living at home, you should have your parent's permission to purchase a car or you may find that you have problems you did not know you could have.

3. Can I get someone to finance the car? Who will pay for the car?

If you buy a car on a time-payment-plan, will you have sufficient funds to keep up the payments? What would happen to the car if you lost your job?

4. Who will provide the upkeep of the car?

Many teenagers are surprised at the cost of keeping a car. Not only is fuel a major expense, but what about tires? insurance? maintenance and repairs? These expenses could be very high and should be taken into consideration when you are deciding whether or not to purchase a car.

5. Are your driving habits of a quality to justify purchasing a car?

Perhaps the answer to this question may be the deciding factor in purchasing a car. Even if you can arrange financing and have your parent's consent to purchase a car, you must be convinced that you are a safe driver and use mature judgment when you are driving.

SUPPLEMENTAL TEACHING MATERIAL

Booklet: Welcome to the Highway

Source: The Goodyear Tire and Rubber Company

Booklet: How's Your Driving

Source: Metropolitan Life Insurance Company
New York, New York

Booklets: Deadly Reckoning

R. I. P. (Rest in Pieces)

Source: The Travelers Insurance Companies
Hartford, Connecticut

Lecture-demonstration: Defensive Driving
Southern Bell Telephone

Source: Southern Bell Telephone and Telegraph Company

Films: Before It's Too Late

Momento

Anatomy of an Accident

Source: Southern Bell Telephone and Telegraph Company

Film: Look Who's Driving

Source: Aetna Life and Casualty Company
Information and Education Department
151 Farmington Avenue
Hartford, Connecticut 06115

Animated cartoon demonstrating to the average driver the perils of acting like a child behind the wheel.

Film: To See Ourselves

Source: Aetna Life and Casualty Company
Information and Education Department
151 Farmington Avenue
Hartford, Connecticut 06115

Shows that the fault of driving is not always that of "the other fellow"

Film: Occupation -- Auto Mechanic

Source: Modern Talking Picture Service
714 Spring Street, N.W.
Atlanta, Georgia 30308

Film: Not Around the Block

Source: Travelers Insurance Companies
Plaza Productions, Inc.
Distribution Division
3 Constitution Avenue
Hartford, Connecticut 06115

Explains insurance importance. Written for teenagers.

Film: Let's Live a Little -- Longer

Source: General Motors Corporation
Public Relations Staff -- Film Library
General Motors Building
Detroit, Michigan 48202

ARE YOU READY TO BUY THAT CAR?

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HOW MUCH DOES IT COST TO OPERATE A CAR?

Joe was asked to figure his expenses for operating his 5-year old car for one year. He estimated that his car was worth $1,000.00 and he would drive it 10,000 miles. His first step was to ask his father to help him make a list of the expenses that he expected to incur. His list of expenses were:

1. depreciation
2. gasoline
3. oil
4. tires
5. repairs
6. washing
7. greasing
8. insurance, taxes, license, tag
9. payments

He began his costs by figuring depreciation. Joe knew that depreciation meant how much the value of the car would decrease at the end of a given period of time. In other words, as a car grows older, it isn't worth as much as it was to begin with. Since Joe was interested in figuring his expenses for one year, he estimated his car would be worth only $700.00 at the end of the year. Therefore, the amount of depreciation would be $300.00. He computed the depreciation in the following manner:

```
$1000.00 - estimated value of car at beginning of year
  700.00 - estimated value of car at the end of year
$ 300.00 - depreciation (estimated)
```

In figuring how much his expenses for gas would be for driving 10,000 miles, he used the following procedure: estimating that the car averaged 15 miles to each gallon of gas, he divided 10,000 by 15 as shown in the following example:

```
       666
   15)10,000
       9 0
       1 00
         90
         100
          90
          10
```

He determined that it would take approximately 666 gallons of gas during the next year and he estimated the cost of gas to be 35¢ per gallon. By multiplying his total gallons of gas needed by the cost per gallon, he estimated his cost for gas to be $233.10.

```
    666
    x.35
    3330
   1998
 $233.10
```

Joe figured his expense for oil in the following manner. He wanted to change his oil every 2,000 miles and he knew that it cost $4.00 each time that he changed his oil. He divided 10,000 by 2,000 and found that he would change oil 5 times during the year. The next step was to multiply the number of changes by the cost of each change. He found that his total cost for oil would be $20.00.

```
              5 times
 2,000)10,000                  $4.00 per oil change
       10,000                    x  5
                              $20.00
```

Joe decided to purchase medium grade tires. He could buy these for $27.00 each, or four for $100.00. He decided that he would need to replace all four tires; therefore, his cost was $100.00. He saved $8.00 over the cost of purchasing each tire separately. Can you show how he saved the $8.00?

Joe did not know how to figure the cost of repairs. However, since his car was 5 years old, he decided to estimate the cost at $100.00.

Joe decided he could save some money by doing the washing himself, so he did not have any expenses for washing the car.

Joe decided that he would have his car greased each time he changed the oil in the car. Since he planned to change oil 5 times and, since each time he had his greased it would cost $2.00, he figured his expenses to be $10.00 for greasing.

Joe's car payments did not include the cost of insurance and taxes and he surely wanted to be covered if something happened to his car. His insurance cost $150.00 per year. His taxes, tag, and license cost $60.00 per year.

Joe was not sure that all expenses would be covered so he decided to allow $50.00 to cover any expenses not included. He called these expenses "miscellaneous".

Joe felt that he should include his car payments since these had to be paid during the next year and this is a part of his automobile expenses. His payments are $50.00 per month and when he multiplied $50.00 by 12 (the number of months in a year), he found his yearly payments to be $600.00.

Joe's expenses for his automobile during the next 12 months were estimated as follows:

gas	$233.00	
oil	20.00	
tires	100.00	
repairs	100.00	
grease	10.00	
insurance	150.00	
taxes/license	60.00	
car payments	600.00	
miscellaneous	50.00	
	$1,323.00	
less depreciation	300.00	(not a cash expense)
	1,023.00	

Joe figured his total cost was $1,323.00 for the next year even if he deducted depreciation which is not a cash expense. The out-of-pocket expense would amount to $1,023.00.

IT IS A PRETTY CAR - BUT . . .

Class Activity I

Situation: Everything was going well for Harold. He had a good job and now he was thinking about buying a car. He decided to discuss this with his father.

Father: You wished to talk with me about buying a car, Harold?

Harold: Yes sir, I've been saving my money for a down-payment and I've decided that I could pay up to $50.00 a month as payments. I wanted to discuss this with you before making a definite decision on purchasing a car.

Father: That's a good idea. Did the $50.00 you set aside for payments include the operation of your car?

Harold: No, sir. I didn't include those expenses. What would be included in those expenses?

Father: There are certain expenses which are necessary if the car is used, such as gas, oil, tires, repairs, then there is depreciation.

Harold: What is depreciation?

Father: As you know, Harold, a car is not worth as much as it gets older. The difference in the price of the car when it is new is more than it is the second year and the price gets less the older the car.

Harold: Then depreciation may be why an older car costs less than a new car.

Father: That's right. Have you thought about your expenses for gas?

Harold: I haven't thought much about that. How much gas do you think it would take?

Father: That would depend on how much gas your car uses and how much driving you do.

Harold: How about the tires and oil?

Father: Here, again, the cost depends on how much you use the car and the condition of your car. Maybe we could make an estimated amount of how much per week the cost would be.

Questions:

1. If Harold expected to drive his car 100 miles per week and his car averaged 15 miles per gallon, how many gallons of gas would it take to operate the car each week?

2. If the price of gas is 35¢ per gallon, how much would the total cost for gas be?

3. If a car cost $2000.00 and after the first year it was worth only $1,500.00, how much would the depreciation be?

4. If recap tires cost $10.00 each and first-line tires cost $20.00 each, what would be the difference in the cost of 4 recap tires and 4 first-line tires?

5. Would the repairs usually cost more on a new car or an older car? Explain.

Class Activity II

Situation: Harold still has not decided to buy the car, however, he has decided to investigate the sources of loans that may be available to finance the car. He decided to talk this over with his friend, Sam, who recently purchased a car.

Harold: (after looking at Sam's car). It's a fine looking car, Sam. How much did you pay for it?

Sam; I paid $600.00 in all. I'll be paying for my car over a 2-year period. I paid $100.00 as a down-payment.

Harold: (after considerable figuring): That would mean the payments are around $28.00 per month.

Sam: The payments are nearer to $35.00 per month. This is because of the charges and insurance.

Harold: What does the carrying charges and insurance include?

Sam: Carrying charges is what you pay the people who lend you the money for using their money. It is usually a certain percentage of the total amount that you borrow.

Harold: This is very interesting. I would like to ask my teacher more about how to figure carrying charges. What about insurance?

Sam: Mr. Barney at the finance company said that insurance is very important and that I should be protected if something happened to my car, or if I should have an accident.

Harold: I guess everyone needs insurance.

Sam: Some states require some types of insurance and some finance companies require you to carry insurance in order that they won't lose their money if the car is damaged.

Harold: How did you find out about all these things, Sam?

Sam: Many of these items were discussed in our pre-vocational class last year and we asked different insurance companies to speak to the class and answer questions regarding insurance.

Harold: Are there other types of insurance that are required?

Sam: The particular finance company that I used required that I take out life insurance in order that if something happened to me, my car would be paid for. This, too, is included in my payments.

Harold: There is much more to insurance than I thought. I'm sure glad that I talked with you today. Guess you can learn something new each day.

To Teacher: Have someone who has a broad knowledge of car insurance and car financing, speak to the class and ask him the following questions:

Class Activity III

Questions:

1. What is meant by "carrying charges"?

2. Are carrying charges the same at each place that lends money?

3. Ask someone in your class who has bought a car or other item, to produce his contract in order that the amount of carrying charges could be figured.

4. Why are the carrying charges less if you make a large downpayment?

5. What are some places in your community where you could borrow money to buy a car?

6. Why may insurance on a car be desirable?

7. Are insurance rates the same for everyone? Explain.

8. What are different types of insurance for cars which are available in your locality?

9. What is meant by collision insurance? Liability insurance? comprehensive cover age?

10. What is meant by $50.00 deductible? $100.00 deductible?

11. Why is it better to always have the carrying charges and insurance explained to you before you make a purchase?

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SHOULD I CHANGE JOBS?

Introduction (read and discuss in class)

Often a person may want to change jobs. There are many reasons given for wanting to change jobs. Some of the reasons given by employees for changing jobs are: (1) wanting more salary, (2) wanting job closer to home, (3) better working conditions, (4) wanting more opportunity for advancement, (5) can't get along with supervisor or other employees.

To change jobs is a big decision for a person to make. He must take into consideration such things as (1) do I have another job to change to? (2) is the new job really better than the one I have now? (3) is the new job permanent (if I do a good job)? (4) am I qualified for the new job? (5) will my new job offer as good security as my old job? (6) will my present employer give me a good recommendation? (7) did I promise, or sign a contract to work for a certain length of time at my present job? (8) what effect will my changing jobs have upon my family?

A person must consider the above factors carefully before deciding to change jobs. Sometimes he may feel that he did not make the best decision. However, if a person decides to change jobs, he should not try to judge a new job too soon. He should do his best to try to make the new job a success. Many people make the mistake of changing jobs so often that they have difficulties in finding a job at all. Often a worker, thinking of changing jobs, may find it helpful to discuss his problem with some other person. A student in school may be able to make a better decision after discussing his ideas with his family, teacher and/or counselor.

Class Activity I

After answering the following questions, discuss each one in class.

1. Name four (4) reasons why you may consider changing jobs.

A.

B.

C.

D.

2. Give four (4) factors you should consider before you change jobs.

A.

B.

C.

D.

3. Under what circumstances may you decide to remain on your present job even though you are offered a new job where you may receive a higher salary?

A.

B.

C.

D.

4. Give two (2) reasons why a person who has changed jobs several times, during a short period of time, may have difficulty in getting a job.

A.

B.

5. Give two (2) reasons why a student may find it helpful to discuss his wanting to change jobs with his counselor or teacher.

A.

B.

Class Activity II

Situation: Sam had been working at the Hill Street Furniture Store for six months. However, he had been unhappy the last few days and today he planned to talk to his teacher, Mrs. Smith about his problem.

Sam: Mrs. Smith, the reason that I asked to see you after school today is that I'm planning to change jobs and I wanted to ask for your opinion.

Mrs. Smith: I'm glad you came to me and that you decided to discuss your problem. I thought you were enjoying your work at the furniture store.

Sam: I like my job all right and I enjoy being with people I work with, but I want a job selling furniture rather than this job where all I get to do is help with the delivering of the furniture.

Mrs. Smith: Why do you think you would like to sell furniture, Sam.

Sam: Well, I believe it would be fun taking in all that money and you would get to dress up all the time.

Mrs. Smith: Yes, there are two good reasons but do you know other things that a furniture salesman must do besides what you have mentioned?

Sam: Well, I've watched the salesmen at the store and they [illegible] work hard and they [illegible] smiling.

Mrs. Smith: Sam, a salesman has many duties in addition to what you may actually see, and they must have many personal qualifications if they are to become good salesmen.

Sam: How can I find out about the qualifications that a salesman must have, Mrs. Smith?

Mrs. Smith: There are many ways, Sam; we could study about the salesman's job during our occupational class or, if maybe that you could talk with a salesman and ask him about the qualifications.

Sam: Maybe I could ask the salesman at the furniture store what would I need to do to become a salesman.

Mrs. Smith: That sounds like a good idea, Sam, then we could find out more about the job as a salesman by studying about the job of salesmanship in our occupational class.

Questions:

1. What do you think the duties of a delivery person would be in a furniture store?

2. Do you think a salesman's job is more difficult than Sam thinks, at this time? Explain your answer.

3. What personal qualifications do you think a salesman would possess?

4. Do you think that Mrs. Smith may have helped Sam in thinking through his problem? Explain.

5. Do you think that asking someone employed in an occupation about the job and qualifications for the job is a good way to find out about it? Explain.

Class Activity III

Scene: at the furniture store.

Sam: Mr. Stan, would you mind if I talked with you about your job as a salesman? I'm very interested in this job and I would like to find out more about it.

Mr. Stan: Sure, Sam, why don't you spend some time with me this afternoon. Selling is one of the main jobs in our store and the salesman's main job is to please the customer.

Sam: What do you have to do to become a salesman?

Mr. Stan: First, I think you must like to work with people and you should have a good education since you must know how to make change and fill out charge accounts. You must be able to study about the merchandise so that you will be able to explain all the details to the customer.

Sam: I didn't know that a person had to know all this to be a salesman.

Mr. Stan: This, and more, Sam. A person observing a salesman may not be aware of all the problems and the kind of customers that a salesman deals with. You watch the customers and we will see the different kinds of customers that you may find.

Below are the customers Sam observed.

1st customer - A man wanted to buy a chest and after looking at several and asking many questions regarding the chest, the customer decided he didn't like the ones available.

2nd customer - A lady wanted to buy a T.V. set and was not sure whether to get a black and white, or a color set. After discussing advantages and disadvantages of each, Mr. Stan sold her a color set.

3rd customer - A lady wanted to exchange a picture that she had bought the previous day because the frame did not fit in with her furniture at home.

After the customers left, Sam resumed his conversation with Mr. Stan.

Mr. Stan: Well, Sam what do you think of the job as salesman now?

Sam: I think that a salesman has a much harder job than most people think. A salesman is a very important person and he must be trained for his job.

Mr. Stan: That's right, Sam, many of our salesmen started work in another job in the furniture business and then worked their way to salesman.

Sam: I understand, Mr. Stan, and I plan to stay with my job as a delivery boy until I learn more about the furniture business and determine if I have the qualifications to become a salesman.

Mr. Stan: That's good thinking, Sam, and I hear you are becoming a good worker in the delivery department.

Class Activity IV

1. Have someone pretend that they are Mr. Stan and have others pretend they are the first, second, and third customers.

2. What did Mr. Stan think the most important qualifications for a salesman are?

3. What may be other qualifications necessary for a successful salesman?

DO THE BEST JOB POSSIBLE

Getting the job is the first big step; however, almost everyone wants to be able to keep his job and almost everyone wants to advance in his work and to receive more salary. The best way to insure this is to do the best job possible for your employer. No one is assured that he will be able to keep his job, however. there are some things that an employee can do that may prove helpful in keeping his job, as well as advancing to a better position.

(Below are listed some of the things employers consider important for any employee):

1. Be on time for work. If, for some good reason you must be out or late, tell the employer in advance and give him the reason that you will be out.

2. Learn as much as you can about the job you are assigned. Most employers would prefer an employee to ask questions if there are things about a job that the employee needs to know.

3. Respect the other person's rights. This is true whether it is your supervisor or fellow-workers. It has been reported that more people lose their jobs because they cannot get along with people than for any other reason.

4. Dress appropriately for the job. You should wear clothing that is appropriate for the job you are assigned.

5. Make every effort to get along with your supervisor. You should talk with your supervisor if you disagree with him and not to your fellow-workers. You must remember that the supervisor is your boss.

6. Another way to help insure your keeping a job is to take an interest in your work and learn as much as you can about it.

WORK OR TRAINING

One of the decisions that each high school graduate must make is whether to enter into some type of training or to enter employment upon graduation. The final decision must be made by the student. However, many times the student may find help with his decision by discussing his plans with others. Often the Vocational Rehabilitation counselor will provide valuable assistance in helping the student to arrive at a decision. The student may find it helpful to enlist the aid of his teachers and school counselor, as well as his parents and other members of his family.

Some of the factors that you must take into consideration in deciding between work and training are such factors as:

(1) Your wishes. This probably will be the most important consideration since it is your life and future that is involved and you should make the final decision.

(2) Kind of training available. Many communities do not offer a great variety of training opportunities so you must decide whether you could leave home to obtain training.

(3) Past achievement in school. This would include your past grades, your work experience in school, how you feel about your abilities, how the teachers felt about your ability, and what your parents think you are capable of doing.

(4) Cost of training. Many times this may be an important factor since you must decide not only the cost of training, but you must consider how much income you may make if you are not in training.

(5) Length of training. The length of the training program may depend on the type of training you desire and your ability.

(6) On-the-Job training available. Often you may have an opportunity to train for a job and receive a salary at the same time. This may be similar to your job training while you were in school; however, this may be a full-time training situation.

Class Activity I

Often the occupational choice to be made by the student will change many times. However, consider one job that you are interested in and answer the following questions:

1. Name of a Job:

2. Duties of the job:

A.
B.
C.
D.
E.
F.

3. What types of abilities will be required? such as reading, writing, arithmetic, manual labor, driving a car, use of tools,etc. Make a list of these:

A.
B.
C.
D.
E.
F.

4. How can training for this job be acquired? Check the ones which apply:

______ formal training after high school
______ on-the-job training
______ no specific training required

5. How would my parents feel about this job?

(a) strongly approve
(b) mildly approve
(c) disapprove

Give reasons for your answers.

WORK OR TRAINING

Situation: This was Sue's last year in high school and she was trying to decide whether or not to enter work or to go into some type of training. She decided to talk this problem over with her sister, Betty.

Sue: This is a big problem to me, Betty. I would like to go to college like you did but I feel that I would have difficult time with my course work since I have quite a bit of difficulty with my school work. But, I haven't given up the idea of training altogether.

Betty: I think you are wise to think about the future and college is not the only source of training. The choice of your future will be up to you; however, there may be others who could help you plan for the future and provide you with information that you may find helpful.

Sue: What kind of information could I expect from others?

Betty: It is possible that the school counselor could help you to understand some of your strong points and your weak points, and be able to help you make a decision.

Sue: Yes, we have already studied about different jobs that are available and the requirements for them in our pre-vocational class, and we learned that a counselor's duties include helping with vocational problems.

Betty: Let's not forget our parents; they probably could help more than anyone else. We should consider their advice.

Sue: Maybe I could get pamphlets explaining some of the courses offered from a local school which offers training after high school.

Betty: The employment office would be able to let you know something about the employment situation in our community.

Sue: I'm going to make plans to begin gathering information right away and I certainly appreciate your help, Betty.

Questions:

1. What do you suppose Betty meant when she told Sue that the choice of the future would be up to her?

2. Do you feel that your choice of the future is up to you?

3. How could your teacher help you in planning your future?

4. Why are your parents a good source of help? Why is it so important to have them approve of your decisions?

IS THIS JOB GOOD ENOUGH FOR ME?

Often an employee may feel that his job is not good enough for him. He may feel that his paycheck amount is too small, or that his job is looked down on by his friends. Each job must be considered on what it means to the employee. For example: A farmer's income may be low but he receives satisfaction from his job in being able to see things grow and produce and in being his own boss. A janitor's job may seem a lowly job to some, but did you ever think what would happen if there were no janitors? Did you ever observe a janitor who takes pride in his work? Chances are, he was happy with his work. Garbage collecting sometimes is placed in the class of "jobs not wanted" by some, but suppose you lived in a large city and the garbage workers went on strike, could you imagine what would happen? We could say every job is important if the employee thinks it is important and one of the best ways to insure keeping a job is to take pride in whatever job you are doing, and try to be one of the best workers in that occupation. You must remember that money is not the only factor in determining if a job is good or bad, but more, how you feel about the job you are doing.

Class Activity I

Listed below are 16 possible jobs for boys and girls. Rate them in the order of your preference, beginning with the one that you would like best down to the one you would most dislike.

Boys

1. carpenter ______
2. janitor ______
3. filling station attendant ______
4. school teacher ______
5. farm worker ______
6. brick layer ______
7. truck driver ______
8. veterinarian helper ______
9. dish washer ______
10. lawyer ______
11. minister ______
12. plumber's helper ______
13. bulldozer operator ______
14. mechanic ______

Girls

1. food service ______
2. arranging flowers ______
3. maid ______
4. school teacher ______
5. housewife ______
6. secretary ______
7. laundry worker ______
8. nurses' aide ______
9. day-care worker ______
10. telephone operator ______
11. factory worker ______
12. waitress in rest. ______
13. assemblyline operat. ______
14. baby sitter ______

WHY EMPLOYEES LOSE JOBS

Activity I

Listed below are examples of situations where an employee lost his job. Read each situation and give reasons why you think the employer was right or wrong in dismissing the employee.

EXAMPLE I

Billy was hired by Lester's T. V. Sales and Service as a trainee in the parts department. Bill was making good progress but when his employer asked Billy to empty the garbage, Bill remarked, "I wasn't hired to be a janitor, I'm a technician." Bill, therefore, refused to carry out the instructions given to him by his employer and so he was fired.

Do you think the employer was justified in dismissing Billy? Give reasons for your answer.

1.

2.

3.

4.

EXAMPLE II

John was hired to clean tables in a hospital cafeteria. His work was progressing satisfactorily until John began mixing the silverware with the garbage. This began to happen often and the hospital was aware of missing several pieces of silver. Repeated warnings by his supervisor produced little results. John was dismissed.

Do you think John's employer was justified in dismissing John? Give reasons for your answer.

1.

2.

3.

4.

EXAMPLE III

Lucy was hired to train as a florist assistant in a large flower shop. She enjoyed her work except when she was assigned to work on a funeral wreath. During this job she cried continuously while she was working on the wreath. Talks with Lucy could not find a cause for her crying and since a large part of the florist business was to make funeral wreaths, Lucy could not be placed in work where she would not come into contact with funeral wreaths. Lucy was dismissed.

Do you think Lucy's employer was justified in dismissing her? Give reasons for your answer.

1.

2.

3.

4.

EXAMPLE IV

Jack was hired as a veterinarian assistant. He liked his job and his performance was satisfactory. John began to let his hair grow and did not bother to shave. Some of the customers began complaining about his looks to the doctor in charge. The doctor talked to Jack about the customer's complaints and asked him to get a hair cut and shave. Jack refused, saying that the complaining customers were a bunch of squares. Jack's employer dismissed him from his job.

Do you think Jack's employer was justified in dismissing him? Give reasons for your answer.

1.

2.

3.

4.

Other reasons given by employers for dismissing employees are listed below:

1. dishonesty
2. absent too frequently
3. constant complaint by employee
4. improper dress
5. using profanity
6. taking too long for breaks
7. refusing to work on weekends
8. not following orders
9. constant tardiness
10. inability to do the job
11. lack of self-confidence
12. making too many debts
13. getting into trouble with the law
14. not getting along with fellowworkers
15. not cooperative

Can you think of other reasons why someone may lose his job? Make a list of these.

1.

2.

3.

4.

5.

THE "BEAR" FACT REMAINS . . . .

NO ONE

WANTS A

DIRTY EMPLOYES

WHY DON'T I GET MORE MONEY?

Introduction (Read and discuss in class)

Often a worker does not consider how much money is required for an employer to provide him with a job. In almost every case, there is more involved than just a salary for the worker. There may be tools, equipment, insurance, cost of supervision and cost of training. Below is an wxample of some of these costs:

Situation (Bill was a plumber's helper, working at Smith's Plumbing service. Bill was making service calls and he had noticed that Mr. Smith was charging the customer $4.00 per hour for labor. Bill knew that Mr. Smith only paid him $2.50 per hour. Bill felt that he shoud receive the entire $4.00 since it was charged as labor performed by him. Bill decided to ask Mr. Smith about this and the following conversation took place:)

Bill: Mr. Smith, I have a problem I would like to discuss with you.

Mr. Smith: Sure, Bill, what is the problem?

Bill: Well, its about my salary. You are only paying me $2.50 per hour and I know that the customer is being charged $4.00 per hour and I would like to know what happens to the other $1.50.

Mr. Smith: That is a very good point, Bill, and I can see that it may be a concern to you. The $1.50 goes for overhead and operating expenses.

Bill: I don't understand, Mr. Smith.

Mr. Smith: Well, Bill, let's take a look at the overall business and see what expenses are connected with the plumbing business.

Bill: You mean like the truck I drive?

Mr. Smith: Yes, that certainly is a major expense, Bill, since the truck alone costs around $2,000 and, of course, there is the operating expenses of the truck . . . gas, oil, and insurance.

Bill: You know, I didn't consider this kind of expense. That would mean that the tools I used would be operating expenses.

Mr. Smith: That's right Bill, the electric pipe threader alone cost around $400.00.

Bill: I can see where you need to charge the customer more than just what my salary would be.

Mr. Smith: In addition to the cost that we have mentioned, Bill, we must pay for operating license each year as well as insurance and other benefits to our employees and we must hire someone to "keep books", that is, to be sure that bills are sent promptly and payments are accounted for.

Bill: Gee. I never considered all these expenses. Are there any others?

Mr. Smith: Well, Bill, each business is in operation to make a profit. This means that you must make above the costs of running a business in order that a profit can be made to the people who start a business, otherwise, there would be no new businesses started.

Bill: I think I understand more of how a business operates and I understand why the company must charge more than the salary I am paid.

Mr. Smith: Glad you came in Bill, and maybe you may want to make a list of how much it costs me to give you a job.

Bill: I would like to do that - it would make a good project and help me learn more about the business.

Class Activity I

Why do you think Mr. Smith charged more for Bill's labor than the $2.50 per hour that Bill received?

1.

2.

3.

4.

5.

6.

Class Activity II

What would be some of the overhead and operating costs in the following types of businesses:

1. Farming

2. Fisherman:

3. Mechanic:

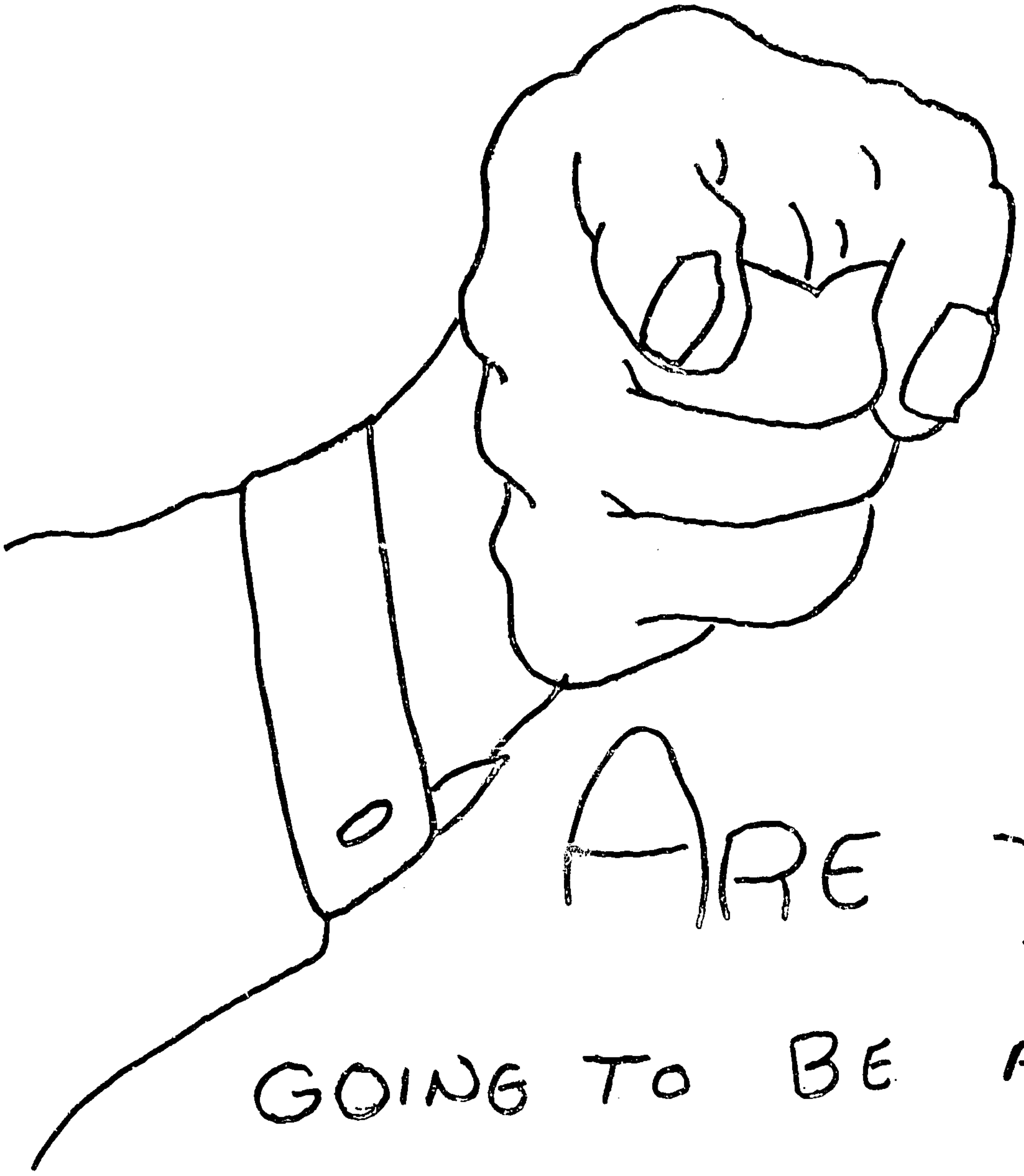
4. Filling station operator:

5. Truck driver:

6. Secretary:

7. Beautician:

8. House painter:



ARE YOU...

GOING TO BE A

GOOD WORKER

OR

A DRIFTER ??

(IT'S UP TO YOU)

WORDS YOU SHOULD KNOW

1. Salary: The amount of money paid for services performed.

2. Employee: A person employed by someone else.

3. Employer: A person who hires or supervises some other person.

4. Vocational: Having to do with work.

5. Curriculum: The course of study provided by a school.

6. Work-study-program: A school program designed to give the student actual work experience while he is attending school.

7. Progress report: A report completed by the employer discussing the student's progress . . .this is usually given to the counselor and teacher.

8. In-school-training: The name given to a student's activities if he is working in a school setting.

9. Out-of-school training: The name given to a student's program if he is working in a school setting.

10. Vocational Rehabilitation: A public agency whose objective is to assist vocationally handicapped people to overcome their handicap to the extent they can successfully hold down jobs.

11. Counselor: A person employed by the school or Vocational Rehabilitation to help the student with problems that he may have. These problems may, or may not be vocationally related.

12. Social Security card: A card issued to a worker. This card contains the worker's name and a number. This number helps the Social Security Administration keep up with the amount of social security tax paid by the worker.

13. Social Security tax: The payment the worker makes to the Social Security Administration. The worker may receive benefits from this tax in the form of payments if he becomes disabled or, upon his retirement.

14. Refund: Used to indicate a payment made to an individual if he overpays his income tax.

15. Exemptions: Allowable deductions to the tax-payer when he is submitting his income tax.

16. Dependent: A person who is dependent on another for most of his support.

17. Interview: This work is used to mean when the person looking for a job presents himself to a person needing a worker. The face-to-face meeting is called an interview.

18. Personnel: Usually used to refer to the total number of workers in a given job.

19. Applicant: A person applying for a job.

20. Reference: A person asked to tell whether he thinks another person would make a good worker for a particular job.

21. Budget: A list containing how much income you expect to receive and how this income is to be spent.

22. Savings account: Putting money in an institution such as a bank for the primary purpose of saving as opposed to a checking account.

23. Depreciation: The amount of money-loss on an item of property due to wear and use. A car may be purchased for $500.00 but at the end of the year is worth only $400.00. Therefore, the amount of loss due to depreciation is $100.

24. Carrying charges: The amount of money charged for lending money, or buying "on-time" . . . this expense goes toward the extra expense for keeping books, etc.

HOW DO YOU SCORE?

Circle the correct answer:

1. A person who works for another is known as:
    - a. Employer
    - b. Supervisor
    - c. Employee
    - d. Counselor
2. Which is not considered a good worker trait:
    - a. Honesty
    - b. Dependability
    - c. Tardiness
    - d. Cleanliness
3. A person applying for a job may be known as:
    - a. Personnel
    - b. Employer
    - c. Employee
    - d. Applicant
4. Before accepting a job, an applicant should have:
    - a. Insurance
    - b. Savings Account
    - c. Progress report
    - d. Social security card
5. A person who would probably be placed in charge of hiring workers in a large company would probably be:
    - a. A technician
    - b. Health Officer
    - c. President
    - d. Personnel Manager
6. Payment received from over-paying your income tax is known as:
    - a. Deduction
    - b. Exemptions
    - c. Refund
    - d. Social Security Payments
7. Which of the following would not ordinarily be deducted from your gross pay:
    - a. Group Insurance
    - b. Income Tax
    - c. Social Security Tax
    - d. Car Payments
8. Charges for buying on credit are known as:
    - a. Income
    - b. Refund
    - c. Carrying charges
    - d. Deductions

9. A person would probably find employment listed under the following part of a newspaper:

a. Front page
b. Want ads
c. Magazine section
d. Editorial section

10. What is the amount of depreciation on a car that was bought for $300 at the beginning of the year but was worth only $250 at the end of the year?

a. $250.00
b. $100.00
c. $50.00
d. $75.00

11. If you purchased four (4) t at a cost of $80.00, one tire would cost:

a. $20.00
b. $15.00
c. $18.00
d. $45.00

12. To write your signature on the back of your check is known as:

a. Forgery
b. Endorsing
c. Falsifying
d. Joint account

13. To write a letter asking for employment is known as:

a. An acceptance letter
b. Reference letter
c. Letter of application
d. Friendly letter

14. A joint checking account means that:

a. You cannot write checks on your money.
b. More than one person can write checks.
c. The money is in a savings account.
d. A combination of a savings and checking account.

15. Which of the following would not be a factor in determining how much the bank paid you to use your money while it was in a savings account:

a. Amount of money in bank (principal)
b. The interest rate paid by the bank.
c. The length of time your money remains in the bank.
d. The place where you earned your money.

16. Signing someone else's name to a check is known as:

a. Forgery
b. Joint account
c. Interest
d. Signature

17. Which of the following would be least important in being a successful salesman:

a. Superior strength
b. Ability to get along with others
c. Honesty
d. Self-confidence

18. The state employment office is:

a. In business to make a profit.
b. Always located in the center of town.
c. Non-profit tax supported.
d. Privately financed.

19. Which of the following would not be a deciding factor in determining if a student is ready for out-of-school work stations:

a. Age of student
b. Cooperativeness of student
c. Attendance record of student
d. Number of brothers and sisters

20. The yellow pages of a telephone book lists:

a. The number of businesses located in the community.
b. The names of churches and schools located in the community.
c. Both 1 and 2 are correct.
d. Neither 1 nor 2 is correct.

21. A social security card does not contain which of the following:

a. Name of worker
b. Age of worker
c. Social Security No.
d. Worker's signature

22. Which of the following is not a good reason for starting a checking account:

a. Safer than carrying cash
b. The bank pays interest on money in a checking account
c. A cancelled check may be used for a receipt
d. The check may be more convenient in paying bil

23. A man drove 250 miles with 25 gallons of gas. How many miles did he average per gallon of gas?

a. 10 miles per gallon

c. 20 miles per gallon

b. 9 miles per gallon

d. 14 miles per gallon

24. Which factor would be least important when deciding on buying a car?

a. Cost of car

c. Age of car

b. Mechanical condition of car

d. The method of advertising the car

25. Which job would be most likely to require a worker to be a college graduate:

a. Truck driver

c. School teacher

b. Secretary

d. Nurses' aide

VT 017 214
COORDINATED VOCATIONAL ACADEMIC EDUCATION
GAMES AND PROJECTS.

GEORGIA UNIV., ATHENS. DIV. OF VOCATIONAL
EDUCATION.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 71 51P.

DESCRIPTORS - *EDUCATIONAL COORDINATION; *VOCATIONAL EDUCATION; *ACADEMIC EDUCATION; VOCATIONAL DEVELOPMENT; STATE PROGRAMS; ELEMENTARY GRADES; SECONDARY GRADES; HUMANITIES; *STUDENT PROJECTS; GOAL ORIENTATION; *EDUCATIONAL GAMES
IDENTIFIERS - EDUCATION PROFESSIONS DEVELOPMENT ACT; EPDA; EDUCATIONAL AWARENESS

ABSTRACT - THIS MANUAL PRESENTS NUMEROUS EDUCATIONAL GAMES AND STUDENT PROJECTS FOR THE ELEMENTARY AND SECONDARY GRADES RELATING TO VOCATIONAL EDUCATION FOR THE USE OF TEACHER-COORDINATORS IN GEORGIA'S COORDINATED VOCATIONAL-ACADEMIC EDUCATION PROGRAMS. INTENDED FOR USE IN THE CLASSROOM OR LABORATORY, THESE SUGGESTED IDEAS SHOULD ENHANCE THE CREATIVITY AND MEANINGFULNESS OF THE VOCATIONAL-ACADEMIC CURRICULUM. THESE GAMES AND PROJECTS, DEVELOPED BY VOCATIONAL PROGRAM COORDINATORS ENROLLED IN AN INTERNSHIP AT THE UNIVERSITY OF GEORGIA, INCLUDE GOALS, GRADE LEVELS, AND COMPLETE DESCRIPTIONS AND EXPLANATIONS OF THEIR USE. (AG)

C V A E

Coordinated Vocational Academic Education

Games and Projects

Prepared by:
CVAE Coordinators
Division of Vocational Education
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Athens, Georgia
July, 1970 - June, 1971

ACKNOWLEDGEMENTS

This C.V.A.E. Games and Projects manual was prepared during the school year 1970-1971 by Georgia C.V.A.E. coordinators enrolled in an internship at the University of Georgia.

The training of the coordinators was conducted by the Division of Vocational Education, College of Education, University of Georgia. Funds were made available from the following cooperating agencies:

Division of Vocational Education
Georgia State Department of Education
Atlanta, Georgia

and

Education Professions Development Act, Part F
U.S. Office of Education
Department of Health, Education and Welfare
Washington, D.C.

We are indebted to the following individuals for contributing their special talents:

Mrs. Revonda Williams
Graduate Assistant

Mrs. Alicia Hobbs
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These Games and Projects should be screened by the C.V.A.E. coordinator for possible use in the laboratory and classroom. They should be modified to fit the needs of each situation and student. They are offered as techniques or methods and should be used to add creativity to meaningful subject matter.

TABLE OF CONTENTS

TITLE: Hunt the Animals

Grade: All Grades

Purpose: To enable students to be more observant in class, on the job, etc.

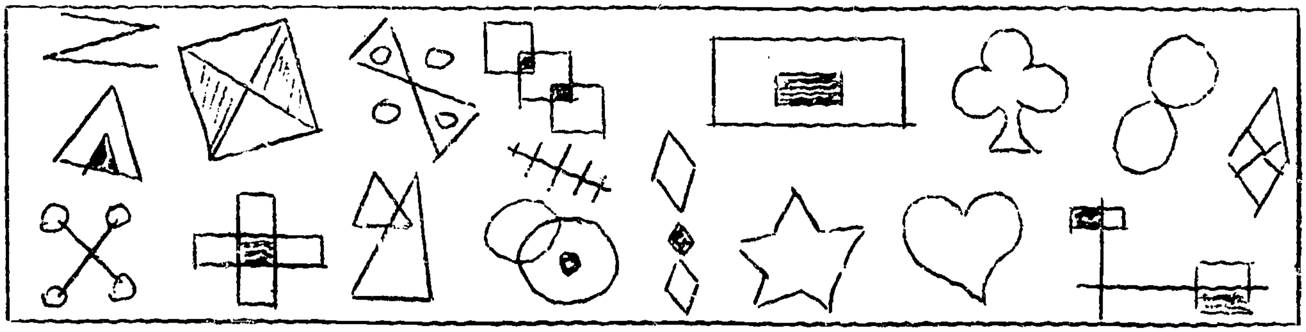
Description: Before the meeting, place small pictures of animals around the room so that they are concealed but not completely hidden from sight. During the meeting have the group walk around the room and try to spot the animals. When a player sees one she makes a mental note. After about three minutes, all return to their places and list the animals they saw and where. One point is given for each correct answer. The team with the greatest number of points is the winner.

TITLE: Kim's Game

Description: The leader places about twenty objects on a table and puts a cover over them. Each team, in turn, is brought to the table and the cloth is removed for one minute. Then the girls go back to their places and each writes down as many of the objects as she can recall. One point is scored for each article listed. The team with the highest number of points is the winner.

TITLE: Patterns

Description: Draw twenty patterns, such as those illustrated at the bottom of the page, and place them around the meeting room. The players are given five minutes to look at the designs and try to memorize them. Then they are asked to make accurate sketches of the patterns. One point is scored for each clear reproduction and the team with the highest score is the winner.



TITLE: Buzz and Fizz

Grades: All Grades

Purpose: To find out how well the students concentrate

Description: The first player calls out "one", the next "two," the third "three" and so on until seven is reached. The player who ordinarily would call this number says "Buzz" instead. When any multiple of seven (fourteen, twenty-one) or any number containing seven (seventeen, twenty-seven) is to be called, "Buzz" is substituted. After "Buzz-buzz" (Seventy-seven) the counting starts again with one. If a player misses she drops out of the game.

Fizz. The word "Fizz" is substituted in the counting for five, any multiple of five or any number in which five occurs. After "Fizz-fizz" is called for fifty-five, the game starts over again.

TITLE: Numbers

Description: The group sits in a circle and counts off. It is important to stress that the numbers belong to the positions rather than to the players. The game starts with the person in the first position calling out the number of one of the other positions. The player occupying that position must answer immediately with another number and so on.

If a player hesitates or calls out her own number, she must move to the higher number position. The players with numbers higher than the original number of the player who missed thus have a chance to move up one position. For example, if there are twenty in the game and the second player misses she must take the place of number twenty who then becomes number nineteen. This affects all the positions down to number three, who moves into the second place. The object of the game is to see who can stay in the first position the longest.

TITLE: Many Motions

Description: The group sits or stands in a circle and the player who is "It" leaves the room. One person is selected as the leader and is responsible for starting and changing the motions. The leader generally starts by clapping her hands which is the signal for "It" to return and take a position in the exact center of the circle. When "It's" back is turned, the leader changes the motion to tapping her toes, moving her arms above her head or whatever she desires and all the other members immediately follow her example. "It" tries to determine who the leader is. If after three times she has failed to name the leader, she must leave the room again.

TITLE: "Simon Says"--Compass Points

Purpose: To help students to follow directions better.

Grades: All grades

Description: Every time "Simon Says" do something, the players must do it. However, if a command is given without the prefix "Simon Says," the players must remain motionless. For example: when "Simon Says--the wind blows north," everyone turns toward the north but if the leader simply says: "The wind blows east," no one moves. If a player moves at the wrong time or turns in the wrong direction, he puts one hand on his head. The second time he misses, he puts the other hand on his head. The third time he fails, he is out. The more quickly the commands are given and the greater the number of different compass points called, the more difficult the game will be. The team that has the most players still in the game at the end wins.

TITLE: Foolish Facts

Grades: All Grades

Purpose: To help students to distinguish facts and opinions

Description: Two places in the room are designed as "True" and "False". As the leader calls out a fact, such as "All snakes are poisonous," the players run to whichever end of the room they think is right. Each member who was correct gains a point for her team. Those who were wrong subtract a point. The team with the highest score is the winner. Make up a list of facts for this game which relate to the interests of the group and take time to see that all members understand why each statement is "true" or "false".

TITLE: Personality Roundtable

Grade: 10th, 11th, and 12th

Purpose: To get the students to recognize their own strong and weak points and those of their classmates.

Description: First of all, it must be remembered that an exercise of this type must be handled with a great deal of tact. It should be carried out at the beginning of the year and again at the end to see what improvements have been made.

The students should be arranged in a circle. Each one have a pencil and paper ready to take notes. These notes will be kept throughout the year for the student's referral and for the evaluation at the end of the year. For the best results, let the girls evaluate the boys and the boys evaluate the girls . During the evaluation, the first person will begin by giving his strong points and then the ones that he feels need improving. Then another person or persons will be called on to add to what has already been said. The person being evaluated will take notes. The students must be encouraged to point out both the strong characteristics and the weak ones.

At the end of the year, a similar activity will take place to see if the students improved on their weak points and maintained their strong characteristics.

TITLE: Charity Food Basket

Grade: 11th and 12th

Purpose: To teach the application and necessity of social awareness

Description: First, assign a committee of three students in the program to get a list of needy families from the school counselor or local welfare department. Second, have each class bring a certain kind of food (canned vegetables, meats, fruit and nuts) and augment the basket with money from the CVAE treasury and purchase necessary items to fill the baskets with a balanced meal. Third, assign a committee to receive the goods, make the necessary purchases and arrange the baskets a few days before Thanksgiving and Christmas or other appropriate occasion.

TITLE: Job Qualifications

Grade: 10th and 11th

Purpose: To make the students realize the importance of being well qualified for a job.

Description: This project should take place during the first part of the year before students are employed if possible. The project could start by having a person from the local State Department of Labor to talk on the "Qualifications Employers Expect From Their Employees."

TITLE: CVAE Password

Grade: All Grades

Purpose: To review terms, procedures and the business know-how of students.

Description: Play as a game just like the Password T.V. program. Divide class into two teams. The coordinator should act as official judge and talented student can act as emcee. Buzzers can be used by timer - suggest 15 seconds time limit for each word.

The students develop a long list of words used by DE personnel, and of ones used on their jobs, or in units of study. The emcee chooses a word from a list of two 3" by 5" cards hands the word to the players. Two players come forward and seat themselves at the table.

The emcee gives the same word to player A and B. They are allowed to give one word clues to their teammate. You will also need a score keeper to write results on the blackboard. Start at 10 points and go down one point each time a wrong answer is given. When the correct answer is given, that team is awarded remaining number of points. 100 points wins the game. Loosing partners must sit down and are replaced by two more of their team mates.

CVAE: Good practice for Spelling Contest.

TITLE: Career Day

Grade: 11th and 12th

Purpose: To acquaint students with the different careers of today.

Description: This project can be very beneficial to the student but it must be well planned and organized.

Everyday for a month have a speaker come and talk to the class on their particular career. If possible the teacher should try to have speakers from related fields for a week and then the next week have speakers from another field.

At the end of the series the teacher should have the students write an evaluation to determine if they have benefited from the lectures.

Suggestions:

1. Invite other teachers and classes to come hear your series of guest speakers.
2. Run a news article in your local paper telling about your project.

TITLE: Teen-Age Charge Accounts

Grade: 10th

Purpose: To make students aware of teen-age credit.

Description: Survey the student body for information concerning credit and charge accounts.
Sample question - Do you have any charge accounts?
How many? Where? What is your credit limit?
How much do you charge on the average per month?
Do you use a credit card for gasoline?
Why do you like credit cards or charge accounts?

Compile the results and make a large bulletin board in a main school hall showing the results.

Evaluation: Have an article written and placed in local paper (school) and local community newspaper. Ask merchants to evaluate your project.

TITLE: Teacher of the Week or Month

Grade: 11th and 12th

Purpose: To promote CVAE in the school and better relations between students and teachers.

Description: Make a good looking showcase for the hall where student traffic is heavy. Each week or month show a picture of a different faculty member and a short write-up about him. Have a big CVAE sign displayed and a sign that says Teacher of the Week or Month.

CVAE: The club could handle this as a project over the entire year and compete in the chapter of the year contest with this project.

Evaluation: Ask or listen for favorable or unfavorable comments on the window.

TITLE: Grooming and Business Dress

Grade: 10th and 11th

Purpose: To research dress and grooming requirements.

Description: Have the students develop a manual in connection with the study of grooming and business class. Each manual should contain a report on "Why proper business dress is important" and "The proper dress for an interview." The students would be assigned a job classification and a manual on the proper business dress for that particular job giving a detailed description of the proper dress and including pictures and illustrations collected from newspapers, magazines and other sources. The end result would be presented to the class.

TITLE: Budgeting First Pay Check

Grade: 11th

Purpose: To help students plan their spending.

Description: During the orientation period each student should plan a budget for spending. In class ask them to make a list of everything in detail of what they spend in a weeks time. Then make them put down what they make for a week's pay and subtract what they spend. If they possibly spend more than they make, or if they are not saving anythin try to make them realize the importance of saving.

Make a scale to show them what percent they should spend and what percent they should save. Have them decide just how they are going to spend one week's check. Then that week they should record what they do with their money. At the end of the week, they should compare this to their budget and see how close they came to staying on their budget.

Evaluation: If the project is effective take them on a field trip to a local bank and allow time for interested students to open their own accounts.

TITLE: Conduct a Series of Guest Lectures Concerning Good Grooming

Grade: 10th and 11th

Purpose: To help the students understand the importance of good grooming. To help the students dress properly for the job.

Description: Set aside one half of an hour a week in which the students may be taught the importance of good grooming. Invite different types of employers, home economists, personnel leaders, models, etc. to lecture on the various areas. Successful sales personnel could be invited to explain how they dress for a job. If possible, have live models to show what the speaker is talking about. Maybe have one improperly dressed and one properly dressed and let the class see and talk about the difference.

Have one program presented by the students of the CVAE club to a school assembly.

CVAE: This would be an excellent professional meeting, as well as good public relations.

Evaluations: Have students write an essay about grooming. This should be completed after the series has ended.

TITLE: Wink

Players: An uneven number of 21 to 41 players

Grade: All Grades

Description: An Uneven number of players is required for the game. Suppose there are twenty-one players. Eleven chairs are placed in a circle. Eleven players stand behind these chairs as guards. Ten players are seated in the chairs. The object of the game is not to be a guard of an empty chair. All the seated players look toward the one who is guarding the empty chair at the beginning. He winks at someone who is seated. At once that one springs up and runs across and fills the empty chair. He may not escape if his guard lays his hand up on his shoulders. Each guard must keep his hands at his sides and must not touch the shoulders of the one he is guarding until he sees his player winked at. The guard who is not paying attention is in danger of losing the one whom he is guarding.

TITLE: Words or Word Making

Grade: All Grades

Description: Each player has a pencil and a sheet of paper. A long word is given out, which each writes at the top of the sheet. Then all are given ten minutes to see who can write the longest list of words, using only the letters found in this word on the paper, and never using any letter more often than it appears in the word. One with the longest list, winne

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TITLE:	Yes or No
Players:	10 or more players
Grades:	All grades

Description: One of the players is sent out of the room. The rest decide upon some object in the room. The guesser comes in and asks questions to find out what the object is, but all the questions must be such that they can be answered by "yes or no". For example the guesser may not say "What coler is it"? but may say, "Is it red?" The one who answers when the guesser guesses right becomes "IT" and goes out.

TWENTY QUESTIONS. In playing this game the guesser may ask only twenty questions. If he has not guessed the object correctly before he has used up his twenty he must pay a forfiet. If he can do it within twenty questions, he then chooses the one who will be "IT".

TITLE:	Stage Coach
Players:	10 or more players
Grades:	All grades

Description: The leader should be a good story-teller. He gives each of the players the name of some part of the stagecoach or of some of the passengers. One may be the "whip", the "wheels", the 2 cushions, the windows, or the fat old gentleman, the woman with the bandbox, etc... If there are several players, they may be given the same names, although those who have the same names should not be seated close to each other.

All the players but the leader are seated either in a circle or anywhere about the room. The player tells the story about a stagecoach. Whenever he names one of its parts or passengers, the one or ones baring that name must get up at once when his name is called he is either out of the game or may pay a forfiet. Whenever the storyteller says "Stagecoach" all the players must get up and turn around. Whenever he says Stagecoach Upset, all of the players must change seats. The leader now tries to get a seat for himself, and the players who are left without a seat become the leaders of the next game.

Title: Teapot

Players: Any number of players

Grade: All Grades

Description: One player is sent out of the room. The rest decide upon some object in the room. They then call the one who has gone out of the room to guess what has been selected. Each one says something about the object, but uses the word "teapot" in place of the object itself. For example, the clock is chosen. One of the players says, "Teapot has hands." Another says, "Teapot strikes, "the one who says something which enables the guesser to learn what the object is now becomes It, and goes out.

Title: Rapid Pass

Players: 10 or more players

Grade: 8-11

Description: The players all stand in a circle. Four or five articles are handed to as many children. These articles should be of different sizes and shapes, such as a broom, a wastepaper basket, a thimble, or a hairpin. While music is being played these articles are passed around. Those who are holding any of the articles when the music stops must drop out of the game. Of course no one wishes to drop out, so everyone must be alert and move as quickly as possible, keeping the articles passing all the time.

Title: Investigation Job Opportunities

Grades: 10th, 11th, and 12th

Purpose: To help students discover types of jobs that are available in distribution.

Description: This project should be carried on in the beginning of the year in case some of the students want to prepare themselves for a particular job during the year. To introduce the activity, invite representatives of the local employment agency to come in and tell the students about some of the jobs. To continue the project, have the students look in newspapers, trade journals, the Wall Street Journal, and other magazines to find information on jobs in distribution, have them compile this information to be presented to the class and turned in for evaluation.

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Title: Monopolize Your Time

Grades: 11th and 12th

Purpose: To teach students the value of making wise decisions and purchases.

Description: The teacher brings approximately three or four monopoly games to class, students are divided in groups of four and each group has a game.

They choose a banker for each group and then begin to play. The teacher acts as observationist while the students are playing. He goes from group to group and observes the students making purchases and various moves.

After the students have played for thirty minutes the teacher should then tell them to stop. Each student should then compare their final status or standing - ie., how much money they have, the number of investments such as buying houses, utilities, etc. Then they should discuss as a whole they way they could improve their financial standing and note how they can avoid making the same mistakes. Then they should discuss how they can apply the lessons learned in this game to the actual business world.

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Title: Pick Up Your Troubles - Popularity

Players: 20 or more players

Grades: All Grades

Description: Let us suppose that there are more boys than girls. The boys choose girl partners. The extra boys stand in a circle with their partners, while they sing or while someone plays the chorus of Pack Up Your Troubles. At the phrase "whats the use of worrying" the boys right-about-face and march in the opposite direction, while the girls keep on as before. When the music stops suddenly or the leader shouts "Partners" each boy must try to find a partner and those in the center try to take a partner. Those who get no partners go into the center for the next round.

The game is sometimes called POPULARITY, and may be played to the music of the TURKEY IN THE STRAW (Old Zip Coon--Victor Record 20592)

Title: I Love My Love - The Ministers Cat

Players: 10 or More Players

Grades: 8-11

Description: The children sit in a circle. The first child says, "I love my love with an 'a'" and finishes the sentence by some word that begins with "a" such as active. " That is I love my love with an a because he is "active!" The next child may say, I hate him because he is angry. The third may say, "I feed him on apples. " The fourth may say, his name is Alfred. The fifth may say, "and he lives in Africa. " and so on. After the whole circle has taken part the game begins again with the letter "b".

THE MINISTERS CAT. The players sit in a circle. The first player says, "The ministers cat is an active cat. " The player to the right describes the cat with another word beginning with "A" and so on around the circle. When the first players turn comes next, he starts to describe the minister's cat with an adjective beginning with "b". Anyone who cannot supply a word gives out. Go through the alphabet until the players agree to stop.

Title: BIRD, BEAST, OR FISH

Players: Any number of players

Grade: All grades

Equipment: A sofa cushion

Description: The players all sit in a circle except the one who is "It." This one, who stands in the center, throws a cushion or soft ball or a knotted handkerchief at some player, and at the same time calls out "Beast" or "Bird" or "Fish". At once he quickly counts, "One, two, three, four, five, six, seven, eight, nine, ten," out loud while the player at whom the handkerchief or ball has been thrown must name some animal, if he has called "Beast"; and if he has call "Bird", some bird; or some fish, if has called "Fish". He must do this before "It" has reached ten. If the one who was hit by the cushion fails to answer correctly before ten is counted he changes place with the thrower. No child may name any beast, bird or fish that has been named before by any other child. EARTH, AIR, FIRE, AND WATER. If the word "Fire" is called, all must remain silent. When Earth is called the one to whom the ball is thrown must name an animal; when "Air" is called, a bird; when "Water" a fish. One who puts birds in water, speaks when "Fire" is called, or fails to give an appropriate answer before ten is counted, may be dropped from the game or made to pay a forfiet afterward.

ADVERTISEMENT: Whenever the one in the center throws the cushion at anyone in the circle, that one must name some familiar advertised article, like Quaker Oats or Gillette Razors, before the one in the center can count to ten. Anyone who fails to do this, or who names an article that has been named before, moves back, and is out of the game. The one who stays in the game last wins.

Title: Birds Fly, or Birds Have Feathers - Horns

Players: Any number of players

Grade: All Grades

Description: The one who is it "calls out", _____ fly," naming some bird that flies, at the same time holding up his hands. All imitate him. If he calls out "Cats Fly", and anyone holds up his hands, this one is out, because cats do not fly. He names other birds and animals while each child by correct responses tries to stay in the game as long as possible.

Horns is played the same way, but animals are named, both those with and without horns, instead of birds.

Title: Concentration

43 Nurse	9 Teacher	8 Banker	17 Salesman	4 Doctor
13 Engineer	22 Teacher	28 Banker	5 Technician	44 Carpenter
33 Engineer	9 Farmer	6 Architect	5 Barber	44 Carpenter
3 Nurse	7 Electrician	6 Salesman	75 Farmer	4 Doctor
68 Electrician	57 Technician	60 Architect	58 Barber	

Purpose: To test student ability to concentrate

Description: This game is played like the TV version of Concentration. The attached cards (which should be drawn on a large poster board) is displayed before the contestants. Each team of contestants (one to a team) will have a chance to match the occupations. Behind each occupation is a point (instead of a prize as the tv version) and if he gets the correct two occupations, he wins the point behind each. Ex: Numbers 9 and 22 are matched occupations. A scorer is selected to record points.

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C	V	A	E
2 -0	7-0	9 -9	1-0
2-2	8 -8	5 -0	7-7
5 -0	8-0	3-0	2 -0
3-0	1 -0	6-0	8 -0

Title: CVAE (Bingo) For Mathematics

Purpose: To test students use of subtraction facts. The tested facts are arranged in order from the easiest to the most difficult.

Description: Each game of CVAE is played by 2 to 6 contestants plus one caller with a pack of 6 CVAE cards (no two being alike) of one color and a matching call card.

To play CVAE the player must first select a pack of cards of the same color. A caller is selected. Each person is then given a handful of cover pieces. The caller must be be sure that each contestant is using the side of his card that matches the call card.

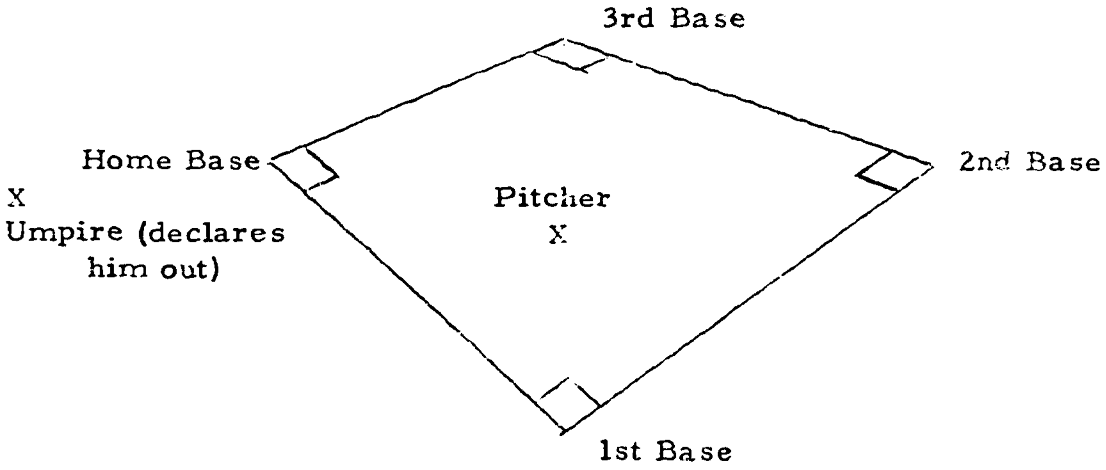
Each contestant covers cells of his CVAE card which have numerals or the correct answer to the problem. The contestant yells "CVAE" if he gets four in a column, horizontal or vertical.

Evaluation: Students will rate players according to the most winners as to how skilled they are in math.

Title: Occupational Baseball

Purpose: To familiarize students with occupational careers.

Description: Students will form two teams (home and field)



Each team will have nine (9) players (catcher, pitcher, basemen). The pitcher will throw a word connected with an occupation. Ex: medicine--if the batter answers "doctor", he goes to first, if he misses, he's out. Pitcher continues until the home team makes 3 outs. The team with the most points, wins.

Note: Other subject areas may be substituted.

Title: A Survey of Students Opinion On Controversial Issues

Grade: All Junior High Grades

Purpose: To make students aware of the issues facing the world today.

Issues Might Include

Viet Nam War
Student Dress
Drug Use
Teachers
Drop-outs
Smoking
Students Civil Rights

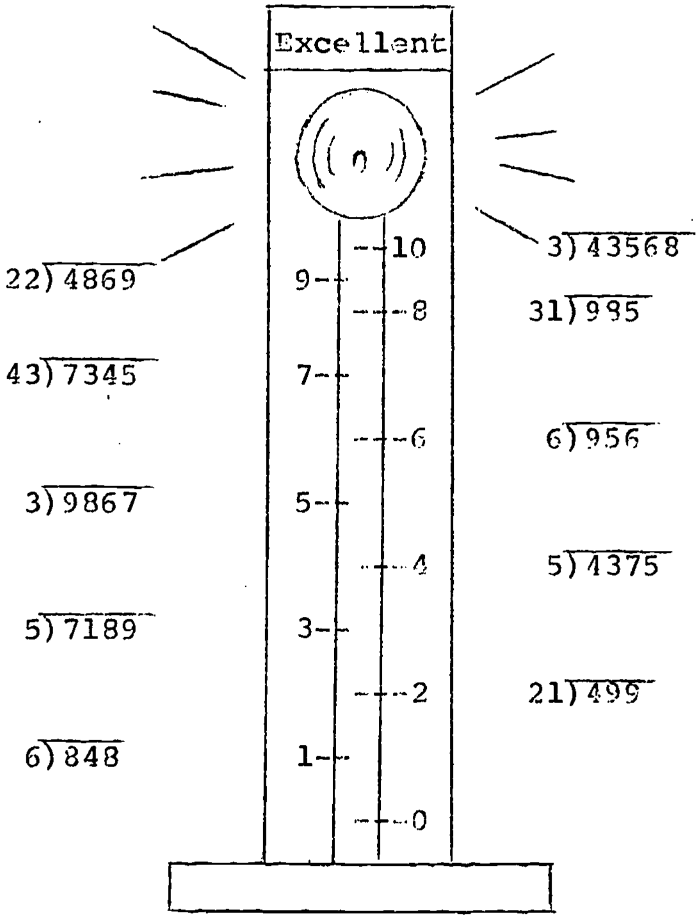
Description: Divide the club into two groups. One group could make up a written survey of questions concerning opinions that could be asked concerning the issue. One group would distribute these to student body in a cross section of grades or age groups. The second group could take these results and discuss them. The club members could discuss final results and make publication of suggestions in a weekly write-up.

Title: Ring The Bell (Math Classes)

Grades: Students Experiencing Difficulty in Division Facts

Materials: Chalkboard and Chalk

Description: A drawing similar to the illustration made below is put on the chalkboard. Players from each of two teams take turns coming to the board and quickly and correctly working one example, going from the top to the bottom. One team works the left side, the other team works the right. The first team to finish it's work correctly "rings the bell".



Title: Student of the Week

Grade: CVAE Students

Purpose: To encourag [illegible] rive for excellence in achievement a [illegible] ct.

Description: Students will draw up a criteria, showing desirable qualities and accomplishment for selection of an ideal "CVAE Student".

Students, weekly or monthly, will select by secret ballot the person who possesses most of these qualifications using the point system for evaluation.

Students selected will attend games that week or month without a charge, or other desirable awards. His picture and write-up will appear in the local paper accompanied by an article of achievement.

Evaluation: Students will rate candidates.

Title: Survey on Television Programs

Grades: Junior High

Purpose: To teach the students how to conduct a survey on television and it's appeal to the student.

Description: The students should be divided into groups of threes. they should take a section of the school to survey. This would be a student-to-student survey.

They should draw up a questionnaire to ask the students. Some possible questions might be:

1. Do you have a favorite TV program? If so, why does it appeal to you?
2. Which program do you like the least? Why does it not appeal to you?
3. Do the commercials on television influence you to buy a certain product?
4. Who is your favorite actor? Actress? Why?
5. Who is your favorite comedian?

6. If you could award an oscar to a television personality, who would it be? On what do you base your selection?
7. What improvements do you think could be made on television?
8. What is your favorite "western program"?
9. How much of the day is spent watching television?

After the survey is made, the students could compare their answer and draw conclusion on what students think of television.

Title:	Celebration of CVAE Week in the School
Grade:	All Grades
Purpose:	To promote CVAE. To give all students a chance to participate in CVAE activities.
Description:	Have students write a proclamation, proclaiming CVAE week. A delegated group of students will take this proclamation to the principal for approval and discuss such an observance. After approval, the principal will announce the proposal. Have the students make arrangements to have a program concerning "What CVAE is All About". The program could be in the form of a skit written by the CVAE club members. Over the intercom daily, club students could give a riddle concerning CVAE, the first to submit the correct answer, will be given a prize.

Other form of advertising could be done to promote the activities involved during the week. Activities would vary for each day. A radio announcement could be aired proclaiming the activities involved.

TITLE: Cross Number Puzzle

PURPOSE: To give students extra practice in building computation skills.

DESCRIPTION: Each student is given several different puzzles such as the following:

1) 4	2)	▨	3) 3	4) 5
5) 3	2	▨	6) 3	9
▨	2	▨	3	▨
7) 6	▨	▨	▨	8) 1
9) 6	5	▨	10) 8	8

ACROSS:
1. The sum of 21 + 21.
3. The product of 7 x 5.
5. 64 - 32.
6. Subtract the product of 43 x 13 from 520.
9. Twelve 5's + 5.
10. (13 x 4) + (4 x 9).

DOWN:
1. The multiplier in 43 x 166.
2. 2 x 111.
3. (3 x 110) + 3.
4. (7 x 9) - 4.
7. 5 doz. + 6.
8. 54 divided by 3.

Students could make puzzles of their own and exchange with others. More advanced pupils could work on more difficult puzzles while the teacher gives extra time to slower workers. Puzzles should be carefully checked before duplicated.

Title: How to Promote CVAE Through T.V. or Radio

Grade: All Grades

Purpose: To promote CVAE

Description: Have the students make arrangements with the local T.V. or Radio stations to have a program about CVAE. The program could be set up as a panel or informal talks with a discussion leader. If the program is set up as a panel, at least four members should be on it with a leader to ask questions. The purpose should be to inform the public about CVAE. The students should be well informed about CVAE and about the entire program in Georgia and the nation.

Title: Exploration of CVAE

Grade: 9th thru. 12th.

Purpose: To explain CVAE to different groups, improve public speaking ability, and teach panel techniques

Description: A representative group of four or more should be selected to comprise a panel. Each should be able to explain the CVAE program and answer any questions that might be asked them. The students on the panel could practice by letting their fellow classmates ask them questions. The panel could give their explanation to an assembly program, or to the civic clubs. This could be used during the spring when recruiting students for the next school year.

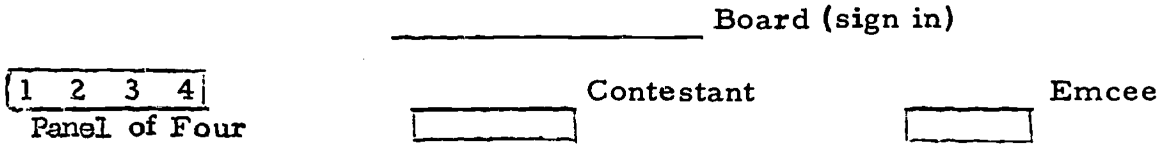
CVAE: This could be used as civic activities for the club.

Title: What's My Line ?

Purpose: To Acquaint Students with Different Occupations as Suggested by the Students

Description: (TV Version) Students enter and sign in. Each student contestant representing a service or unusual occupation will try to stump the panel. A panel of four will attempt to guess through a series of questioning the occupation of the contestants.

Variations may be made.



TITLE: Meet and Tie

Grades: All Grades

Purpose: To enable students to think clearly & move quickly.

Description: The group forms a circle. The player who is "It" holds two ropes of equal length and thickness. She runs around the outside of the circle, hands one rope to a player in the circle and continues on her way. The girl who received the rope runs in the opposite direction. When they meet they shake hands and say "hello." "It" then calls out the name of a knot after which they shake hands again and say "good-bye." As they continue around the circle, each of them ties the knot that "It" has named. The first to return to the empty place with the knot correctly tied wins. The game continues with the loser acting as "It".

TITLE: Higgledy-piggledy Compass

Description: Set a compass in the middle of the floor and mark its points in a large circle with chalk. Have a point for each player except the one who stands in the center with her back to the leader.

The leader stands outside the circle and signals in Morse two points of the compass. The players who are occupying those positions must change places without being caught by the girl in the center. They cannot run outside the circle. If caught, they drop out of the game. Compass, signaling and stalking skills are used by the players in the event.

TITLE: Call Ball and Spin the Platter

Description: Players stand in a circle and number off. One player is "It" and goes to the center. He throws a ball or bean bag up in the air and calls a number. The person with that number must catch the ball or bean bag before it touches the ground. If he fails, he pays a forfeit, performs a trick or drops out of the game.

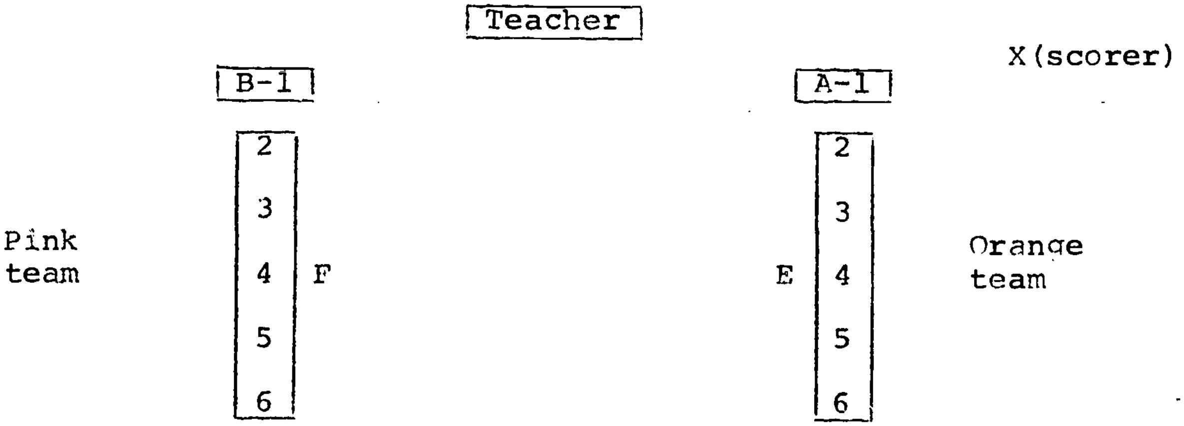
In Spin the Platter, "It" spins a pie plate and calls a number. The player called must pick up the plate before it stops spinning.

TITLE: CVAE Countdown

Grades: All grades

Purpose: To review terms and get all students participating. This game may make shy students more active.

Description: Arrange the seating of your students in the following manner.



First have your students prepare a long list of CVAE words or short terms. The teacher selects a word or term and writes it on the board so that students A and B cannot see the word. They are facing their teammates. Rotating A and B try to guess the word on the board. Starting with student F-2 and working down the line of students on the pink team, each student F can give a one word clue to student B. Taking turns, the clues are rotated between pink team and orange team. The scorer starts each new word with a 10 point value. After each clue, the value goes down one point. If either student A or B guesses the word correctly, the scorer will give the winning team that amount of points. One hundred points wins the game. You may change the student arrangement at any time during the game. As each word is guessed, a new word is written on the board by the teacher.

TITLE: Your Career

Grade: 9th and 10th

Purpose: Research career opportunities.

Description: In the study of careers and opportunities in marketing and related fields, have students prepare and present to the class a report on a job classification. The report should include the following:

1) History of the job
2) Qualifications
3) Job description
4) Location of job opportunities
5) Demand for people in the job
6) Salary
7) Opportunities for advancement

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TITLE: Building Displays

Grade: 9th and 10th

Purpose: To give the student the actual experience of building displays

Description: This project can be done during the unit on display. The students should be divided into groups, with each group assigned a special place to make a display. Such a display can be in the hall, the classroom, etc. Some local stores will give you a space for display. This would be a good project for your CVAE club to let the public know more about CVAE. It can be used to promote the program in the school to help recruit new students.

TITLE: CVAE Newspaper

Grade: 9th through 12th

Purpose: A newspaper would be an excellent method of advertising the CVAE program. The students could use this advertising knowledge.

Description: After the principal's approval, the students would be divided into groups: writers, editors, copy writers, ad layout, and advertising.

It should be decided whether the paper should come out weekly or monthly. The students should decide whether it will be devoted strictly to CVAE or to all school activities. The name should have something to do with CVAE.

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TITLE: School Store

Grade: 9th through 12th

Purpose: To give the students actual experience in organizing and operating a small scale retail store.

Description: After the principal's approval has been gained, divide the class into committees. The following committees should be formed:
1) Location--responsible for finding a suitable location for the store, and planning the interior design.

2) Merchandise--responsible for planning for the stock, ordering and storage.

3) Finance--how the inventory would be financed.

4) Personnel--responsible for arranging for students to run the store.

CVAE: Advertising and display contest

Possible items to sell in your local school store

1) Notebooks and pencils
2) Ink pens
3) Notebook paper
4) Carbon paper

5) Typing paper
6) School emblems and banners
7) Drawing instruments
8) School jewelry
9) Educational paperbacks
10) Paper clips
11) Rulers

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TITLE: Breakfast Club

Grade: 11th and 12th

Purpose: To make the students aware of the problems of establishing a business and operating it. The business is a coffee hour each morning before school starts (coffee, tea, donuts, cakes, toast, etc.)

Description: Set up committees to handle the following areas of operation of the club.
1) A committee to research the students to see if the club is feasible.

2) A committee to find a place and arrange permission from the principal.

3) An operating committee to find the people to run it, secure the merchandise, and set up actual operation. (The class could go in with another class or club and run it as a partnership arrangement.)

4) A committee is also needed to draw up rules and policies as to serving, discipline, etc.

CVAE: This would make an excellent project for the club and would help toward the club of the year award.

Evaluation: Supervise each committee to see if it is doing its job properly. Solicit remarks from students and teachers who have seen it in action.

Suggestion: Invite local school talent to perform each morning while faculty and students relax just before starting their busy day.

TITLE: Anagram

Purpose: To help students become more familiar with terms in different vocations or careers.

Description: Tables are marked with any career that you wish, such as Doctor-Teacher-Minister-Mechanic-Cook. Students may be paired off or they may play as individuals. Students may progress in any one of three ways: (1)the winning couple moves up, except that at the head table, the losing couple would go to the last table (2)all students move to another table; half at each table move up and half move back, in which case half at the head table would go to the foot and half at the foot table would go to the head table.

Students take turns turning up a letter. The player who turns up the letter tries to call a word beginning with that letter. The word must be appropriate to the subject to which the table is devoted. If he cannot answer immediately any other player calling a suitable word takes up the letter. Unclaimed letters lie face up on the table and they can be clained any time.

After students have made several progressions it can be readily seen they are likely to get their categories mixed. No penalties are required for such mistakes, but, of course, a player is not allowed to pick up a K for shouting knife at the mechanic table.

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TITLE: Act It Out

Purpose: To learn the fun in studying different vocations and becoming more familiar with specific traits of each.

Description: A student or volunteer is selected to act out the vocation selected and is to guess what it is. He leaves the room for a few minutes while the vocation is being selected. When the student returns he tries to discover what the vocation is by asking questions and observing the manner of reply. In answering each student must act in such a manner as to suggest the vocation. For instance, suppose the vocation is "dentist." Each response must be related to what a dentist would do until the student guesses the word. The student would probably ask some such question to another student, "Can you give me a clue to the word?" And the student would act out his interpretation; if the student does not guess the word, he moves on to the next until he gets the correct word, then he changes places with suudent giving clue that led to the right word.

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TITLE: Puppet Show

Purpose: To portray work in the service occupations.

Description: The art teacher could help a small group make puppets. Students could work up a skit using one of the service occupations such as a fireman, chef, waitress, lifeguard, or airline hostess. Present skit to own age group or to elementary school children.

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TITLE: Set Up Personal Interviews

Grade: 9th through 12th

Purpose: To gain first-hand information on a particular job.

Description: Devise an interview form asking questions about a particular job that students might be interested in. This could be a general form that could be used on any job information interview.

Give student an assignment of obtaining an interview with a person that is doing the type of work he is interested in, if possible. If this is not possible, have him interview someone that is possibly in a related field. Have each student bring these forms back to class and share the information.

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TITLE: Career Manual

Grade: Any grade

Purpose: To have available information on careers in which the student has an interest.

Description: Have each student prepare a career manual consisting of a minimum of ten careers. List for him specific information that needs to be included in this manual; also encourage the student to find pictures, or draw his own, depicting the job or career.

TITLE: Study of Famous People

Grade: 9th through 12th

Purpose: To give the student an insight as to why people were famous and apply it to the student's future.

Description: Approve a student's choice of a famous person. The student will look for the traits that made him or her famous and how these same traits might be applied to his future.

At the close of the assignment, each student will come dressed as the person he chose and give an oral presentation to the class of his findings.

TITLE: Concern for Others

Grade: 9th through 12th

Purpose: Student growth and realization that to help others is satisfying and rewarding. And that no man is an island to himself.

Description: Student will select or be assigned to help a younger student or even a student in his own class that might be having difficulty either in adjusting to school routine or in assignments.

Details would be worked out as to what lines the group wanted to follow in this.

TITLE: Employment Service

Grade: 9th through 12th

Purpose: To find part-time employment for students.

Description: Select a committee that is interested in working on this type of project. They then will advertise on school bulletin boards, school paper, etc., that students that are interested in part-time work, odd jobs, etc., are to register with them, filling out applications and type of work in which they would be interested.

The committee then calls people, businesses, etc., to find out what work is available, such as yard work, window washing, baby-sitting, and even more dignified jobs. They then match job with application and notify student that work is available at a certain place and certain time.

Committee would charge a small fee for services rendered.

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TITLE: Old-Fashioned Spelling Bee

Grade: 9th through 12th

Purpose: To help students learn to spell words relating to different occupations, vocations, etc.

Description: Divide into two equal sides and conduct an old-fashioned spelling bee using words that have recently been studied in a given unit. The winning side might receive an appropriate award.

- - - - - - - - - - - - - - - - - -

TITLE: The Mystic Fifteen

Purpose: To stimulate thought in working with numbers.

Description: Ask each student to draw a square. Then ask them to draw four lines dividing the square into nine small squares. Now each one is to put a number in each square using the numbers 1 to 9. No number can be used more than once. It should be explained that the numbers are to be placed so that they total 15 any way they are added, horizontally, vertically, or diagonally. (The secret lies in placing 5 at the center and then working the corners with the even numbers, 2, 4, 6, and 8.) See who can work it out first; perhaps a hint in placing the number 5 may be needed.

4	3	8
9	5	1
2	7	6

TITLE: Department Stores Versus Discount Houses

Grade: 9th

Purpose: To let the students compare the activities of a department store with those of a discount house.

Description: Divide the students into two groups. One group will be responsible for visiting and preparing information on department stores, and the other group will be responsible for visiting and preparing information on discount houses. Information that should be gathered will include: the different types of sales, types of credit systems, ways returns are handled, advertising methods, delivery systems, and personnel policies. When all this information has been compiled, have a roundtable discussion comparing the differences of the two types of businesses.

TITLE: School Bank

Grade: 9th

Purpose: To give the students actual experience in organizing and operating a small scale bank.

Description: First invite a local bank official to visit the class and speak to them about the various operations, services, and policies of the bank. Next proceed to let the students set up their own bank.

To establish the bank, let students become stockholders by buying stock in the bank. As stockholders, they will elect a board of directors. The board of directors will then elect the officers of the bank and set up the bank's policies. The students will lend money at a certain designated rate of interest to their customers. At the end of the year, the savings customers will receive the interest from their accounts, and the remaining profits will be divided among the stockholders.

If it is not possible to set up an actual bank to function for a lengthy period of time, then the same process could be used to set up a temporary bank using play money for exchange. This would still give the students experience in organizing and operating a small scale bank. An operation of this type could be done during class time and last only two or three days.

CVAE: May be used as a chaper marketing improvement project.

TITLE: Change Making

Grade: 9th

Purpose: To acquaint the student with the procedures and protection of making change.

Description: Invite the personnel manager from a large department store to tell how they protect their salesmen from people who try to fraudulently obtain money. Have each student study in detail the policies of the major stores of the area pertaining to change making. Have the students sit on a panel or let each student report his findings. Role playing, let students make change.

After all the students have presented their study, formulate the best policy of making change. The findings could be made into a report to a cash register company or a retail store that requested it.

CVAE: This could be done as a CVAE project or the findings could be presented to the club.

Evaluation: Rate the student as to content, depth of study, and presentation.

- - - - - - - - - - - - - - - - - - - -

TITLE: Survey of Teenage Buying Habits

Grade: 9th

Purpose: To inform the students about the buying habits of teenagers in their own school and how much they spend

Description: Develop a questionnaire with the questions centered around the spending habits of teenagers. Each teenager in the school should be surveyed, if possible, personally. The results should be computed as to how much money they have to spend and what they spend it on, ranking items in order. Also, how much they spend should be computed and ranked. The results should be published for the benefit of the students.

CVAE: A good marketing research project for the club

Evaluation: Check the content of the marketing research project and supervise the whole project

Suggestions: 1) After all the data has been computed, write an article for the school newspaper.

2) Make the questionnaire short and to the point.

3) Find out where the students obtain their money.

4) Suggested items to survey: entertainment, clothing, food, autos, records, sporting goods, etc.

5) How much do they save?

- -

TITLE: Handle Him Right!

Grade: 9th

Purpose: To help the students become better trained to handle the different types of customers.

Description: Have the students divide into pairs and do a study on the different types of customers. Example: argumentative, silent, slow, fast, angry, etc. Assign one type to each pair of students. After the study is completed, have the team draw a picture of the face of the type of customer they researched. Let each team show the picture and have the class guess what kind of face it is. After the type of customer is identified, have the class tell how they would handle him in comparison to the way the team handled him. Use large poster boards.

CVAE: Have the teams present the same type of program to the club as a meeting. Invite salesmen of the community to the meeting.

Evaluation: Ask the outside people what they thought of the presentation.

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TITLE: Correct Dress for My New Job

Grade: 9th

Purpose: To help students understand what will be needed in a working person's wardrobe and how to budget their clothing money.

Description: Have each student select a job he feels he would like to hold on a full time basis. Have each student prepare a simple manual and at the close of the study he will present it to his fellow students. The manual should consist of the following items:

1) Season's wardrobe
2) Cost of all items
3) Pictures and drawings of each ensemble
4) Care of clothing, including cost
5) Special uses

Suggestions: Use Sears and Ward catalogues, savings stamp and fashion magazines, personal interviews, and take pictures.

CVAE: Plan wardrobe for attending CVAE activities such as the District Contest and the State Leadership Conference.

TITLE: A New Store for Your Town

Grade: 9th

Purpose: To help the students become more aware of their surroundings as related to community needs

Description: The project could probably be carried out best as a survey. The teacher could divide the class into groups of three or four. The students should then decide among themselves which group will survey such areas as:

1) Number of stores in town
2) Number and breakdown of the different types of stores
3) Type of store that is most popular and why
4) Type of store which has lowest number of sales and why
5) Population of town and number of citizens that shop in town rather than going elsewhere

Finally after the students have surveyed these different areas, then they should make comparison to see what type of store their town actually needs.

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TITLE: Job Opportunities in My Town

Purpose: To help students become familiar with businesses in their community

Description: Divide the class into several small groups and have them conduct a survey to see what jobs are available to them now and in the future. Some of them might want to talk with business owners and employers; others might wish to merely observe. Reports could be made orally in class on findings.

- - - - - - - - - - - - - - - - - - - -

TITLE: Twenty Questions

Purpose: To increase students' understanding of various occupations as well as their interest in them.

Description: Students try to guess unusual occupations in twenty questions or less.

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TITLE: The CVAE Game

Purpose: To aid students in grasping material presented in books dealing with the world of work

Description: Divide the class into two panels or groups. After reading and studying a selection from *The World of Work*, *About Him*, *The Job You Want*, or other appropriate material, have one member of Team A ask Team B questions relevant to the material. If Team B responds incorrectly Team A receives the letter "C" (a twist on the old "Horse" game in basketball). Team A then asks another question. If and when Team B responds correctly, it is their turn to ask Team A a relevant question. The first team to receive all four CVAE letters is the winner.

TITLE: The Interview

Purpose: To develop the student's skill in being interviewed

Description: Have coordinator or a student who has been coached role-play a job interview wtth a prospective employer(another student). The interviewee will do 8 inappropriate things during the session. The students are to list these on a sheet of paper if they can detect them.

TITLE: Story Game

Purpose: To foster the skill of concentrated listening in students while adding new concepts to their knowledge.

Description: An adventurous, vocational, humorous, or career story is told carefully and in detail to the entire class. Pre-determined points and/or concepts have been outlined by the coordinator. It is the task of the class to re-tell that story either verbally or in writing. A percentage score can be given relative to the number of main points and/or concepts that the student reproduces.

TITLE: The Arrangement

Purpose: To increase the concentration, memory, and quick-thinking skills of students. Also to help develop their ability to notice people.

Description: Chairs are arranged in a circle or semi-circle. Students are then to sit down and remove unoccupied chairs. They are told that they will be given two minutes(more time may be needed for a large class) to observe and identify where everyone is sitting. One student is selected by the coordinator to leave the room. The students will then rearrange their seating order. The student that left the room then returns and must attempt to reseat everyone in the previous order. Highest number of correct seats wins.

* * *

TITLE: Project--CVAE Handbills

Purpose: To learn something about making handbills(advertising) while promoting CVAE.

Description: Using small groups of students, have them design a one-page handbill using the VOCA creed, motto, and emblem, embellished imaginatively with topical quotes and CVAE information. This additional material should propagandize and emphasize CVAE interests. The handbills can then be mimeographed and handed out in the halls or placed on bulletin boards.

* * *

TITLE: Object Description

Purpose: To develop skill in verbal expression, and in the ability to recognize the important aspects of an object or person through evaluation or description.

Description: The coordinator prepares a list of names of objects found in nature(or perhaps manmade) and each name is placed on a slip of paper. Each piece of paper is anonymously selected and the student goes before the class to describe the object . Time is the determining factor. The students in the class raise their hands when they think they can identify the object. The least amount of time wins.

TITLE: Job Requirements

Purpose To acquaint the students with what different jobs demand of the employee

Description: Coordinator shall pre-select three to five occupations. Examples: skilled worker, such as electricians, plumbers, etc., office worker clerk, salesman, manager, etc. Allow each student to write down all of the requirements that he thinks these vocations demand. Let the student write a paper on the vocation of his choice. These papers can be used in a later discussion concerning the differences in what the students think are required of a particular vocation and what the requirements actually are.

TITLE: Let's Make a Deal

Purpose: To increase the student's product knowledge and sales ability

Description: Have one group of students role-play a sales presentation to a group of buyers. The product is new, thus the sales team must have product knowledge and sales ability. The "buyers" group rates the presentation as to whether they were sold by the presentation. Different grouping, products, and evaluation procedures might be employed.

TITLE: Spread the Word

Purpose: Seek to stress how communication ties in with all occupations.

Description: Ask students to name kinds of communication known to them and write these on the chalkboard. Assign students three to a team to study the more recent methods of communication and have one from each team make an oral report on findings. Have samples of communications methods brought to class--models, drawings, or pictures might substitute.

TITLE: Study of Store Layouts

Purpose: To make students aware of the importance of store layouts to retail business

Description: Assign each student a store within the community and get a description of that store's layout. Stress observation of where each department is and why. The instructor would then make presentations regarding store layouts, the psychology of the buyer, and other related information. The students would discuss the good and bad aspects of the layouts they investigated. They might design and write up possible improvements.

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TITLE: Know Your Bank

Purpose: To increase knowledge of money management and banking

Description: Divide the class into three or four groups with a chairman for each. Have each group interview certain bank officials to find out about their customer service. Arrange visits to different banks so that comparisons might be made. The students could also interview bank customers regarding services and summarize all findings.

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TITLE: CVAE Tick-Tack-Toe

Purpose: To facilitate the learning of CVAE material

Description: Students are divided into two teams with two players at the time taking turns marking either crosses or circles in a block of nine squares. In order to mark the square the student must have correctly answered a question. The first one to complete a straight line or diagonal wins a point for his team. After all pairs of students have played, the points are totaled to determine the winning team.

TITLE: Crossword Puzzle

Description: Words selected from occupational and business discussions, etc., encountered in CVAE classes. Copies made for students to fill out.

1			22	▨	2	4		▨
3				25			▨	15
	▨	4			▨	▨	▨	
	▨	▨		▨	16	▨	5	
6	23	24	▨	7		18	▨	
8			17					
	▨	▨	9			▨	▨	
▨	10	19			▨	20	▨	
▨	▨	11					21	
12			▨	▨	▨	13		▨

Across

1. Price of an article.(cost)
2. If a price tag is not on an article, one must _____ the price. (ask)
3. To drive a piece of machinery means to _________ the machinery. (operate)
4. Money left for a waiter or waitress.(tip)
5. Abbreviation for registered nurse.(RN)
6. Something a person might do who works in a garment factory.(sew)
7. A female member of the Army.(WAC)
8. Something every person needs to obtain in school.(education)
9. A factor to be considered when thinking of retirement.(age)

10. Something very good to do with a part of each paycheck. (save)
11. What a person does when he sells again. (resells)
12. Goods that are sold in a certain quantity might be called goods that are sold in a certain _____. (lot)
13. Abbreviation for pound. (lb)

Down

1. Advice (counsel)
2. Translation of the symbol @. (at)
7. Pay received for work. (wages)
14. Abbreviation for safety engineer. (SE)
15. Money resources. (finances)
16. Payment per hour. (rate)
17. The abbreviation, CVAE, scrambled.(CAVE)
18. Abbreviation for cost index.(CI)
19. Abbreviation for article. (art.)
20. If a person is _________, under certain conditions he may receive "sick pay." (ill)
21. Abbreviation for pound. (lb.)
22. If a person is traveling for a company, one might say he is on a _______. (trip)
23. Abbreviation for education. (ed.)
24. Abbreviation for the union, Workers United(ficticious). (WU)
25. Abbreviation for Associated Press. (AP)

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TITLE: Cross-Number Puzzles with Signs

Description: Numbers are arranged to provide a given result, but the arithmetical signs of operation are missing. You are to insert the signs of operation in the empty spaces such as to provide the indicated results with the given numbers. A correct solution will "check out" horizontally and vertically.

6	(X)	3	(-)	9	=	9
(X)	▨	(+)	▨	(-)	▨	(+)
2	(X)	5	(-)	8	=	2
(-)	▨	(-)	▨	(+)	▨	(-)
8	(+)	2	(-)	4	=	6
=	▨	=	▨	=	▨	=
4	(+)	6	(-)	5	=	5

1	(X)	6	(÷)	2	=	3
(+)	▨	(÷)	▨	(+)	▨	(X)
9	(+)	2	(-)	8	=	3
(-)	▨	(+)	▨	(-)	▨	(-)
5	(+)	3	(-)	2	=	6
=	▨	=	▨	=	▨	=
5	(+)	6	(-)	8	=	3

STILL MORE GAMES AND PROJECTS

1. Tell It Like It Is

Set stage (or area substituting for stage) either for a skit or for mock radio transmission. Use real microphone if at all possible. (Many tape recorders are built so microphone should feature material correlated from studies or enrichment. Skits acted out to hold interest could include such things as drug abuse, getting stopped by a policeman, vandalism, etc.

For mock radio transmission - (these could be recorded for re-use) make an "on the air" sign with a red light you can turn on. Have students present special reports as though they were radio commentators. Student or coordinator may serve as the master of ceremonies. after several such reports, have best report chosen by student applause or voting. Post winner on CVAE bulletin board and designate time for competition between winners of all CVAE classes.

2. A. Living Memory

To develop concentration and remembering. Place an unreasonable number of selected items (all of which relate to the subject under study) in a reasonable order on a tray or table (or write a number of vocabulary words on the board). After the students have had one or two minutes to look over the items, cover them up. Have each student write down as many as he can remember. You may want to divide class into competing teams. You may want to allow the winner to make the selections for the next game.

B. Elephant Ears

Played in the same manner as "LIVING MEMORY" except the objects (or vocabulary) are spoken. The listing may be reiterated once. Then have students recall in writing as many of the objects as were named as he can.

3. Vocabulary Bee

Identical with spelling bee, except vocabulary words are used--divide into teams, and give teams points for correct answers rather than having anyone sit down for missing the question.

4. Here Come the Groceries

Similar to "The Price is Right", but with groceries only. It becomes a little more complicated but certainly worthwhile if you work in amount vs. cost on prepacked goods and quality vs. cost. Coordinator will have to establish fair quality/price for his locale. If goods are purchased with club money, you may choose to allow the winner of the day (week) to keep the groceries.

5. Russian Roulette

If possible, mark off spaces on the floor similar to markings on a roulette wheel. In these spaces students are to sit. Use a well balanced imitation wooden rifle (or substitute--but use a bottle only as a last resort) for the gun. Have one more student than there are spaces to be used. The odd student then is "it" for the day. When the gun-pointer comes to rest pointing at a student, that student is to answer the question which was asked immediately before the "gun" was spun. If he answers correctly, he has survived; if not--BANG! He's Dead! When only one is left, he is declared the winner and "preaches" the funeral oration for the deceased amid a coffee-donut break.

6. Picture Parade

(Poster Competition) Have each student prepare a poster on the current subject. Have team teachers act as judges. One or Two top posters to be used on school bulletin board as central theme for the whole board. The CVAE class should do the whole board, giving board recognition both to the individual poster winner and to the CVAE class.

7. Word-Spelling Race

There are so many things that may be done with letters that the recreation leader's equipment should always include them. They may be made at small expense by printing the letters on cards about five inches square with colored crayons. For the word-spelling race, each of two or more groups should have lettered cards with all the letters of the alphabet on them that are needed to spell the words to be pronounced by the leader. The leader should first make out a list of about thirty or forty words and make sure that duplicate letters are provided if needed. It will not be necessary to use all letters of the alphabet--only those needed to spell the words to be pronounced. When the leader pronounces a word, each group tries to line up in order so that the players who hold the proper letters will spell the word. The judges decide which group was able to do this first. Give one point to the group which first completes a word.

8. Animated Numbers

Prepare two sets of numbers from zero through nine. These may be printed on cardboard about five inches square. The printing may be done with colored crayons. The players are divided into two teams of ten each, and a judge is appointed. The players stand at one end of the room, one team in each corner, while those who are not playing stand at the opposite end of the room. The leader and the judge take their places in front of the spectators. Each player is given a number, and when the leader calls for the number, "789," the players having those numbers run to the end of the room and take their position in front of the judge. The team first completing a number wins a point. If there are more than ten players on a team, duplicate numbers should be given to the players, and the leader in calling the numbers should include large numbers which call for duplicates such as "25,752." The side that first makes twelve points is the winner.

9. Charades

The group is divided into two teams. Each team lists occupations on individual slips of paper, with one slip for each player on the opposing team. In rotation, a player draws a slip from the other side and acts out the occupation. The other members of his team must guess what occupation is being demonstrated. The team using the least amount of total time is the winner. (Use stop watch.) The performer must remain silent and can use no props.

10. S. O. S.

One player acts as radio dispatcher, while the other players are arranged in a circle. Leave an opening on opposite sides of the circle so that players may pass through without having to break the circle. Behind each open space is located an imaginary hospital. These might be named after local hospitals. Before the play starts, the leader gives to each player a name of a trade or profession, such as doctor, nurse, dentist, preacher, undertaker, carpenter, painter. When the game is ready to start, the dispatcher calls out, "A nurse and a doctor are wanted at City Hospital." The ones who have the names of the professions indicated break from the line and rush toward the hospital. The one to arrive first is admitted but the other must take his place in the center of the circle and act as catcher. The dispatcher may now call out, "A carpenter and a preacher are wanted at County Hospital." Both of these run for the hospital. The one in the center of the circle tries to tag one of them, and if he succeeds this one must also take his place in the center of the circle and help catch others. The number in the center of the circle will constantly increase. Another interesting feature of the game is that not more than one workman or profession may be in the hospital at the same time. If a doctor is in the hospital then the dispatcher says that a carpenter and nurse are wanted, whenever either of them safely arrives, the doctor must then leave and take his place in the circle. He is subject to being tagged on his return as well, and if tagged, must take his place in the center of the circle as a catcher.

11. Horse Race

This game can be played with up to twelve players. A race track (either straight or oval) is placed on the bulletin board. Horses made from colored paper are placed on the starting line with each student's name written on a horse. The track is marked off into sections, each section labeled with assignments given to each participant. When the student completes his assigned task his "horse" is moved into that section. Tasks must be done in order and can be either serious or fun type. One variation of this game is "Climbing the Mountain." The first to reach the top is "King of the Mountain."

12. English Exercise

The teacher supplies the students with sheets of paper on which have been written ten letters of the alphabet vertically. Each student then tries to make a sentence from the letters. (In place of individual letters, a name can be used.) A prize should be awarded or a step onward or upward (in the horse race or mountain climbing).

Example:

P lease

A sk

U ncle

L ouie

J ust

O ne

N ice

E asy

S entence

13. What Do I Do?

Each player has an occupation fastened on his back with the audience seeing what it is, but not the player. The players ask questions about their work. Is it always done at the same place: Do I need a hammer? Do I use a typewriter? Do I stand up? All questions must be answerable with a yes or no. (This is a good game to use to get a new group of students acquainted). When a student correctly guesses his occupation, he can remove his sign. The last one left with his sign should pay a forfeit(sing a song or do something similar.)

VT 017 215

COORDINATED VOCATIONAL ACADEMIC EDUCATION TRAINING GUIDES.

GEORGIA UNIV., ATHENS. DIV. OF VOCATIONAL EDUCATION.

OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 71 67P.

DESCRIPTORS - OCCUPATIONAL INFORMATION; *EDUCATIONAL COORDINATION; *ACADEMIC EDUCATION; *VOCATIONAL EDUCATION; VOCATIONAL DEVELOPMENT; HUMANITIES; SECONDARY GRADES; *JOB TRAINING; *LEADERS GUIDES; ENTRY WORKERS; COURSE OBJECTIVES; TRADE AND INDUSTRIAL EDUCATION; TASK PERFORMANCE IDENTIFIERS - BEGINNING COMPETENCE; EDUCATION PROFESSIONS DEVELOPMENT ACT; EPDA

ABSTRACT - THE OCCUPATIONAL INFORMATION CONTAINED IN THESE JOB TRAINING PLANS FOR A COORDINATED VOCATIONAL-ACADEMIC EDUCATION PROGRAM AT THE SECONDARY LEVEL IS INTENDED TO PROVIDE PROGRAM COORDINATORS AND ACADEMIC TEACHERS WITH SUGGESTIONS FOR RELATING PRACTICAL JOB INSTRUCTION TO ACADEMIC SKILLS. THESE TRAINING PLANS FOR VARIOUS ENTRY LEVEL OCCUPATIONS INCLUDE OBJECTIVES, OUTLINES OF REQUIRED TASK PERFORMANCES, DIRECTLY RELATED INFORMATION NECESSARY FOR PERFORMING THESE TASKS, AND RELATED ACADEMIC SKILLS IN A 3-COLUMN FORMAT. THESE LEADERS' GUIDES WERE DEVELOPED BY COORDINATORS FOR GEORGIA'S COORDINATED VOCATIONAL-ACADEMIC EDUCATION PROGRAMS WHO WERE ENROLLED IN AN INTERNSHIP AT THE UNIVERSITY OF GEORGIA. (AG)

4650

C V A E

Coordinated Vocational Academic Education

Training Guides

Prepared by:
CVAE Coordinators
Division of Vocational Education
University of Georgia
Athens, Georgia
July, 1970 - June, 1971

PREFACE

The purpose of the information contained in these training guides is to provide coordinators and academic teachers with suggestions for interlocking practical instruction for specific jobs with related useful instruction in academic classes. The guides are designed to indicate the responsibilities for a specific job and the necessary skills to perform that job successfully as were academic skills relevant to that job which will add to the general knowledge of the student and assist him in judgment and problem solving. Many of the activities will also contribute to his ability to get along with others, to be a good citizen, and to develop respect for various areas of work.

ACKNOWLEDGEMENTS

These *CVAE Training Guides* were prepared during the school year 1970-1971 by Georgia C.V.A.E. Coordinators enrolled in an internship at the University of Georgia.

The training of the coordinators was conducted by the Division of Vocational Education, College of Education of the University of Georgia, Athens, Georgia. Funds were made available from the following cooperating agencies:

Division of Vocational Education
Georgia State Department of Education
Atlanta, Georgia

and

Education Professions Development Act, Part F
U.S. Office of Education
Department of Health, Education and Welfare
Washington, D.C.

We are indebted to the following individuals for contributing their special talents:

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3. To develop skill in measuring and painting surfaces.

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TRAINING PLAN FOR A PAINTER
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Description of work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task to assist judgment and problem solving)
D. Clean painting area III. Billing procedures	V. Billing procedures A. Knowledge of prices for specific jobs B. How to bill customers	Home Economics 1. Study of color chart 2. Hygiene 3. Care of equipment 4. Removal of paint stains 5. Safety 6. Proper dress for the job 7. Behavior

COOK'S AND BAKER'S AIDE IN CAFETERIA

cription of the work to be formed (what the student t do	Direct Related Knowledge (what the student must know to perform the task.	Academic Related Knowledge (Knowledge relevant to the task)
Cooking , Methods of cooking . Use of cooking equipment , Handling of pressure cookers . Changing menus . Ability to plan ahead . Being able to use the right seasoning	I. A. Learning how to broil, fry, and grill B. Learning how to prepare cooking equipment C. Be Familiar with the hazards of pressure cookers D. How to make out menus E. Know the function of all spices and when to use them.	English 1. Speech 2. Courtesy 3. Being able to use and pronounce foreign words related to gourmet cooking and baking
Baking . Preparing dough in advance . Storing . Decorating . Cutting	II. A. How to prepare all kinds of doughs B. Know how to store dough C. Be familiar with many ways of decorating pastry D. Learn how to cut pastry and know how to display it.	Business English 1. Keeping written records Home Economics 1. Personal hygiene 2. Cleaning and care of uniforms 3. Learning to prepare food in large quantities 4. Learning to decorate cakes and pies 5. Storage of food 6. Sterilizing of cafeteria equipment

TRAINING PLAN FOR BELLHOP IN A MOTOR LODGE

Objectives:

1. Knowledge of ways to make guests comfortable.
2. Development of an understanding of customer desires.
3. Development of a pleasing appearance and personality.

Description of work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the tasks)	Academic Related Knowledge (Knowledge relevant to the task to perform judgment and problem solving)
I. Have a concept of the reasons for motor lodges	I. General Knowledge of motor hotels A. Purpose of motor lodges B. Brief history of the hotel industry C. Understanding the size and dimensions of the modern industry	Social Studies 1. History of hotels, etc. 2. Size of modern hotel industry Math 1. Importance in terms of income derived
II. Understanding of the general procedures of operation	II. General procedures in motor hotels A. Ability to state orally what jobs are available in this industry B. Ability to simply state what the tasks of these jobs are C. Understanding of the necessity of the hotel	English 1. Practice in oral speeches on jobs available in hotels 2. Correspondence to get information concerning these jobs 3. Use of team approach in these lessons 4. Oral reporting to improve

TRAINING PLAN FOR BELLHOP IN A MOTOR LODGE

(page two)

Description of work to be Performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the tasks)	Academic Related Knowledge (Knowledge relevant to the task to perform judgment and problem solving)
		verbal communications skills
III. Greeting Guests	III. Greeting Guests A. Knowledge of proper salutations B. Need to be helpful and courteous C. Ability to carry on a conversation	English 1. Oral communications skills concerning salutations 2. Conversational skills in communication
IV. Unload luggage	IV. Understanding of how to carry luggage	Health 1. Knowledge of how to lift properly 2. Knowledge of how to balance weights lifted

TRAINING PLAN FOR BELLHOP IN A MOTOR LODGE
(page three)

Description of work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the tasks)	Academic Related Knowledge (Knowledge relevant to the task to perform judgment and problem solving)
V. Showing customers to their rooms	V. 1. General courtesy 2. Place luggage in proper place 3. Hang up clothes that are not bagged 4. Check lights 5. Check drapes 6. Await guest approval	English 1. Working knowledge of general courtesy through role playing Home Economics 1. Proper hanging procedures for clothing etc. CVAE 1. Customer approval and customer comfort and understanding through role playing
VI. Working with Room Service and running errands for guests	VI. 1. Understanding the importance of promptness 2. Importance of pleasing the guest 3. Ability to carry trays and to have good mobility 4. Knowledge of where to locate what the guest needs	English 1. Pleasing people through oral communication Home Economics 1. Knowledge of carrying trays Health 1. How to walk properly and how to carry trays

TRAINING PLAN FOR BELLHOP IN A MOTOR LODGE
(page four)

Description of work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the tasks)	Academic Related Knowledge (Knowledge relevant to the task to perform judgment and problem solving)
VII. Pleasing appearance and proper manners	VII. A. How to dress properly B. Good grooming and hygiene C. Manners	English 1. Understanding manners 2. **Proper** dress for proper occasions Health 1. Good grooming habits

TRAINING PLAN FOR BUSINESS MACHINE REPAIRMAN

Objectives:

1. To be able to operate each business machine serviced.
2. To be able to disassemble and reassemble machines serviced.
3. To know and be able to recognize all parts of machines serviced.
4. To develop skill in recognizing and repairing worn or broken parts.

<u>Description of work to be performed</u> (what the student must do)	<u>Direct Related Knowledge</u> (what the student must know to perform the task)	<u>Academic Related Knowledge</u> (knowledge relevant to the task to assist judgment and problem-solving)
I. Operation of machines A. Typewriter B. Calculator C. Adding machine D. Cash register E. Addressing machine F. Dictating machine G. Duplicators II. Disassemble machines A. Parts B. Look for worn or broken parts C. Get new parts D. Clean old parts III. Reassemble machines A. Assemble all parts 1. Place parts back into machine 2. Make necessary adjustments	I. Different machines A. Knowledge of use B. Operational ability II. Tools A. Identification B. Knowledge of use III. Disassembly procedure A. Order for removal parts B. Tools necessary IV. Parts A. Ability to recognize parts B. Ability to determine worn or broken parts C. Parts catalog 1. Catalog set up 2. Prices V. Reassembly procedure A. Tools necessary B. Order of reassemblage	<u>English</u> 1. Speech 2. Courtesy 3. Spelling 4. Listening 5. Handwriting <u>Math</u> 1. Basic arithmetic skills 2. Use of different machines 3. Figuring costs <u>Home Economics</u> 1. Hygiene 2. Courtesy 3. Grooming 4. Personality 5. Care of equipment <u>Industrial Arts</u> 1. Terminology

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TRAINING PLAN FOR BUSINESS MACHINE REPAIRMAN
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Description of work to be performed (what the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task to assist judgment and problem solving)
B. Oil machines C. Check machines for operation IV. Billing procedures	VI. Oiling A. Type of oil to use B. Which parts to oil VII. Billing procedures A. Forms and usage B. Cost of services	A. Parts B. Tools 2. Oiling machines 3. Operation of machines 4. Practice in use of tools 5. Proper cleaning and oiling procedures

TRAINING PLAN FOR CABINET MAKER'S AIDE

Objectives:

1. To learn about the nature and history of cabinet making.
2. To gain an overview of cabinet design.
3. To gain an appreciation and use of materials, tools, and processes.
4. To learn shop skills and knowledge.
5. To gain in preparation toward an occupation.

Description of the work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge Knowledge relevent to the task to form judgment and problem solving)
I. General Shopwork A. Work in lumber room B. Sort lumber by kind and grade C. Obtain stock to be used in shop D. Work Safely	I. A. Types and uses of lumber B. Types and uses of plywood C. Uses and characteristics of lumber D. Types of woodworking hand tools	Industrial Arts 1. General shop safety 2. Use of woodworking hand tools 3. Selection and grading of lumber and plywood English 1. Speech 2. Courtesy 3. Composition (History of Cabinet making) 4. Spelling Math 1. Figuring board feet 2. Figuring linear and square feet 3. Measuring with a rule fundamentals of stock billing

TRAINING PLAN FOR CABINET MAKER'S AIDE
(page two)

Description of the work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevent to the task to form judgment and problem solving)
II. Cutting stock with hand tools A. Cut stock to length B. Plane stock with hand plane C. Trim and cut joints D. Cut dados E. Cut miters	II. A. Types of saws for making cuts B. Common types of cabinet joints C. Methods of cutting a dado by hand D. Types of chisels and gouges E. Types of holding devices	Industrial Arts 1. Using saws for making cuts 2. Fundamentals of hand planning 3. Cutting joints by hand 4. Uses of chisels and gouges 5. Uses of holding devices English 1. History of measurement 2. Spelling 3. Speech 4. History of woodworking tools Math 1. Types of measuring tools 2. Decimals and fractions 3. General Business 4. Business Math

TRAINING PLAN FOR CABINET MAKER'S AIDE
(page three)

Description of the work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevent to the task to form judgment and problem solving)
III. Assembly Work A. Glue panels B. Fasten frames C. Fit and glue doors D. Assemble door frames E. Fit and glue drawer F. Fit and glue showcases G. Fit and glue wall panels H. Fit and glue wainscot I. Install glass and mirrors J. Treat edges of plywood K. Apply composition surfacing L. Fit and install hardware M. Fit and hang doors	III. A. Types of wood glues B. Fastening devices C. Types of assembly tools D. Types of fixtures E. Mehtods of making panels F. Qualities of glass and mirrors G. Methods of treating edges of plywood H. Kinds of surfacing materials I. Types of hardware and uses J. Types of cabinet doors	Industrial Arts 1. Using wood glue 2. Using assembly tools 3. Standard cabinet construction 4. Construction of doors 5. Construction of drawers 6. Boring and drilling operation 7. Hanging doors English 1. Speech 2. Spelling 3. Composition Math 1. Geometric construction for structural strength

TRAINING PLAN FOR CABINET MAKER'S AIDE
(page four)

Description of the work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevent to the task to form judgment and problem solving)
IV. Sharpening Tools A. Sharpen chisel and gouges B. Sharpen cabinet scrapers C. Sharpen plane irons	IV. A. Methods of sharpening hand tools B. Types of files C. Types of planes D. Types of chisels and gouges E. Types of scrapers	Industrial Arts 1. Sharpen hand tools 2. Uses of files English 1. Spelling 2. Speech 3. Composition Math 1. Comparing costs of tools 2. General business 3. Business math
V. Finish work A. Sand by hand B. Sand with portable sanders C. Apply wood stains D. Apply wood filler E. Apply finishes	V. A. Kinds of abrasives for wood finishes B. Types of wood stains and fillers C. Types of finishing materials D. Types of spray guns E. Safety in the finishing room	Industrial Arts 1. Operations of portable sanders 2. Use of wood stains 3. Uses of wood filters 4. Using finishing materials 5. Using spray gun English 1. Speech 2. Spelling 3. Composition

TRAINING PLAN FOR CABINET MAKER'S AIDE
(page five)

Description of the work to be performed (What the student must do)	Direct Related Knowledge (What) the student must know to perform the task)	Academic Related Knowledge (Knowledge relevent to the task to form judgment and problem solving)
		Math 1. Figuring "ratio" of mixing finishes
VI. Blue print reading A. Technique	VI. A. Type of drawings B. Language of industry C. Reading various drawings D. Sketching free hand	Industrial Arts 1. Use of drawings 2. Use of alphabets of lines 3. Draw various drawings 4. Work in shop with drawings English 1. Comparison of English and industrial language 2. Speech 3. Spelling 4. Vocabulary Math 1. Study decimals - fractions 2. General business - business math

TRAINING PLAN FOR CABINET MAKER'S AIDE
(page six)

Description of the work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevent to the task to form judgment and problem solving)
VII. Layout Work A. Various layout tools (uses of) B. Make layouts C. Study geometric layout	VIII. A. Learn layout tools B. Practice use of layout	Industrial Arts 1. Make layout on project material 2. Adjust and care of tools English 1. Speech 2. Spelling 3. Vocabulary Math 1. Work with geometric layout 2. Read drawings (dimensions) 3. General business and business math
VIII. Power Tools A. Operate circular saw B. Make various cuts on circular saw C. Operate planer D. Cut stock with handsaw	VIII. A. Power saw safety practice B. Kinds and purpose of machines C. Methods of special cuts or machines D. Methods of sharpening machines tools	Industrial Arts 1. Operation of various machines 2. Practice safety skills 3. Practice sharpening machine tools 4. Make use if machines on projects

TRAINING PLAN FOR CABINET MAKER'S AIDE
(page seven)

Description of the work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevent to the task to form judgment and problem solving)
E. Operate jointer F. Operate drillpress G. Shape stock on shaper H. Shape stock on router I. Sand with machines J. Make various joints K. Cut stock on radial saw L. Sharpen machine tools		English 1. Composition - history of woodworking machines 2. Spelling 3. Speech 4. Vocabulary Math 1. Study of R.P.M. (ratio) speeds 2. Why different speeds on some machines 3. General business and business math

TRAINING PLAN FOR CAR HOPS (DRIVE-IN WAITRESS OR WAITER)

Objectives:

1. To aid students in learning how to work with other people
2. To help students become confident in their ability to take orders, serve food, and do other related duties required as a drive-in waitress or waiter.

<u>Description of the work to be performed</u> (what the student must do)	<u>Direct Related Knowledge</u> (what the student must know to perform the task):	<u>Academic Related Knowledge</u> (Knowledge relevant to th task)
I. Taking orders and giving them to cook	I. A. Public Relations B. Write legibly C. How to write down orders D. Personal hygiene E. Manners to others F. Self confidence	<u>Math</u> 1. Addition 2. Multiplicatin 3. Tax computation 4. Making correct change 5. Subtraction
II. Preparing serving tray and fountain drinks	II. A. How to operate fountain B. Ratio of ice to beverage C. Items to place on tray D. Health regulations	<u>English</u> 1. Correct speech 2. Courtesy - manners 3. Writing
III. Serving food and drinks to customers in cars	III. A. How to carry tray B. How to place tray C. Public relations	<u>Business Education</u> 1. Use of cash register 2. Health requirments fo food places <u>Home Economics</u> 1. Dress 2. Care of skin 3. Care of teeth

TRAINING PLAN FOR CAR HOPS (DRIVE -IN WAITRESS OR WAITER)
(page two)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
IV. Making out tickets	IV. A. To know food prices B. Simple math C. Tax computation D. How to make out a check	4. Care of hair 5. Care of hands 6. How to prepare a tray properly 7. Proper care of dishes 8. Personal hygiene 9. Posture and walking
V. Collecting money	V. A. Returning proper change B. Using a cash register	
VI. Collecting trays to return to kitchen	VI. A. How to remove a tray from a car B. How to clean a tray properly	

TRAINING PLAN FOR CAR WASHER & WAXER - SERVICE STATION

Objectives:
1. To learn to efficiently wash, wax and polish automobiles
2. To gain skill in dealing with people

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
I. Greeting Customer	I. A. Importance of politeness and friendliness B. Learning what the service should be to the customer C. Writing up the work order	English 1. Manners 2. Speech 3. Vocabulary 4. Writing
II. Cleaning the car	II. Selection of shops, polishes and waxes Operating the mechanical equipment	Science or Home Economics 1. Effects of chemicals 2. Effects of solvents on painted metals. 3. Dangers of electricity and water
III. Completing the work ticket	III. A. Writing the charges B. Adding the bill C. Figuring the bill D. Figuring the tax E. Writing up a credit card sale	Math 1. Addition 2. Subtraction 3. Multiplication 4. Handling money making change

TRAINING PLAN FOR CHILD CARE AIDE

Objectives:

1. To assist the teacher in the care of children left by parents during part of the day.
2. To learn the proper techniques in the care of a young child.
3. To learn to understand the expected behavior of young children and how to avoid certain problems.

Description of the Work to Be Performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevent to the task to form judgment and related problem solving)
I. Receiving child when delivered by parent - welcome child and parent. II. Removing outer garments of child and placing child in bed, play pen, or at some place to begin day's activities. III. Directing games, reading to children or teaching some simple activity (inside or outdoors) IV. Assisting child in eating, dressing, resting, and toileting.	I. Social graces A. How to greet parent and child B. How to receive special information and instructions concerning child. C. How to report on child's behavior during the day if this is expected/or special problems D. How to secure assistance in emergencies. II. Child Care How to: A. Change diapers, bathe, dress and feed an infant or young child. B. Properly discipline children who cause problems for themselves and others.	Home Economics 1. Proper care and handling of young children 2. Proper food and nutrition 3. Preparation and serving of attractive meals or refreshments 4. First aid 5. Proper sanitation and cleaning techniques. English 1. Self expression 2. Memory 3. Proper greetings, etc. 4. Proper telephone usage Social Studies 1. Emphasize traits of responsibility, caution,

TRAINING PLAN FOR CHILD CARE AIDE

(page two)

Description of the Work to be Performed (what the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevent to the task to form judgment and related problem solving)
V. Assisting child in the care of clothing and in picking up and putting away toys. VI. Assisting in maintaining discipline. VII. Serving meals or refreshments or helping in the preparation of the food. VIII. Supervision of rest periods. IX. Assisting in cleaning. X. Use of telephone in receiving messages.	C. Care for clothing - washing or laundering soiled clothing. D. Properly marking children's belongings. E. Administering first aid III. Food Preparation and Serving A. How to assist in the kitchen in the preparation of food or refreshments B. How to encourage a child to eat or try new food. C. How to properly sanitize dishes, equipment, etc. D. How to serve attractive meals and refreshments IV. Maintenance A. How to properly clean floors, walls, cribs, play pens, and other equipment. B. How to properly launder sheets, diapers, etc. C. How to store games, equipments, etc. V. Activities A. How to present "new" games and ideas to children	understanding of others. 2. Games and activities for children. Simple Mathematics In Understanding 1. pay check - hourly earnings, social security, tax, etc.

TRAINING PLAN FOR CHILD CARE AIDE
(page three)

Description of the Work to be Performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task to form judgment and related problem solving)
	B. How to manage/or supervise children in games so as to prevent behavior problems. C. How to select stories to head or tell and how to present them in the most interesting way.	

TRAINING PLAN FOR COUNTERMAN, CAFETERIA (STEAM TABLE HELPER)

Objectives:

1. To assist in the serving of food at steam tables in cafeterias or in the kitchen some restaurants.
2. To assist in other kitchen activities such as preparation of food and cleaning of kitchen and equipment.

Description of the work to be Performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
I Preparation of foods A. Preparing salads B. Preparing vegetables C. Making sandwiches D. Carving meats E. Preparation of coffee or tea, etc.	I. Preparation of food A. Assisting the cook or chief in the preparation of food. B. Willingness to take instructions, remember directions, be able to work under pressure.	Home Economics 1. Food preparation 2. Proper utensils 3. Proper serving 4. Cleaning techniques 5. Storage of equipment English 1. Manners and courtesy 2. Speech 3. Memory
II. Setting up counter A. Food B. Dishes C. Silver D. Napkins, trays, etc.	II. Setting up counter A. Knowledge of people and proper arrangement of food & counter B. Knowledge of ways in which food can be made more appetizing and appealing.	Social Studies 1. Getting along with others 2. Dependability 3. Conditions to expect, etc.

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TRAINING PLAN FOR COUNTERMAN, CAFETERIA (STEAM TABLE HELPER)
(page two)

Description of the work to be preformed. (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
	C. Must be sure that proper equipment is available for food service.	
III. Replenish the above items	III. A. Consciousness of need to replenish food, dishes, silver, etc.	
IV. Serving food on plates, or individual dishes. Adding garnishes or relishes if instructed by supervisor	IV. Serving A. Knowledge of proper amounts of food and proper arrangement on plate. Of food selected. B. Keeping area clean and attractive at all times.	
V. Scrub and polish counters, steam tables and other equipment.	V. Cleaning up A. Knowledge of proper use of cleaning equipment, sanitizing procedures, proper washing and scrubing of dishes, pots, pans. B. Knowledge of proper storage of equipment.	

TRAINING PLAN FOR DRUG STORE CLERK (SALES)

Objectives:

1. To begin to perform the duties of a drugstore sales clerk
2. To gain more skill in dealing with people
3. To learn to obtain the skills to operate cash register

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
I. Meeting the customer	I. A. Importance of a courteous and friendly attitude B. Recieving prescription slips	English 1. Speech 2. Courtesy-manners 3. Vocabulary 4. Writing
II. Looking up every perscription	II. A. Procedure used in looking up perscriptions for druggist B. Placing perscription slips to be filled	Math 1. Simple addition 2. Subtraction 3. Computing sales tax 4. Giving refunds 5. Giving correct change 6. Making out receipts
III. Serving the customer	III. A. Selling techniques B. Study of personality trait C. Leading customer to needed items	Home Economics 1. Personal Hygiene 2. Care of equipment 3. Study of cleaning agents 4. Color coordinator 5. Eye catching arrangements

TRAINING PLAN FOR DRUG STORE CLERK (SALES)
(page two)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
IV. Recieving money A. Cash payments B. Charge accounts C Making out receipts D. Giving change	IV. A. Types of sales and charge slips B. Kinds of receipts C. Use of receipts D. How to charge items to accounts E. Making correct change F. Procedure for giving change G. State and Federal Taxes	
V. Operating a cash register A. Techniques of operation B. Proper maintenance of register C. Changing tape	V. A. Types and uses of cash register B. Correct operation of register C. Procedure for changing tape of register	

TRAINING PLAN FOR FLOOR LAYERS

Objectives:
1. To develop skill in installation of flooring.
2. To learn types of surfaces and floorings and care of each.
3. To develop skill in measuring and matching section of flooring.

Description of work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (knowledge relevant to the task to assist judgment and problem-solving)
I. Preparation of surface A. Cleaning B. Measuring C. Removing materials II. Resurfacing A. Measuring B. Choosing materials III. Installation of flooring A. Cutting B. Nails or adhesive IV. Repair A. Measuring B. Matching C. Installation V. Billing A. Figuring cost B. Completing reports	I. Surfaces A. Knowledge of types of surfaces 1. Care of surfaces 2. Cleaning procedures B. Ability to measure correctly II. Resurfacing A. Ability to select proper materials III. Installation A. Ability and skill in cutting and matching covering B. Skill to use tools IV. Repair A. Knowledge of proper procedure for cutting and matching V. Billing A. Knowledge of service charges B. Ability to figure costs	English 1. Vocabulary 2. Courtesy 3. Handwriting Math 1. Measurements 2. Figuring costs 3. Basic arithmetic skills Home Economics 1. Courtesy 2. Hygiene 3. Personality 4. Safety 5. Surfaces Industrial Arts 1. Safety 2. Care of tools 3. Use of tools 4. Measurements 5. Materials 6. Surfaces

TRAINING PLAN FOR A GROCERY WAREHOUSE ASSISTANT

Objectives:

1. To gain a general understanding of procedures and operations of a grocery warehouse.
2. To gain experience in working with stock in large quantities.
3. To show the potential that lies in this area of work.

Description of the work to be preformed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task to form judgment and related problem solving)
I. Receiving and Shipping A. Keeping a record of items received or shipped B. Keeping record of a stock on hand C. Sorting stock D. Filing of invoices and records E. Know equipment and personnel needed	I. 1. Knowledge of the stock and area it is stored in. 2. Knowledge of the different ways of storing-dry refrigeration, etc. 3. Familiarity with invoices and ability to fill them out.	English 1. Correct speech. 2. Reading skills-for orders, invoices, and receipts. 3. Lettering skills. 4. Mastery of symbols used in the grocery business. Mathematics 1. Measurement 2. Fractions 3. Basic skills of math for weighing, etc. 4. Cost problems
II. Stock Arrangement A. Stacking of stock using proper ways B. Removal of damaged stock C. Disposal of packing materials	II. A. Ability to handle heavy loads B. Knowing the proper ways to arrange stock C. How to use clearing equipment to make way	Industrial Arts 1. Personal safety 2. Use of electrical equipment 3. Practice in working with cutting tools

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TRAINING PLAN FOR A GROCERY WAREHOUSE ASSISTANT
(page two)

Description of the work to be preformed (what the student must do)	Direct Related Knowledge (what the student must know to preform the task)	Academic Related Knowledge (Knowledge relevant to the task to form judgment and related problem solving)
	for new stock	
III. Inventory A. Counting of large quantities of materials on hand B. Weighing of items C. Filling out inventory reports	III. 1. Ability to be accurate 2. Able to use scales 3. Write legibly 4. Use of simple calculators 5. Follow directions	III. Mathematics 1. Good computational skills 2. Review of basic addition 3. Neatness of work English 1. Legible writing 2. Spelling words that relate to grocery terminology 3. Speech talking with many people
IV. General cleaning A. Sweeping B. Waxing C. Cleaning stock	IV. 1. Use of available materials 2. Knowledge of special areas to be cleaned 3. Knowledge of rules of the sanitary department	IV. Science 1. Knowledge of safe chemicals 2. Bacteriology

TRAINING PLAN FOR HELPER IN PET SHOP

OR VETERINARY HOSPITAL

Objectives:

1. To assist the veterinarian in the care and treatment of animals.
2. To assist in the general care and cleaning of the shop or hospital.

Description of the work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task to form judgment and related problem solving)
I. Care of animals A. Handling and treatment of animals B. Grooming of animals C. Feeding of animals D. Proper treatment of dead animals	I. Care of animals The ability to follow the doctors' instructions in each of the following: A. Knowledge concerning temperament of animals B. Knowledge concerning first aid of injured or sick animals C. Knowledge of the proper feeding of animals	English 1. Telephone usage 2. Alphabetizing 3. Record keeping and letter writing 4. Preparation of reports Math 1. Basic math skills 2. Figuring bills and cost 3. Checking invoices and orders 4. Making change 5. Basic bookkeeping
II. Care of building A. Cleaning cages, feeding pans, water pans, floors, etc. B. Reception areas C. Examination and/or treatment rooms	II. Care of building A. Use and care of vacuum cleaners B. Use of broom and dust pan	Social Studies Project and/or individual study of animals and their care

TRAINING PLAN FOR HELPER IN PET SHOP
OR VETERINARY HOSPITAL
(page two)

Description of the work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task to form judgment and related problem solving)
III. Receiving clients and facts	C. Dusting techniques D. Mop, disinfectant and deodorizer	
IV. Ordering medicinal supplies, food, etc.	III. Office procedure A. How to fill out forms B. How to fuse telephone and receive messages C. How to keep and file records D. How to explain services E. How to make out statements and bills F. How to keep books G. How to make change H. How to make appointments I. How to make out orders according to the doctor's instructions J. How to type orders	

TRAINING PLAN FOR HELPER IN PET SHOP OR
VETERINARY HOSPITAL
(page three)

Description of the work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task to form judgment and related problem solving)
	K. How to receive and check orders L. How to store supplies	

TRAINING PLAN FOR HOSPITAL ROOM CLEANING (HELPER)

Objectives:
1. To learn the importance of cleanliness to the health and safety of patients.
2. To acquire the skills and knowledge necessary to perform the tasks assigned to this occupation.

Discription of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
I. Locating room in hospital to be cleaned	I. Location A. To become familiar with the general floor plan of the hospital and specifically all areas where equipment supplies, etc. are stored. B. To become throughly acquanted with the assigned area, supervisors, equipment etc.	Home Economics 1. How to make hospital beds 2. The importance of proper care of dirty linens 3. Disenfectants, their used, prepartion, limitations and dangers 4. Proper usage and care of cleaning equipment 5. Importance of good h health and precautions to be observed in working with the sick
II. Cleaning of room	II. Cleaning of room A. To learn the correct way of making hospital beds B. To learn the location of all clean linens and how to secure them C. To learn how to treat dirty linens from a room which may house a patient with a communicable disease - and how to	English 1. Importance of following instructions

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TRAINING PLAN FOR HOSPITAL ROOM CLEANING (HELPER)
(page two)

Description of the work to be Performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
	dispose of all other linens D. To learn how to clean all furniture in the room before a new patient is admitted E. To learn how to properly move furniture hand drapes, curtains, etc. if so instructed. F. To learn how to properly clean all ash trays and cuspidors G. To learn how to properly clean and disinfect the ash trays, bathroom, fixtures and floors. H. To learn how to properly sweep, dust, and vacum I. To learn how to properly replenish guest room supplies and linens J. To learn how to properly dispose of all trash K. To learn how to mop floors L. To learn how to properly respond to emergencies such as spills, breakage, etc.	

TRAINING PLAN FOF INDUSTRIAL ARTS AIDE

Objectives:
1. To introduce the students to basic shop work.
2. To develop skills and competences in a student to enable him to assist the industrial arts teacher.
3. To teach knowledge that will develop a safety oriented student.

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (knowledge relevant to the task to assist judgment and problem-solving)
I. To be responsible for the safe-keeping of equipment A. Making daily check B. Checking out tools and equipment in. C. Checking tools and equipment in D. Reporting any damage to the equipment	1. To be familiar with various tools 2. Knowledge of proper storage for equipment 3. Filling out check sheets 4. Filling out inventory sheets.	Industrial Arts 1. Names of equipment 2. Safe handling of tools 3. Proper storage method English 1. Correct speech 2. Manners 3. Spelling of related words 4. Writing with a good handwriting
II. To help with simple repair of equipment A. Replacing broken handles B. Replacing missing screws and bolts C. Replacing of broken parts of lathes, drills, etc.	1. How to properly use wrenches and hand tools 2. Proper techniques in installing replacement parts	Industrial Arts 1. Use of tools 2. How to make simple replacement parts Math 1. Study of forces 2. Costs of new parts

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TRAINING PLAN FOR INDUSTRIAL ARTS AIDE
(page two)

Description for the work to be Performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task to form judgment and related problem solving)
		Science 1. Simple tools 2. Alloys 3. Tension and pressure
III. Cleaning of the shop A. Removing grease, oils and paints B. Sweeping of floor C. Disposal of excess wood and left-over materials	1. How to use paint and grease removers 2. Selection and use of sweeping compounds.	Science 1. Solvents-make up and selection 2. Chemical make-up of paints and oils 3. Fire extinguishers for various kinds of fires

TRAINING PLAN FOR LOCAL TRUCK DRIVER

Objectives:

1. To develop driving skills in safety.
2. To develop the ability to make small mechanical repairs.
3. To develop the ability to deliver and pick up freight and carry it through the proper channels.

Description of work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (knowledge relevant to the task to assist judgment and problem-solving)
I. Driving A. Delivery B. Pick up II. Loading--Pack freight III. Unloading--Work hoist or cable winch IV. Minor mechanical repairs A. Change tires B. Small repairs V. Check freight bills--daily reports	I. Driving A. Safety rules knowledge B. Ability to pass driver's test C. How to make a pick up or delivery II. Loading--knowledge of packing freight III. Unloading--Ability to use work hoist or cable winch IV. Repairs A. Ability to change tires B. Knowledge of engine parts V. Bills A. Knowledge of billing procedures B. Knowledge of reports and records	English 1. Speech 2. Handwriting 3. Courtesy 4. Directions 5. Listening Math 1. Basic arithmetic skills 2. Fill out reports 3. Check bills Home Econonics 1. Courtesy 2. Hygiene 3. Safety 4. Grooming 5. Behavior Industrial Arts 1. Safety 2. Small repairs 3. Equipment 4. Lifting

TRAINING PLAN FOR NURSES' AIDE

Description Of Work To Be Performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task to form judgment and problem solving)
I. General duties (in office) A. Take notes efficiently B. Answer the telephone politely C. Keep office neat D. Neat appearance E. Be able to file F. Use adding machine	I. A. How to take notes B. How to keep office neat C. How to file D. Knowledge of using adding machine	English 1. Speech 2. Courtesy 3. Spelling 4. Telephone manners Math 1. General math skills 2. Use of adding machine
II. General duties (in the hospital) A. Make up bed for patients B. Give patient back rubs if required C. Take temperature and blood pressure	II. A. Methods of making up hospital beds B. Ability to give back rubs (knowledge of different lotions) C. Ability to take temperature and blood pressure D. Be aquainted with ways on how to get patients ready for minor and major surgery	Biology 1. Anatomy 2. Study of diseases 3. Study of hygiene Science 1. Temperatures

TRAINING PLAN FOR PIANO TECHNICIAN'S AIDE

Description of work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
I. General duties A. Customer Contact B. Sales Personality	I. A. How to be courteous B. Proper approach to customer C. Good telephone manners	English 1. Speech 2. Courtesey 3. Telephone manners
II. Routine Knowledge A. Know the piano functions B. Know the different parts C. Know how to prepare parts D. Know how to replace strings E. Know how to tune	II. Know the different parts of the piano A. Hammer Beett B. Shang C. Back Stop D. Bridle Strip E. Hammer Rail F. Front Rail felt G. Back Rail felt H. Center Rail felt	Woodshop 1. Different wood for pianos 2. How to repair 3. Proper use of tools Music 1. Music appreciation 2. History of pianos Math 1. Bookkeeping 2. Basic math

TRAINING PLAN FOR RECREATION CENTER ASSISTANT

Objectives:

1. To introduce the student to basic job skills.
2. To teach skills in working with groups and attitudes that are needed for success.
3. To become knowledgeable about careers in the recreation business.

Description of work to be performed (what the student must do)	Direct Related knowledge (what the student must know to perform the task)	Academic Related Knowledge (knowledge relevant to the task to assist judgment and problem-solving)
I. Assisting with minor duties A. Checking out materials B. Checking for behavior and reminding people of safety rules C. Removing of dangerour articles from the activity areas D. Cleaning the center E. Answering the telephone and delivering any messages to participants F. Giving information	I. A. Knowledge of basic principles of recreation B. Knowledge of equipment used in the center C. Knowledge of the rules that the center has D. Proper techniques in answering the telephone E. How to use the cleaning equipment	English 1. Good speech in everyday conversation 2. Telephone manners 3. Reading skills - reading directions, etc. 4. How to meet people 5. Personality 6. How to present a good impression 7. Writing directions 8. Oral lessons on "How To Do It" Science 1. Study of cleaning fluids and correct use 2. Reaction of wood to various chemical cleaners 3. Study of glazes and paints 4. Study of the effects of temperature on ceramics

TRAINING PLAN FOR RECREATION CENTER ASSISTANT

(page two)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (What the student must know to perform the task.)	Academic Related Knowledge (Knowledge relevant to the task)
II. Assisting with young children and other groups A. In group games B. In basketball C. In tennis D. In volleyball E. In ceramics F. In simple dances	II. A. A knowledge of rules for each game or activity B. Some skills in maintaining group control C. Use of equipment in teaching the different games D. Use of glazes in ceramics and how to handle it E. Use of ceramic equipment F. Treatment of minor scratches and cuts	<u>Home Economics</u> 1. Theory of teaching young children 2. How to get along with people 3. Simple first aid <u>Industrial Arts</u> 1. Study of furnaces 2. Study of electrical wiring 3. Study of heating elements
III. Assisting with special shows A. Flower shows B. Coin shows C. Club Meetings D. Other activities	III. A. Welcome people B. Help with problems C. Assist with decorations D. Help with cleaning	

TRAINING PLAN FOR ROOFER APPRENTICE

Objectives:

1. To develop skill in using tools.
2. To learn the application procedures for each type of roofing.

Description of work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (knowledge relevant to the task to assist judgment and problem-sloving)
I. Know the materials A. Types of roofing B. Suitability C. Application procedures II. Prepare necessary tools A. Roofing knives B. Adhesives or tacks C. Pincers D. Caulking guns III. Apply roofing to surface IV. Billing	I. Materials A. Knowledge of roofing equipment and tools B. Knowledge of types or roofing C. Knowledge of application procedures II. Tools A. Knowledge of necessary equipment and use B. Ability to use equipment III. Application A. Skill in applying roofing IV. Billing A. Knowledge of company billing procedure B. Ability to figure cost of jobs	English 1. speech 2. Vocabulary 3. Listening skills Math 1. Figuring area 2. Basic arithmetic skills 3. Figuring costs Home Economics 1. Hygiene 2. Safety 3. Personality 4. Care of equipment and tools Industrial Arts 1. Tools 2. Use of tools 3. Types of roofing 4. Preparation of surfaces 5. Safety 6. Terminology 7. Care of equipment and tools

TRAINING PLAN FOR SALES CLERK - FABRIC SHOP

Objectives
1. To learn to sell fabrics & accessories
2. To effectively deal with people
3. To be able to handle cash sales

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
I. Greeting Customers	I. A. Importance of courtesy B. Pleasant personality	English 1. Speech 2. Vocabulary 3. Writing 4. Courtesy & manners
II. Making the sale	II. A. Knowledge of Fabrics B. Style and fiber content C. Knowledge of colors D. Knowledge of current fashions in clothing and draperies	Home Economics 1. Fabrics 2. Fashion 3. Design 4. Interior Decorating
III. Measuring the goods	III. A. Knowledge of yardages and fractions	Art 1. Colors
IV. Writing up the sales ticket	IV. A. Making out the sales slip B. Figuring out the amount of the sale & sales tax C. Making change	Math 1. Linear measurement 2. Multiplication 3. Addition 4. Fractions

TRAINING PLAN FOR SHOE SALESMAN

Objectives:
1. Knowledge of types of shoes and styles
2. Develop an understanding of customer desires and needs
3. Develop sales techniques and personal appearance

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
I. Knowledge of shoes A. Working knowledge of styles B. Typical customer desires C. A working knowledge of shoes	I. Knowledge of shoes A. History of shoes 1. Ancient 2. Modern B. Manufacture of shoes 1. Types of heels, soles 2. Materials used C. Shoe styles 1. Desired by men according to age 2. Desired by women according to age D. Understanding of shoe sizes E. Importance of correct sizing	Social Studies 1. History of footwear 2. Styles through history and how they change Home Economics 1. Styles Industrial Arts 1. Shoe constructions 2. Machinery & tools used Science 1. Study of natural materials 2. Study of synthetic materials
II. Knowledge of stock A. How to organize stock by style, number and size B. How to inventory	II. Knowledge of stock A. Ability to understand stocking procedures 1. Stock numbers 2. Size marking	Math 1. Study of shoe sizing 2. Basic measurements Health 1. Foot care

TRAINING PLAN FOR SHOE SALESMAN
(page two)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
	B. Knowledge of inventory control and ordering 1. Standard inventory techniques 2. Standard purchasing forms	2. Shoe sizing Math 1. Simple arithmetic skills 2. Basic business arithmetic 3. Simple accounting English 1. Understanding order forms 2. Understanding purchasing procedures
III. Sales Techniques A. Ability to find proper shoe B. Ability to measure feet correctly C. Ability to make the sale	III. Sales Techniques A. Understanding customer wants B. Understanding operation of foot measuring device C. Understanding of sales conversation with consumer	English 1 Basic communication skills 2. Proper speech patterns 3. Proper manners Math 1. Understanding use of measuring devices
IV. Personal appearance A. Dressed in a manner which is acceptable to the average customer B. Groomed	IV. Personal appearance A. Ability to choose proper clothes B. Desire to wear them properly C. Desire to keep them clean	Home Economics 1. Clothing care 2. Clothing selection

TRAINING PLAN FOR SHOE SALESMAN
(page three)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
	D. Development of good grooming habits 1. General 2. Hands, nails 3. Hair 4. Teeth	Health 1. Personal hygiene English 1. Understanding of importance of appearance Science 1. Knowledge of the need for good hygiene
V. Sales completion A. Ability to properly conclude a sale	V. Sales Completion A. Cash register 1. Operation 2. How to make change B. Knowledge of how to write sales slips C. Understanding packaging of the product after the sale	Math 1. Cash register operation 2. Basic math concepts 3. Ability to understand charge 4. Understanding credit Business Classes 1. Sales slips English 1. Neatness in penmanship Industrial Arts 1. Proper packaging

TRAINING PLAN FOR SHOE SALESMAN
(page four)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
VI. Store Merchandising A. Arrange display windows B. Arrange interior displays	VI. A. Understan[illegible]chniques of merchandi[illegible] B. Ability to make signs C. Understanding of appealing art work, etc.	Art 1. Ability to make signs 2. Ability to make pleasing arrangements Industrial Arts 1. Knowledge of how to manufacture display equipment Math 1. Basic measurements

TRAINING PLAN FOR SIGN PAINTER'S AIDE

Objectives:

1. To learn about the nature and history of sign painting.
2. To gain an overview of sign construction and design.
3. To gain an appreciation and use of materials, tools and processes.
4. To gain in prepartion for an occupation

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (knowledge relevant to the task)
I. Constructing Signs	I.	Industrial Arts
A. Prepare wood for paint	A. Preparing wood for paint	A. Preparation of materials for finishing
B. Prepare metal for paint	B. Preparing metal for paint	B. Construction techniques
C. Select materials	C. Selecting materials	C. Selecting materials
D. Construct sign frames	D. Constructing sign frames	D. Applying finishes
E. Sand signs	E. Standing signs	
F. Prepare used materials for paint	F. Preparing used materials for paint	
II. Mixing of Paints	II.	Math
A. Mix prime	A. Mixing primers	A. Proportions of mixing
B. Mix gloss	B. Mixing gloss	B. Estimating and pricing paints and materials
C. Mix flat	C. Mixing flat	C. Spacing and proportion
D. Mix paints for glass	D. Mixing paints for glass	D. Guideline dimensions
E. Mix paints for wood	E. Mixing paints for wood	
F. Mix paints for metal	F. Mixing paints for metal	
G. Mix paints for cloth and paper	G. Mixing paints for cloth and paper	
H. Gild	H. Gilding	
I. Mix paints for silk screen printing	I. Mixing paints for silk and screen painting	
J. Mix colors	J. Mixing colors	

TRAINING PLAN FOR SIGN PAINTER'S AIDE
(page two)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
III. Painting, Layout & Lettering	III.	Lettering
A. Apply brush coat	A. Applying brush coat	Making frames
B. Apply spray coat	B. Applying spray coat	
C. Make guide lines, pounce and chalk lines	C. Color scheme	English
D. Draw illustrations	D. Spacing and proportioning	1. Speech
E. Select letters to fit message	E. Using guide lines	2. Courtesy
F. Letter	F. Drawing illustrations	3. Composition (history)
G. Letter with a pen	G. Selecting letters	4. General Shop safety
H. Letter with brush	H. Lettering with pen and brush	5. Use of hand tools
I. Construct wood letters	I. Lettering	6. Selection of materials
J. Attach letters to background	J. Constructing wood letters	
	K. Attaching letters	
IV. Processing	IV.	
A. Make silk screen frame	A. Making silk screen frame	
B. Stretch silk on frame	B. Stretching silk on frame	
C. Cut the film	C. Cutting the film	
D. Affix the lacquer film to silk	D. Affixing the lacquer film to silk	
E. Affix shellac film to silk	E. Affixing shellac film to silk	
F. Register the print	F. Registering the print	
G. Print the copy	G. Printing the copy	
H. Remove the stencil	H. Remove the stencil	
I. Prepare photo stencil	I. Preparing photo stencils	

TRAINING PLAN FOR SIGN PAINTER'S AIDE
(page three)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
V. Materials and Equipment	V.	
A. Care for equipment and materials	A. Caring for equipment and materials	
B. Buy Utensils & paints	B. Buying paints	
C. Make estimates	C. Estimating	
D. Keep inventory	D. Keeping inventory	
E. Erect signs	E. Erecting signs	
F. Keep shop clean	F. Keeping shop clean	
	G. Safety	

TRAINING PLAN FOR SUPERMARKET STOCK BOX

Objectives:

1. To learn to perform the duties of a stock box in a supermarket efficiently
2. To learn to deal with people successfully

Description of the work to be performed. (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
I. Inventory the store	I. A. Reading the stock sheet B. Writing up shortages	English 1. Vocabulary 2. Writing 3. Reading 4. Manners and courtesy
II. Stocking the shelves	II. A. Correct way to lift B. Pricing the merchandise	Health 1. Personal hygiene 2. Muscle functions
III. Special service to customers	III. A. Importance of courtesy to customers B. Locating wanted items	Math 1. Simple addition and subtraction 2. Pricing and money 3. Knowledge of computer print outs
IV. Building Displays	IV. A. How to stack cans and boxes B. Proper display sizes	Arts 1. Shapes and balance

TRAINING PLAN FOR TICKET SELLER FOR THEATER

Objectives:

1. To learn to answer inquires courteously and accurately.
2. To learn to make change quickly and accurately.
3. To learn how to respond properly to emergencies:
   - a. hold up
   - b. counterfeit
   - c. requests to look for child or frien in theater, etc.
   - d. how to summon help

Description of the work to be performed (what the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevent to the task to form judgment and related problem solving)
I. Kinds of admissions A. Matinee B. Reserved seats C. General admissions D. Child and Adult tickets II. Types of movies A. Ratings B. Identification required C. Coming movies III. Operation of ticket dispensing machine. IV. Receiving payment for tickets	I. Admission A. When rates change for matinees, etc. B. How long one may hold reservations, etc. C. How to determine age of person who requests a child's ticket D. When refunds, if any, are made II. Types of movies A. Knowledge of ratings and explanations of each type. B. Knowledge concerning proof of age, chaperons or parents presence. C. Information concerning coming movies, etc.	Math Basic mathematics skills in 1. Figuring costs 2. Making change 3. Balancing report English 1. Telephone usage 2. Speech 3. Answering questions 4. Courtesy and good manners.

TRAINING PLAN FOR TICKET SELLER FOR THEATER
(page two)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (knowledge relevent to the task to form judment and related problem solving)
V. Keeping records A. Daily balance sheet of cash received and tickets sold. B. Preparation weekly reports of the above VI. Closing of ticket window A. Preparation to close by removal of tickets and money B. Locking up	D. Knowledge of correct telephone usage III. Operation of ticket machine A. Knowledge of how to operate the machine and make minor adjustments such as installation of new ticket rolls or the hand tearing of admission tickets IV. Receiving payment for tickets A. How to determine the amount to be charged B. How to make correct change accurately and quickly C. How to handle criticism or challenges of incorrect change	

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TRAINING PLAN FOR TICKET SELLER FOR THEATER

(page three)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevent to the task to form judgment and related problem solving)
	V. Keeping records A. Knowledge concerning the way daily sales and money received must check out VI. Closing of ticket window A. Removal of tickets checking to see if proper information is recorded B. Removal of cash - checking in both cash and tickets to manager C. Turning off lights and locking office	

TRAINING PLAN FOR A TRUCK FARM ASSISTANT

Objectives:

1. To gain knowledge of general maintenance and cleaning on a truck farm.
2. To gain the ability to maintain and service general farm machinery.
3. To gain a knowledge of various produce grown and steps in planting, cultivating, harvesting, and marketing.

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must krow to perform the task)	Academic Related Knowledge Knowledge relevant to the task)
I. Maintenance and cleaning of the farm A. Cleaning of building and grounds B. Use of cleaning materials C. Painting of storage bins and sheds	I. A. Basic principals of cleaning using hoses and compounds B. How to mix cleaning materials C. How to mix paints properly D. Correct methods of painting	Science A. Chemical make-up of paints and cleaning materials B. Paint thinners C. Basic chemical symbols D. Knowledge of solvents E. Study of friction and heat F. Lubricants and what they do.
II. Maintenance of farm equipment A. Lubrication of farm machinery B. Servicing of tractors and power equipment C. Cleaning of the equipment	II. A. How to remove greases and oils B. How to lubricate tractors and etc. C. How to change oil C. How to replace air cleaners D. How to clean fuel lines E. Checking for loose bolts and belts	Industrial Arts A. Proper care of tools B. Practice in painting C. Uses of various paints

TRAINING PLAN FOR A TRUCK FARM ASSISTANT
(page two)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
III. Basic jobs about the crops grown on a truck farm. A. Planting of crops B. Cultivation of crops C. Tending of the crops D. Fertilization of crops E. Harvesting of the crops F. Packing of the produce G. Transporting the produce H. Marketing the produce	III. A. How to prepare the soil B. How to fertilize and plant the seeds C. How to cultivate the plants D. Proper methods of harvesting the crops E. Methods of grading F. Methods of boxing G. How to load food **produce** H. Techniques of marketing	D. Practice in cleaning of filters E. Practice in checking of fuel lines F. Study of internal combustion engines G. Discussion of ways of keeping an engine in good operating condition H. Identification of various produce grown I. Identification of various weeds and plants J. Study of fertilizers and their chemical make-up K. Study of various soils and their properties L. Study of soil conservation M. Study of the plant kingdom Mathematics A. Knowledge of various

TRAINING PLAN FOR A TRUCK FARM ASSISTANT
(page three)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
		units of weight and how to work with them. B. Knowledge of scales and their use C. How to figure costs of production and them profits.

TRAINING PLAN FOR TYPING ASSISTANT

Objective: To provide the student with enough knowledge to be able to perform the duties of a typist successfully.

Description of the Work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (knowledge relevant to the task to assist judgment and problem-solving)
I. Typing correspondence II. Typing from a dictaphone III. Performing various office techniques IV. Filing	I. Correspondence A. Learn to type attractive and well-spaced letters B. Learn to make accurate tabulations C. Learn to proofread accurately D. Develop typing speed and accuracy E. Learn to prepare and type telegrams and other correspondence F. Learn to use the correct paper II. Typing from a dictaphone A. Develop skill of using a dictaphone B. Learn to operate a dictaphone properly III. Office techniques A. Learn to handle materials efficiently B. Learn to organize work according to the need. C. Learn to work under pressure efficiently	Business Education 1. Typing speed and accuracy 2. Typing various forms and letters 3. Office procedures 4. Filing 5. Using a dictaphone 6. Proofreading English 1. Spelling 2. Vocabulary 3. Punctuation 4. Letter form Math 1. Measurements (tabulation) 2. Converting inches to typewriter lines and spaces

TRAINING PLAN FOR TYPING ASSISTANT
(page two)

Description of the Work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevent to the task to form judgment and related problem-solving)
	D. Develop a skill in performing various office work swiftly and accurately E. Take responsibility for one's own work IV. Filing A. Learn procedure for filing work B. Importance of an efficient filing system C. Learning to keep work in orderly fashion until filing	

TRAINING PLAN FOR USHER

Objectives:

1. To familiarize student with the duties of an usher
2. To provide an opportunity for student to gain the self-confidence he needs to be successful in this job.
3. To help the student be aware of himself and others.

<u>Description of the work to be performed</u> (What the student must do)	<u>Direct Related Knowledge</u> (What the student must know to perform the task)	<u>Academic Related Knowledge</u> (Knowledge relevent to the task to form judgment and related problem solving)
I. Directing patrons to seats A. Use of ticket stubs B. Watching empty seats C. Using flashlight	I. A. Public relations B. Locating seats from a ticket stub C. How to use a flashlight properly in a theater D. Escorting procedures	<u>English</u> 1. Speech - correctness, loudness, pronunciation, etc. 2. Courtesy - manners 3. Reading <u>Math</u> 1. Adding simple numbers <u>Home Economics</u> 1. Care of hair, hands, teeth, etc. 2. Proper dress 3. Correct procedure 4. Escorting procedures etiquette 5. Importance of self-control
II. Answering questions for patrons A. Restrooms and exits B. Refreshment stands C. Coming attractions, etc	II. A. Public relations B. Personal hygiene C. Importance of knowing the theater well (exits in case of emergency)	
III. Handing out programs and paging patrons	III. A. Procedure for handing out programs B. How to use loud speakers	

TRAINING PLAN FOR USHER
(page two)

Description of the work to be performed (What the student must do)	Direct Related Knowledge (What the student must know to perform the task)	Academic Related Knowledge (Knowledge relevent to the task to form judgment and related problem solving)
	C. Procedure for locating a patron	

TRAINING PLAN FOR WORKER-BUILDING SUPPLIES OUTLET

Objective:
To acquire the overall knowledge that a general employee must have.

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
I. Meeting the public	I. A. Knowledge of manners B. Knowledge of sales technique	English 1. Good speech, diction 2. Reading 3. Spelling 4. Grooming manners 5. Invoicing
II. Inventory and cleaning	II. Knowledge of: A. Linear feet B. Square feet C. Board feet D. Cubic units - volume	Math 1. Areas 2. Linear 3. Volumes 4. Fractions 5. Rates and discounts 6. Angles
III. Storage and stocking of supplies and materials	III. Types of materials to use on various jobs. A. Example: Shingles vs rock B. Example: 1/4" vs 1/2" plyboards	Science 1. Balancing, vectors, counter-weight 2. Compound compositions 3. Pigments 4. Friction 5. Gravity 6. Adhesion

TRAINING PLAN FOR WORKER - BUILDER SUPPLIES OUTLET

(page two)

Description of the work to be performed (what the student must do)	Direct Related Knowledge (what the student must know to perform the task)	Academic Related Knowledge (Knowledge relevant to the task)
IV. Loading, Locating and unloading lumber etc.	IV. A. Loading techniques B. Lifting and handling technique	
V. Taking and recipting orders	V. A. How to read and ill contractor orders B. Billing techniques	

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MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 71 95P.

DESCRIPTORS - *EDUCATIONAL COORDINATION; *VOCATIONAL EDUCATION; *STATE PROGRAMS; *CURRICULUM PLANNING; CORE CURRICULUM; *ACADEMIC EDUCATION; VOCATIONAL DEVELOPMENT; TEACHING PROCEDURES; WORKSHEETS; RESOURCE MATERIALS; STUDENT PROJECTS; SECONDARY GRADES; HUMANITIES
IDENTIFIERS - ATTITUDES APPRECIATIONS; CAREER AWARENESS; EPDA; EDUCATION PROFESSIONS DEVELOPMENT ACT

ABSTRACT - THIS INSTRUCTIONAL MATRIX FOR A COORDINATED VOCATIONAL-ACADEMIC EDUCATION PROGRAM IN GEORGIA WAS DEVELOPED BY REGIONAL PROGRAM COORDINATORS ENROLLED IN AN INTERNSHIP AT THE UNIVERSITY OF GEORGIA IN ORDER TO AID THE VOCATIONAL TEACHER-COORDINATOR IN CURRICULUM PLANNING. THE 29 SUGGESTED INSTRUCTIONAL UNITS COVER SUCH TOPICS AS: (1) CHOOSING A CAREER, (2) CONSUMER EDUCATION, (3) INTERPERSONAL RELATIONSHIPS, AND (4) GETTING AND KEEPING A JOB. FOR EACH OF THE FIVE SCHOOLDAYS IN THE WEEK, LEARNING ACTIVITIES, STUDENT PROJECTS, TEACHING TECHNIQUES, AND RESOURCE MATERIALS ARE LISTED FOR EACH TOPIC IN 6-COLUMN, 2-PAGE FORMATS. THIS CORE CURRICULUM INCLUDES A TEACHER'S WORKSHEET FOR NOTES ABOUT ON-THE-JOB WORK EXPERIENCES, CLASSROOM OR LABORATORY SIMULATION, FOLLOW-UP IDEAS, AND STUDENT EVALUATION PROCEDURES. (AG)

CVAE

Coordinated Vocational Academic Education

Instructional Matrix

Prepared by:
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Division of Vocational Education
University of Georgia
Athens, Georgia
July, 1970 - June, 1971

ACKNOWLEDGEMENTS

This C.V.A.E. *Instructional Matrix* was prepared during the school year 1970-1971 by Georgia C.V.A.E. coordinators enrolled in an internship at the University of Georgia.

The training of the coordinators was conducted by the Division of Vocational Education, College of Education of the University of Georgia, Athens, Georgia. Funds were made available from the following cooperating agencies:

Division of Vocational Education
Georgia State Department of Education
Atlanta, Georgia

and

Education Professions Development Act, Part F
U.S. Office of Education
Department of Health, Education and Welfare
Washington, D.C.

We are indebted to the following individuals for contributing their special talents:

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PREFACE

This Instructional Matrix should assist the C.V.A.E. Coordinator as he plans to activate his curriculum. It should stimulate creative teaching through a "total approach"...set specifically to the needs of each student. The various topics covered in this manual are presented as suggestions and the coordinator should strive to improve on each matrix model.

After each two page spread containing one unit of instruction the teacher coordinator will find a page with the following:

ON THE JOB WORK EXPERIENCES
CLASSROOM OR LABORATORY SIMULATION
FOLLOW-UP
EVALUATION

This "work" page is provided as a convenience in designing the learning processes to fit the local needs of individual programs and students. Write in the experiences and processes that work for you and make note of those that prove to be unsatisfactory. Check with other coordinators and seek their advice and suggestions.

FOR A SAMPLE WORK SHEET (COMPLETED) TURN THE PAGE....................

SAMPLE

" A More Attractive You"

ON THE JOB WORK EXPERIENCE:

1. Have students observe and evaluate full time employees concerning dress and grooming, poise, and other factors of "A More Attractive You."
2. Does an employer have the right to request boys to cut their hair? To have girls wear their hair up?

CLASSROOM AND LABORATORY SIMULATION:

1. Practice walking in front of a full length mirror... checking the various points of good grooming.
2. Boys: Discuss hair styles worn by class members and are they correct for where they are now working?
3. Girls: Discuss and practice make-up application and hair styling.

FOLLOW-UP:

1. During coordination visits observe hair styles and dress. Discuss employer's policies and wishes.
2. Note changes in hair styles and grooming after teaching the unit.

EVALUATION:

1. Check personal responses of students to unit.
2. Changes observed.
3. Note Changes to be made the next time unit is offered.
4. Discuss length of unit with students.
5. Evaluation by team teachers and employers.

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A MORE ATTRACTIVE YOU

	MONDAY	TUESDAY
CONTENT	Unit: A More Attractive You Topic: Exercise and Diet	Unit: Same Topic: Care of Skin and Hair
SOURCE	Charm for Miss Teen, by Whitcomb and Cochran Healthier Living, by Continental Press	About Her, by Margaret Andrews Charm for Miss Teen, by Whitcomb and Cochran Healthier Living, Continental Press
METHOD	Show transparencies on proper posture and exercises for various weight problems. Discuss proper foods and preparation.	Discuss About Her and Charm for Miss Teen for care of skin.
PROJECTS	Begin preparing for a fashion show to be given at end of week.	Continue preparation for fashion show.
ACTIVITIES	Prepare one panel of bulletin board on four basic food groups--another on exercise illustrations.	Invite cosmetologist to speak to class about skin and demonstrate use of makeup on one of the girls.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Same	Unit: Same Topic: Your Fashion Flair	Unit: Same Topic: Same
Same	Same	Same
Use slides showing various hair styles and textures. Have class do ditto master sheet on "Attractive Hair Styling.	Read and discuss sections 10 and 11 in <u>Charm for Miss Teen</u>.	Have each girl write a description of what she is wearing in fashion show. Describe good grooming habits she followed in regard to skin, hair, etc., in preparing for show.
Decide on individual hair style for fashion show.	Continue planning for fashion show. Have girls select one outfit each, well suited for her. These will be modeled in the show.	Have coordinator read description of what each girl wears as she models outfit for class.
Have local beautician speak to class on care of hair. Have her style hair for one of the girls.	Continue panels on bulletin board--on care of skin and hair and coordination of clothing.	Take class to large department store for a visit to cosmetics department and ready-to-wear section. Plan to attend fashion show there.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: American Economic System Topic: Simple Truths of Economics	Unit: Same Topic: The American Free Enterprise
SOURCE	Consumer Economic Problems, 7th Edition, Wilson-Eyster	Same
METHOD	Discussion of chapter from source--Overhead projector--Transparency 1:10--Economic Freedoms of Citizens Under Free Enterprise System. Transparency 2:12--Simple Truths Everyone Should Know About Economics.	Panel discussion on primary or essential wants and secondary or non-essential wants.
PROJECTS	Students go to the library to gather information about the free enterprise system, preparing for an individual report and a class bulletin board.	Students should inquire of five students (not in this class), five teachers, five neighbors working in factories, five persons who own business enterprises.
ACTIVITIES	Word Study: income, economic, vote, civil liberties, political freedom, economic freedom, free enterprise system, and wealth.	

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Economic Goods Ownership	Unit: Same Topic: Simple Truths of Economics	Unit: Same Topic: Ecomonic Good Ownership
Same	Same	Same
Overhead projector--Show 17 selected countries of ownership of selected economic goods--Telephones in use, radios television sets, motor vehicles in use.	Study sheets in workbook, pages 1 & 2. Check after students finish.	Study sheet in workbook, pages 7-8, after students finish.
Continue gathering information and interviewing for bulletin board and report.	Put up the bulletin board in composite ideas for interviewing of different people.	Hand in individual reports on the Free Enterprise System.
Give students a sheet of graph paper and let them make a bar graph from the transparency and prepare a statement of their observations and interprepations.		

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

APPLYING FOR A JOB

	MONDAY	TUESDAY
CONTENT	Unit: Applying for a Job Topic: Appearance--pp. 73-111	Unit: Same Topic: Making a Personal Data Sheet
SOURCE	The Job You Want, by Margaret Andrews	Same
METHOD	Students will draw up a list of "Good Grooming Ideas." Discuss the importance of making a good impression on the person doing the hiring.	Students will write out the personal data that they will need in applying for a job. Have students relate some of the questions they have been asked in job interviews.
PROJECT	Students begin making a "well-dressed" exhibit from magazine & newspaper pictures.	
ACTIVITIES	Announce "job interview" contest for club.	

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Where, When, Who, What, Why	Unit: Same Topic: The Interview	Unit: Same Topic: Same
Same	Same	Same
Discuss the importance of getting to the right person on time and the kinds of questions the student will be asked and that he should ask. Give students a job application to fill out as homework.	Using applications that have been filled out, begin role playing of job interviews with each student. Teacher should act as employer for first few interviews and then let students take both parts.	
	Put up "best-dressed" exhibits.	
		Call for entrants for regional contest elimination.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Applying for a job Topic: Deciding to apply for a job	Unit: Same Topic: The Interview--How?
SOURCE	<u>The Job You Want</u> by Margaret E. Andrews	<u>The Job You Want</u> by Margaret E. Andrews
METHODS	Use film on how to apply for a job. Give lectures on making a good impression. Have discussions on the roads that lead to a job.	Show films and have student discussions on interviewing. Do some role playing. Review material in the book concerning interviews.
PROJECT	Have students contact employers at the different industries in the community and find out about job openings and the possibilities of getting jobs.	Have several students attend interviews at industries in the community. This will help prepare the class for future interviews.
ACTIVITIES	Require class to bring in a list of job openings at the industries they plan to apply. Find out the opportunities for advancement on these jobs. Role playing.	Role playing.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: How to fill out an application blank	Unit: Same Topic: Asking questions in applying for jobs.	Unit: Credit--Its Role in Our Economy Topic: What is Credit?
<u>The Job You Want</u> by Margaret E. Andrews	<u>The Job You Want</u> by Margaret E. Andrews	<u>Basic Principles in Family Money and Credit Management</u> by Carl F. Hawver
Use filmstrips and records in discussing the application blank. Use Overhead projector in showing sample application blanks.	Using filmstrips and records, lecture to students on the importance of asking and answering questions when applying for job.	Use films, filmstrips, records, and/or overhead projector in discussing credit.
Discuss application blanks, and have an employer come to class. Secure application blanks from industries to demonstrate.	Have students apply for jobs at several industries and compare the questions asked by the interviewers.	Have students begin to establish their credit by purchasing one or more small items, such as shoes, ties etc.
Have students sesure application blanks from all the industries in the community, bring them to class, and fill them out.	Have students make a list of questions they should be able to answer in applying for a job, and review application before reporting. Take everything needed.	Have students list several places where they, or their parents, friends, etc., may have credit. Invite someone to talk to class.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

ARE LAWS NECESSARY?

	MONDAY	TUESDAY
CONTENT	Unit: Are Laws Necessary? Topic: Definitions of Rules and Laws	Unit: Same Topic: Why We Need Laws.
SOURCE	Webster's School Dictionary Who's Delinquent? McGraw-Hill Book Co.	Who's Delinquent? Business Law Text Book
METHOD	Show transparencies of definitions of "law" & "rule". Group session with emphasis on how students deal and react to parental and school rules. Relate peer suggestions and get feedback from each student.	Role Play-Disciplinarian and rule breaker--allow students to be disciplinarian. Group Sessions follow on rules & alternatives--Emphasize student participation.
PROJECTS	Form groups of 5 to begin task of writing paper on "Why Are Laws Necessary?"	Continue to put together paper on "Why Are Rules Necessary?"
ACTIVITIES	Begin accumulating definition list of legal terms. Coordinator to provide ten words and definitions and students to provide five words and definitions.	Have oral definition test on legal terms. Familiarize each individual with the terms.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Who Makes the Law.	Unit: Same Topic: To Obey or Disobey To change the Laws	Unit: Same Topic: Law Enforcement
Who's Delinquent? You Said It McGraw-Hill Business Law Text Book	Same	Law Enforcement Official
Present pictures of Ga. legislator in Session. Discuss legislator process. Use questions from students. Use minutes of local Board of Ed. meeting.	Summary of principals & methods of Ghandi, M. L. King, Socrates, Christ How do we change laws-Representatives How do you affect laws-Voting	Speech by and/or audio visual on law enforcement by an official.
Same	Readings of top three papers-"Why Are Rules Necessary?"	
Assign four students to research (library or newspapers) recent trials of public interest.	Presentation of three judicial cases (from newspapers) with concurrent questions and clarification.	Question and Answer Session.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Budgetting Topic: Planning the Use of Income	Unit: Same Topic: Individual Budgets
SOURCE	<u>General Business for Economics</u>, by Crabbe, Debrum, Haines. <u>Moderns Make Money Behave</u>, by Institute of Life Insurance	Same
METHODS	Discuss: 1) Earning a satisfactory income 2) Wise buying 3) Planning your contributions 4) Planning your savings	List the advantages of budgetting on the chalkboard. Describe steps in setting up a money management plan.
PROJECT		Have each student set up a personal weekly spending plan. Use the plan for two weeks, evaluate it and make needed adjustments.
ACTIVITIES	As a group discuss how the following influence money management. 1) Goals 2) Resources 3) Needs 4) Wants 5) Values 6) Prices 7) Credit 8) Economic Conditions 9) Insurance 10) Savings 11) Investments	Have each student estimate approximately how much his family spends on him each year.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Same	Unit: Same Topic: Family Budgets	Unit: Same Topic: Same
	Same	Same
Discuss why it is important for each individual to work out his own budget. Explain the difference between a want and a need.	Show examples of several family budget forms. Show how budgets differ for an individual; a family; a business; a community; a government.	List on chalkboard the things to consider in evaluating a family budget. Show how a family budget can be adjusted to meet changing needs.
Design a bulletin board to show how budgets are affected by seasonal variation in clothing, food, household maintenance, etc.	Assign groups to work out family budgets. Establish family size, ages, income, etc.	Use role playing to dramatize a couple planning to meet the cost of their first child; a couple discussing the pros and cons of the wife working; a family planning the use of income for one year.
	Study and discuss budgetting for: families with irregular income; families with double income; newly married couples.	

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Business Psychology in the Office. Topic: Service with a Smile; Being able to Communicate; Being Respectful; Good Work Habits.	Unit: Same Topic: Time; Neatness; Efficiency.
SOURCE	Business Behavior, by Allen R. Russon Film Strip: "Good Office Behavior"	Same
METHOD	1) Role Playing 2) Group Discussion 3) Individual Reports 4) Films and Film Strips Students demonstrate techniques used in the offices where they are employed.	Have the pupils make reports while some of the class members act as judges. Have the pupils listen to their reports from the tape recorder.
PROJECTS		
ACTIVITIES	Have the pupils to act out the parts of the employer and employee in a drama.	Review the articulation and try to improve on the dialogue.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Business Psychology in the Office Discussion Topic: Integrity; Don'ts for the Office.	Unit: Same Topic: Trait Training; Judgement; Morality; Responsibility.	Unit: Same Topic: Illustrative Cases
Reports from other members of the class.	Continue individual reports from class members.	<u>Business Behavior</u>, by Allen R. Russon.
Recall former reports recorded to determine improvements. Have a speaker from one of the business offices to speak to the class.		Read the illustration and have the pupils critique each one and give their opinions.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Career Manual Topic: Choosing a Career to Explore	Unit: Same Topic: Same
SOURCE	SRA Occupational Exploration Kit	Same
METHOD	Pass out student record booklets & kit for determining amount of education anticipated, math and language levels, & interest. Have students complete record books based on this.	Complete Occupational Exploration Kits. Finish checking student record booklets. (If results of OEK & preferred occupation do not coincide, may use latter for manual). Choose career to explore.
PROJECTS	Have students prepare career manual of not more than 100 pages on occupation of choice, based on OEK & personal preference (to be bound in wooden backing made by Industrial Arts & Home Ec. classes).	Bring materials to school to begin work on manual cover.
ACTIVITIES	Have representative from State Department of Labor administer GATB.	Have students write letters to business firms asking for information and materials for career manuals.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: How to Use SRA Occupational Exploration Kit file & CAREERS Desk Top Kit file.	Unit: Same Topic: How to Find Reference Materials for Manual	Unit: Same Topic: Same
SRA Occupational Exploration Kit directions booklet CAREERS Desk Top Kit file	Career Manuals from University of Missouri & University of Texas Other materials in the CVAE Lab	School librarian
Explain to class how to look up brfefs describing their chosen occupation for exploration.	Display materials and let students examine manuals.	Have librarian come to class and explain where and how vocational materials are found in the library.
Have team teachers explain several ways that boards for covers may be cut and attached. Let students decide which they prefer.	Begin actual work on covers.	Same
When manuals are completed, several competent judges will select best manual to enter in region contest. These will be displayed for judging at luncheon meeting. Give pupils instruction on SRA & CAREERS kits.	Make sure students understand region contest rules. Pass out duplicated instructions to follow.	Take students to the library and ask librarian to show students where vocational reference material may be found.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Choosing a Career Topic: The Job and Your Future 1) Success and happiness are important 2) Consider yourself and the job	Unit: Same Topic: Take a Good Look at Yourself 1) Interests 2) Physical and mental makeup 3) Personality type 4) Work you enjoy
SOURCE	Film--"Choosing Your Career" Why Work Series, Occupational Kit	Film--"Personal Qualities for Job Success" Booklet--"Helpful Hints for Choosing a Career" Why Work Series, Occupational Kit
METHOD	Using film as introduction, discuss importance of above subheadings. In buzz groups make lists of things to consider in choosing a career. Have students interview employers to add to lists. Compare lists.	After film discuss how interests affect happiness and success on the job. Have students list their interests; using Why Work Series decide which jobs could be good. Make plans with employers for students to work several weeks.
PROJECTS	Have students begin notebook on "Jobs I Am Interested In." Notebooks might contain pictures and short description of the job.	Check progress on projects.
ACTIVITIES	Field trips to various area occupations which students are interested in. Discussion of what students saw should follow.	Continue field trips if possible.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: What the Job Offers 1) Working hours 2) Salary 3) Fringe benefits 4) Type of work 5) Advancement	Unit: Same Topic: Education and Training 1) High school 2) Technical school 3) College 4) On-the-job training	Unit: Same Topic: Personality Plus 1) Your personality 2) Supervisor's personality 3) Requirements of supervisor 4) Fellow workers
Handouts on occupations "Helpful Hints for Choosing a Career" Why Work Series	"Helpful Hints for Choosing a Career" Why Work Series	Filmstrips with record--"Work Habits and Attitudes" Transparencies
Panel discussion on proper working conditions. Have students make list of hours, salary, etc. acceptable to them. Have students obtain salary schedules & lists of fringe benefits from employers. Compare and discuss.	Individual work by students using occupational kit to find the training required for jobs interested in. Have students talk with employer about type of training and education needed for occupations in his plant.	Fill out personality inventories. After the filmstrip discuss how attitudes affect work situations. Show transparencies on personality clashes between workers & employers. Have students observe attitudes on the job.
Work on individual job interests.	Have students display several of the occupations they have prepared for their notebooks.	Prepare display areas in school and place some of the notebooks there.
	Have counselor speak to students about several career areas and how each person's future is affected by his career choice.	Have students write short paragraphs on what they have seen on the job.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Consumer Savings & Investments Topic: Why People Save Money	Unit: Same Topic: Same
SOURCE	<u>You Pay for It</u> Gregg/McGraw-Hill "What Is Savings?" Virginia Bankers Association, Richmond, Virginia	Same
METHOD	Discuss with class: 1)Feeling a sense of security 2)Taking advantage of unusual opportunities or bargains 3)Paying cash 4)Developing responsibility 5)Investing in the future	Give vocabulary words to look up: Interest Compound interest Passbook Semi-annually Maturity Discuss in class.
ACTIVITIES OR PROJECTS	Obtain pamphlets from Bank--Group I Post Office--Gr. II Credit Union--Gr. III Insurance Co.--Gr. IV	

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Types of Savings Banks	Unit: Same Topic: Opening a Bank Account	Unit: Same Topic: Interests on Deposits
Materials from local concerns and personnel	<u>You Pay for It</u> Gregg/McGraw-Hill <u>Succeeding in the World of Work</u> McKnight & McKnight	Same Also <u>Introduction to Business</u> Reed, Conover, & Stearns(pp. 135-150)
Give examples of commercial banks and savings and loan associations. Discuss what each does --functions and services.	Have sample forms to fill out: Passbook Deposit slip Withdrawal slip Make students aware of different types of accounts and how to open one best suited to their needs. Discuss: Individual account Joint account Trust account	Discuss amount of interest received for different accounts and for varying amounts of money left for different lengths of time. Do various Math problems involving interest. Discuss how interest accumulates on even small amounts.
Speaker from local bank.	Practice depositing and withdrawing money. Role playing. Field trip to the bank.	Make up an imaginary plan of savings goals: What type? How much? What for? Interest? Accumulation?

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

DISTRIBUTION

	MONDAY	TUESDAY
CONTENT	Unit: Distribution Topic: Introduction	Unit: Same Topic: Distribution Serves the Consumer
SOURCE	<u>General Business For Economic Understanding</u> by Crabbe	<u>Consumer Economic Problems</u> by Wilson
METHOD	Discussion and charts on how we obtain goods and services	Charts Discussion and evaluation of materials and merchandise from local stores
PROJECTS	Creative projects on any phase of distribution	Plan to report on some phase of personal spending. Home Ec. girls give demonstration of topic application in the home.
ACTIVITIES	Recognize students working in jobs connected with distribution. Write on board all local distributors and label them retail or wholesale.	Bring and exhibit examples of 'caveat emptor,' ("Let the buyer beware"). Let students recognized yesterday tell how their jobs are connected with distribution & with serving the consumer.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Distribution Adds Value to Products	Unit: Same Topic: The Three Channels of Distribution	Unit: Same Topic: Jobs in Distribution
<u>General Business For Economic Understanding</u> by Crabbe	Same	<u>Your Job in Distribution</u> by Beaumont
Show film on products from natural state to end product. Discuss how value increased (for example, from steel to refrigerator).	Demonstration and discussion on taking different products through each of the three channels	Use opaque projector to show chart on the breakdown of jobs in selling and other areas and on the opportunity in the future.
Farm shop boys give examples of farm products. Industrial Arts boys make a game using maze through which product must be worked through to consumer.	Take one object and trace it by use of a chart through one of the channels of disbribution.	Work on projects already assigned.
Play consumer games. Let working students tell how some product they are connected with has increased in value through distribution.	Play consumer games. Identify products actually worked with according to what channel they came.	Play consumer games. Personal accounts of those interested in jobs in distribution and why they are interested.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Educating the Consumer Topic: Buying Wisely (Food)	Unit: Same Topic: Buying Wisely (Clothing)
SOURCE	Consumer Economic Problems, Wilson-Eyster Accent/Family Finances (Containers), Follett Corp.	Same
METHOD	Inform class of next week's studies: 1) Buying food 2) Buying clothing 3) Buying appliances, furniture, etc. Discuss Buying Guide I--Buying Foods. Show film "Janet and the Genie" on food inspection.	Discuss Buying Guide II. Obtain specimens of various fabrics. Determine ply, thread count, abrasion effect, spot removal, effect of washing.
PROJECTS	Have two students to shop in a super market, one buying low-priced items and the other buying high-priced items. Compare results and have the students give a report to the class.	Plan wardrobe for spring and summer. Prepare list of: 1) usable clothing on hand 2) items needed for regular and special occasions. 3) items to buy for adequate wardrobe. Write report describing planning of wardrobe.
ACTIVITIES	Take students on field trip to staple, perishable, and frozen food warehouses. Ask supervisors to explain importance of labeling and grading of foods.	Invite shoe dealer to visit class to demonstrate good and poor shoe construction, proper fitting, measurements of foot size, etc.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Buying Wisely (Home Appliances, Furniture, Automobiles, Homes.)	Unit: Same Topic: Same	Unit: Same Topic: Buying Wisely (Understanding Consumer Credit)
<u>General Business for Economic Understanding</u>, Crabbe, DeBrum, and Haines. <u>Modern Economics</u>, Wronski, Doody, and Clemence <u>Consumer Economics Problems</u>, Wilson amd Eyster	Same	Same, plus <u>Accent/Consumer Education</u>, Follett
Discuss <u>Buying Guide III</u>. Have students prepare a reference file providing information for selecting and buying: 1) a clothes washer & dryer 2) a power lawn mower	Point out guides to follow in buying furniture and houses. Use transparencies illustrating Buying Guides. Show slides of various types of furniture and home design.	Show films: "Wise Use of Credit" and "Installment Buying". Have group discussions on films. Bring credit cards to class to show to students.
Prepare a list of points to be considered in buying a used car. Include what should be observed about the car (a) on the lot, (b) on the road (c) testing the car in the mechanic's shop.	Have three or four students to visit a large department store to examine labels of mattresses, pillows, and other bedding...also various kinds of furniture. Have store representative explain federal laws and regulations.	Have each student visit one store in community and report on procedures followed in opening charge accounts.
Take a class on field trip to automobile showroom. Prepare in advance with car salesman to have him point out features of different models.	Invite local realtor to speak to class about square footage and cost of housing--also advisability of buying as opposed to renting a home.	Ask Retail Credit Corporation representative to speak to class.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Effective speech and job success Topic: How is speech used in distribution?	Unit: Same Topic: What facts can we learn about a person from his speech?
SOURCE	Telephone company Newspaper ads	Class group
METHOD	Direct discussion	Discuss thoroughly and point out that enthusiasm is quite often contagious--a fact useful in selling
PROJECT	Have students bring in ads from newspapers depicting speech being used in business.	Same
ACTIVITIES	Have committee of 2 or [illegible] class members visit local telephone business office to obtain material for class bulletin board.	Make a list from group with specific incidents of each from their past experiences.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Elements Not Appropriate in Business Speech	Unit: Same Topic: Elements Desirable in Speech	Unit: Same Topic: How Do We Learn Good Speech?
Negative voice rating sheet	<u>Webster's Dictionary</u> Grammar book	School library State film library
Discussion and questionnaire--language not to use on the job	Define elements and write on board. Class discussion on desirable elements. Apply to job training.	From group: List on board. Use tape recorder.
Voice rating	Same	Same
Have students rate themselves.	Prepare bulletin board with obtained material.	If time permits, have students tape prepared material for self-evaluation.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Financing Topic: Buying on Credit	Unit: Same Topic: Same
SOURCE	General Business For Economic Understanding, by Crabbe, Debrum, and Haines Moderns Make Money by Life Insurance Institute	General Business For Economic Understanding Moderns Make Money Film--Credit, by Dun and Bradstreet
METHOD	Lecture and discussion. Use transparency of an application for a charge account.	Lecture, discussion, and film. Use sample copies of sales tickets, invoices, statements of accounts, and receipts.
PROJECT	Collect newspaper and magazine ads to show what can be bought with credit. Collect and compare credit applications from retail stores.	
ACTIVITIES	List the purchases typically made with charge account credit.	Investigate and report on the cost of providing consumer credit and the cost of using it.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Borrowing in Order to Buy	Unit: Same Topic: The Cost of Installment Loans	Unit: Same Topic: Buying on Installment
General Business For Economic Understanding Moderns Make Money Film--Impulse, by CUNA Mutual Ins. Society	General Business For Economic Understanding Moderns Make Money	Same
Lecture, discussion, and film. Use overhead projector to show parts of a promissory note.	Lecture and Discussion	Lecture, discussion, and film. Use transparencies of an installment contract.
		Assign committees to study and discuss credit problems and how to avoid them and laws that regulate consumer credit.
Display credit contracts and discuss the terms set forth in each.	Find out how the following affect the cost of credit: 1. Amount of credit used 2. Length of repayment period 3. Credit rating 4. Security offered	

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

GETTING ALONG WITH OTHERS

	MONDAY	TUESDAY
CONTENT	Unit: Getting Along With Others Topic: A Look at Yourself	Unit: Same Topic: Making Friends
SOURCE	<u>Your Attitude is Showing</u>	<u>The Nature of Prejudice</u> <u>Your Life in the Big City</u>
METHOD	Role play, filmstrips research persons, and films such as "Left-out," "Cheating," "Respect for Property" and "Litterbug."	Discussion Role play(introduction) Films--"Life of Abraham Lincoln" Filmstrips on human relations Explore community service jobs
PROJECTS	Choose a personality trait and try to improve on it for six weeks. Keep a progress chart. Plan a field trip to observe juvenile cases in court connected with poor personality traits.	Extra credit to a group for bulletin boards displaying good and bad attitudes. Assign report or bulletin board denoting significant contributions of respected persons.
ACTIVITIES	Work with figures in math connected with juvenile delinquency in the U.S. Collect newspaper clippings showing rewards of honesty & making friends. Report on "Honesty and Your Job."	Post quotes on board about honesty. Have a personality checkup. In English write short essay on "Why I Like My Best Friend." Role play favorite character and let class guess who it is.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic. How Your Behavior Affects Your Friends	Unit: Same Topic How Your Appearance Affects Your Friends	Unit: Same Topic: How Your Voice and Writing Affect Your Friends
Business Behavior by Russon About Him and About Her by Andrews	"Between 13 and 18," by the American Dental Association	You Said It, by Andrews Applied Penmanship
Dramatic role play connected with history of etiquette (chivalry & table manners). Discussion on "My Most Embarrassing Moment." With opaque projector & pamphlet scenes show behavior of students on the job.	Resource persons such as a nurse or chiropractor. Discuss how appearance has caused people to be promoted, lose their jobs, or has caused embarrassment.	Opaque projector Demonstration with dummy telephone equipment Resource person--speech therapist
Write a paper of situations observed on the job relating to behavior. Report or interview on "How Group Attitudes Affect Our Lives Today."	Go by the health office and have ears and eyes checked. Report findings.	Set up schedule so that each student spends some time (about 30 minutes) in office answering the phone. Individual practice on handwriting notebooks
Same as Monday and Tuesday	Play Personality Roundtable. Self-rating on the Good Grooming chart Create "The Perfect Friend."	Practice using the phone. Discuss the usefulness of this unit to the jobs of students.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Holding a Job Topic: Your Appearance 1) Good grooming 2) Proper dress	Unit: Same Topic: What Your Employer Expects of You 1) Follow instructions 2) Performance and efficiency 3) Pleasant attitude 4) You and co-workers
SOURCE	<u>About Him</u> <u>About Her</u> <u>Business Behavior</u> Filmstrip--"Good Grooming"	Filmstrips and records --"Getting Along on the Job" Transparencies--"Finding and Holding a Job" Booklet--"Succeeding in the World of Work"
METHOD	Use filmstrip for discussion on grooming, cleanliness, and appropriate dress. Show pictures of outfits & ask where each is suitable Have students observe differences in dress of office worker and plant employee; look for improper dress.	In buzz groups compile lists of things employers expect from employees. Let 1 person from each group put their list on board. Use transparencies and filmstrips to show things they may have left out. Discuss Topic subheadings.
PROJECTS	Have students begin some worthwhile project of their choosing to do during leisure time.	Work on same projects as on Monday. Students may be given as long as the coordinator desires for projects, allowing student time to see some benefit to himself from it.
ACTIVITIES	Ask students to get involved in one community or school activity of their own choosing.	Continue work on community and/or school activity. Have students strive to improve on efficiency and one other weak point on the job. Have employers evaluate improvement.

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HOLDING A JOB

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: What You Expect from the Job 1)Fair treatment 2)Unions & professional groups 3)Good working conditions	Unit: Same Topic: Keeping Your Cool 1)Knowing when to speak up 2)Asking for a raise 3)Thinking before you speak or act	Unit: Same Topic: Using Your Leisure Time 1)Hobbies provide emotional outlets 2)Contributing to your community
"Succeeding in the World of Work" Transparency--"Finding and Holding a Job" The Job You Want	Filmstrips & records --"Getting Along on the Job" Business Behavior The Job You Want	The Job You Want Business Behavior
Familiarize students with several different unions and their functions. Let pupils comment on unions familiar to them. Role play situations in fair treatment & discuss students' feelings in same situation.	Show filmstrips to start discussion on topic. Role play situations of good & bad behavior on the job, & discuss effects on the employer & consequences to employee. Have students observe behavior of co-workers.	Read appropriate sections in books. Have students tell about their hobbies. Relate to growth & effective use of leisure time. Have pupils comment on importance of leisure time; activities; how these help your studies.
Continue work on projects.	Check progress on projects(typing, guidance when needed, looking at any which may have started).	Check projects and have students demonstrate or display them sometime during the next month. Have students evaluate their growth from projects.
Community or school activity. Have students find what unions & professional groups are active where they work, and also what these organizations do for the worker.	Have several employers present a panel discussion on "Succeeding on the Job" (behavior, performance, etc.).	Let pupils use breaks to observe other jobs so they can learn more about the company that hires them. During the month, ask students to turn in an evaluation of how the community or school activity helped them.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

HOW TO GET ALONG WITH OTHERS ON THE JOB

	MONDAY	TUESDAY
CONTENT	Unit: How to Get Along with Others On the Job Topic: New on the Job 1) How to act 2) Use your manners 3) Remember that you are new	Unit: Same Topic: How to Dress 1) In accepted manner of the plant, etc. 2) Follow other employees' example 3) Wear clean clothes 4) Nothing gaudy
SOURCE	World of Work, McKnight & McKnight The Job You Want, Gregg Div. McGraw-Hill You and Your Job Southwestern Job Series (filmstrips) Guidance Research Association	Same (Job Series filmstrips) 1) "A Job That Goes Someplace" 2) "Getting and Keeping Your First Job" 3) "Liking Your Job and Life"
METHOD	Class discussion on use of proper manners, following example of older employees, and why not to pressure old employees or to assume privileges such as taking breaks. Use filmstrip--"How to Get and Keep Your 1st Job"	Invite a personnel director to come and speak on dress, and good attitudes to have on the job. Allow time for students to ask questions.
PROJECTS	Have students develop a guide book with animated drawings, showing how one reacts the first day on the job. Make it interesting & include unusual problems, proper dress, rules, etc.	Continue working on guide books.
ACTIVITIES	Have club make posters concerning good will between employers and employees.	Have club collect pictures from old magazines, etc., and organize pictures of different types of dress.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: When to Ask Questions 1) Don't appear the eager beaver 2) Don't be pushy 3) Have reason to ask 4) Listen to answer	Unit: Same Topic: How to Make Friends 1) Be polite 2) Be friendly 3) Be helpful	Unit: Same Topic: What Rules? 1) Ask manager the first day 2) Read the handbook 3) If you aren't sure, don't do it.
Same	Same Also How to Win Friends and Influence People by Dale Carnegie	Same
Role play the situation in which one student asks a "fellow worker" too many questions and also the same question several times.	Have a guest speak on the art of making friends. List the points of making friends on the board. Role play situations involving making new friends on the job.	Group discussion on the necessity of rules and on how they can protect as well hamper.
Continue working on the guide books.	Continue working on the guide books.	Collect a series of plant rule booklets. Allow the class to ask local industries for copies. Display these booklets on a table in class.
Continue picture collection.	Have club members make posters on what a friend is for school display.	Continue working on the posters.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

INSURANCE

	MONDAY	TUESDAY
CONTENT	Unit: Insurance Topic: Economic Risks	Unit: Same Topic: Policies for Protection
SOURCE	<u>Succeeding in The World of Work</u>, Kindrell-Vineyard	"Policies for Protection," Institute of Life Insurance, 227 Park Avenue, New York, New York.
METHOD	Read Chapter 15. List risks people may encounter: 1) Property 2) Liability 3) Life 4) Health Insurance(discuss chapter).	Each student has his own booklet (source). Discuss topics, Pages 3-9, Insurance ABC's: Risk; Sharing & Planning; How Life Insurance Works.
PROJECT	Plan a bulletin board on the risk the students have listed. Gather pictures to show these.	Put up bulletin board that was planned on Monday in the classroom.
ACTIVITIES		Do matching terms, page 5. Do 8 statements to see if students agree or disagree.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: How Life Insurance Works	Unit: Same Topic: Health Insurance	Unit: Same Topic: How Personal Insurance Can Help You
Same	Same	Same
Read student booklet, Pages 6-9. Have representatives from two different companies to come and explain: 1) Straight Life 2) Limited Payment Life 3) Endowment 4) Term	Have representatives from two or more different companies to explain Group Health Insurance and Individual Health Insurance.	Read student booklet, Pages 14-16. Discuss Case Study No. 1 and Case Study No. 2 on page 16.
Ask parents or friends for health policies to examine. Prepare an outline report to be discussed aloud in class.	Consider these for report: 1) Policy's Title 2) Protection Provided 3) Policy's Continuation 4) Unpaid Premiums 5) Presenting Claims 6) Premium Rates 7) Maximum Benefits	
		Page 13. Have suggested class discussion.

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ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Marriage and the Family Topic: The Historical Aspect of Marriage	Unit: Same Topic: The American Family in Transition.
SOURCE	*Marriage and Family: A Developmental Approach,* by A. L. Stroup.	Same
METHOD	Give a short and simple lecture on the historical aspects of marriage. Compare different cultures. Since there is much discussion on women's liberation presently, discuss a working mother's effect on family life.	Have students compare marriages from past to present. What are the differences? How has work influenced the living standard of the American family? Have a discussion.
PROJECTS	Have students do research in the library on different wedding customs throughout history.	Have students write a report on: What are some contributing factors that determine a successful marriage?
ACTIVITIES		Have marriage counselor talk about his experience with couples who have had difficulties and how these difficulties were solved.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: The Role Money Plays in Marriage.	Unit: Same Topic: The Problem of Over-Population and the Responsibility of Every Family.	Unit: Same Topic: The Family Atmosphere Determines the Future of the Children.
Same, plus <u>Family Money Management</u>, by First National Bank of Atlanta.	Same plus slides on malnutrition in over-populated countries.	Same
Have the students make a budget for a family of four. How much should the family income be in order to live comfortably. Stress the importance of vocational choice.	Make mimeographed charts indicating the population increase and the dangers to the world population. Clarify that a family with 2 or 3 children can live better than a family with more. Stress importance of security in life.	Child Development--How are children influenced by their surroundings? What does a broken home mean for a child?
Have students write a report on why money plays an important role in marriage.	Have students find out how much it costs to have a baby, what must be bought, nursery cost, formulas, doctor bills, etc.	Have a discussion on teenage marriages. Why do many fail?
Have a representative from a bank talk about frmily savings plans, and what students can do now in order to have some savings by the time they marry.	Ask a public nurse or doctor to talk about birth control, child care.	Make a trip to a foster home, orphanage or children's home. Let students make their own observations.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Obligation As a Member of the Community Topic: Brotherhood	Unit: Same Topic: Role of School and Church.
SOURCE	<u>The Shared Journey</u>, O'Banion, T. <u>The Golden Rule</u>	Same plus "Policy Statement of Local Board of Education."
METHOD	Group discussion on concept of sharing ideas and emotions with peers, parents, teachers, etc. Group discussion of golden rule-"Do unto others as you would have them do unto you."	1) Have school official speak on obligations of school to community. 2) Have minister speak on obligations of church to community.
PROJECTS	Select committees to begin work on school project. Project shall be a pamphlet with theme of neighborhood solidarity--Brotherhood and how CVAE contributes.	Same: Section 1-Helping agencies in the community. Section 2-School agency Section 3-Church " Section 4-CVAE "
ACTIVITIES	Have various students tell about the civic organizations that they are familiar with.	Question and Answer session with minister, counselor or principal/ asst. principal.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Role of Helping Organizations	Unit: Same Topic: Role of Civic Organizations	Unit: Same Topic: Active Citizens-Speech by local citizen involved in neighborhood affairs.
Materials gathered from local helping organizations.	Materials gathered from local civic organizations.	Officer of the Chamber of Commerce, a minister or businessman.
Pass out material from helping organization, i.e., juvenile court, community chest, hospitals, employment agency counseling centers, etc.	Pass out material from civic organizations, i.e., Jaycees, Kiwanis, Lions, etc.	Talk and/or audio visual on participation of active citizens.
Continue putting together the various sections of pamphlet.	Same Distribute pamphlets to homeroom classes-post in homerooms.	
Talk by CVAE chaplain concerning how CVAE might better the school through helping a community helping agency.	Distribution of CVAE pamphlets.	Question and Answer Session.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Personal Finances Topic: Money and Money Substitutes	Unit: Same Topic: Budgetting 1) What a Budget Can Do 2) How to Plan Your Spending
SOURCE	<u>General Business for Economic Understanding</u>, by Crabbe, Debrum, and Hayes. <u>Family Money Management</u>, by First National Bank of Atlanta	Same
METHOD	Have students list ways of getting money. Have students list money substitutes: credit cards, checks, etc. Discuss types of employee discounts that are given by businesses.	Students will discuss the purpose of a budget and plan an interim budget for their own use. Have students give examples of how types of jobs affect budget: transportation, lunches, special clothes, etc.
PROJECT	Students should begin to gather material on consumer money problems for display.	
ACTIVITIES	Students should review club budget and plan income earning projects.	Review club expenses for balance of year.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Budgetting 1) Following Your Budget 2) Making Adjustments	Unit: Same Topic: Record Keeping	Unit: Same Topic: Borrowing
Same	Same	Same
Students will examine their interim budget to see if it is practical and make adjustments to keep within total amount. Students will discuss: Will their vocational choice pay them enough to stay within a practical budget?	Students will determine costs of family expenditures for food, rent, utilities, taxes, and installment purchases. Students will list various payroll deductions.	Students will figure cost of borrowing to get cash, auto loans, household goods. Students will discuss employment attitides toward garnishcement and bill collections.
Students make bulletin board display of materials collected.	Check progress on bulletin board.	Arrange for completed bulletin board to be displayed where entire school can see it.
Speaker from bank to discuss personal financing.	List ways to meet requirements of club expenses for balance of year.	Plan additional fund raising projects if necessary.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Personal Hygiene Topic: Cleanliness	Unit: Personal Hygiene Topic: Care of the Teeth
SOURCE	<u>Ebony</u> <u>Glamour</u> <u>Ingenue</u> <u>Seventeen</u>	Booklets from the dentist's office, especially written for young adults
METHOD	Have nurse come and talk about importance of cleanliness for our health and appearance. Have 2 students role play for an application. One plays a filthy-looking person, and one a neat person.	Show charts of healthy and decayed teeth. Discuss the cost of dental care. Discuss the validity of TV ads that say that people with the whitest, brightest smiles have the best chance.
PROJECTS	Students should start making a manual containing hints and advertisements for cosmetics.	Have students write a report on why teeth are important for health.
ACTIVITIES	Have students make a check list to determine whether or not they follow the magazine directions for cleanliness and good appearance.	Make a field trip to a dental clinic to get students acquainted with the opportunity for low cost dental care.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Personal Hygiene Topic: The Importance of Dental Examinations	Unit: Personal Hygiene Topic: Care of the Skin(cause and cure of acne)	Unit: Personal Hygiene Topic: Care of the Skin--the desirable look for working girls
Same	Merle Norman cosmetologist	<u>Glamour</u> <u>Seventeen</u> <u>Paris Match</u> <u>Brigitte</u>
Show charts demonstrating the development of teeth. Demonstrate the proper way of brushing teeth. Discuss why clean teeth and fresh breath are a must for everyone.	Cosmetologist gives complete facials and explains how and why skin has to be kept clean.	Have a role play of several girls who are made up with different types and quantities of makeup. Discuss an employer's attitude toward too much makeup.
Have students write a report on general dental care.	Have each student set up an individual program for his or her particular skin type.	Have students write a report on how to take care of the skin. Girls add an extra report on correct use of makeup.
Have students compare the cost of seeing the dentist semi-annually with that of having major work done every two to three years.	Encourage students with skin problems to follow the plan faithfully. Promise a reward.	

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Planning Your Future Topic: Choosing Your Career (General) Introduction 1) Individual abilities 2) Individual aptitudes	Unit: Same Topic: Knowing Yourself 1) Outdoor 5) Artistic 2) Mechanical 6) Musical 3) Computational 7) Social Service 4) Scientific 8) Clerical 9) Literary
SOURCE	Georgia Film Library "Choosing Your Occupation" "Choosing Your Career" Humphreys, SRA Guidance Series "Guidance Discussion Series" Jim Handy Organization	"Choosing Your Career," Humphreys-SRA Guidance Series Various Achievement Tests and Interest Inventory Tests Filmstrips: "Vocational Decisions," SVE Educational Filmstrips
METHOD	Show Film-Emphasizes self-appraisal, occupational possibilities, preparation requirements in general and guidance factors. Show Filmstrips-"Guidance Discussion Series", Jim Handy Organization	Tests: Give Otis Achievement or California. Give Kuder Preference, GATB or Strong. Show Filmstrips-"Vocational Decisions," SVE Educational Filmstrips.
PROJECTS	Assignment to each student: Make a chart of the activities you enjoy and those you dislike.	Make a list of the occupations you might enjoy studying most.
ACTIVITIES	Inform students that one of [illegible] will have the opportunity to win the regional and state career manual contest.	Go over rules and regulations of career manual contest.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Knowing the Job 1)Nature of Work 2)Conditions of Work 3)Preparation 4)Social & Financial Returns 5)Advantages & Disadvantages	Unit: Same Topic: Same	Unit: Same Topic: How to Apply for a Job
SRA-"Occupational Exploration Kit." Greenleaf, Walter J. "Occupations and Careers." McGraw-Hill. <u>Occupational Outlook Handbook</u>	Same	Transparencies: "How to find a Job." Tecnifax Education Division. Pamphlet Series: Southern Bell Helpful Hints Series
Let students use Occupational Information Outline data sheet to guide them in their research. Explain fully using one occupation as an example.	Let students continue familiarizing themselves with the outline data sheet and the SRA Kit and Outline Handbook. Answer questions.	Show transparencies on "How to Find a Job." Role play interview situations. Fill out sample application forms, etc.
Prepare a "Career Manual" on the occupation of your choice. This may take one or more six weeks to complete.	Students should be able to continue on "Career Manual" on their own after a day or two of guidance.	Everyone make a personal information folder including all job and interview information.
Discuss organization of the "Career Manual" from the club contest manual during club meeting.	Scrapbook: Show pictures of last year's club activities. Have a speaker come who can contribute occupational information.	Inform students about the job interview contest at regional and state levels.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Planning Your Future Topic: What Can You Do? Why Test?	Unit: Same Topic: What Job Are You Interested In?
SOURCE	Making the Most of Yourself and Making the Most of Your Skills, by Morrison Essential Aspects of Career Planning and Development	Happiness Is Choosing the Right Job The Job You Want, by Andrews You and Your Job, by Blackledge Getting the Right Job, by Morrison
METHOD	Use testing and discussion. With opaque projector,Show various activities(some of them easy ones) and ask class if they are capable of performing each activity.	Using pamphlets from Ga. Dept. of Labor and an opaque projector, show as many different types of jobs as possible.
PROJECTS	Set up projects dealing with accomplishments at home, school, and in the community. Also have parents submit a write-up on the accomplishments of the student. Parents of best project honored.	Start Career Manual on the job each is interested in. Work on one of six projects available in workbook.
ACTIVITIES	Have class work with a puzzle on the "Total You" while results of Otis Quick Scoring Test are given in individual conferences.	Individual conference on results of Kuder Preference Test and Vocational Interest Test. (In English do library work for career manuals.)

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: What do You Know About the Job?	Unit: Same Topic: How Can I Get and Hold a Job?	Unit: Same Topic: How Can I Get and Hold a Job?
The Receptionist, by Wood Opportunities in Today's Office Forty Years Experience in Training Men and The Modern Telephone Operator	"Helpful Hints for Young Job Seekers" by Southern Bell How to Find and Apply for a Job, by Keily	Same
Discussion on the availability of jobs and the requirements of jobs existing in the community.	Role play (interview) Films Filmstrips	Same
Same. Set up appointment with counselor and report results. Plan field trips to each work station with the student in charge of the tour.	Plan "FOCUS ON FUTURE DAY"	Same
Look over college and technical school catalogs. Write letters asking admissions director to visit class. Have films, filmstrips, and occupational handbooks available for study.	Plan "FOCUS ON FUTURE DAY." Discuss interviews and application forms. Let experienced students practice with those not working.	Same

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Securing a Job Topic: Applying for a Job	Unit: Same Topic: Personal Preparation for an Interview
SOURCE	How to Find and Apply for a Job, Southwestern Pub. Co. Succeeding in the World of Work, Chap. 3, p. 38, McKnight and McKnight	U.S. Dept. of Labor How to Prepare Yourself for Job Interviews Succeeding in the World of Work
METHOD	Give information to students, and have them write letters of application to certain firms. Prepare personal data sheets.	Speaker from State Employment Office to visit and talk to class
ACTIVITIES AND PROJECTS	Bring newspaper ads to school about available jobs. Discuss and put on bulletin board.	Questions asked by students which they have made up ahead of time

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic. How to Locate a Job	Unit: Same Topic: Filling out Job Applications	Unit: Same Topic: The Interview
Set of 15 transparencies I Want a Job, United Calhoun Company You and Your Job, Southwestern K05	Sample applications from U.S. Dept of Labor and local industries in the area	How to Prepare Yourself for Job Interviews, U.S. Dept. of Labor The Use of Job Employer Interviews, Southwestern Pub. Co. Succeeding in the World of Work
Have students talk to employees, friends customers, competitors, employment agencies, or civil service to find out where jobs are.	Fill out applications correctly and completely. Students given sample ones for practice.	Discuss questions: 1. What qualities should I possess at an interview? 2. How to sell myself at an interview? 3. What should I do after the interview?
Report back to class. Discuss with class.	Obtaining application blanks from various businesses in which the students are particularly interested	Divide the class into groups to act out a typical interview.

SECURING A JOB (SECOND WEEK)

	MONDAY	TUESDAY
CONTENT	Unit: Securing a Job Topic: Continuation of Job Interview	Unit: Same Topic: Job Interview Skit
SOURCE	Same	Same
METHOD	Have personnel director from local industry speak to students on importance of filling out applications properly, and on cues for interviews.	Role playing by students in acting out job interviews
ACTIVITIES AND PROJECTS	Work on a skit concerning job interviews. Show different types of persons applying.	Make movies and tapes of skits. Use later to point out strengths and weaknesses, and to suggest means for improvement when being interviewed.

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(from Frame 16)

YOUR ANSWER: The second stage of the Application Step is necessary to learning a skill because "An ounce of experience is worth a ton of theory."

Good! This statement was made by John Dewey, a famous American educator. What it means in essence is that regardless of how much information or how many demonstrations you provide for the trainee, he will not be proficient at his trade until he can experience the operation for himself. Once he sees how he can use what you have taught him, his learning will have meaning and become a natural part of h .

What about the teaching principles that apply to this step? Several teaching principles whose roles in other steps of instruction of instruction we have already discussed are also important in the Application Step. One is the principle of <u>effect</u>. The trainee must experience success with his attempts to perform the skill. His success, in turn, tends to motivate him to wish to do better and learn more. Without naming them, we have discussed two more teaching principles that are particularly important to the Application Step. These are <u>repetition</u> and <u>reinforcement</u>.

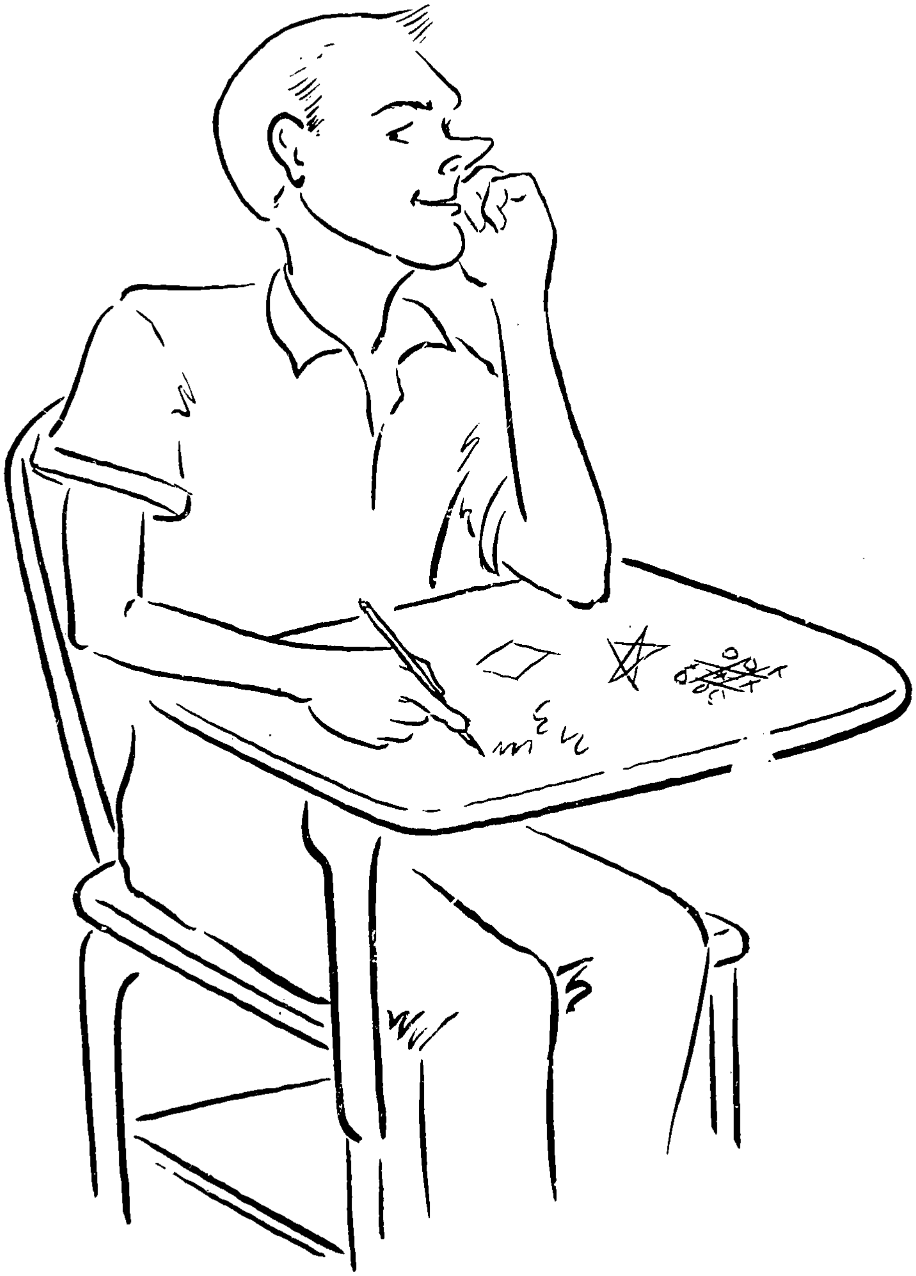
When you went to school, do you remember the marks that appeared on the desk where you sat? Someone would start by writing his name unconsciously in the form of doodling. The next person who sat there would trace it. Within a week or two, the name was a groove in the desk. As years went by the name was <u>carved</u> into the desk. This is how the principle of repetition works to help the trainee learn a skill or information. Each time the trainee practices the skill or uses the information, he makes a little memory "groove" in his brain. The more he practices, the deeper and more permanent the groove becomes. This is how we got the expression "Practice makes perfect!" We will add one word to this expression: "Correct practice makes perfect!" You must observe carefully to make sure that the trainee is not repeating, and, therefore, <u>learning</u>, the skill incorrectly.

GO ON TO THE NEXT PAGE

(frame 13 continued)

In the Application Step what teaching principle involves allowing your trainees to practice the skill?

	FRAME NO.
motivation	14
repetition	17
effect	20



(from Frame 16) 14

YOUR ANSWER: The teaching principle which involves allowing your trainees to practice the skill is motivation.

A successful practice session may be motivating, but motivation does not necessarily involve practice. Motivation consists of stimulating the trainee to wish to learn. The teaching principle that you are looking for deals with providing the trainee a chance to use what you have taught him often enough until it becomes a natural reaction. The trainee may need to be motivated to practice, and the practice may serve to motivate. The principle that you are looking for explains why the practice is necessary in the first place.

We learn by doing. The more we use what we learn, the easier its use becomes. The teaching principle that applies to this statement is the correct response. Return now to frame 13 and find this principle.

(from Frame 16) 15

YOUR ANSWER: The second stage of the Application Step is necessary to learning a skill because "Two heads are better than one."

This expression applies to the first stage of the Application Step more than the second. In the first stage, the groups of trainees weren't learning by using their own knowledge. They were learning from the experience of another trainee. In other words, they were adding the knowledge and skill of another "head" to their own understanding.

In the second stage, the trainee is using what he has learned to try the skill on his own. The instructor is there to help him should he need help, but this stage is important mainly because it gives each trainee a chance to practice what he has learned.

Keeping this in mind, return to frame 16 and select the correct response.

YOUR ANSWER: The following accurately describes Mr. Bright's role in the Application Step:

> Mr. Bright observes the demonstration and questions the performing trainee. He corrects all errors as they are made, but waits until the demonstration has been completed before re-teaching any weak points he may have discovered.

Excellent! You realize that the instructor should neither wait until the end of the demonstration to correct errors, nor should he repeat instrution during the demonstration. Errors must be caught as they are made; re-teaching must be carried out at the end of the demonstration. This approach insures that the trainee will get a total picture of the correct performance of the task and, at the same time, understand the skill and related information before trying the skill himself.

If you carried out the first stage of the Application Step, your trainee should be ready for the second stage--individual try-out. The trainee must practice the skill himself before he can learn it. This stage gives you a chance to work with each individual trainee. You can iron out all the little fine points that cannot be detected until you see the individual trainee in action. For your faster trainees, this is a good time for review and practice. For those having difficulty, you have more time to help them with their particular problems.

Your role as instructor is the same in this stage as in the first. You observe very closely each trainee's performance. You question him to see if he understands what he is doing and why. You stop and correct him if he makes errors. You repeat instruction if you see the need for it. Then you question him again to assure that he has learned what you have taught.

Why is the second stage of the Application Step necessary to learning a skill?

	FRAME NO.
"An ounce of experience is worth a ton of theory."	13
"Two heads are better than one."	15
"If you want it done right, do it yourself."	19

YOUR ANSWER: The teaching principle which involves allowing your trainees to practice the skill is repetition.

Very good! This teaching principle allows the trainee to practice a skill until it becomes second nature to him. He is forming good habits. WARNING: Make sure that the trainee is practicing the skill correctly, or the incorrect method will become a habit!

The second teaching principle of importance to the Application Step is reinforcement. In general for your own use, reinforcement is anything "which serves to strengthen and perpetuate the response." What does all this mean? Suppose a trainee practicing a skill does particularly well. If you say, "Good work!" he will try to do the task the same way the next time he practices. In other words, you have reinforced or strengthened the correct performance of the job. The joy of repeating the skill that the trainee knows he can do well is also reinforcing. Later on in the Evaluation Step, you will use grades to reinforce good work.

The most important thing to remember in applying the principle of reinforcement is that it must come immediately following the performance to be effective.

Mr. Bright looks at a pamphlet that one of his passengers is preparing and says, "I like the way you are setting up this information!" What teaching principle is he applying?

	FRAME NO.
reinforcement	21
repetition	23
readiness	25

(from Frame 12) 18

YOUR ANSWER: The following accurately describes Mr. Bright's role in the Application Step:

> Mr. Bright watches the demonstration carefully. He questions the trainee and corrects errors as they arise. When he sees that a trainee does not understand, he stops the demonstration and repeats the instruction before allowing the demonstration to proceed.

Read the last sentence of this paragraph carefully. Do you really think this is the best way for the instructor to carry out the Application Step? The performance should be carried out as smoothly and correctly as possible. It is necessary to stop the trainee to correct errors. However, if you stop the demonstration long enough to re-teach each point that the trainee may not be certain of, he will lose the logical order of the operation.

It is best to get a total picture of the trainees' needs before re-teaching. You can take note of the weakest areas of understanding and re-teach these at the end of the demonstration instead of chopping up the demonstration into meaningless pieces.

Read each answer choice carefully, making sure to choose the one that says exactly what you wish it to say. With this precaution in mind, return to frame 12 and select the correct answer.

(from Frame 16) 19

YOUR ANSWER: The second stage of the Application Step is necessary to learn a skill, for "If you want it done right, you must do it yourself."

This may apply to the trainee's learning later on, but not right now. Regardless of how good an instructor you are or how good a trainee you happen to have, he still must practice what he has learned in order to be able to do it well. Just because a child has learned to play "Chopsticks" on the piano does not mean that he is ready for Beethoven's Fifth Symphony.

We learn by doing. In the Application Step the trainee is still learning. He is not an accomplished tradesman, nor is he ready to work on his own! His performance in this step should not be expected to be perfect.

Think this through before returning to frame 16 to make the correct response.

(from Frame 13) 20

YOUR ANSWER: The teaching principle which involves allowing your trainees to practice the skill is effect.

The principle of effect consists of providing the trainee with opportunities to experience success. Allowing the trainee to practice what he has learned may give him a feeling of accomplishment and success, but this is not the reason for providing practice. This is the by-product of a good practice session.

When a child first learns to write his name, his muscles are stiff and the pencil feels awkward in his hand. The more he writes his name, the easier it becomes for him. The pencil begins to feel natural in his hand, and his muscles become accustomed to the action of writing. What started out to be a seeming impossible task becomes a normal, everyday occurrence. This is the purpose of the teaching principle for which you are searching. Return with this in mind to frame 13 and find the correct response.

(from Frame 17) 21

YOUR ANSWER: The teaching principle that Mr. Bright is applying is reinforcement.

Correct! In turn, let me reinforce you for your good efforts. You have successfully completed the Application Step of the "Four-Step Method." Because you have worked so well, I have prepared a short review to help you recall the information that we have just studied.

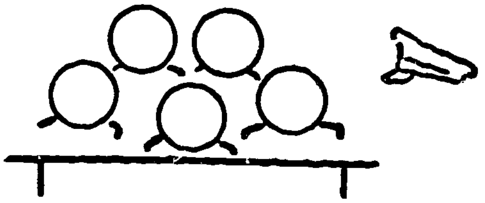
Because this review will be presented in the form of a visual aid, you should know for what you are looking. As you study the aid on the next frame, answer the following questions?

1. What are the two stages of the Application Step?
2. What is the instructor's role in the Application Step?
3. What are the teaching principles involved in the Application Step?

When you have these questions in mind, proceed by turning to frame 22.

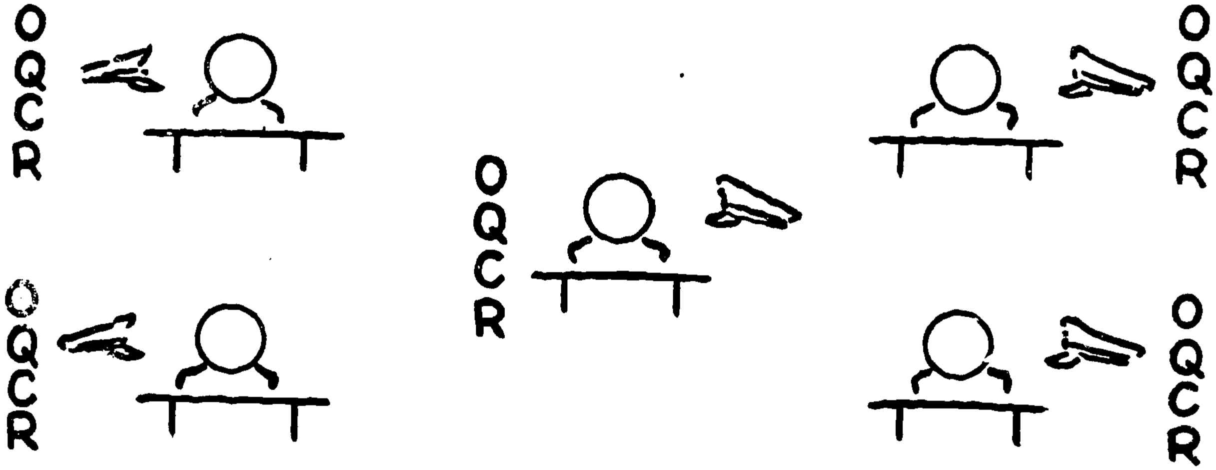
APPLICATION STEP

STAGE 1: SMALL GROUP DEMONSTRATION (TRAINEE - LED)



OBSERVE
QUESTION
CORRECT
REPEAT

STAGE 2: INDIVIDUAL TRY-OUT



TEACHING PRINCIPLES : REPETITION
REINFORCEMENT

When you are ready, go to the next frame for your first question by turning to frame 24.

(from Frame 17) 23

YOUR ANSWER: The teaching principle that Mr. Bright is applying is repetition.

The principle of repetition is just what it tells you that it is--learning by repeating. There is nothing in Mr. Bright's statement that would lead you to believe that he is asking the student to repeat his performance. As a matter of fact, he is complimenting the trainee's performance. His compliment serves a greater purpose than merely making casual conversation or being courteous. Look back at the information in frame 17 to discover this purpose. You will then be able to choose the correct response.

(from Frame 22) 24

The Application Step may be divided into two phases. What is the first phase?

	FRAME NO.
Instructor supervises individual trainee tryout.	26
Few trainees demonstrate to small groups.	28
Instructor demonstrates for each trainee individually before trainee tryout.	31

(from Frame 17) 25

YOUR ANSWER: The teaching principle that Mr. Bright is applying is readiness.

The principle of readiness consists of determining the trainee's knowledge, background, and needs in a particular subject. This trainee is already engaged in applying what he knows, so we must assume that his readiness has already been determined and acted upon.

In this situation, Mr. Bright has found something particularly good about the trainee's performance and has encouraged this kind of performance by praising him. Whether or not he is aware of it, he has applied a teaching principle by this action. Return to frame 17 and review to refresh your memory before making the correct answer choice.

(from Frame 24) 26

YOUR ANSWER: In the first phase of the Application Step the instructor supervises individual student tryout.

Remember, the trainee has just been presented the information or skill. He has not had the opportunity to do any part of it by himself. Have you ever run hot water into a glass and then suddenly run cold water? Chances are you ended up with a broken glass! The change from hot to cold was so sudden that the glass broke under the stress. On the other hand, if you take the same glass, run hot water into it, then gradually turn on the cold water, the glass will adjust to the change in temperature by degrees. You must do the same thing with your trainees. You just gradually introduce the trainee to performing the skill on his own.

Consider each answer choice carefully before making another response. Turn back to frame 24.

(from Frame 29)

YOUR ANSWER: The second phase of the Application Step is "test for understanding."

The instructor is constantly checking with his trainees by asking questions to see of they understand what he is trying to teach. This takes place in the Presentation Step, the Application, and the Evaluation Step. In other words, it is not a major division of one step, but an important part of three steps.

You should recall that the first phase of the Application Step consists of having a few trainees demonstrate to small groups. What, then, would be the next most logical step?

Return to frame 29 and select the correct answer.

(from Frame 24)

YOUR ANSWER: In the first phase of the Application Step a few trainees demonstrate to small groups.

You are correct! The more the trainee sees the operation performed, the better equipped he will be to try the skill on his own. The instructor picks the trainees who have the best grasp of information and skill to show small groups of his classmates how the task is done. This adds assurance to these trainees and gives the others a closer view of the task.

Please continue to the next question by turning to frame 29.

(from Frame 28) 29

Which one of the following names the second phase of the Application Step?

	FRAME NO.
Test for understanding	27
Allow trainee to work on his own	30
Supervise individual tryout	32

(from Frame 29) 30

YOUR ANSWER: The second phase of the Application Step is "allow the trainee to work on his own."

The trainee has, in the first phase of the Application Step, observed while one of his classmates demonstrated a skill. Would it be wise to allow this trainee to work completely independently without some guidance? How can you be sure that he will make no mistakes? This is a crucial point in instruction. Whatever misconceptions the trainee has up to this point must be corrected here, for in the next step of instruction he will be tested and put on his own. You cannot allow him to learn mistakes by practicing them.

The learner has seen the skill demonstrated many times at this point in instruction, but he has not performed the skill himself. He is apt to make mistakes, and you should be there to correct them. He also needs your encouragement to reinforce what he is able to do well.

You should be able to return now to frame 29 and make the correct response.

(from Frame 24) 31

YOUR ANSWER: In the first phase of the Application Step the instructor demonstrates for each trainee individually before trainee tryout.

This might be ideal for very slow trainees. However, you must assume that you have an average class that contains some slow, some average and some very bright trainees. It would be very time-consuming for an instructor to give group presentation of a skill or information and then to go to each trainee separately. Why not use the brightest trainees to help those who cannot catch on as quickly? These trainees would be disgusted at having to listen to you re-explain something that they already know. What they need is the opportunity to use what they have already grasped. This reinforces their learning and gives those who observe a better chance of succeeding when they do try the task on their own. This gives you an opportunity to catch any mistakes that might be made in trainee trial before most of the trainees have a chance to make them, too.

There is a more accurate response from which to choose. Return now to frame 24 and select that response.

(from Frame 29) 32

YOUR ANSWER: The second phase of the application step is "supervise individual try-out."

Good! The instructor must be on hand here to make sure that the trainee knows what he is doing, to correct mistakes, and to give encouragement. The trainee learns through repetition, and you must be sure that he is repeating the procedure correctly.

You are ready to go to the next question. Please turn to frame 33.

(from Frame 32)

Which of the following paragraphs best describes the role of the instructor in the Applicatio ?

	FRAME NO.
The instructor serves as a reference source in the Application Step. He allows the trainees to perform the skill and makes himself available to them in case they need help or run into difficulty. No real instruction takes place. This step is solely to give the trainee practice before evaluating his work.	35
The Application Step is the trainee's chance to show what he knows. The instructor serves as an observer and examiner in this step. He tests the trainee to discover his capabilities and then gradually allows him to work on his own. Afterwards, the instructor checks with the trainee from time to time to review his progress.	37
In the Application Step, the instructor shares the stage with the trainee. He observes each step the trainee performs. If he sees an error made, he is quick to stop the trainee and correct the error. As the trainee continues, the instructor asks questions and repeats instruction whenever he feels it is necessary.	39

(from Frame 31)

YOUR ANSWER: The teaching principles that apply to the Application Step are aptitude and observation.

The word aptitude means "ones capacity for learning." This has to do with someone's inborn abilities and is not a teaching principle. It is good to know a trainee's aptitude, for this helps you understand his learning problems and capabilities. This information should be gathered during the Preparation Step of instruction, however. Observation by the instructor is one method he uses to judge the performance of a trainee or to catch mistakes before they become habit.

You are evidently guessing. Perhaps you need to refresh your memory. A teaching principle is a fundamental rule of teaching which helps the trainee to learn when applied properly. For instance, "readiness" is a teaching principle which must be applied in the Preparation Step, as you may remember. To carry out this principle, the instructor must discover the trainee's aptitude, previous experience and knowledge, and IQ and must motivate the trainee to want to learn.

Think of the Application Step as a whole. What is the trainee doing in this step? What would help him to be able to do this better? The answer to these questions should tell you what the teaching principles for this step are.

Return with these things in mind to frame 38 and make another response.

(from Frame 33) 35

YOUR ANSWER: The following paragraph best describes the role of the instructor in the application step:

> The instructor serves as a reference source in the application step. He allows the trainees to perform the skill and makes himself available to them in case they need help or run into difficulty. No real instruction takes place. This step is solely to give the trainee practice before evaluating his work.

It is true that the instructor serves as a reference source during the Application Step. His role, however, is much more important than that. Up to this point, he has done all the work. In the Application Step he sees how well the trainees can relate what he has taught to the actual performance of the task. He must catch all mistakes that are made and make sure that the trainee understands why the mistake was made and how the task should actually be done. Actually, this is probably the most important and most critical stage of instruction. "Experience is the best instructor" is an old adage that is well suited to this situation. In other words, we learn by <u>doing</u>. You must be on hand to make sure that the trainee is learning <u>correctly</u> what he does.

Re-read the paragraphs on frame 33 before making another selection.

(from Frame 38) 36

YOUR ANSWER: The teaching principles that apply to the Application Step are readiness and effect.

Readiness is a teaching principle, but the instructor must ready the trainee to learn before instruction actually begins. This is the main purpose of the <u>Preparation Step.</u> You are in the final stages of instruction now. You must assume that the trainee is ready to learn by this time. Effect is also a teaching principle. Learning must have a favorable <u>effect</u> on the trainee: he must see that he is making progress and he must experience success. The principle of effect does apply to the Application Step.

Your response was partially correct. You should be able to return now to frame 38 and make the proper response.

(from Frame 33) 37

YOUR ANSWER: The following paragraph best describes the role of the instructor in the Application Step:

> The Application Step is the trainee's chance to show what he knows. The instructor serves as an observer and examiner in this step. He tests the trainee to discover his capabilities and then gradually allows him to work on his own. Afterwards, the instructor checks with the trainee from time to time to review his progress.

This paragraph actually describes the fourth step of instruction--Evaluation. In the Application Step, the trainee is never left to work alone nor is he tested. A person who wishes to get a driver's license must practice driving under close supervision by a good driver, even though he has observed carefully other drivers and knows all the rules. He then is tested. To test him before this time would have been unfair.

Remember, not until the final stages of instruction is the trainee put on his own. Until that time he must be carefully observed to insure that he is learning correctly and understands what he is doing.

Return now to frame 33 and make the correct response.

(from Frame 39) 38

What are the teaching principles that apply to the Application Step?

	FRAME NO.
aptitude observation	34
effect readiness	36
repetition reinforcement	40

(from Frame 33) 39

YOUR ANSWER: The following paragraph best describes the role of the instructor in the application step:

> In the application step, the instructor shares the stage with the trainee. He observes each step the trainee performs. If he sees an error made, he is quick to stop the trainee and correct the error. As the trainee continues, the instructor asks questions and repeats instruction whenever he feels it is necessary.

Very good! You recognize the highly important task of the instructor at this crucial point in his learning. You must be active enough to catch his errors and praise his success to make sure that his learning is complete.

You are ready to go on to the next question now. Turn to frame 38.

(from Frame 38) 40

YOUR ANSWER: The teaching principles that apply to the application are repetition and reinforcement.

You are correct! The instructor gives the trainee the opportunity to repeat a skill or related information as often as possible to ingrain the correct reaction in his memory. He reinforces the trainee's learning by praising him when he performs well. Repetition also reinforces learning.

Congratulations! You have passed the test and have demonstrated that you are ready to go on to the next section. How do you test your trainees' ability? What do you look for in testing them? What kinds of tests are best? When do you allow the trainee to work independently? These are the questions that we will answer in the next lesson.

You may begin with Module VI of the "Four-Step Method" when you are ready.

VT 016 185
TERRY, MARTHA, ED.
THE FOUR-STEP METHOD OF INSTRUCTION. A
PROGRAMMED COURSE FOR OCCUPATIONAL
INSTRUCTORS. MODULE 6.

REHABILITATION RESEARCH FOUNDATION, ELMORE,
ALA.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
OEC-2-7-006711-4542
PUB DATE - ND 40P.

DESCRIPTORS - *COURSE EVALUATION; *PROGRAMED MATERIALS; TEACHING GUIDES; INSTRUCTIONAL AIDS; *TEACHING TECHNIQUES; *EFFECTIVE TEACHING; *TRADE AND INDUSTRIAL TEACHERS; VOCATIONAL EDUCATION TEACHERS

ABSTRACT - THIS MODULE IS THE LAST IN A SERIES OF SIX WHICH CONSTITUTE A FOUR-STEP PROGRAMED COURSE IN TEACHING TECHNIQUES AND STRATEGIES. DEVELOPED PRIMARILY FOR OCCUPATIONAL TEACHERS, THE PURPOSE OF THE PACKAGE IS TO AID IN IMPROVING INSTRUCTIONAL COMPETENCY. IN MODULE 6, ATTENTION IS DIRECTED TO THE EVALUATION PROCESS AS A TOOL IN MEASURING SUCCESS. THIS PROCESS INVOLVES: (1) DETERMINING IF THE TRAINEE HAS DEVELOPED THE KNOWLEDGE AND SKILLS NECESSARY TO PERFORM THE TRADE, (2) DETERMINING IF HE CAN PERFORM THE TRADE TO MEET THE STANDARDS OF EXCELLENCE AS VIEWED BY THE INSTRUCTOR, AND (3) DETERMINING IF HE HAS REACHED THE OBJECTIVES, BOTH GENERAL AND SPECIFIC. OTHER COMPONENTS TO THE SET ARE AVAILABLE AS VT 016 180-VT 016 184 IN THIS ISSUE. (SN)

VT 016 185

THE FOUR STEP METHOD OF INSTRUCTION

A Programmed Course
For Occupational Instructors

MODULE 6

THE FOUR-STEP METHOD OF INSTRUCTION

A Programmed Course

OCCUPATIONAL INSTRUCTORS

Module 6

Developed by the

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Pursuant to a Contract with

U. S. Office of Education
Contract No: OEC2-7-006711-4542

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Now we come to the final step of instruction--the Evaluation Step. Evaluate means "to determine or fix the value of, to examine and judge." Roughly, the Evaluation Step asks, "How well did I teach? How well did the trainee learn?" Not all evaluation takes place in the Evaluation Step. Actually, you are evaluating the trainee continuously, judging his progress and changing your approach to meet his needs. How do you go about evaluating or judging the trainee's progress? It's like taking a trip. You have to know where you are going before you can decide if you got there.

When you were planning the lesson, you decided your goals or objectives. This told you where you wished to go with the lesson. In order to decide if you got to your destination, you will have to examine your objectives.

GO ON TO THE NEXT PAGE.

(frame 1 continued)

These are the questions that you asked to determine your objectives:

What knowledge does the trainee need to do the job?

What skills must he have?

What attitudes should he develop to make him successful?

These are the questions that you ask to evaluate the trainee's progress:

What knowledge did the trainee gain?

What skills did he master?

What attitudes did he develop?

The answers to the questions above compared to the answers given for the first group of questions will tell you what progress the trainee has made.

What must you do in order to evaluate the trainee's success with a lesson?

	FRAME NO.
Determine if he has developed the knowledge and skills necessary to perform the trade.	2
Determine if he can perform the trade to meet your standards of excellence.	4
Determine if he has reached the objectives.	5

YOUR ANSWER: In order to evaluate the trainee's success with a lesson, you must determine if he has developed the knowledge and skills necessary to perform the trade.

This is certainly a major part of the evaluation task. One important point has been forgotten, however. The trainee's success depends not only upon his knowledge and skills, but also upon his attitude toward his job. Suppose a trainee with a mastery of the knowledge and skills of his trade finds a job. He's not particularly interested in his job. It's just a way to earn a living. He doesn't want to take time to help his customers. Do you think he will be very successful at his trade? It is doubtful! Without the proper attitude, the knowledge and skills are of little use.

You are on the right track. With this hint, you should be able to return to frame 1 and select the correct response.

YOUR ANSWER: You carry out the Evaluation Step by testing.

You are correct! The primary measurement of the trainee's achievement is determined through testing. These test results plus your observations and records throughout instruction give you a fairly accurate picture of your trainee's progress. How accurate the picture is depends largely on the type of tests that you use and how they are written and administered. Let's examine the form and purpose of each type.

One form of testing you have already used within your instruction, so you will need only a short review of its use. This is the oral test. Using an oral test, the trainee answers questions aloud to determine how well he has mastered or can apply related information.

Listed below are some important points to remember in giving an oral test:

1. Questions should be brief and easily understood.
2. Questions should require thought--a problem solved using the information the trainee has learned. Questions that can be answered with a "yes" or "no" are no indication of what he really knows.
3. Questions should be stated to the whole group before calling on one person to answer. Example: Why do we have 365 days in a year, John?
4. Questions must measure accurately the trainee's understanding or skill.
5. Questions must be valued fairly and accurately.

When do you use an oral test?

	FRAME NO.
To test trainee's skill	8
To see if trainee is paying attention	12
To test trainee's understanding of related information	14

YOUR ANSWER: In order to evaluate the trainee's success with a lesson, you must determine if he can perform the trade to meet your standards of excellence.

A trainee's performance may be deceptive. He may be going through the motions without understanding why the operation must be performed this way. Understanding of related information is necessary. On the actual job, situations might arise that he could not remedy because he did not understand the reasons behind a particular operation.

More than likely, you drive a car. You can make the car perform well and take you where you're going. This does not mean, unless you are a mechanic, that you understand what makes the car run. Even though you are an excellent driver, you might not be able to fix the car should it stop. You know the how (skill), but not the why (knowledge)! It takes both the how and the why plus another important ingredient--a good attitude--to make a successful tradesman, and these are the things that you must evaluate.

You may need to study the materials in frame 1 more carefully before making another response.

YOUR ANSWER: In order to evaluate the trainee's success with a lesson, you must determine if he has reached the objectives.

Certainly! Your objectives consist of giving the trainees the knowledge, skills, and attitudes that are necessary to become a successful tradesman in your field. Evaluation is determining to what degree you have reached your objectives.

Evaluation is more than measuring the progress of the trainee. It is also an indication of how well you taught. You are taking inventory of your teaching methods, materials and aids to decide how effective they were in helping you to reach your objectives. If they failed, you have at least learned that they will not work with this lesson or this particular class.

One question that evaluation asks is, How well has the trainee learned?" What is the other question?

	FRAME NO.
"What can the trainee do?"	7
"What methods should I use next time?"	9
"How well have I taught?"	10

(from Frame 10) 6

YOUR ANSWER: You carry out the Evaluation Step by oral questioning.

Oral questioning is one method of evaluation. It is used throughout the "Four-Step Method" as a means of judging weaknesses in instruction so that corrective measures can be taken immediately. The Evaluation Step is carried out by using several means of testing and judging trainee progress. No one means can give you an accurate picture of your trainee's knowledge and ability.

There is a better answer for this question. Return to frame 10 and find this answer.

(from Frame 5) 7

YOUR ANSWER: The second question that evaluation asks is, "What can the trainee do?"

This is a part of the trainee's total learning task, isn't it? He must learn how to <u>do</u> the job, why the job is done this way, and what attitudes are necessary to perform the job successfully. This is, then, a part of the first question.

Return to frame 5 and study it carefully before making the correct response.

(from Frame 3) 8

YOUR ANSWER: You use an oral test to test the trainee's skill.

Suppose someone asked you how to water ski. You may be able to tell him exactly how it is done and yet not be able to ski an inch! In order to test a trainee's skill, you must observe his performance. An oral test can tell you only what the trainee <u>knows</u>, not what he can <u>do</u>.

With this reminder, return to frame 3 and make the correct response.

(from Frame 5) 9

YOUR ANSWER: The second question that evaluation asks is, 'What methods should I use next time?"

When you evaluate your teaching, there is more to be considered than the methods you should use. Your total teaching task must be analyzed. Did you use the best aids and materials? It may have been that your choice of aids was particularly important for this lesson. If they were chosen wisely, your teaching was more effective. Did your teaching materials add to the success of the lesson? Could they have been more carefully selected or used to better advantage?

Consider these questions when you return to frame 5 to make the correct response.

(from Frame 5) 10

YOUR ANSWER: The second question that evaluation asks is, "How well have I taught?"

Good! The responsibility for teaching belongs to the instructor. The responsibility for learning is the trainee's. The trainee cannot be expected to learn unless the instructor has taught. This is why the Evaluation Step includes examination not only of the trainee's progress, but also of the instructor's job.

Now that we know whose task is to be evaluated and why evaluation is necessary, we must ask how to accomplish the task of evaluation. You can measure a person's physical growth with a yardstick, but how can you measure mental growth and understanding? There are several methods that we will discuss. Besides your own day-to-day observation, trainee record books that chart progress, and oral questioning as you carry out the Presentation and Application Steps, there are various types of tests. Look at the list below:

1. Oral tests
2. Written tests--essay and objective
3. Performance tests

After learning how each one is used, you will be able to decide which one or which combination of tests you should use.

How do you carry out the Evaluation Step?	FRAME NO.
By testing	3
By oral questioning	6
By using a measuring stick	11

YOUR ANSWER: You carry out the Evaluation Step by using a measuring stick.

You may be confused by the comparison we used in the previous frame. Can you measure a trainee's knowledge and ability with a measuring stick? The number of inches that he may have grown in a year's time is no evidence of <u>mental</u> growth, is it? The trainee does not have a dipstick in his head that you can pull out to decide whether he needs more knowledge or ability, does he?

You must have some "measuring stock" to go by in evaluating your trainee's knowledge. The "measuring stocks" instructors use are different types of tests, progress charts, and student record books. Progress charts, daily record books, and oral questioning are used throughout the steps of instruction. Oral, written, and performance tests are used to complete your measurement of trainee learning.

Read carefully the information given in each frame. Make sure you think about each answer choice before making your decision. Return now to frame 10.

(from Frame 3) 12

YOUR ANSWER: You use an oral test to see if the trainee is paying attention.

You may discover if the trainee is paying attention when you ask him a question, but this is not the purpose of an oral test. During the Evaluation Step you are testing the trainee to discover what knowledge he has gained, what skill he has mastered, and what attitudes he has developed. Of course, you are concerned with conduct, but your prime concern is instruction. Tests should never be used as a means of punishment. Oral questions should never be used to embarrass or belittle the trainee. They are used for two reasons: 1) to determine what the trainee knows in order to decide how best to help him; 2) to evaluate the trainee's progress so that instruction can continue on his level of understanding.

Return to frame 3 and find the answer which best satisfies the question.

(from Frame 17) 13

YOUR ANSWER: The following objective is a simple recall or completion question:

What is another word for "cat"?

a. feline

b. canine

c. bovine

Let's look again at the example of a simple recall question.

Write the answer to each question in the space at the right.

1. How many threads per inch has a 1/4" NC screw?______

This question has a blank to be filled in. Are you given a selection of answers from which to choose? No, you must know the precise amount to be able to fill in the blank.

Return to frame 17 and examine the question that you were asked. Then find the type of objective test that requires the trainee to do the same thing that you must do in order to continue in the program.

(from Frame 5)

YOUR ANSWER: You use an oral test to test the trainee's understanding of related information.

Good! Oral tests cannot be used to test the trainee's skill; only having the trainee perform can tell you how well he has mastered the skill. Oral tests should not be used to embarrass the trainee before his classmates. They can be used to see how well he has learned the information that will help him to perform the skill more easily and efficiently.

There are two kinds of written tests that you should be familiar with. Both are used to test the student's use of related information. They are the essay and the objective tests.

An essay test requires the trainee to write answers in sentence form often in composition style. For this reason, it tends to emphasize writing ability. A poorly written essay question can be difficult to grade and unfair to the trainee. Essay questions do have the advantage of testing ideas and concepts that other forms of tests cannot examine. Here are some points to follow in making out an essay test:

1. Test for only one idea at a time. Do not call for too much information in one question.

   Example: Paint is made up of a vehicle and a pigment. Give two examples of each.

2. Word questions so that they do not suggest the answer. The words, "always," "seldom" and "never," tend to cue the trainee. Questions requiring only a "yes" or "no" answer do not test for understanding.
3. Assign SPECIFIC values to each part of an essay question. This helps to insure fair and accurate grading.
4. Make sure that it measures accurately the trainee's understanding.

According to the four points listed above, which of the following questions would make the best essay question?

	FRAME NO.
Give two reasons for setting the hand brake on a car when parking.	16
Is there something to be gained by always setting the hand brake on a car?	19
Discuss the electrical system in a car.	20

YOUR ANSWER: The following objective question is a true-false question:

What is another word for "cat"?
a. feline
b. canine
c. bovine

This response may be a careless error on your part. Let's examine your answer to discover your misunderstanding. True-false questions are answered by deciding if a given statement is right or wrong. Suppose you are given the following statement:

All flowers grow on trees. ______________
(true or false)

You know immediately that this statement is false. Some flowers grow on bushes; some grow directly from the earth; and some, not all, grow on trees. After coming to this conclusion you would answer the question in this manner:

All flowers grow on trees. ______FALSE______
(true or false)

Does the objective question that we are examining require you to respond in this manner? Of course not! This type of question gives you a 50-50 chance at the correct response, and I'd never do a thing like that!

Return to frame 17 and compare the types of objective questions to the question that you were asked. You should be able to find the response easily now.

YOUR ANSWER: The following question would make the best essay question: "Give two reasons for setting the hand brake on a car when parking."

Excellent! This question clearly outlines the parts that are to be discussed. It is stated clearly and simply. The answer will require thought and knowledge of the subject. The manner in which the question is stated does not give away the answer. Grading will be easier and more accurate because the answer will not be long and involved, but straightforward and to the point.

The second type of written test is the objective test. An objective test usually requires only a single letter, number, or word response. This makes it easy to take and easy to grade. It is usually more fair to the trainee and a more accurate measure of the trainee's knowledge. It is used, of course, to test the trainee's understanding of related information. Continue to frame 17 for some examples of the types of objective tests.

Objective tests are short-answer written tests. They require usually only a word or letter choice to answer each question. There are 6 types of objective tests. Below are samples of each type. Study each example carefully:

1. COMPLETION QUESTIONS. The trainee writes only one-word or short responses.

   Example: How many threads per inch has a 1/4" NC screw?______

2. TRUE-FALSE QUESTIONS. The trainee decides whether each statement is true or false and answers by writing either "true" or "false" in the blank provided after each statement.

   Example: The density of battery electrolyte is measured with a voltmeter.

   ____
   (true or false)

3. LISTING QUESTIONS. The trainee responds by writing the items asked for in the blanks provided.

   Example: Name in proper order the strokes of the Otto cycle, using the spaces provided.

   ____
   ____
   ____

4. MATCHING QUESTIONS. The trainee matches the items in one column with the corresponding items in the other column by placing the number of the matching item in the blank provided.

   Example:

   1. Toughness — a. Property of metal that permits drawing.____
   2. Elasticity — b. Property of metal that permits stretch under tension without breaking or tearing.____

(frame 17 continued) 17

5. MULTIPLE CHOICE QUESTIONS. The trainee is asked a question and given three or more possible answers from which to choose the correct response.

Example: What kind of test is this?

a. Essay
b. Oral
c. Objective

6. IDENTIFICATION QUESTIONS. The trainee is given a drawing and asked to identify or label parts of the drawing.

Example:

NO RESPONSE REQUIRED. GO ON TO FRAME 18

18

Now, compare the following question to each of the types of objective tests you have just studied:

What is another word for "cat"?

a. feline
b. canine
c. bovine

Which of the six types of objective questions is the one above?

	FRAME NO.
Completion	13
True-false	15
Listing	21
Matching	24
Multiple choice	26
Identification	27

(from Frame 14) 19

YOUR ANSWER: The following question would make the best essay question: "Is there something to be gained by always setting the hand brake on a car?"

The trainee can easily guess the answer to this question. He doesn't really have to know anything about the subject. The question requires only a "yes" or "no" answer, so he would have a 50-50 chance of getting the answer to begin with. There is another cue word in the question which suggests that "yes" is the correct response. This word is "always." With just a bit of simple reasoning, I have made 100% on this essay question!

Review the four points on frame 14 again before making your next answer selection.

(from Frame 14) 20

YOUR ANSWER: The following question would make the best essay question: "Discuss the electrical system in a car."

How much time do you have to grade this test? (You have quite an involved question here!) What specific points do you want discussed? What value can you assign to the parts since you have not designated the parts to the trainee? Do you think that this kind of essay question is really fair to the trainee?

Make sure that the essay questions you write require only one main idea in answer and that the parts to the question, if any, are clearly outlined and assigned a specific value.

Look again at the four points for writing an essay question listed on frame 14. Take care to select the question that most nearly satisfies each of these points.

(from Frame 17)

YOUR ANSWER: The following question is a listing question.

What is another word for "cat"?

a. feline

b. canine

c. bovine

Perhaps you are confused because this question gives you a list of possible responses from which to choose. Let's look at a listing question and compare it to the question above.

Example: List in proper order the days of the week according to the calendar:

____

____

____

____

____

____

____

You must have memorized by the calendar each day of the week in order to fill in the blanks provided. Do you have blanks to be filled in when you answer a question like the one we are examining? Must you have memorized the information? Do you have to write in your answer?

You probably recognize your error now. Look carefully at the examples you are given before making your next answer selection. Return to frame 17.

(from Frame 26) 22

YOUR ANSWER: Mr. Bright can be sure that his passengers can do the job that they were sent to do by giving them a written test.

Written tests cannot tell you what a trainee can do. They can tell you only what he knows. A woman may be able to tell you how to change a tire on a car, but this does not mean that she can do it herself. She may not have the physical strength for the job.

Both knowledge and skill are necessary to do a job well. Written and oral questioning tests the understanding of information. Another type of test is necessary to evaluate the trainee's ability to do the job.

With this reminder, return to frame 26 and make the correct response.

(from Frame 29) 23

YOUR ANSWER: After testing has been completed, the instructor must continue to the next lesson.

The trainee is not yet ready to continue to the next lesson. He has been operating under a strictly supervised situation. He has not yet had the opportunity to work on his own without someone to watch every move. Now that you are sure that he can perform the skill well, he needs the chance to practice his new-found skill and get it well-fixed in his mind before going on to a new skill. We will discuss the teaching principle behind this reasoning in the next frame.

Look again at the information in frame 29 before making your next answer selection.

(from Frame 18)

YOUR ANSWER: The following objective question is a matching question:

What is another word for "cat"?

a. feline

b. canine

c. bovine

A matching question is similar in some respects to the type of question above. There are some decided differences, however. The objective question we are examining asks a question and then gives you a number of possible answers from which to choose. Tests with matching questions have two columns. One column contains statements on certain information. The other column consists of words or phrases that apply to these statements. Look at the example below:

1. Evaluation
2. Decide objectives
3. Application
4. Lesson plans
5. Preparation
6. Job breakdown
7. Presentation

A. The instructor must complete these before he begins to teach. ______

B. The first stage of lesson planning--decide upon the subject. ______

C. The second stage of lesson planning--limiting the subject to one or more goals. ______

D. The first step of the "Four-Step Method." ______

E. The second step of the "Four-Step Method." ______

F. The third step of the "Four-Step Method." ______

G. The fourth step of the "Four-Step Method." ______

GO ON TO THE NEXT PAGE

(frame 24 continued)

The information in this test should look familiar! The object of this matching test is to match the numbered words to the proper statement in the opposite column. If you would like to take this little test to see how well you recall the information, cover the small block at the bottom left-hand corner of this frame with your hand. Using a scratch sheet of paper, letter down the left side A, B, C, D, E, F, and G. Next to each letter, place the number of the word or phrase which applies to the statement. As soon as you have completed the test, you may check your answers by looking at the block which you have covered at the bottom of the frame. This type of objective test is similar to the questions in this program only because you have a number of possible answers from which to choose. There is only one possible answer for each statement, however, and you must associate the answers with the statements yourself.

You are certainly on the right track, and, with this reminder, you should be able to make the correct response now. Return to frame 18

ANSWERS TO MATCHING TEST

A.	4
B.	6
C.	2
D.	5
E.	7
F.	3
G.	1

(from Frame 29)

YOUR ANSWER: After testing has been completed, the instructor must gradually taper off instruction.

Good! You have remembered that the instructor's task has not yet ended. He must give the trainee a chance to use the skill that he has perfected. You are sure at this point that the trainee can perform the skill to the best of his ability and is able to work on his own. You still check with him and make yourself available to him in case he should need help.

Why do you allow practice of the skill after testing has been completed? Why not continue to the next lesson? Teaching principles of repetition and reinforcement apply here. In addition to these familiar teaching principles, we can add the principle of feedback. Feedback is the positive or negative results that a learner receives upon attempt to perform. If the learner has success (positive results) with his performance, his learning of the skill is reinforced (made stronger). You have assured in your testing of the trainee that he will receive positive feedback from his performance of the skill. You want to make sure that his learning of the skill is permanently ingrained in his memory. This is why you allow the trainee to gradually work on his own after evaluation of his progress has been completed.

What is the new principle that you apply in the Evaluation Step?

	FRAME NO.
repetition	28
reinforcement	32
feedback	34

YOUR ANSWER: The following objective question is a multiple-choice question:

What is another word for "cat"?

a. feline

b. canine

c. bovine

Very good! Because each question includes three or more possible answers, this kind of objective test is called multiple (many) choice. We ask you multiple-choice questions in this lesson to determine if you are ready to go on to a new teaching point.

The last type of test that we will discuss is the most important for the vocational instructor. You are able to test the trainee's knowledge of a skill and the information which he must have to perform correctly, but there is no test for the trainee's ability with the skill except his actual performance of this skill under your close observation.

Planning the performance test is the most important part of your job. Below are listed some points that will help you to measure accurately the learner's skill:

1. Decide exactly what you are going to test--safety, speed, ability to plan work, accuracy, etc.
2. List the operation in the job or the steps in the operation that the trainee will be expected to perform and assign a score to each part.
3. Prepare written directions for each trainee to follow as he performs the skill.
4. List and make available to each trainee all the tools, equipment, specifications, and plans the learner will need to perform the operation.
5. Prepare a scoring sheet to use while giving the performance test.

GO ON TO THE NEXT PAGE

(frame 26 continued)

Careful preparation insures that the test is given fairly and accurately in a minimum of time.

As you administer the test, question the trainee, just as you did in the other steps of instruction (WHY, HOW, WHEN, WHERE, WHICH, AND WHAT), to make sure that he understands the reasoning behind his performance.

How can Mr. Bright be sure that his passengers can do the job that they were sent to do?

	FRAME NO.
By giving them a written test	22
By giving them a performance test	29
By evaluating their progress	30

(from Frame 18) 27

YOUR ANSWER: The following objective question is an identification question:

What is another word for "cat"?

a. feline

b. canine

c. bovine

Now look at this example:

1. ______

2. ______

3. ______

4. ______

This is an identification question. The arrows point to parts that are to be identified in the blanks to the left of the diagram. It is really nothing like the objective question we are examining, is it?

Return now to frame 18 and compare the question that you were asked to the examples of objective questions on the previous frame.

(from Frame 25) 28

YOUR ANSWER: The new principle that you apply in the Evaluation Step is repetition.

The principle of repetition is applied in the Evaluation Step, but it is not a new principle. You applied this principle in the Application Step when you allowed the trainee to begin gradually to perform the skill following your instruction.

Look back at the information in frame 25 to discover the new teaching principle that you apply in the Evaluation Step.

YOUR ANSWER: Mr. Bright can be sure that his passengers can do the job that they were sent to do by giving them a performance test.

Correct! A performance test tells you if your trainees have acquired the skills you have been teaching them. It is your only means of finding out if they can do the job.

Your teaching job is not over when you have completed your testing. Even though you are sure the trainee can perform the skill, you don't suddenly put him to work without supervision. When you assign him a job, check with him periodically to make sure that he has not run into difficulty. Continue to ask questions and to correct errors if he makes them. Encourage him to ask for help if he needs it.

Reduce the amount of supervision with each succeeding job. Gradual release helps you to determine when he is ready to work on his own and it gives the trainee confidence in his own ability.

After testing has been completed, what must the instructor do?

	FRAME NO.
Continue to the next lesson	23
Gradually taper off instruction	25
Review the lesson	31

(from Frame 26) 30

YOUR ANSWER: Mr. Bright can be sure that his passengers can do the job that they were sent to do by evaluating their progress.

We cannot say that this answer is incorrect. It is simply not the best response of those from which you were given to choose. This is the general term that we use when we discuss determining the degree of the trainee's advancement toward the objectives that you have set. This includes an evaluation of the trainee's knowledge and skill gains as well as his development of the proper attitudes. In order to answer the question precisely, you need to decide which of these three Mr. Bright wishes to evaluate.

Think through this information as you re-read the question on frame 26. Then select the best answer choice for this question.

(from Frame 29) 31

YOUR ANSWER: After testing has been completed, the instructor must review the lesson.

The purpose of review is to help the trainee get all of the information from one lesson gathered together into a meaningful whole. The logical time for review is before evaluation takes place. Review refreshes the memory and makes a total picture out of all the parts that have been presented from day to day. I am being fair to you, for instance, in giving you a short review before questioning you on the material that you have covered.

When testing has been completed the trainee is supposed to be proficient at the skill. Review would hardly be appropriate at that point.

Study the information in frame 29 carefully before making another answer selection.

(from Frame 25) 32

YOUR ANSWER: The new principle that you apply in the Evaluation Step is reinforcement.

The principle of reinforcement plays an important part in the Evaluation Step. The results of your testing serve as a reinforcement to his learning. Reinforcement is not a new principle for you, though. You used the reinforcement principle in the Application Step by praising your trainee's efforts at performance and giving him a chance to experience the skill for himself.

The new principle of learning that you are looking for is closely related to reinforcement. Have you ever expected a letter or word on a job for a period of time? Just the desire to know the results was about to kill you. The information that you finally received was feedback. If it was good news, the feedback was positive and you were reinforced. This is essentially what happens to the trainee. He has worked for a good while at learning a particular skill. When he finally sees the results of his learning (feedback), his learning is reinforced.

This should have clarified the problem for you. You should be able to return to frame 25 and make the correct response.

(from Frame 34) 33

What is the purpose of evaluation?

	FRAME NO.
to learn if the trainee has accomplished the objectives and to discover if you have taught successfully	35
to discover what the trainee knows and what he is able to do	37
to enable the instructor to assign a numerical grade to the trainee's progress	39

(from Frame 25)

YOUR ANSWER: The new principle that you apply in the Evaluation Step is feedback.

Excellent! This first word is at the same time feedback and reinforcement. How? The word "excellent" told you how well you answered the question. Because you have answered well, you will be more likely to remember the principle of feedback; therefore, your learning of that principle was reinforced.

Here is another bit of feedback for you: You have just completed the Evaluation Step of the "Four-Step Method of Instruction." Before you go to your first question, let's briefly summarize the information in this lesson.

CONTINUE TO THE NEXT PAGE

(frame 34 continued)

THE EVALUATION STEP

I. Test the trainee to determine if he has reached the objectives.

  A. Select the method of testing.

    1. Oral questioning is used to test mastery of related information.
    2. Essay tests tend to emphasize writing ability.
      a. Questions should be brief containing only one idea.
      b. Points should be assigned to each part of the required answer.
      c. Essay questions can test for ideas that other tests cannot.
    3. Objective tests are short answer forms.
      a. Parts are easy to take and easy to grade.
      b. If well-written, objective tests give an accurate measure of the trainee's understanding.
    4. Performance test examines trainee's skill.
      a. Careful planning is necessary in order to carry out this test accurately and successfully.
      b. This test must be used to examine all skill lessons.

  B. A good test has the following qualities:

    1. It is an accurate measure of the trainee's understanding or skill.
    2. The questions are direct, clear, and complete.
    3. It is easy to give, easy to take, and easy to correct and score.
    4. Questions are valued fairly and accurately.

II. Put the trainee on his own.

  A. Refer the trainee to someone for help if needed.

  B. Check with him frequently.

  C. Continue to question performance when needed.

  D. Taper off instruction.

III. Principles which apply to the Evaluation Step.

  A. Repetition

  B. Reinforcement

  C. Feedback

After reviewing to your satisfaction, go on to your first question by turning to frame 33.

(from Frame 33) 35

YOUR ANSWER: The purpose of evaluation is to learn if the trainee has accomplished the objectives and to discover if you have taught successfully.

Excellent! When you wrote your objectives during the planning stages of instruction, you asked yourself, "What must the trainee be able to do? What must he know? What must his attitude be in order to be successful at his trade?" The answers to these questions formed your objectives. Evaluation should be conducted to determine if you and your trainees reached the objectives satisfactorily. Your evaluation, then, will answer the questions, "What can the trainee do? What does he know? What is his attitude?"

You may proceed to the next question now. GO ON to frame 36.

(from Frame 35) 36

On which of the four kinds of tests will you find questions like those in this course?

	FRAME NO.
oral	38
essay	40
objective	42
performance	44

(from Frame 33) 37

YOUR ANSWER: The purpose of evaluation is to discover what the trainee knows and what he is able to do.

You are on the right track, but your answer is not complete. The instructor must also evaluate the trainee's attitude to discover if the attitude he has toward his trade will aid or hinder his success. The instructor must determine if the trainee's attitude has changed since the beginning of the lesson and to what degree it has changed. Just as important as trainee evaluation is the instructor's self-evaluation. Each instructor must ask himself, "How well have I taught? What should I do differently the next time I teach this lesson?"

Take time to study each response before making your next selection. Return to frame 33.

(from Frame 36) 38

YOUR ANSWER: The test I am taking is an oral test.

Another word for oral is "spoken." Of course you understand your mistake now. You are not being asked questions aloud, are you? You are choosing selections from given possibilities.

Think before you answer. Return now to frame 36 and make the correct response.

(from Frame 33) 39

YOUR ANSWER: The purpose of evaluation is to enable the instructor to assign a numerical grade to the trainee's progress.

We would certainly mislead you to try to convince you that this is not part of the evaluation of a trainee. You must not allow this to become the purpose of evaluation, however. You are not instructing the trainees so that they can make a grade on a test. You are trying to help them learn a trade. Your evaluation should be designed to see how well they have learned this trade, not what score they can make on the tests you give them. Tests are only one indication of trainee success, and their accuracy as a measuring stick depends upon how good your tests are. You cannot even design a test without knowing what you wish to test. "What does the trainee know? What can he do? What is his attitude?" The answers to these questions will tell you how well your trainees learned, and just as important, how well you have taught.

Return now to frame 33 and make the correct response.

(from Frame 36) 40

YOUR ANSWER: The kind of test I am taking is an essay test.

Let's refresh your memory. Essay questions require the learner to answer in several sentences by writing in a composition style. You are not writing an answer, are you? You are merely selecting an answer from a group of possible responses.

See if you can select the proper response now. Turn back to frame 36.

(from Frame 43) 41

Which of the following groups lists correctly the procedure the instructor must follow in conducting the evaluation step?

	FRAME NO.
Test the trainee to determine how well he can perform the skill. Allow him to work on his own. Help him find a job.	46
Gradually taper off instruction. Choose oral, objective, and/or essay questions to test related information. Give a performance test to determine trainee's skill.	48
Choose oral, objective, and/or essay questions to test related information. Give a performance test to determine trainee's skill. Gradually taper off instruction.	50

(from Frame 36 42

YOUR ANSWER: The kind of test I am taking is an objective test.

Good! Anytime you are given multiple choice, matching, identification or short answer questions, you are taking an objective test. This kind of test is usually a good indication of the trainee's mastery of related information and can be easily and accurately graded.

Continue to the next question, please, by turning to frame 45.

(from Frame 45)

43

YOUR ANSWER: The following question would appear on an essay test: "When two different size gears mesh, what is the speed of the smaller gear?"

Very good! You recognized the fact that this question requires more than a word or a letter as a response, so it could not be an objective test. This question has to do with related information and not skill itself; therefore, it could not be a performance test. This question requires several sentences in order to reply satisfactorily. It must be an essay question, then.

You are doing well! Continue to your last question by turning to frame 41.

(from Frame 36)

44

YOUR ANSWER: The test I am taking is a performance test.

A performance test is given by having the learner perform a job or operation under the observation of the instructor. If you were taking a performance test for this lesson, someone would come to your classroom and watch you actually teach a class.

Try again to select the correct response. Return to frame 36.

(from Frame 42) 45

On which kind of test would the following question appear: "When two different size gears mesh, what is the speed of the smaller gear?"

	FRAME NO.
essay	43
objective	47
performance	49

(from Frame 41) 46

YOUR ANSWER: The following group lists correctly the procedure the instructor must follow in conducting the evaluation step:

Test the trainee to determine how well he can perform the skill.
Allow him to work on his own.
Help him find a job.

Look at your answer choice more closely. First of all, do you test solely to determine the trainee's skill? What about the trainee's knowledge of information he needs to perform the skill? Secondly, do you put him on his own after testing? How do you know that he won't make the same mistake he did while you were testing him? The last sentence in this answer choice assumes that the trainee has completed the entire course. Evaluation takes place during and at the end of each lesson, as well.

Considering the questions asked above, return to frame 41 and apply them to each of the two remaining choices before making another selection.

(from Frame 45) 47

YOUR ANSWER: The following question would appear on an objective test: "When two different size gears mesh, what is the speed of the smaller gear?"

Objective tests are written so that they can be answered with a letter, a single word, or a number. Do you think that this question could be answered in any of these ways?

You probably realize your mistake now. Return to frame 45 and make the correct choice.

(from Frame 41) 48

YOUR ANSWER: The following group lists correctly the procedure the instructor must follow in conducting the Evaluation Step:

Gradually taper off instruction.
Choose oral, objective, and/or essay questions to test related information.
Give a performance test to determine trainee's skill.

Like so many instructors, you think that teaching and learning end with testing. The instructor's tests should point out weak spots in his teaching and the trainee's learning that should be corrected before the trainee is allowed to go on to another lesson. This is why the instructor puts the trainee on his own gradually <u>after</u> the testing is completed. By the time the trainee is able to work by himself, he is completely capable. Even then, however, he may need to ask you questions, and you should allow him this time.

With this reminder, you may return to frame 41 and select the correct response.

(from Frame 45) 49

YOUR ANSWER: The following question would appear on a performance test: "When two different size gears mesh, what is the speed of the smaller gear?"

If you think for a moment, you will realize that this question asks for knowledge of related information and has nothing to do with actual performance of the skill. Performance tests are given to determine what the trainee can do: related information tests help determine what the trainee knows.

Weigh your choices carefully before making another selection. Return to frame 45.

(from Frame 41) 50

YOUR ANSWER: The following group lists correctly the procedure the instructor must follow in conducting the evaluation step:

Choose oral, objective, and/or essay questions to test related information.
Give a performance test to determine trainee's skill.
Gradually taper off instruction.

Excellent! It is hard for many instructors to see why the trainee must be gradually released to work on his own after he has been tested. They think that the tests end all instruction. It is important that the trainee learn to work on his own gradually. He must feel that he can correct errors made on his tests and come to you for help if he needs it.

You have now completed this series of lessons on the "Four-Step Method of Instruction." We hope that you have enjoyed taking this programmed series as much as we have enjoyed preparing it for you, and we wish you much success with your teaching career.

VT 016 268

MANUFACTURING. INDUSTRIAL ARTS FOR THE MIDDLE GRADES.

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DESCRIPTORS - *INDUSTRIAL EDUCATION; *INDUSTRIAL ARTS; *CURRICULUM GUIDES; *TEACHING GUIDES; MIDDLE GRADES; TEACHING TECHNIQUES; LEARNING ACTIVITIES; BUSINESS EDUCATION; *MODELS; LESSON PLANS; EDUCATIONAL PHILOSOPHY; BEHAVIORAL OBJECTIVES
IDENTIFIERS - *GEORGIA

ABSTRACT - THIS INSTRUCTIONAL MODEL, DEVELOPED BY 34 GRADUATE STUDENTS, AN EDUCATION PROFESSIONS DEVELOPMENT ACT (EPDA) INSTITUTE, 11 INDUSTRIAL ARTS TEACHERS AND NINE JUNIOR HIGH SCHOOL COUNSELORS, IS BASED ON THE PHILOSOPHY STATED IN "CURRICULUM FRAMEWORK FOR GEORGIA SCHOOLS." PRIMARILY FOR GRADES 8 OR 9, IT IS INTENDED AS A FLEXIBLE COURSE WHICH CAN BE ADAPTED TO LOCAL NEEDS THROUGHOUT THE STATE SERVING AS A GUIDE TO THE TEACHER AND THE ADMINISTRATOR OF A 1-YEAR INTRODUCTORY INDUSTRIAL ARTS COURSE. FOLLOWING AN INTRODUCTION OF THE MODEL, PLANS FOR 21 LESSONS ARE PRESENTED WITH NOTES TO THE INSTRUCTOR, BEHAVIORAL OBJECTIVES, SUGGESTED TIME REQUIRED, INSTRUCTIONAL AIDS, STUDENT ACTIVITIES IN DETAIL, SUGGESTED COUNSELOR INTERACTION AND DEMONSTRATIONS, AND A LIST OF SUMMARY QUESTIONS FOR THE TOPIC. AN EXTENSIVE INSTRUCTIONAL AIDS APPENDIX IS INCLUDED. (MU)

VT 016 268

INDUSTRIAL ARTS FOR THE MIDDLE GRADES

MANUFACTURING

FUNCTIONS OF INDUSTRY

finance

research & development

secretarial & legal

production

organization

external relations

personnel administration

marketing

INDUSTRIAL ARTS FOR THE MIDDLE GRADES
MANUFACTURING

INDUSTRIAL ARTS EDUCATION
VOCATIONAL EDUCATION DIVISION
OFFICE OF INSTRUCTIONAL SERVICES
GEORGIA DEPARTMENT OF EDUCATION
ATLANTA, GEORGIA 30334

JACK P. NIX, STATE SUPERINTENDENT OF SCHOOLS

1971

ACKNOWLEDGEMENT

This bulletin is based on the philosophy stated in Curriculum Framework for Georgia Schools and seeks specifically to implement this philosophy in terms of industrial arts for Georgia youth in grades eight or nine.

A previous bulletin issued in 1960 was the result of work done by members of a graduate class at Georgia Southern College. In 1967 the bulletin was revised to build on the insight of the original contributors and to include the work of other graduate students at Georgia Southern College.

This bulletin is the result of the efforts of 34 graduate students during 1960-1970. In the summers of 1969 and 1970 an EPDA Institute in Industrial Arts and Career Development made significant contributions to this work. In addition to eleven industrial arts teachers, nine junior high school counselors assisted in developing and organizing the materials presented herein. The staff of the Institute consisted of Dr. Rex a Nelson, Associate Professor of Industrial Technology, and Dr. William L. Hitchcock, Professor of Guidance and Educational Psychology. The Institute was directed by Dr. Donald F. Hackett, Professor of Industrial Technology and Chairman of the Division of Industrial Technology, Georgia Southern College, Statesboro, Georgia 30458.

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FOREWORD

The phenomenal advance in science and the application of scientific knowledge through design and engineering to the processes of production and management have combined with other primary developments in recent decades to completely transform our economic world. In such fields as agriculture, manufacturing, mining, public utilities and transportation, these developments have increased the productive power of the individual worker many times. The controls of mechanical power, improved technology on the part of workers, and the expanding use of capital and credit have combined to bring us a greatly increased standard of living. The automobile, television, electronic computer, plastics, rockets, frozen foods, and efficient and comfortable homes are familiar examples of our inventive and productive capacities.

Changes have occurred so rapidly that our schools have experienced difficulty in assisting youth in keeping abreast of current developments. While all phases of education may contribute to this orientation and preparation, it is believed that industrial arts has as its particular function a practical and an active approach to the problem. It capitalizes on man's natural interest and desire to be productive, to build things. It introduces him to and acquaints him with many phases of his environment which can best be presented through direct experiences and discussions of the social and technical problems involved. The industrial arts laboratory provides an excellent opportunity for our young people to gain an insight into modern industry and to relate their observations to the content taught in other school subjects and to themselves--their interests aptitudes, needs, and abilities. It provides an excellent approach to career decision making.

The industrial arts course outlined in this bulletin is for use primarily in grades eight or nine. It is intended as a flexible course which can be adapted to conditions found in industrial arts laboratories throughout the state. It is also intended, however, that it serve as a guide to the teacher and to the administrator who may be concerned with the content and nature of an introductory industrial arts course.

The content of this bulletin is sufficient for a year's course for these important grades and is broad enough to meet the needs of a wide range of abilities, experiences, and interests of young people. It should be a prerequisite for any senior high school industrial arts course because of its comprehensive offering. It may be used as an elective course by those students who can find time for only one technical course.

STATEMENT OF EDUCATIONAL PHILOSOPHY

Educational Philosophy for School System

The educational needs of a people stem from the society in which they live. But it becomes the problem of every society to induct the younger members of the society into their culture. A culture, according to some authorities, is the fabric of ideas, ideals, beliefs, skills, tools, methods of thinking, values and customs to which members of a society are introduced. Since the school is one of the chief agencies through which members of a society can be inducted into group ways of thinking and acting, it becomes the task of curriculum designers to set up experiences through which these objectives can be realized.

The task of curriculum building is a joint responsibility of the society and of the school. The chief function of the school is to develop boys and girls to the limit of their abilities so they may become happy, useful and successful citizens. A curriculum, to be sound, must meet the needs of each student. In order to contribute to the physical, mental and moral health of the child and to provide experiences through which the child can gain an adequate set of tools in terms of information and skills, the school must develop in the child desirable attitudes, ideals, beliefs and values--reflections of the society in which he lives.

Since the task of the school is to provide these experiences, it follows that the objectives should be expressed in terms of qualities and competencies desired in citizens of our democracy. These objectives may be listed as

1. Self-realization
2. Human relationships
3. Economic efficiency
4. Civic responsibility

The society (from which the educational needs of a people stem) must be aware of the fact that the needs of youth change with the nature of the society of which they are a part. In short, the philosophy of the school of years ago would not be the same as a present day philosophy. We are living in a changing world and becoming more and more technological through the advancement of science and technology. Thus, it should be with these changes in mind that we plan an educational program for the young of our culture.

Basic Philosophy of Industrial Arts

Industry and its technology have had, and will continue to have, an overwhelming impact on society. Industrial ingenuity has brought change through new tools, materials, methods and developments. Automatic production, scientific management, engineering research and the changing occupational pattern with its requirements for continuous retraining are evidence of a new way of American life brought about by industry and its technology.

Industrial arts is the study of industry and its technology; their origins and development; their organizations, structure and interrelationship; their tools, materials, processes, products, and occupations involved in converting raw materials into useful products; their related social, economic, and cultural problems and benefits. It involves the student in creating, experimenting, inventing, designing, constructing and operating with industrial materials, processes and products. Industrial arts, as a study of technology, is a discipline deserving the same recognition as science, history, languages and the like.

Industrial arts is <u>not</u> vocational education <u>nor</u> is it manual training or manual arts. While tools and materials are prominent in industrial arts, the development of tool skills and the building of projects are not the purpose of this program. Actually, the industrial arts reflected herein parallels industry in its process of evolution and change.

Industrial arts is designed specifically to help prepare individuals to meet the requirements of our technological culture. As an integral part of the total program of education it provides unique opportunities for students to obtain representative industrial-technological experiences. These experiences require the application of mathematics, science, language arts and other school subjects. Industrial arts assists in the discovery and development of personal aptitudes, interests, creative technical abilities, self-reliance, sound judgement and resourcefulness through problem solving and self expression in an environment related to industry. Problems involve the students in developing ideas from their inception, through the necessary research, planning, designing, modifying, evaluating, communicating, managing, laying out, cutting, shaping, forming, assembling, finishing, testing and evaluating phases. Through these experiences and through close working association with classmates and teachers, the objectives of the course are attained.

Industrial arts brings about changes in the learner that involve the man-made, physical world. They are brought about through relevant activities which assist the learner in discovering and developing

1. A knowledge of how man satisfies his material needs by changing raw material into useful products through an organized and systemized complex termed industry.
2. An insight and understanding of industry and its technology and the impact they have on the culture.
3. Interests and capabilities in careers related to the total complex of industry and its technology.
4. The ability to apply the concreteness of tools, materials and processes to the solution of technical problems involving the application of science, mathematics, mechanics and inventiveness.

Introduction To Manufacturing

Manufacturing is a term often used in describing the activities by which man makes useful things from natural resources. Manufacturing takes an idea and raw materials or natural resources and makes something useful by subtracting, forming, adding and finishing. Also utilized are labor, management and capital for machines and buildings in the manufacturing industry.

This course in manufacturing is organized for the purpose of providing boys and girls with an opportunity to acquire some basic understanding of (1) industry, its organization, its tools, its materials, its processes, its occupations, its

INDUSTRIAL ARTS IN PERSPECTIVE

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<tr><td>SPECIAL EDUCATION</td><td colspan="3">INDUSTRIAL ARTS</td></tr>
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Engineers, Scientists, Industrial Teachers</td><td>GRADE</td></tr>
<tr><td rowspan="4">WORK EXPERIENCE
OCCUPATIONAL INFORMATION
CONSTRUCTIONAL ACTIVITIES
CONSUMER KNOWLEDGE
HOME MAINTENANCE
HEALTH & SAFETY
HOBBIES
CRAFTS</td><td rowspan="2">UNIT COURSES
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A program of industrial arts for a large comprehensive junior-senior high school.

products, its problems, its benefits and its technology; (2) themselves in the areas of ability, aptitude, interests and career maturity; (3) the relationship between knowledge gained about industry and the knowledge of themselves; and (4) the usefulness of their relationship to industry in making educational and career plans for the future.

It should be noted at this point that as the course is being taught, it will be necessary for the students to be given instructions as to the operation of machinery and manipulation of tools. The teacher should add to the lesson plans those areas that will be of benefit for operating machine tools and other tools and hardware of industry.

The general objectives of this course are to develop in the student

1. Insight and understandings of the manufacturing industries and their technology in our culture.
2. Interests and capabilities in manufacturing with emphasis on men, materials, processes and mechanisms.
3. Knowledge and understanding of the development and application of manufacturing technology in the United States.
4. Proper attitudes of good human relations through cooperative activities and the need for continual good relationships in all areas of life.
5. The ability to use tools, materials and processes to solve technical problems involving the application of science, mathematics and inventiveness.
6. Understanding of the opportunities and requirements in the manufacturing industries as they relate to career development.
7. Technical, recreational, cultural and occupational interests and attitudes.
8. The abilities to choose and use industrial products wisely.
9. Technological and social growth and awareness through representative industrial experiences.
10. The ability to explore industry and the American industrial culture in terms of the organization, raw materials, processes and operations, products and occupations.
11. An understanding of education as a means of achieving both short and long range goals.
12. The ability to analyze the knowledge learned about industry and discover areas where more knowledge about self is needed to better prepare for the future.

Lesson Plans and Outlines

The following lessons, one through 21, are organized and arranged in a logical teaching order. However, this order is not the only one. The effective teacher will find it opportune and expedient to reorganize and rework the lessons as the needs and interests of his students dictate. These 21 lessons do reflect the nature of the course and its content. All students should have some knowledge of each lesson.

Many of the lessons simply outline the content to be dealt with. The intention is that the teacher will draw from this material that which fits the nature, interests and abilities of his students. Furthermore, some of the lessons provide more depth and detail than some students can cope with. Again, the intention is that this material will provide for the maximum range of student abilities. Each teacher will need to exercise his good judgement in knowing what to present and how to present it.

These lessons help the student to plan intelligently, and they give him an overview of the operations, processes, materials and knowledge that are essential to most activities associated with a study of manufacturing. Much that is taught in these lessons will need to be repeated on an individual basis, especially for the less able student. For the superior student, however, progress may be at his own rate. These lessons are intended to be of most benefit to the average and superior student. Do not permit the slow student to establish the pace and standard for your class.

Each lesson has assignments associated with it. After each lesson is presented, the students should, individually or in small groups, immediately attempt to apply the lesson to one or more of the problems identified in the assignments. Some assignments will require several weeks to complete. The better students will quickly complete some assignments. These students should be helped individually or in a small group to proceed with the assignment and study materials of the next lesson. Do not make this group wait for the slow student.

When 15% - 25% of the class has completed an assignment, present the next lesson. In like manner proceed with each of the lessons. Insist that the students take notes and that they use their notes. Place as much of the responsibility for learning upon the student as possible.

Lessons should be adapted to the class. You may proceed to a logical stopping point in a lesson and assign the students a related problem, or you might so schedule a lesson that you reach a logical stopping point at the end of a class period. Do not attempt to present all of these lessons before providing some type of student activity.

You will find that lessons one, two and three follow one another quite naturally. Then, lessons four through 13 should be presented in more-or-less rapid order, as the students need this information to successfully proceed with their assignments. The remaining lessons will need to be introduced as their need becomes evident. Frequently, it will be found expedient to present only a portion of a lesson to satisfy an immediate need of the class or a group of students.

Lesson 1

ORIENTATION

Note to Instructor

Career development is one important objective of this course and is a joint effort of industrial arts and guidance. The counselor and the industrial arts teacher should present a "united front" to students in explaining the long range aims. A good start at the beginning of the year is of prime importance in teaching industrial arts. As many lasting impressions are made at the first class meeting, try to insure the most favorable student impressions. Have your lab in perfect order, your instructional materials ready and your enthusiasm in high gear.

Students, at the beginning of a new experience, are usually eager and excited about the things they are to learn. Getting each student involved in activity as soon as possible will help to develop his interests in the subject. For these reasons, mass production of a product is desirable during the first week students are in the class. The instructor should have all the necessary materials, tools, jigs and fixtures for the product and all the machines that are to be used, checked thoroughly. Being well organized will play a great part the success of this first production.

Counselor Interaction

Administer a standard interest inventory and questionnaire before any instruction begins so the total effect of the course on the students' growth may be evaluated later.

Objectives

The students will be able to
1. Explain the nature and purpose of industrial arts.
2. Participate in the experience of producing a useful product.
3. Work safely and cooperatively.
4. Begin the process of decision-making for self-attainment.
5. Describe the counseling services that are designed to aid them in decision-making and educational and occupational planning.

Time Required One week

Instructional Aids

1. Film #1483 - "Working Safely In The Shop" (See Appendix)
2. Safety posters
3. Prototype of product

4. All necessary jigs, fixtures and tools for product.
5. Instruction sheets for operations in product production.
6. Material sheets
7. Route sheets
8. Drawings of product

Introduction

In order to manufacture a product, materials, manpower, and machines must be present. Natural resources cannot be increased and human energy is limited to a certain degree. Only the tools and machines can be changed. When using the tools and machines in the industrial arts laboratory to mass produce a product, it is necessary to make devices called jigs and fixtures to help the machines perform better and more safely. The use of jigs and fixtures is one of the techniques used to produce parts that are the same size and shape. This concept of interchangeable parts aids in the assembling of the many items produced in industry. In order to meet the needs and desires of society, industry must find ways to supply them. Bicylces, ball gloves, skates, fishing rods, and model cars are all products of industry that employ the ideas and techniques we will study in this course.

Subject Matter Outline

1. Orientation
    a. Explain the nature and purpose of the course as follows. The study of manufacturing gives boys and girls an opportunity to acquire some basic understandings of the tools, materials, processes, products, opportunities, and working conditions in the world of work.
    b. Discuss course objectives. Brainstorm for other ideas.

Counselor Interaction

The activities and subject matter presented in the course may be used by the student as a basis for a comparison of his own interests, abilities, and knowledge with what will be required of him in the world of work. The knowledge the student acquires should be interpreted for him in the light of how he sees himself in relation to this environment.

Explain the significance of this course for each individual in the areas of decision-making, career choice and maturity and educational planning.

Explain and discuss the data gathering devices and how the results may be of use to the student in learning and understanding more about himself.

Administer the "Survey of Occupational Maturity," the "Personal Data Questionnaire" and the appropriate interest survey. One of the following interest surveys may be appropriate for the reading level of your students: (a) Kuder General Interest Survey, Form E, (b) What I Like To Do -- A Survey of Children's Interests (c) Ohio Vocational Interest Survey. (This survey must be computer scored by the company.)

- c. Classroom Formalities
    - (1) Pass out textbooks and identify references
    - (2) Collect the following on a data card: name, address, phone number, parent or guardian, occupation of parent or guardians, age, grade, hobbies, future career, work experiences, experiences with tools and materials.
    - (3) Student materials and obligations
        - (a) Notebook
        - (b) Pencils
        - (c) Ruler
        - (d) Supply fee
        - (e) etc.
    - (4) Tour shop. Explain shop procedures.
    - (5) Evaluation
        - (a) Objective tests
        - (b) Special problems
        - (c) Observation
- d. Safety program
    - (1) Home
    - (2) School
    - (3) Industry
    - (4) Around tools and machines
        - (a) Color codes
        - (b) Safety zones
        - (c) Safety rules and habits

(Ask students to make up safety slogans and posters)

Counselor Interaction

Work with the Industrial Arts teacher to reinforce the importance of safety and safety consciousness in all areas of life.

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2. Preview of Manufacturing
    - a. Prepare all the necessary tools, jigs, fixtures, etc., for the production of a simple, but useful product. Set up the equipment and make a trial run before the first day of class. Insure that all machines are so guarded that it is virtually impossible for student injury. The product should require a limited number of operations (8-12) and none of the operations should involve hand skills beyond sanding or possibly brushing on a coat of finish. Quick drying, oil-wax or thin pigmented finishes that permit dipping the article are preferable. The class should be able to complete the production in one day, two at the most. The purposes of this activity are to satisfy the students interest in making and possessing something and to create interest and curiosity for the instruction to follow.
    - b. Organize for production. Using the data collected from the students, "hire" three or four as foremen and the remainder as operatives for a

mass production activity. Train the foremen so they may train their classmates in an operation or two. Preferably, do this outside classtime.

c. When the production is completed, brainstorm for ideas on the usefulness, construction, economy, demand, and possible improvement of the product.

Counselor Interaction

The following questions may be discussed with the class after their first mass production experience

1. What did this experience teach you about yourself?
2. What specific job or task performed did you feel was most meaningful to you?
3. What, if any, particular activity allowed you to do something you found you really liked to do, and what did you find you didn't like to do?

Summary Questions

1. After being involved in the actual production of a simple product, students should be stimulated to ask questions that will lead to the more thorough study of manufacturing to follow.
2. How does industry meet the demands of society?
3. How important is safety at home, school and in industry?
4. How important is it for a company to be well organized?

MANUFACTURING ORGANIZATION

All the activities in an enterprise of more than elemental size require organization. Organization is a problem of management that is exceedingly vital and often complex in substantial industrial operations. Individuals and groups are members of a team, that, to be effective, requires coordinated planning, assignment of responsibilities, direction and control. An understanding of these principles that apply to organization in general and to the interrelationship designed to coordinate and control the various activities is the purpose of this lesson.

An organization is a systematically grouped body of individuals assembled for the accomplishment of some objective. In industry this entails the appropriate grouping of individuals into operating units. The assignment of authority and responsibility to each, and the defining of relationships between these units, to obtain coordination and control of action-steps is known as "the process of organization." An efficient organization performs as a coordinated whole and moves toward the objectives for which it was designed.

Organizations of some sort have always existed among groups of people engaged in a common objective. In the simplest form, there is no more "structure" than that of boss or leader with one level of subordinates. As needs arise, the boss assigns tasks to subordinates and directs their efforts. Stable divisions of responsibility or systemized grouping of individuals may hardly exist. It is when demand for stability and specialization develops and when personnel relationships become more complex that systematized organization structure necessarily follows.

Line organization constitutes the structure of the simplest industrial enterprise. It is the backbone of larger organizations at any stage of development. The line comprises those individuals, groups, and supervising executives concerned with the primary objectives of the enterprise. A staff unit of an organization is one established to assist the line or any other part of the organization by performing advisory, service, coordination or control functions which are necessary to the primary responsibility of the assisted unit. An organization chart is used to show these structural functions of an organization.

A study of career information will define the descriptions and qualifications of many of the jobs that are included in the organizational structure of an enterprise. Students are given the opportunity to project themselves into the world of work; thus enabling them to perform an analysis of the self in respect to their own interests and abilities.

Elements of Industrial Decision Making

The actual process of managing may be described as a simple three step procedure--establish objectives, direct the attainment of objectives and measure the results. These three steps must be followed to perform any task, whether it be the building of a spacecraft or asking a girl for a date.

Establishing objectives could be divided into four elements--gather information, synthesize information, plan and decide. The first element, gather information, goes on more or less informally all the time as we talk to people, read reports, mail, newspapers and magazines. It occurs more formally when a person seeks to collect all available information on a given problem with which he is concerned. This step is essential before any intelligent action can take place.

The second element is to synthesize information which means to combine or put together the pieces of information. The information available on any given situation is seldom complete. A person must take the bits and pieces he has and form them into as complete a picture as possible. This picture can then be used as the basis for taking action.

Element three consists of planning. After the information has been gathered and synthesized, the various possible courses of action by which the goals may be reached are determined.

Deciding is the element which results in the selection of the course of action which seems to offer the best chance for meeting the objective. If the first three elements have been thorough, the decision may be easily reached.

These four elements are used to establish the objective. They accomplish the first step of the managing process and are used to determine what to do and when to do it.

The second step of managing, direct the attainment of objectives, has four elements that must be performed to accomplish the objective. The first element is to organize. This consists of determining the methods of assigning facilities and people to accomplish the established objective. The person may seek help with this element from his associates or an outside consultant, but is basically responsible to organize the activity or project so that the objectives which he has established are accomplished through the efforts of the people he directs. At this point, he decides who is to do each phase of the necessary work.

The next element is to communicate. The person tells other individuals or groups what they are to do. He explains the objectives and describes the organization for their accomplishment. He makes sure that everyone understands the duties and responsibilities he has been assigned.

The third element is "motivate," which means to stimulate an interest. This is the point where the why of what is to be done is explained. A considerable understanding of people is needed to perform this element skillfully. If the reasons are presented in terms which are understandable and with which the worker can identify, the success of the project usually results.

The next element is to direct, guide, or counsel. This is the how of doing the work. It consists of aiding progress through giving suggestions, orders, or additional data, or by teaching how the objectives can be accomplished.

These four elements are concerned with getting the work done. They are the second step of the three-step decision-making process and comprise the active part of decision making. They result in carrying out the objectives established during step one. Their effectiveness is greatly dependent upon the skill with which the elements in step one were handled.

The third step of managing is to measure, evaluate and control. It is necessary for a person to be able to determine the effectiveness with which his plans are being carried out. Evaluation takes place throughout the active phase of decision-making as well as when the project has been completed. The person finds out, for example, what hindrance to progress is developing by information communicated to him by his group. This information, acting on a sort of feed-back principle, shows where alternations to plans may be necessary. At the end of the project, the final results obtained are compared with those anticipated. This often provides new information and the starting point for another decision-making cycle.

The element of developing people is one of the important obligations of decision making which can be best described by the use of industrial examples. The manager must get his results through others. It follows that if these others are adequately qualified through proper development, the results he will obtain will be better than would otherwise be the case. But in addition to this short-range goal, the manager has responsibility for the continued functioning of the work which he directs, whether he is on hand to manage it or not. The lives of many people--employees, customers, and in many cases, the public at large--are vitally affected by the continued successful functioning of each component of the business.

The manager has an obligation implied by his very position to do what he can to insure continuity of operation. This means that he must encourage the development of those who will in due time succeed him. This should be a continuing process, something that he does at all times as he contacts his people. This element exerts its influence on the total decision making cycle.

The final element is promote innovation. This in some ways is the most important of all. The manager must be the steady force behind innovation. If he wants the company to progress, he must never permit himself or his people to become satisfied with things as they are, whether it be products, methods and processes, markets, or the use of the company's capital. He must always strive to stimulate his people to seek better ways of doing their assigned tasks. The constant search for innovation should influence every phase of the decision-making cycle.

Note to Instructor

The purpose of this unit is to assist the students in developing a better understanding of the principles of organization used in our "free enterprise system." The importance of organization in industry can be better illustrated by having the students form their own company within the industrial arts class. Information on starting an enterprise, company structure, types of enterprises, and occupations within any particular enterprise will be included in this unit lesson plan.

Objectives

The students will be able to

1. Discuss the importance of organization to the industrial world.
2. Discuss the process involved in mass production.
3. Prepare an historical review of the need for mass production in our society.
4. Evaluate the three most popular forms of organization.
5. Determine the form of organization that will be used in formation of their enterprise.
6. Construct an organization chart to be used in their company.
7. Describe the duties and functions of the positions on their organization chart.
8. Investigate the reasons underlying the establishment of companies.
9. Visit industry to learn more about industrial methods, techniques and products of production.
10. Discuss industrial organization and management from a logical approach.
11. Discuss career information with their parents, teachers and friends.
12. Research a career and give the job description and qualifications for that career.
13. Evaluate job requirements in the light of their own interests and abilities.
14. Make better career choices in relation to their own self-appraisal.

Time Required One to two weeks.

Instructional Aids

1. Films
   a. "Productivity - Key to America's Economic Growth"
   b. "To Reach the Dawn"
   c. "World of Henry Ford, The"
   d. "Modern Corporation"
   e. "Going Places"
   f. "Eddie Incorporated"
   g. "Help Yourself to Ownership"
   h. "Small Business, U.S.A."
   i. "Competition and Big Business" #4861
   j. "How to Investigate Vocations" #1-00576
   k. "How to Keep a Job" #1-00578
2. Filmstrips
   a. "Preparing for the Jobs of the 70's" #D-213
   b. "Preparing for the World of Work" #D-188
3. Occupational Information Materials
   a. Occupational Outlook Handbook
   b. Dictionary of Occupational Titles
   c. Life-Career Game
   d. Widening Occupational Roles Kit, Grades 6-9 #5-2200
4. References
   a. Manufacturing Organization and Management, by Amrine
   b. Manufacturing Management, by Irvin
   c. General Industry, by Lindbeck and Lathrob

5. Transparencies, slides, charts of company organization.

Introduction

There are 11 elements of decision-making or managing that should be recognized. The first nine are used, usually, in the order in which they are listed to carry out the three-step decision-making process. The other two affect the quality and continuity of the managing work done within the area of the manager. The 11 elements of managing may be listed as follows

Subject Matter Outline

1. Elements of Decision-Making or Managing
    a. Established objectives
        (1) Gather information
        (2) Synthesize information
        (3) Plan
        (4) Decide
    b. Direct attainment of objectives
        (1) Organize
        (2) Communicate
        (3) Motivate
        (4) Direct, guide or counsel
    c. Measure results
        (1) Measure, evaluate and control
        (2) Develop people
        (3) Promote innovation

    Student Activities
    1. Using the 11 elements of decision making, explain how decisions were reached in the project that was completed the first week of school.
    2. Explain how a company would reach a decision concerning a product.
    3. Explain how the 11 elements could be used for getting
        (a) A weekly allowance or an increase in a weekly allowance.
        (b) A date with a girl.
        (c) A change in school procedures.
        (d) Other.
    4. Explain the reasons for a manufacturing company organizing.

2. Manufacturing Organization
    a. Discuss organizing for production
    b. Discuss industrial organization
    c. Discuss and evaluate operations involved in introductory mass-produced product.
    d. Compare the mass-production method to the individual method of producing a product.
    e. Identify some of the advantages and disadvantages of the mass-production technique of manufacturing a product.
    f. Use the comparison of the advantages and disadvantages of the mass-production method as a basis for deciding the type of company to form in the industrial arts class.
    g. Visit an industry employing mass-production techniques.

(Show film #1 after students have discussed the above and then review the topics. Discussions should be led in the direction of having the students decide to form an enterprise. If the class has as many as 20 students consider forming two companies to provide competition and more opportunity for student involvement in responsible roles. When additional help is needed, one company may hire students from the other company.)

3. Starting an Enterprise
   a. Basic considerations
      (1) Need (public)
      (2) Profit
      (3) Personal needs
   b. Methods of financing
      (1) Stocks
      (2) Personal monies
      (3) Borrowing
      (4) Others

   Student Activities
   1. Compile a list of consumer needs that will influence the formation of a company to supply those needs.
   2. Discuss new products that will be needed in the future.
   3. Discuss which methods of production may be used in the industrial arts class.
   4. Research and discuss the ways in which an enterprise may be formed.
   5. Consider the need and profit concepts when making the decision to form a company.
   6. Explain how big industries utilize the concepts of need and profit.
   7. Reinforce the idea of forming a company to facilitate manufacturing a product.

4. Types of Enterprises (Show one of the films d, e, f, g or h and discuss.)
   a. Sole proprietorship
   b. General partnership
   c. Corporation

   Student Activities
   1. Make an evaluation of the advantages of the corporate form of organizing over the proprietorship or partnership in relationship to the intended use in the classroom.
   2. Investigate the requirements for incorporating.
   3. Decide on a name for the company.
   4. Analyze the needs of the company and decide on how to finance the company. Refer to unit on finance,

(Have materials prepared that will assist the students in deciding upon a type of company structure. Some students might be interested in studying company organization forms in more detail. Allow for individual differences.)

5. Organizational Structure of the Enterprise (Show film i and discuss.)
    a. Managerial
        (1) Stockholders
        (2) Board of Directors
        (3) President
    b. Line organization (Illustrate)
    c. Line and staff organization (Illustrate) (Compare several companies)
    d. Students form a company
        (1) Decide whether company officers will be elected by the class or appointed by the instructor.
        (2) Write up requirements for the various positions to be included in the organizational structure of the company.
        (3) Use the democratic process in deciding who will hold office in the company.
        (4) Prepare an organizational chart for the company.
        (5) Include all the line jobs that will be necessary in the company on the organizational chart.
        (6) Decide on the staff positions that will be necessary to assist the line in accomplishing its objectives.
        (7) Select several industrial company structures to use as models for setting up the company in the industrial arts class.

6. Occupational Information
    a. Job descriptions
        (1) Occupational Outlook Handbook
        (2) Dictionary of Occupational Titles
    b. Classified sections of newspapers
        (1) Categories of jobs
        (2) Descriptive information
    c. Employment offices
        (1) Federal
        (2) State
        (3) Local
        (4) Private

Student Activities

1. Interview students for jobs in their company. Permit students to play roles. (See personnel administration section)
2. Write up a job description for positions in their company.
3. Use the classified sections of local newspapers to get ideas about how to write job descriptions.
4. Determine what descriptive information is included in the classified sections of the newspapers.
5. Identify coding systems used by newspapers in classifying jobs.
6. Show and discuss contents of films 10 and 11 and the filmstrips.

(The counselor will normally assist more in this area than in any other section in this unit. Most activities will be centered around occupational information and the techniques used in presenting this type of information will be left up to the counselor.)

Counselor Interaction

1. Plan group guidance sessions with students and introduce them to the Junior Guidance Booklet.
2. Assist students in the proper use of the Occupational Outlook Handbook and the D. O. T.
3. Introduce students to the Life-Career Game.
4. Develop career activities centered around the Occupational Roles Kit (WORK).
5. Prepare occupational profile folders on each student.
6. Introduce, show and review films 10 and 11.
7. Introduce students to contents of filmstrips a and b. Invite them to view the filmstrips at their leisure.

Summary

This unit prepares students to understand the principles of manufacturing organization that exist in the United States today, and many of the changes that have occurred since its introduction. The comparison of the processes in mass-production and those used in the individual method of production should be of great assistance to the class in deciding to form an enterprise to fully investigate and implement the principles of industrial organization and the mass-production techniques used in industry.

The study of organizational structure of companies should bring about a clearer understanding of the many problems industries face today in their never ending fight for existence, and the development of more effifient methods of producing the goods and services demanded by our present society. Understanding the careers that are associated with the various companies should aid the students in forming and staffing their industrial arts enterprise for production.

Summary Questions

1. Name some advantages of mass-production.
2. How has mass-production helped industry to better meet the needs of our society?
3. What are the three major types of company organizations?
4. Which of the three types of organization is governed by law?
5. What is the basic unit of any industrial enterprise in relation to its objectives?
6. What are some of the advantages of the line and staff organisational structure?
7. Why is it important to study the requirements for entering various occupations?
8. Should students discuss occupational information with their parents?
9. Would the study of occupations help you in making a vocational decision?
10. Could you successfully pass an interview for a job in industry after having studied this section on occupational information?

RESEARCH AND DEVELOPMENT

Research and development has as its objective the creation and refinement of new ideas in products and, in some cases, production methods. Research and development are not product design, and should not be thought synonomous. Product design follows research and development in the sequence of the manufacturing process. The people in research and development work directly toward long range product improvement through creative effort.

Although constantly engaged in research, personnel do not work just within themselves. They are always in contact with personnel from related departments. For example, sales people supply such information as customer preferences and needs, suggested innovations in the product, and stability of new or improved products suggested by research and development.

Before the ideas of research and development can be put into effect, they must be approved by top line executives of the company.

The ultimate objectives of research and development are to

1. Improve existing products
2. Develop new products, processes and uses
3. Perform fundamental research for the advancement of industry

The objectives of research and development do not extend to the manufacturing of the product itself. Once the design has been created and approved, the product becomes the responsibility of production management.

Research, in past years, has been reserved exclusively for the work of certain universities and certain foundations and institutions. Today, a lot of the research has moved to the industrial concern. Companies are spending millions of dollars to get ideas and saleable products in advance of their competitors. In essence, research is a careful, critical investigation that seeks to extend and discover new knowledge. Usually, research is classified as (1) basic or pure, and (2) applied or practical.

Basic or fundamental research is a studious inquiry conducted to understand the basic phenomena of nature. One of its primary aims is to broaden our knowledge base with little or no concern for the use which will be made of the new knowledge. The fact that one concept, generated from basic research effort, can give rise to a large number of products through the evolutionary process of applied and developmental research makes it the hub of manufacture.

The endeavor to extend the understanding of basic phenomenon, determine its practical significance and develop useful applications is called applied research. In applied research, which precedes product development, one of the common principal goals is the generation of a prototype product. The principal effort of applied research is directed toward understanding the basic phenomenon being investigated in order to obtain sufficient engineering information for use in the design of a prototype.

Applied research is intermediate between the discovery of the basic phenomenon and the generation of a final product. In many cases the applied research effort is done by organizations which do not discover the idea or ideas on which their applied research is based. Therefore, these groups are able to produce saleable products and results with a much high probability of financial reward.

Development typically occurs chronologically after fundamental and applied research are complete. When an idea has been discovered and refined, then development carries it through to the point of actual design engineering, where the final blueprints and specifications are made, or directed to production itself. It is interesting to note that development is the most expensive phase of research and development, and is not entered into until the company is sure the idea is sound and has approved its production. Development work includes the preparation of models, the establishment of pilot plant operations, and the try-outs of the product with selected consumer groups. The cost lines of development come from the use of expensive equipment, and the setting-up of pilot plants.

New product development and product improvement design is the development of new and improved products so they best achieve stated performance requirements. These areas are responsible for planning and even producing a prototype so the designs, specifications, and other requirements may be met.

In the planning of a product the development department must be aware of the many decisions that must be made. They must determine the size, shape, and finish. They must be aware of the best material to use while including thoughts on costs to consumer and producer. Tests must be made to solve many of these questions. Different types of models and prototypes must be constructed to show different designs and techniques to give tangible evidence of the variations of the problem.

This department also designs new and improved manufacturing systems, operations, and facilities so that the best stated technical performance requirements are achieved.

The reappraisal and redesign of products with respect to materials, appearance costs and quality is termed product re-development.

Note to Instructor

This lesson is provided as an introduction to the areas, functions, and concepts of research and development as they apply to the manufacturing enterprise. The lesson will also deal with the categories of research and how they are employed to benefit industry in developing a product.

Objectives

The students will be able to
1. Discuss research and development as it is used in industry.
2. Use problem solving techniques in the solution of his daily problems.
3. State some of the principles used in research to investigate and experiment with a new product or to improve upon a product.
4. Differentiate between product and market research.

Time Required Three to five days for instruction; three to five weeks for the student activities

Instructional Aids

1. Films
   a. "Research and Development"
   b. "Scientific Method"
   c. "Industrial Research - Key to Progress"
   d. "Photography at Work"
   e. "Jobs in Atomic Energy"
   f. "Scientific Method in Action"
   g. "Of Men and Machines"
2. Filmstrips
   a. "Moment of Discovery"
   b. "Why Research"
   c. "There Is a Lot of Reason to Research"
3. Models of some product (product drawings and plan sheets)
4. Charts
   a. Chemistry of Petroleum Refining
   b. This is Oil Refining; Oil for Energy - The Story of Manufacturing - Shell Oil Company
   c. How Basic Tools Created Civilization - Do All Company
   d. Mechanical Drawing Wall Chart
5. Some Products of Industry
6. References
   a. Bross, Irwin, D. J. Design For Decision New York: The Macmillan Company, 1965.
   b. Haws and Schaefer, Manufacturing In The School Shop, Chicago, Illinois: American Technical Society, 1966
   c. Dictionary
   d. Research and Development Function, by American Management Association
   e. What It Is, What It Does, U. S. Atomic Energy Commission
   f. Lindbeck and Lathrop, General Industry
7. Bulletin board displays of stories, pictures and news reflecting research and its importance in industry
8. Transparencies illustrating
   a. How management develops an idea
   b. Functions of R & D
   c. Market research
   d. Designers sketch possible solutions, evaluate them and make prototype drawings
   e. Prototype is built on the final solution
   f. Prototype is tested and final corrections are made
   g. Final model is inspected and passed
   h. Detail and assembly drawings are made for production

Introduction

Research involves the preliminary investigation which leads to the conception of the product or to the solution of the more difficult problems in a product's development. Research obtains the facts and develops the principles on which subsequent decisions are based.

Research may be either basic or applied--two types are distinguished by their objectives. Research that is basic (pure or fundamental) aims to discover new facts and principles in some field. Its primary object is advancement of knowledge. It constitutes a scientific effort which is not aimed directly at some particular type product or procedure. Often the direction it takes cannot be anticipated.

From basic research has come many of the great developments of our age. Research into the properties of the atom came along before the atomic bomb was conceived. The discovery of the light-sensitive cell in the 1880's was an essential factor leading to today's electronics. Many plastic materials were discovered by researchers who had no conception of their practical uses. The initiator may think of basic research as the endeavor of abstract scientists devoted to explorations in many fields beyond the realm of practically. Industrial engineers recognize it as the seed from which future industry grows.

Applied research (intensive or practical) aims directly at some product, process or practical problem. It includes market analysis, comprehensive investigation of competitor's product; studies of patent situations, past experiences, processes, materials, matters affecting the course of product development and efforts to relate the findings of science or basic research to practical applications.

Applied research of some sort is a practical activity for the average industry. Many large companies, including General Motors, General Electric, Westinghouse, DuPont, Eastman Kodak and American Telephone and Telegraph, conduct both basic and applied research and obtain additional assistance from outside agencies.

The process of converting an invention or product conception into final form is usually known as development. Developmental research involves the creation of methods, tools and processes to produce a product.

Research and development, a relatively new corporate function, is the pacemaker of industries today. R & D probes every conceivable field and method, critically examining the old and new techniques in processes and in the designs and functional structure of products and always reaching into new areas of the unknown.

Counselor Interaction

1. Engage the student in experiences both individual and group wherein he will be able to assess personal development, i.e., experimentation, evaluation, communication, and decision-making.
2. Ask the student to appraise his interests, aptitudes, and abilities as a result of using the methods of research as they relate to his preferred occupational choices.
3. Illustrate and discuss how the methods of research or problem-solving techniques may be applied in the solution of the students everyday problems.
4. Provide experiences relating to research and development to help the student discover and exhibit some aspects of creativity. This creative ability may be shown by developing an idea and producing a product to illustrate the idea.

5. Ask the student to conduct a scientific inquiry by investigating and exploring various scientific accomplishments and scientific occupations.

Subject Matter Outline

1. Kinds of Research
    a. Basic research (pure or fundamental)
        (1) Obtains new knowledge without reference to specific use
        (2) Discovers new facts and principles in some field
        (3) Aims directly at some particular type of product or procedure
        (4) Designs and conducts experiments
        (5) Interprets results of experiments
    b. Applied research (practical or intensive)
        (1) Aims directly at some product, process or practical problem
        (2) Makes useful results of basic research including
            (a) Market analysis
            (b) Comprehensive investigation of competitors' products
            (c) Studies patent situations, past experiences, processes, materials, and other matters affecting the course of product development
        (3) Redesigns and conducts experiments
        (4) Interprets results of experiments made by basic research

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Counselor Interaction

1. Prepare questions to ask a research person from industry or a science teacher on how pure and applied research are used in industry.
2. Review, show and discuss films a or b.

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2. Development
    a. New product development and product improvement
        (1) Design new and improve existing products
        (2) Develop experimental models - prototypes
        (3) Prepare functional designs and inspections
        (4) Conduct engineering experiments
    b. Advanced development
        (1) Improve products
        (2) Demonstrates potentially valuable applications of nature's laws
    c. Product redevelopment for cost reduction (Show film g)
        (1) Reappraises and redesigns products with respect to
            (a) Material
            (b) Appearance
            (c) Performance and manufacturing requirements to reduce cost and improve quality
        (2) Conducts engineering experiments
        (3) Develops experimental models (if needed)
        (4) Revises designs and specifications

Counselor Interactions

1. Plan a field trip to some industry or industries to observe and study present and future work of research workers.
2. Have students evaluate, interpret, and communicate results of product designed or redesigned.
3. Utilize the service of a customer service director or commercial education teacher to give customer's appraisal of product developed.
4. Brochure: The Technicians and Tomorrow, No. 21
5. Pamphlet: Market Research and Management, No. 7

3. Applications of R & D
    a. Functions (Review, show and discuss film c or d)
        (1) Investigate, search for a better way
        (2) Discover or develop new or improved products and processes
        (3) Provide specialized technical support for products in the current line and for existing processes
        (4) Furnish information on technological changes affecting sale of current product or influencing introduction of new products
        (5) Establish quality test methods and procedures
    b. Methods
        (1) Product research
            (a) The preliminary investigation which leads to the conception of the product
            (b) The solution of the more difficult problems in a product's development
            (c) The obtaining of facts and development of principles on which the subsequent decisions are based
        (2) Market research
            (a) Studies market conditions
            (b) Studies customers' demands
            (c) Reacts to selling practices
            (d) Studies competitors' activities
            (e) Employs scientific methods of sampling opinion and analyzes results

Counselor Interaction

1. Conduct one or more interviews with persons in research and development and relate information to individuals occupational choice.
2. Make a job survey in the community dealing with research. List name of jobs, services rendered, qualifications, working conditions, etc.
3. Read Junior Occupational Briefs dealing with jobs relative to ideas, people, animals, and things. Discuss those concerning research and development.
4. Organize into a research team and, under the direction of a science teacher, carry out an experience to solve a research problem.
5. View and discuss films 5 and 6 as they relate to research.

Student Activities

1. Have each student write a short paper showing why industries conduct research.
2. Let students make an investigation of products in the school, home, or community showing systematic and unbiased research.
3. Have students write about ways in which industries use product research and market research and give advantages of each.
4. Have student or team of students plan and make sketches for a product to be produced in class. (This will create a need for instruction in sketching. See Lesson 5.)
5. Have student or team of students conduct an experiment and investigate the best materials suitable for the product. (This will create a need for instruction in materials. See Lesson 7.)
6. Have student or team of students make a detail drawing of the product sketches after all information has been analyzed and finalized. (This will create a need for instruction in drafting. See Lesson 5.)
7. Have student or team of students to write a brief report on all decisions made about product that was selected.
8. Have student or team of students to list some ways to be used in making a market analysis.
9. Have development group devise a product to meet the needs of a problem.
10. Make a list of improvements that may be made to the product.
11. Have students make prototypes to show their ideas to assist in production.
12. Let students experiment with the processes to determine the best one for the product.
13. Students may set up experimental process to see how it runs.
14. Students may evaluate product in terms of purpose, appearance and customer cost.
15. Students may revise design and specification if necessary.
16. Students may evaluate processes in terms of quality of job and producer cost.
17. Students may revise new models to show new ideas that may be used.

Summary

1. Research is scientific investigation including
   a. Preliminary investigation leading to concept of a product
   b. Obtaining the facts and developing the principles
   c. May be pure or applied
   d. Exploring nature scientifically for the purpose of increasing knowledge of the universe
2. Development
   a. Converts an invention or product conception into final form
   b. Involves the creation of methods and tools to produce a product
   c. Develops a prototype, not ready for actual production processes
   d. Recreates and refines the prototype and build production systems so that it can be manufactured in an efficient, economical, and rapid manner
3. Functions
   a. Involves the formation of conclusion and the use of facts
   b. Searches for better ways of doing things and for new knowledge
   c. Examines many facts in order to cast new light on a complicated phenomenon

Evaluation

1. Applied or practical research aims
   a. at some product, process or practical problem
   b. to discover new facts and principles in some field
   c. at advancement of knowledge
   d. none of the above
2. Research may be either basic or applied.
3. Newly discovered facts and principles of nature are
   a. guaranteed protection by court action
   b. not patentable
   c. can be protected under appropriate conditions
   d. kept a secret
4. What are the two classes of research? Cite one example of each.
   The two classes of research are basic and applied.
   The discovery of the light-sensitive cell in 1880 was an essential factor leading to today's electronics. (basic research) Market analysis (applied research)
5. Cite three roles of research which contribute to company growth
   a. Search for new knowledge
   b. Search for knowledge relating to a specific problem
   c. Application of knowledge to the design of new product and processes
6. Basic research aims
   a. at some product, process, or practical problem
   b. to discover new facts and principles in some field
   c. at market analysis
   d. at comprehensive investigation of competition
7. What is research?
   Research is carefully oriented and organized investigation which seeks to extend current knowledge through the analytical and experimental discovery and use of new facts.
8. Research involves the preliminary investigation which leads to the solution of the more difficult problems in a product's development.

[✓ T] F 9. Research obtains the facts and develops the principles on which subsequent decisions are based.

Teacher Notes

It is apparent that every good research organization must have certain elements if it is to survive

1. The organization must have creative, intelligent, and versatile researchers.
2. It must have an administration, environment, and tools for the implementation of creative ideas into reality.
3. It must operate in a climate which permits the organization to explore the products of its creative research and development men.
4. It must make use of market surveys and information to assure that the results of its efforts are worthwhile from a need and/or financial standpoint.

The ideal research and development organization, therefore, comprises men, environment and opportunities. These three components comprise almost any organization.

Special Note

As student activities are assigned during this lesson, it will become evident that instruction in sketching, drafting, materials, the use of tools and machines and the like will be necessary. Consequently, the next several lessons are presented here with the intention that they will be adapted to the needs of the class and the individual student. These lessons are intended to present the knowledge necessary for the student to proceed with his assignments. The content of these lessons will have to be reviewed several times during the course - with individual students and with groups of students. The content of these 10 lessons should require about three weeks for presentation.

DESIGN

Note to Instructor

Poor design is far too common in industrial arts. This lesson is only an introduction to design. The teaching approach here is through use of the industrial product with which the student is already familiar, a product which is the result of the efforts of many: the industrial designer, the engineer, the technician, the craftsman, the serviceman and, to an extent, the consumer. The scope of these occupations and of the associated processes and problems is the subject matter of industrial arts.

This lesson should help the student to realize that the industrial product is the result of teamwork. Furthermore, it should make him aware of the need for knowledge of tools, materials and processes.

Objectives

The students will be able to

1. Recognize a problem which involves analysis, tools, materials, and processes in its solution.
2. Perform a task in an orderly, logical and efficient manner.
3. Recognize and apply the elements of good design.

Time Required Three to five days

Instructional Aids

1. Films #4679, "Seven Guideposts to Good Design," Georgia Department of Education, Film Libraries
2. Text and reference books
3. Chalkboard and necessary accessories
4. Models of furniture, autos, airplanes, rockets, birdhouse, etc.
5. Products of industry--appliances, furniture, toys, tools, etc.
6. Charts
    a. How Basic Tools Created Civilization (Do All Co., Des Plaines, Ill.)
    b. Automotive Progress (General Motors Corp.)
7. Tools and materials
    a. Rule
    b. Pencil
    c. Paper (8 1/2 x 11 mimeo or ditto)

Introduction

Almost every industrial product passes through several phases before it reaches the consumer. Generally, the product originated as a more or less nebulous idea in the mind of a person who visualized it as the solution or answer to some discovered need or problem. This person we might refer to as an inventor, scientist, engineer, designer, mechanic, craftsman or maybe even a dreamer, like you or me. The important thing is that someone recognized a problem or a need for a better way of doing something, a way of making man's work or life easier or more pleasant.

After the recognition of the problem, as many ideas as possible were investigated, explored, tested and experimented with until the best possible solution to the problem was found. This best solution was then developed in terms of its function, the tools, materials and processes available, and then produced for public consumption. The clothes you wear, the food you buy, the buildings in which you study, the place in which you play or live, the automobiles, busses, airplanes, and rockets you see about you have all been developed through this process.

In this course we shall study this process as it is applied to the products of industry. Furthermore, we shall provide you with an opportunity to apply this process to one or more problems, activities, or projects during this year.

We will move slowly at first because there are many things in this area of work about which you know little. You will find, however, that there is much need and opportunity for you to apply the mathematics, science, English, and social studies concepts that you have already acquired. You will even find an opportunity for new applications of this knowledge and you will certainly learn some things in these areas for the first time.

Subject Matter Outline*

1. Every industrial product must be designed and engineered.

2. Designing is a process. (List on chalkboard. Student should copy in notebook.)
   - a. Define the problem exactly. (What is to be done?)
   - b. Consider the limitations concerning the problem. (Must fit in an auto, must rest on a table, must be light in weight, must be portable, must be expendable.)
   - c. Study other solutions if they exist. (Look at solutions to similar problems, study references, make inquiries. Keep notes.)
   - d. Make many sketches of best possible solutions.
   - e. Criticize, ask others to evaluate solutions in terms of
     - (1) Its success in satisfying the requirements of the problem--its function.
     - (2) Appropriateness of its materials.
     - (3) Its adaptability to available processes.
   - f. Revise on basis of "e".
   - g. Make a model of best solution.
   - h. Criticize as in "e" and make revisions.
   - i. Make a full size model if practicable.
   - j. Make working drawings.
   - k. Produce the article.
   - l. Evaluate the finished article as in "e".
   - m. Make recommendations for further improvement.

* New words and terms are underlined. Explain them and write on chalkboard.

3. The industrial designer applies this process to every product he works with. This film will illustrate the design process just as you have noted it. See if you can identify each step as the film proceeds.

   (Present film "Seven Guideposts to Good Design.")

   (After the viewing ask students to recall the parts of the film that illustrated the steps of the design process.)

   (Ask students to describe the design process as it would apply to the designing of a new type of moon rocket, a jet propelled bicycle, a ladder without rungs, a means of reducing traffic congestion in the city, a school athletic field, a community recreation center, etc..)

   (Ask students to name the various occupations involved in the design of a product.)

4. Good design has several characteristics. (List on chalkboard)
   a. Functional - useful, serves purpose well
   b. Durable - Long lasting, but not unnecessarily so
   c. Economical - materials not too heavy or costly
   d. Materials used honestly - suitable and appropriate, retain identity
   e. Logical construction - appropriate to function, durability, economy and materials
   f. Beauty - beauty is built in when form and shape reflect function (form follows function)
   g. Personality - has individuality; make it reflect your personality

5. Design factors (List on chalkboard)
   a. Function - determines form
   b. Proportions - must be good
   c. Balance - symmetrical (formal), occult (informal)
   d. Emphasis - center of interest
   e. Unity - oneness of design, eye flows easily
   f. Rhythm - repeating lines, curves, forms, colors
   g. Harmony - all parts get along well together
   h. Texture - surface conditions varied to add interest
   i. Color - yellow, orange, red--warm; blue, green--cool; white, black, silver, gold, grey--neutral

6. Technique of improving form of an object (Illustrate on chalkboard)
   a. Proportions
      (1) Subtle relationships of length to width
      (2) Most interesting are 2 x 3, 3 x 5, 2 x 5, 5 x 8
      (3) Best compared--full size drawings
      (4) The square, circle and equilateral triangle are uninteresting because the shape is easily analyzed by the eye. Use a rectangle, ellipse or other well proportioned shape when possible.
      (5) If function dictates the use of a square, circle, etc., use it.
      (6) A mass should be either vertical or horizontal.
   b. Division
      (1) A mass may be divided into two or more major design units--horizontally or vertically.
      (2) In two part vertical division, one part should be greater than other (Note a freezer-refrigerator combination).

(3) In two part horizontal division, parts may be equal or one may be smaller. Smaller area must be so treated as to give a sense of balance.
(4) In three part horizontal division
(a) All areas may be alike
(b) Small area may be between two equal size larger areas.
(c) A large area may be between two equal size smaller areas.

c. Zoning
(1) Set major areas forward or backward.
(2) Set rails, panels, etc., back 1/16" - 1/8" rather than 1/4" - 1/2".

d. Outline enrichment
(1) Curves
(a) Compass
(b) Reverse
(c) Freehand - one direction
(d) Compound
(e) Change direction with fillets

e. Surface enrichment
(1) Not a substitute for good design
(2) Add color
(3) Add ornament

(Each of the above should be illustrated on the chalkboard, in pictures of industrial products and by examination of products. Students should collect pictures of well-designed products and make a bulletin board display of them.)

7. The Industrial Designer
a. Primitive men were the first industrial designers when they tried to improve their tools, living conditions, etc.
b. Occupation originated about 1927
c. Education - B. S. degree in industrial design
d. Preparation - as artist, craftsman and draftsman
e. Opportunities - demand is increasing. Some have own agency, some work for an industry.
f. Earnings - small salary to start as assistant. Salary unlimited if head of design agency.

Summary Questions

1. What are the steps of the design process?
2. Why is a logical procedure important?
3. What is good design? How can you recognize it? What is good taste?
4. What limitations does the designer work under?
5. What different types of workers are involved in the development of an industrial product?
6. What does the industrial designer do?
7. What are some of the techniques by which the form of an object may be improved?
8. What is meant by "function" of an object?
9. What effect has the annual changing of the design of the automobile had on the industry? What is planned obsolesence?
10. In what way has the industrial designer added to our living comfort?
11. Why must the designer be familiar with materials and the processes by which they are worked?

Assignment

1. Determine some problem about the school or home that could be solved by applying the design process. Think of the basic problem--not of an article to satisfy the situation. For example, suppose you realize the need for better reading light over a chair at home. This is a statement of the problem. If your first answer for this problem is a lamp, you will have ruled out any possibility of inventing or discovering a better solution to the problem. Begin your solution by investigating all the possible ways of producing light and all possible ways of providing it in the proper location. Then consider tools, materials, process, etc., until you have arrived at your own best solution to the problem. It may still be a lamp, but it should be of your own design.
2. Study your text.

Methods of Testing

1. Objective test
2. Evaluation and comparison of design of industrial products
3. Evaluation of evidence of student understanding of design

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7. Shigley, Mechanical Engineering Design, McGraw-Hill, 1963.
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WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: First Day on the Job	Unit: Same Topic: Policies and Procedures and Safety on the Job	Unit: Same Topic: Code of Ethics
You and Your Job, Southwestern K05 The Job You Want, Gregg Div/McGraw-Hill	Senior Safety Series, McGraw-Hill Calhoun Co. The Job You Want, Gregg/McGraw-Hill	Succeeding in the World of Work, Chap.4 McKnight & McKnight Pub. Company The Job You Want, Gregg/McGraw-Hill
Group discussion: 1. Punctuality 2. Appropriate dress 3. Duties and responsibilities 4. Co-workers 5. Supervisors 6. Forms and reports	One group of students do research on safety rules. Another ask various industrial supervisors their policies and procedures; then both groups report back to class; discuss.	In groups draw up a simple code of ethics applicable to any job.
Same	Have students: 1. Compile a list of general safety rules. 2. Compile a list of general policies (after discussion). 3. Make posters on safety for classroom bulletin board with prize going to the best one.	Have each group read their code of ethics to the class. Combine them to make one code of ethics.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

SHOPPING TECHNIQUES

	MONDAY	TUESDAY
CONTENT	Unit: Shopping Techniques Topic: Planned Use of Money--Budgeting	Unit: Same Topic: Shopping Tips
SOURCE	Personal Money Management, American Bankers Association You Pay For It, Gregg/McGraw-Hill How to Be a Better Shopper, Sperry, Hutchinson, & Co., 1960	Same
METHOD	Class discussion on differences in "wants" and "needs" (students list theirs), and on advantages of a budget--(a) living within income (b) important things (c) looking ahead (d) making choices	In groups discuss what to buy, what quality, where to buy, when to buy, using ads wisely, and planning ahead to cut down on impulsive buying. Present conclusions to class.
ACTIVITIES AND PROJECTS	Each student will make up a budget, with teacher designating amount to be used. Include savings, room, clothing, insurance, food, and extras.	Bring examples of advertisements to class about specials. Also bring examples of "gimmick" advertising.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: The Shopping Trip	Unit: Same Topic: After the Shopping Trip	Unit: Same Topic: Taking a Shopping Trip
The Label Tells the Story, Grocer Manufacturers of America, Inc. Hidden Values Series Sears, Roebuck, and Co.	Same	Same Plans presented by committee and approved by the principal.
Go over the reading of labels, asking questions of sales clerks, comparing prices, figuring the amount spent, and counting change.	Have group discuss best method of checking purchases, methods of arranging them, and things that could be wrong.	Discuss plans, give students instructions, permission slips to be signed, and notes on what to expect. Obtain first-hand knowledge of a real shopping trip and compare the different goods and stores.
Examples from newspaper ads given to students to figure with in learning to shop wisely. Labels brought to class for scrutiny of information.	Selected group of students plan a field trip. Draw up complete plans to visit several types of stores.	To complete unit, group completing arrangements for the trip to be made on Monday of the following week.

ON THE JOB WORK EXPERIENCE:

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP:

EVALUATION:

TAXES

	MONDAY	TUESDAY
CONTENT	Unit: Taxes Topic: Individual Income Taxes	Unit: Taxes Topic: Individual Income Taxes
SOURCE	General Business For Economic Understanding by Crabbe, Debrun, & Haines Understanding Taxes by Internal Revenue Service	General Business For Economic Understanding by Crabbe, Debrun, and Haines Understanding Taxes by Internal Revenue Service
METHODS	Lecture, discussion, and workshop. Use transparency of Form 1040.	Lecture, discussion, and workshop. Stress importance of using the correct table and column. Stress that an incomplete return will hold up the refund.
PROJECT	Prepare a bulletin board display illustrating the variety of Federal taxes.	Collect cartoons to use in making transparencies illustrating such points as casualty loss, contributions, sick pay, etc.
ACTIVITIES	Complete Form 1040 line by line. Go over the use of the tax tables using different incomes for practice.	Have students work sample problems.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Taxes Topic: Individual Income Taxes	Unit: Taxes Topic: Individual Income Taxes	Unit: Taxes Topic: Individual Income Taxes
General Business For Economic Understanding by Crabbe, Debrun, and Haines Understanding Taxes by Internal Revenue Service	General Business For Economic Understanding by Crabbe, Debrun and Haines Understanding Taxes by Internal Revenue Service	General Business For Economic Understanding by Crabbe, Debrun, and Haines Understanding Taxes by Internal Revenue Service
Lecture, discussion, and workshop. Use transparency of schedule A. Discuss types of income to be reported on Form 1040	Lecture and workshop. Stress the importance of using correct schedule. Discuss various items that may be deductible.	Lecture and workshop
Keep a notebook of any newspaper items about taxes published during the filing period.	Select two teams of three "tax experts" from the class. Let the teams compete in quiz-program fashion using questions based on the Teaching Taxes unit.	Select "tax experts" from the class to set up a student assistance center to help students prepare their returns during the filing period.
Have students work sample problems.	Quiz competition	Have students work sample problems.

ON THE JOB WORK EXPERIENCE :

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP :

EVALUATION:

	MONDAY	TUESDAY
CONTENT	Unit: Travel Services Topic: Methods of Travel	Unit: Same Topic: Traveling by Automobile
SOURCE	<u>General Business</u>, 7th edition by Crabbe, Enterline, DeBrum, Southwestern Pub. Co.	Same
METHOD	Read chapter. Lecture on methods of travel changing: buses, trains, airplanes, private automobile, oceanliners, etc.	Use slides to show road signs and overhead projector to show traffic laws of our state and others. Discussion of budget needed for this type of trip.
PROJECTS	Have students gather information and materials from state highway departments, travel agencies, and automobile clubs. At the end of the unit, they will each plan a trip.	
ACTIVITIES	Plan four business trips in one month's time. For each, use a different mode of travel, including bus train, automobile, and airplane. Have students suggest reasons why different means of travel might be used.	Word study: road map accommodations baggage reaction distance tourist and motel slowing distance destination schedule expenses

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Planning a Trip by Train, Airplane, Bus, or Ship	Unit: Same Topic: Traveling on Trains, Airplanes, and Buses	Unit: Same Topic: Services for Travelers
Same	Same	Same
Panel discussion by invited personnel of travel agencies.	Plan a 400-mile trip for three days; give means of travel, accommodations, and budget and time needed.	Discuss American Plan, European Plan, traveler's checks, tipping, redcaps, bellhops, reservations, types of accommodations, etc.
Check students' progress on gathering assigned materials.		Let each student present the trip he has planned to the class from materials gathered.
Put up a bulletin board showing the time zones in the United States.		

ON THE JOB WORK EXPERIENCE :

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP :

EVALUATION:

WHO NEEDS MATURITY?

	MONDAY	TUESDAY
CONTENT	Unit: Who Needs Maturity? Topic: Knowing Yourself 1) Who are you? 2) Your personality traits 3) Building walls between oneself & others	Unit: Same Topic: You and Your Family 1) Rights of teenagers and parents 2) Solving your differences
SOURCE	Maturity: Growing Up Strong	Maturity: Growing Up Strong CoEd Magazine, Nov., 1970 Parents' Declaration of Rights Teenagers' Declaration of Rights Filmstrip--"Growing Up"
METHOD	Have students look at a classmate, then shut his eyes & describe classmate's clothing to illustrate how much we actually see. Discuss importance of all our senses. Have students list their personality traits (good and bad).	Show filmstrip "Growing Up" and discuss parent-teenage problems and how these can be resolved. Discuss Parents' and Teenagers Declarations of Rights.
PROJECTS	Have students begin preparing skits on maturity to present to class or perhaps to several combined classes.	
ACTIVITIES	Have students take a survey of personality traits people most admire in others. Have them make notes on behavior, attitudes, clothes, and traits of those they work with.	Have students observe parents and their children together. Have them make notes to bring to class for discussion.

WEDNESDAY	THURSDAY	FRIDAY
Unit: Same Topic: Keeping Your Cool 1) Facing adversity 2) Consideration of others	Unit: Same Topic: Dare to be an Individual 1) Individuality and ridicule 2) Following "the crowd" 3) Pride	Unit: Same Topic: Apply Your Knowledge 1) Making your own decisions 2) Choosing a goal 3) Success is important
Maturity: Growing Up Strong Play--"Fight In the Gym"	Maturity: Growing Up Strong Play--"A Matter of Pride"	Maturity: Growing Up Strong Record--"Personal Development" (interviews with students concerning important changes in their lives)
Role play situation in which different reactions are given to "bugging." Have students select best solution to problem and tell why.	Use play. Discuss: Should you defend your beliefs when everyone opposes you? & How important is the crowd? Have pupils answer letters from teenagers in difficult situations involving individuality. Suggest work on own undesirable traits.	Let pupils present TV interview telling how important success, choosing a goal, & making own decisions is to them (including how unit has helped). Discuss response they got from employers, customers, etc. as result of working on bad traits.
Check progress on the skits.	Have students decide who will read skits. Continue work on the skits.	Practice skit presentations.
Review and discuss the previous two days of notes which the students brought.	Guest speaker (counselor, personnel manager, etc.) to talk about how maturity is important to a future job and security.	Students plan and put up a bulletin board on "Maturity--Knowing Yourself."

ON THE JOB WORK EXPERIENCE :

CLASSROOM OR LABORATORY SIMULATION:

FOLLOW-UP :

EVALUATION:

VT 017 217

VT 017 217

COORDINATED VOCATIONAL ACADEMIC EDUCATION INDIVIDUAL PROJECTS.

GEORGIA UNIV., ATHENS. DIV. OF VOCATIONAL EDUCATION.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 71 78P.

DESCRIPTORS - *EDUCATIONAL COORDINATION; *INDIVIDUAL ACTIVITIES; PROJECTS; RESOURACE MATERIALS; *VOCATIONAL EDUCATION; *ACADEMIC EDUCATION; *COORDINATORS; VOCATIONAL DEVELOPMENT; ELEMENTARY GRADES; SECONDARY GRADES; HUMANITIES; BIBLIOGRAPHIES
IDENTIFIERS - EDUCATION PROFESSIONS DEVELOPMENT ACT; EPDA; EDUCATIONAL AWARENESS

ABSTRACT - THE INDIVIDUAL PROJECTS OF THIS DOCUMENT WERE DEVELOPED FOR GEORGIA'S COORDINATED VOCATIONAL-ACADEMIC EDUCATION PROGRAMS BY 50 COORDINATORS WHO WERE ENROLLED IN AN INTERNSHIP AT THE UNIVERSITY OF GEORGIA AS REQUIRED ASSIGNMENTS FOCUSING ON SOME ASPECT OF THEIR EDUCATIONAL ACTIVITIES OR PERSONAL DEVELOPMENT. STUDENT FORMS, COORDINATOR FORMS, A BIBLIOGRAPHY, AND OTHER RESOURCE MATERIALS ARE INCLUDED AND INTENDED FOR THE USE OF VOCATIONAL PROGRAM COORDINATORS. INVENTORIES, CHECKLISTS, QUESTIONNAIRES, AND DATA SHEETS RELATING TO VOCATIONAL EDUCATION ARE PROVIDED. (AG)

4814

C V A E

Coordinated Vocational Academic Education

Individual Projects

Prepared by:
CVAE Coordinators
Division of Vocational Education
University of Georgia
Athens, Georgia
July, 1970 - June, 1971

PREFACE

The information in this manual is the accumulation of unique ideas and materials used by select C.V.A.E. Coordinators during the 1970-1971 school year in Georgia.

Approximately fifty coordinators were enrolled in an internship f[illegible] 0 until May, 1971 with the Division of Vocational Education, University of Georgia. One assignment during the internship required each coordinator to prepare an individual project centered around some aspect of their school, program, club, or personal development.

During the summer of 1971 a screening committee met at the University of Georgia and selected various forms, checklists, guides, and other materials with potential value for coordinators of C.V.A.E. programs of the future. Because of the wealth of information available, it was extremely difficult to select items for this manual; therefore, credit and sincere thanks is given to all coordinators enrolled in the internship.

It is hoped that the sharing of these materials and ideas will be of professional assistance to all C.V.A.E. coordinators in our state.

We are indebted to the following individuals for contributing their special efforts:

Mrs. Revonda Williams
Graduate Assistant

Mrs. Virginia Karnas
Typist

Dr. H.R. Cheshire
Project Director
Division of Vocational Ed.
University of Georgia

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ORAL PRESENTATION ON CVAE

This presentation can be adapted for use in talking to parents, administrators, teachers, civic groups, etc.

I. What is CVAE ?

- A. Letters stand for: Coordinated Vocational Academic Education (will be explained in more detail later in talk)
- B. A "special" program designed to meet the needs of the under-achiever or displaced youth
- C. A co-op program where students go to school approximately one-half of the school day and work either out in the community for pay, or receive simulated work experience in a vocational laboratory
- D. A "flexible" program designed to meet the needs of a large or a small community

II. How does CVAE work?

- A. Explain "Coordinated."
  1. The Coordinator's job (briefly)
  2. The community and the school working together
  3. The CVAE class
- B. Explain "Vocational."
  1. Training for a vocation
  2. Vocational class in school
- C. Explain "Academic."
  1. The "interlocking" process
  2. Combining course objectives with student objectives
- D. Explain "Education."
  1. New approach - steer away from the traditional
  2. More relevant and meaningful
  3. Teach without students realizing they are being taught
  4. Make learning fun as well as meaningful
- E. Club
  1. First time these students have participated in a club - gives them a sense of involvement and belonging

2. Develops leadership abilities (by serving as officers, committee chairmen, etc.).
3. Competition encourages them to work together toward goals and also how to be good losers as well as good winners.
4. Through club work they learn to work together for the good of all.
5. Club activities give them a chance to [illegible] together for "fun" activities as well as "work" activities.

III. How can you help? (This section will have to be adapted to the group you are talking with: parents, administrators, teachers, civic groups, etc. I am writing this one for civic groups.)

A. Let them know that the community cares by giving them a job.
B. After you give them a job, be patient with them.
C. Have a definite training plan worked out by you and the coordinator.
D. Encourage the student in every way that you can.

NINE-WEEK SPONSOR TRAINING REPORT

Coordinated Vocational Academic Education

Student's Name ____________________   ____________________ Supervisor's Name

Please enter in the appropriate column the numerical rating which you believe the CVAE trainee deserves.

Numerical Code:
1. Unacceptable for job
2. Fair for job
3. Adequate for job
4. Acceptable for competitive situation
5. Excellent for competitive situation

N/A - Not applicable for any item not rating at this time

	1st	2nd	3rd	4th	June	July	Aug
Personal Skills							
Cleanliness							
Good Mannerisms							
Neatness in Appearance							
Grooming							
Social Skills							
Relates well to co-workers							
Relates well to supervisor							
Politeness in public contacts							
Work Skills							
Punctuality-initially-from breaks							
Attendance record							
Adjustment to new assignments							
Willing to accept responsibility							
Works steadily							
Effective use of time							
Works without supervision							
Dependability							
Shows initiative							
Ability to work productively							
Care for equipment							
Completes tasks							
Follows written directions							
Follows oral directions							
Will request assistance							
Verbal expression							
Concentrates on job							
Displays concern for work							
Supervisor's Signature →							

STUDENT PROJECTS

Community Activity: Public Relations

A CVAE week was set up in the month of April, a proclamation was signed by the mayor. All during the week, spot announcements were played on the radio about CVAE. These had been taped by the students at school ahead of time.

Social Activity: Cook-out

The students planned their meal of hamburgers, potato salad, pickles, cokes, and do-nuts. The girls bought the food, made the patties and potato salad at school. The boys brought the cookers, charcoal, and iced down cokes. This was held at a state park by the river, just outside of the city limits.

School Activity: Bulletin Board

A bulletin board for the entire high school was prepared by the classes on different occupations. It was placed in the hall on Monday and remained there for a week.

School Activity: Homecoming

A float was planned and built by all of the CVAE students. They borrowed the trailer to be used from one of their employers, planned the Snoopy float, bought the materials, built the float at school, chose the people to ride the float, and took part in all of the Homecoming events.

Community Activity: Hospital Trays

The CVAE students made arrangements with the Director of Evans Memorial Hospital to do something for the patients during the Christmas holidays. Students made little place cards saying, "Merry Christmas." These were taken to the hospital and placed on lunch trays. Christmas Day they placed boxes of candy on trays. Small folding boxes were ordered from Sears. Fruits were placed in the boxes of patients that could not have candy.

HANDCRAFT OR HOBBY CONTEST

PURPOSE

The purpose of this contest is to give encouragement and recognition to CVAE students. Many students can excell with their hands and this should be recognized.

OBSERVER RULE

Objects may be displayed at state conventions. No observer shall be present during the judging.

PROCEDURES

1. Clubs will organize and combine the handcrafts and hobbies activity at school with their classes.
2. The local club should have a run off with judges.
3. The regions shall send their entry by registered mail to the Regional Chairman two weeks prior to the regional meeting.

RULES

1. The entries should be grouped according to the type of handcraft.
2. A 3" X 5" card should accompany each object with a list of materials used.
3. All entries must be the work of the student.

REQUIRED CONTEST PERSONNEL

1. Three to five judges.
2. One contest chairman.

INSTRUCTIONS TO CONTEST CHAIRMAN

1. Arrange for all necessary materials in advance of the contest.
2. Attend all meetings announced for chairmen or judges.
3. Check room arrangements to be certain contest will operate smoothly.
4. Assemble judges at the contest site to be certain all questions are answered and rating procedures are clear.
5. After judging is complete, judges will return rating sheets to the contest chairman in envelope provided.

INSTRUCTIONS TO JUDGES

1. Careful consideration should be given to each rule and should be judged exactly in the same manner.
2. Judges will meet at the contest site in advance of the contest, at an announced time, to confer on rule meanings and to select or elect a chairman of the judges.
3. Judges will total their own rating sheets and return them to contest chairman in envelope provided after judging is complete.
4. Judge will keep all information confidential until general announcement.

EQUIPMENT AND MATERIALS NEEDED

1. Rating sheets.

ROOM ARRANGEMENT

Judging Room - A room with sufficient tables to display all entries and chairs for the judges.

PROCEDURES FOR PLANNING STUDENT TRAINING UTILIZATION OF FIELD TRIPS

STEPS IN PROCEDURE

1. Develop reason for field trip and pick exact place.
2. Contact place for permission to visit, time and day, size of groups, name of leader, parking, etc.
3. Hold class discussion on what to look for, kinds of information that students will be interested in and that fulfills the purpose of the trip. Kinds of information that students could look for could be:

    a. Location of plant
    b. Products or services
    c. Accessibility
    d. Parking, cafeteria and washroom facilities
    e. Maintenance level
    f. Types and levels of jobs
    g. Physical comfort and safety of job setting
    h. Types of employees
    i. Kind of cars driven by employees to work
    j. Physical demands of various jobs
    k. Mental demands of various jobs
    l. Social demands of various jobs
    m. Qualifications for employees
    n. Hours, pay, fringe benefits, unions
    o. On-the-job training
    p. Entry-level jobs

4. Field trip site personnel should be notified in advance about the information the students are seeking.
5. The teacher (if possible) should visit field trip site ahead of time.
6. On the day of the field trip, students should be encouraged to ask questions at the end of the tour to clarify areas of information they did not understand. A basic list could be prepared beforehand.
7. Next day class discussion should elicit information from students as to what they saw, why operations were performed as they were, types of jobs performed, range of families represented, types of skills needed, etc.
8. Student committee should write short letter of thanks for permitting students to visit company.
9. A follow-up film or film strips on production in this company will now serve to emphasize various jobs and work procedures that students would otherwise overlook.
10. A bulletin board depicting the varied job opportunities of this company, plus pictures reviewing what they saw on the field trip, would be a pleasant reminder of the trip and insurance that it would not all be so quickly forgotten.

A FUN ACTIVITY ON FOLLOWING DIRECTIONS

Especially good for a rainy day or the day before a holiday.

Cut a stencil and run off the following for your classes:

Directions:

How well do you follow directions? You should be able to finish all the things required in five minutes by following the directions below. Your teacher may wish to time you to see who can finish 1st, 2nd, or 3rd. Do not begin until your teacher says go, following directions as given. You will need only one sheet of paper.

1. Read all directions before doing anything.
2. On a sheet of notebook paper write your name in the upper right hand corner.
3. Number from 1 to 7, leaving three blank lines between each number.
4. Draw 5 small squares beside the number 1.
5. Put an x in each of the small squares beside number 1.
6. Put a circle around the number 2 on your paper.
7. Count the number of pages in chapter 4 of your text, and write the number beside number 3 on your paper.
8. Multiply the answer above by your age.
9. Say your name outloud.
10. Beside number 4 write today's date.
11. Beside number 5 write the city and state where you were born.
12. Count the number of persons in the room and write it beside number 6.
13. Say, "I have reached number 13 and I am following directions correctly."
14. Now that you have completed the reading, omit all directions except the first two.

DRUG ABUSE RESOURCE MATERIALS AND FILMS

I. ORDER FROM: Department of Mental Health
American Medical Association
535 North Dearborn Street
Chicago, Illinois 60610

- A. "Dependence on Cannabis (marijuana)" (Reprint)
- B. "Marijuana and Society" (Reprint)
- C. "Dependence on LSD and other Hallucinogenic Drugs" (Reprint)
- D. "Dependence on Barbiturates and other Sedative Drugs" (Reprint)
- E. "Dependence on Amphetamines and other Stimulant Drugs"

II. ORDER FROM: American Medical Association
Department of Health Education
535 North Dearborn Street
Chicago, Illinois 60610

- A. "Glue Sniffing" (Leaflet)
- B. "Barbiturates" (Leaflet)
- C. "Amphetamines" (Leaflet)
- D. "Marijuana" (Leaflet)
- E. "LSD" (Leaflet)

III. ORDER FROM: Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

- A. "LSD, The False Illusion"
- B. "Drug Abuse, the Empty Life"

IV. ORDER FROM: National Institute of Mental Health
50 7th Street, N.E., Room 423
Atlanta, Georgia 30306

- A. "Narcotics, Some Questions and Answers"
- B. "LSD, Some Questions and Answers"
- C. "The Up and Down Drugs, Amphetamines and Barbiturates"
- D. "Marijuana, Some Questions and Answers"

V. ORDER FROM: Bureau of Narcotics and Dangerous Drugs
1405 I Street
Washington, D.C. 20537
Attn: Mrs. Irene Dunn

- A. "Drugs of Abuse"
- B. "Fact Sheet"
- C. "LSD 25"
- D. "Resource List of Literature"
- E. "Symptom of Drug Abuse Poster"

VI. ORDER FROM: Blue Cross Association
840 North Lake Shore Drive
Chicago, Illinois 60611
Attn: Public Relations

A. "Drug Abuse, the Chemical Cop-Out"

VII. ORDER FROM: Western Electric
Southern Region Headquarters
Atlanta, Georgia 30328

A. "Parents Guide to Marijuana"

VIII. ORDER FROM: Smith, Kline and French Laboratories
1500 Spring Garden Street
Philadelphia, Pennsylvania 19101

A. "Articles on Drug Abuse," June, 1966 through March, 1969 - Bibliography. Get Revised Edition.

IX. ORDER FROM: The American Social Health Association, Inc.
1740 Broadway
New York, New York 10019

A. "Films on Drug Abuse Education"

FILMS AVAILABLE IN GEORGIA

I. State Department of Education
  A. "Loser, The" - 31 min. Order No. 7029
  B. "LSD 25" - 27 min. Order No. 7017
  C. "Marijuana" - 34 min. Order No. 7516
  D. "Drugs and the Nervous System" - 18 min. Order No. 5247
  E. "Seduction of the Innocent" - 11 min. Order No. 741

II. Georgia Department of Public Health, 47 Trinity Avenue,S.W., Atlanta, Georgia 30334
  A. "Hide and Seek"
  B. "Drug Abuse: The Chemical Tomb"
  C. "LSD: Insight or Insanity"
  D. "The Problem of Amphetamine Abuse"
  E. "Marijuana"
  F. "Narcotics: Pit of Despair"

III. Federal Aviation Administration, Librarian SO-433, Box 20636, Atlanta, Georgia 30332. 1-404-526-7276
  A. "LSD: Insight or Insanity" - 28 min.
  B. "Drugs and the Nervous System" - 18 min.

STUDENT'S FORMS

STUDENT'S PERSONAL CHECKLIST

Do you have confidence in yourself?	Always Sometimes Never
Do you accept responsibility?	Always Sometimes Never
Do you work well on your own?	Always Sometimes Never
Can you work under pressure?	Always Sometimes Never
Are you neat?	Always Sometimes Never
Are you on time for classes?	Always Sometimes Never
Do you apply yourself to school work and other jobs you do?	Always Sometimes Never
Do you adapt well to situations at school and home?	Always Sometimes Never
Do you make friends with your classmates and treat them with respect?	Always Sometimes Never
Do you let friends or others show you how to do things if you need their help?	Always Sometimes Never

THE PROBLEM CHECKLIST

Directions: Read the list slowly, and as you come to a problem which bothers you, put a circle around the number in front of it.

1. Being smaller than other kids.
2. Being bigger than other kids.
3. Can't talk plainly.
4. Hands hurting a lot.
5. Having something wrong with me.
6. Don't like school.
7. Would like to join a club.
8. Afraid of failing in school work.
9. Don't like art.
10. Teachers always telling me what to do.
11. Too much work to do at home.
12. Nothing to do or play with at home.
13. Afraid of brother and sister.
14. Not able to take music lessons.
15. Not having my own room.
16. Being too bashful.
17. Not knowing how to act at parties.
18. Kids not liking to play with me.
19. Never chosen as the leader.
20. Being talked about.
21. Afraid to try new things myself.
22. Can't forget mistakes I've made.
23. Afraid God will punish me.

24. Not enough time for fun and play.
25. Losing my temper.
26. Hungry most of the time.
27. Not liking to eat.
28. Not being strong enough.
29. Being too fat.
30. Being too thin.
31. Too hot in school.
32. Not smart enough.
33. Don't like teachers.
34. Not having any fun in school.
35. Not interested in books.
36. Being afraid of Daddy or Mother.
37. Having to take music lessons.
38. Wanting my mother home more.
39. Not liking babies.
40. Daddy won't help me.
41. Being made fun of.
42. Playing mostly with little kids.
43. People think I'm sissy.
44. Not able to work with others.
45. Have to worry too much about money.
46. Have to worry too much about clothes.
47. Being watched all the time.
48. Not able to sit still.
49. Having bad dreams.
50. Being careless.
51. Wanting to get a job.
52. Worrying.

SELF CONCEPT

Instructions: These statements are to help you to describe yourself. Please answer them as if you were describing yourself to yourself. Do not skip any items! Read each statement carefully; then select one of the following answers and mark the number in the answer spot. THIS IS NOT FOR A GRADE AND HAS NOTHING TO DO WITH YOUR GRADE.

Answers: Completely true 5
Mostly true 4
Partly true 3
Mostly false 2
Completely false 1

Remember that you are not trying to show yourself as others see you, but yourself as you see yourself.

1. I am usually eager to go to class. ________
2. I never ask teachers to explain something again. ________
3. I try to change when I know I'm doing things wrong. ________
4. I wish I didn't give up as easily as I do. ________
5. I do the work assigned, but no extra. ________
6. I would rather do well than poor in school. ________
7. Once in a while I put things off till tomorrow. ________
8. I become discouraged easily in school work. ________
9. I do things without being told several times. ________
10. I am satisfied to be just what I am. ________
11. I like school jobs which give me responsibility. ________
12. I like to start work on new things. ________
13. I cannot remember directions for doing things. ________
14. I do well when I work alone. ________
15. I give up easily in school work. ________

16. I am satisfied with my ability to speak before classes. ________

17. I am able to get my work done on time. ________

18. I have difficulty in deciding what to study. ________

19. I do my share of school work. ________

20. I give up if I don't understand something. ________

21. I try to be careful about my work. ________

22. I get tense when I'm called upon in class. ________

23. I make mistakes because I don't listen. ________

24. I do things without thinking. ________

25. I have trouble deciding what is right. ________

26. I find it hard to remember things. ________

27. I think clearly about school work. ________

28. I can't express myself in writing very well. ________

29. I can tell the difference between important and unimportant things in a lesson. ________

30. I do poorly in tests and homework. ________

31. I change my mind a lot. ________

32. I feel good about my school work. ________

33. I do not understand what is going on in class. ________

34. I am as smart as I want to be. ________

35. I solve problems quite easily. ________

36. I can figure things out for myself. ________

37. Good grades come easily to me. ________

38. I know the answer before the rest of the class. ________

39 I can usually see the sense in others' suggestions. ________

40. I find it easy to get along with classmates. ________

41. I enjoy not taking the lead in class. ________

42. I take an active part in group projects. ________

43. I try to play fair with my classmates. ________

44. I try to understand the other person's point of view. ________

45. I am an important person to my classmates. ________

46. My classmates don't feel like I do well. ________

47. I am not interested in what my classmates do. ________

48. I find it hard to talk with classmates. ________

49. I feel left out of things in class. ________

50. I don't like to read in class. ________

MAJOR INTEREST PREFERENCE CHART

Check only those which you are interested in.

Mechanically Oriented Trades, Etc. (Creative)
Airline pilot
Construction laborer
Contractor
Electrician
Elevator repairman
Engineer
Lineman phone and power
Mechanic
Teacher
Machinist
Sheet metal worker
Tool and die worker
Blacksmith

Outdoor
Farmer
Fisherman
Forest ranger
Game warden
Gardener
Nurseryman
Rancher
Sight-seeing guide
Tree surgeon
Zookeeper

Computational
Accountant
Auditor
Bookkeeper
Cashier
Civil engineer
Clerk
Teacher
Office machines operator
Statistician
Surveyor
Actuary

Persuasive
Auctioneer
Information clerk
Lawyer
Public relations
Purchasing agent
Routeman
Sales manager
Sales person
Radio announcer
Counselor

Scientific
Chemist
County agent
Detective
Dietician
Forest supervisor
Laboratory technician
Lens grinder
Meteorologist
Traffic engineer

Artistic
Architect
Artist
Beautician
Designer
Draftsman
Engraver
Art teacher
Painter
Photographer
Tailor

Literary
Actor
Author
Editor
Teacher
Interpreter
Librarian
Reporter

Social Service and Sports, Etc.
Athlete
Clergy
Personnel worker
Library assistant
Nurse
Rehabilitation worker
Child care worker
Social worker
Sports official
Teacher

Musical
Arranger
Chorus girl
Composer
Dancer
Musical instrument repairman
Musician
Music store clerk
Music teacher
Orchestra conductor
Singer

Clerical
Baggageman
Bookkeeper
Checker
Clerk
Mail carrier
Paymaster
Secretary
Telephone operator
Ticket agent
Typist

INTEREST INVENTORY

This instrument should help the coordinator isolate a student's vocational interests or career objectives.

My name________________________Age_______Date_____________

My highest grades are in________________________________

My lowest grades are in ________________________________

My favorite subject is__________________________________

My favorite sport is_____________________________

My three most interesting hobbies are__________________________

____

Out of school I would rather___________________________________

What skills do you have? (typing, driving, etc.)

____

What course of study or special training would you like? (Business, Aviation, Mechanical drawing, Automobile repair,etc.)

____

Has anyone ever said you were particularly good at one thing?

_______If so, what was it?___________________________________

Have members of your family or friends suggested a particular career to you?_______What is it?___________________________

What have you often thought that you would like to do for a living?____

What occupations or fields of work would you like more information on?____

Consider your part-time jobs. Name two part-time jobs and answer these questions about them.

Job 1. was _________________ Why did you like or not like this

job?____

Name any job in this career that you would like.

____

Job 2. was ____________________ Why did you like or not like this job? ________________________________

Name any job in this career that you would like.

____

Different jobs require different types of reading.

Do you read newspapers? ____________ What newspaper? ____________ ____________________ Which section(s)? ____________________

Do you read magazines? ________ Which ones? ____________________ ____________________________ What T.V. program do you like best?

____

Check the activities in the list below which interest you, and tell why you like them.

Working outdoors ________________________________

Writing ________________________________

Solving puzzles ________________________________

Being always on the go ________________________________

Using tools ________________________________

Meeting people ________________________________

Repairing things ________________________________

Making speeches ________________________________

Facing danger ________________________________

Doing new things ________________________________

Check two of the following things which you would like to do best about either a radio or a piece of clothing.

Make it_____ Draw it_____ Design it_____ Repair it_____

Sell it_____ Write about it_____ Use it_____ Teach others about it_____

Improve it_____ Buy it_____ Improve its appearance_____

STUDENT VOCATIONAL INTEREST QUESTIONNAIRE

Your school and community are interested in helping students do the best possible job of choosing and preparing for a field of work in line with their abilities and interests and in which they will have a reasonable opportunity for employment. With information you furnish and information about job opportunities, your school should be able to do more to help students make wise vocational choices and plans.

This questionnaire is divided into two parts, one which determines what activities you like to take part in, and one that will tell us about your educational and vocational plans.

Instructions

1. A separate answer sheet will be used to mark responses to questions in this questionnaire.
2. Read carefully each interest item listed and answer them on your answer sheet.
3. You should mark L if you like the activity.
4. You should mark ? if you don't know.
5. You should mark D if you don't like it.
6. The last part is question items which will let us know your future plans.

1. Working with business records, such as sales slips, receipts, bills, records and amount of goods purchased or work done.

L ? D

2. Helping in the supervision of children's activities.

L ? D

3. Buying merchandise to be resold in a retail or wholesale business.

L ? D

4. Operating adding machines and calculators.

L ? D

5. Helping to care for an elderly person in performing personal services.

L ? D

6. Acting as a receptionist.

L ? D

7. Displaying plants including ornamental and vegetable plants.

L ? D

8. Planning and organizing household activities and managing a home.

L ? D

9. Taking the responsibility of caring for children while parents are at work.

L ? D

10. Working in a print shop or publishing company.

L ? D

11. Sorting, indexing, and assembling papers and written records.

L ? D

12. Operating a sewing machine.

L ? D

13. Collecting information to compile records.

L ? D

14. Selecting, storing, and displaying of fresh fruits and vegetables.

L ? D

15. Arranging food so that it is atrractive and appetizing.

L ? D

16. Accepting deposits or loan payments as a teller in a bank.

L ? D

17. Taking apart mechanical things and putting them back together again.

L ? D

18. Reading instructions or interpreting rough sketches to help plan sheet metal projects.

L ? D

19. Treating animals for diseases and parasites.

L ? D

20. Cleaning a house.

L ? D

21. Contracting many retail and wholesale businesses to show merchandise.

L ? D

22. Working on engine ignition and carburation systems.

L ? D

23. Laying out designs on sheet metal.

L ? D

24. Carrying trays, cleaning utensils, and assisting nurses in caring for patients.

L ? D

25. Working with ideas such as planning, designing, drawing, or writing.

L ? D

26. Studying ways of increasing the profits from farm crops.

L ? D

27. Finding out what profit or losses a business makes.

L ? D

28. Setting a table and serving food correctly.
L ? D

29. Managing a retail, wholesale, or service establishment.
L ? D

30. Serving meals to persons who are ill.
L ? D

31. Cleaning, pressing, and mending clothing.
L ? D

32. Figuring out arithmetic problems using multiplication, division, squares, and square roots.
L ? D

33. Advising customers on the use of chemicals for weed and insect control.
L ? D

34. Leading groups of children in their activities such as games, crafts, and sports.
L ? D

35. Operating a printing press.
L ? D

36. Teaching simple games and songs to young children.
L ? D

37. Working on furnaces and air conditioners.
L ? D

38. Writing letters for and reading to an elderly or ill person.
L ? D

39. Grading fresh fruits and vegetables.
L ? D

40. Taking dictation in shorthand or on a shorthand machine.
L ? D

41. Helping children to get along with other children.
L ? D

42. Examining mechanical equipment for worn or damaged parts to determine repair needs.
L ? D

43. Helping to prepare and serve foods.
L ? D

44. Cutting and shaping metal objects or parts using hand-tools and machines.
L ? D

45. Helping people to choose new merchandise wisely.
L ? D

46. Greasing and oiling machines.
L ? D

47. Selling various items of merchandise or service such as automobiles, clothing, electrical appliances, insurance,etc.
L ? D

48. Planning an electrical system for buildings.
L ? D

49. Working on a job that requires strength and active movements.
L ? D

50. Taking orders and serving food in a restaurant.
L ? D

51. Planning menus and preparing meals.
L ? D

52. Helping prepare special diets for a patient.
L ? D

53. Copying long lists of numbers and checking to be sure they are copied right.
L ? D

54. Helping in the care of young children in a nursery school.
L ? D

55. Supervising other employees in a retail, wholesale, or service establishment.
L ? D

56. Copying figures or words neatly and orderly.
L ? D

57. Setting type by hand or machine for printing or working with sizes, styles, and spacing type.
L ? D

58. Visiting persons who are ill.
L ? D

59. Advising concerning identification of plants, insects, and diseases.
L ? D

60. Working with people.
L ? D

61. Working in an office.
LL ? D

62. Planning the arrangement of pictures or printing articles on a page to make it look attractive.
L ? D

63. Reading stories to children.
L ? D

64. Preparing fruit and vegetables for marketing, including trimming, washing, and packaging.
L ? D

65. Making calculations to determine angles, curves, or shapes of masonry structures.
L ? D

66. Baking pies, cakes, and pastries.
L ? D

67. Interviewing people applying for a charge account in retail or wholesale business.
L ? D

68. Repairing or replacing worn or damaged motor or other mechanical parts of an automobile or truck.
L ? D

69. Operating welding equipment.
L ? D

70. Sewing by hand.
L ? D

71. Reading about new developments in textiles and new fashions.
L ? D

72. Giving permanents and other treatment for woman's hair.
L ? D

73. Informing customers what an article of merchandise or service will do for them.
L ? D

74. Caring for children in a private home.
L ? D

75. Making clothes for others.
L ? D

76. Working with doctors and nurses to help sick people.
L ? D

77. Typing letters and reports.
L ? D

78. Arranging attractive displays of merchandise.
L ? D

79. Helping farmers in preparing an economical feeding program for their livestock.
L ? D

80. Filing written reports alphabetically or according to subject matter.
L ? D

81. Using electric household appliances.
L ? D

82. Proofreading printed copy.
L ? D

83. Explaining uses of new products or services to people.
L ? D

84. Displaying and selling home and garden plants, shrubs, and equipment.
L ? D

85. Operating office machines.
L ? D

86. Typing from a dictation machine.
L ? D

87. Selecting seed and maintaining turf grasses.
L ? D

88. Fitting and altering garments.
L ? D

89. Receiving, inspecting, weighing, and handling fruit or vegetable products.
L ? D

90. Figuring out logical and orderly steps to work problems.
L ? D

91. Shopping for food.
L ? D

92. Tuning up motors to see that they are running right.
L ? D

93. Helping people to select goods and services.
    L ? D

94. Working with decorators.
    L ? D

95. Reading and trying out new recipes.
    L ? D

96. Giving manicure and hand care treatments.
    L ? D

97. Developing advertisements to sell merchandise or services.
    L ? D

98. Doing laundry and ironing.
    L ? D

99. Working with my hands.
    L ? D

100. Shopping for patterns and fabrics.
    L ? D

101. Receiving, checking purchase orders against invoices and storing supplies for resale.
    L ? D

102. Testing radio and television sets.
    L ? D

103. Working outdoors.
    L ? D

104. Constructing and using plant growing structures such as greenhouses.
    L ? D

105. Making chemical laboratory experiments.
    L ? D

106. Working in a scientific laboratory.
    L ? D

107. Using hand and power tools.
    L ? D

108. Making calculations to determine angles, curves, or shapes of small wooden parts.
    L ? D

109. Repairing and maintaining garden tractors and lawn equipment.
    L ? D

110. Changing fuses and fixing short circuits.
    L ? D

111. Keeping machinery in a factory in operation.
L ? D

112. Studying the theory of electricity, including direct and alternating current, volts, amperes, etc.
L ? D

113. Supervising crews in the sodding and seeding of lawn areas.
L ? D

114. Studying consumer preferences.
L ? D

115. Working in a dentist's laboratory.
L ? D

116. Working factory, garage, or workshop.
L ? D

117. Running machines that cut or grind small shavings from metal parts.
L ? D

118. Keeping experiment records,charts,and graphs.
L ? D

119. Supervising the preparation and sale of floral products.
L ? D

120. Working with a microscope to study small objects.
L ? D

121. Operating metal working machines such as engine lathes, milling machines, power hacksaws, grinders and shapers.
L ? D

122. Feeding and caring for livestock.
L ? D

123. Repairing furniture.
L ? D

124. Studying ways of increasing the profits from livestock.
L ? D

125. Shaping metal parts from blueprints and specifications.
L ? D

126. Finishing or refinishing fine wood surfaces using shellac, stains, varnishes, and other materials.
L ? D

127. Working in a bakery.
L ? D

128. Helping farmers to determine the machinery needs for their farm business.
L ? D

129. Selecting or designing hair styles.
L ? D

130. Maintaining and repairing gasoline engines.
L ? D

131. Creating posters and show cards to advertise products.
L ? D

132. Cutting, tinting, and dyeing hair.
L ? D

133. Studying soil characteristics.
L ? D

134. Displaying garden store products.
L ? D

135. Repairing bus, truck, tractor and heavy diesel engines.
L ? D

136. Operating and maintaining special turf equipment such as mowers.
L ? D

137. Growing and marketing flowers.
L ? D

138. Assisting a dentist during treatment of patients.
L ? D

139. Preparing and packaging flowers for sale.
L ? D

140. Working in a service station or garage.
L ? D

141. Developing and drawing up plans for the construction of a bridge or building.
L ? D

142. Studying how plants grow.
L ? D

143. Working with lumber, paints, masonry, building materials.
L ? D

144. Preparing landscape plans for home or public grounds.
L ? D

145. Working in a cleaning and pressing establishment.
L ? D

146. Working the mathematical problems necessary to draw things. to scale.
L ? D

147. Working with wood, fabrics, and leather.
L ? D

148. Operating machinery or equipment.
L ? D

149. Giving first aid treatment.
L ? D

150. Pruning, fertilizing and caring for ornamental shrubs and shrub trees.
L ? D

151. Using carpenter's tools to help in the construction of a home.
L ? D

152. Working from exact tracings or copies of plans or designs made by someone else.
L ? D

153. Assembling or adjusting machinery and explaining to customers how a machine works.
L ? D

154. Repairing or replacing defective parts in T.V.'s.
L ? D

155. Giving skin beauty treatments.
L ? D

156. Recognizing and controlling plant insects and diseases.
L ? D

157. Designing and preparing diagrams and sketches for publications and exhibitions.
L ? D

158. Designing lawn areas for commercial concerns such as golf courses, parks, etc.
L ? D

159. Identifying shrubs and trees.
L ? D

160. Working on a job that is active and requires the use of math problems.
L ? D

161. Repairing damaged automobiles by replacing broken body parts and pounding out dents.
L ? D

162. Working with projects that control soil erosion.
L ? D

163. Assisting in the preparation of foods in quantity.
L ? D

164. Designing and making floral displays.
L ? D

165. Working with gauges and tools that make fine measurements.
L ? D

166. Running lathes, and drill presses, etc.
L ? D

167. Working with laundry and dry cleaning equipment.
L ? D

168. Studying the effect of different fertilizers.
L ?

169. Supervising the selection and planting of ornamental shrubs and shade trees.
L ? D

170. Working on a job that requires very delicate hand movements and very close inspection and precision.
L ? D

171. Assembling electrical equipment or motors.
L ? D

172. Growing and marketing of nursery and greenhouse products.
L ? D

173. Drawing things to exact scale.
L ? D

174. Working as a nurse's aid in a hospital or as a practical nurse at home.
L ? D

175. Advising customers concerning fertilizing and control of diseases in plants.
L ? D

176. Giving shampoo and scalp treatments.
L ? D

177. Replacing or repairing worn or damaged parts of wooden structures such as barns, stairs, etc.
L ? D

178. Working from blueprints.
L ? D

179. Wiring, splicing, soldering, and installing electrical equipment.
L ? D

180. Supervising the transplanting of nursery crops.
L ? D

181. Installing and adjusting automatic equipment.
L ? D

182. Illustrating stories, advertisements, or articles in books.
L ? D

183. Designing and installing drainage systems for lawn areas or golf courses.
L ? D

184. Developing new kinds of flowering plants through controlled breeding techniques.
L ? D

185. Lettering signs or posters and advertising copy for magazines and newspapers.
L ? D

186. Taking and developing dental X-rays.
L ? D

187. Designing machinery and mechanical or electrical equipment.
L ? D

188. Improving livestock production through animal selection and breeding programs.
L ? D

189. Making corsages.
L ? D

190. Painting and refinishing automobiles or repaired body sections.
L ? D

191. Laying out and caring for flowers and shrub gardens.
L ? D

192. Repairing electrical stoves, vacuum cleaners, fans, etc.
L ? D

193. Working with cooking ingredients.
L ? D

194. Making an analysis of soil to determine specific needs of soil to fertilizers.
L ? D

195. Planning wiring diagrams and installing electrical wiring circuits, outlets, and fixtures.
L ? D

196. Making experiments using the principles of chemistry.
L ? D

197. Working with cloth and fabrics.
L ? D

198. Identifying and using plants for the landscaping of homes and public buildings and grounds.
L ? D

199. Repairing buildings.
L ? D

200. Using drafting tools to repair detailed plans and drawings of things to be built.
L ? D

The following is a list showing the questions broken down into interest or career groups. It must be remembered that many will overlap. After deciding what a student's preference is, it would be best to go over his/or her choices in detail. It would also be advisable to ask the student why he likes this particular career field. Have him investigate it through research and a career manual. It must be remembered that this is merely an aid. It is not designed to replace professional tests such as the"Kuder Preference Test."

Business records, shipping clerks, etc.
101, 1, 2, 11, 13, 27, 32, 53, 61, 85, and 160---question nos.

Child care
2, 9, 34, 36, 41, 54, and 63.

Wholesale
3

Medical occupations
174. 138. 115, 120, 93, 5, 24, 30, 38, 42, 52, 58, 76, 149.

Secretarial
6, 56, 61, 77, 80, 86.

Florist, nurseryman, gardener, etc.
186, 144, 136, 118, 164, 7, 84, 189, 103, 169, 183, 104, 172, 109, 180, 113, 184, 134, 198, 150, 158, 159, 191.

Domestic
8, 20, 74, 98.

Printing industry
10, 35, 57, 62, 82.

Fabric and clothing manufacturing, etc.
145, 12, 31, 70, 71, 75, 88, 100, 197.

Grocery
14, 15.

Banking
16.

Mechanical
17, 99, 109, 116, 148.

Sheetmetal
165, 166, 18, 23, 99, 117, 125, 152.

Agriculture
162, 142, 19, 26, 33, 156, 39, 168, 175, 59, 188, 64, 79, 89, 103, 122, 124, 128, 133, 194.

Sales
21, 29, 47, 55, 60, 67, 73, 83, 153.

Automotive
22, 68, 92, 99, 109, 130, 135, 140, 153, 161, 190.

Drafting, etc.
25, 187, 141, 195, 146, 152, 173, 200.

Food service
163, 193, 28, 43, 51, 50, 66, 81, 91, 95.

Machinist
44, 99, 108, 148, 116, 125, 170, 152, 117, 165, 121, 166.

Purchasing
45.

Maintenance
37, 46, 111, 166, 177, 199.

Electrician
181, 48, 99, 110, 112, 152, 179, 195, 178.

Warehouseman, etc.
49.

Building trades
37, 65, 103, 107, 143, 199, 151, 178, 177.

Welding
69, 99.

Beautician
72, 96, 129, 132, 155, 176.

Art advertisement, and decoration
185, 78, 94, 97, 131, 157, 182.

Appliance repair
1 2, 154, 171, 192.

Lab work
105, 106, 118, 120, 196, 168, 194.

Working with consumers
114.

Furniture and upholstery
123, 126, 147, 197.

Laundry and dry cleaning
167.

STUDENT QUESTIONNAIRE

Please answer this questionnaire truthfully as it will help your coordinator to understand your feelings and viewpoints. It will help him to plan his lessons in a more interesting manner and also allow him to know more about you. The answers should be written as short as possible; just be sure that you get the idea across.

SCHOOL EXPERIENCES

1. What do you like in particular about going to school?
2. What is there that you dislike about school?
3. Have you ever thought about quitting school?
4. If your best friend came to you and told you that he was going to drop out of school, what would you tell him?
5. What type of work are you planning to do when you finish school?
6. Do you feel like what you are studying in school will help you with your life's work?

FAMILY

1. Would you say that it is your father or your mother that makes most of the decisions?
2. What type of decisions would your father make?
3. What type of decisions would your mother make?
4. If your whole family had a vacation at the same time, how would they spend it?
5. Does your family talk things over with each other very often?
6. Would you say that your family understands and likes each other?
7. Do you think that your family both understands and accepts you?
8. Does your family encourage you to do well in school?
9. Have you ever planned on running away from home for good?

FAMILY FRIENDS

1. How many really close friends does your family have?
2. Does your family get together with relatives on big holidays?
3. Does your family get along with the neighbors?

YOUR FRIENDS

1. Does your family care who your friends are?
2. Does your family not like your friends?
3. If your family doesn't like one of your friends, what usually happens?
4. Have any of your friends dropped out of school?
5. Have you ever been friends with any of your teachers?
6. How many of your parents' friends are you friendly with?
7. If you needed help with a big decision, who would you get to help you?

STUDENT RECORD FORM

Name____________________________Date__________Sex____________

Present Address___________________________Homeroom_____________

Phone_______________Age_______Date of Birth__________________

Race_____________Nationality_______________Religious Preference _______________________________

Check any of the following where applicable:

Father living Yes_______No_______

Mother living Yes_______No_______

Parents living together___________Parents divorced_______

Parents separated_______Father re-married_______

Mother re-married_______

Father's name and initial_________________________Father's age _______Father's address_______________________________________

Address of firm or employer___________________________________

Name of firm or employer______________________________________

Father's title, position, or work_____________________________

If father unemployed, give usual occupation____________________

Mother's present occupation___________________________________

Mother's occupation before marriage___________________________

Father's birthplace____________Mother's birthplace_____________

Father's and mother's education: Mark below the highest grade finished in school. Use an x for your father and a circle for your mother.

Grade School 1 2 3 4 5 6

Junior High School 7 8 9

High School 10 11 12

Business College 1 2

Nursing School 1 2

College 1 2 3 4

Are you like your father?____________________

Are you like your mother?____________________

Does your father understand your problems?___________________

Does your mother understand your problems?___________________

How do your parents feel about your future education after high school? Check any of the following where applicable.

Trade School (Business college, Vo-Tech School, Nursing, etc.)

________Very anxious for me to go.

________Interested in my success in a particular career.

________Opposed to trade school.

College

________Very anxious for me to go to college.

________Interested in my studying a particular thing.

________Opposed to my going to college.

If you have had any of the following illnesses, UNDERLINE the illness and put at what age you were when you were ill.

Whooping Cough_____Mumps_____Measles_____German Measles_____

Chicken Pox_____Encephalitis_____Epilepsy_____

Polio_____Pneumonia_____Tuberculosis_____Influenza_____

Rheumatic Fever_____Smallpox_____Diabetes_____

Stuttering_____Stammering_____Eye Problems_____

Hearing problems_____ Hernia_____ Headaches (persistent)_____

Height__________ Weight__________

Do you wear glasses?______________

How often are you absent from school because of illness?_______

____

Brothers' and sisters' Names	Age	Highest Education	Job
1.			
2.			
3.			
4.			
5.			
6.			
7.			

What is your present vocational choice?________________________

When did you make this choice?_________________________________

How much information do you have about the requirements for this job?

____

Where did you get this information?____________________________

List below your actual job experiences.

PERSONAL DATA SHEET FOR CVAE

INSTRUCTIONS: Read each statement carefully and respond by underlining or circling the appropriate answer, or fill in the blank.

1. I live with my: (a)mother and father (b)mother (c)father (d)a relative________________ (e)other_________________________. (relationship)
   (specify)
2. I have _____ sisters and _____brothers who live at home.
3. My mother finished the_______grade in school.
4. My father finished the_______grade in school.
5. My mother is employed by______________________________
   (Name of the company)
6. My father is employed by______________________________.
   (Name of the company)
7. My parents or guardian have told me how important it is for me to finish school. Yes_______No_______
8. Last summer during my vacation from school I took a trip to ____.
9. I come to school because I want to come. Yes_____No_____
10. I have a sister or a brother who has graduated from or is now attending a college. Yes_______No_______
11. Many mornings I wake up and do not feel like coming to school, but I come anyway. Yes_______No_______
12. I plan to attend a college and become______________________.
13. I think that 12 years of school is too much. I learned all that I need to know by the time I finished the_________ grade. I wish I could have graduated then.
14. My family live on_______________Street or Avenue in Macon.
15. We have lived there for ________years.
16. I have always lived in Macon. Yes_______No_______
17. I could quit school and find a job if I really wanted to. Yes_______No_______

18. If I could, I would move away from home and live alone. Yes______No______

19. My mother makes approximately______dollars per week, month.

20. My father makes approximately______dollars per week, month.

21. Some members of my family receive some assistance from social security, welfare or some other agency.Yes___No____

22. My younger sisters and brothers pattern their lives after mine, and I must finish school to set a good example for them. Yes______No______

23. If I could, I would be like________________________________.
(person's name)

24. When I finish school I will take great pride in having a high school diploma, for it will be the first one in my family. Yes______No______

25. I get no pressure from anyone;I come to school because I like to come. Yes_____No_____

26. I would like to transfer to Dudley Hughes because I hear the teachers are more understanding. Yes_____No_____

27. If I could, I would quit day school and finish the necessary courses in night school. Yes_____No_____

28. I would like to take the GED Test and if I pass, be through with school. Yes_____No_____

29. If one of my brothers or sisters wanted to quit school, I would encourage it______ discourage it______.

30. I am glad that we have public schools and a compulsory attendance law. Yes_____No_____

PERSONAL DATA SHEET ON FAMILY BACKGROUND

Does the child have any relatives who have or have had trouble hearing?_____ seeing?_____ talking?_____ walking?_____

Name of child's doctor_______________________________

When did the child last see the doctor?_______________

For what reason?____________________________________

Does he/she get physical check-ups?___ How often? ________

SOCIO-ENVIRONMENTAL DATA

PARENTS:	Mother	Father
Name		
Address		
Birthdate		
Birthplace		
Occupation		

Marital status (PLEASE check one) Living together____
Separated____ Divorced____ Remarried____.

Education (Please circle the last grade completed.)

(mother)	(father)
1 2 3 4 5 6 7 8 9 10 11 12 C 1 2 3 4	1 2 3 4 5 6 7 8 9 10 11 12 C 1 2 3 4

Special interests outside vocation:

(mother)	(father)

In what type of dwelling does the family reside? (Please check one).
Apartment_____Single family dwelling_____Other_____

Number of rooms (Please circle one.) 1 2 3 4 5 6 7 8 9 more

What newspapers are taken regularly in the home?__________

______________________________Magazines?__________________

______________________About how many books are in the home?

____

			Difficulty in Sch.W/			
Names of brothers & sisters	Ages	Grades	Read.	Spch.	Hear.	None

Are there other adults in the home?__________________________

BEHAVIORAL DATA

What is the child's attitude toward school? Likes to go?______

Doesn't like to go?_____Doesn't care at all?_____Changeable?____

Does the child complete homework assignments regularly?________

Sometimes?_______Seldom?_______

Does he complete homework by himself?_____With help?_____

Does the child have duties or responsibilities at home?________

Does the child perform these duties regularly?_______________

Sometimes?_________Seldom?_________

How well does the child get along with parents and other adults?

____

Does the child get along well with his sisters & brothers?_____

_______________His playmates?______________

With whom does the child like to associate? (Check as many as necessary.)

Children of his own age_______ Parents_______

Older children_______________ Other adults_______

Younger children_____________ Prefers to be alone_______

With whom does the child spend much of his spare time?_________

____

Does the child like to read at home for fun? Regularly?_______

Sometimes?__________ Never?_________

What are the child's favorite amusements and games?____________

____

Can the child work or play at one task for long periods of time?

____________As a rule?______Sometimes?_____Seldom?_______

Does the child have bad dreams or nightmares?_______Any fears (such as) of dogs?_____of the dark?_____other?_____

Is the child usually happy?_____fussy?_____angry?_____tearful?

_____content?_____a dreamer?_____

Has the child traveled?______Where?___________________________

EDUCATIONAL HISTORY OF THE CHILD

Did the child attend nursery school?_____Where?________________

___________________Years?______________

Did the child attend kindergarten?_____Where?__________________

______________ At what age?________

Age of entering first grade________Number of years in school___

Has the child ever repeated a grade?______If yes, indicate the grades and give the reasons for retention.________________

____

Has the child ever skipped any grades?_______Explain___________

____

List schools attended by the child and reasons for changes:
(Give dates)

The Child's Reading Problems: Use the remainder of this sheet to discuss and explain the child's reading problem as you see it. Feel free to list possible causes or factors contributing to this difficulty. Think seriously of family and school situations, the child's relationship with siblings, other children, and sleeping habits. This is a confidential report and you may add another sheet to completely explain all matters which might help the teacher to understand the child's problem as fully as possible.

Name of person supplying this information______________________
Address____
Telephone__________________________________
Date of first conference with Coordinator______________________
Diagnosis to begin____

PERSONAL HISTORY FORM

The purpose of this blank is to bring together essential information about you, so that you may make efficient use of your interview wtth us. The information that you give in the following pages is a very useful addition to any tests you may take and will aid you in making more use of the test results.

Final responsibility for decisions and plans always rests with the person being counseled. However, discussion of your problems with a counselor, coupled with such facts about your abilities, personality, and interests as can be gained by psychological tests and techniques may enable you to make your decisions and plans more wisely than you could make them unaided. It is not to be expected that all problems will be solved in a single interview. Adjustment in and after school is a continuous process because of the development and experiences of the individual, and because of changes in external circumstances.

A clear picture of you as an individual can be obtained only if you answer the questions as frankly and completely as possible. Yet, you do not have to answer any questions you do not wish to answer. It is also necessary that you answer the tests you may take as carefully as you can, according to the instructions on each test. <u>All the information is treated in a professional manner</u>.

Name____ Sex__________
Last First Middle

Present Address________________________________ Phone__________

Age____Date of Birth__________________Place of Birth__________

Religious Preference: Catholic___Protestant___Jewish_____
None_____Other_____

Marital Status: Single___Married___Divorced___Widowed___
Separated___

If Married: No. of Children____Age of Oldest Child_____
Youngest_____

Father living: Yes____No____Mother living: Yes____No____

Check any of the following which are applicable: Parents still married____Parents divorced____Parents separated____ Father remarried____Mother remarried____

If Father not living: Name and relationship of guardian_______
____

Father's Name ______________________________ Father's Age ______

Father's Home Address ______________________________________

Father's or Guardian's Business or Occupation ________________

Nature of Father's or Guardian's Work ________________________

____

Mother's Present Occupation ____________________ Occupation

Before Marriage ____________________________ Mother's Age ______

Father's Birthplace ____

Mother's Birthplace ____

Father's Education ______________________________

Mother's Education ______________________________

Brothers and Sisters (List oldest to youngest including yourself).

	Names	Sex (M orF)	Age	Education (Highest grade reached)	Married (Yes or No)	Occupation (If unemployed, give usual occup. or training.)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8						

Type of Course Taken in High School ________________ __________

Subject Liked Most ______________ Subject Liked Least ____________

Colleges or special schools attended (including present attendance) and also including special training or private instruction in art, music, stenography, etc.)

NAME OF SCHOOL OR COLLEGE	DATE ATTENDED	COURSES TAKEN

You will find listed below several kinds of leisure time activities. Draw a circle around each of the activities in which you engage frequently. Include both the things you liked to do in high school and the things you like to do now. Add any activities in each group that do not appear on the list.

I. Individual activities--either organized or unorganized

A. Tennis, golf, fishing, hunting, hiking, riding, swimming, ping-pong, boxing, handball, skating, bicycling, bowling, etc. ____________

B. Movies, billiards, pool, listening to radio, stamp collecting, auto riding, woodworking, cooking, modeling, photography, other hobbies, (specify) ____________

____

C. Reading, theatre, art museums, concerts, dance recitals, lectures, etc. ____________

II. Group Activities--either organized or unorganized

A. All team sports such as: football, baseball, basketball, volleyball, hockey,etc. ____________

B. Dancing, "dates," bridge, poker, picnics ____________

C. Dramatic clubs or organizations, music clubs or organizations, discussion groups, debating teams or societies, political clubs or organizations, literary clubs or organizations, etc. ____________

D. (Were you, or are you, an active member of any of these organizations?) Y.M.C.A. or Y.W.C.A., Boy Scouts or Girl Scouts, DeMoley ____________

E. Church attendance, Sunday School attendance, Sunday School teaching, participation in young people's group of some church, sing in church choir, etc. ____________

____

What types of books or articles interest you? (Fiction, biography, scientific, etc.) ____________

____

What magazines do you read most frequently? ____________

____

How many hours of study do you put in during the week (on the average)?_____________________

Are you engaged in any outside work while attending school? _____

If so, what is the nature of this work?_____________________

How much time does it take each week?_____________________

Who is your employer?_____________________

Why are you planning to attend college? (check as many as necessary or explain below).

_____Do not plan to attend
_____To get a liberal education
_____To prepare for a vocation
_____For the prestige of a college degree
_____To be with old school friends
_____To make friends and helpful connections
_____For social enjoyment of "college life"
_____Without a college degree (or training) there is less chance of getting a job
_____To get a general education
_____To please parents, friends, family tradition
_____To learn more of certain subjects
_____It was the "thing to do"
_____Foregoing conclusion--I never questioned "Why"
_____Will enable me to make more money

Explanation:_____________________

____

What other type of taaining have you considered besides a college education?_____________________

How does your family feel about college work? (Check one).

_____Doesn't care what you do.
_____Opposed to your going to college.
_____Wants you to go to college.

Comments_____________________

Plans for your financial support in college. (Check one).

_____Entirely supported by family
_____Part-time work will be necessary
_____About how many hours a week?
_____Total self-support will be necessary
_____How many hours a week?
_____G.I. Bill _____State aid
_____Scholarship _____Vets., Rehab., Training
_____Other

****

List in chronological order all your civilian work or employment experiences to date (including part-time or summer jobs).

FIRM	FROM	TO	NATURE OF WORK	SALARY
	(Give month & Year)			(Per month)

Which of these jobs did you like best? ______________________

Why? ______________________

List in order of preference five occupations in which you would like to earn your living. Do not consider your abilities or job opportunities in making this list. Just consider whether or not you would be happy in the work.

	OCCUPATION	REASONS FOR INTEREST IN THE OCCUPATION
1.		
2.		
3.		
4.		
5.		

If you were free of all restrictions(if you could do as you wish), what would you be doing 10 or 15 years from now? ______________________

____

____

It is possible to make a rough classification of occupations in terms of your general interests and abilities. In the following list, indicate in order of preference, (1, 2, and 3) the three groups in which you believe you would best fit.

_____Occupations involving business contact with people, such as the various fields of selling, promotional work, politics, etc.

_____Occupations involving business detail work, such as accountant, business statistician, cashier, banker, stenographer, and officer clerical worker.

_____Occupations involving social service activities such Y.W.C.A. worker, Boy Scouts executive, personnel worker, social case worker, teacher welfare worker.

_____Occupations involving technical or scientific work, such as engineer, chemist, surgeon, architect, research worker, inventor, physicist, toolmaker, etc.

_____Occupations requiring special artistic abilities, such as musician, actor, artist, interior decorator, designer, etc.

_____Occupations involving verbal or linguistic work, such as lawyer, newspaperman, author, advertising man, professor, librarian, etc.

_____Occupations involving executive responsibilities such as director, office manager, foreman, etc.

****

What is your present vocational choice?_________________________

What other possibilities have you considered?___________________

____

When did you make your present choice?(Give year.)______________

Why did you make this choice?(Check the reason.)

___Family suggestion or tradition
___Friend's or teacher's advice
___The vocation of someone you admire or respect
___Suggested by study in school
___Suggested by study in college
___Choice made on my own responsibility
___A long personal interest in work
___It is not profitable financially
___It is best suited to my abilities
___Chosen as being most interesting intellectually

How certain are you that this occupation you have specified is the one you really want to prepare for? Very certain and satisfied_____ Uncertain_____ Very questionable_____

How much information have you about the requirements of the vocation you are choosing? None_____ Some_____Extensive amount_____

What vocation do (or did) your parents want you to follow?______
________________Why?____

We are interested in determining why you have considered your present occupational choice. Below write all the things that have happened to you which you think might have influenced your vocational interests. If you need more room, use the other side of this paper.____

____

____

____

____

PERSONAL CHARACTERISTICS

Read the qualities listed below, then indicate the degree to the right which, you believe, best describes you by using the number of your present school grade. For instance, if you are now in the eighth grade and believe you are cooperative always, place eight (8) under Always to the right of "Cooperative."

I believe I am:	Always	Often	Seldom	Never
Cooperative				
Dependable.				
Industrious				
Punctual.				
Honest.				
Sincere				
Loyal				
Unselfish				
Self-controlled				
Emotionally mature. . . .				
Cheerful.				
Poised.				
Patient				
Friendly.				

I believe I am in general, in my	Excellent	Good	Fair	Poor
Grooming				
Posture.				
Health				
Manners.				
Conversational ability . . .				
Concern for others				
Seriousness of purpose . . .				
Academic ability				
Academic achievement				

STUDENT PROBLEM CHECKLIST

Everyone faces problems throughout his life. Some of these problems cannot be solved without help. Many times they are very easily solved. At other times they are solved only after much effort. Below a list of problems with which young people are often concerned is found. After those problems you have not been able to solve adequately, place a check (✓). After those problems which you would like to discuss with a counselor, place a double check (✓✓). These will help us to be of greater assistance to you.

1. I usually feel inferior to my associates................ ____
2. I have been unable to determine how much time I should study................ ____
3. I have too few social contacts................ ____
4. I have difficulty in making friends................ ____
5. I do not know how to obtain the money I need................ ____
6. I have been unable to determine what I am best able to do ____
7. I do not know how to take good lecture notes................ ____
8. I do not get along well with my parents................ ____
9. I often have difficulty in keeping my friends................ ____
10. I am unable to determine what I would like to do................ ____
11. I have not obtained parental approval of my vocational plans................ ____
12. I do not have enough to talk about in company................ ____
13. I receive inadequate financial help from my family................ ____
14. I do not know how to outline textbook assignments................ ____
15. I am unable to get along with my brothers/sisters................ ____
16. I am not interested in my studies................ ____
17. I do not have enough information about job opportunities and duties................ ____
18. I am frequently embarrassed when with others................ ____
19. I usually do not enjoy being with members of the opposite sex................ ____
20. I am unable to do my work well because of too many social activities................ ____
21. I usually cannot read fast enough to cover all of my assignments................ ____
22. I usually have difficulty understanding what I read................ ____
23. I do not know what the most appropriate training is for my chosen career................ ____
24. I do not know if an education is worthwhile................ ____
25. I feel guilty about something I have or have not done................ ____
26. I have so much outside work to do that I am neglecting my school work................ ____
27. I have trouble making myself study................ ____
28. I lack self-confidence................ ____
29. I am dissatisfied with my state of health................ ____
30. I do not know how to improve my personal appearance................ ____
31. I do not know how to break certain habits I have................ ____

Other problems(use back of sheet for extra space) ____________________

Have you any physical disabilities? (Describe.) ____________________

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STUDENT OPINION SURVEY

Please check your answers to the following questions. Answer all questions to the best of your ability. Please do not sign this questionnaire.

1. What grade are you in? 10_____ 11_____ 12_____

2. Are you male_____ or female_____?

3. Are you in a vocational_____ or academic_____ curriculum? I don't know_____.

4. How old are you? 14_____ 15_____ 16_____ 17_____ 18_____ over 18_

5. Do you plan to finish high school? Yes_____ No_____

6. After high school what do you plan to do? 1) Go to work_____ 2) Go to college_____ 3) Vocational tech school_____ 4) Servic_____ 5) Other(please list) ____

____

7. Do you know what type of career you plan to follow after you finish school? Yes_____ No_____

8. If the answer to the above question is yes, please list the career you plan. ____

9. Did your father finish high school? Yes_____ No_____

10. Do your parents say they want you to fihish high school? Yes_____ No_____ No opinion_____

11. Do you think your parents really want you to finish high school? Yes_____ No_____

12. Do your parents make you come to school regularly? Yes_____ No_____

13. Do you live with your parents? Yes_____ No_____

14. Do you feel like your parents are too strict on you? Yes_____ No_____

15. Do you drive to school? Yes_____ No_____

16. Do you honestly feel that you enjoy coming to school? Yes_____ No_____

17. Approximately how many days of school do you miss each year? 0_____ 10_____ 10-20_____ 20-30_____ over 30_____

18. Do you feel that the physical appearance including cleanliness of a school building affects whether or not people want to come to school? Yes_____ No_____

19. In what way?____

20. Do you feel that school administration causes attendance problems among students? Yes_____ No_____

21. In what way?____

22. Approximately what percent of your absences are unexcused?
____

23. Do you feel school should have an open campus? Yes____ No____

24. Should schools allow more time for lunch? Yes____ No____

25. Should our school offer more courses? Yes_____ No_____

26. List the courses which should be added.______________________
____

27. List the courses which should be dropped.____________________
____

28. Do you feel teachers have a genuine interest in the students' attendance? Yes_____ No_____

29. Do you feel that schools should offer more vocational courses? Yes_____ No_____

30. Have you ever been enrolled in a vocational course or program? Yes_____ No_____

31. Do you feel courses you are taking now will be beneficial to you when you graduate? Yes_____ No_____

32. List those courses which you feel will be of least benefit.
____

33. Do you feel that people would attend school more regularly if they felt their courses were of benefit to them in beginning employment after high school? Yes_____ No_____

34. List courses you feel will be most beneficial after graduation.
____

35. Do you feel that vocational courses are helpful in obtaining jobs after high school? Yes____ No____

36. Do you think people would attend school more regularly if there were more vocational classes? Yes_____No_____

37. Are you familiar with vocational work-study programs? Yes_____No_____

38. Would you like an opportunity to participate in such a program? Yes_____No_____

39. Do you think people would attend school more regularly if they could leave school after half-a-day to receive training at a wage-earning job? Yes_____No_____

40. Do you think this questionnaire was a good idea? Yes_____No_____ Why?____

____

EXPLANATION OF THE SCORING OF THE WORK-STUDY QUESTIONNAIRE

Letters or symbols	Explanation
Pos or P	Positive attitude toward school
Neg or N	Negative attitude toward school
H-p	If the subject circled a high number, the response is positive.
H-n	If the subject circled a high number, the response is negative.
L-p	If the subject circled a low number, the response is positive.
L-n	If the subject circled a low number, the response is negative.
NO	The subject circled the three which indicates that he had no opinion.
NR	The subject did not circle any number; therefore there is no response.
% (percentage)	Denotes what percent of the class responded in the same manner, either positively or negatively.

****

QUESTIONNAIRE FOR THE CVAE WORK-STUDY PROGRAM

INSTRUCTIONS: Please indicate your answer choice by circling one of the numbers to the right of each statement. Larger numbers indicate stronger opinions. Three indicates that you have no opinion at all. For example, if you strongly agree with a statement circle the number 5. If you strongly disagree with a statement circle the number 1.

1. School is a meaningful experience for me. 1 2 3 4 5
2. I am learning a great many things. 1 2 3 4 5
3. The things that I am learning will enable me to earn a livelihood. 1 2 3 4 5
4. I do well in all my endeavors if they have no connection with school. 1 2 3 4 5
5. Adults who are connected with the school are always 1 2 3 4 5

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6. I do not mind people telling me what to do if they have no connection with school. 1 2 3 4 5

7. I hate school because it serves no useful purpose in my life. 1 2 3 4 5

8. Physical education, band, or study hall time is necessary and useful to me. 1 2 3 4 5

9. An afternoon job would keep me from doing well in school. 1 2 3 4 5

10. If allowed to work, I could secure my own job. 1 2 3 4 5

11. I could do better in school if the experiences were more meaningful. 1 2 3 4 5

12. Money earned on an afternoon job would enable me to have all of the necessary school supplies and to eat lunch at school. 1 2 3 4 5

13. I would agree to have my work graded, and to have this grade made a part of my total school record. 1 2 3 4 5

14. The work coordinator from my school should approve my place of employment and my employer. 1 2 3 4 5

15. If I do not like my first job, I should be allowed to change as often as I like until I find a job that I like. 1 2 3 4 5

16. Without regard to future usefulness of work experience, I would work where I make the most money. 1 2 3 4 5

17. I am disillusioned with school because I am learning nothing. 1 2 3 4 5

18. I could find a job if I tried harder. 1 2 3 4 5

19. I make failing grades in some of my classes because the teachers do not like me. 1 2 3 4 5

20. My school guidance counselor is understanding and has helped me with my problems. 1 2 3 4 5

21. It is silly for the school to have such tight restrictions on all students. 1 2 3 4 5

22. The teachers, as a group, are understanding and helpful to me. 1 2 3 4 5

23. If school taught me what I need to know to earn a livelihood, I would have a better attitude. 1 2 3 4 5

24. I dislike school because many teachers try to tell me what to do. They do not try to understand me. 1 2 3 4

25. We should have more privileges, even if we do not do exactly what we are told to do. 1 2 3 4 5

26. Even if I do good work, many of my teachers will not give me credit. 1 2 3 4 5

27. I have considered dropping out of school to get a job. 1 2 3 4 5

28. Satisfactory work experience could be useful to me later. 1 2 3 4 5

29. If I had an income, things would be easier on my parents. 1 2 3 4 5

30. I will agree to have my schedule rearranged so that all of my classes are in the morning. 1 2 3 4 5

31. If I fail to maintain satisfactory grades, I will resign from my job. 1 2 3 4 5

32. The school should find a job for me. 1 2 3 4 5

33. If I get a job, there is a greater possibility of my staying in school. 1 2 3 4 5

34. My parents know about the CVAE program and approve of my participation. 1 2 3 4 5

35. My relationships with my friends would be adversely affected if I got a job. 1 2 3 4 5

36. School would be easier for me if I could attend the necessary classes and then go home or to work. 1 2 3 4 5

37. I could discipline myself if classes at school were more relevant. 1 2 3 4 5

38. I feel that the school personnel are interested in me and are trying to help me. 1 2 3 4 5

39. My peers come down pretty hard on me when I fail to do my best in school. 1 2 3 4 5

40. The physical activity that I get away from school is sufficient. 1 2 3 4 5

COORDINATOR'S FORMS

OUTLINE FOR A CASE STUDY
COORDINATED VOCATIONAL ACADEMIC EDUCATION

Case Study for ______________________________

IDENTIFYING INFORMATION

FAMILY BACKGROUND

DEVELOPMENTAL HISTORY

EDUCATIONAL EXPERIENCES

PSYCHOLOGICAL TEST DATA

Name of Test	Norm Group	Raw Score	Percentile	Date Tested

SOCIAL RELATIONSHIPS

VOCATIONAL PLANS

DIAGNOSIS

PROGNOSIS

(Use more space if needed.)

TEAM-TEACHER'S RATING SHEET

Dear Teacher:

Please answer the following nine (9) questions regarding ______________________ and return to my mail box today. Your kind help will be tremendously appreciated and will help me evaluate the impact of our C.V.A.E. program.

1) Subject - ______________________________

2) Is this student currently making satisfactory academic progress in your class? (yes or no)

3) Has this student's rate of achievement over the past quarter been stable, increasing or decreasing?

4) What is the student's current grade?

5) Does this student's behavior detract from your learning setting? (yes or no)

6) Regarding question five, is this an improvement, the same as, or regression from past behavior?

7) Would you rate this student's attitude toward your learning situation as poor, fair, good, or superior?

8) Regarding question seven, is this an improvement on, the same as, or regression from past attitudes?

9) If you like, comment freely here regarding any characteristic of this student.

C.V.A.E. Coordinator

LETTER TO OBTAIN STUDENT'S BIRTH CERTIFICATE

State Department of Health
Bureau of Vital Statistics
Atlanta, Georgia

Dear Sirs:

I would greatly appreciate your helping me obtain my birth certificate.

My name is________________ ____________________________

I was born (date)______________________________________

Place____

_____________ ____

My mother's name is____________________________________

My father's name is____________________________________

Enclosed is $1.00 to cover the costs.

Thank you,

____

____

____

____

BIBLIOGRAPHY

PUBLISHER	ADDRESS	PUBLICATION	AUTHOR
Continental Press, Inc.	Elizabethtown, Pa. 17022	PRE-PRINTED DUPLICATING MASTERS	
		Healthier Living (Book 1)	
		Healthier Living (Book 2)	
		You Are a Teen-Ager	
		Beginning High School	
		You Are Growing Up	
Follett Publishing Company	1010 W. Washington Blvd. Chicago, Illinois 60607	GUIDANCE SERIES	
		Turner Career Guidance Series	
		Turner-Livingston Reading Series	
		Accent/Personality Series	
		Accent/World of Work Series	
		VOCATIONAL SERIES	
		Vocational Reading Series	
		Accent/Jobs & Job Models	
		Understanding the Automobile	
		CONSUMER EDUCATION SERIES	
		Accent/Consumer Education	
		Accent/Family Finances	
		WORLD HISTORY STUDY LESSONS (Units 1-9) & Comprehension Checks	
		AMERICAN HISTORY STUDY LESSONS (Units 1-9)	
		STUDY LESSONS IN CIVICS (6 units)	
Gregg Division, McGraw-Hill	Hightstown, New Jersey 08520	ABOUT HER	Margaret Andre
		ABOUT HIM	" "
		THE JOB YOU WANT	" "
		CHARM FOR MISS TEEN	Whitcomb and Cochran

SECTION X CVAE OCCUPATIONAL GUIDANCE MATERIALS

PUBLISHER	ADDRESS	PUBLICATION	AUTHOR
Frank E. Richards Publishing Co.	324 First Street	FINDING OURSELVES	Dr. Eileen Co
	Liverpool, N. Y. 13088	FOUNDATIONS OF CITIZENSHIP (1)	Bernard Shawn
		FOUNDATIONS OF CITIZENSHIP (2)	" "
		GETTING & HOLDING A JOB	Bernard Schne
		GETTING READY FOR PAY DAY (1)	Hudson & Weave
		GETTING READY FOR PAY DAY (2)	" "
		GETTING READY FOR PAY DAY (3)	" "
		I WANT A JOB	" "
		MANNERS	Helen Pravo
		101 PRACTICAL ACTIVITIES	Alpha Brown
		TEENAGERS AT WORK	Yvette Dogin
		USING MONEY SERIES (1)	John D. Wool
		USING MONEY SERIES (2)	" "
		USING MONEY SERIES (3)	" "
		USING MONEY SERIES (4)	" "
		WEATHER AND US (1)	Dr. Eileen Co
		WEATHER AND US (2)	" "
		WHAT IS ELECTRICITY?	" m "
		WORKING WITH WOOD	Herbert Horow
		YOU	Clare Trenkle
		YOU (WORKBOOK)	" "
Scholastic Magazine	50 W. 44th Street	SCHOLASTIC SCOPE	
	New York, N. Y. 60611		
Science Research Associates, Inc.	259 E. Erie Street	OCCUPATIONAL EXPLORATION KIT	
	Chicago, Illinois [illegible]		
		HOW TO GET THE JOB!	Dresse & Mitch
		STUDY YOUR WAY THROUGH SCHOOL	GERKEN, C.
		CHOOSING YOUR CAREER	J. A. Humphrey
		GETTING ALONG WITH OTHERS	H. Schacter
		YOUR PERSONALITY & YOUR JOB	D. Sinick
South-Western Publishing Co.	1955 Montreal Road	YOU AND YOUR JOB	Blackledge &
	Tucker, Georgia 30084	HOW TO FIND & APPLY FOR A JOB	Kelly & Walter
		GENERAL BUSINESS	Crabbe et al.
		CONSUMER ECONOMIC PROBLEMS	Wilson & Eysta
		BUYING GUIDES FOR ABOVE TEXT	" "

SECTION I

CVAE OCCUPATIONAL GUIDANCE MATERIALS

PUBLISHER	ADDRESS	PUBLICATION	AUTHOR
Teacher's Practical Press, Inc.	47 Frank Street Valley Stream, N. Y.	CREATIVE TECHNIQUES FOR TEACHING THE SLOW LEARNER	Howitt
Webster Division, McGraw-Hill	Manchester Road Manchester, Missouri 63011	WORLD OF WORK KIT	
Instructional Materials Lab Dep't. of Practical Arts and Vocational-Technical Education	University of Missouri Columbia, Missouri	ORIENTATION TO EMPLOYMENT (Designed for Students Enrolled in Cooperation Education)	
in cooperation with Vocational Education Division State Department of Education	Jefferson City Missouri 65101	GENERAL MECHANICS RADIO & TV SERVICING VARIETY STORE - MERCHANDISING AUTO BODY REPAIR MEDICAL ASSISTANT CLEANING & PRESSING MACHINE SHOP APPLIED ELECTRICITY DENTAL ASSISTANT SERVICING ELECTRICAL APPLIANCES UPHOLSTERY JEWELRY MAKING & REPAIR PAINTING & DECORATING [illegible] DESIGN DRAFTING CARPENTRY FOOD SERVICE SHEET METAL HARDWARE RETAILING PRINTING ELECTRICAL CONSTRUCTION SHOE RETAILING MEAT CUTTING SALESMANSH BUILDING TRADES FOOD SERVICE DIESEL MECHANICS OFFSET LITHOGRAPHY NURSING ASSISTANT MERCHANDISING	

CVAE OCCUPATIONAL GUIDANCE MATERIALS

PUBLISHER	ADDRESS	PUBLICATION	AUTHOR
Univ. of Missouri (Con't.)		MEDICAL RECORD TECHNOLOGY	
		FLORISTRY	
Instructional Materials Development Vocational Education Division of Extension	The University of Texas Austin, Texas 78712	BIBLIOGRAPHIES (1968)	
		MOTORCYCLE REPAIRMAN STUDY GUIDE	
		APPLIANCE SERVICING STUDY GUIDE	
		BUILDING MAINTENANCE STUDY GUIDE	
		COMMERCIAL ARTIST STUDY GUIDE	
		PLUMBER STUDY GUIDE	
		SMALL ENGINES & OUTBOARD MOTORS STUDY GUIDE	
		SUGGESTED PLANS FOR GROUP DISCUSSIONS	
		STUDENT'S PERSONAL ADJUSTMENT TO WORK	
		TYPEWRITER REPAIR STUDY GUIDE	
		WELDING STUDY GUIDE	
		HUMAN RELATIONS IN HOSPITALS	
		INTRODUCTION TO PROGRAMMED INSTRUCTION	
		MOTIVATION & RESISTANCE TO CHANGE	
		PREPARATION OF OCCUPATIONAL INSTRUCTORS	
		WORK SIMPLIFICATION, INFORMATION MANUAL	
		COMMUNITY SURVEYS FOR EDUCATIONAL PURPOSES	
		INSTRUCTIONAL AIDS CABINET FOR CLASSROOM & RELATED SUBJECTS CENTERS	
		STANDARDS & FORMATS FOR INDUSTRIAL INSTRUCTIONAL MATERIALS	
		X-RAY TECHNICIAN STUDY GUIDE	
		NURSE AIDE STUDY GUIDE	
		(All Study Guides listed above are accompanied with tests & answer books)	

SECTION II

CVAE COMMUNICATIONS MATERIALS

PUBLISHER	ADDRESS	PUBLICATION	AUTHOR
Continental Press, Inc.	127 Cain Street, NW Atlanta, Georgia 30303	PRE-PRINTED DUPLICATING MASTERS Junior High English, Semester 1 - Grade 8 Junior High English, Semester 2 - Grade 8 Junior High English, Semester 1 - Grade 9 Junior High English, Semester 2 - Grade 9 Junior High Outline Map Mastering the Sentence (Ungraded) Mastering Parts of Speech (Ungraded) Mastering Good Usage (Ungraded) Capitalization & Punctuation (Ungraded)	
Follett Publishing Company	1010 W. Washington Blvd. Chicago, Illinois 60607	INDIVIDUALIZED ENGLISH (Programmed Instruction) COMPLETE SET J (Extra Diagnostic & Mastery Tests, Student Profile & Record Folders, and Answer Sheet Sets may be ordered.)	
Gregg Division McGraw-Hill Book Co., Inc.	Hightstown, New Jersey 08520	YOU SAID IT	Margaret Andrew
Harcourt, Brace & World	Atlanta, Georgia	ENGLISH 2200 (PROGRAMMED) ENGLISH 2200 TEST BOOKLETS	Joseph Blumenth
Reader's Digest Services, Inc.	Pleasantville, N. Y. 10570	READING SKILL BUILDER	Lydia A. Thomas
Scott, Foresman & Co.	Atlanta, Georgia	ACE (Activity Concept English) KIT 301	
South-Western Publishing Co., Inc.	1955 Montreal Road Tucker, Georgia 30084	ENGLISH THE EASY WAY (Workbook)	Schachter

[illegible]

CVAE MATH MATERIALS

PUBLISHER	ADDRESS	PUBLICATION	AUTHOR
Continental Press, Inc.	Elizabethtown, Pa. 17022	PRE-PRINTED DUPLICATING MASTERS	
		A New Look at Decimals	
		A New Look at Percentages	
		A New Look at Common Fractions (Part 1)	
		A New Look at Common Fractions (Part 2)	
		A New Look at Common Fractions (Part 3)	
		Junior High Modern Mathematics (Part 1)	
		Junior High Modern Mathematics (Part 2)	
Frank E. Richards Publishing Co.	324 First Street Liverpool, N. Y. 13088	ARITHMETIC THAT WE NEED	Thomas J. Moone
		LEARNING ABOUT MEASUREMENT	R. J. Bohn & J. D. Wool
		USEFUL ARITHMETIC (Book 1)	Bohn & Wool
		USEFUL ARITHMETIC (Book 2)	John D. Wool
South-Western Publishing Co.	1955 Montreal Road Tucker, Georgia 30084	MATHEMATICS SKILL BUILDER (Workbook)	Gossage & Bri
Webster Division McGraw-Hill Book Company	Manchester Road Manchester, Missouri 63011	BOOK 1: BASIC ADDITION	Marjorie Sulli
		BOOK 2: ADVANCED ADDITION	
		BOOK 3: SUBTRACTION	
		BOOK 4: MULTIPLICATION	
		BOOK 5: DIVISION	
		BOOK 6: FRACTIONS	
		BOOK 7. DECIMALS	
		BOOK 8: MEASUREMENTS	
		PLACEMENT EXAMINATIONS (BOOKS 1-8)	
		WORD PROBLEM BOOKS 1-8	
		BOOK 9: CONSUMER MATH	
		BOOK 10: PERSONAL MATH	
		BOOK 11: MORE PERSONAL MATH	

VT 017 218
COORDINATED VOCATIONAL ACADEMIC EDUCATION
CONTEST MANUAL.

GEORGIA UNIV., ATHENS. DIV. OF VOCATIONAL
EDUCATION.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 71 30P

DESCRIPTORS - *STATE PROGRAMS; *MANUALS;
VOCATIONAL DEVELOPMENT; SECONDARY GRADES;
*VOCATIONAL EDUCATION; *YOUTH CLUBS;
*ACADEMIC EDUCATION; EDUCATIONAL
COORDINATION; GUIDELINES; WORKSHEETS
IDENTIFIERS - EDUCATIONAL AWARENESS; EPDA;
EDUCATIONAL PROFESSIONS DEVELOPMENT ACT

ABSTRACT - THE CLUB ORGANIZATION ACTIVITIES AND THE CONTEST MANUAL WHICH MAKE UP THIS DOCUMENT WERE DEVELOPED FOR GEORGIA'S COORDINATED VOCATIONAL-ACADEMIC EDUCATION CLUBS BY A PROJECT STAFF OF REGIONAL VOCATIONAL EDUCATION COORDINATORS. THE THREE SECTIONS OF THE MANUAL CONTAIN: (1) THE STATE ORGANIZATION, (2) CONTESTS AND AWARDS, AND (3) SUGGESTED GUIDELINES FOR CLUB ACTIVITIES AND PROCEDURES. TEN CONTESTS ARE BRIEFLY OUTLINED, AND SUCH TOPICS AS PARLIAMENTARY PROCEDURES AND ELECTION OF STATE OFFICERS FOR THE CONDUCT OF THE CLUB ACTIVITIES ARE DISCUSSED. (AG)

C V A E

Coordinated Vocational Academic Education

Contest Manual

Prepared by:
CVAE Coordinators
Division of Vocational Education
University of Georgia
Athens, Georgia
July, 1970 - June, 1971

ACKNOWLEDGEMENTS

This VOCA Activities and Contest Manual was prepared by the C.V.A.E. project Staff at the University of Georgia during the summer of 1971.

Funds for duplicating services were made available from the following cooperating agencies:

Division of Vocational Education
Georgia State Department of Education
Atlanta, Georgia

and

Education Professions Development Act, Part F
U.S. Office of Health, Education and Welfare
Washington D.C.

We are indebted to the following individuals for contributing their special talents.

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Mrs. Alicia Hobbs
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Miss Dinah Ely
and
Mrs. Virginia Karnas
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Dr. H.R. Cheshire
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Division of Vocational Education
College of Education
University of Georgia...Athens

V O C A

ACTIVITIES AND CONTEST MANUAL FOR GEORGIA C.V.A.E.---COORDINATED VOCATIONAL ACADEMIC EDUCATION

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C. V. A. E.

COORDINATED VOCATIONAL ACADEMIC EDUCATION

CONSTITUTION

and

BYLAWS

ACKNOWLEDGEMENTS

The CONSTITUTION AND BYLAWS for Georgia VOCA were prepared during the school year of 1970-1971 by Mrs. Corrine G. Thompson and Mrs. Barbara Elmore, CVAE Coordinators in Region V. A committee of coordinators from Region III reviewed the draft copy in March and suggested several changes. In August, at G V A Mr. Ken Reynolds, State Supervisor of CVAE, presented the draft to all CVAE coordinators present. Additional changes were made andfinal editing was accomplished by Mrs. Thompson and the CVAE project staff at the University of Georgia. Funds to assist in duplicating were made available from:

Division of Vocational Education
Georgia State Department of Education
Atlanta, Georgia
and
Education Professions Development Act, Part F
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Division of Vocational Education
College of Education
University of Georgia

CONSTITUTION OF
THE GEORGIA ASSOCIATION OF
COORDINATED VOCATIONAL ACADEMIC EDUCATION CLUBS

ARTICLE I - NAME

The official name of this organization shall be the Vocational Opportunities Clubs of America and may be referred to as the Georgia VOCA Club.

ARTICLE II - PURPOSES

The purposes of this Association are:

To unite in a common bond those students in the State of Georgia who are enrolled in Coordinated Vocational Academic programs.

To provide leadership for the local clubs.

To provide a clearinghouse for information and activities.

To provide recognition and prestige through an association of local clubs.

To develop leadership abilities through participation in educational, vocational, civic, recreational, and social activities.

To foster a deep respect for the DIGNITY OF WORK.

To assist students in establishing realistic vocational goals.

To help students attain a purposeful life.

To create enthusiasm for learning.

To develop the ability of students to plan together, organize, and carry out worthy activities and projects through the use of democratic process.

To create among students, faculty members, patrons of the school and persons in business and industry a sincere interest in and esteem for all vocational education.

To develop patriotism through a knowledge of out Nation's heritage and the practice of DEMOCRACY.

ARTICLE III - ORGANIZATION

Section 1. The Georgia Vocational Opportunities Clubs of America is an association of local clubs of the State of Georgia.

Section 2. The Administration of the Georgia Vocational Opportunities Clubs of America shall be vested in the CVAE Executive Council comprised of State Association officers and the State Advisor. Officers shall be elected for a term of one year.

Section 3. The State CVAE Executive Council will be comprised of: all state officers, the state advisor, and five coordinators, one from each of the five regions. The five coordinators will be elected for one to three years in staggered terms and will be elected by all State CVAE Coordinators at the annual GVA Conference, three for one year and two for two years. The two-year terms will be rotated by regions, beginning with Regions I and II, whose representatives will serve for two years, beginning August 12, 1971.

Section 4. The State Supervisor of CVAE programs shall serve as State Advisor.

Section 5. Charters shall be issued to local clubs by the State CVAE Executive Council of the Georgia Association of Vocational Opportunities Clubs of America.

Section 6. All powers not delegated to the State CVAE Executive Council shall reside within the local clubs.

ARTICLE IV - MEMBERSHIP

Section 1. Membership of the Georgia Association of Vocational Opportunities Clubs of America shall consist of the total eligible members of the chartered local clubs and members shall hold the same membership status as in their respective club on the local level.

Section 2. A membership year shall be from September 1 through August 31 inclusive.

Section 3. Students formerly enrolled in CVAE programs shall be eligible for membership as Associate members with non-voting privileges.

Section 4. Adults or students shall (at the discretion of the local clubs) be eligible for membership as Associate members with non-voting privileges.

ARTICLE V - VOTING DELEGATES

Section 1. The club member shall exercise his franchise through voting delegates at state meetings.

Section 2. Each local club may send one voting delegate for each 15 active members or major fraction thereof to the Annual State Convention.

Section 3. Each delegate is entitled to one vote after his credentials have been presented and approved by the parliamentarian.

ARTICLE VI - OFFICERS

Section 1. The officers of the Georgia Association of Vocational Opportunities Clubs of America shall be the President, Vice-President, Secretary, Treasurer, Reporter, and Parliamentarian.

Section 2. These officers shall be elected by a majority vote of the voting delegates at the annual State Convention.

Section 3. Officers shall serve for a term of one year.

Section 4. One regional representative (student) shall be elected by the voting delegates of each region present at the state convention. He shall serve for a one-year term, be an active member of the Executive Council and preside at regional meetings.

ARTICLE VII - QUALIFICATIONS FOR STATE OFFICE

Section 1. Candidates for a State office shall have:

1. Active membership status
2. Endorsement of their local club and written recommendation of local advisor
3. At least one full school year remaining in a CVAE vocational program

Section 2. All candidates for a State Office must file their candidacy for office with the State Advisor not later than ten days prior to the date of the annual State Convention.

Section 3. No club is eligible to provide the State President for two consecutive years.

Section 4. No state officer shall serve for two consecutive years in any capacity.

ARTICLE VIII - DUES

Section 1. State dues shall be set at 50 cents per member for the school year and shall be payable before November 1.

Section 2. The State Treasurer shall report on or before December 1 of each school year as to which clubs have paid their membership dues in full.

Section 3. No student may participate in any regional or state activity unless he has paid his membership dues and is a member in good standing.

ARTICLE IX - EMBLEM AND COLORS

The emblem of the Georgia Association of Vocational Opportunities Clubs of America shall be as pictured in the handbook, and its colors shall be royal blue and gold.

ARTICLE X - AUDIT

The accounts of the State Treasurer shall be audited each year by an Auditing Committee appointed by the President.

ARTICLE XI - MISCELLANEOUS

Any state-wide issue that arises that is not covered in the Constitution pertaining to a state-wide matter is the responsibility to the State CVAE Executive Council.

ARTICLE XII - AMENDMENTS

Section 1. This Constitution may be amended by a two-thirds vote of the authorized delegates to any annual State Convention.

Section 2. Only such amendments shall be made as are in keeping with the purposes stated in Article II of this Constitution.

Section 3. Any proposed amendment to the Constitution shall be submitted to the State CVAE Executive Council at least six months prior to the State Convention. Those proposed amendments receiving favorable consideration from the State Advisory Council shall be mailed to each local president at least 30 days prior to the State Convention.

BY-LAWS

ARTICLE I - METHOD OF ELECTING OFFICERS

Section 1. Officers shall be elected by secret ballot at the annual State Convention. To be duly elected all officers must receive a simple majority of all votes cast by the delegates. Time shall be allotted for a run-off between the two highest delegates at the annual State Convention, if necessary.

Section 2. In the event that any officer is unable to fulfill his responsibility, the President will appoint the runner-up to serve the remainder of the term. In the event the President cannot assume his responsibility, the Vice-President will assume the role of President.

ARTICLE II - DUTIES OF THE OFFICERS

Section 1. The President. It shall be the duty of the president to preside over all meetings. The president, in collaboration with the State Advisor, shall appoint standing committees and all other committees and may serve as an ex-officio member of these committees.

Section 2. The Vice-President. It shall be the duty of the vice-president to assume the duties of the president in his absence or upon request of the president and to assist the president in other ways as appropriate. The vice-president will be in charge of all student activities and arrangements at the State Convention.

Section 3. The Secretary. The secretary shall perform the duties common to the office such as keeping an accurate record of all meetings. It shall be the duty of the secretary to submit the required reports to the State Office. The secretary shall also handle all correspondence.

Section 4. The Treasurer. The treasurer shall act as guardian of the funds of the organization, collect dues, and give financial reports at designated periods. It shall be the duty of the treasurer to send to the State Office the state dues for each local chapter not later than December 31 and immediately thereafter as new members are endorsed.

Section 5. The Reporter. The reporter shall act as public relations officer for the chapter. He shall see that news stories and photographs are delivered to the various news media. He shall also cooperate with the school officials concerning assembly, radio, and television programs.

Section 6. The Parliamentarian. The club parliamentarian serves as a consultant to the president on procedural matters. An authority on parliamentary procedures is frequently needed, and the parliamentarian is the source of such information. The parliamentarian should have a working knowledge of parliamentary law and the ability to give opinions based upon that law and not biased opinion. He must be a person in whom others have confidence, since he may be called upon to settle controversial issues.

ARTICLE III - DUTIES OF STANDING COMMITTEES

Section 1. The "auditing committee" shall examine the records of the State Vocational Opportunities Clubs of America and shall make a report to the delegate body at the annual business meeting as to the financial status of the organization.

Section 2. The "by-laws committee" shall draw up and present to the CVAE Executive Committee for its consideration such resolutions as may be in order at that time of the annual meetings.

ARTICLE IV - DELEGATE BODY

Section 1. Vote on any controversial issue shall be by roll call of the schools.

ACTIVITIES AND CONTEST MANUAL

GEORGIA ASSOCIATION VOCATIONAL OPPORTUNITIES CLUBS OF AMERICA

Purpose of this Georgia VOCA Activities and Contests Manual is to provide local VOCA Clubs with the information needed to operate their programs successfully. All approved contests, State Convention, Regional Run-Off, report forms, judging procedures, State VOCA Executive Council and club officer information is included in this manual. For more information please contact the State VOCA Club Advisors, Division of Vocational Education, Georgia Department of Education, Atlanta, Georgia.

SECTION I

STATE ORGANIZATION

VOCA CREED

We're CVAE students
One purpose in view,
To strive for the best
In all that we do. . .

To accept responsibibility,
In each daily task,
And look toward the future
By learning from the past. . .

To work together our place to find
Through use of our hands,
Our hearts, and our minds. . .

To realize that success
Is ours to hold,
If, through CVAE, our
Future we mold. . .

PURPOSES OF GEORGIA VOCA

To assist local VOCA Clubs in the growth and development of CVAE.

To further develop a respect for education through academic experiences coordinated with vocational talents.

To promote an understanding, and appreciation for the responsibilities of citizenship, the world of work, and the American way of life.

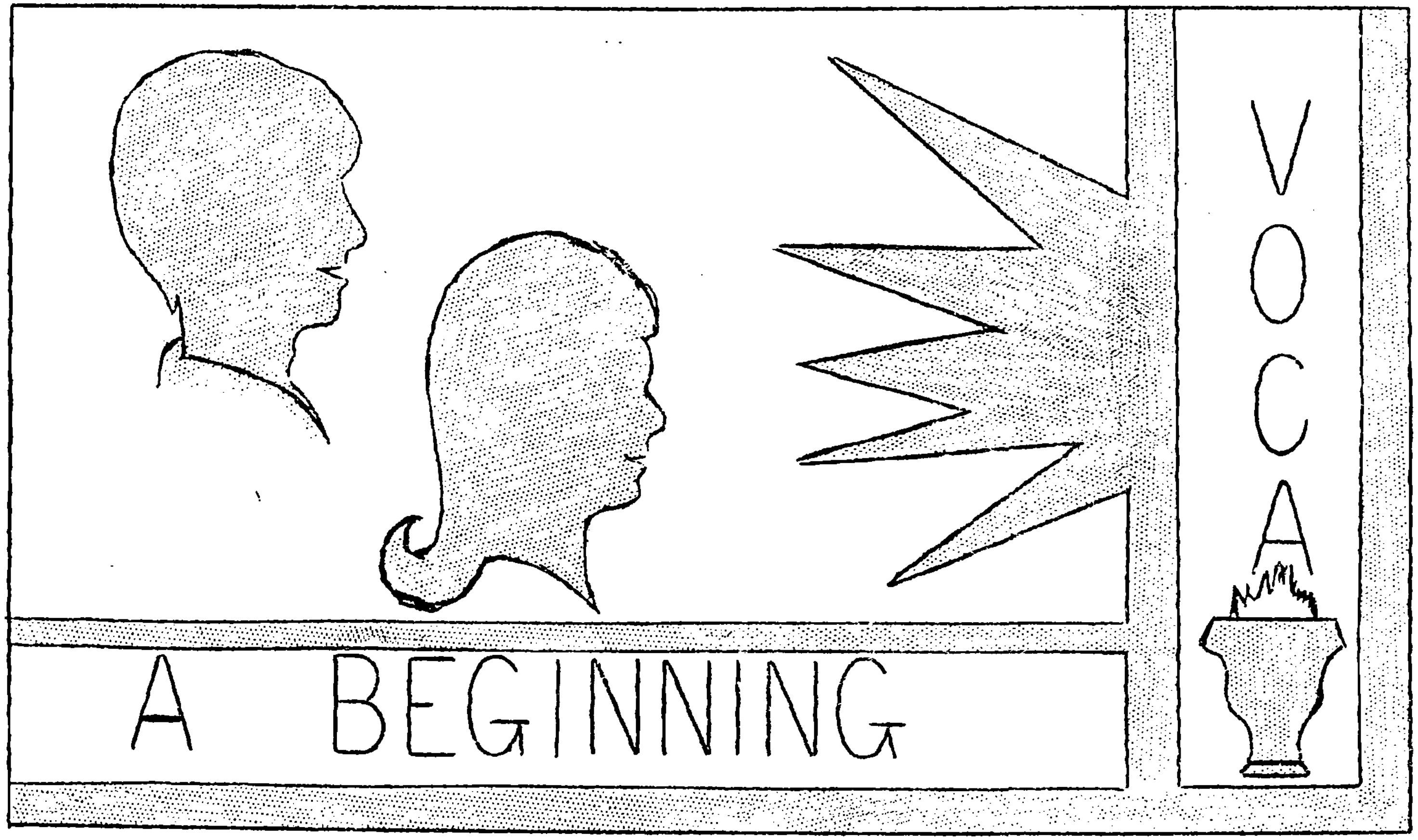
VOCA STATE MOTTO

"A Beginning"

Learning to work,
Working to learn,
Learning to finish
A job well done;
Willing to try
After defeat
To be successful
For a life complete!

VOCA STATE EMBLEM AND COLORS

The State VOCA emblem presents the silhouettes of two students (heads only) looking toward sun rays coming from the letters VOCA. Below the letters are a torch and flame. The emblem should be in club colors of blue and gold. The flame may appear in red.


VOCA
A BEGINNING

VOCA CONSTITUTION AND BYLAWS

The first draft of the Georgia VOCA Club Constitution and Bylaws was written by Mrs. Corrine G. Thompson and Mrs. Barbara Elmore, during the school year of 1970-71. A committee of seven CVAE coordinators reviewed the draft in Athens in March of the same school year. Each coordinator was requested to review the document with his local clubs. During G.V.A. 1971, after another review, the Constitution and the Bylaws were approved by the coordinators. The revised copy was then sent to each school for student evaluation with final approval at the 1972 State VOCA Convention.

STATE VOCA OFFICERS

President

Vice President

Secretary

Treasurer

Parliamentarian

Reporter

STATE VOCA EXECUTIVE COUNCIL

The executive council will consist of:

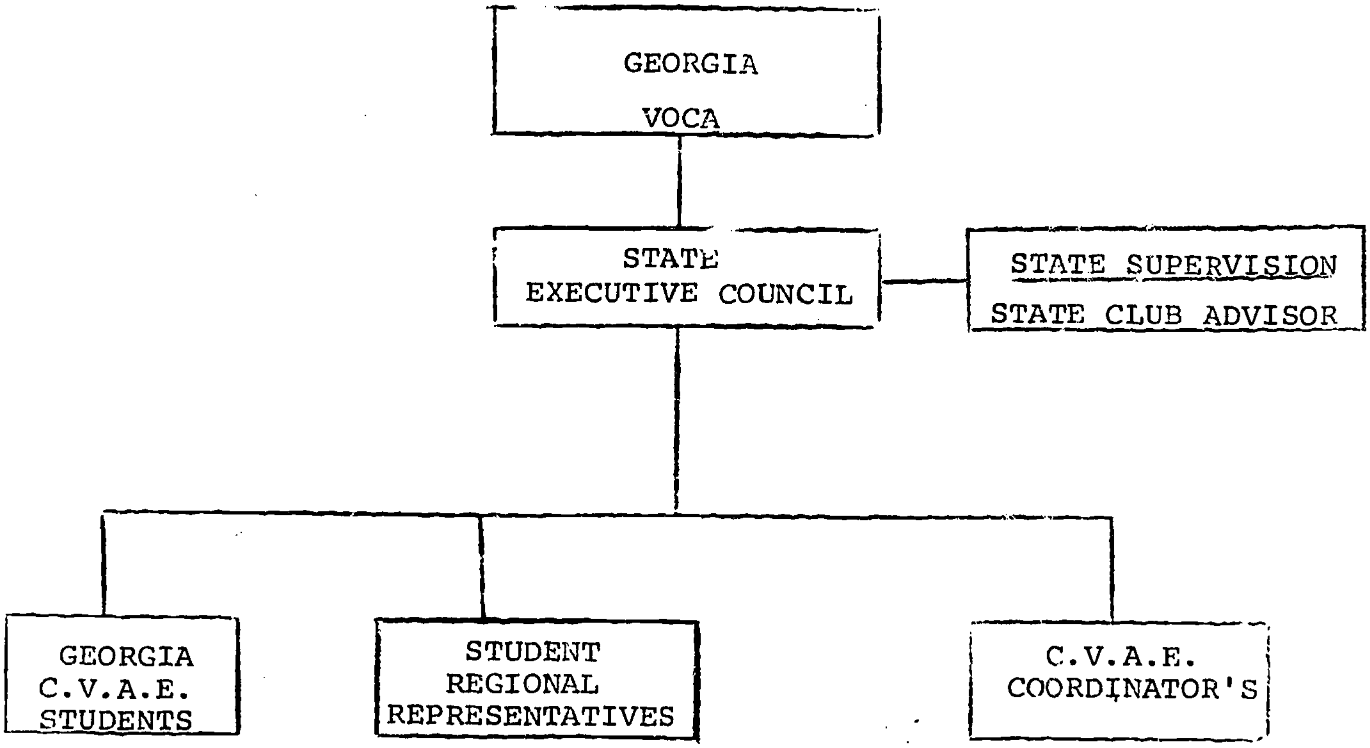
a. The State VOCA officers

b. One Student Regional Director from each of the existing regions

c. The State Club Advisor

d. One coordinator from each region elected by a statewide vote of coordinators

ORGANIZATION OF GEORGIA VOCA



ELECTION OF OFFICERS

(Please refer to Constitution and Bylaws)

STATE:

Elected by voting delegates at the annual State Convention. A nominee must receive a majority. All officers are for one year beginning at the time of the State Convention.

REGIONAL:

Each region in the State may elect one student Regional Representative. The Regional Director is elected at the scheduled Regional meeting during the State Convention.

LOCAL:

It is suggested that local clubs pattern their organization and structure after the State club, but local clubs may have more or less officers.

GEORGIA VOCA DUES

State dues must be paid by November first of each school year. Dues are 50¢ per student for the year. Most State club activities are financed from State dues. These activities include such expenses as are incurred for the Officer's Training Conference, the State Club Executive Council, Regional meetings and the State VOCA Convention. Other expenses are contest awards, trophies, publicity and the expenses of State VOCA officers representing the State club.

The local club advisor should point out to the club--when dues are discussed-- the fact that 100% payment of dues on time gives the club the right to receive bonus points toward the "Club of the Year" award.

Dues should be sent to the State VOCA Club Advisor, Division of Vocational Education, Georgia State Department of Education, Atlanta, Georgia, 30334. Checks or money orders should be made payable to the VOCA Clubs of Georgia.

JUDGING CONTEST

All judges at all levels local, regional and State should be trained by the coordinator-in-charge of the contest. All rules should be reviewed, and each judge should understand rating procedures prior to contest time.

Two judges should be secured for all contests, and in some cases three judges may be desirable.

Rating sheets (shown in this manual) should be used in all contests.

After the judges have selected the top three entries in all contests, point ratings should be disregarded and the final selection should be left to the opinion of the judges. Judges need not be influenced by rating point totals in their selection of winners.

STATE CONVENTION

Each year the "event" of the year should be the State VOCA Convention. When possible, the convention will be held during the months of March or April. All local clubs are encouraged to attend and participate. The State Executive Council will select the site and dates for the convention.

Club of the year entries are only made at the State level, ten days prior to the contention.

REGIONAL COMPETETITION RUN-OFFS MARCH OR APRIL

The state is divided into (5) five regions. Regional Run-Offs should be held the first week in March (if possible) in each of the regions.

Each coordinator must let the host club know the names of the contestants and the contests they will enter, at least 10 school days before the contest is to be held.

The host club will be responsible for judges, contest rooms, and eating accomodations.

Each 1st place winner will be entered in the State competition to be held at the State Convention in March or April of each school year.

SECTION II

CONTESTS AND AWARDS

PURPOSES AND VALUES OF THE CONTEST PROGRAM

Among the values which may accrue are:

1. Greater student interest in school work
2. Enthusiasm through competition
3. Classroom work put to use
4. Recognition of student's best work and success
5. Enphasis placed on participating and doing one's best, but not on winning
6. Fariness, good sportsmanship, and integrity encouraged
7. Student's abilities and interests discovered and developed
8. Greater interest in Regional Run Offs
9. Preparation for State Convention
10. Publicity resulting from the contest is a definite aid for advancement of good public relations.

RECOMMENDATIONS

1. Contest program should be an outgrowth of the instructional program, not an addition to it

2. Teaching for contest purposes rather than educational should be minimized

3. "Winning" aspects should not be over-emphasized

ALL WORK MUST BE STUDENT WORK - - BY THE STUDENT(S) SUBMITTING THE ENTRY OR PARTICIPATING IN THE PARTICULAR CONTEST.

COMPETITIVE CONTESTS: REGIONAL

Each club may have one entry in each of the following contests to be held at the regional level.

1. VOCA Club of the Year
2. Outstanding VOCA Boy of the Year
3. Outstanding VOCA Girl of the Year
4. Job Interview
5. Scrapbook
6. Talent - Performing Arts
7. Talent - Arts and Crafts
8. Voca Club Project - - School and/or Community
9. Career Manual
10. Public Speaking

STATE COMPETITION

The state competition will be held at the state convention, all first place regional winners will be entered.

The city that host's the convention, or the coordinators of that area will be responsible for setting up the contest.

The host coordinators will work with the state supervisor in getting the judges for the state competition.

Club of the Year entries must be submitted to the State Club Advisor 10 days prior to the state convention.

VOCA Convention Trophy: During the State Convention the State Club Advisor will be charged with the selection of the VOCA Convention Trophy. This trophy will be awarded to the club accumulating the most points during state competition. Scoring will be based on

1 point for each contest entered at the State level.

3 points for each third place award.

4 points for each second place award

5 points for each first place award.

CONTEST # 1

VOCA CLUB OF THE YEAR

Club Ratings

The VOCA Club of the Year Trophy is the most coveted of all awards that Georgia VOCA makes each year. The trophy is presented at the Annual State Convention and remains in the possession of the club winning it.

How Clubs are Rated

Clubs are rated on the basis of objective standards which carry point values according to their relative importance. A description of these standards and their point values is included in this section of the manual. It is suggested that they be discussed with all club members for their consideration and planning.

Clubs ranking over 200 are given a rating of Superior. Clubs ranking 150 - 199 are given a rating of Excellent. Clubs ranking 100 - 149 are rated Good.

Rules of VOCA Club of the Year Competition

1. In order to be eligible for VOCA Club of the Year competition, clubs must submit the Rating Sheet ten days prior to the State Convention. The rating Sheet must accompany the Annual Club Report. Each point on the Rating Sheet must be substantiated. (Description of these reports included in another section of this manual.) Reports may be submitted in Scrapbook form or in a notebook.

   Verification on the Club of the Year Rating Form, Items may be covered by secretary's minutes, if desired. If verification is not written up in separate form, the report must be explicit so that judges can easily find the information.

2. A professional judging committee and the State Club Advisor will evaluate all reports and determine all ratings.

3. All awards will be made at the annual State Convention.

STANDARDS FOR SELECTING THE VOCA CLUB OF THE YEAR

1. STANDARDS OF LOCAL MEETING PLACE 9 points

The 9 points are based on 3 points for each of the following: Photos should be submitted.

- a. Creed framed and displayed
- b. Emblem displayed
- c. Permanent minute book kept up to date

2. INITIATION CEREMONY FOR NEW MEMBERS 5 points

Written report or publicity clipping.

3. INSTALLATION CEREMONY FOR LOCAL OFFICERS 5 points

Written report or publicity clipping.

4. PROFESSIONAL CLUB MEETINGS 12 points

a. The 12 points are based on an automatic 3 points per meeting. Credit given only for four meetings.

b. Professional meetings include meetings other than regular business meetings at which time a guest speaker, film or other special feature is planned for the purpose of promoting professional growth. However, when the program of a regular business meeting includes a special feature of the nature described above, in addition to regualr club business, this meeting may be counted for points toward the Club of the Year Award.

c. Written description of each meeting must be submitted. Minutes are acceptable but completeness is important.

5. VOCA PROGRAM DEVELOPMENT OR (ASSEMBLY PROGRAM) 10 points

- a. The 10 points are based on one assembly program per year.
- b. Program must present phase of CVAE or VOCA
- c. Written report must be submitted, including information and materials such as the following:
  1. Name of club, school and community
  2. Type of program
  3. Purpose of program
  4. Details of planning and executing
  5. Number of club members participating and what they did
  6. Printed program, if any
  7. Pictures, if any

8. Local and school publicity
9. Local evaluation of value of program to club members, CVAE program, school and community
10. Other materials or information which will aid the committee in evaluating the program

d. Total points to be allowed for program will be determined by contest committee. Will be rated in terms of value to club members, CVAE program, school and community.

6. PUBLICITY 20 points

a. The 20 points are based on 5 points for each item of publicity appearing in the local or school paper, radio or T.V. Show.
b. All articles must be written by club member.
c. All local articles must appear in print to be valid for points and an actual copy of each article as it appeared in print must be submitted.

7. APPEARANCE BEFORE CIVIC GROUPS 20 points

a. The 20 points are based on an automatic 10 points for each appearance. Credit given only for two.
b. Must be done by club members.
c. May be done by one or more club members and may be any type such as a talk or demonstration.
d. Description of each appearance must be submitted.

8. LOCAL EMPLOYER-EMPLOYEE BANQUET OR FUNCTION 20 points

The 20 points are based on the following:

An automatic 20 points for holding a banquet.

9. STATE OFFICER 2 points

a. Two points are given for any one state officer coming from the local chapter.
b. Credit given only for officer who was elected at this year's state convention
c. Credit for one officer only.

10. ATTENDANCE AT STATE CONVENTION 5 points

a. An automatic 5 points are earned if the chapter is represented with an official delegate to this year's state convention.
b. Number of delegates attending does not influence rating, but at least one must attend.

11. PARTICIPATION IN CONTESTS AT REGIONAL RUN-OFF 45 points

The 45 points are based on 5 points for each contest in which the club participates at this year's Regional Run-off.

12. PARTICIPATION IN CONTESTS AT STATE CONVENTION 0 - 50 points

The 50 points are based on 5 points for each contest in which the club participates at this year's state convention.

13. RECREATIONAL ACTIVITIES 20 points

a. The 20 points are based on an automatic 10 points for each club-wide activity. Credit given only for two.
b. Written description of each activity must be submitted.

14. ALUMNI ACTIVITIES 5 points

a. The 5 points are based on the following:

1.	Alumni active all year	3 points
2.	Three club meetings with alumni present. .	1 point
3.	Follow-up survey made of last year's members	1 point

b. Copy of survey results must be attached.
c. Written description of points claimed in No. 1 must be attached.

15. CLUB PROJECT (SCHOOL OR COMMUNITY) 5 - 15 points

The 5 - 15 points possible are based on a worthwhile club project of "special service" either to the school or to the community. A professional judging team and the State Club Advisor will award points.

16. RELATED PROJECT INVOLVEMENT 5 - 15 points

The 5 - 15 points possible are based on a curriculum project and follow-up where academic coursework has been displayed with vocational experience.

An example would be where math and industrial arts combine to build a child's playhouse later donated to a children's home.

17. WORK EXPERIENCE OR WORK SIMULATION — 5 - 15 points

A short written statement outlining on-the-job experiences by cooperative students or a descriptive explanation of training stations on the school campus (with pictures if possible).

18. CLUB MEMBERS INVOLVEMENT IN SCHOOL ACTIVITIES — 5 - 15 points

Examples: clubs other than VOCA, athletics, drama, music, leadership and service

19. VOCA DUES PAID ON TIME — 12 points

100% membership State dues mailed to state club advisor by November 1st.

SAMPLE SAMPLE

VOCA CLUB OF THE YEAR REPORT

DIRECTIONS:

1. Keep record of points accumulated during year and transfer to this form for final report.
2. Begin accumulating points at close of immediate past state convention.
3. Give all information called for below and enter total points under "Local Club Rating." Do not write in "State Rating" column.
4. Prepare two copies of the report. Keep one for your files and forward the other copy to your state club advisor.
5. State advisor will then check the report for accuracy and completeness, sign it, and forward to the state judges.
6. Report must be in the hands of the state advisor at least ten days prior to the opening date of the state convention, and must carry all signatures and substantiating evidence called for to be valid.
7. Substantiating evidence called for must be submitted in neat, logical manner. Separate each area by numbers corresponding with the numbers on the rating sheet. For example, evidence for No. 6, should be numbered "6" and neatly presented.
8. The club winning the highest club rating will be the VOCA Club of the Year. Scores may be prorated if deemed necessary.

STANDARDS	POSSIBLE POINTS	LOCAL CLUB RATING	STATE RATING
1. STANDARDS OF LOCAL MEETING PLACE			
(List items for which points are claimed)			
____________________			
____________________			
____________________	9	________	________
2. INITIATION CEREMONY FOR NEW MEMBERS			
a. Date held ____________	5	________	________
3. INSTALLATION CEREMONY FOR LOCAL OFFICERS			
a. Date held ____________	5	________	________
4. PROFESSIONAL CLUB MEETINGS			
No. held ________	12	________	________

STANDARDS	POSSIBLE POINTS	LOCAL CLUB RATING	STATE RATING
5. VOCA ASSEMBLY PROGRAM			
a. Date held ________ b. Attach written description	10	____	____
6. PUBLICITY			
a. No. local articles or shows ________ b. Attach copies called for	20	____	____
7. APPEARANCES BEFORE CIVIC OR TRADE GROUPS			
a. No. appearances ________ b. Attach description of each appearance	20	____	____
8. EMPLOYER-EMPLOYEE SOCIAL FUNCTION			
a. Date held ________ b. Type function ________	20	____	____
9. STATE OFFICER (List name and office below)			
________________	2	____	____
10. ATTENDANCE AT STATE CONVENTION			
Date of convention ________________	5	____	____
11. PARTICIPATION IN CONTESTS AT REGIONAL RUNOFF: LIST NAMES OF STUDENTS AND CONTESTS ENTERED.			
a. ________ ________ b. ________ ________ c. ________ ________ d. ________ ________	45	____	____
12. PARTICIPATION IN STATE CONTESTS (List contests below for which points are claimed)			
________________ ________________ ________________ ________________ ________________	0 - 50	____	____

	POSSIBLE POINTS	LOCAL CLUB RATING	STATE RATING
13. RECREATIONAL ACTIVITIES			
a. No. held ________ b. Attach written description of each	20	______	______
14. ALUMNI ACTIVITIES			
a. Check activities for which points are claimed: 1. Alumni active all year ______ 2. Three club meeting with alumni present ______ 3. Follow-up survey made of last year's students ______	5	______	______
15. CLUB PROJECT (School or Community)	5 - 15	______	______
16. RELATED PROJECT INVOLVEMENT	5 - 15	______	______
17. WORK EXPERIENCE OR WORK SIMULATION	5 - 15	______	______
18. CLUB MEMBERS INVOLVEMENT IN SCHOOL ACTIVITIES	5 - 15	______	______
19. VOCA DUES PAID ON TIME (100% Membership)	12	______	______

POSSIBLE POINTS ------------------------------- 300

TOTAL POINTS ACCUMULATED ---------------------- ______

____
Certified by Coordinator

____
Local Club President

____
School Official

____
Local Club Secretary

____
State Club Advisor

____
Date Report Mailed to State Club Advisor

CONTEST 2 and 3

Contest 2

Outstanding VOCA Boy of the Year

Contest 3

Outstanding VOCA Girl of the Year

Local Club:

Each local VOCA Club is encouraged to hold a local contest (of their own design) to select the outstanding boy and the outstanding girl. A local committee of educators, business and civic leaders should be used to judge the local contest.

Regional:

EACH CLUB MAY ENTER ONE BOY AND ONE GIRL AT THE REGIONAL RUN-OFF.

The student must attend the Regional Run-off to be interviewed by a committee of unbiased educators, business leaders and civic leaders who will study the standards for selecting the VOCA student of the year, study the student's notebook and interview all candidates.

Regional and State

PURPOSE: To encourage a high degree of student achievement in the total CVAE Program.

Standards for possible consideration may include:

1. Leadership in local VOCA Club.
2. Service to the club, the school and the community.
3. Grade point average improvement
4. Social and mental growth while a member of VOCA
5. Improved school attendance
6. On-the-job experiences
7. In-class or laboratory growth and development
8. The student Interview
9. Comments and recommendations from academic teachers, vocational teacher and the school principal.
10. The 300 short report.

Each item shall be given a point value from 1 - 7 points. The actual interview will be assigned a weight of 1 - 10 points.

The judges will then compute the points awarded and select the top 3 candidates. From these 3 students - the top student shall be selected with no regard to points.

After selecting the top 3 students the judges may require a second interview of no more than 3 minutes each - for final selection.

NOTES TO COORDINATORS: (VOCA STUDENT OF THE YEAR REPORT)

1. Each school shall be allowed to enter one boy and one girl each.
2. Each entry will write a short report (300 words or less) giving a description of his school and job success and experiences for the year.
3. Each entry will be prepared to answer a minimum of three questions related to the CVAE Program and his or her experience.
4. Each entry will be prepared to face a panel of judges and answer questions concerning CVAE, the school, future career goals and club activities.

The 300 work report, letters of recommendation, pictures, grade sheets, attendance reports etc. should be bound together in a notebook or a simple binder or folder.

Date:____________

VOCA STUDENT OF THE YEAR

Rating Sheet

Name of Student:______________________________ School:______________________
Employer:______________________________ City or County:______________________

STANDARD	Point Value CIRCLE ONE ONLY
I. Leadership in local VOCA Club	1 2 3 4 5 6 7
II. Grade Point Average improvement (Look for official transcript or signature of principal as proof of grades)	1 2 3 4 5 6 7
III. Service to the club, the school, and or the community	1 2 3 4 5 6 7
IV. Social and mental Growth while a member of CVAE (Look for letters from teachers and school administrators	1 2 3 4 5 6 7
V. Improved overall school attendance	1 2 3 4 5 6 7
VI. On-the-job Experiences	1 2 3 4 5 6 7
and or	
In-class or laboratory growth and development	1 2 3 4 5 6 7
VII. Comments and Recommendations: by teachers, academic team members, vocational instructors, and school staff	1 2 3 4 5 6 7
VIII. Short Report by student (Not more than 300 words)	1 2 3 4 5 6 7
IX. Student Interview	1 2 3 4 5 6 7 8 9 10

Total Points: ______________________

CONTEST 4

JOB INTERVIEW

Purpose:

To stimulate interest and acquaint the students with employment procedures which they will face in applying for positions in industry, government or business.

Rules:

1. Contest judged 25% on application form and 75% on personal interview.
2. Assemble at designated room one-half hour prior to personal interview time for purpose of filling out application form.
3. Contestants apply for job or position of their choice in keeping with career objective.
4. Personal data sheets is recommended, but not required.
5. Photo should be attached to Personal Data Sheet.

In order that the contestants may understand their good and bad points and thus be able to profit by the judges' rating, summary sheets showing a composite scoring of the judges will be sent to each contestant as soon after the Regional contests as possible.

Judging:

The contestant in the job interview contest is first interviewed by a receptionist. The receptionist, after a brief interview, gives the applicant an employment application to fill out. Upon the completion of this application, the contestant returns the application to the receptionist who rates it from the standpoint of legibility, neatness, and completeness in answering or acknoweedging all questions. During this rating period, the applicant is told to be seated. After the receptionist completes the scoring of the rating sheet in other general areas as the manner in which the applicant introduced himself/herself, the expression and tone of voice used, the applicant's general attitude and appearance, the contestant is conducted to an interviewer. Here the applicant is rated once again on such factors as the introduction, manner of answering questions, ability to express himself/herself, general attitude, and leave-taking. Judging and scoring is done on a point system by the receptionist and the interviewer. See rating sheet.

Contest Personnel:

1. Chairman should assemble judges one-half hour before interview time to answer questions, explain rating procedures, give out rating sheets for interview, go over applications, set up facilities, and insure reasonable degree of privacy for judges.

2. Co-Chairman - secure application forms, meet with contestants one-half hour before interview, explain how to fill out form, answer questions, and give completed applications to chairman.

3. Two to 3 judges - review application forms - use rating sheets for personal interview - Judges may rotate turns at interviewing - but only one judge should question any given applicant - others should observe.

Suggested Interview Questions:

Why are you taking CVAE?
What do you like most about it?
What are your favorite subjects? Why?
What subjects do you dislike? Why?
What are your extra-curricular activities?
What type of work do you like?
What would you like to be doing five years from now? Ten years?
What jobs could you do well without further training?
What is your career objective?
How does your family feel about your working?

NOTE:

The following application and rating sheets should be used in all Regional Run-Offs and at the State Convention.

APPLICATION FOR EMPLOYMENT

Print (Page 1)

Date ____________ Position applied for ____________________

Name ____________________ Height ______ Weight ______ Age ______

Address ______________________________ Telephone No. ________
(Street or RFD) (City) (State)

Previous Address ____________________ State Social Security Number ________

Birth date ____________________ Birthplace ____________
(Month) (Day) (Year) (City, State)

CHECK ALL THAT APPLY:

_____ Female
_____ Male
_____ Single
_____ Married
_____ Widowed
_____ Divorced
_____ Separated

_____ Own home
_____ Rent
_____ Board
_____ Live (Parents)
_____ With (Relatives)
_____ Purchasing home

Number and age of dependents ________
____
Relationship of dependents ________
____
Business or occupation of father
____
(or husband) ________________

Interested in: Temporary work ____; Full-time _____; Part-time _____;
Saturday only _____.
Salary expected ____________________
Are you responsible for your entire support _____? Others who are dependent on you for their support: Number ________; Ages ____________
Nature of any physical defects ____________________
Recent illnesses ____________________
Date of last physical examination ____________________

Education	Circle grade Completed	Name of School	Location	Major Subject	Year Graduated
Elementary	1 2 3 4 5 6 7 8				
High	1 2 3 4				
Business or Vocational	1 2 3 4				
College or University	1 2 3 4 5 6				
Night or Correspondence	1 2 3 4				

Give details of any other educational training: ____________________
____
____

Print (Page 2)

What are your hobbies? ____________________
In case of illness or emergency, notify:
Name ____________ Address ____________
Relationship ____________ Telephone ____________

Why do you feel qualified for the position for which you are applying:
____
____

PREVIOUS EMPLOYMENT
(Last employment first)

From	To	Name and address of employer	Department-Position Duties-Salaries	Reason for leaving
Month	Month			
Year	Year			
Month	Month			
Year	Year			
Month	Month			
Year	Year			

PERSONAL REFERENCES
(Do not give names of relatives or former employers)

Name	Address	Occupation
1.		
2.		
3.		

Do not write in space below.

Interviewed by:

____

Other remarks:

Personality ____________
Attitude ____________
Ambition and initiative ____________
Calmness ____________
Physical qualities ____________
Intelligence ____________
Leadership ____________
Appearance and Grooming ____________
Work best suited for ____________

JOB INTERVIEW

Rating Sheet Application Form

Award the number of points (5,4,3,2, or 1) in the blank space to the right

Items Evaluated	Excellent 5	Very Good 4	Good 3	Fair 2	Poor 1	Applicant Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Neatness Legibility of Ptinting Ink Cross-outs Spelling Chronological order Completeness Omissions References Reasons for Leaving Education; (back ground) Physical Record																				
Total Points Awarded																				
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

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JOB INTERVIEW

RATING SHEET FOR THE PERSONAL INTERVIEW

Items Evaluated	Excellent	Very Good	Good	Very Good	Poor		1	2	3	4	5	6	7	8	9	10	11	12	13	13	14	15
earance	20	16	12	8	4																	
Grooming																						
Posture																						
curity	20	16	12	8	4																	
Frankness																						
Consistency																						
Accuracy																						
Tact																						
Anwsering Questions asked by interviewer																						
Temperament																						
esentation	20	16	12	8	4																	
Forcefullness																						
Poise																						
Sincerity																						
Persuasiveness																						
Grammar																						
Vocabulary																						
Enunciation																						
eparation	20	16	12	8	4																	
Knowledge of Position																						
School Record																						
Vocational Training																						
Work Record																						
References																						
Personal History																						
rsonal Salesmanship																						
tal Points Awarded																						

CONTEST # 5 SCRAPBOOK

Entries in the Scrapbook Contest will be mailed to the Regional Run-Off Chairman at least 10 days prior to the date set for the Regional Contest Run Off. The following criteria for judging entries will be considered and each criterion will carry points toward evaluation... please see the rating sheet.

THEME, CLUB ORGANIZATION AND OBJECTIVES, ACTIVITIES (SOCIAL, RECREATIONAL) ON-THE-JOB EXPERIENCES OR SIMULATION, CLASSROOM PROJECTS OR ACTIVITIES, ARRANGEMENT AND LAYOUT OF SCRAPBOOK (table of contents, continuity, conciseness and originality).

Each scrapbook will be on display at the Regional Run-offs. The winning entry will be sent to the State Scrapbook Committee 10 school days before the State Convention.

The club scrapbook should present, in logical form, a history of all club activities for the past school year. Items used in the Scrapbook may cover one calendar year - from the last state convention until the 10 days prior to this year's convention.

The scrapbook may not be used as an entry in the "Club-of-the-Year Contest." Materials may be duplicated and appear in both scrapbook and in the notebook verifying materials and activities to support the club-of-the-year entry.

The following rating sheet should be used by all judges at the Regional Run-Offs and at the State Convention.

SCRAPBOOK

Rating Sheet

Entry Number ____________ Theme of Scrapbook ________________________

Judge's Name ______________________ School ________________________

Directions:
1. Fill out separate rating sheets for each scrapbook.
2. Sub-headings have been given point values as a guide in determining total judged points for each major heading.
3. Total the judged points and place this total score at the bottom of the page.

****

PURPOSE: (Possible Points - 10) Judged Points _______

Is the purpose expressed clearly in preface and does the scrapbook achieve this purpose?

ORGANIZATION: (Possible Points - 20) Judged Points _______

Preface and Table of Contents
CVAE and VOCA Information
Arrangement of Information
Continuity of Thought

APPEARANCE: (Possible Points - 10) Judged Points _______

Originality and conciseness
Appropriateness of Illustrations
Neatness
Layout

USE OF WORDS: (Possible Points - 10) Judged Points ________

Grammar
Spelling

SUBJECT COVERAGE: (Possible Points - 50) Judged Points ________

Club and Program organization, activities, and projects. Work experiences, laboratory simulations and CVAE accomplishments in terms of club and program objectives.

TOTAL JUDGED POINTS __________

CONTEST # 6 Talent-Performing Arts

Purpose: To encourage cultural participation.

Each club may enter one entry in this contest. The entry may be comprised of one to eight members. Time will be limited to 10 minutes for any talent of the club"s choosing. The 10 minute rule is a maximum. No minmum will be set.

This contest will be held just before(or after)the awards banquet at the state convention. At the Regional-Run Off the host coordinator will schedule the talent contest.

EXAMPLES: dramatic reading, live entertainment, speech, dance,play band, solo, comedy act or combination of two or more of those listed. Entries are not limited to examples presented here.

REGIONAL RUN OFF: Each coordinator entering students in this contest should contact the host coordinator if special arrangements are needed to assist the student's performance...at the school hosting the Run Off.

STATE CONVENTION: The local club sponsoring the Regional Run-Off Winner in Contest #6 Talent-Performing Arts is responsible for the transportation and all necessary arrangements for their entry to,during, and from the state convention site. The following contest rating sheet must be used at the Regional and State levels during competition.

Contest

Talent-Performing Arts

RATING SHEET

ITEM	POINT VALUE	POINTS AWARDED
I. Poise and confidence	15	______
II. Stage Appearance	15	______
III. Talent	50	______
IV. Originality	15	______
V. Audience Reaction	5	______
Total Points	100	______

CONTEST # 7 ARTS AND CRAFTS

PURPOSE: To encourage students to develop all skills and talents.

Each club may enter one entry in the Arts and Crafts Contest. The entry may be designed, built, crafted or painted by one, or any number of CVAE students. It may be constructed of any material and it may be of any size, shape and color.

IT MUST BE THE WORK OF THE VOCA STUDENTS.................................

EXAMPLES: paints, projects from industrial arts, home economics, science class, machine shop, art, wood shop, auto shop, agri-shop,etc. or the entry may be designed and constructed in the home or a training site.

REGIONAL RUN OFF: Each coordinator entering students' projects or art objects in this contest should contact the host coordinator if special space or arrangements are needed for proper display at the Regional.

STATE CONVENTION: The local VOCA club sponsoring the Regional Run Off Winner in Contest # 7(Arts and Crafts) is responsible for the transportation, and all necessary arrangements for their display at the State Convention.

The following rating sheet must be used by the judges at the Regional and State contests.

RATING SHEET

Talent-Arts and Crafts

ITEM	Point Value	Points Awarded
I. Display and Arrangement	10	______
II. Creativity	10	______
III. Originality	10	______
IV. Art, talent or craft skill (must be the work of one or more students enrolled in CVAE)	60	______
V. Special Effects	10	______
Total Points	100	____________

CONTEST # 8

VOCA CLUB PROJECT

SCHOOL AND OR COMMUNITY

This is either a committee of students or an enire local VOCA club project. All Georgia VOCA clubs are encouraged to participate in this contest each school year.

A Club (or group of students) may enter only one entry per club. The project may be of service to the school, the community or a combination of both. These projects will be judged prior to the Regional Run-off and should be in the hands of the regional chairman at least 10 days prior to the competition. A description of the project should be limited to 25 pages and placed in a 3 ring notebook. The winning project will be announced the day of the regional competition.

The winning regional project will be sent directly to the state supervisor by each regional chairman and the winning State projects will be announced at the State Convention

EXAMPLES: Description of Projects: A community project is a worthwhile civic endeavor. It may be a short project which extends over a short period of time. It may or may not involve all club members and may or may not contribute directly to the promotion of CVAE and VOCA.

Specific Examples:
- Care Packages
- Visits to Rest Homes
- Voting Drives
- Community Chest Drives
- Community Clean Up
- Safety Campaigns
- Needy Faimly project
- Assistance to a civic group or project

A school project may or may not be or direct service to the school and may or may not benefit the whole school. It may be for any period of time. It should(not required) involve all club members. Specific examples: Career night, CVAE Day or Week,Teacher Appreciation Day and Campus Clean-up.

In addition to the examples noted on the last page a club may elect to serve both the school and the community in the same project. The following report form should be used in the front of the notebook. This will give the judges a quick, concise over-all picture of the project. This rating sheet must be used by judges at both the Regional and State Competition.

VOCA

SAMPLE FORM ---REPORT OF CLUB PROJECT

This form should be completed for the project and placed in the front of the project notebook.

CLUB____________________CITY:________________Date:____________________

Advisor:____________________________________

Name(or Kind) of Project:____

Purpose of Project:____

____

Date Begun:____________________Date Completed:______________________

Number of Club Members Participation:_________________________________

Description: Write a short paragraph describing your project and how it was carried out.

____
Signature of Club President or
Project Chairman

____
Signature of Club Advisor

RATING SHEET: VOCA SCHOOL AND/OR COMMUNITY PROJECT

SCHOOL: ______________________ TITLE OF PROJECT: ______________________

CITY: ______________________ ______________________

ITEM	POSSIBLE POINTS	POINTS AWARDED
PRUPOSE: Is the purpose expressed clearly in preface and does the project achieve this purpose?	10	______
ORGANIZATION: (of the notebook) Arrangement of information and continuity of thought.	10	______
SUBJECT COVERAGE: Notebook should include information such as: Importance and development of service, procedures, major activities, groups served, publicity, student participation, and learning experiences.	50	______
USE OF WORDS:		
Grammar and Spelling	10	______
FOLLOW UP Value of Project (Was it worthwhile)??	20	______
TOTAL POINTS	100	______

CONTEST # 9 CAREER MANUAL

Each CVAE student should begin to think about the future and how they fit into selected occupations. This contest should encourage individual students to investigate jobs and see not only what the occupation has to offer but what one must do to obtain this career goal. The student should ask himself the following questions:

What does this job have to offer me ??? What do I have to offer to to this field??? What education and training is necessary to secure this position???? What rewards are available, should I seek this career???

Each student entering this contest should do his/her own work. The coordinator and team teachers should only advise. The student should research the job or jobs in one major area of his/her choice...for example: jobs in heavy construction or the field of nursing. The student report may be in the form of a "paper", notebook or manual.

One student career manual from each local club may be entered at the Regional level. TWO career manuals will be judged as winners at the Regional level and both will be declared as 1st place winners. These two manuals will be sent to the state VOCA club advisor and this will make 10 entries at the State Convention. At the State Convention the following awards will be given: 1st place, 2nd place and 3rd. place.

Manuals should not be more than 50 typed pages(typing is not required) and should be submitted in a three ring notebook or a simple folder or binder.

Both Regional and Statejudges must use the following rating sheet.

RATING SHEET

CAREER MANUAL.....

ITEM	POSSIBLE POINTS	POINTS AWARDED
I. Actual Student Research	15	______
II. Organization of Material	10	______
III. Creative drawings, pictures, or photographs	5	______
IV. Career Information	50	______
V. Future opportunities for the student	10	______
VI. Conclusions or summary	10	______
Total points	100	______

CONTEST # 10 PUBLIC SPEAKING

PURPOSE: To develop the students ability to organize and present information in an effective manner to a group of peers or adults. This contest also serves to select outstanding students to assist with the State Convention.

PROCEDURE: The student's speech should be approximately 3 minutes long . The coordinator should help the student time the presentation. If the student's speech is over 4 minutes the coordinator-in-charge of the contest should ask the student speaking to please stop and take their seat.

In order that the contestants may understand their good and bad points and thus be able to profit from their rating sheets....the ratings will be given to the contestant as soon after the speaking contest as possible.

The speech should be prepared and practiced several times prior to contest time. The topic is optional and completely open. Suggested topics might include:

a. The generation gap
b. C.V.A.E. and me
c. Transportation today and tomorrow
d. Our changing society
e. Affects of Drugs
f. Pollution

One entry allowed per club at the Regional Run Off. This is a good contest for all students to watch at the Region and State...while other contests are in progress. Notes made during the preparation may be used during the actual speech, if the contestant so desires. The student should not "read" the speech. The following rating sheet should be used during competition at the Regional and State contests.

RATING SHEET

PUBLIC SPEAKING CONTEST

NAME OF CONTESTANT____

VOCA CLUB:______________________________CITY: ____________________

TOPIC OF SPEECH:____

LENGTH OF PRESENTATION:________________(Minutes)

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Directions: each item under Content and Presentation carries a total weight of 5 points. The weight you give each item should be anywhere from 5 points to 1 point...judging from excellent to poor. Total the points for all items and place the total score at the bottom of the page.

CONTENT

(Possible Points 25) ACTUAL POINTS________

DID THE SPEAKER..........

____Develop the subject adequately?
____Support opinions by effective examples?
____Make effective use of diction and English?
____Have unity, coherence, and emphasis in the presentation?
____Organize the material well?

PRESENTATION

(Possible points 35) ACTUAL POINTS____________

DID THE SPEAKER..........

____Show poise and confidence?
____Have a pleasing manner?
____Hold audience attention?
____Have a clear, pleasing voice?
____Have a good personal appearance?
____Have a good pronunciation and enunciation?

TOTAL ACTUAL POINTS AWARDED

____

++

AWARDS

LOCAL CLUB: Awards by Local VOCA Clubs: Whenever possible local VOCA clubs and their CVAE coordinators should strive to have local run-offs within their own school. Competition and related activities on the local level will improve morale and build interest in the curriculum and program.

REGIONAL RUN OFF: The Regional host or chairman should meet with a committee of coordinators from their region and make plans in September or October for financing the Regional Run-Off in terms of trophies, gifts, prizes and other awards.

PLEASE NOTE: THE CLUB OF THE YEAR WILL NOT BE JUDGED ON THE REGIONAL LEVEL Whenever possible 1st, 2nd and 3rd place prizes should be awarded. The Career Manual Contest is an exception.

STATE CONVENTION: The State VOCA Executive Council will plan the awards program and will take the leadership in securing all awards on a statewide basis. Local clubs and coordinators are encouraged to assist the Executive Council and the State Club Advisor.

At the state convention the following awards will be presented in each contests:

FIRST PLACE
SECOND PLACE
THIRD PLACE

The dates for all Regional Run-Offs and the State Convention will be announced to all clubs by the State Club Advisor no later than November 1st. of each school year

SECTION III

SUGGESTED GUIDELINES

SUGGESTED ORDER OF BUSINESS FOR VOCA MEETINGS

1. The meeting is called to order by the president--two raps of gavel.
2. Recite the VOCA Creed. (Three raps of gavel for members to stand; one rap to sit down.)
3. The minutes of the preceding meeting should be read by the secretary. These may be approved as read or may be approved with additions or corrections.
4. Treasurer's Report is read and "received as read and filed for audit (Chair so states)."
5. Reports of committes are called for by the president.
6. Unfinished business is taken up at the call of the chair or of the meeting.
7. New business.
8. The program, if any, may be held at this point. This is considered part of the meeting and the president presides throughout with the assistance of the program chairman.
9. Adjournment. This may be followed by refreshments and entertainment.

OFFICER INSTALLATION

This impressive ceremony can be adapted for use by your local VOCA Club in installing new officers. However, since it should be a standardized and formal ceremony, it is given in full detail.

This event may take place at the same time new members are initiated into your local VOCA Club. You may wish to invite parents, friends, and faculty to this ceremony.

Staging: In the center of the stage or room, place lighted candles--or spell out C.V.A.E. with large "cut-out" letters. If possible, use a floral center piece. Use VOCA colors--blue and gold. Display the creed, emblem, and motto. Place the American flag in the proper place on the platform, and a Bible on the table in such a manner as to be visible to the audience.

If the platform is small, place only enough chairs on it for the outgoing officers. The incoming officers can then be seated in the first row of the auditorium--ready to take their places upon the platform at the proper time. However, if the platform is large enough to accommodate them, the outgoing officers should sit on the right side of the stage (from audience viewpoint), with the incoming officers on the left and opposite their corresponding officers.

Officers should sit from left to right in this order: President, Vice President, Secretary, Treasurer, Reporter, and Parliamentarian.

Music: If at all possible, it is very effective to have a pianist playing "America the Beautiful" as the officers file up on the platform. This may be played softly at both the beginning and the end of the ceremonies.

Ceremony: The outgoing President speaks first: "Fellow members of Vocational Opportunities Clubs of America, it is my pleasure at this time to present your new officers--duly elected and entrusted with the administration of this organization during the coming year. Will each of our incoming officers please stand when called upon and face his predecessor for induction into office."

The outgoing President calls upon the President-elect to step forward and addresses him concerning the duties and responsibilities of his office in this manner.

"Mr. President-elect, you have been chosen by the club members of this Club of VOCA to lead this organization for the following year. In electing you President, we have indicated our faith in your qualities of leadership, responsibility, diplomacy and intelligence and hereby entrust you with the future administration of this club.

"As President you will preside over all of the meetings of this Chapter and be responsible for our progress during the coming year. We will look to your leadership in all endeavors. If you are willing to accept this responsibility, please raise your right hand and repeat after me:

> "'I understand fully the honor and responsibilities which have come to me as President of this Club of VOCA and do solemnly and sincerely promise to accept and fulfill these responsibilities to the best of my ability.' "

The retiring President then shakes hands with the President-elect and presents him with the gavel--handle first. The new President then returns to his chair. Each outgoing officer is then called upon by the President to induct his successor. (Though their speeches are essentially the same, they are given below as a guide.)

"Retiring Vice President": "You, (name of incoming Vice President), have been chosen as Vice-President of this VOCA Club by your fellow members. They have, thus, demonstrated their confidence in your ability to assume the leadership of this organization in the President's absence. It shall be your duty to assist the President whenever called upon to do so and to serve as chairman of all meetings of this club in the absence of the President. If you are willing to assume these responsibilities, please raise your right hand and repeat after me this pledge:

> 'I understand fully the responsibilities of the office of Vice-President and hereby promise to accept and fulfill these responsibilities to the best of my ability.'" The Vice-President then follows the same procedure as the incoming president.

"Retiring Secretary": "You, (name of incoming Secretary), have been chosen by your fellow members as Secretary of this VOCA Club. As Secretary, you will be responsible for the records of this organization, and the keeping of accurate minutes. You will also be called upon to carry on all official correspondence. You will keep an accurate list of members and furnish members with membership cards. You should provide the President or his substitute with a written agenda for each meeting and, if possible, with a list of committees. If you are willing to accept these responsibilities, please raise your right ha and repeat after me: 'I understand fully the responsibilities of the office of Secretary and hereby promise to accept and fulfill these responsibilities to the best of my ability.'" Shakes hands and incoming Secretary takes proper place.

"Retiring Treasurer": "You,(name of incoming Treasurer), have been chosen for a position of high honor and trust. Your duties will require you to keep accurate records of all receipts and disbursements of this club and be ready at all times to give a report of its financial condition. It is your duty to receive and deposit all club funds, pay them out as directed, prepare a budget of proposed expenditures and collect dues. It is also your responsibility to encourage thrift in the club and among your fellow members, thus performing an educational function. If you are willing to assume these responsibilities, please raise your right hand and repeat after me: 'I understand fully the responsibilities and duties of the treasurer and hereby promise to accept and fulfill these to the best of my ability.'" Shakes hands and takes proper place.

"Retiring Reporter": "You,(name of incoming Reporter), have been chosen by your fellow members, as Reporter of this club. You will be responsible for gathering club news and reporting it to the local and school papers and to the State Association. It should be considered as part of your duties to provide continuity between previous, present, and future members of this club by keeping complete records of events of importance in the life of your club to pass on to your successor at the end of your term. If you are willing to assume the responsibilities of this office, please raise your right hand and repeat after me: 'I understand fully the responsibilities of the Reporter and hereby promise to accept and fulfill these responsibilities to the best of my ability.'" Shakes hands and takes proper place.

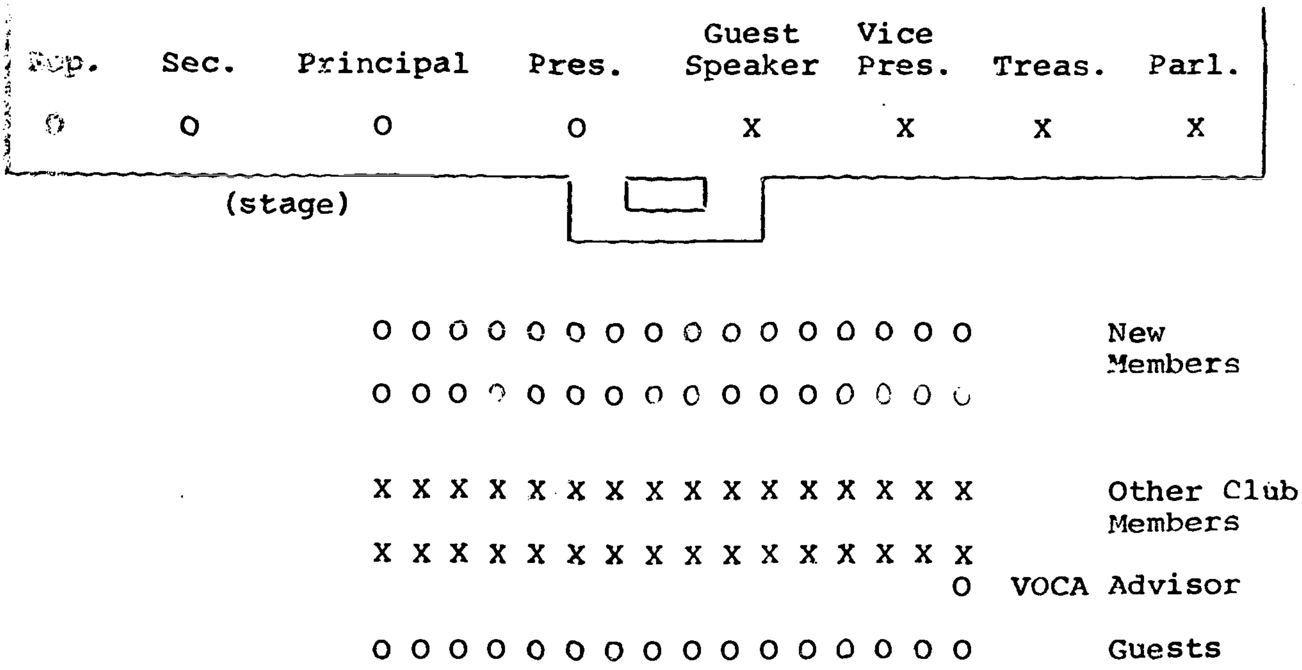
"Retiring Parliamentarian": "You,(name of incoming Parliamentarian), have been chosen by your fellow members as Parliamentarian of this club. You should be well versed in Robert's Rules of Order, Revised, and be able to settle all questions of parliamentary procedure as they arise. If you are willing to assume the responsibilities of this office, please raise your right hand and repeat after me: 'I understand fully the responsibilities of the Parliamentarian and hereby promise to accept and fulfill these responsibilities to the best of my ability.'" Shakes hands and takes proper place.

INITIATION

Early October is an excellent time for the initiation ceremony. This ceremony can be as elaborate or as simple as your resources and desires allow. It can be strictly a "members only" affair, or it may be held in the evening with parents and school officials attending. Whether small or large, it must be conducted with due solemnity and beauty.

The ceremony may be conducted either on a stage or in the center of a room, with the audience around the outer edge. The diagram shown here may be helpful in placing the participants.

Floor Plan For Initiation Ceremony



A table on the stage should be draped with Blue and Gold cloth. One lighted candle with the words "A Beginning" is impressive and the State Club Emblem should be displayed if possible. Where the initiation ceremony is large enough to warrant it, spotlights and background music are most effective.

The suggested script which follows may be helpful:

President: The ______________ Club of Georgia V.O.C.A. is now in session. The purpose of our meeting is to receive into our organization a number of new members. These candidates have been instructed by the Installing Officer. (Name of Installing Officer) will now report the results of his instruction.

Installing Officer: Mr. President, I am happy to report that all candidates have met the conditions for membership in our club. I certify to you that each has satisfactorily completed all requirements for club membership.

President: Thank you. You have heard the report of the Installing Officer. Now let us proceed with the ceremony.

Installing Officer: The candidates who have qualified for membership in this club are: (Reads list of names.) I recommend that these candidates be formally granted the rights and privileges of full membership.

President: You are about to take an important step. Your qualifications have been examined, and you have been recommended for membership in our organization. This is an important occasion for you and for us and one which we shall all remember always.

Vice President: This organization exists because of the dedication of all of its members to its purposes. These purposes are three-fold:

To assist State VOCA in the growth and development of CVAE.

To further develop a respect for education through academic experience and vocational competence.

To promote understanding and appreciation for the responsibilities of citizenship, the world of work, and the American way of life.

These purposes determine the character of our club activities. Through these activities--social, professional, and civic--we further develop the sense of friendship and unity which permits us to help and encourage one another in the pursuit of our common ideals.

President: In view of this statement of the purposes of VOCA, will you . . . (At this point have one of the officers explain the emblem, another student could give meaning to the colors and the objectives of the local club.)

(If you do this the Vice President would then say---)

Vice President: You have heard the explanation of our insignia. As members of VOCA, you are expected to support the activities of our organization, to carry out the duties assigned to you and, by diligent attention to your work, to qualify for leadership by meeting the standards set in work experience, in school work, and in your character.

President: You are now prepared to take the vows of membership in our organization. As you repeat these vows, think of the meaning of the words you say and resolve to do your best to live by them. Please repeat after me:

"I solemnly pledge myself to carry out to the best of my ability all of the duties and responsibilities of membership in Georgia VOCA. I fully accept the purposes of this organization, and promise to uphold its ideals in my personal life and in my school activities. I realize the importance of working cooperatively. I will so conduct myself that I shall reflect honor upon the organization, and I will at all times endeavor to maintain high standards of personal integrity."

As a symbol of your induction into our organization, will you please stand and our secretary will light the candle as a token of your acceptance. (pause)

I now declare you to be members of the ____________ Club of Georgia VOCA, with all the rights and privileges of membership. Let us repeat in unison the VOCA Creed.

Following the reading of the creed, the principal of the school should welcome the new students and give his support to CVAE and VOCA.

After his remarks, the President should adjourn the meeting and refreshments should be served for students, parents, and guests.

LOCAL CLUB OFFICERS

It is important for the growth of each Club to have a well-qualified and dependable group of officers. With capable officers, the business of the Club will be conducted in the proper parliamentary fashion, an effective program of work which includes all members will be maintained, records and minutes will be up-to-date and complete, good publicity will be forthcoming, and all members will grow professionally.

Every consideration should be given by the membership in electing officers. It is a mistake to look only for the most popular members. Qualifications for the position to which the individual will be elected should be the prime consideration. Don't expect every officer to be familiar with his duties and responsibilities just as soon as he is elected, but be sure you have chosen a person who is willing to work hard to prepare himself to perform his duties well. All VOCA Club members should have a general understanding of the duties and responsibilities of each office as well as a knowledge of the qualities of leadership to look for, since only with this understanding and knowledge can a good slate of officers be elected.

A leader is one who can communicate his ideas and feelings and yet is willing to listen and understand the need for democratic procedures. He respects the rights, the ability, and dignity of every member. He is able to convey enthusiasm and inspire confidence. He has the courage of his convictions, but he is open-minded. He is vitally interested in everything that concerns the VOCA Club and the community and is willing to put the good of the Club before his personal desires.

Each officer should be familiar with the Club constitution and by-laws and with the annual program of work. He should know his part in all ceremonies, and be familiar with parliamentary procedure. He should, of course, cooperate with other officers and all members at all times.

VOCA Clubs may want to consider electing a slate of officers each semester to allow maximum opportunity for leadership development.

Suggested officers and duties:

PRESIDENT. Preside over and conduct meetings according to accepted parliamentary procedure; keep members on the subject and the discussion within a time limit;. appoint committees and serve as ex-officio member on them; call other officers to the chair as necessary and desirable; represent the Club at special school events and before out-of-school organizations; coordinate Club activities by keeping in close touch with the other officers, the membership and the Advisor; keep Club work moving in a satisfactory manner by following up on progress being made on all activities; and call special meetings.

VICE PRESIDENT. Assist the President in the discharge of his duties; preside at meetings in the absence of the President; be prepared to assume the duties and responsibilities of the President should the need arise; and, serve as ex-officio member on Club Committees.

SECRETARY. Prepare and read the minutes of meetings; have available for the President the agenda for each meeting; attend to official correspondence; send out and post meeting notices; count and record rising vote when taken; prepare Club reports; keep permanent records of the Club; cooperate with the Treasurer in keeping an accurate membership roll and issue membership cards; read communications at meetings; and, have on hand for each meeting secretary's book, minutes of previous meetings, lists of committees and committee reports, copies of local, state and national programs of work, copies of the constitution and by-laws.

TREASURER. Receive and act as custodian of Club funds; collect all state dues and be responsible for their disbursement to the state treasurer; keep financial records neat and up-to-date; devise, with the assistance of the membership and the Advisor, appropriate fund-raising activities; pay out Club funds as authorized; encourage systematic saving--individual and Club thrift; assist in preparing an annual statement of estimated receipts and expenditures; and, protect the financial reputation of the Club by seeing that its obligations are met promptly.

REPORTER. Gather and classify Club news; prepare news and articles for publication in school and local newspaper(s); acquaint local newspaper editors with aims and purposes of VOCA; file clippings and pictures of Club activities and keep a Club scrapbook; assist in maintaining a Club bulletin board; assist with planning and arranging Club exhibits; and, prepare and collect news and feature stories of Club activities for the state newsletter.

PARLIAMENTARIAN. Assist Club members in understanding the fundamental purposes of parliamemtary procedure; be prepared to advise the presiding officer and other Club members on points of parliamentary procedure; have reference material pertaining to parliamentary precedure available for each meeting; watch for significant irregularities in parliamentary procedure and call them to the attention of the Chair; and, be prepared to explain any irregularity and its effect on the rights of all Club members.

CLUB ADVISOR:(CVAE COORDINATOR). Although the Advisor is not an elected officer, his duties should include: responsibility for starting a Club; become familiar with the history, principles, constitutional provisions, ceremonies, State activities, parliamentary procedure, and other aspects of VOCA; assist with plans for obtaining an efficient group of officers; instruct newly-elected officers in their duties and provide leadership training for all members; assist members in setting up practical and worthwhile programs of work and guide them to completion; see that programs are adequately financed and Club funds properly protected; see that

Club meetings are held regularly throughout the year and conducted in a business-like manner; help new members to get into the activities of the Club and see that each member has a part in Club work; help set up a system of adequate Club records and accounts; counsel individual members and committees on problems; see that all ceremonies, public performances, and displays are carefully planned and creditably carried out; keep school authorities and the public in touch with the activities and developments; keep informed of new developments in VOCA and pass information on to the members; encourage membership participation in state contests and on committees; explain the significance and proper use of CLUB insignia; and keep the purposes of CVAE in mind regarding all VOCA activities.

PARLIAMENTARY PROCEDURE

NOTE: The information contained herein is based on Robert's Rules of Order.

The minutes of an organization should contain a record of what is done and not what is said. Minutes should contain:

1. Date, place and time of meeting.
2. Whether it is a regular or special meeting.
3. Name of person presiding.
4. Name of secretary.
5. All main motions, whether adopted or rejected.
6. The names of the persons making the motions--the name of the seconder need not be recorded.
7. Points of order and appeals, whether sustained or lost. A motion which was withdrawn should not be recorded.

The treasurer of any organization is the custodian of its funds and receives and disburses them upon authority from the organization, the executive committee, or the budget committee. The organization should authorize the medium by which bills are paid--whether by check or by cash and by whom--and should either approve the budget or authorize the executive committee to do so. A chairman or an officer or member should get permission from the president or board to make an expenditure.

No treasurer should accept bills for payment, such as postage, traveling expenses, etc., from a chairman unless receipts are enclosed.

The treasurer should make a monthly statement and a yearly report. The full report should be audited. The presiding officer informs the assembly that to adopt the audited report has the effect of accepting the treasurer's report.

Committees have no authority except that which is granted by the constitution or by vote of the organization. Unless otherwise provided, the person first named or the one receiving the largest number of votes is its chairman. A committee has no right to incur any debt or involve the organization in any way unless given authority to do so.

Under no circumstances should one or more members of a committee go ahead with the business without action by a quorum; usually a majority of the committee, being present. Failure to observe these rules renders such action "the action of individuals" and subject to "censure," "suits", etc.

Motions

General Statement: When a motion has been made, seconded and stated by the chair, the assembly is not at liberty to consider any other business until this motion has been acted upon. If the motion is long and involved the chairman asks the mover to hand it in writing to the secretary. The mover cannot withdraw his motion after it has been stated by the chair. In general all important motions should be seconded, which may be done without rising or addressing the chair.

1. To Amend: This motion is "to change, add, or omit words" in the original main motion, and is debatable; majority vote.

   To Amend the Amendment: This is a motion to change, add, or omit words in the first amendment; debatable, majority vote.

   Method: The first vote is on changing words of second amendment, the second vote (if first vote adopts change) on first amendment as changed; the third vote is on adopting main motion as changed.

2. To Commit: When a motion becomes involved through amendments or when it is wise to investigate a question more carefully, it may be moved to commit the motion to a committee for further consideration: Debatable--Amendable--Committee must make report on such question.

3. To Lay on the Table: The object of this motion is to postpone the subject under discussion in such a way that it can be taken up at some time in the near future, when a motion "to take from the table" would be in order. These motions are not debatable or amendable; majority vote.

4. To Postpone: A motion to postpone the question before the assembly to some future time is in order, except when a speaker has the floor. Debatable: majority vote.

5. To adjourn: This motion is always in order except:
   a. When a speaker has the floor.
   b. When a vote is being taken.
   c. After it has just been voted down.
   d. When the assembly is in the midst of some business which cannot be abruptly stopped.
   Under all the above circumstances, the motion is not debatable.
   When the motion is made to adjourn to a definite place, and time, it is debatable.

6. To Reconsider: The motion to reconsider a motion that was carried or lost is in order if made on the same day or the next calendar day, but must be made by one who voted with the prevailing side. No question can be twice reconsidered. Debatable: majority vote. Requires 2 votes: First on whether it should be reconsidered. Second on original motion after reconsideration.

7. The Previous Question: Is to close debate on the pending question. This motion may be made when debate becomes long drawn out. It is not debatable. The form is "Mr. (Madam) Chairman, I move the previous question." The chairman then asks, "Shall debate be closed and the question now be put?" If this be adopted by a two-thirds vote, the question before the assembly is immediately voted upon.

8. Point of Order: This motion is always in order, but can be used only to present an objection to a ruling of the chair or some method of parliamentary procedure. The form is "Mr. (Madam) Chairman, I rise to a point of order." The Chairman: "Please state your point of order." After the member has stated his objection, the chair answers:
   a. "Your point of order is sustained" of
   b. "Your point of order is denied."

   If any member is not satisfied he may appeal from the decision of the chair. The chairman then addresses the assembly, "Shall the decision of the chair be sustained?" This is debatable and the presiding officer may discuss it without leaving the chair. Voted on like any other motion, majority or the vote sustains the decision of chair. Requires a majority of "no" votes to reverse decision of the chair.

Nominations, Elections and Term of Office

General Henry M. Robert, author of Robert's Rules of Order, says: "In the election of the officers of a society it is more usual to have the nominations made by a committee--when the committee makes its report, which consists of a ticket (a ticket is one name for each office to be filled by ballot), the chair asks, 'Are there any other nominations?'--at which time they may be made from the floor. The committee's nominations are treated just as if made by members from the floor, no vote being taken on accepting them."

If nominations are made from the floor, these names are added to those submitted by the nominating committee. Neither nominations by the committee nor nominations from the floor require a second or adoption vote, but are acted upon in the election ballot. Nominations are never seconded except as a complimentary endorsement of candidates not known to the assembly. This is rarely done except in national meetings where candidates assemble from all parts of the country.

A nomination ballot is NOT an elective ballot: (is not necessary or desirable where a nominating committee operates).

When nominations are completed the assembly proceeds to the election, voting by the method prescribed in the constitution and by-laws. The usual method in permanent societies is by ballot, the balloting continued until the offices are filled. If a member is in good standing in the organization and receives a majority of the votes cast in the elective ballot, (or plurality if by-laws so provide), he is then declared to be legally elected to fill the office even though he has not been nomintaed from the floor or by the nomination committee.

A motion may be made to close nominations but this motion is not in order until the assembly has been given reasonable time to add further nominations to those already made. It is an undebatable main motion, incidental to the nominations. It may be amended as to the time of closing nominations, but have no other subsidiary motion applied to it because it deprives members of one of their rights. It requires a majority vote. It may also be amended as to time, but no other subsidiary motion applies.

The Chair should remind the members that the nominating committee has endeavored to present as sure a ticket as possible, but it is now their privilege to name a candidate for any or all of the offices to be filled, and that they still have the opportunity of casting a ballot, for any eligible members, whether nominated or not.

General Roberts says: "Each member may vote for any eligible person whether nominated or not".

A member may withdraw his name if placed in nomination, announcing that if elected he would not be able to serve, but he cannot "withdraw in favor of another member."

Kinds of Voting--Majority vote means one over half of the members voting and plurality vote is the largest of two or more numbers. A plurality vote never adopts a motion or elects a member to office except by virtue of a special rule previously adopted in the constitution or by-laws. In an election a candidate has a plurality when he has a larger vote than any other candidate.

The Chair Votes--When the vote is by ballot the President writes his ballot, and casts it with the rest.

On a tie vote the motion is lost. If a majority of one, the chair, (if a member of the assembly), may vote with the minority and make it a tie, and declare the motion "lost" unless the vote is by ballot.

In the event of a tie vote by ballot, balloting must continue until a candidate receives a majority. (Unless by-laws provide for plurality).

To move "that an election be made unanimous," is a mistaken courtesy, as it forces those who did not vote for the candidate to unwillingly submit to the transferring of their vote, thus making it appear to be unanimous, when it is not:--one negative response causes such a motion to be "lost".

An election takes effect immediately following the completion of the annual business unless the by-laws specify some other date.

This does not mean that officers are to assume office at this meeting, for the duties of the outgoing officers are not completed for the year until after the adjournment of the annual session and all business relating to the annual meeting has been perfected.

Balloting--It is the duty of a chairman of elections to see that ballots are prepared in advance of the meeting and pencils are ready for the election. The tellers shall count the ballots. The chairman of elections reads the report, giving the number of votes for each person, whether nominated or "written-in" on the ballot. The presiding officer then "declares" who has been elected.

SUGGESTED LOCAL
VOCA CLUB ACTIVITIES

In planning activities for VOCA every effort should be made to incorporate the state and national programs into the calendar. Wherever possible, other youth organizations such as FFA and FHA may be helpful in promoting activities and projects.

Professional

Professional activities are those that contribute to the professional improvement of the students. Clubs should plan for meetings at least once a month at which guest speakers, demonstrations, panel discussions, films and similar presentations relating to distribution are featured. Field trips are frequently conducted in connection with topics studied in class.

Possibly the most universally accepted professional activity is the annual Employer-Employee Banquet which brings together those closely associated with CVAE and VOCA. Participation of students, school officials, and business leaders in the banquet program demonstrates the community-wide nature of the cooperative plan of instruction in CVAE.

Contests and Club projects are also considered professional activities. Designed primarily to stimulate student interest in improving career-related knowledge and skill, these activities emphasize the importance of learning through preparation and participation. Individual achievement is recognized in a sequence of local, regional, and state competition.

Financial

Financial activities involve raising funds to support the financial obligations of the Club. These obligations often include expenses for items such as travel funds for delegates and committee members, field trips, professional and social meetings and communications. Individual Clubs determine the number and types of financial activities in which they wish to participate. Many Clubs assess nominal membership dues, but a major proportion of local revenue comes from financial activities and projects.

Civic

Civic activities are conducted by Clubs to serve the school and the community. Projects range from campus improvement campaigns to participation in fairs, trade shows, and other community-wide events. The activities are frequently conducted in cooperation with local business organizations, school organizations and civic groups.

Service

Service activities emphasize the need for sharing with others. Frequently projects are designed to coincide with Thanksgiving and Christmas. Many of the projects are so conceived that they involve student participation as well as gifts and contributions.

Social

Social activities are a major requisite of the VOCA program. There is a tendency to de-emphasize social activities per se by enriching professional activities with social elements. For example, many social connotations are connected with the annual Employer-Employee Banquet although the primary purpose is professional in nature. Social activities also become an important finishing touch to professional meetings, particularly when community leaders are invited to participate in the VOCA program.

SUGGESTED VOCA ACTIVITIES

Films
Field Trips
T-V Program
Fund Raising
Fair Exhibit
Fashion Show
Radio Program
Parents' Night
Guest Speakers
Contest Program
Boss Breakfast
Assembly Program
Regular Meetings
Alumni Activities
Social Activities
Civic Appearances
Panel Discussions
Homecoming Parade
Chapter Newsletter
Faculty Recognition

Election of Officers
Needy Family Project
Professional Meetings
Savings Club Program
Installation of Officers
Local Publicity Releases
Initiation of New Members
Employer-Employee Banquet
"Good Citizenship" Project
"Get-Out-the-Vote" Project
Sponsor "Clean-Up" Project
Executive Committee Meetings
"Student Day" at Local Busines
Reception for Prospective CVAE Students
Follow-up Survey of Former CVAE Students

GUIDELINES FOR CLUB ACTIVITIES

The variety and number of Club activities and projects depend to a large extent on the ingenuity and vision of the members and the Club Advisor. In determining projects or activities, however, fundamental consideration should be given to the value that the project or activity will have for each individual student. The Club program of activities should lend itself to the needs of the individual. Thus he is afforded an opportunity to participate. As the program is extended to area, state, and national levels, the opportunity for individual student participation becomes proportionately less. While many projects or activities will be of a group nature, every effort should be made, even in group activities, to allow for individual activities that are in keeping with the individual student's interests and abilities.

The club activities or projects should provide an opportunity for:

- The development of a spirit of cooperation
- An understanding of competition
- A recognition of social values
- An ability to communicate
- Individual recognition
- Realization of the responsibilities of leadership and followership

COOPERATION

Cooperation enables students to work with each other. Planning and programing club activities emphasizes the importance of individual contributions to successful group accomplishments. By learning to work well with one another in club activities, students develop a sense of human relations necessary for success in the world of work.

COMPETITION

Competition is a basic element of the American System. Students preparing for careers today must learn to win and to lose. Club awards give students an opportunity to develop a competitive spirit. Competition encourages initiative and vision. The true essence of competition may not necessarily be in winning or losing, but it may be the motivating device that enables one to make a greater contribution to the society in which he lives.

SOCIAL VALUES

Social values should be apparent in the activities conducted by local clubs and should provide the students with an opportunity to know others engaged in work roles. The ability to meet with other people easily and freely is a basic requisite of personal communication which is fundamental to success.

COMMUNICATIONS

Communications must be effective in any organization. Opportunities to learn the importance of good communications exist in almost every activity of the CVAE Program. Planning local activities requires a closely knit system of conveying information and ideas to individuals and groups involved. Reporting activities in local and state publications gives students practice in disseminating ideas through a central exchange.

RECOGNITION

Recognition builds individual morale. Club activities provide abudant opportunities for recognition and student participation. The most obvious recognition is that given to student officers, committee charimen and contest winners. Less evident contributions to individual and clubs growth are frequently recognized. For example, recognition for important tasks performed in the background, such as addressing envelopes for a club survey or creating table settings for a banquet can strengthen student appreciation for their part in the success of VOCA.

LEADERSHIP AND FOLLOWERSHIP

Leadership and followership are essential to the success of a marketing enterprise. Cooperative students must learn the principles of sound leadership and how to use them if they are to be fully prepared for future responsibilities to life and society. They must learn that good leadership and good followership are closely interwoven. A leader in one function will be a follower in another.

The club program is patterned to provide students the opportunity to develop leadership qualities through participation in projects and activities. Elected officers are in a position to develop leadership ability, but the club that stands out is the one that offers such advantages to the entire membership. Frequently clubs will elect officers for short terms, perhaps once each semester, in a deliberate attempt to develop leadership abilities in a greater number of students. The club which serves its members best, however, is the one that emphasizes leadership through individual responsibilities and committee activities.

PLANNING YOUR EMPLOYER-EMPLOYEE BANQUET

The key to the success of any Employer-Employee Banquet, like any other VOCA Activity, is pre-planning. Inasmuch as this event involves everyone who participates in a CVAE program, it is important that every effort be made to assure a 100% successful activity. Probably at no other time during the school year is your CVAE program on exhibit as it is during your annual Employer-Employee Banquet.

The best time to start planning for your Employer-Employee Banquet is the day after the previous year's banquet, if possible. A complete written report indicating items needing improvement should be made to assist in planning for the next banquet. Planning for the current school year's banquet should continue shortly after school begins. Necessary committees should be appointed, and there must be close coordination between the Club Advisor and all committees.

The Club President or a qualified individual should be appointed general chairman for your banquet. A time table is a MUST and should be closely adhered to throughout the entire year. Remember, during the Employer-Employee Banquet you are selling a product--your're selling Coordinated Vocational Academic Education--CVAE.

The matter of obtaining a speaker for your banquet generally causes quite a bit of concern. It is, of course, not necessary to have a speaker. There are other alternatives--members can present skits, plays, talent shows, etc.; you may have two or three successful graduates each talk a minute or so about what CVAE meant to them; you may select three or four of your employers to speak two of three minutes on how VOCA helps them. The best source from which you can secure a speaker for your program would be from your local civic clubs--Lions, Optimists, Rotary, etc. The entertainment or program chairman of these local civic clubs can be of great help in securing an able speaker. Many companies furnish speakers, and, quite often, they can be obtained. Your Advisory Board members will undoubtedly be able to help you in selecting the type of speaker you want for your banquet. State Representatives and State Senators should certainly be considered as potential banquet speakers. As to the length of the speech, thirty minutes should be the absolute maximum and, as a rule of thumb, you might remember that nobody ever heard a bad short speech. If possible, select a speaker who will entertain your audience and also bring a short, serious message woven into his remarks.

Since you are not going to pay the speaker, there are other ways to thank him. Meet his train, his plane, or his bus; see to his hotel reservation; be sure to arrange for his transportation to your meeting place; do those things which make anyone feel welcome and wanted. In introducing the speaker, be sure the master of ceremonies does it well and that it is neither too lengthy or too short. Pick out the important things from his biographical sketch which he will furnish you. After the speaker has finished, be sure that something nice is said about his remarks. It would be well if you could clue your students to come up after the program, shake hands with the speaker and again thank him for being with your group.

In all cases, the student giving the invocation should read the invocation. The welcome given by a student and the response given by one of the employers should not be lengthy. Two or three minutes should be ample for each. Your entire program will be keyed on you master of ceremonies. If at all possible, a microphone should be used with a table rostrum. The master of ceremonies should practice a great deal before the banquet in the use of the microphone. Great care should be exercised in the length of your program. Remember no one appreciates sitting through a lengthy program.

The question of whether or not students should be introduced and they, in turn, introduce their employer comes up many times in planning Employer-Employee Banquets. This is time consuming and, if your Club has fifteen or more members, it might be well to dispense with this formality. Remember, the names of the students and their employers appears in the printed program--a must for any Employer-Employee Banquet. Consider the guest list carefully. Other than your employers, for whom the banquet is held, you should always invite your State Senator and Representative. Members of your School Board and your School Administrators should be invited if at all possible.

With respect to publicity, you should always handle this matter through business editor of you local newspaper. If your news paper does not have a business editor, then it should be handled with the regular editor, who will assign this story to one of his reporters. The Club Advisor should always go out of his way to cultivate the business editor of the local newspaper for, if he understands the CVAE program, he should be one of your greatest disciples. When the Club Advisor is interested in publicity for his program, he should go to the newspaper in person--never call or send material by mail.

Every Club should have a professional meeting well in advance of their Employer-Employee Banquet and invite the Future Homemaking chapter in your school to present a program on table manners. Remember CVAE is on display.

Certificates of Appreciation may be given to all employers for their participation in the CVAE program. In addition, you will probably want to give a few Outstanding Service Awards to individuals who have gone out of their way to support your program during the year. The highlight of any presentation that a Club might make during the year will, or course, be the presentation of an Honorary Life Membership to an individual or individuals, who have over the past years, contributed a great deal to the support of your CVAE Program.

Remember, your Employer-Employee Banquet will be only as successful as the planning and the effort that you put forth to make it a success.

VT 017 219
COORDINATED VOCATIONAL ACADEMIC EDUCATION
SECOND YEAR CURRICULUM (1970-71).

GEORGIA UNIV., ATHENS. DIV. OF VOCATIONAL
EDUCATION.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 71 89P.

DESCRIPTORS - *EDUCATIONAL COORDINATION; *CURRICULUM GUIDES; *VOCATIONAL EDUCATION; HUMANITIES; *ACADEMIC EDUCATION; VOCATIONAL DEVELOPMENT; SECONDARY GRADES; *STATE PROGRAMS; CAREER PLANNING; BEHAVIORAL OBJECTIVES; CONCEPTUAL SCHEMES; LEARNING ACTIVITIES; TEACHING TECHNIQUES
IDENTIFIERS - EDUCATION PROFESSIONS DEVELOPMENT ACT; EPDA; CAREER AWARENESS

ABSTRACT - THIS CURRICULUM GUIDE FOR THE SECOND YEAR IN A COORDINATED VOCATIONAL-ACADEMIC EDUCATION PROGRAM AT THE SECONDARY LEVEL CONTAINS FIVE TOPICAL UNITS DEALING WITH: (1) CAREER PLANNING, (2) INFORMATION ABOUT JOBS, (3) MONEY MANAGEMENT, (4) THE BUSINESS WORLD, AND (5) LABOR LAWS AND BENEFITS. EACH UNIT INCLUDES GENERAL UNIT OBJECTIVES, SPECIFIC BEHAVIORAL OBJECTIVES FOR EACH SUBTOPIC, TOGETHER WITH CONCEPTS AND SUGGESTED LEARNING ACTIVITIES IN 2-COLUMN FORMATS. SUGGESTED TEACHING TECHNIQUES INCLUDE THE USE OF ROLE PLAYING, PANEL DISCUSSIONS, RESOURCE PERSONS, FIELD TRIPS, AND AUDIOVISUAL AIDS. THESE CURRICULUM MATERIALS WERE DEVELOPED FOR GEORGIA'S COORDINATED VOCATIONAL ACADEMIC PROGRAMS BY COORDINATORS WHO WERE ENROLLED IN AN INTERNSHIP AND WORKSHOP AT THE UNIVERSITY OF GEORGIA. (AG)

PREFACE

Certain types of cooperative plans for vocational education have been in the high school curriculum for a good many years; however, these programs were somewhat limited by the age of the student-learners, grade classifications, occupational choices and other restrictions.

The Vocational Education Act of 1968 opened up a whole new concept for Coordinated Vocational Academic Education. Part G of the Act makes broad provisions for students in grades 8 through 12 in occupational explorations orientation, in simulated work experiences, and in actual work experience opportunities.

This is the first Second Year Curriculum for CVAE that has been written. This curriculum was partially developed by CVAE Coordinators attending a workshop at the University of Georgia, during the summer of 1970, and another group of CVAE Coordinators enrolled in a workshop during the summer of 1971.

This curriculum is to be used with CVAE students who are enrolled in the second year program of CVAE. It is hoped that this curriculum will provide knowledge, techniques, and practices that will greatly help in working in the school system in interlocking the vocational and academic instruction to the extent that school attendance and the pursuit of a good education will be more meaningful to the participating student.

ACKNOWLEDGEMENTS

This CVAE Second Year Curriculum was prepared during the school year 1970-71 by Georgia C.V.A.E. Coordinators enrolled in an internship and workshop at the University of Georgia.

The training of the coordinators was conducted by the Division of Vocational Education, College of Education of the University of Georgia, Athens, Georgia. Funds were made available from the following cooperating agencies:

Division of Vocational Education
Georgia State Department of Education
Atlanta, Georgia

and

Education Professions Development Act, Part F
U. S. Office of Education
Department of Health, Education and Welfare
Washington, D. C.

We are indebted to the following individuals for contributing their special talents:

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TABLE OF CONTENTS

UNIT: PLANNING YOUR FUTURE

UNIT OBJECTIVES:

To assist the student in self-appraisal to ascertain what he he has accomplished and hopes to accomplish.

To develop an awareness of job opportunities.

TOPICS:

I. What Have We Done? Where Are We Going?
II. Knowing Yourself
III. Choosing Your Career
IV. Occupational Resources
V. Career Satisfactions

UNIT: PLANNING YOUR FUTURE

TOPIC: What Have We Done? Where Are We Going?

BEHAVIORAL OBJECTIVES:

1. Students will be able to positively and negatively evaluate previous on-the-job and classroom experiences in CVAE.
2. Students will be able to evaluate their summer work experiences, if applicable.
3. Students will be able to suggest means of improving classroom and on-the-job experiences.
4. Students will be able to plan tentative experiences for the coming year.

UNIT: PLANNING YOUR FUTURE

TOPIC: What Have We Done? Where Are We Going?

Concept	Suggested Learning Activities
I. Students will be able to list at least two attitudes for each of the following areas: A. Positive experiences at work B. Negative experiences at work C. Positive experiences in class D. Negative experiences in class	I. Questionnaire: Students will fill out questionnaire, to be discussed in class. Role Playing: Where both positive and negative aspects of class and work experiences are brought out. Individual reports by those who had the most positive and negative experiences.
II. Students will where applicable evaluate their summer work experiences. A. Type of work B. Wages C. C.V.A.E. D. Attitudes of employer and employees E. Personal evaluation	II. Checklist: Students will fill out a checklist developed by coordinator. Presentation of slides or photographs showing students at training or other work stations.
III. Students will discuss means of improving classroom and on-the-job experiences. A. What the employer could do	III. Panel discussion: involving coordinator, students, faculty and employees (where possible)

UNIT: PLANNING YOUR FUTURE

TOPIC: What Have We Done? Where Are We Going?

Concept	Suggested Learning Activities
B. What the student could do C. What the coordinator could do D. What the faculty could do	Charts: Preparation of charts indicating major points covered in the discussion
IV. Planning of tentative experiences for the coming year. A. Listing areas of interest B. Listing methods of improvement	IV. Questionnaire: Students will complete questionnaire, which will become part of their personal portfolio.

UNIT: PLANNING YOUR FUTURE

TOPIC: Knowing Yourself

BEHAVIORAL OBJECTIVES:

1. The student will be able to appraise himself objectively through the use of test results.

2. The student will be able to explain why an occupation should be geared to ones interests.

3. The student will be able to explain the relationship of health to success on the job.

UNIT: PLANNING YOUR FUTURE

TOPIC: Knowing Yourself

Concept	Suggested Learning Activities
I. Appraisal through testing A. Personality revealed B. Areas of weakness indicated C. Mental maturity revealed D. Interests pin pointed	I. <u>Evaluation</u> (Abilities) A. Otis Quick scoring test B. California test of mental maturity C. G.A.T.B. test Some or all of the above tests should be used to give students an ides of their abilities. Reveal results of test that will have a positive effect on students.
	<u>Evaluation</u> (Personality) Give students a personality inventory.
	<u>Class Discussion:</u> Answer such questions as what effect does personality have on your success in a job? How can you overcome a lack of ability in a certain area?
	<u>Films</u>: Show some type of film on the relation of personality to success in life.
	<u>Games</u>: Personality Roundtable (Game #21 in "103 Games and Project")
	<u>Role Playing</u>: Role play reactions to good and bad personalities.

UNIT: PLANNING YOUR FUTURE

TOPIC: Knowing Yourself

Concept	Suggested Learning Activities
II. The importance of interest in an occupation A. Interest effects job success B. Interest alleviates boredom C. Interest provides more pride in work D. Interest stimulates occupational advancement or promotion	II. Evaluation (INTEREST) a. Strong vocational interest b. Kuder Preference record Class Discussion Answer such questions as: a. What effects does interest have on your success in a job? b. Should interest be one of the important criteria for selecting an occupatio Individual Class Project a. Write a paper less than two pages on an occupation you think you are interested in. Tell: 1. Why you are interested in it. 2. What some advanttages of this job are to you. Answer such questions as: 1. Will this job be permanent? 2. Will this job pay for enough to live on?
III. Good health leads to occupational success A. Concentration not impaired by illness B. Health effects the quality of work C. Good health impedes absenteeism	III. Guest Speaker: Have a county health nurse or physician come in and make a talk on "How to take care of yourself" Discuss relation of health to success on the job. Class Project: Have students

UNIT: PLANNING YOUR FUTURE

TOPIC: Knowing Yourself

Concept	Suggested Learning Activities
	pick up a physical examination form from their doctor or county health clinic.
	Discuss information on forms.
	Panel Discussion: Answer such questions as:
	Can you separate the physical form from the mental in a person, or do they complement each other?
	What do we mean by good mental health?
	Film: Show film on relation of physical fitness and mental fitness.

UNIT: PLANNING YOUR FUTURE

TOPIC: Choosing Your Career

BEHAVIORAL OBJECTIVES:

1. The student will be able to identify a suitable occupation as determined through testing and counseling.

2. The student will be able to list criteria necessary in consideration of a job.

UNIT: PLANNING YOUR FUTURE

TOPIC: Choosing Your Career

Concept	Suggested Learning Activities
I. Qualifications for an Occupation A. Know Yourself 1. Assess individual abilities 2. Assess individual aptitudes B. Interests 1. Outdoor 2. Mechanical 3. Computational 4. Scientific 5. Persuasive 6. Artistic 7. Literary 8. Musical 9. Social Service 10. Clerical	I. Tests 1. Give Otis Achievement or California 2. Give Kuder Preference, GATB or Strong 3. Counsel with students individually Film: Show "Choosing Your Occupation" Georgia Film Lab. Read: "Choosing Your Career" by J. Anthony Humphreys, SRA Guidance Service Chart: Make a chart of the activities you enjoy and those you dislike.
II. Explore various aspects of specific jobs through discussions and obsersvations. 1. Promotional Advantages 2. Working Conditions 3. Compensation 4. Co-workers attitudes	II. Guest Speaker: Invite people daily who are qualified to discuss the total job picture in those areas in which the students are most interested. Field Trips: Follow up guest speakers' visits with field trips to these job operations. Transparency--Most Rapidly Expanding Occupations, 1960-1970 Discuss the outlook for various occupational groups. Identify the specific occupations in each group. Analyze reasons for greater anticipated changes in some occupations. Buzz Sessions: Divide class into small groups , ask them to discuss topics over period of time.

UNIT: PLANNING YOUR FUTURE

TOPIC: Occupational Resources

BEHAVIORAL OBJECTIVES:

1. The student will list five sources of materials where he may find information related to the occupation of his choice.

UNIT: PLANNING YOUR FUTURE

TOPIC: Occupational Resources

Concept	Suggested Learning Activities
I. Occupational Literature A. Library Materials 1. Dictionary of Occupational titles 2. Occupational Outlook Handbook 3. The Encyclopedia of Careers and Vocational Guidance I&II. B. Company literature on occupations 1. Southern Bell 2. General Motors 3. Sears Roebuck C. Textbooks 1. Trades and Industry 2. Retail and Merchandising 3. Clerical 4. Ag.and related areas D. Audio-Visual Resources	I. Library: Have students make two complete job descriptions. Resource Personnel: Have resource personnel to present discussion to class on careers in their company Lab. Library: Have students make a display of materials from private industry. Textbooks: Have display of several textbooks on occupational in the room. Georgia Film Catalog: Several films on occupations may be secured from the above source. Free Film: Films may be secured from private industry. Commercial Films: Films may be secured from commercial film firms at a resonable charge.

UNIT: PLANNING YOUR FUTURE

TOPIC: Career Satisfaction

BEHAVIORAL OBJECTIVES:

1. The student will be able to write and discuss orally personal satisfactions he anticipates from his career choice.

2. The student will be able to list some of his contributions to society with his career satisfaction.

UNIT: PLANNING YOUR FUTURE

TOPIC: Career Satisfaction

Concept	Suggested Learning Activities
I. Personal Benefits A. Job Security B. Economic Well Being C. Job Flexibility D. Sense of Contributions E. Personal Pride of Achievement F. Personal Enjoyment	I. Materials: Occupational Outlook Handbook Guest Speaker: Have representative from Labor Department of leader in industry to discuss career field shortages and anticipated demands. Group Activity: Have class, as a group, compile a list of benefits they believe should be obtained from career satisfaction. Role Play: Have students act as if they were working in a career they did not like. Use play money as pay. Have class point out how the individuals situation could be improved.
II. Societies Gain A. A Needed Career Vacancy Aided B. Economic Self Preservation C. More Productive	II. Resource Personel: Have people career fields in need of personel to discuss their career and answer any questions Group Activity: Have class make a list of responsibilities they believe each individual has to society. Reports: Each student will prepare or give orally a short report on his career's choice and why he believes he can achieve career satisfaction from this choice.

UNIT: ABOUT THAT JOB

UNIT OBJECTIVES:

To introduce job expectations and responsibilities to the student.

To present possible avenues for further education.

TOPICS:

I. Getting the Job

II. Knowing the Job

III. Changing Jobs

IV. Opportunities for Further Education

UNIT: ABOUT THAT JOB

TOPIC: Getting the Job

BEHAVIORAL OBJECTIVES:

1. Students will be able to list at least eight steps necessary to accurately, neatly, and concisely complete job application forms.

2. Students will be able to construct an acceptable personal data sheet.

3. Students will be able to construct an acceptable letter of application.

4. Students will be able to state eight areas of preparation in getting ready for job interviews.

5. Students will be able to list twelve do's and twelve dont's which are necessary considerations for proper conduct during a job interview with a prospective employer.

UNIT: ABOUT THAT JOB

TOPIC: Getting the Job

Concept	Suggested Learning Activities
I. Completing the Application Form A. Social Security Number B. Three Personal References, other than Relatives C. Desirable Characteristics 1. Neatness 2. Accuracy 3. Conciseness 4. Completeness	I. Field Trip to Social Security Office to secure each student a number Transparency presenting nine steps for best results Assignment: Obtain name, address, business occupation, and telephone number of three persons from whom student obtained permission to use as reference. Sample job application provided by coordinator will be completed by each student.
II. Preparing the Personal Data Sheet A. Characteristics of a Good Data Sheet 1. Accuracy 2. Neatness 3. Completeness 4. Conciseness (one-page) 5. Simplicity 6. Correct Grammar 7. Correct Spelling 8. Correct Punctuation 9. Typewritten 10. Organization B. Necessary Information 1. Name 2. Address	II. Transparencies examples of personal data sheets will be presented via transparencies. Preparation of personal data sheet by each student. Originality will be goal. Group discussion: Have group discuss what they think constitutes a good personal data sheet and let each group present their results to the class.

UNIT: ABOUT THAT JOB

TOPIC: Getting the Job

Concept	Suggested Learning Activities
3. Photograph 4. Telephone Number 5. Marital Status 6. Military Status 7. Height 8. Weight 9. Health Condition 10. Date of Birth 11. Education 12. Work Experience 13. Hobbies and Interests 14. Extracurricular Activities 15. Special Honors 16. Employment Availability Data	
III. Preparation of a letter of application A. Characteristics of a good letter of application 1. Neatness 2. Brevity 3. Factual 4. Typewritten 5. Correct form 6. Originality	III. Students will compare and evalute samples of original approaches. Class will be asked to select the good characteristics of a sample letter. Composition of a letter of application by each student which could actually be sent to a prospective employer.
IV. Preparing for the Interview A. Consider "How can I be an asset to the organization? B. Learn as much as possible	IV. Students will answer possibl interview questions randomly selected from cards. Class members criticize, calling attention to such things as annoying mannerisms, nervousness, clarity, etc.

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UNIT: ABOUT THAT JOB

TOPIC: Getting the Job

Concept	Suggested Learning Activities
about the firm and job position for which applying.	Assign each student an organization to research
C. Arrive early at interview.	Formulation of list of possible interview questions suggested by students to be asked by interviewer and by the interviewee (student).
D. Anticipate possible questions to be asked by interviewer.	
E. Consider questions to ask interviewer.	Have each student practice in front of a mirror sitting down and getting up correctly.
F. Practice entering and leaving a room, sitting down, and getting up correctly	Role play telephone calls to make appointments for interviews.
G. Always make an appointment before the interview	
H. Find out full name and title of interviewer	
I. Find location of organization in advance of the appointment	
J. Take a pen and personal data sheet to the interview	
V. Proper Interview Conduct A. DO:	V. Role playing: Good and bad interview. Students will identify good and bad points.

UNIT: ABOUT THAT JOB

TOPIC: Getting the Job

Concept	Suggested Learning Activities
1. Telephone interviewer if unavoidably detained 2. Remain standing until asked to be seated 3. Smile as you enter the room 4. Use correct hand-shaking customs 5. Use good posture 6. Think before answering questions 7. Listen carefully 8. Use correct grammar 9. Show interviewer in the eye 10. Show respect to the interviewer, (mr.. Yes Sir, and etc. 11. Convince the interviewer you're interested in the job 12. Look alert 13. Introduce yourself and state business to receptionist 14. Ask intelligent questions 15. Be poised and relaxed 16. Let interviewer control the interview 17. Answer questions completely, truthfully, and concisely 18. Thank interviewer and receptionist B. Don't: 1. Talk yourself out of a job	Group Work: Instruct the students to divide into groups of three members. Each group divided will make a list of do's and dont's for a job interview. Use student lists to make a master list on board. Guest interviewer: Ask several business men to conduct practice interviews with each student.

UNIT: ABOUT THAT JOB

TOPIC: Getting the Job

Concept	Suggested Learning Activities
2. Beg for a position 3. Come on too strong 4. Use slang 5. Smoke 6. Chew gum 7. Make excuses 8. Criticize (exs.,school, previous employers, etc 9. Give vague answers 10. Say, "I'll do anything" 11. Brag 12. Take anyone with you 13. Discuss personal problems 14. Represent low morals 15. Hang up coat until invited 16. Hand-shake limply 17. Mumble 18. Decide when to end interview 19. Make excuses	

RESOURCE MATERIALS

Pamphlet "Can I Get the Job?" Public Relations Staff, General Motors, Detroit, Michigan 48202

Pamphlet "Getting the Right Job". Glidden-Durkee, Division of SC[illegible] Corporation, 900 Union Commerce Building, Cleveland, Ohio 44115

Pamphlet "How to Get a Head Start on Success". Olympia USA INC.,Box 22, Somerville, New Jersey 08876

Pamphlet "Making the Most of Your Job Interview". New York Life Insurance Company, Community Agent.

UNIT: ABOUT THAT JOB

TOPIC: Knowing the Job

BEHAVIORAL OBJECTIVES:

1. The student will be able to list the educational requirements of at least two areas in which he is interested.

2. The student will be able to list the skills required in two areas of employment.

3. The student will be able to list three factors involved in the working conditions of two different jobs that he visited.

4. The student will be able to list three factors about the salary expected in a job and also three fringe benefits offered by the business.

5. The student will be able to list three factors involved with advancement on a job.

UNIT: ABOUT THAT JOB

TOPIC: Knowing The Job

Concept	Suggested Learning Activities
I. Educational Entrance Requirements A. High School B. Vocational-Technical School C. Colleges and Universities	I. Panel Discussion: Panel composed of personnel directors from cross section of business to discuss educational requirements for various jobs within their occupations. Research: Have students choose two areas of interest and find educational entrance requirements for each. (Reference: DOT, Career Encyclopedia) Bulletin Board: Have students prepare bulletin board from their findings.
II. Initial Skills Required A. Professional B. Clerical and Sales C. Service D. Agricultural E. Trades F. Semi-Skilled G. Unskilled	II. Show Films: Following are some films suggested to be shown to describe skills needed in various occupational fields: 1. Knowledge & Skill Associated films 2. Our American Crossroads Public Relations, Staff Lib. General Motors. 3. Careers in the Building Trades (Basic Skills) Georgia Film Lib. 4. The Metal Worker Georgia Film Lib. 5. Do I Want To Be a Secretary Georgia Film Lib.

UNIT: ABOUT THAT JOB

TOPIC: Knowing The Job

Concept	Suggested Learning Activities
	Chart: From Encyclopedia of Careers and Occupational Handbook, have students prepare a chart on skills required.
III. Working Conditions A. Location of Work B. Safety C. Physical Plant	III. Field Trips: Have students visit various businesses in vicinity to examine physical plant. Maps: Have students make maps of city or pinpoint industries in which they are interested. Buzz Sessions. Have small group buzz sessions discussing safety precautions observed on field trips.
IV. Expected Salary A. Federal Wage Regulations B. Fringe Benefits 1. Insurance 2. Workmens compensation 3. Retirement system 4. Vacations	IV. Research: Have class research salaries in "Guide to Occupational Areas for Salary Schedules by H.T. Lester Jr." Guest Speaker: Invite represenatives from the State or Federal Department of Labor to speak to class. Have students participate in question period.

UNIT: ABOUT THAT JOB

TOPIC: Knowing the Job

Concept	Suggested Learning Activities
5. Sick-leave	Chart: Using information derived from research and guest speaker, have students plot a chart.
V. Opportunities for Advancement A. Job Turnover B. Number employed C. Seniority	V. Research: Have each student interveiw some-one employed in his area of interest and get information on advancement opportunities. Report: Have students report to the class on their findings.

UNIT: ABOUT THAT JOB

TOPIC: Changing Jobs

BEHAVIORAL OBJECTIVES:

1. The student will list 4 reasons why a person voluntarily will change jobs.

2. The student will list 4 reasons why a person involuntarily will change jobs.

3. The student will identify two steps to be taken when resigning from a job.

UNIT: PLANNING YOUR FUTURE

TOPIC: Changing Jobs

Concept	Suggested Learning Activities
I. Voluntarily Changing Jobs. 1. Salary Improvement 2. Job Advancement 3. Personality Conflict 4. Geographical Preference 5. Others	I. Discussion: Have students list the reasons and discuss the listing. Speaker: Have State Employment officer discuss relocation potential.
II. Involuntarily Changing Jobs. 1. Dismissed (Fired) 2. Laid off (Lack of work) 3. Labor Strike 4. Health (Relocation) 5. Others	II. Discussion: Have students list the reasons and discuss the listing. Speaker: Have State Employment officer discuss Unemployment benefits
III. Resigning From the Job. 1. Written Notice 2. Verbal Notice 3. Adequate Time 4. Recommendation	III. Speaker: Have employer visit and discuss correct procedure for resigning. Speaker: Have State Employment officer discuss Job Market. Role-Play: Students will role-play employer and resigning employee. Reverse Roles: Class will judge.

UNIT: ABOUT THAT JOB

TOPIC: Opportunities for Further Education

BEHAVIORAL OBJECTIVES:

1. The student will be able to recognize the role of the area vocational-technical schools in the continuing education. He will also examine his educational needs to determine whether a vo-tech school would furnish the desired out-comes and make a listing of ways he would benefit from an area vo-tech school.

2. The student will be familiar with the requirements and programs offered in local colleges in order to gain a broad perspective of the eduactional processes of the colleges or universities. This will be obtained by contact with college personnel and visitation to a college.

3. The students will meet representatives of the Armed Forces, both recruiters and local servicemen, in order to make some judgments concerning the enlistment and training careers offered by the Armed Forces. The Armed Forces will be of special interest to some of the C.V.A.E. students.

4. Students will be shown that training doesn't necessarily stop once the job is obtained. On-the-job-training and special courses available to employees will be outlined by industrial personnel who visit the classroom.

UNIT: ABOUT THAT JOB

TOPIC: Opportunities for Futher Education

Concept	Suggested Learning Activities
I. The Area Vocational - Technical School and You. A. Role of the Area Vo-Tech School. 1. Senior Plan for High School students. 2. Regular Post-High School Programs. B. Admission to the Vo-Tech School. 1. Academic Requirements 2. Entrance Fees and other charges	I. Speaker: Have Admissions Director from area Vo-Tech School meet with the class and discuss the various programs, entrance requirements, and fees, also locations. Field Trip: Take the class on a field trip to a local Vo-Tech School to see the facilities available and give personnel a chance to introduce their various courses of study. Guidance Counselor: Ask the High School Guidance Counselor to meet each student privately to discuss aptitude scores, abilities exhibited, and opportunities for further education.
II. How about College? A. Is College for you? 1. College Entrance Requirements. 2. Tuition and Expenses. 3. Course Offerings. B. What type of College? 1. Universities 2. Junior Colleges 3. Private 4-Year Colleges	II. Speaker: Have Admissions Director from a nearby college discuss the requirements for admission to college and various ways to pay expenses. Field Trip: Take the class on a field trip to a nearby college or university to see college life as well the various courses offered. Films: Obtain films or filmstrips on higher education in general.

UNIT: ABOUT THAT JOB

TOPIC Opportunities for Further Education

Concept	Suggested Learning Activities
III. Uncle Sam will train you. A. Armed Forces will train men and women in specialized areas (Skills to be used only in Armed Services). 1. Branches of the Armed Forces and specialties of each. 2. Entrance into the Armed Forces and how to obtain training in the desired career field by examination.	III. Speaker: If possible, have recruiters from all branches of the Armed Forces make a visit to your class and bring related films, brochures, etc., to answer the students questions. Arrange for boys and girls to hear the recruiters. Speaker: Have someone in the community who is in the service or who has recently been discharged come in and present his side of the picture so that the students may draw better conclusions.
IV. Many Businesses will give you further training or schooling. A. Businesses are constantly trying to upgrade by sending people to special training sessions or schools. 1. Modern techology makes it necessary to constantly keep abrest of the changing times and methods. 2. Employees need special training in new methods or techniques in their jobs.	IV. Speaker: Arrange for Personnel Managers to Visit your class to discuss training programs for employees and the possibility of special training or schooling to further the students education. Speaker: If any local plant is using Co-op students from a college, try to arrange for this student to meet your class and discuss the Co-op training program.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

UNIT OBJECTIVES:

To introduce to the student personal financial planning, banking, and financing.

To familiarize the student with the types of credit cards available.

To discuss with the students the types of automobile insurance coverage available.

TOPICS:

I. Financial Planning: Budgeting-Record Keeping

II. Banking

III. Getting Your Money's Worth

IV. Financing

V. Credit Cards

VI. Automobile Insurance

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Financial Planning: Budgeting - Record Keeping

BEHAVIORAL OBJECTIVES:

1. The student will be able to take one income and develop a realistic financial plan.
2. The student will be able to keep meaningful records.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Financial Planning: Budgeting - Record Keeping

Concept	Suggested Learning Activities
I. Plan for using ones income A. The student is aware of the source and amount of total income available for budgeting B. Given the fixed expense items, the student is able to identify amount of money necessary for these items in his own budget. C. The student is able to weigh alternatives and make wise choices inkeeping with his priority list of goals as he establishes amounts of money for flexible expenses. D. The student is able to estimate the amount of money necessary for his own emergency fund using two or three months income as a general criteria. E. After a study of procedure for making a financial plan, the student can construct a plan for his own use.	I. Management for Modern Families Gross Crandall. pages 332-370. In estimating income, it is necessary to include everything that will be received dividends, interest, bonuses, and any other source of income. Use chalkboard or over head projector and make a list of items included in total income. Film strip Consumer in Action Institute of Life Insurance, 277 Park Avenue N.Y., N. Y. 10017. When planning the use of income unavoidable items such as rent or mortgage, payment insurance premiums, real estate taxes, and installment payments, must be considered. List of fixed expenses: Have each student make a list of his own fixed expenses and deduct these from his net salary or take home pay. A Date With Your Future Health Insurance Institute New York

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UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Financial Planning Budgeting - Record Keepin

Concept	Suggested Learning Activities
	The amount remaining from fixed expenses can be allocated to variable expenses such as food, clothing, house furnishings, and personal allowances.
	List: Make a list of items used monthly that vary in cost or amount of money one spends for them.
	Discuss need for emergency fund.
	Present criteria for selecting flexible items to be included in a budget. Include: clothing, recreation, food, laundry, medicine, personal articles, car operation, and miscellaneous.
	Class Discussion: It is recommended that the equivalent of at least two months income be accumulated to provide for the unexpected that always arise but can not be anticipated. Lead class in estimating the amount of money necessary for emergency fund.
	A Divided Responsibility Family Budget Plan, Teacher Kit.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Financial Planning: Budgeting - Record Keeping

Concept	Suggested Learning Activities
	A financial plan is most likely to be sucessful when the persons involved plan it together and the needs and wants of each member of the family are considered carefully. Brain storm and make a list of reasons for making a financial plan. Show Film Strips: New Look at Budgeting. Discuss. Discussion: Give class a list of steps in making a budget. Taking an imaginary family and work out a budget for it. Slide Guide Family Budget Plan Kit - Consumer Finance Association.
II. The student will be able to keep meaningful records. A. The student is able to select a record keeping system appropriate for his needs. B. The student can list ways in which check stubs can serve as financial record.	II. Discuss why it is important to keep records, kind of records needed and how long they should be kept. Search through news papers to identify ways some records have been used. Keeping a check book up to date helps to verify

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Financial Planning: Budgeting - Record Keeping

Concept	Suggested Learning Activities
C. The student can demonstrate the kind of records needed for tax purposes and procedure for keeping these records.	payments and provide a reliable method of keeping up with money spent. Consider how adequate financial records benefit the individual or family.
A. Better financial planning can be done with comprehensive knowledge of taxes. B. Study procedures for filing tax forms and fill out an income tax form.	_Thresholds of Adult Living_, H.T. Craig. _Management for Modern Families_, Gross-Crandall. _Speaker_: Invite a bookkeeper, accountant, and banker to discuss writing checks. Importance of keeping account balanced, and why cancelled checks and stubs should be kept for reference.
D. The student recognizes the value of records for future planning and can contrast the difference between efficient and unorganized records. E. The student will have an efficient plan of record keeping for his own use.	_Resource Speaker_: Use IRS resource person. _Discussion_: Relate personal experiences or those of friends who have had to support tax forms and tell what was needed. _Role Play_: Possible family scene of efficient record keepers and unorganized ones. _Bulletins_: Household Finance Corporation, publisher, _Moderns Make Money Behave_, _Money Management for Young Moderns_, _Your Budget_.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Financial Planning: Budgeting - Record Keeping

Concept	Suggested Learning Activities
	Develop a Bulletin Board showing record keeping techniques. State ways efficient records can help save money. *Better Homes and Gardens* and other popular magazines for methods of record keeping. *Changing Times* and other popular magazines for methods of budgeting. *It's Your Money* Teacher Kit.

RESOURCES

American Banker Association. *Personal Management*, N.Y., N. Y.

Hawver, Carl F., Ph. D.. Teacher Kit "A One Week Teaching Unit on Consumer Finance." Free through Col. R. H. McKinnon (Ret'd), Georgia Consumer Finance Association, 205 Henry Grady Building, Atlanta, Georgia 30303

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Banking

BEHAVIORAL OBJECTIVES:

1. The student will be able to fill out application for checking account, fill out deposit slip, and write a check correctly.

2. The student will be able to list four reasons for having a checking account.

3. The student will be able to list four reasons for having a savings account.

4. The student will be able to list four services provided by the bank and explain each one.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Banking

Concept	Suggested Learning Activities
I. Checking Account A. Fill out application for checking account B. Fill out a deposit slip C. Write a properly written check (including stub)	I. Bulletin Board: Construct a bulletin board showing a properly written check. Guest Speaker: Have a bank official speak to class on importance of bank Related Materials and Forms: Secure applications blank checks deposit slips and check stubs for each student. Have each student to practice on each.
II. Savings Account A. Importance of Savings Account B. Saving Certificates	II. Interlocking: Work with team teacher in math to calcuate interest rates Role Playing: Have the students set up a banking situation. Let the students become bank officials and tellers. Several students could deposit money, with draw money, borrow money and set up a savings account.
III. Other bank services A. Cashiers check B. Certified check C. Bank draft D. Travelers checks E. Safe deposit box	III. Bank Forms: Obtain from the bank cashiers checks, certified checks, bank drafts and travelers checks if possible, discuss each of these.

Bank Tour: Take the students on a tour through a local bank, showing them the equipment used and safe deposit boxes.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Getting Your Money's Worth

BEHAVIORAL OBJECTIVES:

1. The student will list five ways to get the most for his money.

2. After comparing three products which are the same except made by different companies, the student will be able to compare and contrast prices.

3. The student will be able to name and explain different ways of buying without cash.

4. The student will be able to list and discuss fully the sources from which money is borrowed.

5. The student will list five ways of protecting buying power.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Getting Your Money's Worth

Concept	Suggested Learning Activities
I. Ways of getting the most for your money A. Make the right choice when spending. B. Money earns money through interest on savings, stocks, bonds, insurance, and pensions. C. Set goals for spending. (Budget) D. Practice comparison shopping. E. Pay cash and save credit charges. F. Plan your buying. G. Purchase needed items first. H. Take care of purchases; have good credit. I. Beware of gimmicks and false advertising.	I. Group Project: Obtain materials from banks on interest amounts, materials from stock brokers, materials from insurance companies about savings plans. Bring materials to class for group discussion. Individual Project: Given a certain amount as income, the students will prepare a budget. Combine these ideas and with the help of the class, draw up an ideal one. Field Trip: To grocery store to compare prices of foods and different amounts charged for various weights and measures. Check to see if specials are really that. Newspaper advertising may also be used in conjunction with this activity. Discuss and make Comparison Chart: for selected items purchased with cash and then figure credit charges for different amounts of time on same items. Record the savings on each. Discuss: Methods for planning your purchase.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Getting Your Money's Worth

Concept	Suggested Learning Activities
	<u>List</u>: Items wanted and needed. Discuss differences and importance of putting first things first. <u>Group Projects</u>: Each group will be given one of the following and be expected to lead a class discussion on it. Care of clothes Care of food Care of furniture Care of the home Care of equipment Care of a car Care of public property <u>Special School Project</u>: (CVAE Club) After getting interested in school property the Club could undertake the project of making the other students aware of what is happening to their school, and how much it costs each year. Maybe in this way with the students taking over some of the vandalism could be avoided. Assembly programs, talks to individuals and groups, posters etc. used.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Getting Your Money's Worth

Concept	Suggested Learning Activities
II. Determining Value A. Inventory of what you have. B. Decide what is really needed as replacements. C. Shop around and compare prices before you decide to buy. D. Consider carefully the size and style; praticality of it. E. Check carefully the quality, for the "best" is not always the best buy. F. Decide on the best time to buy. G. Ask friend's opinion. H. Use buying guides and protections set up for consumer.	II. Class Discussion: (a) Where to buy; factors to look for such as materials, construction etc. (b) Factors such as rapidly changing styles and rapid growth considered before making purchase. Special Report: (Volunteer) Reasons to buy certain items. Material obtained from Consumer's Guide and visit to local merchants. Resource Materials: Use government pamplets, consumer reports, Better Business Bureau.
III. Buying now and paying later. A. Not enough cash on hand to pay for a needed i item. B. Establish good credit by having good character, capacity, and capital. C. Know how to open a charge account. D. Use good judgment about credit; set a limit E. Understand fully the lay-a-way plan.	III. Speaker: Credit Manager from local department store invited to speak to the students on credit rating, charge accounts, lay-a-way plans, installment buying, etc. Advantages and disadvantages of each.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Getting Your Money's Worth

Concept	Suggested Learning Activities
F. Installment buying can be risky; check it carefully. G. Read small print carefully and know interest rates.	
IV. Borrowing Money A. Lending concerns 1. Banks 2. Savings and Loan Association 3. Small Loan Companies 4. Credit Unions 5. On Insurance Policies B. Reasons for: 1. Debt Consolidation 2. Lower Interest 3. Reputable firm	IV. Group Project: Class divided into groups and they are to be responsible for getting material and presenting it to the class concerning the lending agencies. Discuss: Material after it is brought to class. Differentiate between lender and their various services.
V. Security against loss of buying power. A. Government helps protect people: 1. Unemployment insurance 2. Old-age, survivors, and Disability Insurance.	V. Special Reports: On different types of government protection. Speaker: From local Social Security Office to explain. Bring applications to fill out so every student will have a card.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Getting Your Money's Worth

Concept	Suggested Learning Activities
3. Workmen's compensation	Class Discussion: Health, life, car, and property insurance. Know the significance and importance of each.
B. An individual protects:	
1. Health insurance 2. Life insurance 3. Car insurance	
a. Liability b. Comprehensive	
4. Property insurance	
a. Homeowners b. Mortgage cancellation	

UNIT: MANAGING DOLLARS IN YOUR LIFE

TOPIC: FINANCING

BEHAVIORAL OBJECTIVES:

1. The student will list the four major forms of consumer credit and write a short definition of each.

2. The student will be able to list two advantages and two disadvantages of consumer credit.

3. The student will be able to figure simple interest by the basic interest formula.

4. The student will be able to name the three classifications of financial institutions and give four subdivisions of each.

5. The student will write a paragraph on employment opportunities in the field of finance.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: FINANCING

Concept	Suggested Learning Activities
I. Forms of consumer credit A. Charge accounts B. Installment buying C. Personal loans D. Mortgages	I. Field Trip: Have the students go to a local department store and go through the necessary steps to open a charge account. Guest Speaker: Have the local banker speak to the class on personal loans and mortgages.
II. Advantages and disadvantages of consumer credit A. Advantages B. Disadvantages	II. Panel Debate: Divide the class equally for a debate of the pros and cons of consumer credit.
III. Basic interest formula A. Interest B. Principal C. Rate D. Time E. I=PRT	III. Problems: Have the students to work 10 simple interest problems using the formula.
IV. Financial institutions A. Long-term capital B. Short-term loans C. Federal agencies	IV. Research: Ask the students to use the following book and find the classifications of financial institutions and their various subdivisions. Introduction to Business: by Raymond E. Glos and Harold A. Baker, Southwestern Publishing Company, Chicago 1963, pp. 431-449.

UNIT: MANAGING DOLLARS IN YOUR LIFE

TOPIC: Financing

Concept	Suggested Learning Activities
V. Employment opportunities A. Clerical B. Credit manager C. Cashier D. Collector	V. Interview: Ask each student to interview at least two people who are presently employed in the field of finance.

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UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Credit cards

BEHAVIORAL OBJECTIVES:

1. Students will recognize major well known credit cards and know what types of purchases can be made with each.

2. Students will distinguish between various types of payment plans.

3. Students will figure finance charges and monthly payments on credit purchases.

4. Students will set up a budget with regard to billing dates of charges.

5. Students will participate in discussion of responsibility and liability of credit card use.

6. Students will list five steps to take if credit card is lost or stolen.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Credit cards

Concept	Suggested Learning Activities
I. Major Credit Cards A. All Purpose 1. Bank Americard 2. Diner's Club 3. American Express 4. Master Charge B. Oil Products 1. American 2. Gulf 3. Shell 4. Phillips 66 5. Union 76 C. General Merchandise 1. Sears 2. J.C. Penny's 3. Rich's 4. Zayre 5. Treasure Island	I. Display of credit cards. Change Plato slip is printed with charge plate. Field trip department of variou stores and companies.
II. Payment Plans A. Regular charge B. Revolving charge C. 30-day D. Terms	II. Role Play: Set up a sample charge and illustrate how various payment plans could change interest, finance charges and time of payment.
III. Finance Charges A. Annual service fee B. Interest C. Percent D. Monthly Statements	III. Compute simple and compound interest. Figure interest and overhead. Discussion reading of sample monthly statement (balance due, credit, etc.)

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Credit cards

Concept	Suggested Learning Activities
IV. Budget A. Wages B. Bills C. Billing dates	IV. <u>Budget</u>: Set up sample budget using fixed expenses.
V. Responsibility and liability A. Limit B. When to charge C. Who can charge D. Responsibility to pay E. Legal consequences	V. <u>Discussion</u>: Group aided by credit manager, representative of credit card corporation, collection agency, or lawyer.
VI. Loss of card A. Responsibility of possession B. Report of loss	VI. <u>Discussion</u>: Discussion group on what to do if lose charge card.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Automobile Insurance

BEHAVIORAL OBJECTIVES:

1. The students will be able to use the terms insurer, insured, policy, policy holder, and premium correctly.

2. The students will be able to distinguish between liability and comprehensive automobile insurance.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Automobile Insurance

Concept	Suggested Learning Activities
I. Terms: A. Insurer B. Insured C. Policy D. Policy Holder E. Premium	I. Role Play: Provide students with terms and definitions. Let students play the part of an insurance salesman in explaining the terms to a prospective client. Bulletin Board: Let students make a display of different kinds of policies with a brief description of the purpose of each policy.
II. Automobile Insurance A. Are you financially responsible? B. Analyzing your automobile 1. Bodily injury liability 2. Medical payments 3. Protection against uninsured 4. Property damage liability 5. Comprehensive physical damage 6. Collision C. Factors involved in insurance cost 1. Place of residence of insured person 2. The value of the auto 3. Purpose for which auto is used 4. Number of miles driven per year	II. Speaker: Have an Insurance Agent come and explain the automobile insurance policy and rates and provide the students with an automobile policy. Field Trip: Take students to visit an insurance agency. Debate: "Every owner of an automobile should be required by law to carry insurance," and "How this law could be enforced." Speaker: A representative of the State Patrol to talk with the students on laws governing operators of automobiles.

UNIT: MANAGING THE DOLLARS IN YOUR LIFE

TOPIC: Automobile Insurance

Concept	Suggested Learning Activities
5. Age of the driver 6. Safety record of the driver	Bulletin Board: Let students make a display of newspaper articles and pictures centered around an automobile insurance policy concerning automobile accidents.
D. Drivers responsibility if he is involved in an accident	

UNIT: BUSINESS IN TODAY'S FAST WORLD

UNIT OBJECTIVES:

To assist students in learning about business and its organization.

To make students aware of the necessity for forming good work relations with their employer and fellow workers.

TOPICS:

I. Free Enterprise System

II. Business Organization

III. Ethics in Business

IV. Business Relationships (Employer, Co-worker)

UNIT: BUSINESS IN TODAY'S FAST WORLD

TOPIC: Free Enterprise System

BEHAVIORAL OBJECTIVES:

1. The students will list the requirements concerning the foundations of free enterprise.

2. The students will identify the relationship of free enterprise to democracy.

3. The students will list examples of modification concerning Free Enterprise that have been developed in the U.S.

4. The students will answer correctly the freedoms that he would lose if the government owned all property.

UNIT: BUSINESS IN TODAY'S FAST WORLD

TOPIC: Free Enterprise System

Concept	Suggested Learning Activities
I. What are the requirements of free enterprise? A. Private property 1. The sources of our personal income are wages for the work we do. 2. Profits from business transactions. 3. Interest for money we have loaned. 4. Rent for use of buidlings or land. B. Profit motivation C. Free Markets D. Competition	I. <u>Charts</u>: Have students make and study charts of how free enterprise works. <u>Resource Speakers</u>: from busines world. Topic: Business & its operation. <u>Films</u>: Buying of products <u>Group discussions</u>: 1. What is the essentials of the free market syst 2. What is public property. 3. What is private property.
II. How is free enterprise related to democracy? A. The right to compete B. Everyone is free to enter any business, trade or other. C. Everyone is free to purchase what he wants and how much he wants. D. Certain basic freedoms: 1. Freedom of thought 2. Freedom of speech 3. Freedom of action 4. Freedom of press 5. Freedom of worship	II. <u>Charts</u>: Prepare different kind of posters depicing the aids and services the government provides produces of economic goodes and services. <u>Films</u>: How a corporation is set up. <u>Group discussion</u>: What are the essential features of the free enterprise system? <u>Role-playing</u>: Let the students review the basic freedoms.

UNIT: BUSINESS IN TODAY'S FAST WORLD

TOPIC: Free Enterprise System

Concept	Suggested Learning Activities
III. What is the free market system or economy? A. Free market for consumer goods and services. B. Organization of enterprises for production. C. Free markets for productive services. D. Individuals determine amount of income, size of family in relation to prices and services.	III. Role-playing: Let students plan business enterprises and set prices of wages and products. Group discussion: 1. How does profit determine whether a product will or will not be used? 2. How does free-enterprise economy help the consumer? 3. How am I affected by the buying habits of others? Films: Buying certain products
IV. How does government interfere? A. Placing high rates of taxation on those with high income. B. Establishing minimum wages rates. C. The government support of farm products. D. Taxing everyone in order to provide government services for those who otherwise might not be able to afford it.	IV. Film: "Business Problems" Group discussion: How does government interfere in the free enterprise system? Charts: Prepare a report showi the historical record of government action to aid business by expanding markets or by preserving free competition. List: examples of how government interferes with the free market system.

UNIT: BUSINESS IN TODAY'S FAST WORLD

TOPIC: Business Organization

BEHAVIORAL OBJECTIVES:

1. The student will name and describe verbally or in writing the four things that must be brought together before a business is formed.

2. The student will be able to list four types of business organizations with a simple chart showing the structure.

3. The student will be able to identify at least two or more of at least three types of businesses that operate in his community either in writing or verbally.

UNIT: BUSINESS IN TODAY'S FAST WORLD

TOPIC: Business Organization

Concept	Suggested Learning Activities
I. Factors of Production: A. Land (Natural Resources) B. Labor (Human effort used in the production effort) C. Capital (Funds used to create tools or machinery in the production of goods D. Enterpriser (Person or persons who initiate, organize, operate and take the risk.	I. Discuss: the meaning of the four factors of production using as many varied illustrations as possible. Outline: the four factors of production of one of the local business or industries. Filmstrip: "Private Investment and Economic Growth" American Petroleum Institute, 1271 Avenue of the Americas, New York, New York 10020
II. Types of Business Organization A. Single Proprietorship (Owned by one person) B. Partnership (two or more persons combine their labor, capital, or land) C. Corporation (Association of individuals, know as stockholders, which is empowered by government to engage in a business as a single business). D. Cooperatives (An organization designed to provide services for its members).	II. Discuss: the four main types of business organizations - giving definition and illustration of each. Socio-drama: three friends discussing whether a single proprietorship or a partnership is the best way of organizing and running a business. Have one person summarize with the class the advantages and the disadvantages brought out and what conclusions were reached in the drama. Study: the stock exchange listing in the daily news to see how many corporations are listed. Speaker: Invite local Farm Bureau president to speak to class on the cooperative organization of the Farm Bureau

UNIT: BUSINESS IN TODAY'S FAST WORLD

TOPIC: Business Organization

Concept	Suggested Learning Activities
III. Comparing Businesses: A. Different Types of Business B. The structure of the Business	III. <u>List</u> about 25 business firms in the community (possible from yellow pages of telephone directory) and find out which type business each is. <u>Visit</u>: one type of each of the first three businesses and ta to owner or manager. <u>Film</u>: "How a Corporation is set up". <u>Role-playing</u>: Let the student set up and run a small loan company. <u>Film</u>: "Empty Lot"

UNIT: BUSINESS IN TODAY'S FAST WORLD

TOPIC: Ethics in Business

BEHAVIORAL OBJECTIVES:

1. The learner will write the definition of ethics.
2. Given specific business practices, the learner will identify and discuss those practices considered unethical or deceptive to the consumer.
3. The learner will list places where cases of unethical business practices can be reported.

UNIT: BUSINESS IN TODAY'S FAST WORLD

TOPIC: Ethics in Business

Concept	Suggested Learning Activities
I. Ethics in business A. Definition of ethics 1. Standards of conduct applied to business world 2. Moral issues of ethical practices	I. Panel Discussions: Group I - Question: How do ethics apply to business in establishing quality standards and product control? Group II - Question: What are the similarities between ethics in business and morals in personal life? Film: "Quality Control in Merchandising"
II. Consumer Welfare A. Advent of new agencies to protect the consumer B. Advertising 1. Truth in advertising 2. Labeling 3. Sounding out "Gimmicks"	II. Consumer Education: It's New Look. Washington, National Association of Secondary Schools. Consumer Reports in classroom to allow students to research specific products presenting any information which may relate directly to ethics. Group Project: Have students use local newspapers to learn about sales in the area. Go to individual stores to ask pertinent questions about quality of products. Compare "truths" in advertisement with reality in store. Related Classroom Activity: Draft a letter from the class to Food and Drug Administration for literature on labeling and identification in food and drugs.

UNIT: BUSINESS IN TODAY'S FAST WORLD

TOPIC: Ethics in Business

Concept	Suggested Learning Activities
	Game: Have each student write up a product to be advertised on T.V., radio, billboard, newspaper. Best use of ethical practises and advertising techniques in working wins.
III. Importance of internalizing ethics within business.	III. Case Problem: Hypothetical situation to illustrate importance of respecting and practicing ethics within company bounds.
A. Reporting unethical practices 1. Better Business Bureau 2. Chamber of Commerce	Speaker: Representative from Better Business Bureau or Chamber of Commerce.
B. Ethics in personal life 1. No compromise past the point of personal integrity	Group Project: Make list of "good: characteristics of worker.
2. Silent dissent preferable to rabble rousing	
	Film: "Am I Trustworthy"
	Discuss: Compare list with points of film. Discuss possible methods for showing disapproval of unethical tactics.

UNIT: BUSINESS IN TODAY'S FAST WORLD

TOPIC: Business Relationships (Employer, Co-worker

BEHAVIORAL OBJECTIVES:

1. Given actual case histories, the learner will select the points at which the employee failed in establishing a working relationship with his employer.

2. Given opportunities similar to actual work situations to cooperate with fellow class members, the learner will, through the use of self-rating charts prepared by the coordinator, evaluate his relationship with his peers.

3. Given a list of common personality traits and attitudes, the learner will identify items essential to establishing good working relationships with employer and fellow workers.

UNIT: BUSINESS IN TODAY'S FAST WORLD

TOPIC: Business Relationships

Concept	Suggested Learning Activities
I. Frame of reference for establishing relationships in business A. Employee to employer 1. Recognition of status 2. Deference to authority B. Worker to worker 1. Individual differences 2. Surface vs. Depth relationships	I. Film: "The Boss Didn't Say Good Morning" Panel Discussion: What would you expect from employees if you were the "boss" Discussion Problem: "Gossip" Game: Break class into two small corporations. Give rules to incorporate by, let each person have a job. A prize will be given to the corporation that exhibits the easiest flow of operation through the practice of good inner-business relationships. (This game encompasses both areas of business relationships).
II. Understanding the need for supervision A. Reactions to supervision B. Using criticism for self-improvement C. Giving constructive criticism	II. Filmstrip: "Taking Criticism" Student-centered Activity: Have students who are working tell why they have received criticism, how they took it, when if ever they have offered constructive criticism.
III. Relationship to public A. Close watch on tempers and emotional outbursts B. Seeing yourself as company representative	III. Role Playing: Cashier confronted by irate customer making rediculous accusations. Read: Guidance Service Booklets on personality, building self-

UNIT: BUSINESS IN TODAY'S FAST WORLD

TOPIC: Business Relationships

Concept	Suggested Learning Activities
E. Personality's effect on relationships 1. Reinforcing good attitudes and habits 2. Eliminating irritating traits	confidence, recognizing behavior problems as group report references. Game: "Personality Plus" Each student lists his personality assets and liabilities. Deposits of assests are made and interest is paid for each demonstation from these assets are payments for personality liabilities which appear. Student with most on deposit wins.

UNIT: LABOR LAWS AND BENEFITS

UNIT OBJECTIVES:

To help students gain knowledge of various state and federal laws governing labor in business and of the provisions that businesses make for their employees.

TOPICS:

I. Labor Laws (State and Federal)

II. Labor and Management Relations

III. Labor Unions and Employees

IV. Social Security

UNIT: LABOR LAWS AND BENEFITS

TOPIC: Labor Laws

BEHAVIORAL OBJECTIVES:

1. The student will list at least five advantages of the Federal Labor laws.

2. The student will list at least five advantages of the Georgia Labor laws.

UNIT: LABOR LAWA AND BENEFITS

TOPIC: Labor Laws

Concept	Suggested Learning Activities
I. Federal labor regulations A. Child labor provisions 1. Age 2. Hours on the job 3. What hours students can work. B. Minimum Wages 1. Fair Labor Standard Act 2. Exemptions from minimum wages 3. Exemptions for student learners. C. Overtime Pay 1. Overtime pay compensation rate. 2. Exemptions from the overtime pay. 3. Requirements of the employer. D. Hazardous occupations 1. Student-learner 2. Age 3. Who is responsible 4. Occupations that are hazardous	I. Panel Discussion: Have students discuss such questions as: 1. What age may students work on different jobs? 2. What hours may students work? 3. Number of hours students may work? Speakers: Have representative of Federal Labor Office discuss regulation to class. Research: 1. Have students read Child Labor Bulletin No. 101. 2. Have student list advant of Child Labor Provision on minimum wages and overtime pay. 3. Have each student list hazardous occupations. 4. Have each student to give advantages and disadvantages of labor laws.
II. State Labor Regulations A. Child Labor provisions 1. Age 2. Hours on job 3. Time of day B. Minimum wages 1. Fair Labor Standards Act 2. Exemptions from the	II. Panel Discussion: Have students discuss such questions as: 1. What age may students work on different jobs? 2. What hours may students

UNIT: LABOR LAWA AND BENEFITS

TOPIC: Labor Laws

Concept	Suggested Learning Activities
minimum wages.	work?
3. Exemptions for student learner.	3. What time of day may students work?
C. Overtime Pay 1. Overtime compensation rate. 2. Exemptions from the overtime pay 3. Requirements for the employer.	Read: Have students read state labor law regulations and discuss advantaes and disadvantages.

UNIT: LABOR LAWS AND BENEFITS

TOPIC: Labor and Management Relations

BEHAVIORAL OBJECTIVES:

1. The student will identify the conditions which brought labor into existance.

2. The student will identify the two national unions we have in the United States and how they differ in membership.

3. The student will demonstrate the bargaining processes used by industry and unions by role playing and panel discussions.

4. The student will be able to define three types of unions that may be in a business.

UNIT: LABOR LAWS AND BENEFITS

TOPIC: Labor and Management Relations

Concept	Suggested Learning Activities
I. History of labor unions. A. Labor movement 1. Guild system 2. Craft or trade 3. Industrial unions	I. Guest speaker TOPIC: The AFL and CIO Classroom discussions Questions: 1. What is the largest and most powerful union in the U.S. 2. Why was the Congress of Industrial Organization formed? 3. Name the basic freedoms of the industries in which almost all of the production workers are members of unions.
II. National unions 1. AFL 2. CIO	II. Chart Have the students make a chart of the structural organization of the American Federation of Labor Panel discussion Questions: What conditions brought labor unions into existence?
III. Collective bargaining A. Mediation B. Arbitration C. Labor contract	III. Classroom discussion: Questions 1. What is collective bargaining? 2. What is the difference between medition and arbitration?

UNIT: LABOR LAWS AND BENIFITS

TOPIC: Labor and Management Relations

Concept	Suggested Learning Activities
	3. Must an employer bargain collectively with his employees? Role playing: Let some students play the parts of the employer and others the union representatives. Have them mediate a settlement. Culminating activities: Have the students write up a labor settlement and give their views on the settlement.
IV. Union security A. Sole bargaining agent B. Open shop C. Agency shop D. Closed shop E. Union shop F. Preferential shop	IV. Panel discussion: Questions: How does the employer feel toward unions. Why? Classroom discussion: Questions: 1. Must an employer bargain collectively with his employees. Why? 2. What is a union shop? 3. What is a closed shop?

UNIT: LABOR LAWS AND BENEFITS

TOPIC: Labor Unions and Employees

BEHAVIORAL OBJECTIVES:

1. The student will be able to write and identify at least three reasons labor unions were formed.

2. The student will be able to write and identify the two major unions in this country.

3. The student will be able to list at least three ways that unions have helped the working man in our society.

4. The student will be able to list at least two ways that unions have been harmful to man in our society.

5. The student will be able to list at least two ways unions have improved the relationship between employee and employer.

UNIT: LABOR LAWS AND BENEFITS

TOPIC: Labor Unions and Employees

Concept	Suggested Learning Activities
1. Reasons stated that labor unions were formed A. Provided better working conditions b. Employees had no organization for dealing with management c. Provided better pay for employees d. Cut down on working hours e. Provided working man with way of organizing into groups	I. Resource Personal: Have person give talk on conditions before unions. Field Trip: Trip to both compan with union and one without one. Role Playing: Play roll with students letting them act as they think they could with and without unions.
II. Major unions in U.S.A. a. American Federation of Labor (AFL) b. Congress of Industrial Organization (CIO)	II. Show Films: Get films on both unions from your local representation of both unions. Resource Personal: Have representative from both unions give talk to students.

UNIT: LABOR LAWS AND BENEFITS

TOPIC: Labor Unions and Employees

Concept	Suggested Learning Activities
III. How unions have helped employees A. Better wages B. Better working conditions C. Better jobs D. Voice by which to talk to Employers E. Organized working man into large powerful groups	III. Resource Personal: Have person who works under a union explain the benefits he gets by belonging to a union. Panel discussion: Let students explain the benefits they think you might get by working at a job which is covered by a union. Show films: Each union has films on the benefits it has provided for its members. Transparency: Show benefits that unions have provided on your local level.
IV. How unions have been harmful to working man. A. High wages have caused cost of living to rise B. Has caused many business to cut down on personal because of cost of operation.	IV. Show Films: Can get these form firms in community that are trying to prevent unions in their companies. State Employment Personal: These people can give you information on the dangers of unions. Group discussion: Let group give ideas on why

Concept	Suggested Learning Activities
	they think unions may cause them problems.
V. How unions have helped management-employee relationship. A. Work under contract B. Provided way for each to know others problems and ideas C. Each has idea of what the other is thinking of doing D. Helps both to work toward same goals	V. Resource Personal: Have employer-employee give talk on how they think unions have caused them to work better as a unit. Transparency: Show how a contract helps both employees and employers.

UNIT: LABOR LAWS AND BENEFITS

TOPIC: Social Security

BEHAVIORAL OBJECTIVES:

1. The student will be able to locate the social security office by address, telephone number, and obtain an application for a social security number and bring the application to class.

2. The student will be able to fill out an application for a social security card in class.

3. The student will be able to identify who pays social security.

4. The student will be able to list reasons why social security is important.

5. The student will be able to state how social security is paid by workers.

6. The student will be able to identify groups of people eligible for social security.

7. The student will be able to list five basic public programs under the guidance of social security.

8. The student will be able to describe what to do in case he looses his social security card.

UNIT: LABOR LAWS AND BENEFITS

TOPIC: Social Security

Concept	Suggested Learning Activities
I. Locating the social security office A. Telephone book B. Map of city C. Draw a map	I. Panel Discussion: Provide the student with a telephone book and map of the city. Let the students discuss ways of finding needed information. Field trip: Visit the social security office.
II. Completing an application for a social security number. A. Know the following: 1. Full name 2. Place of birth 3. Mother's and father's full name 4. Date of birth 5. Present age 6. Mailing address 7. Telephone number	II. Transparency: Show an application for a social security card that you as the teacher could complete step by step as each student completes his or her application. Don't forget: If the student does not have a social security card have him mail the application.
III. Who Pays Social Security A. Workers B. Compulsory for worker if job is covered by social security	III. Contact your local social security office: They will be happy to provide you with current information concerning social security. Guest Speaker: The social security will send a resource person to talk with your class about social security.

UNIT: LABOR LAWS AND BENEFITS

TOPIC: Social Security

Concept	Suggested Learning Activities
IV. Importance of social security A. Type of insurance in case of unexpected accidents or loss of health B. Pays after retirement C. Gives financial aid to families in case provider is injured or dies.	IV. Guest speaker: Contact your social security office. Bulletin board: Have group of students construct bulletin board which clearly shows the importance of social security. Introduction to social security: A programmed learning text available from your local social security office.
V. Payment of social security by worker A. Withheld from worker's pay B. Paid by the self-employed worker C. Employer pays an equal amount	V. Guest Speaker: Contact your local social security office Math Teacher: This is a good time for the math teacher to teach a unit on the amount of social security deducted. Introduction to Social Security: A programmed learning text available from your local social security office.

UNIT: LABOR LAWS AND BENEFITS

TOPIC: Social Security

Concept

VI. Eligibility for Social Security

A. For men:

Type of benefit	When payable
1. Retirement	65 or over
2. Reduced retirement	62 or over
3. Disability	Any age up to age 65
4. Medicare	65 or over
5. Dependent husband	62 or over
6. Dependent widower	62 or over
7. Dependent parent	62 or over

B. For women

Type of benefit	When payable
1. Retirement	65 or over
2. Reduced retirement	62 or over
3. Disability	Any age up to 65
4. Medicare	65 or over
5. Wifes	65 or over any age, if child in her care
6. Divorced wife	65 or over
7. Widow's	62 or over
8. Disabled widow's	50 or over

Suggested Learning Activities

VI. Introduction to Social Security: A programmed learning test available from your local social security office.

Role Playing: Some students can play the part of Social Security workers. Other students can inquire about benefits they may be eligible for.

Role Playing: A disabled woman must apply for social security. What steps must she take. What kinds of information will she need.

Role Playing: Betty's father has been killed in an accident. Betty's mother is disabled. Betty must visit the social security office. What will she say? What kinds of information will she need?

Guest speaker: Contact your local social security office.

UNIT: LABOR LAWS AND BENEFITS

TOPIC: Social Security

<table>
<tr><th>Concept</th><th>Suggested Learning Activities</th></tr>
<tr><td>C. For children
<table>
<tr><th>Type of Benefit</th><th>When payable</th></tr>
<tr><td>1. Child's</td><td>Up to 18</td></tr>
<tr><td>2. Child's</td><td>Up to 22 - if attending school</td></tr>
<tr><td>3. Disabled child's</td><td>18 or over - if disability began before age 18.</td></tr>
</table>
</td><td></td></tr>
<tr><td>VII. Programs under the guidance of social security
A. Old-Age-Survivors, Disability, and Health insurance
B. Unemployment Insurance
C. Workmen's compensation, or Industrial accident
D. Temporary disability or cash sickness
E. Insurance
F. Public Assistance</td><td>VII. <u>Bulletin board</u>: Illustrates programs under the guidance of social security
<u>Role Playing</u>: A group of taxpayers visit a social security office to find out, What programs their dollars support, and to see if they will benefit.
<u>Guest Speaker</u>: Contact your local social security office.
<u>Introduction to Social Security</u>: A programmed learning text available from your local social security office.</td></tr>
</table>

UNIT: LABOR LAWS AND BENEFITS

TOPIC: Social Security

Concept	Suggested Learning Activities
VIII. Lose of Social Security card A. Contact your social security office B. Apply for a duplicate not a new number	VIII. Role Playing: Johnny lost his social security card. What should he do?

VT 017 220
COORDINATED VOCATIONAL ACADEMIC EDUCATION
PROMOTIONAL KIT.

GEORGIA UNIV., ATHENS. DIV. OF VOCATIONAL
EDUCATION.
OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - 71 35P.

DESCRIPTORS - ELEMENTARY GRADES; SECONDARY
GRADES; *VOCATIONAL EDUCATION; *ACADEMIC
EDUCATION; *EDUCATIONAL COORDINATION;
VOCATIONAL DEVELOPMENT; COORDINATORS;
INFORMATION DISSEMINATION; MASS MEDIA;
*PUBLICIZE; *STATE PROGRAMS; COMMUNICATIONS
IDENTIFIERS - EDUCATION PROFESSIONS
DEVELOPMENT ACT; EPDA; EDUCATIONAL AWARENESS

ABSTRACT - THESE MATERIALS FOR A COMPREHENSIVE PROMOTIONAL KIT FOR GEORGIA'S COORDINATED VOCATIONAL-ACADEMIC EDUCATION PROGRAMS HAS AS ITS MAJOR OBJECTIVE THE SIMPLIFICATION OF THE PUBLIC RELATIONS DUTIES OF THE PROGRAM COORDINATORS. DEVELOPED BY GEORGIA VOCATIONAL EDUCATION COORDINATORS ENROLLED IN AN INTERNSHIP AT THE UNIVERSITY OF GEORGIA, THESE SUGGESTIONS ARE GROUPED INTO THE FOLLOWING TOPICAL AREAS; (1) MEDIA, INCLUDING NEWSPAPER AND RADIO, (2) SPEECHES, (3) AUDIO-VISUAL MATERIALS, (4) COORDINATED VOCATIONAL ACADEMIC EDUCATION WEEK, (5) CLUB REPORTER, (6) LETTERS NEEDED FOR THE PROGRAM, (7) CHARTS AND POSTERS, AND (8) PROMOTIONAL HANDOUTS. SAMPLE FORMS ARE PROVIDED. (AG)

CVAE

Coordinated Vocational Academic Education

Promotional Kit

Prepared by:
CVAE Coordinators
Division of Vocational Education
University of Georgia
Athens, Georgia
July, 1970 - June, 1971

INTRODUCTION

This promotional kit has one major objective--to simplify the public relations duties of Coordinated Vocational Academic Education coordinators. The specific needs of each coordinator will vary, and changes in the material may be made to fill those needs. Information useful in the public relations aspects of a coordinator's job is also contained in the Coordinator's Handbook.

ACKNOWLEDGEMENTS

This *CVAE Promotional Kit* was prepared during the school year 1970-1971 by Georgia C.V.A.E. Coordinators enrolled in an internship at the University of Georgia.

The training of the coordinators was conducted by the Division of Vocational Education, College of Education of the University of Georgia, Athens, Georgia. Funds were made available from the following cooperating agencies:

Division of Vocational Education
Georgia State Department of Education
Atlanta, Georgia

and

Education Professions Development Act, Part F
U.S. Office of Education
Department of Health, Education and Welfare
Washington, D.C.

We are indebted to the following individuals for contributing their special talents:

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Project Director

TABLE OF CONTENTS

MEDIA

NEWSPAPERS

The most effective means for placing the CVAE program before the public is the newspaper. Daily, weekly, and monthly papers should carry articles about CVAE. The introductory article should explain the purpose of the program, and should be in all newspapers during the month of August. A timely schedule should be followed as much as possible for the publishing of CVAE news.

The coordinator should get to know the editor of the newspaper personally. News articles need to be prepared to meet the requirements of the paper. Pictures about the program should be used when possible. These pictures must meet the requirements of the paper. News articles and pictures should be in the final form before presenting them to the newspaper. Specific suggestions for preparation of articles and pictures are contained in the Coordinator's Handbook.

EXAMPLE OF INTRODUCTORY ARTICLE:

NEW COURSES OFFERED IN CO. SCHOOL

Superintendent Harry B. Bowen announces an additional vocational course to be found in the curricula of the junior high and secondary schools of Blanche County for the 1970-71 school term.

The program, "Coordinated Vocational Academic Education," (CVAE) is a supervised occupational training work-study program which combines classroom instruction in the school with supervised part-time employment.

The program is an integral part of a regular high school instructional program with emphases on communication skills and reading education, which will enable students to more effectively relate school experiences with out-of-school experiences.

Teacher-Coordinators for the program have been named. They are: Mrs. Carolyn Forrester, Blanche County Junior High, (683-2221) ; Mr. Oscar C. Campbell, T.L. Anderson Senior High, (373-1829); and Mr. Carroll Egizii, South Blanche Elementary School, (793-5313).

For further information contact the coordinator in the respective areas.

EXAMPLE OF NEWS ARTICLE:

STUDENTS SET CVAE CONTESTS

Approximately 350 students enrolled in the state's newest vocational education program will be competing for regional honors in a meeting Friday at Grayson County High School.

The participants are members of 12 Coordinated Vocational Academic Education Clubs, established under the state's only program in which academic subjects are interlocked with on-the-job training.

Alan Munger, CVAE coordinator at Grayson High said about 250 students are enrolled in the local program which also includes Bloomsdale Jr. High and Grayson Vocational-Tech. School.

He said CVAE differs from other programs in that participating students attend classes in 1 group rather than with other students, and that all academic subjects are directly related to the part-time work in which they are employed.He said CVAE students attend class for 4 hours daily, then work in a variety of jobs around the community.

The competition Friday begins at 1:30 p.m. and will include CVAE clubs in Region I comprised of Grayson and Bland counties and schools in Knox and Graham.

The areas in which the students will compete will include a contest to select name, creed, motto, emblem, and colors for the state club and competition in job interviews, scrapbooks, career manuals, school and community projects, talent and outstanding boy or girl. Munger said the program in Grayson Co. is one of 50 in the state,designed for students indicating a need for linking education to practical vocational experience.

RADIO

The community showcase on the local radio station offers an opportunity for promotion of current CVAE activities. If, for example, the club should decide to sponsor a bake sale, the location, date, time and other particulars could be announced along with a brief description of the purpose of the CVAE program. This airing of CVAE activities might create otherwise unobtainable interest of parents and prospective employers.

SPEECHES

OUTLINE OF SPEECHES TO PROMOTE CVAE

Public relations can be approached from many directions. Promotional activities include radio and television publicity, advisory committees to cooperative programs, club activities of the program, personal communications, and field trips. Talks to faculty and community groups is a very good direct way of promoting CVAE. Talks to faculty and civic groups will serve to introduce the coordinated vocational academic education program and to keep the public informed concerning subsequent activities.

TALK TO FACULTY--An outline of a talk to faculty members could:

A. Explain the CVAE program as an addition to the curriculum.

  (1) Point out that the program is structured to meet the needs of those students who will probably not attend college or even finish high school unless some special effort is made to motivate them.

  (2) Present brief statements about the dropout rate in Georgia to show the magnitude of the problem.

  (3) Give capsule view of the coordinated program's relationship to existing vocational programs, explaining its across-the-board aspect.

B. Outline objectives of the CVAE program.

  (1) Structuring environment for success
  (2) Developing positive attitude toward work
  (3) Doing job explorations
  (4) Learning by doing(occupation)
  (5) Using cooperative system: school and on-the-job training
  (6) Getting school, businesses, and industry to help motivate
  (7) Participating in club work for social growth

C. Explain dutues and responsibilities of the coordinator.

  (1) Coordinating at school
  (2) Coordinating in the community
  (3) Coordinating through coordinated program's club work

D. Emphasize importance of related instruction in general academic subjects. Ask for cooperation in:

  (1) Helping to achieve objectives of coordinated program.
  (2) Conducting special classes for some groups, if requested.
  (3) Reconstructing the academic courses to fit the student's training needs.

E. Offer the observation that some educators are wondering whether students are failing schools <u>or</u> schools are failing the students.

  (1) Show number of graduating high school students not attending college--point out that it suggests a new approach to preparation required of schools.

  (2) Show number of dropouts from time of first grade forward which suggests that the educational program is warped in favor of college-bound students, and that needs of a large segment of the population are being neglected.

  (3) Is a new era in education on the horizon--different curriculum structure--different emphasis--different involvement?

F. Offer to cooperate with other members of the faculty in every way and seek their support for the program.

G. Question and answer period.

<u>TALK TO A CIVIC CLUB</u>--In speaking to a civic group, the outline of a talk might include:

A. Origin of the CVAE program.

  (1) Describe vocational programs in high school and their areas of activity.

  (2) Comment on change of emphasis from "programs" to <u>people</u> and the reasons for change.

  (3) Indicate new importance suggested for vocational aspects of education in view of changing needs of students as reflected in dropout rate.

B. Introduction of pilot program in cooperative education involving across-the-board vocational programs.

  (1) Objectives
  (2) Implememtation of program through teacher-coordinator working with school and community
  (3) Advisory committee of citizens

B. (4) Cooperation of businessmen in on-the-job training
(5) How cooperative education-training is obtained:
  (a) Part-time in school
  (b) Part-time on-the-job training

C. Advantages of the program for the students

(1) School environment structured for <u>success</u> to counteract the never-ending spiral of <u>failure to</u> which discouraged students have been subjected.

(2) Actual work experience through on-the-job training correlated with job study at school.

(3) Motivation to complete high school courses required for graduation and better job opportunities afterward.

(4) Learning how to be a good employee: good work habits, thrift, responsibility, punctuality, etc.

(5) Paycheck to assist student while he is finishing school.

D. Advantages of the program for the employers

(1) Organized assistance in the training of workers
(2) Better trained workers in community
(3) Benefits through a simplified induction of young workers into jobs

E. Advantages of the program for the school and community

(1) Enables the school, at a minimum of expense, to extend curriculum offerings for occupational education in the community.
(2) Improves school attendance.
(3) Provides a place of responsibility for youth in the economic and civic life of the community.
(4) Increases productivity of society through cooperative effort of business, industry and school.

G. Conclusion

(1) Emphasize the training of youth for their personal, social, and civic responsibilities.
(2) In closing, repeat the advantages the program offers employers because of trained workers who are also high school graduates.
(3) Point out the social costs that could be involved if the problem of dropouts is not solved.

H. Solicit cooperation in the undertaking of the coordinated vocational program.

Question and answer period

AUDIO-VISUAL MATERIALS

FILMSTRIPS AND RECORDINGS

"One picture is worth a thousand words." It seems appropriate to quote this old cliche because it emphasizes the value of using films and filmstrips.

Recordings, films and filmstrips provide excellent ways to inform the general public of the total operation and function of the CVAE Program in schools as well as in entire towns and counties.

By reaching all large and small community agencies, the message can really be carried to the public. The films, filmstrips, and recordings will explain:

1. The objectives of CVAE
2. The number of students enrolled
3. The coordinators in the program
4. The importance of the program and how it operates
5. Behavioral changes, such as manner of dress--before and after
6. Number of days the student worked
7. Places of employment
8. Community projects
9. The amount of money earned by students
10. Homemaking projects
11. Industrial arts projects
12. State convention activities
13. Local convention activities
14. Classroom activities

Suggested community agencies for showing the films, filmstrips and playing the recordings are as follows:

1. Schools:
    - P.T.A. meetings
    - Principals' meetings
    - Faculty meetings
    - Employers-Employees-Parents Banquet
    - American Education Week
    - Career Day and Open House
2. Municipal Airports
3. Civic Organizations
    - Chamber of Commerce
    - YWCA
    - YMCA
    - Lions Club
    - Rotary Club
4. Shopping Centers
5. Department Stores
    - Davison's
    - Rich's
    - Belks
    - Sears Roebuck & Company
6. Grocery Stores

POSTERS AND PICTURES

Pictures and slogans can be used effectively to help convey the ideas and beliefs of CVAE.

Schools:

Posters can be displayed on bulletin boards, in halls, teachers' lounges, library, classrooms, lunchrooms, gymnasiums, and industrial arts laboratories.

Community:

Shopping Centers
Department Stores
Drug Stores
Service Stations
Coliseums
Municipal Auditoriums
Recreation Centers
Grocery Stores

CVAE WEEK

SCHOOL CVAE WEEK

Any number of activities can be initiated by CVAE in celebration of its own week. Pre-planning is a must, and total membership involvement is an absolute necessity.

The following are suggestions for inclusion in the week's happenings:

a. Thoughts for the day to be read over the public address system during daily announcements.

b. Bulletin board prepared on a CVAE theme in a focal point of the school.

c. Luncheon or dinner for working students and their employers (includes students working school work stations).

d. Campaign for and naming of CVAE Student of the Year.

e. Assembly program with talent presentation centered on aims of CVAE.

f. Staging Career Day for all students in the school.

EXAMPLE OF NEWSPAPER PUBLICITY:

Proclaims CVAE Week

(picture of mayor and club officers)

Mayor John Kellogg signs proclamation declaring February 11-15 CVAE Week. Looking on are Club Officers (l to r) Bob Jerome, President; Martha Dunn, Secretary; Sarah Sparger, Treasurer; Christine Hollis, Reporter; and Fred Robinson, Vice President.

CERTIFICATES OF APPRECIATION FOR STUDENT EMPLOYERS:

The presentation of a Certificate of Appreciation to out-of-school employers who are working with coordinators to help make CVAE a success would be a friendly gesture. This could help make great progress in public relations efforts; however, the CVAE coordinator must use discretion since he would know which employers deserve this recognition.

Guidelines to use when considering this idea:

1. Certificates may be presented to out-of-school employers.

2. If there is more than one CVAE program in the school system, this should be a system-wide function. The certificates should be uniform in size, color, etc., and it should be sanctioned by the local Board of Education.

3. The cost of printing certificates is to be borne by local school systems, or by each local CVAE program.

4. The certificate should be tastefully done so that it fits well into all places of employment.

5. The certificate should be signed by the CVAE coordinator, the school principal, and the appropriate person(s) from the system's central office.

6. Each coordinator would be responsible for presenting a certificate to the employers of his students.

7. Before going with a student to present a certificate of appreciation, the coordinator should talk with the employer and get his permission to make the presentation. Unnecessary embarassment can be avoided if this is done.

CLUB REPORTER

THE CLUB REPORTER

The CVAE Club reporter is the one person, in the club, whose primary objective is to focus as much attention as possible on the total CVAE program, giving special attention to the CVAE Club and its activities. While the reporter may work closely with the club's public relations committee, it is his initiative and abilities which can do much to help or hinder other efforts. Therefore, all possible candidates must be carefully considered before selecting someone to fill this important position.

The club reporter may be appointed by those members of the club who are empowered to make appointments, or he may be elected by the total club membership. In either case, the importance of this position should not go unannounced.

Some of the duties particular to this position are:

A. Early in the school year the reporter will write an informative article for the school newspaper. In this article he will "plain talk" about CVAE. He will tell the faculty and students what CVAE is all about and give some goals and objectives of the program.

B. Subsequent articles may be written for each edition of the school paper.

C. The reporter would help prepare short newsworthy articles for the 'Teen Topics" program on the local radio station. (Necessary only where the need exists)

D. He should post in a conspicious place, in the school, current news bulletins, thus keeping everyone abreast of what is happening in CVAE and in the CVAE Club.

E. The repo should announce or arrange to have announced, urgent items or items of unusual importance over the school's public address system.

F. The reporter will help prepare articles for the local daily or weekly newspaper. This should be done as often as newsworthy items develop.

LETTERS

EXAMPLE OF LETTER FOR AN INTERVIEW

Dear Employer:

____(name of student)______________ who is presently employed with your company has enrolled in the CVAE Program at ____________ High School. In order for a training agreement (student's school credits) to become functional, several forms are needed. This ruling became effective as of __________________.

Please indicate at the bottom of this letter when the CVAE coordinator may have an interview with you and return by the employee or by mail. (Addressed envelope enclosed)

Thank you for your cooperation and an early reply.

Sincerely yours,

Coordinator

Employer: ______________________________
Name

Employee: ______________________________
Name

The CVAE coordinator may have an interview with me on ____________________.
date

________________________________ at ____________________________.
place time

Example of Letter to Parents

CVAE SCHOOL INDICATION REPORT

Date ____________ Grade Level __________

Dear Parent:

The purpose of this report is to inform you concerning the educational progress of ___(name of student)__________. Her learning progress at ____(school)_____ needs improvement. Correction of the following would improve the teaching-learning process. Please note the area checked. Your cooperation will be appreciated.

__________1. Show more initiative and accept more responsibility in school work.

__________2. Organize notebook in a better way.

__________3. Improve behavior in class.

__________4. Take needed materials to class. (text, paper, notebook, pencil, pen, etc.)

__________5. Improve oral participation in class.

__________6. Work steadily and better utilize time.

__________7. Improve spelling.

__________8. Complete all work assignments (Assignments should be completed within _____ days after a student returns to class.

__________9. Study more at home to acquire needed facts and improve test scores.

_________10. Attend regularly (Tardy ____ times, Absent _____ times)

_________11. Pay close attention to presentation and discussion of each day's work.

_________12. Follow oral and written instructions.

________13. Have favorable attitude toward work, students and teachers.

________14. Refrain from excessive talking.

________15. Report for extra help when needed.

________16. Improve on the job skills and classroom skills in working with others.

________17. Participate in group activities.

________18. Wear proper gym uniform.

________19. Wear proper clothing to work.

________20. Wear clean lab uniform or clothing.

EXAMPLE OF ADVISORY COMMITTEE LETTER

(Refer to chapter in Coordinators' Handbook
concerning appointment of Advisory Committee)

Date ______________

Dear ____________________________

The coordinated Vocational Education Program at ______________High School is beginning its first year of operation. We in ____________ County are extremely proud of this program because of the outstanding contributions it has made in our community, our school, and above all to our students.

Recognizing your interest in this program, may I have the pleasure of appointing you to the CVAE Advisory Committee? This committee is comprised of ________ local leaders from businesses, school administrators and the local CVAE Coordinator, Mrs. ____________________.

The purpose of this committee "____

____

____"

If you accept this appointment, your term of appointment will become effective
_____________________ and will expire ____________________.
(start) (end)

Please advise me if you are willing to accept appointment to this committee. Our first meeting will be ____________________ in the CVAE classroom.

Should you have a question concerning the duties of this Advisory Committee, please telephone me at ___________ or the coordinator at ____________.

Sincerely yours,

Superintendent

EXAMPLE OF LETTER TO CO-WORKERS

Dear Co-Worker:

Attached is a list of CVAE students who are enrolled at ______________ for this school term. In order for any meaningful program to function, it must be a cooperative effort. Many of our CVAE students are falling short of our motto, "___________________________________" in and out of classrooms and school.

It is with a professional attitude that I ask you to record any improper action in your classroom of any CVAE student.

Place this slip in box _____. After all school policies have been considered, this information will be used to discuss and counsel with the student concerning his problems for a more effective attitude toward school.

Please feel free to call on me, if I can be of any help.

Professionally yours,

Coordinator

EXAMPLE OF PERMISSION FOR FIELD TRIP

Dear (Mr.) (Mrs.) ______________________________
Coordinator's Name

My ________________, ____________________________
(son) (daughter) (student's name)

has my permission to accompany her class on the trip described below.

Place ____

Date ____

Purpose ____

Transportation _____________________________________

Please check one:

1. ____ Have school insurance

2. ____ Have sufficient insurance and release school of responsibility

CHARTS AND POSTERS

CHARTS

Charts can be very effective to promote C.V.A.E. Charts should emphasize the importance of training by showing comparisons between training and non-training. Charts should be placed where they can be viewed by the students easily.

Charts should show progress reports on absence from school and work before C.V.A.E. and after C.V.A.E.

Charts can be used to show:

TYPE OF EMPLOYMENT	HOURS WORKED	MONEY EARNED

COMMUNITY

SCHOOL

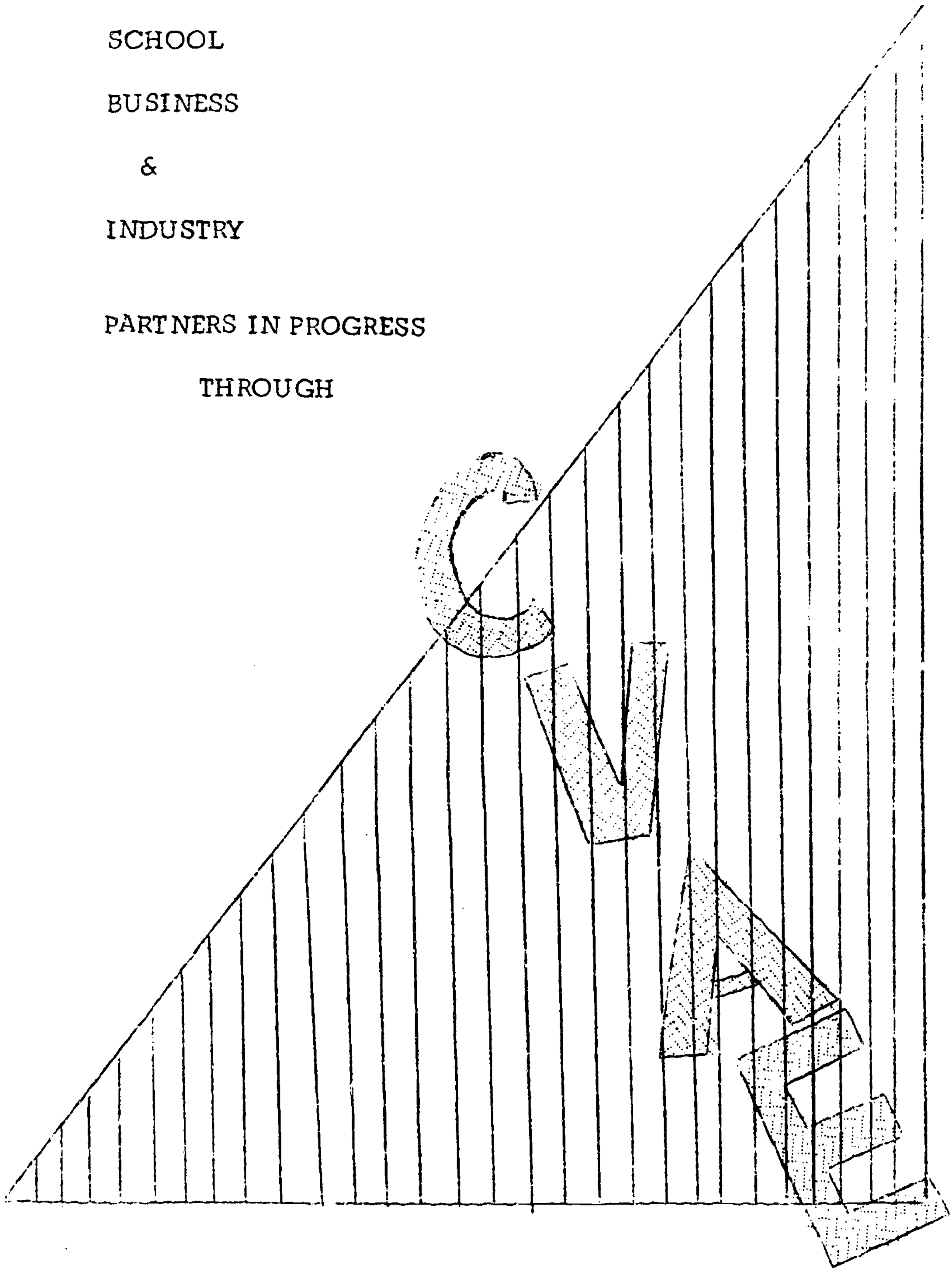
BUSINESS

&

INDUSTRY

PARTNERS IN PROGRESS

THROUGH



WHAT CVAE IS ALL ABOUT

The CVAE Work Experience Program is designed for students in grades 7 through 12. By combining supervised classroom instructions with work experience and by relating these experiences, it is believed that the student will acquire a more positive attitude toward himself, school, work and others.

Through a cooperative arrangement between the school and the employer, the student receives instruction in the classroom that is related to the instruction and work experiences that he received in the work setting. The student spends approximately one-half the day in school (two or three) academic classes and one cooperative work experience or simulated work experience.

It is believed that this interlocking and correlating of the academic curriculum and work experience will make the student's education more meaningful.

The CVAE Program is organized on a developmental basis and serves as the core around which other subject matter curriculums might be related.

It is suggested that, for CVAE, a forced interlocking of academic subjects with vocational experiences be done in order for the student to perform particular job tasks.

OBJECTIVES OF THE PROGRAM

A. Junior High School Level

1. To help students acquire:

    a. a more positive perception of themselves in both a work role and a school setting.

    b. the basic habits of industry.

    c. academic and career development skills needed to pursue a higher level vocational skill.

    d. certain vocational skills such as familiarization with tools, materials, and processes rather than the job skills.

    e. a greater understanding of themselves in relation to different work roles.

    f. adaptive skills needed to cope with today's changing society.

    g. to increase the preparation of students at the junior high school level who remain in school.

2. To help some students acquire preparation for entrance into an occupation.

3. To hlep students decide upon a vocational choice to pursue at the secondary level.

B. Secondary Level (In addition to the above objectives)

1. To prepare students for an entry level job of his choice.

2. To increase the preparation of students who remain in school and prepare for entrance into an entry level job.

3. To increase the preparation of students who enter the field for which he is trained.

Education has a responsibility to prepare each student for his next step, be it further education or work. This is the responsibility of education at all levels.

QUESTIONS AND ANSWERS

Q. What is the drop-out picture in Georgia ?

A. At the close of the 1967-68 school year, Georgia reported that there were 16,797 dropouts for grades 9-12.

Q. What were the most common reasons for dropt-outs ?

A. The most common reasons for dropping out of school were lack of interest and marriage.

Q. How is CVAE different from the regular classroom ?

A. Heretofore, the child had to fit the curriculum; Now in CVAE, the curriculum is made to fit the child. All of his subjects: math, English, home economics, science and vocational agriculture are fitted to his needs in the world of work. In regualr schooling his experience in class meant failure but in CVAE, he succeeds.

Q. Can a student take CVAE and still go to college ?

A. Yes, he still can learn the required units as other students and also one unit on the job. He can choose to go to college or enter into the field of work that CVAE prepared for him.

VT 017 524

RESOURCE UNIT FOR FAMILY LIFE EDUCATION, LEVEL 5. LEARNING MORE ABOUT HUMAN GROWTH AND DEVELOPMENT. SUPPLEMENT TO THE CURRICULUM GUIDE FOR SCIENCE, GRADES 4-5-6.

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DESCRIPTORS - *RESOURCE UNITS; RESOURCE MATERIALS; *FAMILY LIFE EDUCATION; EDUCATIONAL PROGRAMS; *HUMAN DEVELOPMENT; GROWTH PATTERNS; HUMAN BODY; *ELEMENTARY SCHOOL CURRICULUM; *GRADE 5
IDENTIFIERS - CHICAGO

ABSTRACT - A SUPPLEMENT TO THE SCIENCE CURRICULUM GUIDE FOR GRADES 4 THROUGH 6 IN THE CHICAGO CITY SCHOOLS, THIS RESOURCE UNIT IS DESIGNED TO HELP CHILDREN UNDERSTAND AND APPRECIATE THE PHYSICAL, EMOTIONAL, AND SOCIAL ASPECTS OF HUMAN GROWTH AND DEVELOPMENT WITH PARTICULAR EMPHASIS UPON AREAS RELATED TO SEXUALITY AND FAMILY RELATIONSHIPS. IT IS DESIGNED FOR INSTRUCTION AT THE GRADE 5 LEVEL AND CONTAINS A UNIT PREVIEW, REFERENCES, VOCABULARY WORDS, CONCEPTS AND CONTENT TO BE EMPHASIZED, SUGGESTED ACTIVITIES, AND A LIST OF APPROPRIATE RESOURCE MATERIALS. TO FACILITATE COMPREHENSION, A PROGRAM OVERVIEW IS PRESENTED AS WELL AS GENERAL GOALS, OBJECTIVES AND GUIDELINES FOR TEACHING FAMILY LIFE EDUCATION. (SN)

RESOURCE UNIT
for
FAMILY LIFE EDUCATION

Level 6

BECOMING AWARE OF THE HEREDITY FACTOR AND ITS INFLUENCE UPON REPRODUCTION

Supplement to the
Curriculum Guide
for Science
Grades 4-5-6

BOARD OF EDUCATION
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RESOURCE UNIT FOR FAMILY LIFE EDUCATION, LEVEL 6

BECOMING AWARE OF THE HEREDITY FACTOR AND ITS INFLUENCE UPON REPRODUCTION

Supplement to the Curriculum Guide for Science
Grades 4-5-6

JAMES F. REDMOND
General Superintendent of Schools

BOARD OF EDUCATION
CITY OF CHICAGO

FOREWORD

This resource unit for family life education is designed to help children understand and appreciate the physical, emotional, and social aspects of human growth and development with particular emphasis upon areas related to sexuality and social and family relationships.

The Chicago public schools are sharing the responsibility for this kind of education with parents, the clergy, the medical profession, and community groups.

After the completion of a pilot program in 1966-67, a comprehensive program of instruction is being implemented as part of the regular curriculum in science in all elementary schools, and in health education, biology, and home economics in the high schools.

JAMES F. REDMOND

General Superintendent of Schools

ACKNOWLEDGMENT

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DIVISION OF FAMILY LIFE EDUCATION

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GENERAL GOALS FOR FAMILY LIFE EDUCATION

To enable each individual to progressively develop responsible behavior, feelings of self-worth, and respect for others, all of which are reached on the basis of accurate knowledge of human beings in the areas of growth and development, love, marriage, parenthood and family life.

Organizational

To develop and implement a comprehensively and educationally sound program of Family Life Education incorporated into the regular curriculum in all of the elementary, secondary, and special schools

To conduct an extensive program of teacher education and inservice training which relates to the guiding principles of the program and provides knowledge of scientific background materials

To conduct a program of education for parents and other interested citizens about the goals and content of this area of the curriculum

To plan and carry out evaluative procedures which will result in changes in the curriculum reflecting the needs of the individuals involved

To foster communication among teachers-children-parents in an atmosphere of trust and understanding about personal and family living

Teacher—Student

To help teachers-children-parents feel comfortable in discussing sexual growth and development patterns with each other

To help prepare children and adolescents for their respective roles during their various stages of growth and development

To help children and adolescents develop feelings of self-worth and respect for others

To help children and adolescents develop a wholesome, healthy attitude concerning sex in human beings

To provide a protected atmosphere in which youth can objectively discuss his concerns about his own feelings and behavior and the behavior of those around him

To help children and adolescents become responsible, mature adults who can make wise decisions concerning affection, love, and sex

OBJECTIVES

Levels 6, 7, and 8

The child will increase his knowledge about human sexual growth and develop desirable personal values and patterns of behavior through consideration of the demands of daily living in school, home, and the community.

Level 6 - Becoming Aware of the Heredity Factor and Its Influence upon Reproduction

Goal Statement

The child will comprehend that he grows and matures within the potential of what he inherits and that his environment and effort will influence the degree to which potential characteristics develop.

Performance Objectives

Given the opportunity to work with appropriate materials, such as charts, films, filmstrips, transparencies, and texts, the child will be able to—

explain growth patterns of boys and girls, using scientific terms

compare different kinds of cells with regard to size, shape, structure, and function, using classroom reference sources

diagram and label the steps involved in cell division

list the different possibilities in ovum fertilization and cell division that can result in multiple births of human beings

describe in writing how the nucleus of the cell directs all cellular activities, including reproduction

construct a chart to show the differences in the number of chromosomes in various animals, including man

describe how inherited traits are determined by the genes

show, by means of a diagram, that when a male and a female reproductive cell (gamete) unite, the resulting body (zygote) is capable of developing into a new organism with characteristics of both show, by means of a diagram, that half of the chromosomes in the zygote come from the paternal parent and half from the maternal parent

explain how the sex of a child is determined

categorize the ways in which living things resemble their parents

illustrate by a simple diagram that each living thing is the result of generations of gene combinations

predict how the different units of the environment can affect the development of personality traits in growing boys and girls

identify in writing the kinds of traits a person acquires during growth

explore, by means of class discussions, the kinds of activities participated in by the family as a group which have value in the development of desirable personality traits

cite examples to show ways in which patterns and rates of growth can be modified by the environment

analyze by means of panel discussion the role heredity, environment, and personal motivation play in helping an individual achieve his potential.

OVERVIEW OF FAMILY LIFE EDUCATION CURRICULUM

Elementary School

LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
LEARNING MORE ABOUT HUMAN GROWTH AND REPRODUCTION	BECOMING AWARE OF THE HEREDITY FACTOR AND ITS INFLUENCE IN REPRODUCTION	FINDING OUT ABOUT THE CAUSE AND PREVENTION OF COMMUNICABLE DISEASES	GAINING AN UNDERSTANDING OF OUR PERSONAL ABILITIES AND SOCIAL RELATIONSHIPS
Reproduction is a miracle of life.	There should be a sense of wonder in regard to the miracle of birth and a wholesome, healthy attitude toward parts of the body.	The bodies of boys and girls are subject to a variety of diseases during their different stages of growth.	The development of human sexuality is a continuing process that boys and girls should understand.
Before birth, an infant grows and develops in the mother's uterus where it is nourished and supplied with oxygen.	There are variations in the normal cell growth patterns.	Bacteria, viruses, and malfunctions of the body are responsible for diseases in children and adolescents.	Dating is a natural development in the sexual and social growth of boys and girls.
Body changes in boys and girls related to physical and sexual development are normal and natural.	Physical traits are inherited and transmitted from generation to generation.	Adults and young people must accept the responsibility for their own health and of safeguarding the health of others.	Dating presents new challenges to boys and girls in developing appropriate social relationships.
Every person grows and develops physically, emotionally, mentally, and socially at his own rate.	Inherited and acquired traits are influenced by environment.		Development of a realistic personal philosophy will assist boys and girls in meeting the responsibilities of adulthood.
A man and woman share in the process of reproduction. This carries with it a responsibility for the care and support of the newborn baby.			

GUIDELINES FOR TEACHING FAMILY LIFE EDUCATION

The concept that the family is a basic unit of society is to have the major emphasis in the teaching of all Family Life Education units.

The school, in handling controversial issues in family life education, such as masturbation, homosexuality, and prostitution, should be aware of the varying moral, ethical, and religious beliefs of students and their parents. If or when students raise questions in these areas, teachers should have no hesitation about referring students to their parents, their physician, or their clergyman.

If questions concerning abortion arise, only legal abortion may be discussed, in accordance with Illinois law.

Methods of contraception are not to be taught in any detail. If questions concerning contraception arise, teachers may explain that there are natural, mechanical, surgical, and chemical maans; that any decision for use is a personal one and is to be made with the help of a parent, a physician, and/or a religious advisor.

Questions have arisen as to the advisability of having the students make models or drawings of the human reproductive organs. It is, therefore, suggested that the making of models and drawings not be included in the student activities in the teaching of Family Life Education units.

Many teachers find it helpful to give an occasional test in the teaching of this unit. Experience has indicated that simple tests in good taste are of value and are well received by parents.

Teachers have found that in presenting the unit it is best to maintain an objective attitude. The discussion of personal situations involving either the teacher or individual pupils may often create unnecessary problems in the classroom.

The success of the Family Life Education unit is largely dependent upon the extent to which the school and the home work together. The school should encourage the parents to play an active role in helping their child to develop his own sexuality.

Involvement of the parents in the daily lessons is desirable and will help them follow the development of the unit. The parent should feel free to come to school to discuss the unit with the teacher.

A good relationship between parent, teacher, and child will help in attaining the objectives of the unit.

Various methods and techniques have been used successfully to involve the parents in the current unit. Examples of some of the methods follow.

The children devote the last five minutes of the period to writing short summaries of the material covered in the lesson. They list and briefly define the new vocabulary words used in the lesson. The summaries are taken home and parents are requested to sign the papers to indicate that they have seen the material. This provides the parents with an opportunity to discuss the lesson with the child and to know which concept is currently being discussed in the classroom. The children may keep the summaries in a folder.

The children keep "logs" which they take home each day. These "logs" have columns with headings indicating the date, the material discussed on that date, and the signature of a parent.

LEVEL 6

BECOMING AWARE OF THE HEREDITY FACTOR AND ITS INFLUENCE IN REPRODUCTION

Preview

The purpose of this unit is to review the facts of human growth and reproduction with special emphasis upon the study of heredity and environment.

The unit should create an awareness of the effects of heredity through the study of genes, chromosomes, and dominant and recessive traits.

The student should further appreciate the importance of environment in the realization of an individual's potential.

Key References

The following references are recommended for teachers.

American Medical Association. The Miracle of Life. Chicago: The Association, 1966.
The story of man's physiology, embryology, and heredity.

Boyer, Donald Allen. For Youth to Know. River Forest, Ill.: Laidlaw Brothers, 1965.
A simple scientific description of the reproductive process from the one-celled amoeba to man.

Flanagan, Geraldine Lux. The First Nine Months of Life. New York: Pocket Books, 1965.
An invaluable aid to understanding the month-by-month development of the human embryo and fetus. Contains excellent photographs.

Goldstein, Philip. Genetics Is Easy. New York: Lantern Press, Inc., 1962.
A general treatise on genetics dealing with such subjects as Mendel's Law, determination of sex, how genes act, and what is inherited.

Hein, Fred V., and Farnsworth, Dana L. Living. Glenview, Ill.: Scott, Foresman & Co., 1965.
A college text focusing on personal and community health with excellent material for the teacher on understanding human reproduction.

Kimberly-Clark Corporation. The Life Cycle Center Sample Set of Present Life Cycle Materials. Neenah, Wis.: the Corporation, 1968.
A series of pamphlets concerned with the life cycle of women from preadolescence through menopause. The kit is available at no cost.

Lerrigo, Marion O., and Southard, Helen. Facts Aren't Enough. Chicago: American Medical Association, 1962.
Sound ideas for parents and responsible adults about many aspects of family living, including sex education.

________. A Story about You. Chicago: American Medical Association, 1964.

Written for intermediate grade students. Accurate facts on maturation and human reproduction.

Power, Jules. How Life Begins. New York: Simon & Schuster, Inc., 1965.

Multiple births and heredity are treated in chapters 7 and 8.

Scheinfeld, Amram. Your Heredity and Environment. Philadelphia: J. B. Lippincott Company, 1965.

A complete reference work describing how heredity and environment interact in making human individuals what they are. Contains many photographs, tables, and illustrations.

Tanner, James M., et al. Growth. Life Science Series. New York: Time, Inc., 1965.

The complex, intricate process of human growth.

Development of Vocabulary

The vocabulary list on this page contains words which might be found--

in a concept in the unit
in the explanation of a concept
in the reading material
in a question-answer session in class
in the teacher's own background of terminology

All the words listed below will not necessarily be covered in the presentation of the unit. Vocabulary growth should come with the development of each lesson. It is not advisable to teach all words in the list in advance of lessons which involve only part of the list. The words must be relevant to a concept or attitude and should not be taught in isolation.

Review Vocabulary

acquired trait
ejaculation
embryo
erection
fallopian tubes
fertilization
fetus
follicle
heredity
hormones
inherited traits
menstruation
nocturnal emission
nucleus
ovaries
ovum
penis
pituitary gland
placenta
puberty
scrotum
semen
sexual reproduction
sperm
testes
umbilical cord
urethra
uterus
vagina

New Vocabulary

amnion
biology
characteristics
chromatin
chromosomes
contact
dominant
environment
fraternal twins
generation
genes
genetics
hybrid
identical twins
intelligence
maturation
microscopic
mutation
progeny
protoplasm
recessive
reflexes
zygote

Suggested Materials

opaque projector
overhead projector
transparencies
charts
flannelboard
magnetic board
movie projector
filmstrip projector
record player
DuKane sound filmstrip machine

CONCEPTS AND CONTENT

A. There should be a sense of wonder in regard to the miracle of birth and a wholesome, healthy attitude toward parts of the body.

Parenthood is a privilege. It is also a responsibility. All aspects of parenthood should be treated with respect.

The development of human beings from one fertilized cell is a miracle. Any act connected with this occurrence is very special and wonderful. New life is created by the union of a male sperm and a female egg to form a fertilized egg. This fertilized egg (zygote) divides and redivides millions of times. This results in the formation of a new human being.

As a person grows and develops from a child into an adult, his changing body requires additional kinds of care and attention to keep it functioning at its best.

SUGGESTED ACTIVITIES

Review concepts C, D, and E of the Grade 5 Unit in Family Life Education, using the following:

Human Growth and Reproduction, Clearvue, Inc., 1967.

Especially for Boys, Henk Newenhouse, 1966.

Life Begins Series, Eyegate House, 1967, "Human Reproduction."

Use a diagrammatical drawing of human cell growth to reinforce learning of the cellular growth of the new human life.

CONCEPTS AND CONTENT	SUGGESTED ACTIVITIES
B. There are variations in the normal cell growth patterns.	With the use of the chart on multiple births discuss different possibilities of cell division in one or more fertilized eggs.
After fertilization of the ovum, twins occur in one of the two following ways:	Discuss with the class the quintuplets who are living today.
If the fertilized ovum divides immediately into two individuals, the pair will develop as identical twins. Identical twins always are of the same sex and--from the standpoint of heredity--are the same individual in duplicate.	Note to the teacher: Scientists established through tests that the Dionne quintuplets were an all-identical set. The original egg had divided and redivided to form quadruple parts. Three of the four parts developed into the girls who were to be christened Yvonne, Annette, and Cecile. The fourth part divided again, producing the girls who became Emilie and Marie.
If two ova are fertilized at about the same time, the new individuals will develop as fraternal twins. Fraternal twins may be as much alike or as dissimilar as any other brothers or sisters in the family. They may be of the same sex or of different sexes and are two different individuals who merely happen to be born together.	The Lawson quintuplets of Auckland, New Zealand, developed from separate ova; no two are identical. Select students to interview identical twins who are members of the class or of another class in the school. Have the class set up series of questions to be asked.
Triplet, quadruplets, and quintuplets are called "supertwins." As with the case of twins, there may be fraternal or identical sets or combinations of the two types.	Do the same, if possible, with a set of fraternal twins. Ask the interviewers to be prepared to explain to the class why fraternal twins may not resemble each other. As an enrichment activity have some students prepare reports about studies made of identical twins raised in different environments. Ask them to present their findings to the class.

MULTIPLE BIRTHS

EGG CELL DIVISION

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1. TWINS

STATISTICAL PROBABILITY

$\frac{1}{89}$

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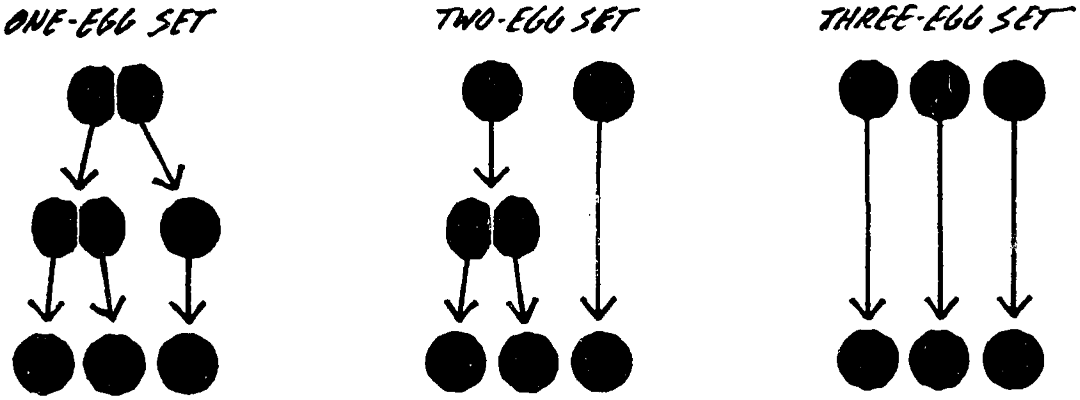
2. TRIPLETS



$\frac{1}{9,000}$

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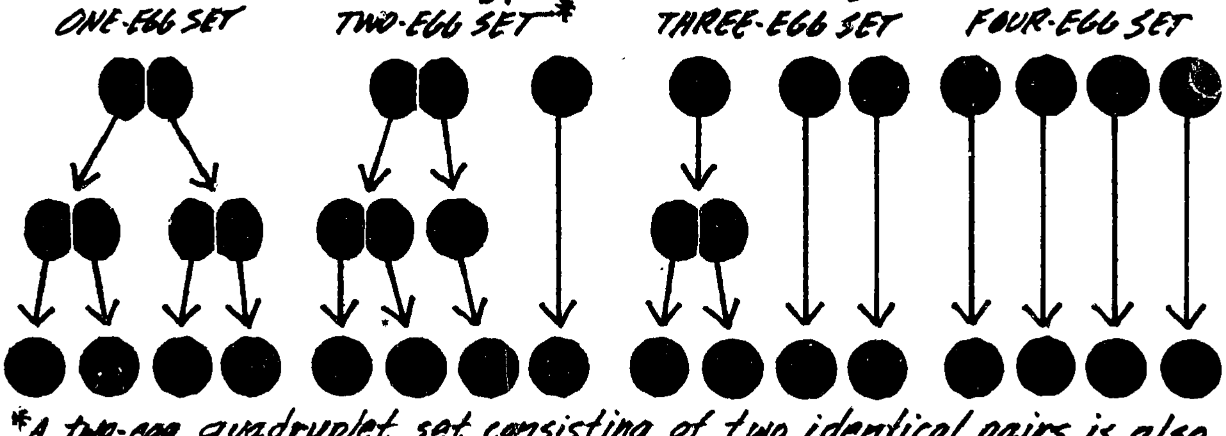
3. QUADRUPLETS



$\frac{1}{492,000}$

*A two-egg quadruplet set consisting of two identical pairs is also theoretically possible but, as yet, has not been found.

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4. QUINTUPLETS

Many possible types may be produced, ranging from five identical to five fraternal.

CONCEPTS AND CONTENT	SUGGESTED ACTIVITIES
C. Physical traits are inherited and transmitted from generation to generation.	Have a group of children prepare charts and a report on Mendel's experiments.
The study of genetics was enlightened by the contribution of Gregor Mendel. He is known for his discovery that certain specific elements determine the inherited characteristics of the offspring.	Ask pupils to report on one of the two men who have furthered the knowledge of inherited traits: Thomas H. Morgan Jean Baptiste Lamarck
Mendel called the elements "factors," but they are now known as genes. He developed the set of laws regarding genes as a result of his experiments with the sweet pea plant. Mendel's cross-pollination experiments produced the following results.	
Plants give to their offspring definite traits which continue from one generation to the next. Some characteristics are dominant and some are recessive.	
A human zygote has a nucleus containing 46 particles called chromosomes. A chromosome is a very small rod-shaped body containing the particles which determine inherited traits. Each type of animal has a different number of chromosomes.	Direct the class to write or report orally on the topic "Family Resemblances." Request the class to find out how farmers use selective breeding to improve farm animals.
The cells that give rise to a new human being have only half as many chromosomes as all other human cells. The egg contains 23 individual chromosomes rather than 23 pairs. It needs 23 additional chromosomes before it can divide and form new cells. These additional	Have a child do outside research about some of the early theories concerning the development of the embryo within the female body. Ask him to report his findings to the class.

CONCEPTS AND CONTENT

chromosomes are supplied by the father's sperm cell when it unites with the mother's egg cell. The chromosomes team up in pairs; of the 46 chromosomes, two are called sex chromosomes.

In women, the two sex chromosomes look alike, and each one is called X. In men, the two sex chromosomes are not alike. There are two types. One is large and looks like the X chromosomes of the female. It is also called X. The other is small, and is called Y.

If an X ovum is fertilized by an X sperm, the child will be an XX individual, or a girl. If X ovum is fertilized by a Y sperm, the child will be an XY individual, or a boy. Thus a person's sex is determined by a special pair of chromosomes called sex chromosomes.

The minute chromosome contains smaller elements called genes. The genes carry specific traits, such as hair color, shape of nose, and blood type. Those named are only a few of the many traits carried by the genes. Since each individual develops from a combination of the genes of the father and the mother, the offspring has certain traits of both parents.

SUGGESTED ACTIVITIES

Have the children make individual bar graphs to illustrate chromosome counts in different animals.

Examples of chromosome counts:

fruit fly	8	sheep	54
clam	16	cow	60
frog	26	guinea pig	64
cat	38	horse	66
pig	40	dog	78
rabbit	44	crayfish	200
man	46	butterfly	380
squirrel	50		

Assign a written report on Luther Burbank.

Provide a classroom aquarium with live-bearing fish. Study fish for inherited traits.

Review cell division in the amoeba. Relate the division to that in the human cell.

Compare the heights of several pupils in the class who are about the same age. Have them obtain heights of their parents in order to illustrate an inherited trait.

Discuss dominant and recessive traits and give as many examples as possible in terms of--

- hair texture
- hair color
- color of eyes
- shape of nose
- mouth size
- lip size
- shape and size of ears
- eyebrows
- height
- sex
- size of feet
- shape of legs

CONCEPTS AND CONTENT	SUGGESTED ACTIVITIES
Half of an individual's genes come from his father. The father received his genes from his mother and father, and then passed them along to his children. Before that, grandmother and grandfather received genes from their mother and father. Thus, the chain is unbroken in a family. The same genes one now has originated generations and generations ago.	Have children prepare a list of traits. Let them combine them with a second set of traits listed on the board. Have them make a drawing of what a person might look like with this combination. Discuss Walt Whitman's quotation: "Before I was born out of my mother generations guided me..." Use transparencies or other available materials (colored chalk or construction paper) to illustrate Mendel's experiment.
Genes are either dominant or recessive. A good example of this is eye color. Genes for brown eyes are dominant; those for blue eyes are recessive.	

CONCEPTS AND CONTENT

D. Inherited and acquired traits are influenced by environment.

Environmental influence is in operation from the time of conception. The prenatal care of the mother and the drastic change from the shelter of the mother's body to the outside world are tremendous influences upon a person's life.

What a person becomes is determined by his heredity and his environment.

Environment consists of many things. It is all of the experiences one has had in life. It envelops the family, the community, the church, the school, and the friends and acquaintances that affect a person's life.

Other aspects of environment are nutrition, health, psychological state, and climate.

Initially, then, a person's environment will play an important part in his physical, mental, and emotional growth. Every impression, whether great or small, molds the way a person feels and thinks. These impressions make him different from anyone else.

Even a brother and sister will respond differently to a situation because their "total" environment is different.

Although environment molds a person, it does not, necessarily, hold him. Despite early environmental hardships,

SUGGESTED ACTIVITIES

Explain the important roles of the family in determining acquired traits.

Compare the lives of two historical characters to determine the effect of outside influences on their lives. Suggest the names of men with opposite backgrounds, such as Washington and Lincoln.

Have students report on people who have achieved success despite environmental hardships. If possible, include people who live in the community.

Subject two similar plants to different surroundings, giving one a bright environment and placing the other in a dark place, such as a closet. Observe changes in the plants. Discuss causes.

CONCEPTS AND CONTENT

many people have been able to achieve success by means of strong motivation, determination, and hard work.

Inherited traits are the characteristics that are a result of gene combination. The traits are present before birth. Since the environmental influences begin at conception, a person can probably achieve greater intellectual development if he is subjected to an environmental situation that is encouraging, challenging, and instructive.

In contrast, someone may have a natural ability to become a good swimmer; for example, he may possess good coordination and stamina. If his environment does not present exposure to aquatic situations, however, he probably will not become a swimmer.

Acquired traits are affected by environment. They are the abilities and characteristics that are developed after a person is born. Many acquired traits are obtained as a result of imitation.

Acquired traits are not passed on to succeeding generations. However, a "talent susceptibility" might be inherited which would make it easier to develop certain skills in music, sports, and other fields.

Identical twins, exposed to life in completely different environments, show marked differences in acquired traits.

SUGGESTED ACTIVITIES

Study lives of some famous people who are considered geniuses, with a view toward determining what factors, if any, were responsible.

Have pupils list situations which promote favorable or unfavorable environments.

Ask the class to contrast mannerisms or traits of different cultural groups.

Have children make self-improvement charts or notebooks.

Have pupils debate the issue: Heredity v. Environment.

Ask students to observe at least one--if possible, several--newborn animals, such as kittens, puppies, chicks, fish, pigs, calves, or young colts. Ask them to list some of the things baby animals are able to do soon after they are born. Have them check all the things they consider to be examples of unlearned, instinctive behavior.

Compile with students a chart listing acquired and inherited traits.

CONCEPTS AND CONTENT	SUGGESTED ACTIVITIES
Every person has within him a talent susceptibility or an ability with which to achieve a worthwhile, productive life. The continuing task of growing up is to recognize these predispositions in certain areas and to develop them to their maximum effectiveness.	

RESOURCE MATERIALS

Books

Irwin, Leslie W., et al. Choosing Your Goals. Chicago: Lyons & Carnahan, 1967.

Hofstein, Sadie. The Human Story: Facts on Birth, Growth, and Reproduction. Chicago: Scott, Foresman & Co., 1967.

Basic and Auxiliary Science Texts

Blanc, Sam S., et al. Modern Science--Earth, Space, Environment. New York: Holt, Rinehart & Winston, Inc., 1967.
Unit 14, "The Continuity of Life."

Brandwein, Paul F., et al. Concepts in Science, Grade 6. Chicago: Harcourt, Brace & World, Inc., 1966.
Unit 8, "Code of Heredity."

Mallinson, George G., et al. Science 5. Morristown, N.J.: Silver Burdett Co., 1968.

Randal, Judith, All About Heredity. New York: Random House, Inc., 1963

Pamphlet

Kimberly-Clark Corporation. The Miracle of You. Neenah, Wis.: The Life Cycle Center, 1946.
A series of booklets concerned with the life cycle of women from preadolescence through menopause. The kit available at no cost.

Films

Genetics: Mendel's Laws. Division of Visual Education. 13 min. 01881-82.
Duplicates Mendel's experiments and clearly explains his laws of Dominance, Integration, and Independent Assortment.

Human Growth. E. C. Brown Trust, 1962. 19 min. Color.
Asks the question: When does growth being? Discusses prenatal growth and changes in physiological makeup during adolescence.

Laws of Heredity. Ency. Britannica Films, Inc., 1963. 22 min. Color. Division of Visual Education. 04106-82.
Discussion of Mendel's Laws, including how traits are passed to each succeeding generation.

Human Heredity. E. C. Brown Trust, 1968. 18 min. Color.

Thread of Life, Part I. Illinois Bell Telephone Co., 1960. 22 min. Color. Division of Visual Education. 05481-22.
Presents materials on heredity.

Wild Animals Families. Bailey Film Associates, 1956. 11 min. Color. Division of Visual Education. 01286-42.
Discusses varieties of animal families and the reproduction of its own kind in each species.

Filmstrips and Records

The Classification of Animals. Jam Handy Organization, 1962. Color.
Presents the history and scientific method of animal classification according to characteristics.

Especially for Boys. Henk Newenhouse, Inc., Wexler Films Productions, 1966. Color.
Presents the physical and emotional changes in adolescent boys.

Becoming a Woman. Society for Visual Education, Inc., 1968. Color.

Life Begins Series. Eye Gate House, Inc., 1967. Color.
"Reproduction in Flowers"
"Human Reproduction"

Transparency

Human Reproduction, Growth and Development. Clearvue, Inc., 1967. 14 transparencies.

Charts

Multiple Births. DGX8-09,413361. Denoyer-Geppert Co., 1970.

Basic Genetics. DGX8-09,413381. Denoyer-Geppert Co., 1970.

VT 017 557
RESOURCE UNIT FOR FAMILY LIFE EDUCATION, LEVEL 6. BECOMING AWARE OF THE HEREDITY FACTOR AND ITS INFLUENCE UPON REPRODUCTION. SUPPLEMENT TO THE CURRICULUM GUIDE FOR SCIENCE, GRADES 4-5-6.

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DESCRIPTORS - *RESOURCE UNITS; RESOURCE MATERIALS; *FAMILY LIFE EDUCATION; EDUCATIONAL PROGRAMS; *HEREDITY; PRENATAL INFLUENCES; ANOMALIES; *REPRODUCTION (BIOLOGY); *ELEMENTARY SCHOOL CURRICULUM; GRADE 6
IDENTIFIERS - CHICAGO

ABSTRACT - DESIGNED FOR INCLUSION IN THE FAMILY LIFE EDUCATION PROGRAM AT THE GRADE 6 LEVEL, THIS RESOURCE UNIT IS A SUPPLEMENT TO THE SCIENCE CURRICULUM GUIDE FOR GRADES 4 THROUGH 6 IN THE CHICAGO CITY SCHOOLS. CENTERED AROUND THE TOPIC, "BECOMING AWARE OF THE HEREDITARY FACTOR AND ITS INFLUENCE UPON REPRODUCTION," IT CONTAINS A UNIT PREVIEW, KEY REFERENCES, CONCEPTS, AND CONTENTS TO BE EMPHASIZED, SUGGESTED ACTIVITIES, AND A LIST OF RESOURCE MATERIALS. TO FACILITATE COMPREHENSION, GENERAL GOALS, OBJECTIVES, AND GUIDELINES FOR TEACHING FAMILY LIFE EDUCATION ARE INCLUDED. (SN)

RESOURCE UNIT
for
FAMILY LIFE EDUCATION

Level 5

LEARNING MORE ABOUT HUMAN GROWTH AND DEVELOPMENT

Supplement to the
Curriculum Guide
for Science
Grades 4-5-6

BOARD OF EDUCATION
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RESOURCE UNIT FOR FAMILY LIFE EDUCATION, LEVEL 5

LEARNING MORE ABOUT HUMAN GROWTH AND DEVELOPMENT

Supplement to the Curriculum Guide for Science
Grades 4-5-6

JAMES F. REDMOND
General Superintendent of Schools

BOARD OF EDUCATION
CITY OF CHICAGO

FOREWORD

This resource unit for family life education is designed to help children understand and appreciate the physical, emotional, and social aspects of human growth and development with particular emphasis upon areas related to sexuality and social and family relationships.

The Chicago public schools are sharing the responsibility for this kind of education with parents, the clergy, the medical profession, and community groups.

After the completion of a pilot program in 1966-67, a comprehensive program of instruction is being implemented as part of the regular curriculum in science in all elementary schools, and in health education, biology, and home economics in the high schools.

JAMES F. REDMOND

General Superintendent of Schools

ACKNOWLEDGMENT

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GENERAL GOALS FOR FAMILY LIFE EDUCATION

To enable each individual to progressively develop responsible behavior, feelings of self-worth, and respect for others, all of which are reached on the basis of accurate knowledge of human beings in the areas of growth and development, love, marriage, parenthood, and family life.

Organizational

To develop and implement a comprehensively and educationally sound program of Family Life Education incorporated into the regular curriculum in all of the elementary, secondary, and special schools

To conduct an extensive program of teacher education and inservice training which relates to the guiding principles of the program and provides knowledge of scientific background materials

To conduct a program of education for parents and other interested citizens about the goals and content of this area of the curriculum

To plan and carry out evaluative procedures which will result in changes in the curriculum reflecting the needs of the individuals involved

To foster communication among teachers-children-parents in an atmosphere of trust and understanding about personal and family living

Teacher-Student

To help teachers-children-parents feel comfortable in discussing sexual growth and development patterns with each other

To help prepare children and adolescents for their respective roles during their various stages of growth and development

To help children and adolescents develop feelings of self-worth and respect for others

To help children and adolescents develop a wholesome, healthy attitude concerning sex in human beings

To provide a protected atmosphere in which youth can objectively discuss his concerns about his own feelings and behavior and the behavior of those around him

To help children and adolescents become responsible, mature adults who can make wise decisions concerning affection, love, and sex

?

OBJECTIVES

Levels 4 and 5

The child will develop healthy attitudes toward human sexual growth and develop confidence in his role as a human being through investigation of the approaching stage of puberty and the structure of the family as a social unit.

Level 5 - Learning More about Human Growth and Development

Goal Statement

The child will establish communication with peers and adults about human sexual growth and the responsibilities of families while learning how children develop the characteristics of maturity which lead for most people to marriage, establishing a home, and raising a family.

Performance Objectives

Given the opportunity to work with appropriate resource materials, such as films, filmstrips, texts, and transparencies, the child will be able to—

describe verbally how the female reproductive system prepares itself for its function of producing new life

describe in writing the process of fertilization, using scientific vocabulary

explain the development of the embryo/fetus using correctly the terms placenta, uterus, umbilical cord, amnion, diffusion, labor, and premature

explain the birth process and name the immediate needs of the newborn infant

compare the growth changes of girls and boys during puberty

predict the physical, emotional, and social growth patterns of each sex during adolescence

explain why each person grows at his own rate

identify the characteristics of the male and female reproductive systems, using scientific vocabulary explain why personal cleanliness becomes more important during adolescence

ask questions, volunteer answers, and willingly participate in the learning activities

identify himself as the one responsible for his own behavior

show by his behavior as he interacts with peers and adults that he is developing feelings of self-respect.

Given the opportunity to discuss family life and the responsibilities of parenthood, the child will--

accept the idea that a child is conceived as a result of love of a father for a mother and a mother for a father

accept the idea that both parents share in the responsibility for creating and caring for a new life

accept the fact that there are many kinds of family groups in which children are sheltered, loved, and grow to maturity successfully.

OVERVIEW OF FAMILY LIFE EDUCATION CURRICULUM

Elementary School

LEVEL 5

LEARNING MORE ABOUT HUMAN GROWTH AND REPRODUCTION

Reproduction is a miracle of life.

Before birth, an infant grows and develops in the mother's uterus where it is nourished and supplied with oxygen.

Body changes in boys and girls related to physical and sexual development are normal and natural.

Every person grows and develops physically, emotionally, mentally, and socially at his own rate.

A man and woman share in the process of reproduction. This carries with it a responsibility for the care and support of the newborn baby.

LEVEL 6

BECOMING AWARE OF THE HEREDITY FACTOR AND ITS INFLUENCE IN REPRODUCTION

There should be a sense of wonder in regard to the miracle of birth and a wholesome, healthy attitude toward parts of the body.

There are variations in the normal cell growth patterns.

Physical traits are inherited and transmitted from generation to generation.

Inherited and acquired traits are influenced by environment.

LEVEL 7

FINDING OUT ABOUT THE CAUSE AND PREVENTION OF COMMUNICABLE DISEASES

The bodies of boys and girls are subject to a variety of diseases during their different stages of growth.

Bacteria, viruses, and malfunctions of the body are responsible for diseases in children and adolescents.

Adults and young people must accept the responsibility for their own health and of safeguarding the health of others.

LEVEL 8

GAINING AN UNDERSTANDING OF OUR PERSONAL ABILITIES AND SOCIAL RELATIONSHIPS

The development of human sexuality is a continuing process that boys and girls should understand.

Dating is a natural development in the sexual and social growth of boys and girls.

Dating presents new challenges to boys and girls in developing appropriate social relationships.

Development of a realistic personal philosophy will assist boys and girls in meeting the responsibilities of adulthood.

GUIDELINES FOR TEACHING FAMILY LIFE EDUCATION

The concept that the family is a basic unit of society is to have the major emphasis in the teaching of all Family Life Education units.

The school, in handling controversial issues in family life education, such as masturbation, homosexuality, and prostitution, should be aware of the varying moral, ethical, and religious beliefs of students and their parents. If or when students raise questions in these areas, teachers should have no hesitation about referring students to their parents, their physician, or their clergyman.

If questions concerning abortion arise, only legal abortion may be discussed, in accordance with Illinois law.

Methods of contraception are not to be taught in any detail. If questions concerning contraception arise, teachers may explain that there are natural, mechanical, surgical, and chemical means; that any decision for use is a personal one and is to be made with the help of a parent, a physician, and/or a religious advisor.

Questions have arisen as to the advisability of having the students make models or drawings of the human reproductive organs. It is, therefore, suggested that the making of models and drawings not be included in the student activities in the teaching of Family Life Education units.

Many teachers find it helpful to give an occasional test in the teaching of this unit. Experience has indicated that simple tests in good taste are of value and are well received by parents.

Teachers have found that in presenting the unit it is best to maintain an objective attitude. The discussion of personal situations involving either the teacher or individual pupils may often create unnecessary problems in the classroom.

The success of the Family Life Education unit is largely dependent upon the extent to which the school and the home work together. The school should encourage the parents to play an active role in helping their child to develop his own sexuality.

Involvement of the parents in the daily lessons is desirable and will help them follow the development of the unit. The parent should feel free to come to school to discuss the unit with the teacher.

A good relationship between parent, teacher, and child will help in attaining the objective of the unit.

Various methods and techniques have been used successfully to involve the parents in the current unit. Examples of some of the methods follow.

> The children devote the last five minutes of the period to writing short summaries of the material covered in the lesson. They list and briefly define the new vocabulary words used in the lesson. The summaries are taken home and parents are expected to sign the papers to indicate that they have seen the material. This provides the parents with an opportunity to discuss the lesson with the child and to know which concept is currently being discussed in the classroom. The children may keep the summaries in a folder.
>
> The children keep "logs" which they take home each day. These "logs" have columns with headings indicating the date, the material discussed on that date, and the signature of a parent.

LEVEL 5

LEARNING MORE ABOUT HUMAN GROWTH AND REPRODUCTION

Preview

This unit is designed to offer the pupils information about the reproductive process and to build a wholesome attitude toward human sexuality.

The students will learn about the stages of prenatal development from a single fertilized egg to a fetus. Instruction is further correlated with an extensive study of human growth and developmental changes during preadolescent years, including seminal emission and menstruation.

The unit should foster an appreciation of the miracle of the creation of a new life within the family unit.

Key References

The following references are recommended for teachers.

American Medical Association. The Miracle of Life. Chicago: the Association, 1966.
An authoritative booklet presenting the story of man's physiology, embryology, and heredity.

Boyer, Donald Allen. For Youth to Know. River Forest, Ill.: Laidlaw Brothers, 1966.
A simple scientific description of the reproductive process from the one-celled amoeba to man.

Duvall, Evelyn Millis. Love and the Facts of Life. New York: Association Press, 1963.
A reputable guidebook by a noted authority on teenage problems.

Flanagan, Geraldine Lux. The First Nine Months of Life. New York: Pocket Books, Inc., 1965.
An invaluable aid to understanding the month-by-month development of the human embryo. In paperback, with excellent photographs.

Jenkins, Gladys, et al. These Are Your Children. Glenview, Ill.: Scott, Foresman & Co., 1966.
For students, teachers, and parents. It reports the findings of research in child development and translates these findings into a practical, usable body of information.

Lerrigo, Marion O., and Southard, Helen. A Story about You. Chicago: American Medical Association, 1964.
Written for students in grades 4, 5, and 6. Accurate facts on maturation and human reproduction.

________. Facts Aren't Enough. Chicago: American Medical Association, 1962.
Sound ideas for parents and other responsible adults about family living, including sex education.

Powers, Jules. How Life Begins. New York: Simon & Schuster, 1965.
A vivid presentation of the plan of life covering the entire world of living beings.

Tanner, James M., et al. Growth. Life Science Library. New York: Time Inc., 1965.
An explanation of the complex process of human growth.

Curriculum Guides

Chicago, Board of Education. Curriculum Guide for Science for Primary Two and Three. Chicago: the Board, 1966.
Grade 2, Unit V, Concept B, "Each part of a seed helps in the growing of a new plant" and Concept C, "Plants which grow from seeds resemble the plant which produced the seed."

Chicago, Board of Education, Curriculum Guide for Science, Grades 4-5-6. Chicago: the Board, 1966.
Grade 5, Unit IV, Concept B, "Animals reproduce similar offspring."

Recordings

When Your Child Asks About Sex. Illinois State Medical Society.
A discussion of sex education by a doctor, a well-known radio personality, and his wife. Helpful for both parents and teachers.

Dr. Fitch Talks to Parents About Sex. Henk Newenhouse.
A review of the reproductive process by a doctor. Answers to questions asked by children.

Development of Vocabulary

The vocabulary list on this page contains words which might be found--

- in a concept in the unit
- in the explanation of a concept
- in the reading material
- in a question-answer session in class
- in the teacher's own background of terminology

All the words listed below will not necessarily be covered in the presentation of the unit. Vocabulary growth should come with the development of each lesson. It is not advisable to teach all words in the list in advance of lessons which involve only part of the list. The words must be relevant to a concept or attitude and should not be taught in isolation.

Vocabulary

acquired traits
adolescence
afterbirth
anus
asexual
circumcision
ejaculation
embryo
erection
external
fallopian tubes
fertilization
fetus
follicle
genital
heredity
hernia
hormones
hymen
hygiene
implanted
inherited traits
internal
labor
menstruation
nocturnal emission
nucleus
ovaries
ovum
penis
pituitary gland
placenta
premature
puberty
pubic hair
reproduction
rupture
sanitary napkins
scrotum
semen
sexual intercourse
sexual reproduction
sperm
testes
trait
umbilical cord
urethra
uterus
vagina
vulva

Suggested Materials and Equipment

opaque projector
overhead projector
microprojector
transparencies
charts
models (commercial)
flannelboard
magnetic board
chicken egg, fish egg, turtle egg
movie projector
filmstrip projector
record player
tape recorder
DuKane sound filmstrip machine

CONCEPTS AND CONTENT	SUGGESTED ACTIVITIES
A. Reproduction is a miracle of life.	
Until such time as this unit, "Learning More about Human Growth and Development," is incorporated into the <u>Curriculum Guide for Science, Grades 4-5-6</u>, the following material on plant and animal reproduction will be used to develop this concept:	
<u>Curriculum Guide for Science for Primary Two and Three</u>.	
Grade 2 Unit V: Concepts B and C	
<u>Curriculum Guide for Science, Grades 4-5-6</u>	
Grade 5 Unit IV: Concept B	
In mammals, birds, and reptiles, fertilization is internal. The male deposits sperm within the body of the female.	Have individual children prepare reports on the advantages and disadvantages of external and internal fertilization in different animals.
The chances of a sperm meeting an egg are greater if the sperm are deposited directly in the mother's body.	
In mammals and some reptiles, development of the embryo is also internal with resultant increase in the offspring's chances of survival.	Discuss the advantages of internal development of an embryo in relation to proper temperature, protection from natural enemies, and food supply.
In human beings, the joining of the sperm of the father with the ovum of the mother results in the fertilization of the ovum and the creation of new life. The internal growth and development of the new embryo takes approximately nine months.	Compare the pinhead size of the human egg with the large, yolky bird's egg. Discuss the reasons for the difference. Make a chart showing the length of gestation for several common animals. Compare these with that of a human being.

CONCEPTS AND CONTENT	SUGGESTED ACTIVITIES
B. Before birth, an infant grows and develops in the mother's uterus where it is nourished and supplied with oxygen.	Exhibit charts, diagrammatic drawings, and transparencies showing the various stages in the development of the embryo and the fetus.
The fertilized egg attaches itself to the wall of the mother's uterus.	
Sometime in the first week cells gather to make a transparent bubble or sack. This bubble is known as the amnion. It becomes the fluid-filled chamber in which the embryo and later the growing baby lives in the womb.	
The placenta, a network of blood vessels, develops on the wall of the uterus. The transfer of food and oxygen occurs in the placenta and then is passed on to the infant by means of the umbilical cord. The umbilical cord connects the baby to the placenta.	
The blood of the unborn is made in its own body and its circulatory system is apart from the mother's.	
After the fertilized egg has divided into many cells, the baby's body parts, such as lungs and muscles, begin to form. During this time the baby is referred to as the embryo.	Have a committee prepare a chart showing the development of the embryo. As an enrichment activity, have a child or a committee do research on the derivation of words such as placenta, amnion, fetus, mammal, villi, cell, embryo. Have a chart prepared showing the exchange of food and oxygen between the blood of the mother and that of the unborn child.

CONCEPTS AND CONTENT	SUGGESTED ACTIVITIES
After the second month, the baby is one inch long. He has a mouth, a nose, ears, and eyes. He begins to resemble a human being. At this stage the baby is referred to as the fetus.	Explain how outside influences, such as German measles, might interfere with the healthy development of the baby.
At four months, the fetus is four inches long and starts to move his limbs. These movements are felt by the mother and can be seen.	Have the children prepare individual reports on the month-to-month development of the fetus.
At six months, the fetus is about twelve inches long and weighs one and one quarter pounds. He now looks more as he will at birth.	Have the children prepare an original composition of what life might be like as a fetus developing in a mother's body.
By nine months, the infant is about 20 inches long and weighs 6 pounds or more. He is developed to the point where his organs can function outside his mother's body.	Prepare a graph showing the growth in size of the unborn baby from conception to birth.
The aging of the placenta and the response of the womb muscles to the great stretching help to trigger the amazing process of labor and delivery.	Encourage children to discuss parent recollections concerning growth and development from the fetal to the infant stage of the children.
Before delivery there is a narrowing of the uterus which helps to straighten the baby's body so that his head is pressed downward against the cervix (opening at the lower end of the uterus). The cervix must give way to accommodate the width of the baby's head. The muscles of the top of the uterus apply a force comparable to a weight of about fifty pounds or more to the baby with each contraction. Usually the amnion ruptures under this pressure.	By means of a scale show pressure exerted by the uterus to begin the process of delivery. Show this by placing a balloon filled with water on the scale and pressing down with a force of fifty pounds.

CONCEPTS AND CONTENT	SUGGESTED ACTIVITIES
The contractions force the baby past the cervix into the vagina (or birth canal), a passage to the outside.	
The vagina is located between the urethra and the anus (through which solid wastes are eliminated). Protecting the vaginal opening are two folds of flesh called the vulva.	
In order to complete the birth of the baby's head, an additional force - equal to the pressure supplied by the uterus - is needed. The extra power must be supplied by the efforts of the mother. That is why the process of birth is called labor. The doctor holds the emerged baby's head and guides the mother in completing the delivery.	
The final stage of labor is the expelling of the placenta.	
The doctor cuts the umbilical cord soon after birth. The cord is almost bloodless because nature closes it - after the baby is born - by means of a special jelly-like substance which is packed around the three blood vessels in the cord. This compresses the embedded vessels.	Prepare a bulletin board of newspaper pictures and articles about current births and babies.
The baby begins to breathe within moments after birth. It takes two to three days for breathing to become regular and to clear the air passages of mucus.	Visit the exhibit on prenatal development at the Museum of Science and Industry.
The baby's heart must begin to pump blood to the lungs to pick up oxygen. A major valve must close in the heart	Visit the exhibit "The Miracle of Life" at the Hinsdale Health Museum. (Make arrangements several months before you wish to go.)

CONCEPTS AND CONTENT

SUGGESTED ACTIVITIES

to keep the used and fresh blood separate.

The portion of umbilical cord attached to the baby quickly dries up and the place where it was attached to the body soon heals, leaving a scar known as the navel.

The mother's uterus and other body parts return, before long, to the size they were before she was carrying the baby.

CONCEPTS AND CONTENT	SUGGESTED ACTIVITIES
C. Body changes in boys and girls related to physical and sexual development are normal and natural.	
A baby's environment changes dramatically at birth. From the moment he is born he must adapt to survive.	Prepare a bulletin board displaying baby pictures of class members.
A newborn baby is not capable of thinking since he has no experience that would activate the development of a memory.	Have children discuss with parents what parents remember about them from the time they were born. Have the children use this information in compositions.
The greatest increase in height and weight occurs during the first three years. Growth is fairly even between the ages 3 and 13.	
Between the ages of 12 and 16 girls usually grow faster than boys. The Boys usually grow rapidly between 14 and 17.	
Although there is a common pattern of growth, each child grows at his own rate.	From information obtained from their own health records have children construct graphs showing changes in their height and weight.
The process of growth toward sexual maturity is called puberty. Puberty begins in both boys and girls with the production of hormones. Hormones are produced by glands and go into the blood stream. The master gland which controls the entire glandular system is the pituitary gland. At puberty it produces a special hormone which matures the sexual glands.	Have students conduct individual research on the pituitary glands and their hormones in relationship to growth and development. See "Free and Inexpensive Materials" at end of unit for chart available for children to record their growth in height (How Tall Chart).

CONCEPTS AND CONTENT

In boys, the sexual glands are the testes or testicles. The hormones from these glands cause physical changes. The penis and testes enlarge. The testes begin to produce sperm.

Following puberty, a boy's penis occasionally becomes stiff. This is referred to as an erection. Sometimes at night, when he is asleep, there will be an unexpected discharge of semen. This is called a seminal emission or a nocturnal emission (commonly known as a "wet dream"). This discharge is a normal occurrence and is in no way harmful. It is simply an indication of an overabundance of sperm.

Other body changes in boys are the appearance of hair on arms, legs, chest, pubic area, under the arms, and sometimes on the back. Shoulders broaden and hair appears on the face. Their voices change and they grow in height and weight.

In girls, the sexual glands are the ovaries. The ovaries send out a hormone which causes the uterus, the fallopian tubes, and the vegina to grow larger. The ovaries begin to produce ova and to release an ovum about once each month.

When an ovum leaves the ovary, the uterus prepares for its reception. An extra supply of blood thickens the lining of the uterus. When

SUGGESTED ACTIVITIES

Direct a class discussion on the topic "What it Means to Grow Up."

Provide a "Question Box" where children may put questions that are related to the unit. Those questions of value to the class might be discussed by the teacher. For those questions of a more personal nature and those of a more specific concern to one or more individuals, private conferences are generally advisable.

Caution: Teacher should exercise discretion in this activity so that there is no invasion of the privacy of the home in the discussions and conferences.

Ask the physical education teacher to demonstrate the proper method of lifting in order to avoid the danger of developing a hernia.

Lead the class in a discussion of the need for cleanliness.

CONCEPTS AND CONTENT	SUGGESTED ACTIVITIES
the ovum is not fertilized, it does not need this extra supply of blood, which then gradually leaves the body through the vagina. This discharge of blood is called menstruation.	
Menstruation begins from 10 to 14 days after the ovum leaves the ovary. The blood flows from the vagina for three to five days each month. The total amount of fluid passing out of the vagina each month is about five ounces. This is extra material which serves no useful purpose.	The hygiene of menstruation should be discussed with the girls only. If possible, include the teacher-nurse in this presentation. Girls, generally, feel more comfortable when this presentation is made by a woman teacher.
At first, the ovaries are not always fully mature, and the menstrual period is, therefore, irregular. Several months may elapse between periods. A monthly cycle becomes established, however, within a year or two. This cycle will continue once a month for about 30 years or more.	
At 40 or 50 years of age menstruation becomes irregular and gradually ends. This may take a few months or longer than a year. This is known as menopause, or "change of life." The only time menstruation stops during the reproductive years is when a woman becomes pregnant. The menstrual period starts again after the baby is born.	
Other body changes in girls at puberty include the appearance of hair on the legs and arms, but in much less noticeable quantity than on boys. Hair appears in the pubic	

CONCEPTS AND CONTENT	SUGGESTED ACTIVITIES
region and under the arms. The breasts being to develop, the hips become rounded, and the pelvis becomes wider. The girl has begun the transition from childhood to adulthood.	
Because the sweat glands become more active at this time, daily bathing and the regular use of a deodorant are necessary.	Discuss the role of deodorants in preventing odors. The discussion should include selection and use of an appropriate deodorant.

CONCEPTS AND CONTENT

D. Every person grows and develops physically, emotionally, mentally, and socially at his own rate.

Growth into maturity brings many changes. The rate of change is never the same for any two people. There is no such thing as an average person. Rate of growth is an individual matter.

A difference between the rate of development for boys and the rate for girls is normal. Girls usually mature one to two years earlier than boys. A girl's rapid growth period may begin when she is eight or nine years of age. A boy's spurt may occur any time from age 10 to 14. Boys continue to grow for a longer period of time than girls and do not reach full growth until they are 20 or older. Height and general body build are established before birth.

In girls, each will have an individual menstrual cycle. Each will begin the cycle at a different time, and each will end the cycle at a different time. This might occur any time between the ages of 9 and 17.

In boys, the genital organs will differ in size, shape, and rate of growth.

Inherited intelligence develops according to education and training. Emotional maturity, as well as all aspects of environment, influence the rate of mental growth.

SUGGESTED ACTIVITIES

Have the children prepare a chart or graph showing the difference in the rate of growth in children of the same approximate age in their classroom.

Lead a class discussion on why awkwardness is common during the period when young people are maturing, why so-called laziness may result from an organic disorder, and why social and emotional maturity fluctuates.

Conduct class discussions on such problems as hurt feelings, shyness, bullies, and showing off. Elicit the reasons behind these feelings and behavior.

Create a role-playing situation in which some of the students demonstrate various responses to emotional situations. Discuss the function of self-control as it applies to the situations.

Have buzz groups on--

ways of showing love and respect for family and friends

ways of showing responsibility toward younger siblings

ways of showing that a person is a "good sport."

Request students to write compositions describing the characteristics they admire in older persons whom they know.

Have students discuss how they feel physically when overwhelmed by emotions like anger. Lead them to note the part which self-control plays in the emotional life of a person.

Have students write brief compositions on a topic such as: "The Kind of

CONCEPTS AND CONTENT	SUGGESTED ACTIVITIES
All human beings have emotions. Emotions are the ways of reacting to people and to situations. Environment and training are important in the rate of emotional development.	Person I Would Like To Be When I Am an Adult.

CONCEPTS AND CONTENT

E. A man and woman share in the process of reproduction. This carries with it a responsibility for the care and support of the newborn baby.

Most forms of life begin as tiny eggs (ova). In human females thousands of ova are contained in the ovaries, two almond-sized organs in the abdominal cavity.

The ovum or egg is as small as the point of a needle. It is light yellow in color. It contains a fragment of yolk. It is round like a ball.

One ovum (usually) is released each month and travels down the fallopian tubes (oviducts) where it may become fertilized if sperm are present. The monthly release of an ovum, known as ovulation, usually alternates each month between the two ovaries.

Male reproductive cells are called spermatozoa or sperm. Much smaller than the ova, approximately 500 million sperm could fit in a teaspoon. Each tadpole-like sperm has an oval head, a narrow neck, and a tail with which it propels itself in a swimming motion. The head of the sperm contains the nucleus which will unite with an egg cell, producing a fertilized egg. Sperm develop in tiny coiled tubes within the two oval testes or testicles.

SUGGESTED ACTIVITIES

Use transparencies to show the reproductive systems of the male and female.

Use diagrammatic drawings to compare the female and male reproductive organs in human beings.

Compare the terms used in plant reproduction to those dealing with human reproduction.

Place thumbs on pelvic bones and spread fingers down over lower abdominal region to designate the location of the uterus in the body.

Have pupils make a tight fist. Explain that their fist is approximately the same size as the uterus, as it would appear under normal conditions.

Place a grain of salt on black construction paper or place a dot on the chalkboard to demonstrate the approximate size of a human egg.

Use a transparency or a diagram and have the pupils trace the route of the egg from the ovary through the fallopian tubes to the uterus.

Compare the number of sperm (millions) to just one egg. See if pupils can discover an explanation for this seeming imbalance.

Recall that fish sperm had a water medium in which to swim. Emphasize the fact that human sperm must swim in a fluid called semen, manufactured in the body of the male.

CONCEPTS AND CONTENT

SUGGESTED ACTIVITIES

The testes are suspended outside the body in a pouch-like sack of skin called the scrotum.

The testes must be located outside the body because the sperm can only survive in temperature lower than that of the body.

The sperm pass from the tiny coiled tubes in the testes into another tube called the epididymis. From there the sperm travel into the abdominal cavity through the vas deferens (or sperm duct).

Inside the body the sperm mix with a thick liquid secreted by special glands (seminal vesicles, prostate gland, Cowper's gland). This combination of fluid and sperm is known as semen. The fluid provides a medium through which the sperm travel. During mating the semen enters into the urethra, a tube through the penis, to the outside of the body. This is known as ejaculation.

In front of the scrotum is the penis. The penis is a finger-like organ which has a two-fold purpose, one of which is to give off liquid wastes from the body and the other purpose is to place sperm in the vagina of the woman. It is usually in a flaccid state but is capable of becoming firm. This is brought about by the blood filling the spongy tissues. This process is called an erection and makes it

CONCEPTS AND CONTENTS

possible for the penis to enter the vagina during sexual intercourse (mating).

In human mating, which is an act of love between a man and a woman, the semen is released into the vagina of the woman. From there it travels to the uterus and from there proceeds to the fallopian tubes.

The miracle of life, therefore, is the result of an act of love between a man and a woman. It carries with it the responsibility to provide the newborn child with the love, security, and guidance it needs for its growth and development.

SUGGESTED ACTIVITIES

Make a chart showing different kinds of families. Have the class discuss in what ways human families are different from animal families.

Have the children make a group picture collage showing families at work and at play.

Have the class write on--

What does it mean to be a parent?

What are the qualities that make a good parent?

Why isn't it easy being a parent?

RESOURCE MATERIALS

Basic Text

Boyer, Donald Allen, and Brandt, Elizabeth R. Human Growth and Reproduction. River Forest, Ill.: Laidlaw Bros., 1967.
Covers reproduction from amoeba to man and human growth patterns.

Free and Inexpensive Materials

Kimberly-Clark Corporation. Very Personally Yours. Neenah, Wis.: Life Cycle Center, 1946.
Good material on menstruation and menstrual hygiene.

Basic and Auxiliary Science Texts, Grade 5

Blough, Glen O., et al. Science is Discovering. (Gr. 5) Chicago: Scott, Foresman & Co., 1965.
Covers material on plant and animal reproduction, pages 89-112; 186-212.

Brandwein, Paul F., et al. Concepts in Science. (Gr. 5) Chicago: Harcourt, Brace & World, Inc., 1966.
Excellent information on cells and plant and animal reproductive systems. Has fine teacher's manual, pages 145-269.

Craig, Gerald S., and Hill, Katherine E. Science for You. (Gr. 5) Chicago: Ginn & Co., 1965.
Discusses the systems of the body, pages 245-53.

Jacobson, Willard, et al. Inquiring into Science. New York: American Book Co., 1968.
Classification of plants and animals, pages 113-76.

Mallinson, George A., et al. Science 5. Park Ridge, Ill.: Silver, Burdett Co., 1968.
Contains excellent information on plants, animals, patterns of life, genes, and chromosomes, pages 235-85.

Navarra, John, and Zaffaroni, Joseph. Today's Basic Science 5. Evanston, Ill.: Harper and Row Publishers, 1967.
Useful in discussion of cells and plant reproduction, pages 165-69; 190-93.

Schneider, Herman, et al. Science in Our World. Boston: D. C. Heath & Co., 1968.
Ample material on systems of the body, animal classification, and plant reproduction, pages 173-265.

Smith, Herbert, et al. Science 5. River Forest, Ill.: Laidlaw Bros., 1966.
Discusses cells in living things and plants and animals as living things, pp. 22-70.

Syrocki, B. John, and Munch, Theodore W. Science for a Changing World. Chicago: Benefic Press, 1967.
Excellent material on how animals and plants are classified. Also traces development of both.

Chart

Travelers Insurance Co. How Tall Chart. Hartford, Conn.
An excellent chart to help students keep a record of their own growth in height and weight. Free on request.

Films

The Day Life Begins. Carousel, 1966. 22 min. B&w.
Emphasizes that all living things reproduce and that most living things start life from a fertilized egg.

The Story of Menstruation. Walt Disney Productions, 1949. 11 min. Color.

Growing Up: Girl's Version. CCM Films, Inc., 1969. 11 1/2 min. Color.
An animated film interspersed with live action-shots showing glandular development, menstruation, and childbirth with emphasis on family relationships with girls 9 to 11.

Filmstrips and Records

Especially for Boys. Wexler Films Productions, 1966. Color.
Presents the physical and emotional changes in adolescent boys.

"Human Reproduction," Life Begins. Eye Gate House, Inc., 1967. Color.

Transparency

Family Life and Sex Education. Oak Brook, Ill.: Clearvue, Inc., 1967. Color.
Covers human reproduction, growth, and development.

VT 017 575

VT 017 575
TYPEWRITING: BUSINESS EDUCATION CURRICULUM GUIDE. INSTRUCTIONAL MATERIALS FOR USE WITH DISADVANTAGED STUDENTS IN VOCATIONAL EDUCATION.

OMAHA PUBLIC SCHOOLS, NEBR. DIV. OF VOCATIONAL AND ADULT EDUCATION.
MF AVAILABLE IN VT-ERIC SET.
PUB DATE - AUG71 67P.

DESCRIPTORS - *BUSINESS EDUCATION; SECONDARY GRADES; *UNITS OF STUDY (SUBJECT FIELDS); TRANSPARENCIES; AUDIOVISUAL AIDS; *CURRICULUM GUIDES; *TYPEWRITING; VOCATIONAL EDUCATION; *DISADVANTAGED YOUTH; HANDICAPPED STUDENTS; VOCATIONAL DEVELOPMENT
IDENTIFIERS - EDUCATIONAL AWARENESS; BEGINNING COMPETENCE

ABSTRACT - DEVELOPED BY VOCATIONAL EDUCATION TEACHERS AS A SUMMER PROJECT FOR BUSINESS EDUCATION CURRICULUMS FOR DISADVANTAGED AND/OR HANDICAPPED STUDENTS, THESE INSTRUCTIONAL MATERIALS OUTLINE FOUR UNITS OF STUDY FOR A VOCATIONAL EDUCATION CURRICULUM FOR THE SECONDARY GRADES IN TYPEWRITING. NUMEROUS TRANSPARENCIES AND OTHER AUDIOVISUAL AIDS ARE INCLUDED FOR THE FOLLOWING INSTRUCTIONAL UNITS: (1) INTRODUCING THE TYPEWRITING KEYBOARD, (2) CHANGING THE RIBBON ON A ROYAL 440 TYPEWRITER, (3) POSTAL SERVICES AS RELATED TO OFFICE PRACTICES, AND (4) THE TERM PAPER. THIS DOCUMENT IS 3-HOLE PUNCHED FOR EASE IN ADDING OTHER MATERIALS. (AG)

TYPEWRITING

SHORTHAND

BUSINESS EDUCATION

DEPARTMENT OF VOCATIONAL
AND ADULT EDUCATION

Distributed by
Office of Public Information Services
Omaha Public Schools
Omaha, Nebraska
351-P160-71

CURRICULUM GUIDE

BUSINESS EDUCATION

TYPEWRITING

Instructional Materials
for use with
Disadvantaged Students
in
Vocational Education

OMAHA PUBLIC SCHOOLS

DR. EDWIN H. PARRISH
Assistant Superintendent of Schools
Department of Vocational and Adult Education

August, 1971

5167

FORWARD

Part II Summer Program

The materials developed by vocational teachers in this special project are concerned with curricula and/or those things that supplement and complement it. These materials are especially prepared for pupils with special needs, commonly known today as the "disadvantaged and/or handicapped."

Some of the units developed are intended for use by the teacher. Others are for the student, and others are for both teacher and student.

As flexibility is the "in" word in education today, the writers of the various projects took this into consideration and designed the projects so they may also be used, with minimum modification, in the regular vocational education classroom setting.

The attitudes, enthusiasm, and interest displayed by participants during the development of these materials will no doubt carry beyond this project and into the classrooms. These continuing factors should be stimuli for further material development for all students enrolled in prevocational and vocational programs, both in non-public and public schools.

CONTENTS

Prepared by:
Jean Whiting
South High School
Special Project 76
Summer 1971

Omaha Public Schools
Department of Vocational
and Adult Education
Omaha, Nebraska

BE-T1

351-P160-71
6578-72

DESCRIPTION OF PACKAGE

This package contains units of study to be used as follows:

1. The changing of the ribbon on the typewriter may be used as desired in typewriting classes. By a classroom demonstration, other manual typewriter ribbons may be easily changed.

2. The Postal Services Unit is intended to be used in the Office Practices area.

3. The transparencies for presenting the keyboard are made from Dr. Cleo Casady's Chalkboard Approach to Teaching Typing.

4. The typewriter keyboard shown on a transparency with overlays is included so as to make it easy to demonstrate the correct fingering of the keyboard.

5. The transparencies for typing the term paper show sections of a term paper and may be used for class presentations as the students progress through the manuscript.

BE-T2

USE OF MATERIAL

This packet is designed to be used in a variety of ways.

1. The film loop and ide tape may be used for class presentations.
2. The film loop may be used by individuals having difficulty with changing a ribbon.
3. A study sheet accompanies the slide-tape presentation which may be used for class discussion.
4. The transparencies for introducing the keyboard are intended to be used for approximately the first two weeks of instruction in the Typing I course.
5. The transparencies for typing the term paper are intended to be used as the student progresses through the typing of the term paper. Use a cardboard mask with the proofreaders' marks transparencies so as to direct the students' attention.

CONTENTS

I. Introducing the Keyboard--Typewriting I

   A. Explanation of Transparencies
   B. Transparencies for introducing the keyboard
   C. Keyboard is shown on transparency with overlays

Prepared by:
Jean Whiting
South High School
Special Project 76
Summer 1971

Omaha Public Schools
Department of Vocational
and Adult Education
Omaha, Nebraska

BE-T4

DESCRIPTION

This unit of study may be used as follows:

The transparencies for presenting the keyboard are made from Dr. Cleo Casady's Chalkboard Approach to Teaching Typing.

The typewriter keyboard shown on a transparency with overlays is included so as to make it easy to demonstrate the correct fingering of the keyboard.

USE OF MATERIAL

The transparencies for introducing the keyboard are intended to be used for approximately the first two weeks of instruction in the Typing I course.

A TRANSPARENCY PRESENTATION OF THE CHALKBOARD APPROACH TO TEACHING TYPING

Special Project 76
Summer 1971
Jean Whiting

TO THE TEACHER:

This unit is designed to introduce the typing keyboard through the use of transparencies as was initiated by Prof. Cleo Casady in his Chalkboard Approach. No textbook is required during the first two weeks of instruction; all material that is needed is on these transparencies.

It is suggested that you refer to the article "Introducing Typewriting: The Chalkboard Approach" by Gunder A. Myran in Business Education World, Vol. 46, September, 1965, pp. 26-27.

The keyboard is illustrated on the transparencies. On the first day of typing, you can present the hand location on the home-row keys. By using the transparency, it is easy for students to see as you can place your hands directly on the transparency. Later on, you may illustrate the reaches by showing the correct reach and the proper fingers to be kept on home row directly on the overhead transparency.

Timings in the chalkboard approach are usually given in a 2-4-2 speed-accuracy cycle. During the first two timings on the copy, the learner practices to control errors and perfect technique. The next four timings on the same material are for speed. During these speed drives, the student pushes for speed and temporarily ignores errors. The objective is to develop increased fluency and rapidity of stroking through short intervals of intensive drill. Following the speed writings, the student slows down to type the final two timings on the same material for improved accuracy and control. One should see some improvement in the rate of these last controlled timings over those taken before the speed drives.

Dr. Casady suggests in presenting the keys that the location-fixation method be used. Strike the key rapidly at first, pause, then strike the same letter rapidly two times. (Pre-set the margins for a 60-space line.) On Transparency 1, you will find the new keys to be presented on the first day. On Transparency 2 are short sentences which contain the new letters and these may be used for practice in developing speed on the new keys. The idea is used that one can best develop fluency through the use of easy material.

You should demonstrate those machine parts necessary to teach the first day's lesson. This may include an explanation of the cylinder knob, the carriage return lever, and the space bar. You can show the use of these parts with a short, clear demonstration from which students can imitate correctness of motion. On the following days, each machine part is presented as needed.

On Transparency 3, you will find a review to start the second class period. The new keys to be presented on the second day are on Transparency 4, and Transparency 5 gives drills for developing speed and accuracy.

The review for the third day is presented on Transparency 6, new keys are shown on Transparency 7, and the drills to reinforce the learning of the new keys are on Transparency 8. The machine parts to be reviewed are carriage return lever, paper bail, margin stops, paper rest, paper guide, carriage release levers, and the line space regulator.

On the fourth day, review the machine parts; Transparencies 9, 10, and 11 provide the material to be used for presenting the lesson.

On the fifth day of instruction, review the keys as shown on Transparency 12 with the same three-letter stroking technique. The new keys to be presented are on Transparency 13 and the sentences for 24-second speed and accuracy drills are shown on Transparency 14.

On the sixth day, the entire alphabet is previewed with the three-letter stroking drill as shown on Transparency 15. On Transparency 16, short sentences are given for the building of speed with accuracy.

For days 7 through 10, material is provided on Transparencies 17 through 25 for review of the keyboard with drills on high frequency words; 12-second, 30-second and 1-minute timings may be used. Some of the drills may be used for practice while you are assisting individuals.

Students are interested in their progress. Each student may keep a chart of his speed and accuracy rate on selected sentences. Return to some of the sentences used during the preceding days so that the degree of progress will be most evident.

fff fff fff fff fff fff fff fff

iii iii fff iii fff if if if iii fff if if if

ttt ttt iii ttt it it fff if if it it iii fff ttt

sss sss iii is is is ttt it is if it is is if if

ooo ooo sss so so so ttt to to to fff of of of

111 111 ooo lo lo lo 111 111 lo lo lo

(12-second timings)

```
     5    10    15    20    25    30    35
     '     '     '     '     '     '     '
if it is so lo it is so lo is it so

lo it is so lo if it is so so it is
     '     '     '     '     '     '     '
     5    10    15    20    25    30    35
```

REVIEW:

```
iii fff ttt sss ooo lll

       5    10    15    20    25    30
       '     '     '     '     '     '
fit lot to it lit sit so it is

if it is so lo it is so is it
      '    '    '    '    '    '
      5    10   15   20   25   30
```

jjj jjj jot sit lot jo

uuu uuu us out tut jut

eee eee fee see tie lie u[illegible] jet let

mmm mmm me met sum mum jem

ccc ccc cot cut tic cue

aaa aaa ma am at mat jam me ace

(Use 2-4-2 12-second drills. Two writings for accuracy, then four writings for speed, then two writings for accuracy.)

5 10 15 20

see me cut a jet tie

cut a jem out of jam 25 30 35 40 45 50 55

a fee is a lot to me see a jem as it is out of a cue too

fit it so as to cue me a cue is a lot of it to me is it

5 10 15 20 25 30 35 40 45 50 55

REVIEW:

```
iii fff ttt sss ooo lll jjj uuu eee mmm ccc aaa

    5    10   15   20
    '    '    '    '
see a jet cut at mat
    '    '    '    '

eat a lot of cut jam
    '    '    '    '

it is a lot to me to see a jet ace sit out so
    '    '    '    '    '    '    '    '    '
    5    10   15   20   25   30   35   40   45
```

www www we wit tow cow saw few

ggg ggg go egg sag jug wag wig

nnn nnn an in inn on now won nag

vvv vvv vow van von vim

ddd ddd do lad dad led did

kkk kkk kid kit kin eke keg

(Use 2-4-2 12-second drills)

```
     5    10    15    20    25    30    35    40    45    50    55
     '     '     '     '     '     '     '     '     '     '     '
one new jug was due and a cow was now won and led on in
     '     '     '     '     '     '     '     '     '     '     '

all men can eat it we saw a cut off a jem and use a keg
     '     '     '     '     '     '     '     '     '     '     '

vow to wag a cue to dad to aid a van as a jem keg is on
     '     '     '     '     '     '     '     '     '     '     '
     5    10    15    20    25    30    35    40    45    50    55
```

REVIEW:

s i f t o d c a m e u j w g n v l k

```
    5    10   15   20   25   30   35   40   45   50
    '    '    '    '    '    '    '    '    '    '
a gal who can eat an egg tow a cow and cut two jem
    '    '    '    '    '    '    '    '    '    '

ask me if a wet jug egg van is due now and cue dad
    '    '    '    '    '    '    '    '    '    '
    5    10   15   20   25   30   35   40   45   50
```

rrr rrr rid rod art row red air

hhh hhh ha he hat she her the hit

xxx xxx ax wax ox fox

ppp ppp up pad pan pat pie pet sup

... (period) ... go on. the ox is red.

(shift) It Am La Do Led Sit Jam Wit Pal Cot Ham Ape

(Use 2-4-2 12-second drills)

```
   5    10    15    20    25    30    35    40    45    50
   '     '     '     '     '     '     '     '     '     '
The wax fox was red.  Her red hat had a hot top.
   '     '     '     '     '     '     '     '     '     '
It is not in the ark and it is not in the ox pen.
   '     '     '     '     '     '     '     '     '     '
The jet van can eke out the red ale if we put wax on a ham
   '     '     '     '     '     '     '     '     '     '     '     '
   5    10    15    20    25    30    35    40    45    50    55    6
```

5187

REVIEW:

a c d e f g h i j k l m n o p r s t u v w x

SHIFT FOR THESE LETTERS:

A J C H D K E L F M G N R O S P T U V W P X L

(Use 2-4-2 24-second drills)

```
          5         10        15        20        25
          '         '         '         '         '
The jet ace won the lug for his kid in the red van.

The red fox can run to the end of the pen and eat two deer.
          '         '         '         '         '         '
          5         10        15        20        25        30
```

bbb bbb be bee bit bad bar bat

yyy yyy my you boy by Yes

zzz zzz zoo zero zeal gaze

,,, ,,, I, too, go by the zoo.

qqq qqq quit quiz

(Use 2-4-2 12-second drills)

5 10 15 20 25 30 35 40 45 50 55 60

A boy at the zoo hid the new quiz and a red fox ate the pie.

We quit as the red bee at the zoo lit on an ox and he ran.

She and he may go when they make up the work for them to do.

5 10 15 20 25 30 35 40 45 50 55 60

REVIEW:

a b c d e f g h i j k l m n o p q r s t u v w x y z

(Use a 2-4-2 24-second drill)

```
The quick fox jumped over a big, lazy hog in the damp snow.
            '          '          '          '          '          '
            5         10         15         20         25         30
```

??? Who are you? Will you go? How much is needed? When?

--- Are you an up-to-date girl? I am an old-fashioned boy.

5191

(Use 2-4-2 12-second drills)

```
    5    10   15   20   25   30   35   40   45   50   55   60
    '    '    '    '    '    '    '    '    '    '    '    '
If it is so and if it must be done do it now or not at all.
    '    '    '    '    '    '    '    '    '    '    '    '
The men got an ape and the dog but the cow did jam the pen.
    '    '    '    '    '    '    '    '    '    '    '    '
Is it the duty of all men to do a good turn when they can?
    '    '    '    '    '    '    '    '    '    '    '    '
Pack my box with five dozen lacquered jugs full of oranges.
    '    '    '    '    '    '    '    '    '    '    '    '
    5    10   15   20   25   30   35   40   45   50   55   60
```

(Use 2-4-2 12-second drills)

5 10 15 20 25 30 35 40 45 50 55 60

You and I are for that as it will have to be for her good.

The quick brown dog jumped over a very lazy fox and bit it.

You are to vote for the other man so that he will win here.

The fox got the doe for the fog cut the foe and bit her toe.

5 10 15 20 25 30 35 40 45 50 55 60

REVIEW:

a b c d e f g h i j k l m n o p q r s t u v w x y z

(Use 2-4-2 24-second drills)

5 10 15 20 25 30

It is for you and me to shake that boy in the nick of time.

A shag flag shall gall all lads and a lass shall fall alas.

You use these words often when you read or write or speak.

5 10 15 20 25 30

(Use 2-4-2 24-second drills)

5 10 15 20 25 30

with not your at we on he by but my this his which dear from

the and of to I a in that you for it was is will have as be

are all me so one if they had has very were been would she a

there her on when time go same any can what send out them or

5 10 15 20 25 30

REVIEW:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z , . ? -

```
    5   10   15   20   25   30   35   40   45   50   55   60
    '    '    '    '    '    '    '    '    '    '    '    '
Six of the twelve quick men who shaved were judged by size.
    '    '    '    '    '    '    '    '    '    '    '    '

She put the big dog over the high wire fence to save a fox.
    '    '    '    '    '    '    '    '    '    '    '    '

Bid the doe and the elf aid the ape and the men tow the ox.
    '    '    '    '    '    '    '    '    '    '    '    '

Can Zoe and Pam let Kay and Rod pay the man for the map?
    '    '    '    '    '    '    '    '    '    '    '    '
    5   10   15   20   25   30   35   40   45   50   55   60
```

```
    5    10    15    20    25    30    35
    '     '     '     '     '     '     '
  J Q Vandz struck my big whelp fox.
    '     '     '     '     '     '     '

The quick brown dog jumps over the lazy fox.
    '     '     '     '     '     '     '     '     '

An ape bit a cow and a dog got rid of a big fox and an elf.
    '     '     '     '     '     '     '     '     '     '     '     '

Arrest my bad opium beggar on fact only after you see Juno.
    '     '     '     '     '     '     '     '     '     '     '     '

It is good for you and me to get out in the sunshine today.
    '     '     '     '     '     '     '     '     '     '     '     '
    5    10    15    20    25    30    35    40    45    50     5    60
```

5 10 15 20 25 30 35 40 45 50 55 60

The wise king and his very pretty queen ate oxtail and jam.

The ox quit running when he became lazy and jumped.

You will please me if you will send her with a letter, sir.

You and I will have to write to thank her for the good pie.

She is the same one who was with him four nights last week.

She and he may go when they make up the work for them to do.

5 10 15 20 25 30 35 40 45 50 55 60

5 10 15 20 25 30 35 40 45 50 55 60

the and of to I a in that you for it was is will as have be

with not your at we on he be but my this his which dear from

are all me so one if they had has very were been would she a

there her on when time go same any can what send out them or

more about no please week night their other him our good say

could who my letter make write thing think sho truly now

its two take thank do after house last sir than just then no

5 10 15 20 25 30 35 40 45 50 55 60

5 10 15 20 25 30 35 40 45 50 55 60

All fall the men in the hall had gone to see the lad run to town. The lad was as fast as any man in the large village.

I can learn to type at the same speed I write in less than six weeks. Each week I should show some gain in speed and control and poise.

5 10 15 20 25 30 35 40 45 50 55 60

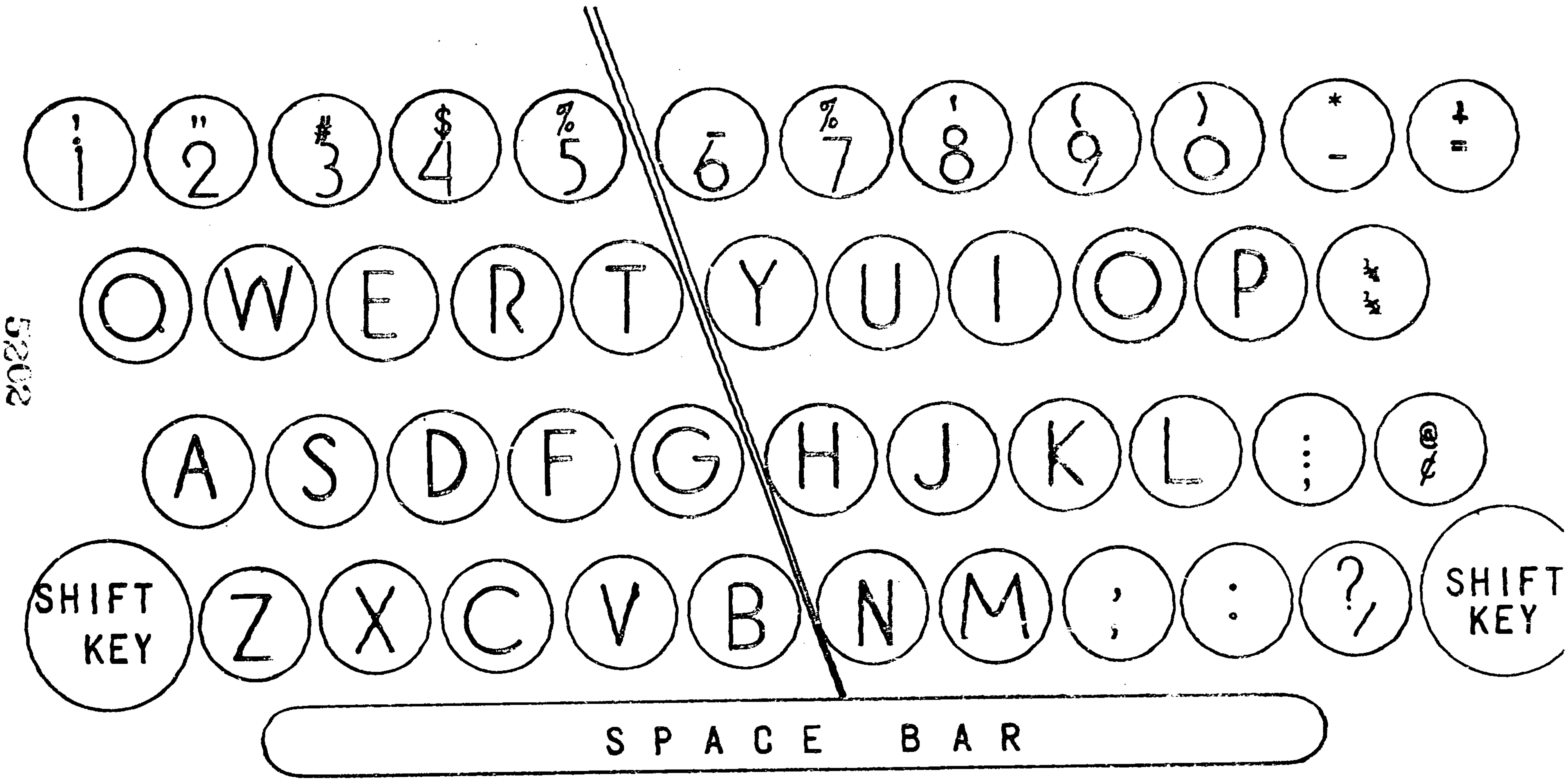
```
    5   10   15   20   25   30   35   40   45   50   55   60
    '    '    '    '    '    '    '    '    '    '    '    '
 Are you trying hard to improve?  Typing is a skill you will

always be able to use.  Be smart and try to improve each day

by being sharp.  The fool and the lazy oaf waste time.
    '    '    '    '    '    '    '    '    '    '    '    '
    5   10   15   20   25   30   35   40   45   50   55   60


    '    '    '    '    '    '    '    '    '    '    '    '
 This home-row drill will aid you to develop speed and poise.

a;sldkfjgha;sldkfjgha;sldkfjgha;sldkfjgha;sldkfjgha;sldkfjgh
    '    '    '    '    '    '    '    '    '    '    '    '
    5   10   15   20   25   30   35   40   45   50   55   60
```


1
" 2
3
$ 4
% 5
6
% 7
' 8
(9
) 0
* -
+ =
Q
W
E
R
T
Y
U
I
O
P
¼ ½
A
S
D
F
G
H
J
K
L
: ;
@ ¢
SHIFT KEY
Z
X
C
V
B
N
M
;
:
? /
SHIFT KEY
SPACE BAR

BE-T34

CONTENTS

Prepared by:
Jean Whiting
South High School
Special Project 76
Summer 1971

Omaha Public Schools
Department of Vocational
and Adult Education
Omaha, Nebraska

DESCRIPTION

This unit of study may be used as follows:

The film loop on the changing of the ribbon on the Royal Typewriter may be used as desired in typewriting classes. By a classroom demonstration, other manual typewriter ribbons may be easily changed.

USE OF MATERIAL

The film loop may be used for class presentations.

The film loop may be used by individuals having difficulty changing a ribbon on the Royal 440 Typewriter.

CHANGING THE RIBBON ON THE
ROYAL 440 TYPEWRITER

Special Project 76
Summer 1971
Jean Whiting

The good typist must inspect the ribbon on the typewriter regularly and change the ribbon as soon as the copy appears too light.

Typewriter ribbons come in many different kinds and qualities. Manual, electric, and portable typewriters may each use different kinds of ribbons and ribbon spools. To get the proper kind of spool, you must request a ribbon for the specific make and model of your typewriter.

In preparation for changing the ribbon, remove the cover from the typewriter. Press down the shift lock key. Observe carefully how the ribbon is threaded through the ribbon-carrier mechanism. Notice the guides it passes. Pay close attention to which side the ribbon passes the guide. Practice unthreading and threading the ribbon.

Lift the right spool slightly out of its socket. Since both sides of the spool are not the same, study it carefully so that you will be able to place the new spool properly in its socket.

Now, you are ready to wind the ribbon on one spool. Adjust the ribbon reverse lever and wind the ribbon on the right spool.

Observe the route of the ribbon as you wind. Notice especially how the ribbon winds and unwinds on the two spools.

Remove the ribbon from the carrier.

Remove both spools. Check to see how the ribbon is attached to the empty spool. The new ribbon must be fastened in the same manner.

Now it is time to prepare the new ribbon for insertion.

Attach the new ribbon to the empty spool.

Wind several inches of the new ribbon on it. Be sure to wind this ribbon in the right direction.

Put both spools back in their holders in the correct winding pattern. If they do not fit down in their sockets at first, tap them gently and they will soon slip down into their proper position.

Thread the ribbon through the ribbon carrier, carefully.

Make sure the ribbon is straight.

Replace the cover on the typewriter. Be sure to place the back of the cover on first, then push the front down.

Release the shift-lock key.

You are now ready to type again.

CONTENTS

III. Postal Services--Office Practices

Prepared by:
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South High School
Special Project 76
Summer 1971

Omaha Public Schools
Department of Vocational
and Adult Education
Omaha, Nebraska

BE-T43

DESCRIPTION

This Postal Services Unit is intended to be used in the Office Practices area.

USE OF MATERIAL

This slide-tape presentation may be used in an ordinary class presentation.

A study sheet accompanies the slide-tape presentation which may be used for class discussion. This sheet may be duplicated for ease in use.

POSTAL SERVICES

Special Project 76
Summer 1971
Jean Whiting

#1 As a secretary working with correspondence, you must have a thorough knowledge of mailing procedures. #2 Day after day, your understanding of postal services and effective mail handling can save your employer time and money and can increase the efficiency of his business.

#3 Some questions that may arise about mail are:

When is it helpful to send an item special delivery?

Should a certain letter be sent air mail?

What types of items should be sent by registered mail?

Let's study the types of mail included in each class; then you will be able to select more intelligently the service best suited for each item.

#4 The four classes of mail are:

First, second, third, and fourth or it is usually called Parcel Post.

#5 First class mail includes letters which are:

#6 Handwritten, typewritten, photocopies, or carbon copies.

#7 It also includes material which is partly in written form such as bills, checks, punched cards, and filled-in forms.

#8 Also, other matter in written form, such as typewritten reports and documents, is included in first class.

BE-T45

#9 All matter sealed that prevents easy inspection by the postal authorities must be mailed first class.

10 Postal cards, those cards which have stamps imprinted on them, and post cards, which are cards on which stamps must be placed, are included as first-class mail.

11 Air mail is the swiftest means of sending letters and other mailable materials where distance is involved; therefore, the cost is higher than for ordinary mail. You should know when the mail truck leaves the post office in your area for the airport. Knowing the schedule will enable you to get letters out in time to take advantage of fast delivery.

Use air mail postage with care on letters that leave the office on Fridays for regular first-class mail will reach most cities in the United States by Monday.

#12 At the post office you can buy special air mail stamps and envelopes in a distinctive red, white, and blue design; but you may use ordinary envelopes. #13 If an ordinary envelope is used, the word air mail should be plainly typed or printed in capital letters below the stamp or you may use a special paste-on label which is available free from the post office.

#14 The first-class cost is based on weight. You pay by the ounce or fraction of an ounce. You can mail letters to Canada and Mexico for the same price as anywhere in the United States. To other countries the rate is higher.

#15 Now for a word about second-class mail. #16 Second-class mail includes magazines, newspapers, and other publications that are issued at least four times a year to a list of subscribers or members. Publishers of these periodicals are given special mailing rates in order to make news and information available to the public at a low cost. #17 You may also mail copies of newspapers, magazines, and other periodicals at the lower postal rate.

#18 Third-class mail includes circulars and miscellaneous printed matter. Everyday you receive in your home many circulars and advertisements that have been sent through the mail at third-class rates. #19 This class of mail consists of printed letters which are being sent in identical terms to several persons. A circular is still considered third class mail even though the date and the name of the person to receive the letter are written inside. Mail sent third class is not usually sealed, that means it is wrapped so that postal authorities can inspect the contents easily. #20 Third-class mail also includes merchandise weighing less than 16 ounces. #21 This weight is important to remember for it distinguishes between third and fourth-class mail.

#22 Fourth-class mail is more commonly known as parcel post. #23 It is used to send merchandise, books, printed matter and all other mailable matter not in first, second, or third class that weighs 16 ounces or over. The address should appear on only one side of the package because the postal clerk places the postage on the same side. #24 Parcel post rates are determined according to the weight of the package and the distance the parcel must travel. This is the only class of mail which costs more because of distance.

#25 Now it is time for an explanation for mailing educational materials. #26 Packages containing educational reference books, instructional films, printed music, printed tests, recordings, and educational reference charts may be mailed at special, low rates

BE-T47

#27

if the package is clearly marked "Educational Materials." The cost of mailing is the same for any distance.

#28 Combination Mailing is frequently advantageous. It is sometimes convenient to have a bill or letter accompany a parcel. Thus when a parcel reaches its destination, the receiver will know what the parcel contains and what he is expected to do about it.

Two acceptable ways of including first-class mail with a parcel are:

#29 The letter may be placed in an envelope and attached to the address side of the parcel,

#30 or a letter may be enclosed inside the parcel itself. The presence of the letter should be indicated by a notation that first-class mail is enclosed. This should be placed below the postage on the outside of the wrapped parcel. Postage for the letter may be included with the postage for the parcel or it may be attached separately.

#31 In addition to handling the mail, the post office provides many special services for you. The special services include: special delivery, registered mail, certified mail and insured mail. There is an additional charge for these services.

#32 Let's take a look at Special Delivery Mail first. If a letter or parcel arrives at the town to which it has been addressed in the late afternoon or during a weekend it will ordinarily be delayed in the post office. However, special delivery service provides immediate delivery to the addressee by messenger. #33 Thus, by adding additional postage after you have stamped your envelope and marked it Special Delivery, the letter you put in the mail will be delivered by special messenger after it gets to the post office nearest the address on the letter. All classes of mail may be sent by special delivery. Rates vary according to weight and type of matter. Find out from your local post office when and whether the service is available before you send anything by special delivery to a small town. Also, it is wasteful to pay for special delivery service on a letter that will arrive over a weekend when the addressee's office will be closed, because if no one is present to accept the letter, the postman brings it in the next regular delivery.

#34 Registered mail provides extra care and protection for a fee in addition to the postage. There will be times when you will want to send something very valuable and important through the mail, such #35 as a contract, stocks and bonds, money or other valuable mail. Registered mail provides evidence of mailing and delivery. All mail may be registered for which the #36 first-class postage or air mail rate has been paid. Registered mail must be sealed but do avoid the use of cellophane tape. In case of loss or damage, you must go to the post office immediately and obtain the necessary claim forms. The Post Office will pay the sender for the full value of the mail or for the registered value, whichever is smaller.

#37 Certified mail is a rather new and inexpensive service which provides a receipt to the sender and a record of delivery at the Post Office of the destination. #38 Air mail and first-class mail may be certified. How will this help you? You will wish to have a means of tracing a letter that the addressee complains he did not receive. For example, a check you mailed to a customer in California is not received. If this mail was certified, the Post Office can trace it quickly. For a small fee, the Post Office provides a numbered receipt which gives you the means of checking on the delivery of the letter.

#39 The next special service we will consider is insured mail. The insurance fee depends upon the declared value of the mail. The fee is in addition to the regular postage. #40 Only third- #41 and fourth-class mail is insurable and the maximum Post Office liability for either is $200.

You know that postal rates and regulations are subject to change. #42 The Post Office Manual of the United States Postal Services gives a complete listing of the postal services with detailed regulations and procedures covering its services. Pamphlets of information from this Manual are available from the Post Office.

Anytime you are faced with an unusual problem involving mailing, call the postmaster at the local Post Office. He or one of his assistants will be able to furnish you the latest information.

#43 (The End)

POSTAL SERVICES

Discussion Questions

For each item listed below, indicate the class of postal service that should be used and any fees that must be paid in addition to the postage:

1. A carbon copy of a letter.

2. A pen-corrected copy of a printed price list.

3. A 5-ounce copy of a typewritten report.

4. A letter enclosing bonds valued at $500.

5. A 7-ounce sealed envelope.

6. A 480-page textbook weighing 2½ pounds.

7. A 7-ounce package of candy.

8. A box of bulbs weighing 12 ounces.

9. A monthly statement of a department store addressed to a local customer.

10. A postal card.

11. A check for $8.92.

12. Sixty individually addressed unsealed envelopes containing one-page mimeographed price lists.

13. A parcel weighing one pound containing costume jewelry.

14. A letter containing a notice to an heir of an estate.

15. Thirty mimeographed invitations in unsealed envelopes.

16. A magazine weighing 10 ounces.

17. A 4½-pound package marked "Special Delivery."

18. Two 8-ounce boxes of candy to be mailed to the same address in a city 600 miles distant.

19. A 3-ounce letter for which a record of delivery is required.

20. A 12-ounce box of stationery.

CONTENTS

Prepared by:
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Special Project 76
Summer 1971

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BE-T52

DESCRIPTION

This unit of study may be used as follows:

> The transparencies for typing the term paper show sections of a term paper and may be used for class presentations as the students progress through the manuscript.

USE OF MATERIAL

The transparencies for typing the term paper are intended to be used as the student progresses through the typing of the term paper.

Use a cardboard mask with the proofreaders' transparencies so as to direct the students' attention.

SIDE MARGINS

1 INCH

1 1/2 INCHES

BE-T54

HOW TO TYPE A TERM PAPER

A Report by Gordon M. Parke

1. Purpose

Many persons learn to typewrite so that they may use the skill in term papers and other formal reports that are assigned to them in high school

FIRST PAGE--TOP--2 INCHES

III. Findings

A. OUTLINE SHOWN BY HEADINGS

A formal report is one that is written to fit an assigned outline.

TOP MARGIN--1 INCH

All three forms of headings are shown on this page: the centered subheading, the sideheading, and the paragraph heading.

B. ARRANGEMENT ON THE PAGE

This study shows that there is general agreement, with only slight differences, on the rules for placement.

1. Top Margin. The top margin on the first page of a report, or of a chapter of a report, should be 2 inches.

SIDEHEADING AND PARAGRAPH HEADING

QUOTATIONS

Each footnote is arranged as ". . . a separate paragraph. It is indented. It is single-spaced. It is numbered."[1] The footnotes must be kept apart from the body of the report:

Separate a footnote from the text above it by a 2-inch line of underscores--that would be 20 pica spaces long or 24 elite spaces long. Be sure, also, to double-space after typing the line, so that one blank space will be left between the typed line and the first footnote below the line.[2]

AND FOOTNOTES

---

1. Alan C. Lloyd and Russell Hosler, *Personal Typing*, 2d ed., McGraw-Hill Book Company, New York, 1959, p. 107.

2. *Ibid.*, p. 106.

CONTENTS

ROMAN NUMERALS AND LEADERS

BE-T61

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Wheland, William O., "When You Type Your Term Paper," *Student Activities Monthly*, May, 1966, pp. 38-41.

Lloyd, Alan C., and Russell Hosler, *Personal Typing*, 2d ed., McGraw-Hill Book Company, New York, 1959.

HOW TO TYPE A TERM PAPER

A Special Report

by

Gordon M. Parke

Submitted for Extra Credit
to Miss White
Typing I
January 18, 19--

PROOFREADERS' MARKS

MARK	MEANING OF MARK	CORRECTION IN TEXT	CORRECTED COPY
‸,	INDICATES INSERTION IS TO BE MADE	If you are interested‸, we	If you are interested, we
○	SPELL IT OUT	Prof. Hill	Professor Hill
○	SPELL OUT	① Park Avenue	One Park Avenue
⁐	CLOSE UP	on the pay⁐roll	on the payroll
≡	CAPITALIZE	Mutual life of New york	Mutual Life of New York
no ¶	NO PARAGRAPH	on the next page. no ¶ If a short	on the next page. If a short

MARK	MEANING OF MARK	CORRECTION IN TEXT	CORRECTED COPY
¶	NEW PARAGRAPH	more lines. ¶One	more lines. One
#^	MORE SPACE	has a press#release	has a press release
∽	TURN AROUND	nad ∽it so	and so it
stet	LEAVE IT AS IT WAS	~~starting~~ next month	starting next month
=	INSERT A HYPHEN	single=spacing	single-spacing
+#→	MORE SPACE HERE	|#→When you are busy at a typewriter	When you are busy at a typewriter

MARK	MEANING OF MARK	CORRECTION IN TEXT	CORRECTED COPY
]	MOVE TO RIGHT	over the]columns and	over the columns and
[←	MOVE TO LEFT	[←one blank	one blank
O	MAKE INTO PERIOD	To him⊙	To him.
\	OMIT STROKE	and so\ it	and so it
/	MAKE SMALL LETTER	A̸nd so it	and so it
//	LINE UP, EVEN UP	//If he is	If he is

THE TERM PAPER

A. Title Page
B. Contents
C. Body
D. Bibliography

VT 017 605

VT 017 605
TEEL, DEAN
LET'S PUT 'EM TOGETHER.

NORTHERN ARIZONA UNIV., FLAGSTAFF. DEPT. OF INDUSTRIAL EDUCATION.
MF AVAILABLE IN VT-ERIC SET.
VE-583
PUB DATE - JUN72 32P. 3RD REVISION

DESCRIPTORS - EDUCATION; *CURRICULUM DEVELOPMENT; TEACHER EDUCATOR EDUCATION; INDIVIDUALIZED INSTRUCTION; INSTRUCTIONAL MEDIA; *MULTIMEDIA INSTRUCTION; BEHAVIORAL OBJECTIVES; GOAL ORIENTATION; TEST CONSTRUCTION; *TEACHER EDUCATION CURRICULUM; *COLLEGE CURRICULUM; VOCATIONAL DEVELOPMENT; INDUSTRIAL EDUCATION; *CAREER EDUCATION; CURRICULUM GUIDES
IDENTIFIERS - SELF AWARENESS; EDUCATIONAL AWARENESS; EMPLOYMENT SKILLS; *VO-PAK

ABSTRACT - THIS COURSE IN PROGRAM DEVELOPMENT, GIVEN IN 1972 BY A TEACHER EDUCATOR IN THE DEPARTMENT OF INDUSTRIAL EDUCATION AT NORTHERN ARIZONA UNIVERSITY, DEALS WITH THE DEVELOPMENT OF INSTRUCTIONAL PACKAGES (VO-PAK) IN ORDER TO INDIVIDUALIZE VOCATIONAL CURRICULUMS, PROVIDE FOR SELF-AWARENESS AND SKILL DEVELOPMENT, ALLOW FOR INTERACTION WITH OTHER STUDENTS, AND OFFER IMMEDIATE FEEDBACK FOR SELF-EVALUATION. FOR THIS TEACHER EDUCATION CURRICULUM FOR VOCATIONAL CERTIFICATION, THE TEACHER EDUCATOR IS GIVEN BEHAVIORAL OBJECTIVES FOR THE COURSE, A SELF-TEST FOR TEACHERS, VARIOUS MULTI-MEDIA LISTS, AND GUIDELINES FOR DEVELOPING GOALS AND BEHAVIORAL OBJECTIVES FOR LEARNING ACTIVITY PACKAGES SUCH AS VO-PAK. SAMPLE TEST ITEMS ARE INCLUDED FOR POSSIBLE VO-PAK OBJECTIVES, AND SUGGESTIONS FOR DEVELOPING TESTING MATERIALS ARE PROVIDED. (AG)

NORTHERN ARIZONA UNIVERSITY

DEPARTMENT:

COURSE:

NUMBER:

BY:

DATE:

VO-PAK

SERIES: PROFESSIONAL
NUMBER: ONE
CLUSTER: VOCATIONAL CERTIFICATION
AREA: INSTRUCTIONAL PACKAGES
TITLE: "LET'S PUT'EM TOGETHER"
BY: DR. DEAN TEEL
TRADE AND INDUSTRIAL TEACHER EDUCATOR
NORTHERN ARIZONA UNIVERSITY
DATE: JUNE, 1972
REVISION: NUMBER 3

5234

TITLE: "LET'S PUT'EM TOGETHER"

RATIONALE:

There is research to show efforts and interest in the development of individualized curriculum. The most recent and exciting approach is learning activity packages. There are many variations being developed; such as, UNIPAC, which was promoted by the Kettering Foundation; HELP (Home Economics Learning Packages) developed at Pennsylvania State University; MISP (Modular Independent Study Packages), Eastern Illinois University; L.A.P. (Learning Activity Packages), Nova School, Fort Lauderdale, Florida; and Vo-Pak (Vocational Packages), Northern Arizona University.

Learning Activity Packages, or whatever you wish to call them, appear to be very promising for use in many areas of Vocational Education. The formats may vary from one researcher to another, but the overall purpose is the same--individualizing instruction. The implications for Vo-Paks are: (1) offering levels of learning so that a student can master the concept or skill or process being presented, (2) offering the opportunity to become responsible for their own learning, (3) offering the opportunity for interaction with their fellow students, (4) offering the opportunity to choose their own paths and pace for learning, (5) offering immediate feedback and self-diagnosis.

Instructional packages are written for student use. That means for kids.

BEHAVIORAL OBJECTIVES:

1. Faced with the aspect of the course, the student will determine what the class is about and what he will be doing in order to receive an acceptable passing mark for the time spent.
2. PROVIDED with a rationale, the student will determine what individualized instruction might be.
3. Provided with resource information, the student will determine what an instructional package is.
4. The student will identify the parts of instructional packages called Vo-Paks.
5. Given the parts of Vo-Paks, the student will determine the function of each.
6. Faced with the aspect of developing learning activity packages, the student will formulate a series of Titles for a course in his teaching area.

7. Using information provided, the student will attempt to follow the suggestions of the U.S.O.E. Occupational Clusters when writing Titles in an attempt to develop packages for Career Education, as well as specific vocational-technical courses.

8. Provided with the Titles and an identified occupational cluster or vocational-technical course, the student will draw up a series of cover identification pages for your package series.

9. Using the Titles written, the student will develop and write a Rationale for each package being planned.

10. Using information provided concerning U.S.O.E. Occupational Clusters, the student will attempt to work this into the Rationale.

11. Using the Titles and Rationales already developed, the student will develop and write Behavioral Objectives for his intended learning packages as specified in the reading references.

12. Using the Behavioral Objectives already developed for a series of packages, the student will write groups of self-test items for those objectives using a multitude of types of questions.

13. The student will develop one form of Multi-Media for each learning package being developed.

14. The student will research for suitable materials for additional media for each learning package.

15. Faced with the need of writing Multi-Mode activities for your learning packages, the student will develop one procedure mode based on the behavioral objectives you have written for each package for your student usage.

16. The student will construct a Final Evaluation for each package being developed using a variation of evaluation techniques to include objective and subjective questions, rating scales, observation, and manipulative performance tests.

17. The student will develop at least one Quest activity which would be appropriate for each package you are writing.

18. Using all materials developed to date, the student will assemble a total course series of packages, including soft and hardware.

19. The student will provide the teacher with one set of typed or an otherwise reproduced copy of the original typed software of the learning packages.

SELF-TEST:

The following are questions you might be able to answer.

1. What special need will this course attempt to meet?
2. What will you be required to do in this course?
3. What grade will you receive for the basic requirements of the course?
4. When will tests be given in the class?
5. How many class hours are we required to meet?
6. How much outside work will we have?
7. When will the complete course work be due for evaluation?
8. What is your philosophy for learning, and the individual student in relation to your teaching area?
9. What differences distinguish individualized instruction from other types?
10. What is individualized instruction?
11. What is independent study?
12. What advantage can you see for individualizing your instruction more?
13. What disadvantages can you see for individualized instruction?
14. What makes your rationale for individualized instruction unique?
15. What is a Learning Activity Package?
16. What is a Vo-Pak?
17. List the parts of a Vo-Pak and what the function is of each part of the Vo-Pak.
18. What constitutes a good <u>Title</u> for a Vo-Pak?
19. What makes a good rationale?

20. What should <u>Behavioral Objectives</u> say?

21. What are the four basic characteristics of <u>Behavioral Objectives</u>?

22. What is the <u>Self-Test</u> for?

23. What can be used to make up <u>Multi-Media</u>?

24. What makes up the <u>Multi-Mode</u> section?

25. What kind of <u>Final Evaluations</u> can be used?

26. What good does the <u>Quest</u> section serve?

27. What function does the <u>Title</u> have as a part of the package?

28. What constitutes a good <u>Title</u>?

29. How should they be written?

30. What time length should be considered for a package?

31. How can you tie in the U.S.O.E. Occupational Clusters?

32. What is a <u>Rationale</u>?

33. What is a philosophy?

34. How do you differ between a <u>Rationale</u> and a philosophy?

35. How should you attempt to write a <u>Rationale</u>?

36. Who do you write a <u>Rationale</u> for?

37. Why should you write a <u>Rationale</u>?

38. How can you tie in the U.S.O.E. Occupational Clusters to your <u>Rationales</u>?

39. How long should a <u>Rationale</u> be written?

40. What determines the wording you should use in the <u>Rationale</u>?

41. What are <u>Behavioral Objectives</u>?

42. What should a <u>Behavioral Objective</u> contain which would indicate it has been well thought out?

43. Of the four characterisitcs described by Raymond Bernabei and Sam Leles in "Behavioral Objectives in Curriculum and Evaluation" do you believe could be left out of each statement without hurting its effectiveness?

44. What make good lead-in words for Behavioral Objectives?

45. What type of words should you avoid in writing Behavioral Objectives?

46. What are good action words for Behavioral Objectives?

47. How will you set the performance in a Behavioral Objective?

48. How will you establish the conditions for a Behavioral Objective?

49. How will you set the standards for a Behavioral Objective?

50. What would be the purpose for the identification of who the learner is?

51. Check which of the following are good verbs to use in a Behavioral Objective:

_____ (a) To identify

_____ (b) To name

_____ (c) To love

_____ (d) To question

_____ (e) To grasp

_____ (f) To test

_____ (g) To write

_____ (h) To compute

_____ (i) To appreciate

52. Give some examples that indicate conditions for Behavioral Objectives.

Example: With a solder pencil, solder and test components....

(a)

(b)

(c)

53. Give some examples that indicate performance.

Example: You will test...

(a)

(b)

(c)

54. Give some examples of standards.

Example: 12 out of 15

(a)

(b)

(c)

55. What is a Self-Test?

56. What purpose does the Self-Test serve?

57. Why use a Self-Test in a learning package?

58. Is there a special way the Self-Test needs to be developed?

59. How would you actually make use of the Self-Test within the package?

60. What type of questions could you use in the Self-Test?

61. How will you know if a question you write is appropriate or not for use in the Self-Test?

62. What is meant by the term Multi-Media?

63. What type of information is suitable for media?

64. How can this material be organized for use in a package?

65. What problems may occur in filing or storage of media?

66. What is meant by Multi-Mode?

67. How does Multi-Mode differ from Multi-Media?

68. What content will you put in the Multi-Mode section?

69. Could you say that Multi-Mode deals with "doing" oriented activities?

70. Would it be safe to conclude that Multi-Media deals with "knowing" oriented instruction?

71. What activities would be suitable for modes?

72. What problems occur in developing modes that are individualized?

73. How can you tie in the Multi-Media section to the Multi-Mode activities?

74. What is meant by Final Evaluation?

75. What are you trying to evaluate in a package?

76. What purpose do you have in evaluation at the end of the package?

77. Describe the various types of multiple choice questions

78. Describe the various types of true-false questions.

79. Describe the various types of matching items.

80. Describe the various types of recall questions.

81. Describe a manipulative performance test.

82. Describe how subjective observation can be used for evaluation of the package.

83. What are Quests?

84. What type of activity could be developed for a lab type class using packages?

85. What type of activity could be developed for a classroom type class using packages?

86. What advantages are there to having Quest activities built into the packages?

87. What disadvantages might there be from this section?

88. How do Quests figure into the Final Evaluation of a student's grade on a package?

89. What is meant by the package software?

90. What is the package hardware?

91. How do you plan to store your packages for effective classroom use?

92. Does the use of packages suggest any changes in your classroom or laboratory?

93. Is your school ready to use learning packages?

MULTI-MEDIA:

Reading Resources

1. S.M.A.P. chart of course.

2. Sample packages. Note: Software and hardware.

3. Sample Vo-Pak in hand.

4. Discussion on requirements.

5. Handout "From Sitting to Doing: The LAP," Nova School.

6. "Really Individualizing Instruction" by Martha Price, Business Ed. World, Nov-Dec 1971, p. 25.

7. "Individualized Instruction: A Meaningful Educational Experience" by David Jelden in Man, Society, Technology, 1970, AIAA, pp. 171-178.

8. "Working With Individualized Instruction" by Thorwald Esbensen, Fearon Pub., 2165 Park Blvd., Palo Alto, CA, 94306, 1968 ($2.75).

9. "The Writer's LAP" by Pat Jackson, Ed. Assoc., Inc., 229 Southeast First Avenue, Fort Lauderdale, Florida, ($5.00).

10. Shear, Twyla and Ray, Elizabeth, Home Economics Learning Packages, Journal of Home Economics, Vol. 61, No. 10, December 1969, pp. 768-770.

11. Rapp, Alfred, Learning Activity Packages, Journal of Ind. Arts Ed., September-October 1968, pp. 34-35.

12. Corhane, Eleanor, Individualized Home Economics Series, Mimeographed 1969, Brookings High School, Brookings, S.D.

13. Lawson, Tom, Individual Learning Packages, Man, Society, Technology, 1970, AIAA, pp. 183-186.

14. "The L.A.P. - What It Is and How To Use It" by Staff Writers, Nova High School, 3600 S.W. College Avenue, Fort Lauderdale, Florida, 33314.

15. Jelden, David L., "Learner Controlled Education" Series, Mimeographed, Ind. Arts Department, University of Northern Colorado, Greely, Colorado.

16. Teel, Dean A.; Helms, Bruce; and Richardson, David, "Modular Independent Study Package" Series, Mimeographed, Ind. Arts Department, Eastern Illinois University, Charleston, Illinois, 61920.

17. Teel, DEan A., "L.A.P. - Electronics: Survey World of Work" Series, Ditto, Ind. Arts Department, Eastern Illinois University, Charleston, Illinois, 61920.

18. Shear, Twyla - "Home Economics Learning Packages" Series, 212 Rackley Building, Penn State University, University Park, PA, 16802.

19. Jones, Richard, "Learning Activity Packages: An Approach to Individualized Instruction," Journal of Secondary Education, 43: (April 1968), pp. 178-183.

20. Kapfer, Philip G. and Swanson, Gardner, "Individualizing Instruction for Self-Paced Learning, UNIPAC Developed by Materials Dissemination Center in South Laguna, California," Clearing House, 42: (March 1968), pp. 405-410.

21. Talbert, Ray L., "A Learning Activity Package, What is It?" Educational and Audio Visual Guide, 47: (January 1968), pp. 20-21.

22. Wolfe, Arthur B. and Smith, James E., "At Nova, Education Comes in Small Packages," Nations Schools, 81: (June 1968), pp. 48-49.

23. "Home Economics Learning Packages--Format," American Home Economics Assoc., 2010 Massachusetts Avenue, N.W., Washington, D.C., 20026.

24. "Learning Activity Packages for Individualized Instruction" by D. L. Jelden.

25. Sample learning activity package. (Nova, South Dakota, Orange County, Penn State, E.I.U., N.A.U., Colorado, Indiana State, Westville, and others.)

26. U.S.O.E. Occupational Cluster

27. Teel, Dean, Coffee Break With The Editor, IAEEE Journal, Jack Heldman Printing, Mattoon, Illinois, Vol. 8, No. 1, November 1970, pp. 1-2.

28. Mager, Robert, Preparing Instructional Objectives, Fearon Publishers, 2165 Park Blvd., Palo Alto, CA, 94306, 1962, ($1.75).

29. Bernabei, Raymond, and Leles, Sam, Behavioral Objectives in Curriculum and Evaluation, Kendall/Hunt Pub. Co., 131 South Locust Street, Dubuque, Iowa, 52001, ($2.95).

30. "Working With Individualized Instruction" by Thorwald Esbensen, Fearon Publishers, 2165 Park Blvd., Palo Alto, CA, 94306, pp. 3-14, ($2.75).

31. "Measuring Educational Achievement" by William J. Micheel and M. Ray Karnes, McGraw-Hill, New York, ($9.50) for suggestions of types of questions to write for your self-te

32. "Assigning Grades to Students" by James S. Terwilliger, Scott, Foresman College Div., 1900 East Lake Avenue, Glenview, Illinois, 60025, 1971, for ideas of writing self-test items.

33. "Polysensory Learning Through Multi-Media Instruction" - California State Department of Education, Bureau of I. E., 1968.

34. "Instructional Media in Vocational Education" by Robert Taylor and Virgil Christensen, January 1967, AVA Journal.

Viewing Resources

1. Slide series: "Individualizing Instruction."
2. Filmstrips: #1 - Educational Objectives
   #3 - Selecting Appropriate Educational Objectives
3. Slide series: "OCCUPAC"

Listening Resources

1. Resource Persons:

__________ "Individualizing Instruction"

__________ "Career Education"

__________ "Occupational Clusters"

__________ "Special Needs"

__________ "OCCUPAC'S"

__________ "W.A.C.O.P."

__________ "Mesa Project"

__________ "Coconino County Career Education Program"

__________ "K-12 Career Program"

Data Briefs

1. The Individual.

The promise of "meeting the needs of the individual" can be more than a cliché; the basic organizing construct of the school can be a one-to-one relationship. Staff, resources, space, time and effort can all be organized so that the instructional effort can be tailored to fit the learning needs of each individual child. And money is not the most important problem. Basic assumptions are.

2. Build instruction packages for students. It is important to keep this in mind as you develop them. You should also keep in mind that what you write is only one part of the package concept. This constitutes the software only. The package is not complete until you include hardware that might be needed. If you were developing learning packages for a lab course, then you would include hand tools, materials, and a means for storage of the total package--the software and hardware.

3. Identification Page.

VO-PAK (Vocational-Package)

Series: Career Education Classification

Number: Identify package in series

Cluster: Occupational - H.E.W. Term

Area: Identify series

Title: Identify package

By: Author
Title
School

Date: Month and Year

4. Vo-Pak Format.

TITLE:

RATIONALE:

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] (as appropriate.)

[illegible]

I. [illegible]ations

[illegible] description of each part of the package.

1. Title is clear, short, precise, and descriptive of the concept or skill to be learned. You are interested here in about two to four weeks for the average student.

2. Rationale is an explanation of what each package will be consisting of. It simply explains to each student, logically, the reason to complete the package. The student is being told why he should learn about this. It is a salesman's pitch

3. Behavioral Objectives are statements of criteria. Magar indicates they should:

   a) Describe what the learner will be doing to demonstrate he has attained competence.
   b) Describe the important conditions under which the learner will demonstrate his competence.
   c) State the standards of performance expected of the student. (Performance - Conditions - Extent)

When writing behavioral objectives, Magar believes you should:

   (a) Employ specific action words that preclude misinterpretation.
   (b) Provide sufficient detail to assure that other behaviors cannot be mistaken for the desired behavior.
   (c) Prepare a separate statement for each objective.

Lemnabel and Leles indicate behavioral objectives must contain four basic characteristics:

   (a) A description of the learner
   (b) A description of the behavior.

c) A specification of the conditions for learning
d) The performance level expected.

*Note: Describe the learner and his behavior; provide a condition and a performance level.

4. Self-Test is designed to afford the individual student the opportunity to assess his own understanding of the learning material. It serves in relation to the behavior objectives to guide the student. It may be used for discussion purposes, for pre-evaluation, post-evaluation, or for summary findings.

5. Multi-Media is made up of Data Briefs which are multi-dimensional information sources. They can be such things as demonstrations, references, tapes, films, etc.

6. Multi-Mode are action type activities such as lab experiments, projects, etc. They are usually written with a procedure to follow.

7. Final Evaluation will be made by the teacher at the end of each package. It can be in the form of a written test, report, oral quiz, lab performance, or subjective. The Final Evaluation is designed to measure the extent to which the student has achieved the behavioral objectives.

8. Quest is an elective extra credit part of the package which allows the student to attempt self-directed research. These activities can be related to re-working, revising, or adding materials to the package, as well as lab experimentation or projects.

6. The Title of your packages has two main functions. It defines and limits the content to be covered in the package. It makes the package appealing and interesting to the students. Remember that you are writing packages for students, so limit your topic. The length of your package should run from a minimum of two hours to a maximum of twelve hours. Having too broad of a topic will make writing your Behavioral Objectives too difficult. You want to be able to deal with it easily and effectively. Try to pinpoint with the Title exactly what the package will cover.

7. The Rationale is used to establish a selling point for the students on why he should learn about the material in the package. It should explain in language the student understands the reason for the package. It should indicate briefly what the package will contain.

8. Behavioral Objectives are statements of the goals the student will be able to achieve as a result of the learning package. They tell the student just what it is he is expected to learn.

You want to write behavioral objectives realistically in terms of your students' ability. Try to keep away from busywork. Make objectives pertinent to the package.

9. Unfortunately, in writing Behavioral Objectives there are many "loaded" words, words open to a wide range of interpretation. To the extent that you use ONLY such words, you leave yourself open to misinterpretation.

Consider the following examples of words in this light:

Words Open To Many Interpretations	Words Open To Fewer Interpretations
to know	to write
to understand	to recite
to <u>really</u> understand	to identify
to appreciate	to differentiate
to <u>fully</u> appreciate	to solve
to grasp the significance of	to construct
to enjoy	to list
to believe	to compare
to have faith in	to contrast

10. To state an objective that will successfully communicate your educational intent, you will sometimes have to define terminal behavior further by stating the conditions you will impose upon the learner when he is demonstrating his mastery of the objective.

Here are some examples:

Given a problem of the following class...
Given a list of...
Given any reference of the learner's choice...
Given a matrix of intercorrelations...
Given a standard set of tools...
Given a properly functioning...
Without the aid of references...
Without the aid of slide rule...
Without the aid of tools...

11. Perhaps more familiar examples of ways in which performance accuracy is sometimes specified are these:

...and to be considered correct, problem solutions must be accurate to the nearest whole number.

or

...The student must be able to use the chemical balance well enough to weigh materials accurately to the nearest milligram.

or

...and when calculating with the C and D scales of the slide rule, calculations must be accurate to at least three significant figures.

12. Performance Goals

[illegible] student performance goals are stated in terms of [illegible] student behavior at the end of the learning period. [illegible] goals are precisely stated and have been made [illegible] to the student, he is more likely to be able to [illegible] in the manner desired. Tests and other means of evaluation of the student's progress tell both the instructor and the student to what extent both have been successful in achieving the student performance goals.

To be precise, student performance goals must:

(1) Describe what the learner will be doing at the end of the instructional period, i.e., the learner will:

Write
Recite
Identify
Differentiate
Solve
Construct
List
Compare
Contrast
Assemble
Paint
Draw
Shape
Operate
Etc.

(2) Describe the conditions under which the student will [illegible], i.e.,

"Without reference to outside materials..."
"With the aid of the textbook..."
"Given a list of ..."
"In the laboratory..."
"In a thirty-minute time period..."

(3) Present criteria of successful performance by the student, i.e.,

"With 80% accuracy the student will..."
"The student will identify 8 of the 10 characteristics of..."
"The student will complete the job to manufacturer's specifications..."

In the actual writing of the student performance goals, a succinct and concise statement is written that relates to the three [illegible] student performance goal areas just discussed. The level of instruction assists in the determination of writing; what the student will do and the conditions under which it will be done, and establishes the limit for the minimum acceptable performance (the criteria aspect of the student performance goal).

A. (Teacher Training)

From memory and without reference to materials, to list, within two minutes, five major kinds of information necessary for pre-assessing students.

B. (Teacher Training)

To adapt a chart, which will be given to you in blank form, so that it will show, with the minimum of record-keeping, actual student progress in your course, in comparison with planned progress.

C. (Teacher Training)

In your school, to inventory the equipment and materials for your course (a) in sufficient detail to support insurance claims in case of fire or other loss, and (b) to use as a guide for timely additions and changes.

D. (Auto Mechanics)

To sharpen a twist drill to the proper specifications in ten minutes, and to demonstrate its sharpness by drilling a hole in mild steel within the time specified in a reference chart.

E. (Auto Mechanics)

Repack front wheel bearings of an American built automobile in thirty minutes, removing the assembly, cleaning the bearings, packing the bearings, replacing the assembly, and making the proper spindle nut adjustment.

F. (Auto Mechanics)

To answer correctly 16 of 20 multiple choice questions on frame design and construction, without reference material. The questions will include types of frames, types of construction, materials used for construction, unitized body and frames.

13. The Self-Test is designed to offer the individual student the opportunity to assess his own understanding of the learning material. It serves, in relation to the behavioral objectives, to guide the student. They may be used for discussion purposes for pre-evaluation, post-evaluation, or for summary development.

The Self-Test items should be written about the behavioral objectives in order to evaluate some direct part of each of them. Do not write questions that do not relate to a behavioral objective you have listed. You may write several questions to cover one objective.

Essentially this pre-assessment is a choice item the student can either elect to take the self-test to determine his abilities and/or weaknesses or completely omit this inventory and begin the activities. The self-test gives the student an opportunity to actually assess his inherent capability for knowledges and/or skills prior to his entry into the major elements of the package.

When students come into a course lacking various prerequisite skills or knowledge, the normal response is to provide remedial instruction. But students <u>also</u> enter a course knowing more than the prerequisites assume. <u>In this case</u>, remedial action should be applied to the course itself so students will not be bored by being taught what they already know.

Perhaps the students are familiar with the topic being presented. The pre-test will help determine which goals should be devoted the greatest amount of time.

14. Polysensory learning through <u>Multi-Media</u> instruction utilizes as many of <u>the physical senses as practical</u> in augmenting the lecture-reading approach to instruction. <u>Multi-Media</u> refers to instructional materials of several kinds, <u>coordinated</u> for simultaneous use in individualized self-instruction. These instructional materials may range through motion pictures, filmstrips, models, mock-ups, etc., depending on the facilities of the school and the requirements of the course content.

<u>Multi-Media</u> deals in information equipment, and resources that encourage motivation: reference books, audio visual components, games, and individual and collective activities. The collection of such "tools" for discovery should have a large psychological and physical appeal so that any type of student can surfeit his interest.

The use of films, filmstrips, tapes, records, pictures, slides, field trips, laboratory experience, and reading matter offer something for everyone.

It takes time to develop <u>Multi-Media</u> for each package you build, but over a period of time, <u>you will</u> revise and continue to build the package into a much better total unit.

15. <u>Multi-Mode</u> are action type activities, such as lab experiments, <u>projects, etc</u>. They are usually written with a procedure for the student to follow for best results. They tell the student how to accomplish the goals of the behavioral objectives. They also indicate the tools needed, supplies required, and the equipment to be used.

16. <u>Final Evaluation</u> will be made by the teacher at the end of each package. It can be in the form of a written test, report, oral quiz, lab performance, or subjective. The final evaluation is designed to measure the extent to which the student has achieved

the behavioral objectives. This is your only reason for making the evaluation--to measure the student's accomplishment with each behavioral objective in the package. Since packages are performance oriented, you can devise various types of charts to record whether a student did meet the criteria set in the behavioral objectives.

BEHAVIORAL OBJECTIVE MET	RATING
#1	1 2 3 4 5 6 7
#2	1 2 3 4 5 6 7
#3	1 2 3 4 5 6 7

17. Quest is an optional, student-initiated, self-directed activity for the purpose of problem resolution or further study related to the concept dealt with in the package.

The Quest is an elective individual extra credit part of the package which allows the student to attempt work on his own. These activities can be related to re-working, revising, or adding materials to the package, as well as lab experimentation or projects.

Each package should offer Quest suggestions, but the student should be free to develop an alternate plan.

18. The following guidelines are offered for the preparation of the criterion examination:

1. Use the objectives as your guide. Prepare as many items as necessary to find out how well the student meets each objective. In some cases, only one item is appropriate as in the tire-changing example. In other cases, you may feel that several items are needed to make an assessment.

2. Create items that call for the same kind of behavior specified in the objective. If an objective calls for a student to use a certain tool, then create test items that cause him to use the tool. In such a case, it would not be appropriate to ask him to write an essay about the use of the tool or to answer multiple-choice questions about the use of the tool. If an objective calls for an ability to repair something, then the appropriate test item is one that asks the student to repair. Again, multiple-choice items are not appropriate. If an objective asks the student to be able to talk about something rather than do it, then oral item or essay item is appropriate.

19. The following are examples of objectives and test items. Some are appropriate for testing the objective, and some are not appropriate. Items that are appropriate for testing the objectives are checked.

OBJECTIVE

Using a slide rule, be able to find the log of a three-digit number.

Test Items

1. Describe in your own words how to find a logarithm on a slide rule.
2. Using a table of logarithms, find the log of:
    a. .00372
    b. 3.24
    c. 9716

XX 3. Using your slide rule, find the log of the following numbers:
    a. 456
    b. 0.0752
    c. 34.5

4. Identify the mantissa in each of the following:
    a. 0.602
    b. 1.398
    c. 2.659

OBJECTIVE

Given a pair of earphones and a pure tone generator, be able to tell the difference between two consecutive tones that are 50 cycles apart.

Test Items

XX 1. Discriminate between two tones of 5000 and 5050 cycles.
2. Define the range of audible frequencies.
3. Explain in your own words the theory of audition.
4. List the steps in measuring a just-noticeable difference.

OBJECTIVE

Given a wood lathe, appropriate tools, and rectangular walnut stock, be able to turn a table leg suitable for a coffee table. The leg should be tapered in any way desired by the student, provided the narrow end differs from the wide end by at least 1/2" diameter.

Test Items

XX 1. Construct a table leg from rectangular walnut that contains at least a 1/2" taper, using the lathe and tools provided.
2. Describe the wood lathe and related tools.
3. List, in proper sequence, the steps required to construct a set of table legs.
4. Describe the advantages of legs.

OBJECTIVE

From three lists of merchandise and their prices, be able to fill out three appropriate sales slips without error.

Test Items

1. Describe in detail and in your own words the difference between the three types of sales slips.
2. Identify the three sales slips in terms of color and size, and determine the price range of merchandise recorded on each.
XX 3. Fill out the three attached sales slips for each list of merchandise.
4. Supply the customer with a cash register receipt instead of completing the three forms.

OBJECTIVE

Given a carburetor that is misadjusted but which contains no malfunctions, be able to readjust it for maximum performance within 5 minutes. Maximum performance is defined by the oscilloscope pattern specified by the instructor.

Test Items

1. Identify the correct pattern as seen on the oscilloscope from several examples illustrated in the carburetor manual.
2. Describe and define the functions of a carburetor.
XX 3. Reset the misadjusted carburetor so that the correct pattern will appear on the oscilloscope within five minutes.
4. List the difference between the two-barrel type versus the four-barrel type of carburetor.

OBJECTIVE

Be able to assemble an M-16 rifle correctly, blindfolded, within ten minutes.

Test Items

1. List the parts of the M-16 rifle.
2. Describe the action of the M-16 rifle and why it is

superior to others. Also state the history of the rifle and pertinent facts concerning its use.

3. Memorize the location of each part on the table so that a faster assembling time can be achieved.

XX 4. On the table in front of you is a disassembled m-16 rifle. Identify the parts with your fingers and assemble the rifle, within ten minutes. Once assembled, check and inspect for accuracy.

OBJECTIVE

Given scissors, comb, and brush, be able to shape and style a client's hair to her satisfaction, taking into consideration facial contour and hair color and texture, within a half hour. Acceptable performance is achieved when the client is satisfied.

Test Items

1. Explain in your own words the methods of good hair grooming.
XX 2. Given scissors, comb, and brush, style a client's hair, taking into consideration her facial contour and hair color and texture, within a half hour.
3. List ten types of hair styles and indicate their current popularity.

20. Self-Test Items.

Two basic types of questions are used in tests, but tests are often made up of only one of the types. <u>Objective</u> questions are written so they can be answered with a single word, letter, or number.

<u>Essay</u> questions require the learner to write a longer answer, often in essay form.

Simple <u>recall</u> questions ask for a short response to definite questions.

Example:

Write the answer to each question in the space at the right.

1. How many threads per inch has a 1/4" NC screw? 1.________
2. What make of carburetor is used on a GMC 270 truck? 2.________
3. How high is foundry type? 3.________

True-False questions ask the learner to indicate whether statements are true or false. Avoid the use of words such as "always," "never," "usually." They tend to give away the answer.

Example:

Read each statement carefully. Decide whether it is true or false. Print the word "true" or "false" in the column at the right after each statement.

1. The density of battery electrolyte is measured with a voltmeter. 1._____
2. New York is one of the states requiring tests of driving license applicants. 2._____
3. A rising barometer reading indicates the approach of clearing weather. 3._____

Enumeration or "list" questions can be used if the desired answer has several unchanging parts.

Example:

A. Name in proper order the strokes of the Otto cycle, using the spaces provided.
1.__________
2.__________
3.__________
4.__________

B. Name the principal components of mortar, using the spaces provided.
1.__________
2.__________
3.__________

A matching question provides two lists, and the learner is required to mark the item on one list which most closely relates to specific items.

1. Only a code letter or number needs to be written.
2. The two lists have unequal numbers of items, but each item should have only one correct answer.

Example:

Place numbers from the list at the left on lines at the right to show which word best fits the statement.

1. Toughness A. Property of metal that permits drawing, etc. _____

2. Elasticity
3. Malleability
4. Ductility
5. Hardness

B. Property of metal that permits stretch under tension without breaking or tearing. ______

C. Property of metal that permits return to original form after deformation ceases. ______

In multiple-choice questions, the trainee must select the most appropriate answer from a minimum of four possible answers.

1. Care should be taken to provide only one correct answer, although all suggested answers should appear plausible or possible choices.
2. Each choice offered should be listed on a separate line.
3. Do not include any choice that is obviously or ridiculously wrong.
4. Avoid giving away the answer by using "a" or "an."

Example:

From each group of suggested answers, choose the one you consider best for the statement. Put a check mark on the correct line to show your choice.

1. The size of wood screws is usually expressed in

______a. gauge size
______b. fractional parts of an inch
______c. decimal fractions
______d. millimeters

2. The pitch of a screw is the

______a. number of threads on the screw
______b. distance between threads
______c. angle between thread faces
______d. diameter of the threads

Completion questions require the learner to write in a blank the word or number that completes the sense of the statement.

Example:

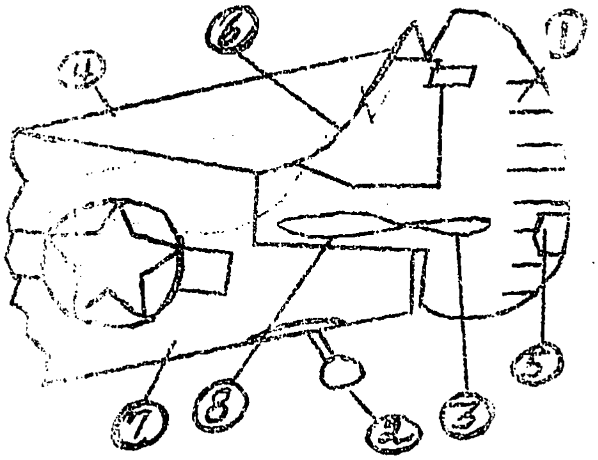
Fill in the spaces with the word or number to make the statement complete.

1. Wearing ______ will prevent most eye injuries. 1.________
2. The ignition is part of the ________ system of a car. 2.________
3. The smallest division on a micrometer is ________ of an inch. 3.________

Identification questions, which require the learner to identify or label various parts of a drawing, not only arouse interest, but are quite effective in testing his understanding of new terms.

Example:

Put the number of each part in its named box at the right.



Antenna	☐
Elevator	☐
Exhaust Stack	☐
Fuselage	☐
Pitot tube	☐
Rudder	☐
Stabilizer	☐
Tail Wheel	☐
Trim Tabs	☐
Vertical Fin	☐

Essay questions are deceptively easy to write, but can be quite difficult to grade. Too often, the instructor writing an essay question goes on a "just-fishing" expedition, scribbling down something like "What do you know about gasoline engines?" Correct answers thathat one can vary from "Nothing" to a chapter of handwritten material. Using more care in writing questions can save much time and will be fairer to the learner. These recommendations will help in writing essay questions that are fair to the learner.

1. Prepare questions that require short answers. Those

that demand lengthy answers take too long to correct. A question can be kept short if it does not involve too many ideas. If several ideas are involved, subdivide the question.

Good: Why use flux in welding? (10 points)
What is an alloy? (2 points)
Give three examples. (2 points)
Give the composition of each alloy. (6 points)

Poor: Explain the electron theory.

2. Make questions specific. State what is wanted and how much detail is desired.

Good: Paint is made up of a vehicle and a pigment. Give two examples of each.

Poor: In broad terms, describe what takes place when soluble oil is mixed with water.

3. Prepare questions that in themselves are not too long and involved.

Good: When two different size gears rotate in mesh, what is the relative speed of the smaller gear?

Poor: Some automobiles are equipped with standard transmissions which incorporate a gear-selector for the driver to achieve greater flexibility of speed and power. How is this accomplished?

4. Avoid questions that suggest the desired answer by using such words as "always," "never," and "seldom."

Good: Give two reasons for setting the handbrake on a car when parking.

Poor: Is there something to be gained by always setting the handbrake on a car?

5. Finally, the writer of a question already knows what he means but what is clear to him may not be clear to another person. It's helpful to let another instructor read the questions to see if he understands each of them.

A performance test is used to decide whether a trainee can perform a skill--or a job or operation--well enough to meet the standards of the occupation. Such a test should never be just a haphazard observation of the trainee doing a job. Instead, a performance test must be carefully planned and given if it is to provide an accurate evaluation of the trainee's accomplishments.

PREPARING TO GIVE A PERFORMANCE TEST:

1. Determine exactly what elements you wish to test. Are safety and precaution used? (Always important.) Speed? Ability to plan work? Accuracy? Exactness in following steps and key points? Skill and confidence in using tools? Craftsmanship?

2. List the operations in the job or steps in the operation. The job or operation sheet may already contain such information.

3. By consulting the steps and key points in the job or operation, decide the acceptable standards for each element that is to be tested. Decide the relative value of each element.

4. Prepare directions to give the learner. Written directions are best since they can be standardized to give each trainee an equal chance.

5. Prepare a scoring sheet for use when giving the test. This will provide a standardized guide when observing and evaluating the performance of each learner. The design and content of such a sheet depend on what is being tested. Some sheets give a numerical value to each element tested, while others simply indicate whether trade standards were met.

6. List and make available the materials, tools, equipment, specifications, and plans which the learner will need to perform the test.

21. Associated Media.

There is no reason why slides could not be used successfully in preparing individual multi-media instructional programs. Filmstrips have the advantages of minimal storage space requirements, unalterable frame sequence when this is important, and less expensive reproduction costs when additional copies of the strips are needed.

ON THE OTHER hand, individual slides are easier to edit by removing or replacing individual frames, a very important factor in keeping a series up to date. Projectors for showing individual slides are quite common and reasonable in cost because of the popularity of this medium with the general public. Filmstrip projectors are not as widely used as in the past, and for this reason are a little harder to obtain and service.

Individual slides are very easy for teachers to make, using the popular double-frame 35mm cameras. If one slide in a sequence is poorly done, it is not a great problem to take another, and both film and processing services are readily obtainable, quick, and relatively inexpensive.

Whether filmstrips or slides are to be selected for development of the individualized multi-media instructional programs is for the school personnel to decide, but it is important that one system be used rather than a combination, to avoid confusion and waste.

While filmstrips and/or slides and tapes are of primary importance in these projects, other forms of media are necessary as well. Accompanying duplicated instruction sheets, worksheets, forms, outlines, and syllabi are a regular part. Ordinarily, the customary stencil duplicating machine or the spirit process is used. These processes are so common that they require no description. Where two-color work or other special requirements justify it, offset printing facilities have been used to reproduce instructional materials.

Sets of overhead transparencies occasionally have been prepared for lectures and discussions. These are hand made or prepared for duplication on transparent plastic sheets by thermo-copy duplicators. Materials are available from audio-visual supply houses.

Series of opaque pictures also have been used in group meetings. These may be either stack mounted on cardboard, or pasted in sequence on a long band of paper, folded in accordion fashion for ease of filing

Flannel boards, charts, sets of flip charts and, of course, the old reliable chalkboard will all continue to serve their purposes in group instruction.

22. Post-Test.

The criterion exam, or "post-test" is constructed <u>solely</u> from the course objectives. The object is to determine how well the student's performance at the end of instruction coincides with performance called for in the objectives. The object is <u>not</u> to see how well the student retains whatever he happened to be told during the course. The difference is an important one.

It is possible to rank students at the end of a course according to how much they learned (a typical technique in an academic course). They can also be evaluated on the basis of how closely their performance approximates the performance called for in the course objectives. In this case, the concern is not with comparing students against <u>each other</u>, but with a comparison of each student against a predefined criterion. This orientation influences the way in which test items are constructed. It calls for the creation of test items that will determine whether or not the student can perform as required, rather than for test items that are "difficult" enough so there will always be some students who fail. For example: If one of the objectives of the course calls for the student to be able to change a tire with a certain set of tools within two minutes, then the appropriate test item is to ask him to change the tire with those tools within two minutes. If all students can perform as specified, it is wrong to make the test item more difficult arbitrarily. If none of the students can perform, one does not make the test item easier...instead, the instruction is improved. After all, the object is to teach students, not fail them.

MULTI-MODE:

1. Determine the course content.
2. Determine the course requirements.
3. Write a statement that describes your philosophy concerning learning and the individual student in relation to your teaching area.
4. Write a paragraph explaining what a learning activity package is.
5. Survey available packages and make a chart of the parts used in the make-up of them.
6. Develop a logical package format from your survey. Be prepared to present and defend your format to the class.
7. Write a short statement in your words explaining the function of each part of a package format.
8. Quest---Develop a master number system for filing of packages.
9. Write a series of Titles for a complete course in your teaching area. Each Title being considered should indicate two hours to 12 hours class work.
10. Write up a series of cover/identification pages complete with occupational cluster and/or vocational-technical term. All identification pages will be of a standard form. Be prepared to present to the class an example of your work for evaluation.
11. Quest---Develop a second series of Titles and identification pages for another course in your teaching area.

12. Write a Rationale for each package Title you now have written. Remember you are writing these for students. [illegible] to work in the U.S.O.E. Occupational Cluster. Be prepared to present a Rationale to the class for evaluation.

13. Quest--Develop a second series of Rationales for a follow-up course.

14. Write the Behavioral Objectives for each package you are developing. Be certain they contain the three basic characteristics to make a good behavioral objective. Write them for your students.

15. Quest--Develop a second series of Behavioral Objectives for a follow-up course.

16. Write a Self-Test for each package you are developing.

17. Quest--Develop a second series of Self-Test items for a follow-up set of packages.

18. Write a Multi-Media procedure for each package you are developing. (Note: The class may wish to use another term besides Multi-Media, such as, Information Sources.)

19. Develop one Multi-Media form of instruction for each package.

20. Quest--Develop additional media for your packages

21. Write a mode activity procedure for each package. This should reflect the goals set forth by your Behavioral Objectives for each package.

22. Quest--Develop for a second series of packages mode activities.

23. Quest--Develop Multi-Dimensional or Multi-Level activities for your first series of packages to truly make them individualized.

24. Write a Final Evaluation for each package you are developing that will effectively cover the Behavioral Objectives that you have stated. Use a variety of techniques for evaluation.

25. Quest--Develop a second series of Final Evaluations for a follow-up course of packages.

26. Write description of one Quest for each package you are developing.

27. Quest--Develop a series of Quests for a second course you may wish to develop.

28. [illegible] develop an idea list or guide sheet to add to [illegible] package to assist others in writing package materials for the quest section.

29. Assemble all parts developed for your learning packages into the package series, this includes software and hardware.

30. Place a copy of the final typed learning packages for the central file at the N.I.U. Trade and Industrial Extension Office -- Software only; hardware is itemized within the software for others to follow.

31. QUEST - Complete the second course series of learning packages with copies for central file.

FINAL EVALUATION:

<table>
<tr><th></th><th colspan="3">RATING COMMENTS</th></tr>
<tr><td>Package Series:
Software -
Hardware -</td><td colspan="3"></td></tr>
<tr><td>Quest Series:
Software -
Hardware -
Other -</td><td colspan="3"></td></tr>
<tr><td>Miscellaneous:</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Required Behavioral Objectives Met:</td><td>Software</td><td>Hardware</td><td>Additional</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

VT 017 663

VT 017 633
HOME ECONOMICS EDUCATION--SYLLABUS.

NEW YORK STATE EDUCATION DEPT., ALBANY.
BUREAU OF SECONDARY CURRICULUM DEVELOPMENT.
MF AVAILABLE IN VT-ERIC SET.
GREGORY BENSON, JR., NEW YORK UNIVERSITY,
STATE EDUCATION DEPARTMENT, ALBANY, NEW YORK
12224
PUB DATE - 65 227P. 1972 REPRINT

DESCRIPTORS - *CURRICULUM GUIDES; *HOME ECONOMICS EDUCATION; ADULT EDUCATION; ELEMENTARY GRADES; SECONDARY GRADES; TEACHING METHODS; CURRICULUM DEVELOPMENT; CONCEPT TEACHING; GENERALIZATIONS; BEHAVIORAL OBJECTIVES; *INSTRUCTIONAL MATERIALS

ABSTRACT - THIS SYLLABUS IS DESIGNED TO PROVIDE LOCAL DISTRICTS WITH FOUNDATIONS FOR DEVELOPING HOME ECONOMICS PROGRAMS WHICH WILL PROVIDE LEARNINGS HELPFUL TO YOUTH AND ADULTS IN WEIGHING VALUES AND MAKING DECISIONS IN ALL ASPECTS OF HOME AND FAMILY LIVING. PART I, FOUNDATIONS OF THE HOME ECONOMICS PROGRAM, IDENTIFIES SOME OF THE TRENDS IN EDUCATION AND SOCIETY, GIVES THE GOALS OF HOME ECONOMICS EDUCATION, AND SUGGESTS GUIDELINES FOR ADMINISTERING PROGRAMS. PART II, THE TEACHING-LEARNING ENVIRONMENT, EMPHASIZES SUCH ASPECTS AS: (1) UNDERSTANDING AND WORKING WITH STUDENTS WHO HAVE DIFFERING ABILITIES AND EXPERIENCES, (2) SELECTING AND USING APPROPRIATE TEACHING METHODS AND MATERIALS, AND (3) DEVELOPING HOME AND COMMUNITY EXPERIENCES AS PART OF COURSES. PART III, COURSES OF STUDY FOR GRADES 7-12 EXPLAINS THE CONCEPT APPROACH TO CURRICULUM DEVELOPMENT AND PROVIDES DETAILED COURSE OUTLINES FOR GRADES 7 AND 8, HOME ECONOMICS 1, 2, AND 3, SEVEN SPECIAL INTEREST COURSES, AND TWO EMPLOYMENT PREPARATION SEQUENCES. PART IV, PROGRAMS FOR ELEMENTARY AND ADULT LEVELS, PROVIDES THE CONTRIBUTIONS AND WAYS OF INTEGRATING HOME ECONOMICS IN THE ELEMENTARY PROGRAM, AND DESCRIBES THE SCOPE OF HOME ECONOMICS AT THE ADULT LEVEL AND OFFERS GUIDELINES FOR DEVELOPING LOCAL PROGRAMS. (SB)

syllabus for a comprehensive program

HOME ECONOMICS EDUCATION

THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE EDUCATION DEPARTMENT
BUREAU OF SECONDARY CURRICULUM DEVELOPMENT
ALBANY

Home Economics Education

Syllabus

(Reprint 1972)

THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE EDUCATION DEPARTMENT
BUREAU OF SECONDARY CURRICULUM DEVELOPMENT
ALBANY • 1965

THE UNIVERSITY OF THE STATE OF NEW YORK

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Chief, Bureau of Home Economics Education
Laura M. Ehman

Foreword

HOME ECONOMICS EDUCATION must keep in tune with changes in society and in education if it is to prepare youth and adults to face the present and the future realistically. Few persons are equipped to deal adequately with the speed of technological and social developments without some basic knowledge, understandings, and skills which will prepare them for personal and family living in the home, community, and world. This syllabus is designed to provide local districts with foundations for developing home economics programs which will provide learnings helpful to youth and adults in weighing values and making sound decisions in all aspects of home and family living. In order to provide stability and serenity needed by each member in a complex and changing world, the home and family must be strong.

The modernized curriculum provides up-to-date content broadened to include the world society. A revised structure of courses focuses on essential concerns in today's living and the varying abilities, interests, and background experiences of all pupils. A new approach to teaching has been introduced to challenge and develop the intellectual capacities of pupils. A new dimension has been added to assist pupils in developing competences for employment in home economics related occupations.

The syllabus is developed in four parts, providing in sequence (1) Foundations of the Home Economics Program; (2) the Teaching-Learning Environment; (3) Courses of Study Grades 7-12; and (4) Programs for Elementary and Adult Levels. Guidance for use of the material is given in the Orientation to the Syllabus. Since there is close relationship between the courses of study and every other part of the syllabus, the material has been organized in one bulletin. Supplements to the syllabus dealing in depth with various phases of home economics will be made available to schools from time to time.

Special recognition and appreciation are due the many persons who have contributed either to decisions leading to change or in the preparation of syllabus material. A State Advisory Committee assisted members of the Bureau of Home Economics Education in organizing and developing the modernized curriculum. Doris Hanson, Purdue University, Lafayette, Ind., edited the manuscript. The achievement of this syllabus is a tribute to all who have shared in any way with its preparation. It would be impossible to identify the hundreds of individuals who had some part in this activity. The State Education Department deeply appreciates the services which have been rendered and trusts that satisfaction will result from the use of the syllabus for strengthening personal, home, and family living.

This curriculum revision was initiated by Miss Dorothy S. Lawson, formerly Chief of the Bureau of Home Economics Education; with the support of Joseph R. Strobel, former Assistant Commissioner for Occupational Education. The revised program was implemented through the efforts of the staff of the Bureau of Home Economics, Miss Laura Ehman, Chief.

A limited reprint of this publication is being prepared to extend the life of a viable publication. A planned revision of the total home economics program, beginning with the middle school years, has been delayed in the development process. The basic guidelines in this publication will carry through until the program is revised.

GORDON E. VAN HOOFT, *Director*
Division of School Supervision

Table of Contents

Orientation to the Syllabus

CHANGES IN SOCIETY imply changes in the teaching of home economics. Complexity, confusion, and unbounded potential characterize the modern world: knowledge is being compounded at phenomenal rates. Each field of study is challenged to concentrate on teaching only essential learnings while simultaneously developing in the learner the ability to continue to learn on his own, to think, to solve problems, and transfer acquired learnings to new and different situations. This syllabus dedicates home economics education to that goal.

Curriculum development in home economics education has progressed from planning a guide in the early 1950's that broadly implied program direction to a syllabus in the mid 1960's which specifically outlines a prescribed program of study. Embracing a new approach to the study of home economics, this syllabus provides local school districts with the basis for a program that is up-to-date in content as well as in standards of curriculum development. It reflects a philosophy of home economics intimately involved with current and predicted changes in society and gives special consideration to individual differences and the needs of groups served at various age levels.

The syllabus reflects a balanced program through the identification of basic learnings in all phases of home economics, along with suggested patterns of time allocation. Continuity is achieved through the careful development of courses of study for the appropriate growth level of the learner and through delineation of sequences in learnings.

I. ORGANIZATION OF SYLLABUS

The syllabus is organized in four parts. It should be studied in its entirety, since each part is vital in developing and teaching a sound home economics program. A brief summary of each part follows:

Part I. **Foundations of the Home Economics Program.** Some of the trends in education and society which influence the program are identified. Goals of home economics education are given. Specific guides are suggested for administering the total home economics education program.

Part II. **The Teaching-Learning Environment.** The many aspects in a challenging and effective learning situation are emphasized. Help is given in (1) understanding and working with pupils with differing abilities and experiences, (2) recognizing the importance of the teacher, (3) planning and using space and facilities, (4) selecting and using appropriate teaching methods and materials, (5) developing home and community experiences as part of courses, and (6) understanding the value of the program of Future Homemakers of America as a part of the total home economics education program.

Part III. **Courses of Study—Grades 7-12.** Explanations are given of the concept approach to curriculum development and the significance of employment preparation for home-related occupations. Detailed course outlines are included for grades 7 and 8; the basic sequence, Home Economics 1, 2, and 3 seven special interest courses and courses for two employment preparation sequences. The scope of learnings in grades 7 and 8 and the basic sequence is shown in a chart. Guides for using these courses of study are given. Each course of study has been carefully developed for the appropriate growth level of the learner and to achieve a sequence of learnings. Each is preceded by an OVERVIEW, which identifies pupils for whom the course is designed, indicates the course focus and purpose, and outlines and explains concepts to be covered. Each is followed by a REFERENCE GUIDE, which gives suggested sources of help for teachers and pupils. The format of each course includes:

- CONCEPTS and SUBCONCEPTS—serve as the organizing elements for the courses of study
- GENERALIZATIONS—are broad and imply goals and learnings inherent in the concepts
- ESSENTIAL LEARNINGS—are stated for each generalization and are followed by more detail to assure pupil background sufficient to draw supporting generalizations
- BEHAVIORAL OUTCOMES—indicate expected change in pupils' behavior resulting from the learning process
- TIME ALLOCATION—gives percentage of time to be spent on each concept and subconcept to provide for proper emphasis

Part IV. **Programs for Elementary and Adult Levels.** Contributions of home economics education to the elementary program and some ways of integrating learnings in the elementary curriculum are given. The scope of home economics at the adult level and guidelines for developing local programs are described.

The appendix includes a sequence of learnings in clothing construction and a guide for teaching basic learnings through meal preparation; these are planned for use in conjunction with areas of food and clothing in the courses of study. Information about where to secure references listed for each course of study is included in the appendix.

II. USE OF SYLLABUS

The successful use of the syllabus is dependent upon the depth of understanding each teacher has of the total content and the implementation made in the local district. Some guides to help in becoming acquainted with and in using the syllabus follow.

- Become familiar with the organization of the syllabus and scope of material contained in it by studying the table of contents and by previewing each part.
- Read each part of the syllabus, noting sections which will need further study in relation to implementation in local school.
- Identify sections which will be used simultaneously, such as: a course of study and the section on Methods, Material, and Media; courses of study for the basic sequence and the section on home and community experiences; a course of study and the profiles of the particular ability and experience levels of pupils in that course.

- Give detailed attention to courses of study which will be taught, noting relationship of these to courses being taught by other home economics teachers. Study all references on concepts and generalizations and refer to guides for using courses of study when making detailed teaching plans.
- Determine sections to be used in working with others, such as the section on program structure with guidance personnel, section on adult home economics program with director of adult education, section on space and facilities with administrators and architects.

part I

Foundations of the Home Economics Program

PART I

Foundations of the Home Economics Program

DEVELOPMENT OF THE HOME ECONOMICS CURRICULUM

The modernized home economics curriculum described and detailed in this syllabus reflects current trends in education and society. Its substance is drawn from acknowledgment of the family as the basic unit of society and of change as the dynamic force in education and the modern world.

To be implemented at the local level with strength and direction, the curriculum must evolve as a total program which recognizes society and the climate of sweeping change but consciously provides for preservation and enhancement of the individual—each individual—as unique and worthwhile.

The same forces which influenced the development of the curriculum will have bearing upon its implementation.

I. EDUCATION IN A WORLD OF CHANGE

The basic purposes of education are influenced by national and world affairs. Scientific, social, and economic developments add new dimensions and lead to changing emphases.

Three traditional educational concerns appear to be of special significance at the present time. First, democracy and individual liberty are threatened by ignorance and blinding prejudices. Illiteracy must be reduced. Individuals must be taught to think independently and critically and be given a broader understanding of facts and principles upon which to base judgments, make decisions, and deal with unknown problems. Differences must be accommodated in both neighborhood and worldwide dimension.

Second, American society has always stressed the worth of each individual, and today's education must face the challenge this implies. Equality of educational opportunity, enabling each individual to become all he is capable of being, and increased recognition of differences in background and ability of each pupil are imperative.

Third, education has long recognized the need for preparing individuals to earn a living. Education has made it possible for individuals to obtain better jobs and to develop skills and abilities for the profession of their choice. The changing character of occupations in the labor force requires more education and training for many occupations. Each year there are fewer places in the working world for people who have not been trained for some type of employment.

This is the climate in which the new curriculum must assume its place. Meeting the needs and interests of individuals and families has historically been the focus of home economics but new and unusual circumstances call for different approaches. Home economics can continue to make a unique contribution to education; the challenge is great.

II. HOME ECONOMICS IN THE TOTAL EDUCATION PROGRAM

Curriculum and program planning in home economics is challenged by the variety and amount of subject matter focused upon the family. The family both reflects and contributes to the culture. Although there is no way of knowing what families and the world will be like in the future, it seems likely there will be homes with individuals to be nurtured; decisions to be made in use of personal, family, and community resources; and relationships to be fostered in the home, the community, and world. The home economics curriculum should help all individuals establish, develop, and strive toward the achievement of personal goals and values, while also becoming accustomed to and comfortable with change.

Home economics in a school program focuses primarily upon junior and senior high school but has contributions to make at the elementary level. It has touched only the fringe of possible service to out-of-school youth and adults. Home economics recognizes and makes provision for different ability and socioeconomic levels, as well as different age groups of both sexes. Such a broad field of learning must be clearly organized to meet the needs of these varied groups. Objectives and learning experiences must be selected and planned to provide depth as well as scope of understanding, thereby leading pupils to understand meaningful ideas based on general truths and to recognize the interrelationship of all knowledge.

Because home economics deals with all phases of personal and family living, the scope of content is very broad. Increased knowledge in all areas creates a need for choosing only the most significant phases to be taught. A carefully planned sequence of learnings, as represented in the new courses of study, enhances learning at each level of maturity.

III. INFLUENCE OF EDUCATION AND SOCIETY ON THE HOME ECONOMICS CURRICULUM

Certain parts of home economics, such as food preparation and clothing construction, which have historically occupied major time, are less appropriate today. Other areas, such as nutrition, personal and family relations, home management, selection and care of clothing, child development, and housing, have become more relevant to needs in society. Prevailing trends which have given direction to the home economics curriculum are listed in the following chart. Conditions of the future will imply further change.

TRENDS IN EDUCATION	CHANGES IN HOME ECONOMICS CURRICULUM
• New understandings of the needs of youth and adults with varying abilities, backgrounds, and aspirations make appropriate education for each group necessary.	• Courses of study and methods of teaching are adapted to needs of special groups of learners; slow, average, more able; mentally and physically handicapped; culturally and educationally disadvantaged; from varied socioeconomic levels. • Pr[illegible] and courses are geared to needs of specific groups: wage earning sequences for potential dropouts and terminal pupils; basic sequence for home economics majors; special interest courses for nonhome economics majors.
• Rapidly expanding knowledge requires careful selection of learnings to be taught.	• Significant concepts have been identified in each phase of home economics. • Learnings essential to the development of each concept are related to realistic concerns.
• Education for critical thinking in solving problems and relating ideas is essential in helping persons gain ability to cope with change and apply what is learned to future situations.	• Instruction planned within his experience aids the learner in becoming self-directive, in formulating and applying generalizations which relate to different situations. • Learning is strengthened through coordination of home economics with other disciplines.
TRENDS IN FAMILIES AND SOCIETY	
• Scientific and technological advances in products and equipment for home and family use provide wide choices and require understanding of their use and care.	• Application of scientific principles, experimentation with new products, making and evaluating decisions regarding use of resources are approached in relation to personal and family values and goals.

● Abundance in material goods and services, pressures of advertising, and extensive use of credit stimulate high spending and deemphasize saving by families and individuals.	● Emphasis is placed on development of sound consumer practices, discriminating judgment, and understanding the influence of responsible consumer action upon personal, family, and national economy.
● Geographic and social mobility of population and changing character of communities can produce feelings of insecurity and conflict within individuals and families.	● Content focus is on understanding and appreciation of differences in living patterns in different sections of the country, taking part in programs of social action, adjusting to new communities, and learning to know and enjoy a variety of people.
● Widening geographical boundaries and interdependence among many cultures create new and varied influences upon individual and family living.	● Attention is given to understanding family responsibilities and contributions to national security and international peace and to awareness of variations in family patterns, child rearing practices, food habits in the cultures of the world.
● Emphasis on the work role of women, early marriage, changes in obligations and needs of family members, longer life expectancy, requires reorienting of values and goals, adapting to variations in patterns of living.	● Development of wage-earning skills in home and community related occupations, preparation for marriage, management of multiple roles, strengthening of self-identity, and consideration of special needs of the very young and the elderly, all are central to the curriculum.
● High incidence of social problems (such as illegitimacy, venereal disease, use of narcotics, divorce, alcoholism, poverty, and unemployment) creates special strains on the family structure and the moral commitment of individuals.	● Recognition of these problems is introduced through various related areas. Challenge to accept responsibility, define values, move toward maturity, and assume an active part in creating a better society and better world is included.

IV. GOALS OF HOME ECONOMICS EDUCATION

A statement of goals provides a rationale for the total curriculum. Goals indicate what is to be emphasized and give direction to the choice of subject matter, teaching procedures, and means of evaluating progress. No single course or teaching unit will contribute to achievement of all the encompassing goals, but each will provide substance for some. Additional specific goals can be related to one or more of the encompassing goals, and thus bring unity to a program and concentration of effort where it is most effective.

Home economics education aims to assist family members of all ages develop attitudes, appreciations, understandings, and abilities for the achievement of satisfying personal, family, and community life. Thus, the curriculum is designed to help individuals to:

1. Appreciate significance of the family as a basic unit in society and the impact it makes upon health, values, and attitudes of members at each developmental age.
2. Understand the nature of personal values and their role in determining the quality of family life and personal relations in society.
3. Perceive family practices of different cultural groups; gain some skill ... deducing general underlying principles relevant to meeting human needs.
4. Comprehend the influences affecting decision making; develop skill in making decisions and managing family resources.
5. Improve understanding of research methods and ability to apply results to the solution of specific problems in the home.
6. Acquire knowledge and skills needed to provide food, clothing, and shelter for the family; develop human relations skills.
7. Develop intellectual abilities and attitudes needed to deal creatively with continuous social, economic, and technological changes affecting family life.

Guided by these goals, an organization plan for serving home, school, and community can be developed for each local situation. When planning framework and detailed learning experiences, understanding must be given to teaching personnel, time and facilities available, dominant needs of people served. Providing a progressive sequence of learnings for all age levels in relation to backgrounds and experience should be the outcome.

PROGRAM STRUCTURE

Home economics education is designed to help youth and adults to be effective individuals, family members, community and world citizens. The program is developed to provide sequential learnings based on developmental needs and interests of all age groups.

This section presents the scope of the home economics program from kindergarten through the adult level. It outlines the framework of courses and gives suggestions for solution of special concerns in program planning. It will be of help to administrators, guidance personnel, and teachers in planning the local home economics program and in scheduling courses.

I. SCOPE OF THE HOME ECONOMICS EDUCATION PROGRAM

Home economics experiences in grades kindergarten through 6 are developed to enrich the learnings and broaden some of the understandings of the existing elementary curriculum. Six home economics concepts which are supportive of the objectives of the elementary program and which may be developed at this level are:

- Family Living and World Understanding
- Health and Grooming
- Nutrition and Foods
- Home Management and Safety
- Entertainment and Manners
- Textiles and Clothing

Experiences should be planned cooperatively by the home economics consultant and the elementary classroom teacher. A study of each subject area within the elementary curriculum will in[illegible]laces at which learning experiences in home [illegible]mily living can be included for the mutual enrichment of the elementary and home economics programs. Regularly scheduled home economics classes are not recommended for pupils in grades kindergarten through 6. The amount of time a home economics consultant might spend in working with the elementary teacher and pupils in any one grade would necessarily vary depending upon the learnings to be achieved and activities to be undertaken.

The program in grades 7 and 8 includes foundation courses which provide opportunities to study four different phases of home economics of vital importance to youth at this maturity level. Development of concepts in sufficient depth requires classes scheduled for a single period daily for a full semester of study at each grade level.

The program in grades 9 through 12 includes a basic sequence of three courses for pupils who major in home economics, a series of special interest courses for pupils who elect a limited number of home economics courses, and employment preparation sequences for youth who desire to prepare for employment following high school study.

The basic sequence extends and deepens concepts introduced in grades 7 and 8 and provides new learnings in relation to each course focus. The first course has as a content emphasis, human growth and development, the second course emphasizes management and the third course focuses on relationships. Each course includes study in several aspects of home economics. These courses are designed to follow in sequence, but each is also independent and can be elected by pupils in the appropriate grade levels.

Each of six special interest courses focuses on a different phase of home economics. The initial concept in each course is concerned with developing a broad view of the particular phase as it is related to and influenced by society as a whole. Content then focuses on the relationship of the phase of study to the family and its members. The final concept in each course aids the pupil in identifying potential employment opportunities in the field of study. A seventh special interest course, Family Values for Democratic Living, designed especially for the more able pupils, aims at helping to identify and analyze personal and family living concerns of contemporary society.

The employment preparation sequences are designed to help prepare youth for the dual role of homemaker and wage earner. The study of home economics contributes to the development of skills, attitudes and understandings which are closely related to success in certain areas of employment. Courses provide help to youth in developing competencies necessary for employment in home economics-related occupations.

The adult home economics program offers courses suitable for helping individuals satisfy personal and family needs presently and in the future and utilize their homemaking skills in preparation for employment in home-related occupations.

II. COMPOSITE PROGRAM STRUCTURE

Grades Kindergarten-6
Home and family living experiences integrated in regular curriculum

Home Economics Grade 7
(includes foods and relationships)
Daily for 20 weeks

Home Economics Grade 8
(includes clothing and child development)
Daily for 20 weeks

Basic Sequence—Grades 9-12 Regents Credit—1 unit each

HE-1: Personal and Child Development (Grades 9/10)
HE-2: Personal and Family Management (Grades 10/11)
HE-3: Personal and Family Relationships (Grades 11/12)

Special Interest Courses—Grades 11-12 Regents Credit—½ unit each

HE-4: Child Development
HE-5: Family and Community Health
HE-6: Housing, Furnishings, and Equipment
HE-9: Money Management
HE-10: Nutrition and Meal Management
HE-11: Textiles and Clothing
HE-12: Family Values for Democratic Living (credit ½ or 1 unit) *

* Grade 12 only

Employment Preparation Sequences Regents Credit—1 unit each

Sequence I —For home economics 4-year majors
Basic Sequence—Grades 9-11
HE-13: Preparation for Employment—Grade 12

Sequence II—For potential dropouts
HE-14: Becoming Employable—Grade 9
HE-15: Training for Wage Earning—Grade 10

Adult Areas of Study

Preparation for Homemaking

Personal and Family Relationships
Personal and Home Management
Housing for the Individual and Family
Personal and Family Clothing
Family Foods and Nutrition

Preparation for Employment-Suggested Occupations

The Visiting Homemaker
Companion to an Elderly Person
Clothing Maintenance Specialist
The Child Day-Care Center Worker
Management Aid in Low-Rent Housing Projects

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III. PLANNING COURSE OFFERINGS

The local home economics program should be planned in relation to the social, economic, and cultural profile of the community and the type of school organization. The preceding chart, Composite Program Structure, gives aid for local program planning by indicating areas of study appropriate for various grade and age levels, amount of Regents credit per course, types of courses and sequences available. Special concerns of schools in planning programs for grades 7 through 12 are explored in the following questions and suggestions.

Question: What courses should be offered in a junior high school with grades 7-9?

Suggestions:

- Home Economics Grade 7 and Home Economics Grade 8 should be scheduled for a single period daily for 20 weeks, at each grade level.
- The first course of the basic sequence, HE-1, Personal and Child Development, should be offered for 9th-grade pupils for a single period daily for 40 weeks.
- The first course in the Employment Sequence II, HE-14, Becoming Employable, may be offered for 9th-grade pupils who are potential dropouts for a single period daily for 40 weeks.

Question: What courses are recommended for schools with grades 9-12 or grades 10-12?

Suggestions:

- The basic sequence, HE-1, HE-2, HE-3, is a three-course series for pupils in grades 9-11, or 10-12. Each course is scheduled for a single period daily for 40 weeks.
- Any special interest course, HE-4, HE-5, HE-6, HE-9, HE-10, and HE-11, may be offered for 11th- and 12th-grade pupils for a single period daily for 20 weeks.
- HE-12, Family Values for Democratic Living, may be offered for more able pupils in grade 12 for a single period daily for 20 or 40 weeks.
- HE-13, Preparation for Employment, may be offered for 12th-grade pupils who have completed the basic sequence.
- The Employment Sequence II, HE-14 and HE-15, may be offered for potential dropouts in grades 9 and 10. Each course is scheduled for a single period daily for 40 weeks.

Question: What courses are recommended for a 3-unit sequence for pupils who major in home economics?

Suggestions:

- The basic sequence, HE-1, Personal and Child Development, HE-2, Personal and Family Management, and HE-3, Personal and Family Relationships, provides the most comprehensive program since it includes learnings in all phases of home economics.
- HE-1, HE-2 for 2 units of credit and two special interest courses, each for ½ unit of credit, may be used as a 3-unit sequence.

Question: Which special interest courses in home economics should be offered during the 11th and 12th years?

Suggestions:

- Offer courses which will best meet needs of pupils, i.e., HE-4, Child Development, for pupils interested in nursery school or elementary education; HE-5, Family and Community Health, and HE-10, Nutrition and Meal Management, for pupils interested in nursing; HE-12, Family Values for Democratic Living, for more able seniors interested in a general family life course.
- Vary course offerings according to a long-range plan to provide broad coverage of the phases of home economics.
- Capitalize on special talents and interests of teachers in selecting the phases of home economics to be taught.

Question: When are home economics courses appropriate for boys?

Suggestions:

- All courses have been designed for boys as well as girls.
- Boys may be scheduled in classes with girls or any course may be offered for boys only.

Question: When is it advisable to offer one or both home economics employment preparation sequences?

Suggestion:

- Introduce HE-13 or HE-14 and HE-15 only after a careful study of pupils' interests and needs, of local wage-earning opportunities in home economics-related occupations, and the interest and background of home economics teachers.

Question: What is the desirable procedure in regard to late registration of pupils in home economics classes?

Suggestions:

- Withhold registration of pupils in grades 11 and 12 until beginning of next term, at which time they may enter a special interest course offered on semester basis.
- Consider each situation individually for pupils in grades 9 and 10, since there are no semester ½-unit courses available at this level. Late enrollment in HE-1 and HE-2 may be possible if teacher guidance and independent study by the pupil are available to bring pupil up-to-date with the class.

Question: How can home economics be provided for pupils in grades 11 and 12 who do not major in this field and have limited time for electives?

Suggestions:

- Offer special interest courses during regular summer school session.
- Offer selected concepts in home economics on a noncredit basis as a seminar or study discussion group series.

Question: What home economics courses should be included in a program limited by the number of teachers and teacher stations?

Suggestions:

- Plan a program which includes courses appropriate for each grade level. For example, if only two courses are possible in grades 9-12, offer HE-1, Personal and Child Development, for pupils in grades 9 and 10 and HE-3, Personal and Family Relationships, or two special interest courses for pupils in grades 11 and 12.

Schools are expected to plan the local home economics program within the framework suggested in this section. If courses desired in the local district cannot be adjusted within this structure, consult the Bureau of Home Economics Education, New York State Education Department, Albany, for assistance.

part II

The Teaching-Learning Environment

PART II

The Teaching-Learning Environment

PUPILS WITH DIFFERING ABILITIES AND EXPERIENCES

School communities are composed of individuals with vastly differing interests, background experiences, and ability to learn. While the majority of average, typical learners are progressing suitably through the prescribed school curriculum, important smaller segments of pupils may have given up completely or be bored beyond belief.

These pupils are the potential dropouts, the unchallenged gifted, and pupils with various mental, physical, or cultural handicaps. In an era when the dropout could easily obtain employment, when society did not dramatize its need for creative intellect, and when the handicapped were abandoned as hopeless, the teacher's attention could afford to be restricted to the average—to the pupils who were ready and receptive to a standard package of learning experiences.

Today the teacher's responsibility has changed. Giving lip service to individual differences is no longer enough. Education is committed to really meeting the needs of all pupils. In this process intensive research, experiments in teaching, and the questioning of many traditional ideas about learning ability are all providing a wealth of new insights to help the teacher reach, inspire, and teach pupils with varying needs.

The nature of home economics, its methods, content, and goals, make it a particularly unique avenue for contributing to the enhancement of learning for each pupil. There can be unlimited scope for the gifted and creative, a secure friendly atmosphere in which all pupils can develop in spite of handicaps or cultural disadvantages. Helping one pupil become employable and an adequate citizen, challenging another to become the first woman president, are equally worthy of the teacher's consideration. Such objectives are not reached in isolation; the influence of one understanding, sympathetic, sensitive adult has often turned the tide of a child's whole life.

Teachers, by the very fact of their status and education, may often lack experience in communicating with pupils who are outside the range of the average. To assume that the child who doesn't learn can't learn, that the child who isn't motivated is stubborn, that the quiet, docile child is well-adjusted while the one who "acts up" is not—these and many other assumptions must be reexamined if the climate is to be created which will permit potential to be nourished.

Environmental variables introduce a special range of questions that the home economics teacher must consider. Do all families have tables to set? Does every child have a father at home? Can a few cents easily be spared for a class project? Does personal bathing involve only turning a faucet? At the other extreme, the riches of environment raise further questions. Can consumer buymanship be discussed profitably in relation to ankle socks when the pupil is shopping for a car? Is emphasis on techniques of dishwashing as important as the understanding of managing and directing household help?

To be able to recognize, identify, or sense the potential of each learner and know how to reach each one would be ideal. The teacher who consciously strives toward this goal can take pride in whatever progress is made, knowing that success perpetuates itself both in learning and in teaching.

The slow learner, the gifted, the educable, the disadvantaged are all attempts to describe and classify a complex range of individual differences within the school and society. Words and terms lack precision; today's disadvantaged slow learner sometimes becomes tomorrow's gifted or high average when properly nurtured within his own reference frame.

Brief discussion of various differences is included here as a starting point or a review. Real comprehension of individuals comes through continuing study and through experience in the classroom and out. Categories and descriptions can at best be only guides or generalities. The key to individual differences is in recognizing individuals, not classes or groups.

I. PROFILE OF THE EDUCABLE MENTALLY HANDICAPPED LEARNER

The most important fact to remember about the educable mentally handicapped pupil is that he *can* learn. The term educable implies the pupil has ability to achieve in some school subjects if special education is used.

Mentally handicapped pupils comprise approximately 2½ percent of the entire school enrollment and have an IQ range of from 50 to 75. Pupils with the mildest degree of retardation are not easily distinguished from the slow learners.

Retardation exists throughout the entire life span of the individual. Although the cause of retardation is not fully understood, it may result from imperfect development of the nervous system. Hereditary factors, certain diseases and injuries, both pre- and postnatal, seem to affect development of the nervous system.

Limited language development is usually noted. The pupil has difficulty with oral and written expression and may not be able to comprehend the meaning of words he recognizes by sight. Speech disorders in educable mentally retarded children are similar to those of normal children but occur more frequently. Experts disagree about the cause of speech defects and linguistic deficiencies, but whatever the relationships, delayed development and defects of speech and language do exist in high ratio among mentally handicapped children.

Some mentally handicapped at the junior and senior high school levels are able to give sustained attention for a scheduled period of time, if printed materials and verbal presentations are within the pupil's experience. Others have comparatively short attention spans.

These pupils have limited ability to think abstractly and may find it difficult to transfer learning from one experience to another. They can compete with other pupils with some degree of success in nonacademic areas. Many can learn some academic skills, but usually they cannot profit from a regular academic curriculum.

The physical growth, maturation, and stamina of educable mentally handicapped children are similar to those of their average peers. However, malnutrition, inferiority in size, high incidence of illness, and physical disabilities may be prevalent, partly because of environmental conditions.

Lack of coordination in gross motor skills may result in difficulties in sitting, walking, and homemaking activities. Poor eye-hand coordination likewise leads to lack of skill in manipulative activities. Deficiencies in these areas often slow the reaction time in physical movements.

Where there is lack of acceptance of the educable mentally handicapped at home, at school, and in peer groups, his social and emotional development may be impaired. He often shows insecurity, lack of self-confidence, and tendency to be easily influenced by others. Interest in organized groups may be lacking.

To compensate, he may devote excess attention to one person or one activity. Individual guidance is needed to eliminate a negative self-concept and develop feelings of successful endeavor.

Although one sometimes reads statements as to maximum achievement level which can be attained by pupils in this classification, such estimates are risky. It is not unusual for progress to exceed what could have been expected.

Patterns for Scheduling

Patterns of scheduling to provide learnings in home and family living for educable mentally handicapped pupils will depend upon such factors as size of school, number of mentally handicapped pupils, and the extent of academic achievement expected in the home economics course being considered for mentally handicapped pupils. Careful consideration should be given to these factors:

- functioning level and emotional and social maturity of each mentally handicapped pupil
- degree to which all pupils involved in the learning experience can benefit
- level of content under study in the particular course
- ability of the home economics teacher to meet the needs of all pupils in the class
- additional time for home economics classes for mentally handicapped learners

Three suggested patterns follow:

1. **Separate classes in home economics for mentally handicapped pupils.** Classes should be scheduled regularly in the home economics department. The special education teacher should attend these classes at frequent intervals as one effective means of correlating pupil learnings. This scheduling pattern (a) provides a meaningful program geared to the needs, interests, and abilities of the group of mentally handicapped learners; (b) enables the home economics teacher to adapt and use methods, techniques, and materials appropriate for this group; (c) assures opportunity for individual instruction and reinforcement of learnings;

(d) allows time for the development of practical skills; (e) stimulates psychological adjustment and school interaction through a change in classroom environment.

2. **Team teaching on a regularly scheduled basis.** Simultaneous conference time should be scheduled for the special education and home economics teachers. Facilities in both the special education classroom and the home economics department should be available for use, depending upon the nature of the learning experiences to be carried out. This plan permits the teachers cooperatively to (a) plan ways to integrate home and family living learning experiences within the special education curriculum: (b) plan ways to implement the teaching of those learnings which will capitalize on the knowledge and abilities of both teachers: (c) develop appropriate instructional materials.

3. **Mentally handicapped pupils scheduled in home economics classes composed of regular grade pupils of similar chronological age and ability level.** Careful consideration should be given to the type of home economics class and the degree of academic competence for which the course is designed. When the home economics learning experiences emphasize the application of practical skills in home and family living, mentally handicapped pupils may participate satisfactorily in classes with regular grade pupils of similar chronological age and ability level.

Guidelines for Teaching the Educable Mentally Handicapped

- Remember that emotional stability, social maturity, and personal drive are more important to their future occupational and life adjustment than academic achievement.

- Cooperate with the teacher of special education classes to help identify individual pupil needs; plan multiple experiences to reinforce learnings; evaluate learning experiences; develop meaningful illustrative materials and resources; and gain greater insight into effective teaching methods.

- Plan simple situations based on immediate needs; clarify and set immediate and concrete goals that are attainable with satisfaction.

- Encourage pupil participation in simple and realistic planning.

- Demonstrate with simple, clear, step-by-step directions followed by opportunities to practice skills.

- Provide specific plans in sequential steps for carrying out activities, emphasizing one learning at a time.

- Provide for much repetition and practice in a realistic setting.

- Provide time and opportunity for pupils to express themselves.

- Provide a calm, encouraging atmosphere in the classroom.

- Place emphasis on recognition of personal growth and work rather than standardized accomplishments; encourage and command pupils frequently.

- Check with pupils repeatedly to ensure the success of products and increase pupil satisfaction: overcome the temptation to complete or improve the pupil's work.

- Provide familiar real life materials related to learning that the pupils can see, feel, taste, smell, and hear.

- Use large, clear visual aids based on pupil's experiences.

- Be aware of existing basic difficulties causing communication or motor disability.

- Have patience and a sense of humor to help the child gain confidence.

II. PROFILE OF THE SLOW LEARNER

The group of pupils termed slow learners, sometimes referred to as borderline or dull-normal, comprises about 20 percent of the school population. Although writers do not agree on a specific range for the IQ scores for these pupils, most consider them to be above the educable mentally handicapped group and below the average or normal group.

Because IQ testing is not precise and because current evidence reveals that many so-called slow learners do not lack inherent ability but have been deprived of experiences which are building blocks that actually establish an ability to learn, this is an especially tenuous classification.

At a particular point in time and in their education these pupils perform as slow learners. Whether suitable reinforcement of a pupil's background or some other supportive technique can aid him in moving out of this category appears to be the question to raise with regard to each individual.

The term slow learner is an apt description, for he learns at a slower rate than the average pupil and exhibits inability to keep up with the rest of the class in academic growth. The slow learner who is actually characterized by limited mental ability does not catch up with classmates but can continue to learn to some extent. He continues to fall further and further behind as he grows older.

The environmentally handicapped slow learner also continues to fall behind and become more detached from the education process, unless an entering wedge reverses the direction.

Slow learners as a group are slow in tasks of association, comprehension, and judgment and slow in developing generalizations and abstractions. They exhibit limited descriptive and expressive language and may have a short attention span for mental tasks. They experience particular difficulty when enrolled in a school program designed for pupils with normal or average intelligence and typical background experiences.

In other characteristics, the slow learner does not differ to any large degree from his peers. In social, emotional, physical, and motor development he is essentially normal and similar to the average. His physical development resembles the average of a corresponding chronological age, and no significant deviations from normal can be expected. However, in some cases, physical development may be somewhat retarded and motor skills slightly inferior. He performs better on tasks that demand motor coordination and control than on verbal facilities, but he seldom surpasses the attainment of rapid learners in manual skills if both are given equal opportunity to engage in these.

Socially and emotionally these pupils have the same needs and wants as other children. They have a prognosis of social adequacy and ability to earn their own living in adult life, and as adults are usually accepted as members of the community. Behavior problems, such as aggressiveness, frequently associated with this group, are not due to organic causes but rather to continual frustrations and unsatisfactory experiences which pupils meet in school. These may result from curricula not adjusted to their needs and from the fact that some come from neighborhoods where certain types of deviate behavior is condoned and encouraged.

The challenges to educators come in developing curricula that will lead to maximum social and emotional development of these pupils and in discovering which slow learners are not really slow learners at all.

Guidelines for Teaching the Slow Learner

- Plan experiences that are built around real life problems and that can be immediately put to use in everyday living.
- Plan firsthand experiences such as field trips, pupil demonstration, sociodrama, dramatization, meal preparation and serving, observation of children to supplement textbook lessons.
- Use a multisensory approach to a lesson through actual materials, objects, models, films, filmstrips.
- Provide short step-by-step demonstrations, followed immediately by pupil activity or practice.
- Provide opportunities for repetition of an idea and practice in different forms.
- Recognize that theory discussions must be short and lead to a specific activity, with frequent stops to review or clinch the essential points.
- Give short, definite assignments that are of real value as preparation for a specified task or as the result of a previous experience.
- Try to challenge slow learners to as high a standard as is possible, within the limitations of their ability.
- Encourage achievement by frequent deserved praise.
- Encourage a sense of accomplishment through assignment of fixed responsibilities for class procedures and routines.
- Provide a calm, orderly, classroom climate.
- Have infinite patience, a sustaining sense of humor, and faith in the knowledge that slow learners want to learn and *do* learn.

III. PROFILE OF THE GIFTED LEARNER

Wide variations exist in the meaning of the term gifted. In some instances it is used to refer to only those pupils in the top 1 to 3 percent of the school population in terms of intelligence test scores. Other references extend the scope to pupils in the top 5 to 10 percent or to pupils who are superior in some ability. The terms academically talented or academically superior generally are used to include a broader segment of top pupils—perhaps 15 to 20 percent of all pupils.

Again, such classifications can be useful only when seen in relation to individual potential and growth. Some gifted pupils draw their entire strength from qualities measurable on IQ tests. For others, creative talent can boost relatively high intelligence to a functioning level or potential that also must be recognized as gifted.

A wide range of individual differences in physical, mental, social, and emotional development is evident among the gifted. As a group, these pupils are above average in all developmental aspects. Intellectual superiority does not imply inferiority along nonintellectual lines.

Gifted pupils are rapid learners or potentially so. Their mental age is consistently higher than their chronological age throughout the preschool and school years. Their greatest deviation from average pupils is in the mental or intellectual area. As a group, they are quick to comprehend and recall information, are able to see generalizations and relationships, and to express themselves through various media. They have highly developed communication skills, large vocabularies, can use words effectively, and compute numbers rapidly. They achieve particularly well in reading, language, and areas requiring abstract thinking or verbal ability.

Curiosity, imagination, originality, and fluency of ideas are especially strong among creative individuals. They need personal courage and adult protection because by definition one is alone at moments of creative production. Spontaneous ideas which bombard the creative child from within often cause him to be amused at situations which may not appear humorous to others and to express thoughts which may seem inappropriate or "far out" to other students and the teacher.

Restlessness, perhaps from unmet needs, apparent indifference to classwork when disinterested, and outspoken criticism of self and others are some behavior patterns that may impede recognition of the true ability of gifted pupils. They are socially perceptive and have a better understanding of the rules of society than the average child, but may or may not have good social conduct. Often they become so preoccupied with a project or an idea that they are unaware of time and neglect social amenities which in turn make them appear inconsiderate, stubborn, or disobedient.

Gifted pupils enjoy games with other children and may seek older companions, perhaps to find similarity in mental age. They may suffer isolation if they are far superior to their peers. They often display more emotional maturity than some of their parents and teachers and frequently are willing to withhold immediate satisfaction in favor of a more distant goal. Since the social environment in which a child grows has a large influence on the development of any potential talent he may have, lack of opportunity or stimulation may restrict the development of abilities in a potentially superior child.

Guidelines for Teaching the Gifted Learner

- Assist each pupil in establishing goals and in realizing his own high potential.
- Offer many and varied experiences to stimulate intellectual activity and to develop its pursuit as a natural continuous process.
- Provide opportunity for pupils to correlate, analyze, and synthesize ideas and materials and to explore wide and varied data.
- Plan opportunity and time for the pupil to deal with subtle ideas and intangibles in life, permit him to to think, to daydream.
- Encourage pupils to participate in experiences which will promote the development of original expression and creativity.
- Provide realistic opportunities to promote depth of understanding in varied interests and encourage development of many abilities in ways that will strengthen, but not abuse, the talents of the pupils.
- Involve pupils in leadership opportunities in areas of special interest and ability.
- Employ cooperative teaching where feasible.
- Supply and use in teaching a wide variety of resources and encourage their use by pupils.
- Maintain a picture of the total development of each pupil, keeping in mind that to confine progress to the mental capacity of the pupil only is to shortchange the child.
- Establish an atmosphere which permits and encourages expression of ideas which challenge the known or accepted.

IV. PROFILE OF THE DISADVANTAGED LEARNER

Every child has inherent worth and is potentially capable of making a positive, worthwhile contribution to society, identifying with fellow citizens, and becoming a productive, happy person. Each deserves an opportunity to develop in this way. By accident of birth and social circumstances a large number of children, youth, and adults may best be described as disadvantaged or deprived, according to prevailing standards of living and education in our culture.

Various terms which have been used to describe those who, in this profile, are referred to as disadvantaged learners, include culturally, environmentally, educationally, socially handicapped; materially deprived, disaffected, underprivileged, undereducated. These youth may originate from all walks of life and all parts of the country, but are found in substantial numbers in the economically depressed slum neighborhoods in cities and in remote rural areas of our nation. Racial discrimination may tend to complicate the situation.

Disadvantaged youth view themselves with little regard. They are often unaware of, and fail to capitalize in a positive way upon, the opportunities available to them. Frequently forced to fare for themselves, these youngsters are likely to roam the streets in all kinds of weather and at all times of day or night. Finding no inspiration at home, they often pattern their behavior after adult models outside the home. They may be relatively independent, appearing to require little adult approval. Lacking association with constructive, character-building organizations, they become susceptible prey to gangs and subversive groups skilled in ways of capitalizing on deprivation. Home life of disadvantaged youth is often characterized by dilapidated, over-crowded dwellings, many children and relatives, and lack of a father image and parental authority.

The last to be hired and the first to be fired often is their understanding of an established adult employment pattern. As a result, children have not known initiative, social consciousness, or a way of life other than through public welfare support. Overflowing living quarters with few rooms and thin walls prevent any semblance of privacy for individual belongings and activities. Several children sleeping in one bed, persistent chatter, bickering, and other sounds make it virtually impossible to obtain needed rest and sleep. Exposure to and involvement in adult behavior at an early age may lead to distorted moral and spiritual values. Inadequate sanitary facilities breed disease and uncleanliness. A balanced diet is unknown to many. Sitting down together for meals, conversation, and family group activities are practically nonexistent. Verbal communication between members in the household tends to be brief and incomplete and provides little experience in language skills.

Physical punishment is common in many disadvantaged homes. Children learn that violence is their best weapon and often their only defense. Consequently, such impoverished homes tend to produce children who are hungry, ill, emotionally unstable and who lack love, affection, and a normal amount of attention. Their experiences at home and on the streets have not equipped them with basic skills necessary for success in typical school programs.

Conditioned by a high level of noise in crowded houses, disadvantaged youth have poor auditory discrimination, are often unable to distinguish between significant and irrelevant sounds. Clamor and confusion interfere with efforts to read, study, or do any constructive activity at home. With experience limited to the sights and sounds available within a relatively narrow radius of home base, the disadvantaged learner has limited perception of the world about him and experiences great difficulty in associating words or names with places and things, in handling abstractions, and in transferring or generalizing ideas from one situation to another.

Their limited command of vocabulary, syntax, and verb form fails to prepare these pupils for the structured school program and results in apparent lack of concentration, short attention span, slow performance in intellectual tasks, and inability to communicate about the unfamiliar in learning situations. While they may be quite verbal and highly articulate outside the classroom and when among friends of similar origin, they see little relationship between their living problems and school life.

Uneducated and undereducated parents, who in many cases have been school dropouts, demonstrate and cultivate both apathy and hostility toward school and study; they fail to provide stimulating experiences for their children. This poverty of experience is evident also in the lack of books, periodicals, music, even pencils and paper in many homes. Often the parents' attitude toward the school is more that of fear, distrust, and lack of identification. They desire something better for their children but fail to see any linkage with a tolerant school or community.

Inability of the child to cope with the standard school program results in absenteeism, repeated failure, and eventual dropping out of school.

The teacher is a key to salvaging the disadvantaged child. To be effective requires divorcing oneself from, or being consciously aware of, preconceived notions, prejudices, middle class values, attitudes of pity and condescension. When this is possible, progress can be made.

Sincere attempts to reach the disadvantaged require not only modified teaching methods but being alert to the child's need for affection, understanding, and recognition. A feeling of security and belonging in school can only be experienced if someone is willing to make a bridge between the school and the world known by this child.

Guidelines for Teaching the Disadvantaged Learner

- Gain insight and understanding of the disadvantaged child, his needs, attitudes, habits, background, values, prejudices, through visits to his home and community, acquaintance with parents, courses or in-service programs which concentrate on the disadvantaged learners, and through reading pertinent references.
- Analyze all facets of the total home economics program to determine where adjustments may be made to meet the needs of the disadvantaged child:
  - — plan curricula with high expectations but realistic in nature.
  - — capitalize on the positive aspects of the child's culture.
  - — plan experiences which are designed to change the self-image of the child, believe that it can be changed.
  - — contribute to economic survival of deprived youth and adults by emphasizing command of communication arts, relationships, and skills for employment.
  - — provide experiences that demonstrate relationships between cause and effect.
  - — state curriculum concepts in such a way the child may perceive their relationship to his needs.
  - — cooperate with the elementary teacher in integrating learning experiences in grooming, sanitation, conversation, selecting school lunches, eating behavior.
  - — encourage membership in Future Homemakers of America to develop association with an organization devoted to worthy causes.
  - — emphasize career and job opportunities at the early adolescent level.
  - — provide opportunity to develop cultural understanding and enrichment at all levels.
  - — provide programs for disadvantaged out-of-school youth and adults in neighborhood centers and housing developments.
- Experiment with a variety of approaches and techniques to develop the skills and abilities of youth:
  - — develop short-term units in basic skills after school, summer sessions.
  - — assist in developing summer session programs for children of migrant workers.
  - — arrange temporary groupings for special study.
  - — use individualized and small group instruction and team teaching to capitalize on ways to motivate and meet needs of disadvantaged pupils.
  - — draw upon the thoughts, feelings, and experiences of children to form a foundation from which to build more acceptable language patterns and skills.
  - — help develop acceptable social behavior through repeated opportunities for practice.
  - — use home and community experiences to help pupils identify ways to improve own home and community situations.
  - — include ways to use surplus commodities for effective use at home.
- Cooperate to coordinate and reinforce other programs carried out by agencies and individuals: social welfare, educational programs, extension service, school lunch, health, guidance.
- Employ teaching methods that bring about learning through the use of all senses: demonstrations, role playing, field trips, programmed learning, story telling, tape recordings.
- Commence teaching "where the pupil is" and provide experiences within his comprehension, gradually expanding his horizons:
  - — recognize the positive aspects of culture.
  - — measure individual progress in terms of personal potential, rather than set standards.
  - — provide activities and experiences in which child meets with success.
  - — capitalize on slowness and cautiousness in learning.
- Exemplify characteristics especially helpful in teaching children with educational handicaps: understanding, compassion, empathy, sensitivity, imagination, warmth, trust, respect for the individual, resourcefulness, ability to exert leadership without preaching or moralizing.
- Develop a circulating reference library covering all phases of home economics appropriate for various

stages and developmental reading and portraying verbally and pictorially various cultures and socio-economic levels.

- Surround the teaching environment with beauty through color and objects exemplifying art principles, various cultures—purchased inexpensively, hand created, improvised, refurbished:
  - give dignity to the simple and ordinary.
  - provide opportunities for learning about items of beauty and interest.

V. ADAPTING TEACHING TO LEARNERS OF DIFFERING ABILITIES

The concept and generalization approach to teaching which is fostered in this home economics curriculum makes it possible to adjust content to the background and abilities of all pupils without jeopardizing the fundamentals or essential learnings. All essential learnings identified in the courses of study should be taught to all pupils. Since many different samples of detailed content may serve to develop an essential learning equally well, these samples may be chosen according to the ability and maturity of the pupils, their interests, current experiences or local needs.

An imaginative approach to classroom activities and outside experiences is the avenue through which learnings can become meaningful to pupils. No two pupils learn in exactly the same way nor at exactly the same rate of speed and comprehension. Specific development of a topic would oblige the teacher to recognize the abilities of pupils in each class and to guide their learning through appropriate experiences until the generalization can be drawn in a meaningful way by each pupil.

Teachers will have the responsibility for making decisions about degrees of difficulty in generalizations expected from pupils in relation to the maturity and ability levels of pupils. Generalizations range from simple to more complex statements as follows:

- A first level of generalization may be a description, a definition, an analogy, or identification or a classification
- An intermediate level of generalization is one which shows relationship among ideas or concepts, may make comparisons, may include more ideas than on the first level
- The most advanced level of generalization is one which explains, justifies, interprets or predicts

The example on the following pages suggests the breadth of experiences through which it is possible to develop the same learning with pupils who are educable mentally handicapped, slow, average, and gifted learners. While the learnings are the same, the degree to which a particular pupil, or group of pupils, is able to pursue them in depth and the means by which these learnings are achieved vary as widely as the abilities of the pupils concerned. The example shows how certain experiences may be used to motivate and challenge pupils of all abilities; some experiences are similar for two or three ability levels, and other experiences for appropriate pupils of only one level or a single individual.

Grouping pupils of relatively homogeneous mental ability in separate classes provides opportunity for learning to take place most efficiently. More learnings can be fostered through common experiences. Often the same technique may be used with separate classes composed of pupils of any one level, to interest and stimulate them to action. This example suggests the use of a film or filmstrip as an introductory device. The learning situations which follow for each group, however, are quite different, requiring greater teacher direction and supervision for pupils of limited ability and providing opportunity for progressively more independent thinking and action in development of the content as pupil ability increases.

In schools with small enrollment, it may be necessary to combine pupils of two or three ability groupings in the same class. Where the range of abilities is wide in any one class, the teacher needs to recognize which activities can be shared successfully and to be creative in providing different types of experiences for particular pupils or groups of pupils. It may be necessary for several of the illustrated experiences to be carried out simultaneously by different groups or individuals within one class. Alternating activities, assigning independent study, using capable pupils to demonstrate certain techniques, employing total group discussion at appropriate times, and evaluating regularly will demand careful planning and coordination by the teacher.

This example is illustrative only of ways a teacher can plan some learning experiences in terms of the abilities of pupils in the class. It is not to be interpreted as a teaching plan which carries learning through to the point of formation of a generalization by the pupil. Specific help with the process of teaching toward a generalization is found in the section Methods, Materials, and Media. Guidelines for teaching pupils with differing abilities and experience which precede this example will be an especially helpful resource as the creative teacher develops additional ideas.

SUGGESTIONS FOR TEACHING-LEARNING EXPERIENCES

Reference: Home Economics Grade 8, Concept II—A, Generalizations 1 and 2, Essential Learnings—Importance of Good Grooming and Health and Beauty Habits for Good Grooming

EDUCABLE MENTALLY HANDICAPPED LEARNERS	SLOW LEARNERS	AVERAGE LEARNERS	GIFTED LEARNERS

Use film or filmstrip showing characteristics of good health and grooming and effects of good and poor habits and attitudes toward health, body care, and general appearance to introduce concept and motivate pupils.

Use pictures of people from magazines, photographs, paintings which can be handled and examined by pupils. Ask them to tell which persons look nice to them and why. Guide them in bringing out evidences of good grooming.

Arrange adult dolls on a table in various stages of cleanliness and attractiveness. Have pupils choose dolls they would like as a friend, a clerk in a store, someone to take care of a house or young children, a hospital worker. Guide them in telling why; reinforce elements of grooming.

Have pupils locate pictures from magazines, in books, from works of art which illustrate features of good health and grooming. Have them arrange these in a bulletin board display. Assign reading of appropriate level. Have pupils use key ideas illustrated on bulletin board as a springboard for class discussion of characteristics and importance of good grooming.

Have pupils select a famous personality or a teen idol such as a movie star, special event queen, astronaut, singer; read about them in popular press, magazines, and report on the elements of appearance which influence their position and the health and beauty practices they follow.

Develop with pupils a checklist of good grooming and health characteristics. Have pupils carry out self-analysis, using checklist. Assign reading from resources of appropriate level and develop a pupil panel presentation relating grooming and health to personal values and to the varied regular routines which become desirable health and grooming habits.

Have pupils interview an attractive older girl in school or college and write a report about the beauty and health practices she thinks are important

Have pupils analyze and report how grooming details establish or influence particular characters in a short story or play.

Have pupils investigate and report on teen-age fads, health and cosmetic frauds which influence personal appearance. Encourage pupil contact with varied information sources—such as school nurse, doctor, science teacher, television, periodicals, health and science reference material.

<table>
<tr><th>Educable Mentally Handicapped Learners</th><th>Slow Learners</th><th>Average Learners</th><th>Gifted Learners</th></tr>
<tr><td colspan="2">Ask physical education teacher, school nurse, or other resource person to demonstrate procedures and simple routines for developing good personal health habits: in using good posture for standing, walking, sitting, caring for face and hands, brushing and arranging hair, menstrual practices, cleaning and trimming nails, cleaning combs and brushes, caring for undergarments, polishing shoes.</td><td colspan="2">Have pupils discuss the effect of good health and grooming hab e. energy, and enjoyment of ard essential personal and gro to posture, exercise, rest, well nenstrual habits, daily routine of personal care hair, skin, deodorants, nails, cosmetics, clothing.</td></tr>
<tr><td>Use pictorial flash cards to help pupils recognize, use related vocabulary.</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Have pupils practice procedures directly following demonstrations.</td><td colspan="2">Demonstrate (pupil or teacher) or use illustrations on flannel board or overhead projector to show some procedures and routines in need of particular emphasis for group.</td></tr>
<tr><td>Repeat, and continue practice of routines in both home economics and special education classes. Urge practice at home.</td><td>Have pupils continue practice of good health routines at home, by checking a personal health chart periodically reviewed in class.</td><td colspan="2">Encourage practice of good health and grooming routines at home.</td></tr>
<tr><td></td><td colspan="3">Have pupils view television commercials advertising beauty and health products, noting all information given. Discuss amount of real information as opposed to emotional appeal, kinds of information omitted, effect on prospective buyer.</td></tr>
<tr><td></td><td colspan="3">Invite foreign exchange student to tell class about type of makeup used by girls and women in Japan, India, other cultures. Discuss differences. Invite drama teacher to explain extremes necessary in stage makeup as compared to makeup suitable for everyday living.</td></tr>
<tr><td></td><td></td><td colspan="2">Ask chemistry teacher or local pharmacist to demonstrate how lipstick, deodorant, hand creams are made and purposes of particular ingredients, and to compare technical details of permanent waving as opposed to straightening hair.</td></tr>
<tr><td></td><td></td><td>Have pupils consult school nurse or doctor and prepare exhibit showing ways to overcome certain teen-</td><td>Have pupils carry out independent research, consulting various resource persons and references to</td></tr>
</table>

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THE HOME ECONOMICS TEACHER

Each teacher holds the key to a challenging and effective learning situation. Throughout history great efforts have been made to define good teaching and describe the successful teacher. An early conception of the good teacher was that of a scholar; it was assumed that a person who knew could teach others. Knowing is not enough, however. A later approach to exploring the question was in terms of teacher competencies; even this does not get at the base of quality teaching. A continued and personal search for clues to being a good teacher is a professional responsibility.

I. THE TEACHER AS A KEY TO LEARNING

To be successful, teaching must lead to learning. Frequently, teachers who know their subject matter thoroughly and meet many of the competencies to be found on any list suddenly become aware that pupils are not learning or that the degree of learning is falling short of what is expected. The teacher's problem then becomes one of learning more about learning, more about pupils, more about himself. The learning process is not a static condition but one that grows and develops with changing situations. It is important and inspiration for learning is based on the teacher's own feelings of competence and personal worth; these can be reinforced through continuing personal and professional growth.

II. PROFESSIONAL GROWTH

Quality in the home economics program can be enhanced through the teacher's active concern with the following points.

- *Keeping up-to-date with changes in education.* All basic changes in philosophy, organization, theory have specific effect on home economics. Experimentation and innovation are central to education today, and the teacher or program that is content to stand still very quickly is moving backward.
- *Reexamining personal beliefs in relation to basic concepts about home economics education.* Develop local programs in line with beliefs, considering cultural, social, economic backgrounds and future plans and aspirations of pupils. Use teaching procedures which will bring about most effective learning. Display respect and enthusiasm

share of routine school assignments and use them to extend personal understanding of the total school program, increase contacts with pupils and faculty, and provide opportunities for interpreting philosophy and functions of the home economics program. Be interested in the school district and all phases of its educational program.

- *Keeping personal and professional goals in balance.* Understand responsibilities of roles assumed simultaneously—teacher, homemaker, community citizen. Recognize personal assets and limitations in relation to physical and mental health, ability, and talents when carrying out varied responsibilities. Be aware of values from participation in professional and voluntary service organizations in the community which provide personal contacts helpful in comprehending the tenor of community, understanding customs and practices of families, and locating sources of help for teaching.

- *Developing personal qualities important in working with youth and adults.* Sympathetic interest in people, vitality, positive attitudes, honesty, dependability, skills in communication and in classroom management can all be practiced and enhanced through personal effort. Allow time and energy for planning and teaching by delegating to pupils such routine tasks in the operation and maintenance of the department as arrangement of bulletin boards, care and upkeep of facilities, handling business of department.

- *Recognizing the differences in pupils.* Become familiar with backgrounds and abilities of pupils as individuals. Make it a personal challenge to find points of contact and experience which will help disadvantaged pupils break long chains of failure and disappointment. Do not be satisfied with pat answers based on any measure of intellect or ability which does not adjust for cultural or class differences. Accept the fact, and be pleased that superior students may often forge ahead of the teacher when released to do so. Develop a feeling of commitment to each pupil, whether progress is great or limited.

- *Capitalizing on opportunities to improve professionally.* Special courses and advanced study offer opportunities for extending knowledge and improving insights and teaching techniques. Educational organizations provide meetings, workshops, and journals. Participation in organizations and projects enhances leadership ability. Contacts with professional people stimulate thinking and action. Travel at home and abroad fosters insights into behavior and customs of people. Reading materials abound in information and description which contribute immeasurably to the breadth and depth of educational reserve and keep a teacher abreast of the times.

- *Sharing experiences and insights.* Talk with other teachers about successful projects and ideas for teaching. Write magazine and newspaper articles or notes for newsletters which will add strength to the profession by extending promising practices that are discovered or adopted.

- *Enjoying teaching.* Enthusiasm for young people and for the job is essential to good teaching. Work to resolve minor irritations and situations which cause gnawing discontent. Develop a deep pride in being a teacher.

Teaching is complex, but the endeavors and accomplishments of the home economics teacher will inevitably have far-reaching effects on the personal, home, and community life of many individuals. Only one's best efforts are good enough.

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SPACE AND FACILITIES FOR TEACHING HOME ECONOMICS

Space and facilities play a significant part in the teaching and learning of home economics. The curriculum sets up behavioral outcomes which can be met most easily and efficiently if appropriate facilities are provided. Since the school situation cannot provide all facilities required for depth in each area of learning, home and community experiences involving additional facilities are used to supplement school experiences.

I. CONSIDERATIONS IN PLANNING SPACE AND FACILITIES

The cooperative efforts of administrators, architects, knowledgeable community citizens, home economics teachers, and consultants should be involved in planning new departments and renovating older ones. Some factors to consider and their implications for planning and equipping the home economics department follow.

Factors to Consider	Implications for Planning and Equipping the Home Economics Department
GROUPS TO BE SERVED: Home economics is designed for pupils at the elementary and secondary levels and for adults of all ages. Special consideration is given to teaching mentally and physically handicapped pupils, culturally disadvantaged youth, potential dropouts and terminal pupils who desire to prepare for employment in home-related occupations.	● Sufficient space is needed in each teacher station for a maximum class size of 24 pupils ● A home economics center on the first floor of the building is preferable for convenience in delivery of supplies, installation of equipment, accessibility to special groups of pupils. ● Types of equipment selected should vary according to size, age, and ability of groups of pupils.
SCOPE OF INSTRUCTIONAL PROGRAM: Home economics helps pupils to recognize the importance of the family as the basic unit of a democratic society; to become effective consumer of food, clothing, housing, and other goods and services; to understand growth and development of infants and children; to manage individual and family resources effectively; to become constructive, creative citizens; to understand and appreciate the influences of other cultures upon individuals and families.	● The complete department should contain facilities for teaching all phases of home economics; child development; family economics; housing and furnishings; management; nutrition and food; personal, family, and community health; personal and family relationships; textiles and clothing. ● Each teacher station should provide facilities for teaching several phases of home economics. ● Homelike equipment and furnishings are needed, such as complete kitchen units, portable and cabinet sewing machines, laundry equipment. ● Display space should be provided for exhibiting projects developed in classes, in the Future Homemakers of America, and at home.
TYPES OF LEARNING EXPERIENCES: Learning	● A variety of equipment, products, resource ma-

Factors to Consider	Implications for Planning and Equipping the Home Economics Department
	variety of purposes should be provided to encourage independent study and group activities.
	● Space to accomodate both large and small groups and allow for team teaching is made possible through the use of movable partitions.
	● Planned storage within the department and adjacent to it provides for ease and efficiency in use and care of equipment and supplies.

II. ARRANGEMENT OF SPACE

Home economics facilities should represent attainable standards of home living in the community and, at the same time, reflect new developments in equipment and furnishings. They should stimulate interest in making homes livable and satisfying. The department should provide pupils with the opportunity to study and work in a colorful and pleasing environment designed also to lead them to new understandings. Flexibility is the basic concept to keep in mind in planning and equipping a home economics center.

An analysis of the home economics program suggests that four basic areas be provided in the department.

1. *Family living-discussion area.* This area provides a place for teaching such aspects of home economics as the selection, arrangement, and care of furniture and furnishings; growth, behavior, and care of children; home care of the sick; personal and family relationships. It serves as a hospitality center where social experiences can be arranged, and it makes possible a flexible space for using such teaching methods as discussions, talks by resource persons, committee work, demonstrations, viewing of visual aids. A few carefully chosen pieces of living room furniture placed in one corner of the room will meet the needs of this area and provide flexibility.

2. *Kitchen area.* A place for experiences in foods and nutrition which help pupils gain knowledge, understandings, and skills in the selection, preparation, and serving of family meals and foods for special occasions is represented by this area. From one to four kitchen areas will be needed, depending upon enrollment, area may provide flexible space for teaching concepts in home care of the sick, child development, and relationships.

4. *Resource area.* This is a place for locating teaching materials and media and equipment such as washer, dryer, freezer, shared by several teachers in a center. It may serve as a teacher's office, conference room, workroom for independent study and committee work. In a school with two or more teachers, the resource center should be located in a separate room adjacent to the other areas.

The best location and arrangement for these areas within a home economics center will vary in local situations. The amount of space allocated for teaching the program, numbers and types of pupils per class, methods of teaching, physical features of the space, and the need for sharing space and facilities among teachers will all affect decisions in this realm.

Two ways in which the areas mentioned may be grouped are:

All-purpose room—all four areas in one room.
Multipurpose room—combination of two or three

use of each teacher station. Major characteristics which should be reflected in the arrangement of facilities in any department are:

- Maximum utilization of space through planning multipurpose uses of areas, placing large equipment against walls with a minimum of fixed installations projecting into the room.
- Provision for flexibility by having lightweight tables and chairs which can be stored easily when not in use, using movable dividers to separate space for individual and small group work, having some trapezoidal shaped tables which can be used in various arrangements, using sectional furniture, using portable equipment, such as ironing boards and sewing machines.
- Efficiency of working conditions for pupils and teachers by locating all home economics facilities adjacent to each other, having storage cabinets designed for specific purposes and flexibility and located where easily accessible, providing equipment and furnishings easy to use and care for, providing sufficient and suitable kitchen utensils, and having home economics books and audio-visuals either in the all-purpose room or resource center available to more than one teacher.

Home economics facilities contribute to effective teaching and learning when they are (1) planned in relation to the purposes of home economics education and to the concerns of individuals and families in local school district, (2) arranged for optimum use of available space and for convenience, and (3) used as tools in daily teaching.

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METHODS, MATERIALS, AND MEDIA

It is the learner who must perceive and make meaning out of what is being taught. One important responsibility of the teacher is to utilize methods, materials, and media which will provide stimulation for this learning and permit the greatest possible

I. PRINCIPLES OF LEARNING

An understanding of the nature of learning is vital in order to provide a teaching-learning environment and meaningful experiences which promote the optimum development of all pupils. Although few precise laws and facts exist certain ideas and principles have come to be widely accepted and supported through experience and repeated observation. Some of these ideas and their implications for the home economics teacher will be helpful in planning learning experiences.

PRINCIPLES OF LEARNING	IMPLICATIONS FOR THE HOME ECONOMICS TEACHER
The intellectual capacities, interests, emotional states, and purposes of pupils influence the type and degree of learning which take place.	Know and understand the personal history of each pupil and the home and community environment in which he lives. Use this data in planning content, learning experiences, and methods.
The quality of learning tends to be higher when learning is motivated by success rather than failure and by compatibility of class and personal goals.	Be generous with praise and encouragement. Find ways for each pupil to experience success at some level. Plan class goals which recognize and build upon pupils' interests and aspirations.
Retention of learning appears to be greater when the facts and skills learned are clearly understood and related to a whole.	Present content in relation to broad concepts or areas of study, rather than in terms of isolated subject matter.
Learning is facilitated through pupils' active participation in the learning situation.	Use methods of instruction which actively involve pupils.
The ability to apply current knowledge and skills to different situations, now and in the future, requires the ability to see relationships and make generalizations.	Emphasize the level of learning which requires pupils to try to see relationships and apply learnings to many situations, rather than merely learning factual material.
Information about the extent and rate of learning by each pupil is essential in determining effectiveness of learning experiences.	Establish a program of evaluation to determine pupil growth and development and utilize results in identifying successful methods, materials, and media.

Learning opportunities in home economics are provided through a variety of experiences and in many places. Experiences in Future Homemakers of America, in homes, and in the community supplement and enrich classroom learnings.

II. TEACHING METHODS

A variety of teaching methods may be used to stimulate and maintain pupil interest

TEACHING METHODS	GUIDES FOR USING	PURPOSES FOR USE
CASE PROBLEM: Problems closely related to pupil's experiences and understanding and stated in terms of specific situations, already written or prepared by teachers and/or pupils	● Review case problem, identify points to be considered. ● Encourage pupils to explore problems, weigh and evaluate each fact, suggest solutions.	● Identifying various phases of personal and social relationships ● Considering intimate situations, personal fears, and problems in an impersonal manner
DISCUSSION:		
Brainstorming Quick, creative imaginative responses to a specific topic by large or small group	● Present problem to be solved. ● Record quick, creative ideas from group. ● Screen and evaluate suggestions. ● Summarize possible solutions.	● Exposing quickly a variety of ideas upon which to base plans and decisions
Buzzing A number of small groups considering specific subjects, with members of each group serving as leader and recorder. Variation: Discussions 66	● Present topic and expected outcomes. ● Allow a specific amount of time for buzzing. ● Have a member of each group report highlights of discussion.	● Drawing implications following a film or presentation ● Identifying questions or ideas to be answered by a resource person or during a unit of study
Circular Response Each pupil sitting in a circle contributing to topic being discussed as his turn comes in the circle	● Present topic for discussion. ● Give each pupil a chance to contribute within a given amount of time. ● Record contributions and summarize after topic has been adequately covered.	● Getting many points of view quickly ● Summarizing understanding of topic by each pupil
Debate Two persons or two panels, each presenting a different side of a controversial subject Variation: Forum	● Allow each person or team to present information regarding pros and cons of the subject and provide opportunity for answering arguments given by opponents. ● Have class or committee judge most convincing presentation.	● Deliberating impersonally on a controversial issue ● Introducing authoritative information to the group

TEACHING METHODS	GUIDES FOR USING	PURPOSES FOR USE
	• Allow questions and comments from group following panel discussion.	
Questions and Answers Raising key questions in relation to a specific subject and obtaining answers	• Formulate clear, concise key questions. • Introduce questions and allow time for each to be thoroughly considered. • Summarize periodically.	• Clarifying topics • Stimulating critical thinking • Evaluating learning • Obtaining information from a resource person
Symposium Brief talks by a few persons, each presenting a different phase of the same general topic before the group	• Have leader give overall view of general topic and point out each participant's contribution. • Limit each participant in time and scope of content. • Have leader summarize and open discussion to entire group.	• Presenting various phases of a topic to create a picture of the whole • Giving accepted information in some depth in a short time
Total Class Discussion Mutual sharing of ideas in relation to a common topic, frequently led by teacher	• Plan with pupils for obtaining sufficient information or experiences to deal with topic to be discussed. • Create comfortable climate in which each person feels free to speak. • Orient group to topic and desired outcomes. • Guide discussion, keep comments relevant to topic being discussed. • Summarize periodically.	• Formulating generalizations • Establishing criteria • Exploring an idea • Organizing plans • Planning and evaluating group progress cooperatively • Stimulating thinking
COMMITTEE WORK: Two or more pupils working together on a section of or an entire problem	• Identify problem or project and understand action to be taken by individuals and by the entire	• Completing an extensive project with minimum time and effort • Pursuing phases of a project

Teaching Methods	Guides for Using	Purposes for Use
DEMONSTRATION: Presentation of a process given by teacher, pupils, resource person, or combination of these	● Determine points to be taught. ● Plan procedures for presentation, time allocation. ● Assemble equipment, supplies, teaching aids. ● Have pupils summarize approved procedures which were demonstrated.	● Introducing a new concept or skill ● Setting standards for pupil's work ● Evaluating pupil's understanding and progress
DRAMATIZATION: *Sociodrama or Role Playing.* Acting out spontaneously various roles within a real life situation	● Plan the situation and define roles to be played. ● Select participants and orient remaining pupils to observations to be made. ● Follow the action with discussion.	● Viewing personal and family problems objectively ● Examining ways individuals interact toward each other ● Seeing the possibility of varied solutions to a problem ● Discovering personal feelings and emotional responses in situations
Skit. A prepared script, designed as a play or a mock radio or television broadcast, presented directly by pupils or through use of puppets or marionettes	● Have pupils write or select a script appropriate for current class work. ● Rehearse skit. ● Prepare group for observations to be made. ● Follow the skit with total group discussion.	● Emphasizing or clarifying a class topic ● Providing content which will motivate further investigation of a topic ● Portraying factors influencing real life situations
Pantomime. Portrayal of situations and character roles through actions without words	● Plan the situation. ● Prepare group for observations to be made. ● Summarize learnings from the dramatization.	● Demonstrating techniques for performing certain tasks ● Showing feelings and actions in relation to different situations
FIELD TRIP: A planned visit outside the regular classroom arranged by teacher, and/or pupils, and/or parents	● Arrange place of trip and things to be seen in relation to purpose, time.	● Providing firsthand information and knowledge of service, product, or facility

TEACHING METHODS	GUIDES FOR USING	PURPOSES FOR USE
	● Have pupils summarize learnings.	
INDIVIDUAL STUDY: A pupil working by himself under teacher supervision on teacher-made assignments, pupil initiated projects	● Identify subject or project to be initiated and plan for accomplishing it. ● Permit pupil to work independently using a variety of resources: give guidance as needed. ● Evaluate progress frequently.	● Exploring special interests or features of a given project ● Increasing skills in some areas of home economics ● Providing greater scope and depth to an area of interest
INTERVIEW: Asking questions of individuals or groups in relation to information for current classwork or special project	● Review with interviewee purpose of visit and type of information desired. ● Guide interviewee in giving only most pertinent information. ● Summarize highlights of interview.	● Gaining firsthand facts and background material on special topics ● Acquiring opinions of specialists in a field
LABORATORY WORK: Individual or group activity involving the application of generalizations and principles in a realistic situation. Emphasis on skills as well as cognitive learning	● Explain nature of the project and, with pupils, determine goals of the activity. ● Guide pupils in correct uses of supplies and equipment, and raise questions to help pupils think through ways to improve their use of resources. ● Evaluate accomplishments and determine improvements to be made another time.	● Having actual experience in a realistic situation ● Developing managerial ability and ability to work with others ● Applying generalizations and principles ● Reinforcing learning through doing and seeing
LECTURE, TALK, OR SPEECH: An oral or taped presentation by teacher, pupil, or resource person	● Present the topic and points to note to class. ● Use supporting devices and techniques to hold interest and emphasize points. ● Summarize and solicit reactions	● Presenting new information and ideas ● Increasing understanding of a subject by using knowledge and experience of specialists

TEACHING METHODS	GUIDES FOR USING	PURPOSES FOR USE
	● Have pupils record activities, analyze results, and draw conclusions.	● Comparing results from use of various methods and equipment
PROGRAMMED INSTRUCTION: Material arranged in small-step sequence to be pursued by pupil at own rate of speed. Contains built-in evaluation and positive reinforcement. May be programmed textbook, machine program, visual or sound medium	● Select or prepare appropriate material. ● Determine whether use will be in or out of class. ● Combine with other methods. ● Catalog and store as other library or reference material.	● Presenting factual information, definitions, basic ideas essential for all pupils ● Releasing teaching time for analysis, development, and integration of learnings ● Permitting slower pupils to progress at own rate ● Affording additional stimulation for brighter pupils
TEAM TEACHING: Two or more staff members cooperatively plan, carry out, and evaluate a segment of instructional program. May be teachers from one subject area or several	● Plan together in detail for all aspects of the instruction. ● Define specific responsibilities according to competencies of each team member. ● Explore ways to involve pupil most effectively. ● Evaluate cooperatively.	● Broadening approach to particular subjects or parts of program ● Enhancing pupil learning ● Sharing strengths and talents of teaching staff ● Utilizing teacher and pupil time most effectively
TELEVISION: Media method which permits teaching or special experiences to be relayed on closed circuit. May be taped or live to suit purpose	● Plan lesson and procedure thoroughly. ● Be aware of special techniques, strengths, and limitations of television for presenting subject. ● Select and wear appropriate clothing, colors, makeup. ● Use appropriate visuals. ● Evaluate lesson and procedure.	● Reaching large numbers of persons ● Demonstrating processes in closeup way ● Sharing special interest presentations with pupils in classes other than home economics ● Permitting pupils to see themselves, develop communications skills

General Considerations in the Selection and Use of Methods

- Decide types of learning desired, i.e., the development of manipulative skills, the acquisition of information and knowledge, development of ability to be self-directive. Use appropriate methods to bring about desired learnings.
- Use methods and techniques with which one feels secure and capable. Gain additional skill in use of others.

- Analyze space and facilities in relation to use of various methods. Adjust and add to facilities within the department, and supplement the classroom situation with school and community facilities.
- Identify capabilities of individual pupils. Plan teaching methods and aids which are within the performance and understanding level of each.
- Combine two or more methods within one learning experience. A field trip can involve total class discussion for orientation prior to trip and summary at conclusion of trip, a talk by a specialist followed by question and answer period during trip.
- Allow for careful preparation by teacher and pupils. Using a case problem requires teacher to study several cases and select or write one appropriate for the situation. Pupils need to gather background information for considering solution to problem.
- Emphasize opportunities for pupils to acquire social and communication skills. In preparing for and conducting an interview, pupils learn to state questions clearly and to carry on an effective conversation, as well as practice graciousness and good grooming.
- Encourage pupils to use human and material resources in obtaining background information and in solving problems as preparation for helping them to be self-reliant in the future. In preparation for participation on a symposium, a pupil uses library facilities, consults specialists.
- Identify areas related to other disciplines. Plan for coordinated experiences which give emphasis to learnings.

III. MATERIALS AND MEDIA

The traditional materials and media, a textbook and chalkboard, can be supplemented today by a vast array of teaching aids from complex electronic devices to simple charts and models. Because perception is stimulated through all of the senses, the teacher who utilizes a variety of materials and media is more likely to establish the conditions for maximum learning.

Although audio-visual media are the most commonly considered, the home economics situation is also particularly suited to the development and exploitation of the senses of touch, taste, and smell. The actual feel of satin, of bread dough, of a child's delicate skin, the smell of rancidity, of fresh paint, or hyacinths all produce images and impressions that communicate more vividly than words or visual symbols.

The media and materials for such learnings are embodied in the environment and in the everyday teaching situation. Their value in the learning process requires guidance and suggestion by the teacher. Is the end of baking signalled by the smell? Is the beauty of crystal perceived through touch? How can danger be smelled, felt, or tasted?

Uses of Materials and Media

Materials and media perform a number of functions. Books, magazines, and pamphlets support and augment the teacher's knowledge and information and provide basic text and reference material for pupils.

Displays, audio-visual aids, and other types of media and materials through which perception is enhanced serve specific functions. They can:

- Concentrate interest and attention. Bright spots of color, delicate displays, bursts of sound, or drama serve to focus and hold attention.
- Illustrate the basic structure of an idea. A quick glance at a poster or diagram, the first bars of a song, the texture of a fabric—each signals a broader concept.
- Explain abstract ideas by relating them to the concrete and known. Hearing rhythm, feeling coarseness, seeing a film on human interaction provide useful learning links for grasping abstractions.
- Bring separate ideas together into larger whole concepts. The picture of a healthy individual.

seeing a well-furnished room, listening to a child at play, all incorporate many scattered single ideas.

- Encourage expression. Preparing visuals, acting out dramas, producing sounds or other stimuli provide learning through the processes of organizing ideas, envisioning results, and carrying out plans.

Selection of Materials and Media

Guides for selection of audio-visual materials and of textbooks and other printed matter should be studied in related literature for each level of pupil ability and for each area of learning.

Useful materials generally meet the following criteria.

- Contain authentic up-to-date content and give true impressions
- Provoke thinking
- Are applicable to teaching in progress; appropriate to interests, needs, and abilities of pupils
- Are easy to use, efficient in promoting learning
- Are suitable from standpoint of cost, storage, purpose, or desired outcome

IV. EVALUATION IN THE INSTRUCTIONAL PROGRAM

Education aims at changed behavior. Evaluation is a means of determining the extent to which behavior has been modified in an instructional program. It embraces all evidences of progress toward individual, group, program, school, and societal objectives. Teachers, pupils, and parents participate independently and cooperatively in the evaluation process. Continuing evaluation is essential to teaching and learning.

Uses of Evaluation

The use of good evaluative techniques helps pupils obtain concrete evidence of their progress in relation to their own abilities, other class members, expected achievement, and, in some cases, nationwide norms. It helps pupils recognize and retain learnings and become interested in further study. It increases their skill in assessing situations and reaching sound decisions in relation to everyday living.

Through evaluative techniques, the teacher is able to judge the quality of instruction, see where changes are needed to stimulate improved learning, and estimate pupil potential and progress. Evaluation can be used productively throughout the teaching-learning process.

Before instruction. Use tests and measures to determine

- — gaps or strengths in knowledge
- — misconceptions, fallacies in thinking
- — level of aesthetic appreciation
- — missing skills for performing specific tasks

During instruction. Stimulate learning and assess progress toward objectives with devices which indicate

- — degree to which learning is taking place
- — need for additional class or home learning experiences for entire group or individual pupils
- — changes in attitudes, values, interests, beliefs
- — effectiveness of teaching techniques

Following instruction. Determine amount and quality of learning with instruments which show

- — amount of factual knowledge retained
- — comprehension of material presented
- — ability to apply knowledge to a variety of situations
- — ability to analyze material and see relationships

Types of Evaluation Techniques

No single measurement can be used to form the basis of sound pupil and teacher judgment, and each analysis should be open to revision and change. Evaluation techniques should be selected for a specific purpose and interpreted in light of that purpose. Although devices may not always measure consistently and uniformly what they are designed to measure, information revealed is often more accurate than subjective teacher judgment. Frequently instruments can be revised to provide more reliable and accurate information.

For purposes of grading or marking. Various evaluation devices are useful in collecting quantifiable evidence for grades.

TESTS OF UNDERSTANDING: short answer, essay, alternative, multiple choice, matching, ranking

TESTS OF MANIPULATIVE ABILITIES AND SKILLS: observation guides, rating scales, score cards, progress charts

REPORTS: field trips, interviews, individual study projects, written or oral learning analyses

For evidence of student growth but not for grades. Certain devices are especially helpful to teachers and pupils, but should not form basis for grades.

STUDENT-RENDERED MATERIALS: diaries, logs, questionnaires, scrapbooks, checklists, personal rating scales, sociometric measures

TEACHER-RENDERED MATERIALS: progress charts, anecdotal records

PARENT-SUPPLIED INFORMATION: reports of home participation, evidence of growth

Guides for Using Evaluation Techniques

Maximum value from any evaluation method can be obtained through careful planning. The following points should be given consideration:

- Select or develop device to satisfy specific objectives or purpose.
- Assemble supplies, materials, and equipment needed to implement the evaluation.
- Orient pupils to purposes of the evaluation, to the particular technique being used, to method of marking and scoring.
- Analyze and return results as quickly as possible, recognizing that informing pupils promptly of their correct responses and of errors aids learning.
- Draw implications for further action by the teacher and by the learner.
- Analyze data furnished by the evaluation technique, to determine the quality of instruments or methods in terms of reliability and results.
- Revise instruments and techniques as needed.

Reporting Pupil Progress

Local school policy will determine form, nature, time interval, and method of reporting pupil progress. Guides to help teachers in rating pupils are:

- Make a clear distinction between assessment of pupil's progress in skills and understandings and assessment of personality characteristics or social development.
- Base marks or grades on frequent evaluation and on objective evidence of several types.
- Involve pupils in the evaluation plan for greater acceptance and understanding of marks and ratings.
- Use evaluation to encourage each pupil to reach his maximum level of achievement.

V. THE PROCESS OF TEACHING TOWARD A GENERALIZATION

Organizing a learning situation usually consists of planning three phases:

1. *Orientation and motivation.* Relating the topic to previous learnings, orienting pupils to experiences to come, familiarizing the teacher with level of learning and interest of pupils in the topic are all part of this phase. Stimulating interest and curiosity is fundamental.
2. *Development of essential learnings.* During this phase, a variety of learning experiences develop each aspect of the subject to be explored. A command of content, skills, and ideas should emerge through the experienced guidance of the teacher.
3. *Summarization, application, and arriving at generalizations.* Generalizations emerge spontaneously through each phase, but specific clarification and reinforcement are important before leaving a topic. Integrating learnings into useful whole ideas implies summary and practice in application. Motivation for further exploration of the topic is also desirable.

At each level of development, the teaching plan should consciously allow for stimulating further interest in the topic, for encouraging creative thinking and expression, and for opening content to exciting critical analysis. It should afford the teacher a secure structure within which to work and, consequently, free her for a flexible, imaginative approach to each day's teaching.

An illustration of teaching toward a generalization using the above three phases of planning is based on the following excerpt from the course, Home Economics Grade 8. The learning experiences are illustrative only; additional ones might be needed to provide sufficient background for pupils to arrive at a generalization. This example is a teaching plan which may extend over several days. Provision should be made for pupils to arrive at supporting generalizations at the most appropriate time.

(Excerpt from Home Economics Grade 8)
CONCEPT: CLOTHING AND THE TEEN-AGER
Subconcept: Clothing Construction

"*Generalization 3:* Good work habits, skill in following directions and in using a sequence in construction contribute to efficiency and satisfaction in sewing.

Essential Learnings: Efficiency and satisfaction in sewing

. . . Kinds of work habits promoting efficiency and satisfaction

Organized work area, organized equipment and tools, good posture, clean hands and work surfaces, organized work plan, storage for supplies, storage for project under construction

. . . Kinds of information needed for following directions

Interpretation of terminology related to fabric, such as selvage, grain line, bias
Interpretation of pattern envelope, guide sheet, pieces

. . . Steps in constructing a garment

Fitting and adjusting the pattern, laying pattern on cloth, cutting out garment, transferring pattern markings, putting pieces together in sequence, fitting"

Arriving at a generalization means reaching the conclusion that two or more significant ideas are related. Teaching toward a generalization, therefore, basically involves helping pupils to:

- Understand, know, or experience aspects of each significant idea in essential learnings.
- See, discover, and assimilate the relationship between these significant ideas.

The following example illustrates the process of teaching toward a generalization.

Analyzing the Generalization

Generalization: GOOD WORK HABITS, skill in FOLLOWING DIRECTIONS and in USING A SEQUENCE IN CONSTRUCTION contribute to EFFICIENCY and SATISFACTION in sewing.

To arrive at this generalization involves learnings which establish the meaning of each of the five significant ideas: What is meant by (1) good work habits, (2) skill in following directions, (3) sequence in construction, (4) efficiency in sewing, (5) satisfaction in sewing? These ideas will be understood and assimilated at the learner's own comprehension and ability level. Learning experiences must clearly reveal relationships which exist between the first three ideas above and the last two ideas, in order to conclude with the meaningful and transferable generalization—

GOOD WORK HABITS + FOLLOWING DIRECTIONS + USING A SEQUENCE IN CONSTRUCTION $\xrightarrow{\text{contribute to}}$ EFFICIENCY AND SATISFACTION IN SEWING

Organizing Learning Experiences

- Relation to previous learnings: Selection of sewing project, fabric, and equipment

  Have pupils show pattern, fabric, and equipment for construction project and explain criteria for selection of each

- Orientation to present essential learnings: efficiency and satisfaction in sewing

  Invite a pupil from a senior high school course to model a garment she has constructed and to point out work habits and sewing techniques used which resulted in the attractive, well-constructed garment.

- Development of essential learnings: kinds of work habits promoting efficiency and satisfaction; kinds of information needed for following directions; steps in constructing a garment

  Use a film, such as "Safe Living with Every Day Tools" from Coronet or filmstrip "A Filmstrip for Beginners" available through local Singer Sewing Centers, to show desirable work habits in sewing. As pupils summarize kinds of habits illustrated in film or filmstrip, list them on chalkboard. Have a class committee develop a rating scale from the list for use by individual pupils in checking own work habits.

  Distribute duplicated list of terms related to fabric and construction processes. Clarify terms by using samples of fabrics and construction processes.

  Use an opaque projector to show and explain how to read the pattern envelope and guide sheet. Have each pupil study own pattern envelope and guide sheet and mark portions applicable to individual project.

  Use enlarged illustrations (made of bristol board) of pattern pieces to interpret markings and to show how to join pieces of the garment.

Have pupils locate markings on own patterns. List on chalkboard the sequential steps in making the garment. Transfer this list to a bulletin board in the form of a progress chart to be used by pupils for indicating individual progress. Demonstrate sewing processes to class and to small groups as a follow-up. Post demonstration samples with directions on bulletin board or place in manila folders for use by individual pupils.

Arriving at Supporting and Major Generalizations

Analyze rating scales which pupils have used in relation to their work habits to identify good ones and those in need of improvement. Have pupils answer such questions as the following in relation to work habits:

Questions	*Possible Answers*
(In relation to posture)	
How did you feel the period you stood up and leaned over the table to sew on your hem?	My back ached.
What should you remember in relation to posture when sewing which will help you in the future?	Good posture while sewing is important to comfort and health of the individual. (Supporting generalization)
(In relation to storage of supplies and equipment)	
In what ways were well-organized equipment and supplies helpful?	I didn't need to spend time hunting for them.
What general suggestion for storing equipment would be helpful to anyone who sews?	Storing sewing supplies and equipment in a definite place saves time. (Supporting generalization)
(In relation to storage of garment under construction)	
What effect did proper storage of garment throughout construction have on your use of time?	I didn't need to spend so much time pressing.
What statement could you make about storing garments during construction which will be helpful as you make other garments?	The proper storage of a garment during construction lessens the time required for pressing. (Supporting generalization)

With pupils, develop a list of criteria for evaluating completed garment; have list duplicated for use by individual pupils, the group, and the teacher. Have each pupil model her garment as the group evaluates it. Raise such questions regarding following directions in construction as:

(In relation to following directions)	
Why does the point of the dart pucker?	I didn't follow directions in stitching it.
What rule about stitching darts will help you make a better looking one in the future?	Stitching a dart from the wide end to the point will avoid puckering. (Supporting generalization)
(In relation to interpreting guide sheet)	
Why is there a seam in the back of your garment when none was indicated on your pattern?	I didn't lay the pattern on the fold, as the guide sheet suggested.
What guideline will help you to avoid this mistake another time?	Following directions on the pattern layout diagram contributes to a satisfactory garment. (Supporting generalization)

Raise a question for group discussion which will help pupils arrive at the major generalization in relation to essential learnings which have been studied:

Questions	*Possible Answers*
From your experiences with this construction project, what factors do you think contribute to efficiency in sewing and to the satisfactions you gain from making a garment?	Using good work habits. Following directions in pattern layout and construction techniques. Putting the garment together in logical steps.
Will you make a statement to show the relationship of these factors to efficiency and satisfaction in sewing?	Good work habits, skill in following directions and in using a sequence in construction contribute to efficiency and satisfaction. (Major generalization)

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HOME AND COMMUNITY EXPERIENCES

Behavioral outcomes in home economics must necessarily be brought about through a variety of experiences in the home and community, as well as in the school. In developing plans to teach toward each generalization, experiences are identified through which the desired learnings may be achieved. Some experiences are provided in the school, others are available in the home and community. Teacher and pupils should explore together situations which offer the most effective learning opportunities.

Pupils, family members, and others involved will recognize values in home and community experiences when they see reasons for them. It should be understood that the opportunities to carry out particular experiences are not available to every pupil, and, therefore, alternate types must be discovered.

Home and community experiences will vary with the course content and grade level. They will be encouraged where needed to extend opportunities for development of skills and abilities and for application of knowledge. Through these activities, carried on at home or in the community, pupils can discover how well they are able to apply classroom learnings to real-life situations.

I. GUIDES FOR DEVELOPING HOME AND COMMUNITY EXPERIENCES

Certain considerations are useful to keep in mind when developing home and community experiences. Among these are:

- Help pupils recognize the opportunities for broadening learning through home and community experiences. Stimulate each pupil to suggest extended activities that would be of greatest usefulness to the individual.

- Seek assistance and cooperation of parents. Help them understand the aims, procedures, value, and potentiality of the home economics program and how home and community experiences function as a part of it. This can be done through home visits, informal meetings, and visits of parents to school to participate in planning or evaluating experiences or to see results of the pupil's activity.
- Be familiar with home situations of pupils in order to help guide the selection of home and community experiences. Home visits are the most direct and accurate way to obtain this information, but some insight can be gained by encouraging parents to visit the school or participate in class activities, such as serving on a panel or demonstrating some talent. Other sources of information are school records, talks with school personnel, and day-to-day observation of the pupil.
- Avoid referring to a definite type and number of experiences and a fixed amount of time to be spent on them. These are variables and depend on working habits, interests and abilities of the pupil, the amount of family cooperation, and the nature and complexity of the experience. The quality of each experience and its value to the pupil is more important than the number and length of experiences.
- Utilize school and community situations for pupils who do not have home facilities available. Use the home economics department for selecting and caring for equipment and furnishings, Future Homemakers of America organization for preparing a budget, kindergarten room or school bus ride for observing the growth and behavior of children, art department for designing and making stage settings and costumes, office intercom for delivering a short consumer information series, part-time job for using good grooming practices, store window for exhibit showing good nutrition practices.

The following is an example of how outside experiences can be planned to supplement classroom learnings in a particular area of study.

Reference: Grade 8, Concept I-B, Generalization 1: Essential Learning—Growth and Behavior Patterns of Children

CLASSROOM LEARNING	HOME AND COMMUNITY EXPERIENCES
• List on chalkboard types of growth important to children of this age. Discuss characteristics of each type, basing information on background reading. • Show film or filmstrip of children participating in some activity. Analyze the behavior by identifying some of the characteristics of behavior and factors that influence them.	• Observe 2- to 6-year-old children at home or in neighborhood for differences in size, interests, behavior of children of the same age. • Choose a particular child in the 2- to 6-year range and observe behavior over a period of time. • Interview parents of children 2 to 6 years old about differences they recognize in growth and behavior of their children. • Participate in activities which involve children, work at a playground, teach or assist with children's classes in a church or community center.

II. ILLUSTRATIONS OF HOME AND COMMUNITY EXPERIENCES

Suggested experiences relating to the concepts in grades 7 and 8 are given here as illustrative of the variety of possibilities which will become evident as each course is developed.

Home Economics Grade 7

- Talk with parents and study family photographs to discover features inherited.
- Plan use of money received from family, from gifts, or earned.

- Determine with parents or guardian specific responsibilities to be assumed in the home and the best time to carry them out.
- Take an active part in some community activity.
- Prepare all or parts of some meals for the family.
- Do a part of the grocery shopping for the family over a period of time.
- Identify and practice good shopping manners.
- Prepare attractive settings for family meals.
- Assume cleanup activities after meals at home.
- Work on the improvement of one or two poor dietary habits.
- Practice table manners when eating at home, in restaurants, in the school lunchroom.

Home Economics Grade 8

- Observe ways children of different ages contribute to the family group.
- Help in the kindergarten before or after school or during free time.
- Correct some safety hazards to children in the home or neighborhood.
- Spend some time each day playing with small children.
- Work on the improvement of several personal grooming habits.
- Take responsibility for mending, pressing, and washing some of own clothing.
- Shop for own underclothes, blouses, and socks, using good buymanship practices.
- Equip a sewing box for own use at home.
- Make an article using similar construction processes to those used in school.

Examples of the type of experiences which may extend and reinforce classroom learnings for particular pupils in Home Economics 1, 2, and 3 are described in the following illustrations. Each extended experience is shown in relation to the area of study and the classroom learning with which it is associated.

Home Economics 1—Personal and Child Development

Classroom learning. Concept II-A. Generalization 4. Essential Learning—Establishing an Attractive Home Environment

Extended experience. MAKING MY HOME MORE ATTRACTIVE: Confer with parents to determine a room or an area in the home which may be made more attractive. Study magazine pictures, read books, visit stores and art gallery exhibits for ideas. Adapt ideas to a plan for improving an area of the home. Decide with parents what can be done and how to accomplish it. Solicit help of family members. Organize and help guide the activities.

Classroom learning. Concept II-A. Generalization 6. Essential Learning—Community as an Extension of the Home

Extended experience. USING COMMUNITY RECREATIONAL FACILITIES FOR CHILDREN: Study own home in relation to available play and learning facilities for younger brothers and sisters. Analyze results to find needs not being adequately met, such as lack of outside play space for small children or insufficient reading material. Investigate available community resources for meeting these needs. Make note of time service is available, regulations, required permission, any costs involved. Plan with parents for possible use by younger brothers and sisters and neighborhood children of some of the community facilities, for example, a supervised public play area or the public library for books, magazines, and newspapers.

Classroom learning. Concept I-B, Generalization 4, Essential Learning—Peer Relationships

Extended experience. IMPROVING RELATIONSHIPS WITH OTHERS: Select one or two aspects of own personality which tend to make for poor relationships with others. Observe some acquaintances and study descriptions of people in fiction and biography who possess qualities which help them get along well with others. Note clues for own action, and make a plan for improving self. Analyze critically from time to time improvements in relationships with others.

Home Economics 2—Personal and Family Management

Classroom learning. Concept II-B, Generalization 2, Essential Learning—Location and Organization of Home Storage Space

Extended experience. STORING PERSONAL BELONGINGS IN THE HOME: Select problems regarding storage of personal articles in the home. Gather ideas on effective storage by reading books and pamphlets, studying pictures, visiting homes and exhibits featuring various methods of storage. Experiment with different ideas for storage, location, and storage aids to discover those suitable to help meet individual problems. Evaluate reorganized storage plan over a period of time, and make adjustments as needed.

Classroom learning. Concept II-D, Generalization 3, Essential Learning—Management in Planning, Preparing, and Serving Meals

Extended experience. EFFICIENT USE OF THE RANGE: Identify a part of the home kitchen range which is not being used effectively, such as timer, broiler, oven. Obtain information on the operation and care of the particular range by reading instruction booklet, talking with home service representative, and observing neighbor who has a similar type range. Compile a list of ways the part of the range might be used. Try out as many uses as possible to justify this part of the range and to gain confidence in its use.

Classroom learning. Concept II-C, Generalization 2, Essential Learning—Resources for Effective Maintenance of the Home

Extended experience. USING COMMUNITY COIN-OPERATED LAUNDRY FACILITIES: Investigate various coin-operated laundries available in the community for doing family laundry. Compare cost and time required for washing and drying, spot and stain removal conveniences, hours attendant is on duty, and other services available. Consider the facility location in relation to distance from home and opportunity to dovetail other activities. Decide which establishment would be best for family use.

Home Economics 3—Personal and Family Relationships

Classroom learning. Concept II-A, Generalization 2, Essential Learning—Family Patterns in Other Cultures

Extended experience. UNDERSTANDING MY FAMILY'S CULTURAL HERITAGE: Develop a guide sheet to use with parents, grandparents, and possible other relatives to study ancestral background, customs, and traditions of countries of their birth. Consult other people who have lived in or visited the country. Read books and magazines, listen to travelogue programs, and look at pictures to gain additional information about customs of people in these countries. Share this information by preparing a school or community exhibit for United Nations Week, giving a report at an FHA meeting, or explaining in class some of the interesting facts about the peoples of these countries.

Classroom learning. Concept II-E, Generalization 1, Essential Learning—Care of Infants

Extended experience. FEEDING AND DRESSING BABIES: Observe a mother feeding and dressing a baby. Consider with her problems involved in these two activities and possible ways to handle them. Do some research on the care of babies by reading books and government bulletins and visiting clinics and hospitals to see care given to babies. Practice feeding and clothing a baby under the mother's supervision. Have mother of the baby evaluate procedures used. Assume care of an infant for a period of time.

Classroom learning. Concept III-E, Generalization 3, Essential Learning—Making a Sport Garment for Self or Other Family Member

Extended experience. CONSTRUCTING A SKIRT AND TAILORED JACKET FOR THE SENIOR TRIP: Analyze uses for such an outfit during and after the trip. Investigate fabrics and patterns which will be appropriate for the way in which the garments will be used. Decide on pattern and fabric in relation to sewing competence, money available, learnings involved. Develop step-by-step plan for the making of the garment. Construct the skirt and jacket, consulting teacher as necessary. Wear garments on trip. Evaluate wisdom of choice of fabric and pattern and quality of construction.

III. RECORDING AND EVALUATING HOME AND COMMUNITY EXPERIENCES

Records relating to home and community experiences should be brief but purposeful and contain only essential information. They may be developed by the teacher or the teacher and pupils working together. Pupils need a simple and flexible form to guide them in planning and evaluating each experience. Such a form promotes organized thinking and encourages clear, positive evaluation. Teachers use records to check pupil growth and progress and to discover future needs of pupils.

Individual pupil reports are often developed in two parts.

1. Planning the experience: brief description of experience: reasons for selection: activities to be undertaken: sequence of work: information and assistance needed: possible sources of help.
2. Evaluating the experience: resources used: adjustments made in plan: learnings achieved: areas needing improvement: values to self, family, and community.

Evaluation is an integral part of the total experience and enables the individual to become aware of his own progress and accomplishment. It needs to be well thought out, consistent with family patterns of living, realistic in terms of pupil abilities, and cooperatively carried out by the pupil, teacher, and others involved in the experience. Pupil's interest and creativeness influence ways evaluation may be done. A series of posters or snap-shots showing before and after pictures, a skit illustrating aspects of the experience, an oral report with something to show, a written report entitled "The Most Successful Part of My Experience" are typical methods of evaluation.

Cumulative records help insure variation in kinds of activities undertaken and areas of home economics covered. They may be maintained cooperatively by teacher and pupil. This type of report provides data regarding the interpersonal relationships, competencies and experiences of a pupil for other teachers and potential employers. Cumulative records are useful not only while the pupil is enrolled in school but also for a period of time after he leaves school.

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FUTURE HOMEMAKERS OF AMERICA

A chapter of Future Homemakers of America at the secondary level is essential in a well-planned home economics education program. Class activities supplemented by FHA experiences result in enriched and extended learnings in personal and family living.

Future Homemakers of America is an organization for youth studying home economics. Any pupil enrolled in a high school, public or private, who is taking or has taken a home economics course in junior or senior high school and who has an interest and desire to help improve personal, family, and community living may become a member. The national organization is composed of chartered State associations and certificated local chapters. At local, State, and national levels, the organization operates within the framework of the secondary school. A home economics teacher is the FHA chapter adviser. A member of the State home economics staff is the State adviser. At the national level, FHA is sponsored by the Home Economics Branch of the Office of Education, U. S. Department of Health, Education and Welfare, and the American Home Economics Association.

I. GOAL AND PURPOSES

The overall goal of Future Homemakers of America is to help individuals improve personal, family, and community living, now and in the future. Eight stated purposes contribute to specific parts of the overall goal and give direction to local and national programs. The FHA purposes are:

1. To promote a growing appreciation of the joys and satisfactions of homemaking
2. To emphasize the importance of worthy home membership
3. To encourage democracy in home and community life
4. To work for good home and family life for all
5. To promote international goodwill
6. To foster the development of creative leadership in home and community life
7. To provide wholesome individual and group recreation
8. To further interest in home economics

II. PROGRAM OF WORK

A national program of work is developed cooperatively by youth and adults. Objectives are determined according to current concerns of youth and society. The program of work serves as resource material for State associations and local chapters. Suggested objectives, projects, and activities may be adapted to State and local situations. Choices within chapters depend upon ages and interests of members, time available for program participation, and correlation with experiences of home economics classes. Any of the chapter experiences may be adapted for individual home experiences and independent development. Chapter activities are evaluated at various times and under various circumstances in relation to achievement of goals, benefits to chapter and individual members, and effectiveness of procedure.[1]

III. RELATIONSHIP TO THE HOME ECONOMICS PROGRAM

The Future Homemakers of America organization, as an integral part of home economics education, provides a framework in which youth-planned and youth-directed experiences can extend and enrich learning introduced in home economics classes. For example, FHA chapters follow through on family-centered projects such as forums covering topics that concern teenagers; recreational activities of FHA emphasize the rewarding use of leisure time and build constructive recreational habits for lifetime use; programs on careers stress wage-earning opportunities in home economics-related occupations.

Well-planned FHA activities provide a realistic setting for learning. For example, decision-making and management skills can be developed through member-planned and conducted programs and through organization of work assignments. Good citizenship is fostered through community service and neighborhood improvement projects which frequently involve cooperation with other organizations. International understanding can be promoted through chapter sponsorship of student exchanges and through participation in cross-cultural welfare efforts.

The home economics department provides facilities for meetings and workshops. Home economics teachers furnish guidance and practical aid in helping members plan activities and programs which will contribute to the achievement of the goals of home economics education.

REFERENCES AND MATERIALS

Available from: **State Education Department, Bureau of Home Economics Education,** Albany, New York 12224

- Chapter calendar
- Enriching homemaking education through Future Homemakers of America
- How to organize a chapter of Future Homemakers of America
- *State Newsletter*, Future Homemakers of America

Available from: **Future Homemakers of America,** U. S. Department of Health, Education and Welfare, Office of Education, Washington, D.C. 20202

- A guide for helping students evaluate their own growth
  - A guide to help you grow as a future homemaker of America
  - Chapter handbook
- Cooperative and competitive activities in home economics education
- FHA in focus
- Official guide
- Teen times
- When you work with others

part III

Courses of Study
Grades 7-12

PART III

Courses of Study Grades 7-12

INTRODUCTION TO COURSES OF STUDY

PART III includes detailed courses of study for grades 7-12. When taught as outlined, each course in grades 9-12 qualifies for Regents credit, and a local plan need not be submitted for approval.

I. CONCEPT APPROACH TO CURRICULUM

Rapid expansion of knowledge, increasing demands in school upon a pupil's time, and need for including only significant learnings are some factors that encouraged the concept approach to curriculum development. This approach provides a way to clarify and pinpoint course content, helps focus on the most important areas of study, and affords opportunity for depth of learning with minimum duplication of subject matter.

Concepts as used in the courses of study are central ideas or organizing elements which integrate classes, groups, or categories of learnings having certain qualities in common. Each concept can be developed through educational experience, is useful in stimulating search for meaning, is directive and cumulative. Each course is organized into broad concepts which are reduced to more specific subconcepts to further define and limit the area of study.

The concept approach involves helping pupils see relationships about which they can make generalizations. As used in the courses of study, generalizations are complete thoughts that express underlying truth, have an element of universality, and usually imply cause and effect. Several broad generalizations are given for each subconcept in the courses of study. Specific or supporting generalizations will be formulated by pupils and teachers as essential learnings are considered. Criteria for generalizations are that they be based on objective data, experience, or theory accepted by specialists in the field, use terms that have clear and precise meanings, can be developed through experiences, are important tasks of the school, have utility in today's culture, and help pupils gain insights in dealing with new situations. Generalizations commonly used are: statement of principle; cause and effect; summarization of related facts; statement of value.

II. GUIDES FOR USING COURSES OF STUDY

The format used for presentation of each course of study includes an overview, concepts, subconcepts, allocation of time, behavioral outcomes, generalizations, essential learnings, and references. When planning learning experiences to develop daily teaching plans, Part II, "The Teaching-Learning Environment," should be consulted. Suggestions for use follow:

1. *Overview.* This should be studied for each course when determining offerings appropriate for local district groups. Teachers, administrators, and guidance personnel will find the overview helpful in developing course descriptions for interpretative purposes.
2. *Time allocation.* Percentage of time to be spent on each subconcept should be translated in terms of available weeks for instruction during the semester or year.
3. *Concepts and subconcepts.* The order in which the two concepts at each level in grades 7 and 8 are taught may be reversed to utilize staff and facilities effectively. Concepts in all courses in grades 9-12 should be taught in the order outlined. In some instances, the order of subconcepts may be changed.
4. *Behavioral outcomes.* These should be used for evaluating effectiveness of teaching and learning.
5. *Generalizations.* Teachers may present a generalization and point out illustrations and applications or let the generalization emerge as a natural consequence of learning experiences.
6. *Essential Learnings.* Each learning should be covered; detail of learnings will need to be expanded in many instances. Listings are often suggestive rather than exhaustive.
7. *References.* Each suggested reference should be reviewed in relation to its usefulness with a particular topic and groups. Teachers should keep the reference list current.

Generalization 3: Good work habits, skill in following directions and in using a sequence in construction contribute to efficiency and satisfaction in sewing.

Essential Learning: Efficiency and satisfaction in sewing

. . . Kinds of work habits promoting efficiency and satisfaction

Organized work plan, work area, organized equipment and tools; good posture; clean hands and work surfaces; storage for supplies and for project under construction

. . . Kinds of information needed for following directions

Interpretation of terminology related to fabric, such as selvage, grain line, bias; interpretation of pattern envelope, guide sheet, pieces

. . . Steps in constructing a garment

Fitting and adjusting pattern, laying pattern on cloth, cutting out garment. transferring pattern markings. putting pieces together in sequence, fitting

Generalization 4: Evaluation of the completed garment forms the basis for future improvement in sewing.

Essential Learning: Evaluation of garment

. . . Personal factors in evaluation

Pleasure derived in wearing garment, feeling of accomplishment, motivation for future sewing

. . . Features in garment to evaluate

Overall appearance, fit, appropriateness for occasion, construction details

HOME ECONOMICS GRADE 8

REFERENCE GUIDE

	Concept I			Concept II		
References	A	B	C	A	B	C
Ahern				Ch. 1	Ch. 5	
Barclay & Champion		Ch. 20	Ch. 20	Chs. 3,6	Ch. 5	Chs. 7,8
Clayton	Ch. 3	Ch. 4	Ch. 4	Ch. 6	Ch. 7	Ch. 8
Greer & Gibbs		Ch. 16	Ch. 17			
Jones & Burnham	Unit 3	Unit 7	Unit 7	Unit 2	Units 2,15	Units 13,14
McDermott & Nicholas (1)			Ch. 1	Ch. 3	Ch. 10	Chs. 8,9
Miller				Pp. 7-155	Pp. 157-203	
Smart & Smart	Ch. 4	Chs. 10, 12,13	Chs. 3,5			
Wallace & McCullar	Ch. 14	Ch. 14	Chs. 15-17	Chs. 6,8	Ch. 7	Ch. 9

HOME ECONOMICS 1—PERSONAL AND CHILD DEVELOPMENT (1 unit)

OVERVIEW

This first course in the basic sequence is planned for pupils in grades 9 or 10. It utilizes a general approach to child growth and development as the means of enriching the adolescent's own understanding of self and others. Aspects of housing, food, and clothing are explored as they relate specifically to growth, health, personal behavior, and self-realization.

The concepts and subconcepts for this course are organized as follows:

CONCEPT I—GROWTH AND BEHAVIOR OF CHILDREN

- The Child from 6 to 12
- Adolescents, Peers, and Parents

CONCEPT II—ENVIRONMENTS FOR GROWING

- Home and Community Surroundings for Growth
- Food for Health and Development
- Clothing and Individual Growth

CONCEPT I is planned to build upon whatever background of understanding the pupils bring in the area of child growth and development. Its emphasis is on children 6 to 12 years and on adolescents, their parents, and friends. Typical and unique growth patterns, emotional maturing, relationships with parents, with siblings and other children, and with peers of both sexes receive attention.

The interdependence of child growth and development with family housing and the community, foods, and clothing is explored in CONCEPT II. Opportunities for self-expression and personal development through housing, foods, and clothing are considered, as well as the contributions these three facets of living make to growth of the child and adolescent.

CONCEPT I—GROWTH AND BEHAVIOR OF CHILDREN

Subconcepts:	Time Allocation: (percent)
A. The Child from 6 to 12	20
B. Adolescents, Peers, and Parents	20
Percent of total time	40

A. THE CHILD FROM 6 TO 12

Behavioral Outcomes:

- Is aware of growth and development characteristics of children
- Reflects upon factors contributing to compatible relationships with children from 6 to 12
- Begins to acquire insight into developmental pattern of own growth and behavior

Generalization 1: Knowledge of ways children grow and develop leads to understand self and others better.

Essential Learning: Growth of children 6 to 12

. . . Characteristics of children 6 to 8
Desire to confide experiences to parents and older siblings; eagerness to learn and succeed in school; increasing self-reliance; determination and dedication to tasks; beginning of self-identity; acceptance of outside authority; development of large muscle coordination with less development of eye and hand muscles; need for unconditional love, understanding, encouragement, permission to fail at many things as own capabilities are explored

. . . Characteristics of children 9 to 12
Growing independence, adherence to peer group, expression of criticism of parents, reaching for independence, clinging to dependence, insolence, secretive, irritating habits, sloppy in dress and personal habits, rejecting but curious toward opposite sex, contemptuous of younger brothers and sisters

. . . Ways children of same age vary
Physical: type and development of features, amount of physical dexterity
Mental: ability to get along with others, desire to be with others
Emotional: type of reactions to situations, type of disposition

Generalization 2: In the play and recreation of the older child, interests increase, abilities change, and group participation becomes more structured.

Essential Learning: Contribution of recreation to development

... Results of children's participation in play and recreation

Extension of physical skills: increased muscle coordination, grace, strength

Refinement of social skills: sharing, taking turns, cooperating, respecting belongings of others, increasing ability to converse intelligently about various types of recreation, extending recreational interests

... Types of play and recreation suitable for older children

Individual: puzzles, reading, swimming

Group: team type of sports, clubs, games

Generalization 3: Awareness of situations likely to produce accidents is essential if one is to minimize these hazards.

Essential Learning: Dealing with accident hazards

... Reasons for particular hazards

Child's inexperience: his growing independence and the desire to do things by himself: his urge to be active, to explore and to investigate, to taste, feel, and look at everything, and as he becomes more competent, to stunt and to take chances

... Typical hazards for children 6 to 12

Traffic and street crossings, construction and excavation sites, fire hazards, equipment in motion, boxes that lock, guns and ammunition, marshes and water holes, trees and places to climb

... Ways children learn to recognize and deal with dangers

Having danger spots in experiences pointed out, accepting adult guidance and discipline, sharpening observation, understanding reasons for precautions, respecting laws and regulations

Generalization 4: Younger children learn and grow through associations with older children whom they admire and try to imitate.

Essential Learning: Interaction between adolescent and the child from 6 to 12

... Factors contributing to a compatible relationship with children

Recognition of common needs of children: acceptance for what they are, what they can do, security, respect, varied experiences for new learnings

Recognition that children have rights and privileges: to share in decisions, to be heard, to accept responsibility commensurate with development

Recognition of characteristics of children: less experienced, less strong, less responsible

... Ways adolescent can have effective relations with younger children

Mutual sharing of interests and activities, giving constructive and consistent discipline, accepting each child for his own unique characteristics, exhibiting genuine friendship toward the child

Generalization 5: Understanding factors affecting interaction between brothers and sisters helps minimize conflict and strengthen affective ties.

Essential Learning: Interaction with brothers and sisters

... Factors affecting interaction among siblings

Position in family, sex of person, ambivalent feelings between siblings

... Ways to get along with siblings

Trying to understand causes for tensions, accepting fact that everyone is different, remembering that brothers and sisters are people too and that advantages of sibling relationships generally outweigh disadvantages, talking over problems, sharing things that are fun, respecting other's property and space, standing up for own rights and respecting rights of others, learning to get grievances out in the open, fighting and making up, expressing affection

B. ADOLESCENTS, PEERS, AND PARENTS

Behavioral Outcomes:

- Feels some security in own adolescent transition
- Is aware of ways adolescents and parents or guardians are interdependent
- Assumes share of responsibility for effective relationships with parents or guardians
- Builds meaningful friendships with peers
- Continues to seek insights into own behavior and interpersonal relationships

Generalization 1: Physical changes in adolescence follow typical patterns but vary greatly from person to person.

Essential Learning: Physical change in adolescence

... Physical growth characteristics of adolescents
Growth spurts: unevenness in growth, wide individual variations, girls ahead of boys by 1 to 2 years
Glandular development: types of glands, ways glands influence growth, female and male sexual organs and their functions
Secondary sex development: changes of voice, growth of body hair, maturing breasts

... Concerns over physical changes
Worry over early or late maturity: self-consciousness due to lack of understanding, information, or sympathetic guidance

... Sources of information, advice, understanding
Knowledgeable, sympathetic adults; reliable reading materials; films

Generalization 2: Emotional maturity is evidenced by the individual's capacity to control emotions effectively and still be able to use them pleasurably and constructively.

Essential Learning: Understanding and control of emotions

... Types of emotional responses and expression
Crying, elation, love, excitement, fear, anger
Positive and negative aspects of emotional expression, timeliness of particular emotions, help or hindrance of emotional responses

... Signs of emotional maturing
Facing consequences of deeds, keeping emotions under reasonable control, withstanding group pressure, respecting self as individual, reacting to success in a modest way, dealing with failure in a positive way

... Contributions of realistic self-concept to feeling of security
Knowing own strengths and limitations, acknowledging personal values and goals, growing from unpleasant as well as pleasant experiences, assuming responsibility for own actions, appreciating worth and dignity of all individuals including oneself

... Ways in which self-concept is formed
Early childhood experiences, successes and failures, comments and action of others, realistic appraisal and understanding of self, efforts and willingness to change own actions and behavior

Generalization 3: Interaction between parents and adolescents is influenced by how one sees the other.

Essential Learning: Interaction between adolescent and parent or guardian

... Privileges of family membership
Belong legally to family, share the family money, enjoy facilities of the home, have backing of family, have place to relieve emotional tensions

... Ways adolescent and parents are interdependent
Adolescent: requires understanding by parents, older siblings, and relatives: has growing need for independence and approval of peers; has conflicting code of values, sense of security varies with situations
Parent: requires recognition by adolescents that parents have continuing basic personality needs, concerns, and responsibilities other than being parents

... Influences of cultural traditions upon parent-adolescent interaction
Patterns of authority, responsibility, and aspiration in various subcultures and in different socioeconomic levels

... Ways adolescent can contribute to positive relationships with parents and guardians
Assume fair share of responsibility, respect authority and ideas of elders, inform parents of outside activities, communicate openly, assume growing share in family decision making, take advantage of educational and cultural opportunities offered by family, show loyalty to members, be understanding of feelings and thoughts of others, try to understand variations in attitudes and beliefs, develop own potentials to maximum and help others to develop theirs, express pleasure and appreciation, show affection

... Special problems of interaction with stepparent, divorced or separated parent
Questions of authority and discipline, expressions of affection, feelings of guilt and alienation, manipulation of situations—"playing one against the other"

Generalization 4: Difficulties often arise between adolescents and parents when the values, codes, and language of the adolescent peer group are very different from those acceptable to parents.

Essential Learning: Peer interaction

... Contributions of peers to personal growth and development of each other

Helps an individual look at himself more objectively, gives opportunity for pursuing interests typical of teen-agers, serves as sounding board for personal actions and feelings

... Ways adolescent can have effective relationships with peers

Accept others for what they are, avoid placing blame for dislike of a person on the other fellow, be free from childhood dependence upon parents, enjoy being a member of groups, accept and abide by the rules of group, make constructive contribution to group, know that getting along with others is ability that is learned rather than a matter of luck, know that getting along is not learning tricks that impress others but of being the kind of person who makes others feel worthwhile and helps them find life interesting

... Values of wholesome boy-girl relationships

Gaining acquaintance of the other sex, becoming acquainted with individual personalities, forming new friendships, emotional weaning from parents

... Factors determining dating age of adolescents

Level of maturity; encouragement of family, friends, and community: personal interest

... Advantages and limitations of steady dating

Advantages: may reduce competitive pressure, assure partner for activities, give opportunity to know each other more realistically, satisfy sense of belonging

Limitations: may prevent knowing other compatible persons, commit a pair socially before they are ready, cause partners to miss fun, limit personality expansion, keep one from participating in some activities, increase pressure for physical intimacy

... Responsibilities of adolescents in adjusting personal and peer loyalties with parental expectation

Communicate openly, discuss differences, demonstrate responsible action, introduce friends, respect rules set down by parents, interpret parents' viewpoints to peers, learn to yield gracefully, negotiate important issues maturely, try to see long-term implications

CONCEPT II—ENVIRONMENTS FOR GROWING

Subconcepts:	Time Allocation: (percent)
A. Home and Community Surroundings for Growth	20
B. Food for Health and Development	20
C. Clothing and Individual Growth	20
Percent of total time	60

A. HOME AND COMMUNITY SURROUNDINGS FOR GROWTH

Behavioral Outcomes:

- Has some appreciation of ways home environment contributes to physical, social, and emotional well-being of family members
- Recognizes the influence of individual needs and interests upon selection and use of space and facilities in the home
- Understands factors influencing type and amount of space and equipment provided in the home
- Is aware of ways the home and community contribute to growth and development of children and youth
- Sees avenues for own continuing growth and self-expression at home and through the community

Generalization 1: A dwelling unit provides the background for human relationships and activities.

Essential Learning: Housing for social and emotional well-being of children and youth

... Characteristics in housing which foster social and emotional well-being of individuals

Adequate space for privacy, sociability, activities; comfort and beauty in surroundings; opportunity for self-expression: availability of music, books, facilities for cultural growth

... Activities of children and youth for which space and facilities are needed

Studying, playing, entertaining, pursuing interests and hobbies, sleeping, bathing, toileting, eating, dressing, storing items

Generalization 2: Sanitary and comfortable home conditions contribute to good physical health.

Essential Learning: Housing for physical well-being of children and youth

... Factors contributing to healthful and sanitary conditions in the home

Light and ventilation throughout house, clean food preparation and storage areas, control of rodents and insects, facilities for physical care and cleanliness, temperature control, adequate repair and upkeep to reduce accident hazards

... Ways to provide comfortable and safe space and furnishings in the home

Select items suitable to the individual: consider size, age, health, and physical condition of individual

Select items for safety features: rounded edges, free of protruding parts, firmness of construction, well balanced, skid resistant, fire resistant

Protect open and high places in the home: screens in windows, gates or other obstructions at top and bottom of stairwells if young children are present

Generalization 3: Adequacy and appropriateness of housing is related to the needs of a particular family in a particular set of circumstances.

Essential Learning: Adequacy of space and equipment in the home

... Factors influencing type and amount of space and equipment provided by families

Size and composition of family, stage of family life cycle, size and type of housing unit in which family lives, cultural background of family, family values and goals, financial and human resources of family

... Ways families provide space to meet needs of members

Separate rooms for some activities, rooms organized for multipurpose use of space, space shared alternately, use of resources outside the home

Generalization 4: Harmonious combinations of color, pattern, texture, lines, and shapes contribute to an environment which is esthetically satisfying.

Essential Learning: Establishing an attractive home environment

... Ways to create beauty in surroundings

Applying principles of art and design in selection and arrangement of furnishings: proportion, balance, emphasis, rhythm, repetition, line, color

... Factors which influence home decoration

Family and individual tastes, physical characteristics of a room, money and time available, interest and concern of individuals involved

... Ways to develop skill in selection and arrangement of equipment and furnishings

Experience with own room, surroundings, accessories; study of principles of design: contact with examples of good design in homes, school, stores, pictures, museums, nature; alertness to own feelings regarding various expressions of taste; practice in creating and carrying out simple and then more complex arrangements and schemes

Generalization 5: Living space can provide continuing opportunity for self-development and individual expression.

Essential Learning: Self-expression in the home

... Basic and conventional avenues for expression

Arrangement and design in furnishings, floor coverings, walls, lighting, window treatments, color schemes

... Opportunities for making the ordinary unique

Functional objects displayed or hung attractively, children's toys and art used decoratively, draping used to mask trouble spots or defects, dividers used as partitions, market boxes and packages arranged colorfully and attractively

... Personal growth and satisfactions to be derived from enhancement of home

Feelings of accomplishment, pride: approval of family and friends: improvement of own abilities and skills: confidence of know-how

Generalization 6: Community resources can supplement the home in providing environment for living and for stimulating growth and development of children and adolescents.

Essential Learning: Community as an extension of the home

. . . Factors which influence the use of community facilities and services
Facilities available in the home: money, time, interest of individuals; knowledge of facilities available and how to use them: standards and status of person commonly using facilities and services

. . . Ways communities are utilized for maximum growth and development of children and adolescents
Extension of physical, recreational, and cultural facilities available in home; special streets and play areas for space; rooms for group meetings; beautification or improvement projects encouraging participation and self-expression; interpersonal contacts with many different kinds of people

B. FOOD FOR HEALTH AND DEVELOPMENT

See TEACHING BASIC LEARNINGS THROUGH MEAL PREPARATION, Appendix)

Behavioral Outcomes:

- Is able to evaluate foods and diets in relation to needs of children of various ages
- Understands how family, culture, and community influence food habits
- Assists younger children in building good nutritional habits and positive attitudes toward eating
- Feels satisfaction in making contributions to family meal preparation and serving
- Discovers possibilities for own growth and self-expression through food preparation and service

Generalization 1: Children and youth have different food requirements that change at successive stages of development.

Essential Learning: Nutrition for children

. . . Factors affecting nutritional needs of all individuals
Age, sex, physical activity, utilization of food within the body, physical health

. . . Special requirements of children ages 6 to 12, adolescents
Foods for body building, energy

. . . Problems of children and youth in meeting nutritional needs
Self-selection of foods away from home; coordinating intake at school, home, and with friends into adequate pattern; having time pressures which tempt eat-and-run habits or skipping meals; too little or poor use of money which leads to excesses or inadequacy in diet

. . . Steps in evaluating daily food intake
Estimate size of serving, determine nutritive value and number of calories: compare food intake with recommended foods in daily food guide

Generalization 2: Eating habits of individuals reflect family traditions and community influences.

Essential Learning: Influence of culture, family, and community on eating patterns

. . . Ways cultural traditions influence family eating patterns
Dictates staple items in diet such as bread, potatoes, or rice; establishes food taboos; directs methods of food preparation and serving; builds in strong emotional rejection of some foods, acceptance of others

. . . Ways the family influences individual eating patterns
Stimulates food likes and dislikes, establishes eating attitudes, directs and controls type of food eaten by children and to some extent by other family members, determines amount of money available for food

. . . Ways local community influences individual and family eating patterns
Makes available certain types and quality of foods; melds together people with varying food traditions; makes possible variation in eating places; helps establish food attitudes by means of magazines, newspapers, radio, television

Generalization 3: Mealtime satisfaction in childhood contributes to the development of healthy attitude toward food.

Essential Learning: Preparing and serving meals for children and youth

... Ways to build positive attitudes in children toward eating

Establish a good environment at mealtime. provide eating equipment suitable for developmental stage, introduce new foods slowly and interestingly, use positive approach to eating problems, make eating a pleasant occasion; celebrate special events

... Common concerns in perparing and serving food to children and youth

Providing safe and nutritious foods, being able to afford enough food to eat, retaining nutrients during the cooking process, serving foods interestingly and attractively, stimulating children and youth to assist in meal preparation and service

Generalization 4: Children respond differently to food.

Essential Learning: Response of children to food

... Meanings of food to children

As expression of acceptance and love, as security, as punishment, as status or lack of status

... Ways children use food for personal expression

Pleasing parents or expressing hostility, exerting independence, indicating withdrawal or hurt

... Possible causes of unusual response to food

Physical illness, emotional tension, fear or grief, copying adult patterns or attitudes

Generalization 5: Self-confidence in food preparation and service comes from experience in handling progressively more difficult responsibilities.

Essential Learning: Helping with family meals

... Ways children can be helped to grow through responsibility

Selecting job suitable to age, ability, and experience; giving complete instructions so that job is understood; giving generous praise for accomplishment; avoiding judgment by adult standards

... Mealtime tasks appropriate for children

Ages 6 to 12: work under guidance of adults. help with preparation of some simple foods. help with serving of meals

Adolescent: assume complete responsibility for preparing and serving simple meals. assist more independently with meals

Generalization 6: Food preparation and meal service provide opportunities to employ creativity and self-expression.

Essential Learning: Individual expression through foods

... Ways to prepare foods which are interesting and attractive

Personalize ready-prepared foods, partially prepared foods, recipes; vary method of food preparation; use ingredients imaginatively; consider seasonings, texture; present food attractively, consider shape, color, size

... Ways to add interest to meal service

Vary types of service, type of equipment and appointment, place of eating

C. CLOTHING AND INDIVIDUAL GROWTH

(See SEQUENCE OF LEARNINGS IN CLOTHING CONSTRUCTION, Appendix)

Behavioral Outcomes:

- Understands the relationship of clothing to growth and development
- Knows characteristics in garments needed by individuals at different growth periods
- Uses judgment in wardrobe planning
- Selects clothing construction projects commensurate with past sewing experiences and new learnings to be acquired
- Enjoys sewing for self and others

Generalization 1: To understand problems of clothing children and adolescents requires consideration of growth and development, as well as of garment design and construction.

Essential Learning: Clothing for growth and development

... Influences of physical growth upon clothing needs

Length of time a garment can be worn, type of garments needed, number of garments needed, style of garments needed

... Ways clothing can influence growth and development

Restrict or promote physical growth: express and reinforce personality characteristics such as self-confidence, inferiority feelings, independence

... Garment characteristics important in clothing of children and adolescents

Children 6 to 12: simplicity of design for exercise, muscle development: appropriate weight for protection from the elements; ease of laundering to permit normal play and activities; correct size for comfort and health; sturdy fabric to resist wear and tear: expandable features to provide for rapid growth: "boyish or girlish" to aid positive sex identification

Adolescents: variety in color, style, and purpose of garments for school and social activities and for self-expression; appropriate fit for comfort and pleasing appearance, for enhancing figure and features: conformity to fads and standards as means of individual security

Generalization 2: Planning clothing for children and adolescents involves consideration of family resources, the child's personal characteristics, and the functions of clothing.

Essential Learning: Wardrobe planning for children and adolescents

... Influences upon clothing provided for children and adolescents

Clothing trends, peer group pressures, family standard of living, season and climate, present clothing inventory, personal activities, importance placed on clothing, state of health, physical handicaps

... Resources available within the family for providing adequately for clothing needs of children and adolescents

Skill and time of family members to care for, renovate, repair and construct articles of clothing; facilities available in the home for caring for and making garments; available money for clothing expenditures; articles presently owned by family members: ability to use wise judgment in selecting articles of clothing: attitudes regarding used clothing

... Personal characteristics of children and adolescents influencing the selection of garments

Figure: proportion, size, expected growth, coloring, features

Personality: active, quiet, daring, shy, dainty, tomboy

... Functions of clothing for children and adolescents

Protection from the elements, enhancement of personal features, contributions to physical and mental health

Generalization 3: Applying clothing construction skills toward improvement of the wardrobe of a child or oneself in turn enhances one's own personal development.

Essential Learning: Clothing construction for children or adolescents

... Ways sewing skill can foster own growth and development

Promotion of self-confidence, feelings of satisfaction in doing for others, expression of creativity, improvement of manual and mental dexterity, judgment

... Ways one's wardrobe can be improved through ability to sew

Increased number of garments, greater individuality in clothing, extended use of garments through proper upkeep, up-to-date styles through ability to alter clothing

... Factors to consider in selecting an appropriate project

Learnings to be acquired, past experiences in sewing, time available, cost, personal interest, types of garments needed

... Considerations in garment construction

Selection of appropriate pattern, fabric, notions, equipment; proper use and care of equipment; sequence of steps in construction; selection of appropriate construction processes

... Aspects of completed garment to be evaluated

General appearance, workmanship

HOME ECONOMICS 1—PERSONAL AND CHILD DEVELOPMENT REFERENCE GUIDE

REFERENCES	CONCEPT I		CONCEPT II		
	A	B	A	B	C
Carson & Ramee				Chs. 2,4	
Craig & Rush			Units 1,4,5,7		
Dunbar (1)	Pp. 16-59	Pp. 16-59			Pp. 75-81
Dunbar (2)		Chs. 1,2			Pp. 88-103
Langford				Ch. 11	
Lewis (3)		Unit 1-Pt. 2	Unit 3-Pt. 2		
McDermott & Nicholas (2)		Ch. 1[illegible]	Chs. 2,3	Ch. 9	
Mussen & Others	Chs. 11,12	Ch. 13			
Peyton				Chs. 1-17	
Pollard & Others		Ch. 1		Ch. 6	Ch. 12
Rathbone & Others					Ch. 2
Rhodes & Samples			Ch. 11	Chs. 6,8	
Seventeen			Chs. 1-10		
Shuey & Others	Chs. 17-19				
Tate & Glisson					Chs. 11,12
Wallace & McCullar		Chs. 2,3			

HOME ECONOMICS 2—PERSONAL AND FAMILY MANAGEMENT (1 unit)

OVERVIEW

This second course in the basic sequence is designed for girls and boys in grades 10 or 11. It is built upon a recognition that realization of human values and goals does not happen automatically in a complex society. The number of choices available in all areas of living and the competition for the time, effort, and money of each individual and family make management important for anyone wishing to help direct his own life. Otherwise, outside forces often become the managers.

The purpose of this course is to teach a framework for management and to illustrate its application in a few selected areas of home living. This experience with the process itself should provide a sound basis for the pupil in moving toward increasingly more critical decisions and responsibility.

The concepts and subconcepts for this course are organized as follows:

CONCEPT I—THE NATURE OF MANAGEMENT

- The Role of Management in Personal and Family Living
- The Management Process

CONCEPT II—MANAGEMENT IN HOME ACTIVITIES

- Management Related to Family Illness and Accident
- Use and Arrangement of Storage in the Home
- Maintenance of the Home and its Furnishings
- Management of Family Meals
- Management in Clothing

CONCEPT I explores the importance of management to all phases of home living—what can be managed and for what purposes. It brings into focus the many elements of management and emphasizes the role of decision making at each stage of the process.

CONCEPT II relates management to home activities. It illustrates how planning and organization helps families consciously direct their resources. good health is a basic value to be promoted. It identifies home storage as a means to order. work simplification. and family harmony. Maintenance of the home and its furnishings is presented as management of resources for the good of the family. rather than an end in itself. Meal management integrates several separate management decisions and processes and provides opportunity for illustrating how the role of manager can be shared. In managing clothing. the pupil will be able to see how resources can be created as well as preserved or expended. Again the emphasis is upon conscious decision making and upon analyzing the relative importance of clothing in the personal and family value structure.

CONCEPT I—THE NATURE OF MANAGEMENT

Subconcepts:	Time Allocation: (percent)
A. The Role of Management in Personal and Family Living	5
B. The Management Process	5
Percent of total time	10

A. THE ROLE OF MANAGEMENT IN PERSONAL AND FAMILY LIVING

Behavioral Outcomes:

- Understands the meaning and importance of management in personal and family life
- Comprehends broad meaning of resources
- Analyzes own resources and potential for developing resources

Generalization 1: Home management is the part of family living that is concerned with achieving the goals and maintaining the values that a particular family considers important.

Essential Learning: Scope of management

... Beliefs concerning management in the home
Present in every home though quality varies. permeates every aspect of personal and family life. involves all family members in varying degrees. is a means of consciously working toward personal and family goals

... Objectives of management
Help individuals and families to clarify and define values and goals. use human and material resources effectively. provide ways of planning and organizing to stabilize crisis situations. take action toward goals as conditions permit. promote physical and mental health

Generalization 2: Resources of a family are those human and nonhuman means used to achieve family goals.

Essential Learning: The nature of resources

... Types of resources available
Human resources: knowledge. ability. skill. talent. attitude. time. energy. personality traits
Nonhuman resources: money. material goods and equipment. community facilities

... Characteristics of resources
Usually limited. one can sometimes substitute for another. increase and decrease under differing circumstances. must be recognized to be used. can often be expanded or developed

B. THE MANAGEMENT PROCESS

Behavioral Outcomes:

- Understands the elements of management
- Knows process of making a rational decision
- Sees importance of decision making and evaluation throughout management
- Identifies some personal and family values and goals and sees relationship to management
- Is able to isolate a goal and organize plan for achieving

Generalization 1: Organization is the process of making and carrying out a plan for using resources to achieve goals.

Essential Learning: Organization in management

... Elements of organization

Goal setting: selecting most important objectives in relation to resources

Information gathering: locating facts that help make judgments, show opportunities. define procedures

Planning: establishing a procedure. method. or scheme of action; standing plans for routine tasks may be used again and again

Carrying out plan: communicating plans to all involved. demonstrating or training for the job if necessary, increasing efficiency through work simplification or buymanship techniques, supervising and directing as necessary

... Characteristics of the role of manager

Adults in family usually share role of manager, all family members assume manager role at certain times, role shifts, manager may or may not be worker, role often includes directing and supervising

Generalization 2: Because decisions are involved in every part of management, it is important to understand the decision-making process.

Essential Learning: Decision-making process

... Steps in decision making

Recognize the opportunity or need for decision, seek and identify possible alternatives, gather information, think through consequences of each alternative, select alternative, take action, accept consequences, evaluate, make next decision

... Ways decision-making activity relates to management

Involved in each phase of organization, one decision influences another or necessitates another, one decision may limit or increase alternatives available for next decision, conscious decision making is difference between management and chance, rational decisions usually preferable to impulse but not always

... Possible benefits from use of group process in making decisions

Greater respect for decisions made, better decisions. more action likely, greater chance of success, provides experience and learning for children

... Methods of resolving conflicts in group thinking during decision making

One side obeys. one side submits voluntarily. both sides compromise. two sides reach a new solution together

Generalization 3: Clarification of personal and family values and goals makes it easier to choose among alternatives when making decisions.

Essential Learning: Relationships of values and goals to decision making

... Reasons for clarifying personal values and goals

Make wise use of family resources, get more out of life, live in an organized way, have an incentive toward which to work. give direction to activities and plans. guide in making decisions.

... Examples of values important in more or less degree to many families

Love, health, comfort, ambition, wealth, education, ethics or religion, efficiency

... Sources of values

Family: traditions, socioeconomic level, composition, health

Society: culture, school, geographical location, facilities and services, peer groups, church

... Ways values influence decision making

Determine goals which will be set, standards which will be maintained, types of resources that will be used, ways resources will be used, ways practices will be approached, amount of enthusiasm

... Characteristics of goals

Imply taking action, change with time, should be in harmony with values in order to be attained, some are end goals, some operational, vary in size and importance

... Ways to clarify personal and family values and goals

Having free and honest discussions among family members, observing own actions for reflection on and evaluation of real beliefs, thinking about what is really important to the individual and family, correlating values with the setting of short-term and long-term goals, discussing personal beliefs with adults who appear to be successful in daily living

CONCEPT II—MANAGEMENT IN HOME ACTIVITIES

Subconcepts:	Time Allocation: (percent)
A. Management Related to Family Illness and Accident	20
B. Use and Arrangement of Storage in the Home	10
C. Maintenance of the Home and its Furnishings	20
D. Management of Family Meals	20
E. Management in Clothing	20
Percent of total time	90

A. MANAGEMENT RELATED TO FAMILY ILLNESS AND ACCIDENT

Behavioral Outcomes:

- Understands the management process in relation to family illness or accidents
- Knows and is able to make suggestions for adjustments in the home during an illness or accident
- Is able to assume responsibility for some treatments in the care of the sick
- Knows ways to maintain a safe home
- Is able to use appropriate first aid procedures when emergencies arise

Generalization 1: Because health is valued highly by individuals and families, management practices aimed at being prepared for illness or accidents and at restoring health are especially important.

Essential Learning: Home preparedness in relation to health

... Considerations in assessing and building up resources

Kinds and benefits of health and accident insurance, selection of a physician, keeping basic supplies and equipment on hand for emergency, knowing community resources that are available, training family members to assume responsibility and to be prepared for emergency

... Effects of good management practices

Promote speedier patient recovery, prevent spread of illness to other family members, prevent friction in the home, cause less financial worry, conserve time and energy of individual and family members, aid in family's feeling of security during illness

Generalization 2: Many management skills are required for the effective care of the sick in the home.

Essential Learning: Care of the sick in the home

... Factors in planning for care of the sick in the home

Type and degree of illness; financial and personal resources of family members; family composition; size, type, and location of dwelling

... Considerations in carrying out plans for nursing the patient at home

Organizing the sickroom: include only essential furnishings and equipment, place furnishings and equipment to avoid wasted motion, take advantage of physical features of room to provide light and air

Meeting the patient's emotional needs: utilize human resources of all, plan for visitors according to patient's condition, keep patient happily occupied with various activities

Meeting physical needs of the bed patient and the convalescent: bathing, dressing, grooming, feeding, providing suitable bedding

Exhibiting personal qualities contributing to well-being of patient: sympathy, patience, cheerfulness, alertness, dependability, capability

Following approved procedures in treatment of sick: in taking temperature, pulse, respiration count; applying dressings and compresses; administering drugs; caring for and storing supplies and equipment required for treatment; keeping records; helping with rehabilitation; caring for patients with communicable diseases

Generalization 3: Knowing how to deal with an emergency situation will help one who is faced with decisions make more rational judgments.

Essential Learning: Accidents in the home

... Types of common home accidents

Burns, sprains, bruises, cuts, poisoning, insect bites, sunstroke

... Causes of home accidents
Carelessness, lack of knowledge, lack of supervision, lack of foresight, chance

... Practices that help prevent accidents
Good housekeeping, equipment in repair, belongings stored carefully after use, safety consciousness, alertness to potentially dangerous situations

... Procedures in dealing with common home emergencies
Survey situation, get victim in safe place, secure assistance, if necessary, make patient comfortable, give necessary first aid treatment, watch for follow-up signs of shock or hemorrhage

B. USE AND ARRANGEMENT OF STORAGE IN THE HOME

Behavioral Outcomes:

- Recognizes relationship between storage and management
- Initiates efficient storage within the home for personal and family items
- Is aware of community facilities for storage of personal and family items

Generalization 1: Organized storage contributes to efficient home management.

Essential Learning: Importance of home storage

... Ways storage relates to management
Allows standing plan whereby all family members can share in keeping materials and goods readily available and home in good order, protects items not in use, contributes to work simplification, saves time for all family members, promotes family harmony and reduces short tempers, permits role of manager to be assumed smoothly by various family members or outsiders

... Benefits of well-planned storage
Easy accessibility of items when needed, longer life and better condition of items, simplification of manager's task, order in the home

Generalization 2: The quantity and variety of resources influence choices available.

Essential Learning: Location and organization of home storage space

... Resources involved in decisions regarding storage
Quantity and variety of space available, finances for buying storage accessories or equipment, personal and family imagination and skill in improvising storage aids or arrangements

... Items to be stored
Clothing and equipment for its care, personal items for grooming and health, perishable and nonperishable foods, kitchen supplies, first aid supplies, recreational materials, household linens, equipment and supplies for indoor maintenance of the home, equipment and supplies for outdoor maintenance of the home

... Places for storage
Separate rooms: attic, closet, garage, apartment house basement or storeroom
Space within a room: shelves, cupboards, desk, file, chests, trunks, boxes, refrigerator, freezer

... Aids in organization of storage space
Linen wrappers, plastic bags, bars, boxes, hangers, vertical and horizontal files, shelf liners, dividers, racks, hooks and nails, step shelves

Generalization 3: Community facilities provide resources for additional storage space for individuals and families.

Essential Learning: Community facilities for storage

... Types of facilities available
Vaults for jewels, furs; lockers for frozen foods; warehouses for furniture, clothing

... Considerations when using community facilities for storage
Record keeping, insurance, relative cost

C. MAINTENANCE OF THE HOME AND ITS FURNISHINGS

Behavioral Outcomes:

- Recognizes advantages of a well-maintained home

... Practices contributing to wear and appearance of clothing

Care for garments after wearing: air, brush, remove spots, launder, repair, press

Use appropriate storage accessories: various type hangers; protective coverings; shoe racks, bags or boxes; hat boxes or stands; jewelry trays or boxes

... Ways to prolong the use of clothing

Dry-clean or launder as needed, alter garments to fit trends in fashion, repair garments as needed

Generalization 3: A well-made garment reflects mastery of sewing skills and provides personal satisfaction in clothing construction.

Essential Learning: Making a sport garment for self or other family members

... Considerations for determining whether to make or buy clothes for individual family members

Skill and enjoyment in sewing, space and equipment for sewing, time and energy available, availability of clothing in relation to figure problems, comparative costs

... Learnings involved in making a sport garment

(See SEQUENCE OF LEARNING IN CLOTHING CONSTRUCTION for Home Economics 3, Appendix)

... Features indicating a well-made garment

Sharp and flat lapels, collars, front facing edges; straight seams; buttons with shank; sleeves on grain; collar smooth around neck

E. MEETING FAMILY FOOD NEEDS

(See TEACHING BASIC LEARNINGS THROUGH MEAL PREPARATION, Appendix)

Behavioral Outcomes:

- Is aware of recent developments in food technology
- Recognizes how own family's food practices are influenced by trends in food preparation and marketing
- Is aware of situations in own family which require adjustments in meal planning, preparation, and serving
- Is able to make satisfactory adjustments in family meals to meet special food needs of members
- Recognizes why food is used as part of entertaining in the home
- Is able to plan, prepare, and serve appropriate foods for various types of entertaining

Generalization 1: Developments in food technology continually present new food products and markets from which families must choose.

Essential Learning: Availability of food and food products

... Developments in food technology affecting types of food available

Processing: freeze-dry foods, frozen food and food products, mixes, ready-prepared foods

Packaging: wrapped for individual servings, parts of a product or meal wrapped separately in one package

... Types of places where food and food products may be purchased

Specialized markets, grocery stores, restaurants, drug stores, department stores, delicatessens, food plans, salesmen, mail order, direct from farm

... Trends in types of foods used by families

Use of greater variety of fresh and processed food and foods in different forms; use of government surplus foods by families receiving public assistance

Generalization 2: Planning and preparing food for a family often requires skill in meeting a variety of special food needs within the same meal.

Essential Learning: Adjustment of family meals

... Situations requiring adjustments in meal planning, preparation, and serving

Families with young children or elderly persons, individuals who are overweight or underweight, individuals with special health conditions, family members from differing cultural backgrounds

... Adjustments in family meals to meet needs of special individuals

Young children: regular mealtime, sufficient time to chew food properly, food chopped or cut into small pieces, new foods added one at a time, small servings, limited use of highly seasoned and fat foods

Elderly: familiar, tasty, easily chewed and digested; food chopped or cut into small pieces; small servings, four or five small meals daily in lieu of regular three meals

Persons with different cultural backgrounds: include some favorite dishes of culture, prepare foods using recipe of other culture

... Adjustments in family meals to meet special health conditions of members

Overweight: three daily meals at regular times, small servings, hearty breakfast and light evening meal, no between-meal snacks

Underweight: addition of high calorie foods; little liquid at mealtime; between-meal snacks

Diseases as diabetes, heart: serve foods as directed by doctor, avoid substitution in diet

Generalization 3: Serving food to others is a means of expressing hospitality and friendliness.

Essential Learning: Food for entertaining

... Reasons food is frequently served when entertaining

Expresses friendship, affection, hospitality; is a common interest of most people; creates common bond between persons at any age level; provides opportunity to display special abilities and creativity; is a traditional part of gatherings in most cultures

... Ways of making entertaining with foods a satisfying experience

Provide an attractive and congenial environment; preplan details in relation to menu, where and how to serve food, table appointments; include types of food which assure success as far as possible; prepare as much as possible in advance so that time may be spent with guests

... Factors influencing types of food served

Number, age, and health status of members of the group; money, time, energy, and skill of persons preparing food; space and facilities for preparing and serving food; occasion; time of day; type and amount of preparation needed

... Patterns of food served to guests

Meals: breakfast, brunch, lunch, dinner, supper

Refreshments or parts of meals: dessert, salad, beverage

... Special foods used in entertaining

Hors d'oeuvres, canapes, relishes, small sandwiches, tiny cookies, punches, garnishes, candies

... Considerations in serving food to guests

Type of service: buffet, family style, formal service, tea, tray

Place of serving: dining room, kitchen, livin [illegible] porch, yard community park

Typ [illegible] table appointments: table covers, table ware, glassware, flat ware, decorative items

CONCEPT IV—INDIVIDUALS AND FAMILIES IN THE ADVANCING YEARS

Subconcepts:	Time Allocation: (percent)
A. Middle Life and Old Age	3
B. Meeting Special Needs of the Aging	2
Percent of total time	5

A. MIDDLE LIFE AND OLD AGE

Behavioral Outcomes:

- Recognizes factors contributing to increased life expectancy
- Knows characteristics associated with the middle and old age periods
- Appreciates mutual benefits of personal relationships with the aging
- Shows respect for older people in society
- Recognizes some concerns of the aging
- Understands the need of preparing for the advancing years

Generalization 1: The increased life span brings new and changed experiences for individuals in the later years of life.

Essential Learning: The increased life span

... Reasons for increases in the span of life

Better health and medical care including reduced infant and mother mortality, safer and better working conditions, improved housing and diets, more financial security and welfare services

... Effects of increased life span on living of aging family members

Longer life together after last child leaves home; decreasing circle of friends for aging persons; increasing dependency upon children; limited availability of jobs and housing within income; more time to enjoy cultural, educational, recreational activities

Generalization 2: Although middle life and old age are identified by certain characteristics and developmental tasks, the rate at which these are reached differs widely among individuals.

Essential Learning: Meaning of aging

... Characteristics associated with middle life and old age

Middle life: maximum income, great mental vigor, assumption of leadership responsibilities in business and community, high employment rate of men and women, decline in parental functions

Old age: increasing physical infirmities, nonemployment, changed position and status within family and community, mellowing and letting down of activities

velopmental tasks of the aging

Locating a satisfying home for later years, adjusting to retirement income level, establishing convenient and comfortable daily routines, facing loss of peers and family members, maintaining contact with family and friends, finding meaning in life, keeping well, facing death as inevitable

... Factors which may cause variation in rate of aging among individuals

Physical and mental strengths and weaknesses with which individuals are born, extent to which basic physical and emotional needs are met throughout life, interests and experiences, mental attitudes

Generalization 3: Middle life and old age can be enriched through meaningful relationships with younger persons.

Essential Learning: Relationship of younger persons to the aging

... Attitudes of younger persons toward the aging

Reverent, resulting from respect for wisdom and knowledge; indifferent, resulting from identifying this as a period of declining productivity and vitality; humanitarian, resulting from increased concern of people

... Responsibilities of younger persons to the aging

Enjoying and appreciating their vision and experience, providing companionship and affection, giving physical assistance when needed, understanding inevitable changes in all human bodies and minds, growing in personal insight through association

... Ways young people provide constructive help to the aging

Helping maintain young spirit and positive attitude toward life, keeping open lines of communications with family and friends, helping sustain interests in everyday events, stimulating physical and mental alertness

B. MEETING SPECIAL NEEDS OF THE AGING

Behavioral Outcomes:

- Is aware of special housing needs of the aging
- Evaluates available housing for the aging in relation to special needs
- Recognizes special health needs of the aged
- Is familiar with family, community, and State resources which contribute to the physical and mental health of older persons
- Understands income needs of older persons
- Knows sources for meeting income needs of older persons

Generalization 1: Living is made easier and more comfortable for the aging when consideration is given to their special housing needs.

Essential Learning: Housing for the aging

... Characteristics of living location which make later years more pleasant

Proximity to relatives and friends; provision for quiet and privacy; opportunity for independent action; accessibility to public transportation, shopping facilities, and community services; cost range within ability to pay; neighborhood age range according to individual preference, with young people or without

. . . Features desirable in houses for the aging
 One floor layout. handrails on stairs, good lighting, safe cooking equipment, nonslip bathtubs and showers, outside sitting space, doors wide enough for wheelchairs and walkers

. . . Types of housing available to older people
 Independent living arrangement: room, apartment, house
 Living with others: private homes of family, relatives, or friends, nursing home, homes for the aged

Generalization 2: Maintaining health is an important goal of the elderly which persons around them can help promote.

Essential Learning: Meeting health needs in later years

. . . Special health needs of the aging
 Eating nutritious foods, wearing suitable clothing, having frequent physical check-ups, exercising extreme caution in preventing accidents, having persons around who are understanding

. . . Situations influencing the eating habits of the elderly
 Special health conditions of the individual, physical handicaps, companionship at meals, physical facilities for preparing and serving foods, amount of money available for purchase of foods, accessibility of food

. . . Characteristics of clothing needed by the elderly
 Easy to put on and take off, fabrics which provide warmth and are easily cared for, attractiveness, pockets in garments, comfortable fit

. . . Reasons for frequent physical check-ups
 Avoid possible complications from minor injuries and illnesses, take measures to prevent illness, provide peace of mind, detect irregularities early

. . . Practices of the elderly in preventing accidents
 Use cane, hold on to railings, wear glasses, utilize sufficient lighting, use arms of chairs in sitting and rising, allow people to assist

. . . Considerations in promoting mental health of the elderly
 Tolerance for habits of the elderly, assistance in keeping the aging constructively busy, fulfillment of the basic needs of the elderly

. . . Resources for helping meet health needs of older people
 State departments of: Health, Education, Social Welfare, Commerce
 Local facilities: geriatric clinics in general hospitals, homemaker services, visiting nurse services, nursing homes
 Family contributions: nursing assistance, safe and healthful housing, companionship and affection, consideration and acceptance

Generalization 3: Planning for meeting financial obligations during later years tends to result in greater financial security for the aging

Essential Learning: Financial security in later years

. . . Practices in planning for future financial needs
 Start retirement plans early; plan a variety of ways of saving money for future use such as savings accounts, stocks and bonds, endowment and annuity insurance policies, real estate; using money resources wisely through the years

. . . Needs of older persons requiring money
 Food, clothing, shelter, medical care, recreation, gifts and charity, travel

. . . Financial resources available to older persons
 Earnings: savings, wages, investments
 Benefits: retirement, disability, survivor, social security
 Public and private assistance: State and county welfare funds; contributions from friends, relatives, private charities

. . . Features of financial security for the aging
 Financial independence, freedom in making choices of way money is spent, less worry about meeting financial needs

HOME ECONOMICS 3—PERSONAL AND FAMILY RELATIONSHIPS REFERENCE GUIDE

	CONCEPT I		CONCEPT II					CONCEPT III					CONCEPT IV	
REFERENCES	A	B	A	B	C	D	E	A	B	C	D	E	A	B
Bowman	Ch. 14	Ch. 2	Ch. 4	Chs. 3-8	Chs. 9-12	Ch. 14	Ch. 14	Chs. 2, 10	Ch. 12					
Chambers											Pt. 1-3			
Craig				Chs. 3, 8.9	Ch. 10	Ch. 11	Ch. 12	Ch. 10	Ch. 17	Ch. 18	Ch. 6	Chs. 4, 5		
Craig & Rush										Unit 2				
Duvall		Chs. 3-5			Chs. 6.7	Ch. 8	Chs. 9, 10	Chs. 1-3					Ch. 13	Ch. 14
Fitzsimmons & White									Chs. 13, 14					
Hoeflin	Chs. 1, 14		Chs. 1, 14	Chs. 10, 12	Ch. 13	Ch. 13	Chs. 3, 4.6.7	Chs. 5, 13					Pp. 100-101	
Landis & Landis	Ch. 1			Chs. 4-15	Chs. 16-18,21	Chs. 22, 26	Chs. 23-25	Chs. 17, 18,21,27	Chs. 19, 20					
Nickell & Others									Pt. 3	Pt. 4				
Pollard (2)												Units 6, 8		
Quinn (1)	Unit 2	Unit 2			Ch. 13			Ch. 12					Pp. 138-141	
Rhodes & Samples	Unit 1, Ch. 19	Unit 1					Unit 2		Chs. 17, 18	Chs. 10-12	Chs. 13, 14	Chs. 6-9	Pp. 13, 19	Pp. 149, 357
Shank & Others						Pp. 30-31						Chs. 2, 3,12		Pp. 32, 33
Shuey & Others	Pt. 2	Pt. 6				Ch. 7	Chs. 8-15							
Smart & Smart							Chs. 1-6							
Starr									Unit 3					
Tate & Glisson						Pt. III	Pt. IV				Pt. I			Pt. IV

HOME ECONOMICS 4—CHILD DEVELOPMENT (½ unit)

OVERVIEW

This special interest course is planned for girls and boys in grades 11 and 12. It provides opportunity for pupils to study human growth and development and to gain a keener understanding of children and of themselves as individuals.

Trends toward early marriage and parenthood and increasing attention to the importance of a child's earliest experiences to his whole future life make this course highly relevant. In addition, knowledge of child development is immediately applicable to the many associations these young people have in living with brothers and sisters, in caring for children of other families, in working with children on playgrounds or community groups, and as means of exploring occupational interests in this area.

The concepts and subconcepts for this course are organized as follows:

CONCEPT I—ENVIRONMENT FOR CHILD DEVELOPMENT

- The Child in Various Cultures
- The Child in the Family

CONCEPT II—DEVELOPMENT FROM INFANCY TO ADOLESCENCE

- Patterns of Development Among Children
- Guiding Children

CONCEPT III—WELL-BEING OF INFANTS AND CHILDREN

- Preparation for Children
- Care of Infants and Children

CONCEPT IV—EMPLOYMENT RELATED TO CHILD DEVELOPMENT

- Occupational Opportunities Related to Child Development
- Suitability of Self for Employment in Occupations Related to Child Development

CONCEPT I considers the family and societal settings in which children grow and develop. CONCEPT II is concerned with the importance and techniques of positive guidance and with the child's physical, mental, social, and emotional growth and development from infancy to adolescence. CONCEPT III explores factors contributing to well-being of infants and children with special emphasis on preparation for children in the home, care of mother and the newborn, health and development of infants and children, home and community resources for optimum development. CONCEPT IV deals with employment related to the field of child development.

CONCEPT I—ENVIRONMENT FOR CHILD DEVELOPMENT

Subconcepts:	Time Allocation: (percent)
A. The Child in Various Cultures	5
B. The Child in the Family	5
Percent of total time	10

A. THE CHILD IN VARIOUS CULTURES

Behavioral Outcomes:

- Is aware of differences in child-rearing practices among various cultures
- Knows ways welfare of children in all countries is interdependent

Generalization 1: Child-rearing practices reflect the culture and affect the kind of person the child becomes.

Essential Learning: Child rearing in various cultures

. . . Areas where parental practices in child rearing vary most among cultures
Type, degree, and time for starting training for adult responsibilities; methods of meeting physical needs; ways of expressing affection; type of responsibilities assumed by parents and others

. . . Effects of differing child-rearing practices
Age at which independence is reached, time at which formal education is started, attitudes developed toward authority, feelings of basic trust and security, characteristics individuals have as adults

Generalization 2: The welfare of one's own children depends upon the welfare of all children everywhere.

Essential Learning: Children as inheritors of suffering or happiness

. . . Reasons for concern for children everywhere
Children unwitting victims of poverty, ignorance, unrest, or recipients of wealth, cultural advantages, harmony; increased interchange between people with differing living standards within and among countries; basic right of all to food, care, dignity

. . . Contributions of American families to welfare of children in other countries
Donations to international and national aid programs; adoption and private support of children; exchange of ideas, goods, technology, culture significant to child development

. . . Ways families in other cultures contribute to welfare of American children
Stimulating trade and economic exchange which create jobs for parents; sharing cultural diversity through art, music, sports; demonstrating by example alternate ways of life, care of children; accepting young people on foreign exchange programs

B. THE CHILD IN THE FAMILY

Behavioral Outcomes:

- Recognizes adjustments made by own families due to children
- Realizes contributions of family to own development
- Evaluates own contributions to family

- Understands special situations within a family affecting child development
- Understands forces outside a family affecting child development

Generalization 1: Children lead to satisfactions in family living and create a need for some adjustments.

Essential Learning: Relationship of children to family living

. . . Satisfactions a child may bring to families
Varied interests, love and affection, realistic outlook on life, feelings of being wanted and needed

. . . Aspects of living frequently requiring adjustments in families with children
Social activities of family members, roles assumed by individuals, physical arrangements for infants and children, division of money, daily routine, work life of various members

. . . Aspects of child development influenced by way families make adjustments
Feelings of being an acceptable person to self and others, development of talents and skills, ability to live with others, understanding of responsibilities associated with role, development of physical and emotional health habits

Generalization 2: The well-being of children is dependent upon reactions to the impacts of family living.

Essential Learning: Impact of family living on children

. . . Factors in the home having impact on life of children
Parental actions: separation by employment, death, divorce, remarriage; social activities; interpersonal relationships; residence change
Sibling interaction: order of birth, differences in age
Material goods: equipment, furnishings, cultural materials, mass media

. . . Ways children are affected by various forces
Parental actions: carry-over of family patterns of behavior into other social relationships, imitation of parental attitudes toward individual siblings, feelings of pride or shame, divided loyalties
Sibling interaction: stimulation, incentive, personal satisfactions, embarrassments
Material goods: imitation and establishment of standards of behavior and activities from television, books; understandings and knowledge acquired; satisfactions, dissatisfactions

CONCEPT II—DEVELOPMENT FROM INFANCY TO ADOLESCENCE

Subconcepts:	Time Allocation: (percent)
A. Patterns of Development Among Children	20
B. Guiding Children	20
Percent of total time	40

A. PATTERNS OF DEVELOPMENT AMONG CHILDREN

Behavioral Outcomes:

- Knows typical and atypical growth and development patterns from infancy to adolescence
- Relates principles of growth to own development
- Expresses empathy to children with atypical growth patterns
- Knows sources of assistance for understanding and coping with atypical children

Generalization 1: Although all children follow a predictable sequence of growth and development, the rate varies among individuals.

Essential Learning: Typical growth and development from infancy to adolescence

. . . Areas of growth and development
Physical: motor skills, sensory development, manipulative skills, muscle development, bone structure, nervous system
Intellectual: mental reasoning, language abilities, creativity; curiosity; imagination

Social: relationship situations, behavior patterns, attitudes toward others
Emotional: feelings of security, love, acceptance; expectations for protection and control; emotional responses

. . . Principles of growth and development of children

Areas of growth are interrelated and each follows a definite, predictable pattern; type and rate of development in each area varies among individuals; children may suffer from being forced or held back in the learning of any activity

. . . Types of development occuring during different ages

Birth through 1 year: wide individual differences in spontaneous motor activity and degree of stimulation needed for sensory responses; imitation of sounds; formulation of words; gradual emotional responses in relation to stimuli

Two through five years: rapid growth of language and intellectual capacities; awareness of sex differences; differentiation of stimuli in environment; recognition of need for adult help; initial establishment of defensive behaviors; slow head growth, rapid limb growth, intermediate trunk growth

Six through twelve years: increased coordination of body movements; idealization of individuals outside the immediate family; increased sex-typing; greater importance of peer group; rapid rate in growth of conscience

Generalization 2: Atypical growth and development patterns require realistic understanding and treatment.

Essential Learning: Atypical growth and development from infancy to adolescence

. . . Types of atypical growth and behavior patterns

Physical irregularities: lack of muscle control, speech and sensory defects, congenital malformation

Mental variations: retardation, giftedness

Social extremes: introversion, extroversion

Emotional maladjustments: psychosis, psychoneuroses

. . . Guides in dealing with children with atypical growth and development patterns

Treat child in normal way except in areas of limitation, help child to set realistic goals and develop his potential, arrange for remedial or special treatment

. . . Sources of assistance for understanding and coping with deviations in growth and development

Special classes, clinics, specialists for children: books, meetings, agencies for parents

B. GUIDING CHILDREN

Behavioral Outcomes:

- Evaluates own behavior in relation to responsibilities of growing up
- Practices approved techniques of guidance in relationships with children

Generalization 1: An understanding of types of behavior expected throughout life contributes to a sound approach in guidance of children.

Essential Learning: Behavior of children

. . . Categories of behavior in relation to responsibilities of growing up

Accepting and adjusting to the changing body, managing body and learning new motor patterns, learning one's psycho-socio-biological sex role, relating to changing social groups, achieving an appropriate dependence-independence pattern, achieving an appropriate giving-receiving pattern of affection, developing a conscience, developing ability to communicate and reason, establishing values and beliefs

. . . Principles regarding development of behavior which will assist in guiding children

Each person faces certain responsibilities of growing up at every stage of life to which he must react, type and degree of reaction to responsibilities vary with individuals, some success must be achieved at each state in order to approach the next level of maturity, no single responsibility of growing up is achieved in isolation, individual behavior is influenced more by own development than by pressures of society

. . . Values of understanding principles of development of behavior

Recognize teachable moment, look for certain types of behavior at certain ages and stages of life, expect differences

Generalization 2: Through skillful guidance a child learns behavior which contributes to adjustment.

Essential Learning: The technique of guidance

. . . Purposes of child guidance

Promote positive attitudes toward self,

environment, and other people; develop individual potential; learn ways to direct energies for good of self and others: establish basic patterns of behavior for present and future

... Practices effective in child guidance

Accept realistic standards of performance at different ages and stages, allow child to learn through mistakes, provide opportunities for success, provide opportunities for gradual adjustment to change, understand and accept the child's role in home and community, feel and exhibit unqualified love for the child, recognize variation in acceptable behavior among different cultures

... Principles of child guidance

Approval fosters values, help stimulates abilities, respect encourages self-respect, affection gives security

CONCEPT III—WELL-BEING OF INFANTS AND CHILDREN

Subconcepts:	Time Allocation: (percent)
A. Preparation for Children	10
B. Care of Infants and Children	30
Percent of total time	40

A. PREPARATION FOR CHILDREN

Behavioral Outcomes:

- Is aware of the many family decisions in determining whether or not to have children
- Recognizes adjustments necessitated by the addition of children in a family
- Is aware of the importance of prenatal care and sources of help to perspective parents

Generalization 1: The addition of children in the home necessitates many family decisions.

Essential Learning: Making decisions regarding addition of children to the home

... Factors influencing the addition of children in the home

Physical and mental health of parents, emotional maturity of parents, basic values and attitudes of couples toward children, housing of family, economic adjustments needed if wife has been contributing to family income, additional expenses due to having a baby

... Ways married couples can acquire children

Pregnancy: planned parenthood, unplanned parenthood

Adoption: sources for obtaining infants and children, laws and procedures for adopting children

Foster care of children: sources and procedures for obtaining children, financial reimbursement and related responsibilities

... Adjustments in the home necessitated by addition of children

Psychological preparation of parents and older children; consideration for interest, concerns, relationships of family members; division of household responsibilities; budgeting to include expenses of newborn, doctor, and hospitalization; housing to include newborn

Generalization 2: Prenatal care of the prospective mother will help assure physical health of mother and mental health of both parents.

Essential Learning: Prenatal care

... Factors affecting health of mother and unborn child

Understanding by parents of conception and the birth process; mental attitudes toward pregnancy; mother's medical and dental care; health habits; illness and diseases; use of drugs, alcohol, and cigarettes, diet, clothes

... Sources of help to prospective parents

Prenatal classes, professional magazines, clinics, physicians

... Reasons prenatal care is important

Peace of mind, early detection of malfunctioning of organs, understanding of expectations in pregnancy, assurance of contact person if an emergency arises

B. CARE OF INFANTS AND CHILDREN

Behavioral Outcomes:

- Understands the physical needs of infants and children and how to meet them
- Appreciates contributions family has made to own physical care

- Recognizes responsibilities of adults in guiding play and recreation of children
- Assumes some responsibility in selecting and using suitable play materials for children
- Knows available resources outside the family for the care and protection of children

Generalization 1: Good physical care contributes to well-being of children.

Essential Learning: Physical care of children from birth to adolescence

... Considerations in meeting physical needs of children

Feeding: food and nutritional requirements, techniques of feeding, eating habits, attitudes toward food and eating

Clothing: requirements in relation to comfort, season, developmental stage; techniques in dressing

Bathing: equipment and supplies, techniques and schedules in bathing

Sleeping: sleep and rest requirements, equipment and furnishings, space and arrangement, habits and attitudes

Elimination: equipment, habits, and attitudes

... Ways to promote safety of infants and children

Providing safety features in the home; teaching safety rules in use and care of home equipment, in play, in contact with others; arranging supervision of children's activities

Generalization 2: Adults have major responsibility for promoting play and recreational activities which contribute to the optimum growth of children.

Essential Learning: Play and recreation for children

... Responsibilities of adults for play and recreation of children

Provision of materials and equipment for play, promotion of the use of safe and suitable equipment, training in correct use of equipment and safe procedures in recreational activities, choice of play area, encouragement of a variety of play and recreational activities, recognition that play is a way child learns

... Types of play activities in relation to values to be derived

Developing muscle coordination: swinging; hiking; squeezing toys

Socializing and sharing: games, folk dancing, sports

Developing imagination and creativity: dramatic play, art work, telling stories

Releasing emotions: sports, reading, listening to or participating in music activities, watching television

Developing manipulative skills: art work, sewing, playing musical instruments

Solving problems: building models, doing puzzles

... Factors to consider when selecting play materials and equipment

Suitability to age, ability, interest; durability and safety of construction; ease of use; type of learning and development involved

Generalization 3: Resources outside the home are available to assist the family in the care and protection of children.

Essential Learning: Assistance to families in care of children from infancy to adolescence

... Ways the local community supplements home in caring for children

Sponsor cultural and educational programs, provide recreational and educational institutions, provide health and protection services

... Community and private agencies for health and protection of children

Health and welfare organizations, local Board of Education, local Homemakers' Service, Visiting Nurses Association

... Areas of legal protection for children

Marriage, adoption, education, work, foster care, support of children

CONCEPT IV—EMPLOYMENT RELATED TO CHILD DEVELOPMENT

Subconcepts:	Time Allocation: (percent)
A. Occupational Opportunities Related to Child Development	5
B. Suitability of Self for Employment in Occupations Related to Child Development ..	5
Percent of total time	10

A. OCCUPATIONAL OPPORTUNITIES RELATED TO CHILD DEVELOPMENT

Behavioral Outcomes:

- [illegible] aware of a variety of occupations related to [illegible]l development and level of training required
- Is able to identify factors which affect availability of employment in child development-related occupations
- Utilizes sources for obtaining pertinent information about occupational opportunities related to child development

Generalization 1: Understanding factors affecting employment opportunities helps individuals make vocational choices.

Essential Learning: The nature of occupations related to child development

. . . Occupations in relation to level of training
High school courses: day care center assistant, nursery school assistant, assistant in children's home, camp counselor, recreational center aide, employment in home care of children, sales clerk in child-related retail area
Two years beyond high school: assistant camp director, self-employment-care of children, self-employment-care of children in own home and homes of others, public nurse, airlines stewardess, governess
Four or more years beyond high school: teacher, child psychologist, social worker, director of children's programs

. . . Places of employment
Schools: private or public, nursery or elementary
Hospitals: children's and infants' sections in general hospital, children's hospital
Retail stores: specialized shops or department in general stores dealing with children's clothing, toys, furniture
Recreational centers: camps, parks, clubs
Homes: private home, institution

. . . Factors affecting number and types of occupations available
Type of community: urban, suburban, rural, small town
Kinds of economic area: agricultural, industrial, resort, residential
Conditions of economic growth and decline: unemployment rate, turnover of employees, income level, industry

Generalization 2: Use of many available sources of information will provide background for weighing decisions regarding choice of occupation.

Essential Learning: Securing information about occupational opportunities

. . . Sources for information about types and location of opportunities
School and public libraries, school guidance office, friends and relatives, newspaper advertisements, employment agencies

. . . Types of information to investigate
Scope of job, opportunity within field, geographic location with greatest potential, stability of job in the field

B. SUITABILITY OF SELF FOR EMPLOYMENT IN OCCUPATIONS RELATED TO CHILD DEVELOPMENT

Behavioral Outcomes:

- Identifies personal qualities which contribute personal employability
- Evaluates personal potential for employment in occupations related to child development

Generalization 1: Careful analysis of personal assets and liabilities will help one determine a suitable choice of occupation.

Essential Learning: General employability of self

. . . Factors to consider when assessing personal qualifications for employability
Physical and mental health, physical and mental capabilities and limitations, physical habits, emotional behavior, personality traits, personal appearance, communication skills

. . . Factors to consider when analyzing personal aspirations regarding employment
Ability for and interest in further training: desire for money, prestige, position, status

. . . Factors to consider when examining personal competence
Manipulative skills: manual dexterity, strength

Mental skills: attention to detail, knowledge, imagination
Social skills: ability to relate well to others, preference for working alone and/or in groups

Generalization 2: When one's personal qualifications and interests are suited to the type of occupations chosen, employment can be more satisfying and rewarding.

Essential Learning: Relation of self to specific child development-related occupations

. . . Aspects to consider when analyzing specific occupations
Title of job, description of work required, personal competences required, working conditions, remunerative potential, opportunities for advancement

. . . Factors to be considered in assessing personal qualifications for a specific occupation
Similarity of personal characteristics to those required, degree of interest in work of position, present and potential aptitude for required work, possible personal satisfaction to be gained

HOME ECONOMICS 4—CHILD DEVELOPMENT REFERENCE GUIDE

	Concept I		Concept II		Concept III		Concept IV	
References	A	B	A	B	A	B	A	B
Bijou & Baer			All	All				
Bossard & Boll		Pts. II-IV						
Bowman		Ch. 14			Ch. 13			
Cavan					Chs. 20,21			
Duvall		Ch. 2						
Hoeflin		Chs. 6,7	Chs. 2-4					
Honigmann	Ch. 13							
Kenkel					Ch. 10			
Kirkpatrick			Chs. 9-11		Ch. 19			
Langford			Chs. 4-7	Ch. 3		Chs. 8-16		
McKinney							All	All
Mussen & Others	Chs. 6-12		Pts. II-IV					
Phillips							All	All
Shuey & Others	Ch. 20		Chs. 8, 12,17			Chs. 9-11, 13-16		
Smart & Smart				Ch. 6		Chs. 1-5, 9-13		
Tate							All	All
Wolf			Chs. 6,9	Ch. 3		Chs. 1,2,7		

HOME ECONOMICS 5—FAMILY AND COMMUNITY HEALTH (½ unit)

OVERVIEW

Families and individuals place good health high on their lists of values and goals. This special interest course for pupils in grades 11 and 12 provides the opportunity to study health in a broad perspective from world concern to individual responsibility. Advances in medical science offer continuing encouragement that mental and physical health can be a realistic aspiration for most people, but actual maintenance of health weighs heavily upon personal decision, family management, and community effort.

The concepts and subconcepts for this course are organized as follows:

CONCEPT I—THE HEALTH OF THE NATION AND THE WORLD

- The Challenge of World Health
- The Citizen and Health

CONCEPT II—HEALTHFUL LIVING

- Development of Health
- Management for Family Health and Safety

CONCEPT III—HOME CARE OF THE SICK AND INJURED

- Family Care for Confined Members
- Using Community Resources for Home Care of the Sick

CONCEPT IV—EMPLOYMENT RELATED TO FAMILY AND COMMUNITY HEALTH

- Occupational Opportunities Related to Family and Community Health
- Suitability of Self for Employment in Occupations Related to Family and Community Health

CONCEPT I is planned to develop an awareness of world health problems and cooperative action being taken toward their solution. It also defines the interrelationships between individual and community responsibility. CONCEPT II establishes personal and family preparedness as basic to reducing and meeting health crises.

In CONCEPT III home care of the sick and injured is explored, mental illness is considered, and the extension of home facilities through knowledgeable use of community resources is given attention. CONCEPT IV relates to employment opportunities in health services for interested persons with various levels of education and training.

CONCEPT I—THE HEALTH OF THE NATION AND THE WORLD

Subconcepts:	Time Allocation: (percent)
A. The Challenge of World Health	5
B. The Citizen and Health	10
Percent of total time	15

A. THE CHALLENGE OF WORLD HEALTH

Behavioral Outcomes:

- Understands the broad meaning of health
- Gains insight into ways world health problems are approached and improvements are made

Generalization 1: Good health is a condition that is often considered an individual's most valued possession.

Essential Learning: Meaning of good health

. . . Indicators of good health
State of complete physical, mental, social well-being; ability to use intellectual, emotional, and physical resources for optimum living; absence of disease and infirmity

. . . Ways good health enriches life
Increases productivity, makes possible better use of human and material resources, encourages a positive outlook

. . . Factors affecting or determining personal health
Heredity, environment, behavior

Generalization 2: Certain health problems are of concern in all areas of the world.

Essential Learning: Major health problems throughout the world

. . . Kinds of health problems with international significance
Malnutrition, mental illness, accidents, potential radiation hazards, chronic diseases, communicable diseases

. . . Factors contributing to health problems
Depletion of natural resources, overpopulation, diseases of old age, increased travel and

mingling of people, nuclear explosions, insufficient food

Generalization 3: Positive action undertaken cooperatively by many organizations is leading to improved health throughout the world.

Essential Learning: Action towards solution of health problems

... Reasons for concern over world health problems
Interest in fellowman, in future of nation and world, and in future generations; desire for survival; challenge of searching for solution to problems

... Types and functions of organizations working toward world health
World Health Organization (WHO): helping people of different nations to help themselves to healthier living, assisting nations control communicable diseases with modern techniques
United Nations International Children's Emergency Fund (UNICEF): helping provide necessities for the children of the world through bolstering nutrition and making medical supplies and services available
International Red Cross, private charities, and relief programs: meeting emergencies and assisting with disaster relief and rehabilitation
Freedom from Hunger Campaign: attempting to solve food crises through combined efforts of peoples of many nations
Private industries and agencies: cooperating on discovery and development of resources as harvesting the sea, population control, radiation control, distribution of food supplies, improved agriculture, research in mental health

B. THE CITIZEN AND HEALTH

Behavioral Outcomes:

- Recognizes influences [illegible] problems of others upon individuals [illegible] families
- Sees ways individuals and groups work to promote improved health for all

Generalization 1: As an individual understands health problems he is better prepared to work with others toward the alleviation of these problems.

Essential Learning: Relationship of the individual and family to health in the community, nation

... Influences upon individuals due to health problems of others
Feelings of uneasiness when epidemics strike; pressures for contributions from agencies and institutions working toward prevention and cure of specific diseases; encouragement to become more aware of causes and cures of various health situations through educational materials, clinics, television programs

... Efforts of individuals and groups in alleviating health problems
Individuals: contribute financially to research programs concerned with health, support programs concerned with eliminating hazards causing health problems, promote good health attitudes and standards in home and community, obey laws, use influence for establishing health measures, maintain home conditions conducive to health
Groups: provide workmen's compensation, health and medical plans, health services, recreational programs; set health standards in relation to foods, shelter, drugs, water; promote aspects of health in educational programs for youth and adults; promote ethical practices in businesses and professions

Generalization 2: Community regulations and practices related to health are designed to protect the individual and family.

Essential Learning: Relationship of community practices to health of individuals and families

... Situations in communities which may affect health of individuals and families
Traffic, eating places, land utilization, air pollution, noise, water pollution, odors, garbage disposal

... Measures for coping with community situations
Zoning laws, traffic regulations, health and safety education programs, housing requirements, recreational areas, food service standards and inspection, curfews for children, clinics

... Ways community regulations and practices affect health of individuals and families
Lessens chance of accidents and disease;

promotes better mental health; protects youth from using narcotics, alcohol, and tobacco

CONCEPT II—HEALTHFUL LIVING

Subconcepts:	Time Allocation: (percent)
A. Development of Health	10
B. Management for Family Health and Safety	20
Percent of total time	30

A. DEVELOPMENT OF HEALTH

Behavioral Outcomes:

- Exhibits good health habits
- Recognizes the need for personal effort in maintenance of health

Generalization 1: Good health is reflected in an individual's appearance and attitude.

Essential Learning: The nature of optimum health

... Characteristics of a healthy person

Physically fit: well-developed body, appropriate weight and height, free from disease or infirmity, good muscle tone, strength and endurance

Emotionally stable: faces problems realistically, relates appropriately to other people, finds pleasure and inner satisfaction in life, is in control of own emotions

Mentally alert: broad interests, continuous learning, active commitment to living

... Results of establishing appropriate health attitudes and habits

Carry-over habits into new environments, positive influence on others, improved health, reduced chances of defects and disease, extended life span, vigorous full existence

Generalization 2: Each individual must adjust his pattern of healthful living according to own situation.

Essential Learning: Promotion of personal health

... Patterns for healthful living

Maintaining physical fitness, developing and keeping mental and emotional health, protecting self from disease, preventing accidents, knowing principles of first aid, relying on professional advice, avoiding health fads, practicing good nutrition

... Reasons for variations in patterns for healthful living

Age, state of health, type of occupation, hobbies and recreational interests

B. MANAGEMENT FOR FAMILY HEALTH AND SAFETY

Behavioral Outcomes:

- Understands the importance of management in creating a safe and healthy environment
- Recognizes the value of a financial plan for medical care and health maintenance
- Is able to act appropriately in time of emergency, either meeting the crisis or seeking help

Generalization 1: Maintaining health and safety in the home is a responsibility to be shared by each family member according to his ability.

Essential Learning: Planning for maximum health and safety

... Considerations in establishing healthful climate in the home

Provisions for physical needs of individuals, such as food, clothing, shelter; provisions for emotional and mental needs, such as security, love; maintenance of safe environment through alertness to and correction of accident hazards, efforts to avoid and prevent illness, safeguards for crises, release from mental and emotional strain

... Steps in managing for family health

Define objectives, identify means of reaching objective, share responsibilities among family members, gather information, carry out plans

... Ways to encourage family cooperation in maintaining health

Promote positive attitudes and effective practices, give approval for each member's contribution, adapt to changing situations

... Resources outside the family available to serve health needs

Professional medical personnel: doctors, specialists and generalists; nurses, registered

and practical; dentists, specialists and generalists
Physical facilities: various types of hospitals and institutions, clinics, nursing homes
Tax-supported services: health department, fire department, police department

Generalization 2: Being adequately prepared to meet emergencies arising from illness and accidents or from loss of income contributes to family economic security.

Essential Learning: Financial security in relation to health

... Benefits of having a plan for meeting health costs
Increased ability to meet costs of medical services, opportunity for better medical care, freedom from worry over possible future costs

... Factors affecting the type of financial plan for health needed by individuals and families
Size of family, age and sex of members, income, cost of medical service in area, community and tax-supported health services available, individual health problems, standards of health care desired

... Types of plans available for meeting health costs
Health insurance: sickness, accident, hospitalization
Personal savings: annuity, bank account, life insurance
Work compensation: disability, sickness

... Health frauds to avoid
Fake health and accident insurance policies, misleading advertising of foods and health products, experiments reported as cures, misuse of statistics, recommended self-medication, quacks, cults, and fads

Generalization 3: Family members will be better prepared to handle emergencies if they have some knowledge of first aid techniques and keep a variety of supplies and equipment ready for use.

Essential Learning: Meeting emergencies

... Types of emergencies resulting in major or minor illness and injury
Traffic or home accidents resulting in breaks, bruises, cuts, shock; contamination of food or water; skin poisoning or burns; exposure to excess sun, wind, cold; disasters such as flood, fire, atomic attack

... General procedures for coping with emergencies
Knowing recommended methods for various emergency conditions, applying appropriate first aid measures, keeping supplies and equipment handy, summoning help

CONCEPT III—HOME CARE OF SICK AND INJURED

Subconcepts:	Time Allocation: (percent)
A. Family Care for Confined Members	35
B. Using Community Resources for Home Care of the Sick	10
Percent of total time	45

A. FAMILY CARE FOR CONFINED MEMBERS

Behavioral Outcomes:

- Realizes the need for evaluating problems facing families when sickness occurs
- Gains some proficiency and skill in caring for the sick at home
- Understands that a well-arranged and appropriately equipped room aids in providing for the comfort and care of the patient
- Applies the principles of nutrition and meal planning in preparing and serving meals to the ill
- Shows beginning understanding of mental illness

Generalization 1: Home care of the patient must be considered in light of total needs and the family's ability to provide them.

Essential Learning: Planning for home confinement of a patient

... Conditions which imply home care
Prolonged illness, lack of funds for hospitalization, attitude of patient, shortage of hospital service, routine short illnesses

... Considerations in deciding to care for patient in the home

Patient: physical and psychological needs. necessary treatments, nature of illness or accident

Home situation: size and type of dwelling: personnel available and able to care for patient; number and types of adjustments needed in household routines, personal living habits

Generalization 2: Keeping the patient comfortable during illness helps assure required rest and relieves the strain of being confined.

Essential Learning: Care and comfort of the patient

... Essentials in care of sick at home

Taking pulse, respiration, temperature; giving hot and cold packs, steam inhalations; bathing patients confined to bed, ambulatory; changing bed linen; administering medications at doctor's advice; maintaining health records

... Techniques for increasing patient's comfort

Caring for grooming and clothing needs, planning diversions, keeping equipment and supplies convenient to patient, changing positions, relieving pressure, providing needed supports, adjusting bedding, giving massages

... Responsibilities of family members to home care of sick

Establishing a schedule, considering needs of patient and other family members, assuming responsibilities commensurate with age, experience, skills, and abilities

Generalization 3: The furnishings and their arrangement in the sickroom contribute to the patient's comfort and well-being and to ease in caring for patient.

Essential Learning: Planning surroundings for the patient

... Characteristics of room appropriate for the sick

Properly ventilated, heated, lighted; conveniently located to bathroom, kitchen; free from disturbing noises; color and design conducive to relaxation; minimum of furniture and accessories

... Types of furniture and equipment for patient's room

Basic equipment: bed, bed table, chest, straight chair, easy chair, signal device, waste container

Special equipment: back rest, commode, foot rest

... Considerations in arranging furniture and equipment for efficiency and comfort

Ease in caring for patient, efficiency in storing equipment and supplies in relation to use. comfort and well-being of patient

... Ways of caring for the sickroom and its furnishings

Follow approved cleaning procedures; use effective and nonirritating cleaning supplies; follow approved methods in arranging and keeping flowers and plants

Generalization 4: In feeding a patient different approaches to planning and serving foods are needed.

Essential Learning: Feeding the patient

... Factors in meal planning for the sick

Follow diet prescribed by doctor; prepare foods to preserve nutritional value; serve foods attractively arranged in suitable quantity; consider age, type of illness, likes and dislikes, physical handicaps of patient; use foods which can be handled and eaten easily by patient; adapt food for sick from family meals

... Diets for various health conditions

Liquid, soft, light, low salt, low fat

Generalization 5: Rehabilitation and recovery from mental illness often depends upon family understanding and care.

Essential Learning: Mental illness

... Types of behavior which may indicate mental illness

Continually unhappy; cannot sleep, eat, concentrate, or get along with people for days on end; severe depression; lack of interest in people, things, and life in general; drink excessively; use narcotics

... Causes and origin of mental illness

Stresses, damage to brain, unusual events, deprivation of a source of emotional support, overprolonged grief

... Sources of assistance to mentally disturbed persons

Clergy, clinical psychologist, psychoanalysts, social workers, marriage counselors, guidance counselors

. . . Ways families can help the mentally disturbed
Recognize symptoms early, encourage persons to seek professional assistance, maintain attitudes of understanding and compassion, adhere to professional recommendations in care of patient

B. USING COMMUNITY RESOURCES FOR HOME CARE OF THE SICK

Behavioral Outcomes:

- Is aware of the human and material resources available in the community to assist in the care of the sick
- Is aware of procedures for obtaining equipment or services

Generalization 1: Use of supplementary equipment available from the community adds to the patient's comfort and reduces cost of illness.

Essential Learning: Loan or rental of equipment for care of sick

. . . Community sources for loan or rental of equipment for care of sick
Local service groups, fire department, medical supply store, rental stores, individuals

. . . Types of equipment available
Hospital type beds, bedside tables, crutches, walkers, wheelchairs, commode, special chairs

. . . Reasons for supplementing equipment available in home
Infrequent use, expensive to buy, more appropriate equipment for patient and person caring for patient, inadequate storage space when not in use

Generalization 2: Use of human resources from the community assists the family and helps make the patient comfortable.

Essential Learning: Human resources within the community for care of sick

. . . Sources of volunteer and paid help
Visiting Nurses Association, Homemakers' Service (check your local health or welfare dept. or Community Chest), individuals with some specialized training or experience, firemen

. . . Types of services which individual may provide
Give treatments, demonstrate procedures, provide nursing care

CONCEPT IV—EMPLOYMENT RELATED TO FAMILY AND COMMUNITY HEALTH

Subconcepts:	Time Allocation: (percent)
A. Occupational Opportunities Related to Family and Community Health	5
B. Suitability of Self for Employment in Occupations Related to Family and Community Health	5
Percent of total time	10

A. OCCUPATIONAL OPPORTUNITIES RELATED TO FAMILY AND COMMUNITY HEALTH

Behavioral Outcomes:

- Is aware of a variety of occupations related to family and community health and level of training required
- Is able to identify factors which affect availability of employment in health-related occupations
- Utilizes sources for obtaining pertinent information about occupational opportunities related to family and community health

Generalization 1: Understanding factors affecting employment opportunities helps individuals make vocational choices.

Essential Learning: The nature of occupations related to family and community health

. . . Occupations in relation to level of training
High school courses: nurse's aide, hospital aide, private employment for aged and sick, office assistant for dentist or doctor
Two years beyond high school: practical nurse, dental hygienist, medical secretary, laboratory technician
Four or more years beyond high school: registered nurse, school-nurse teacher, anesthetist, doctor, director of nurse's training

hospital, supervisor of nurses, dietician, occupational therapist

... Places of employment
Business and industrial firms, private practice, homes, schools, hospitals and clinics, government agencies

... Factors affecting number and types of occupations available
Type of community: urban, suburban, rural, small town
Kind of economic area: agricultural, industrial, resort, residential
Conditions of economic growth and decline: unemployment rate, turnover of employees, income level, industry

Generalization 2: Use of many available sources of information will provide background for weighing decisions regarding choice of occupations.

Essential Learning: Securing information about occupational opportunities

... Sources for information about types and location of opportunities
School and public libraries, school guidance office, friends and relatives, newspaper advertisements, employment agencies

... Types of information to investigate
Scope of job opportunity within field, geographic location with greatest potential, stability of jobs in the field

B. SUITABILITY OF SELF FOR EMPLOYMENT IN OCCUPATIONS RELATED TO FAMILY AND COMMUNITY HEALTH

Behavioral Outcomes:

- Identifies personal qualities which contribute to personal employability
- Evaluates personal potential for employment in occupations related to family and community health

Generalization 1: Careful analysis of personal assets and liabilities will help one determine a suitable choice of occupation.

Essential Learning: General employability of self

... Factors to consider when assessing personal qualifications for employability
Physical and mental health, physical and mental capabilities and limitations, physical habits, personal appearance, emotional behavior, communication skills, personality traits

... Factors to consider when analyzing personal aspirations regarding employment
Ability for and interest in further training; desire for money, prestige, position, status; desire to be of service

... Factors to consider when examining personal competence
Manipulative skills: manual dexterity, strength, endurance
Mental skills: attention to detail, memory, knowledge, attitude toward suffering
Social skills: ability to relate well to others, sympathy, empathy, understanding

Generalization 2: When one's personal qualifications and interests are suited to the type of occupation chosen, employment can be more satisfying and rewarding.

Essential Learning: Relation of self to specific family and community health-related occupations

... Aspects to consider when analyzing specific occupations
Job titles, description of work, personal competences required, working conditions, remunerative potential, opportunities for advancement, inherent worth of job

... Factors to be considered in assessing personal qualifications for a specific occupation
Similarity of personal characteristics to those required, degree of interest in work of position, present and potential aptitude for required work, possible personal satisfaction to be gained, possible personal contributions to be made

... Satisfactions which may be derived from occupations related to family and community health
Helping individuals to be more comfortable and in better health, contributing to an important social concern, working in a field which is respected

HOME ECONOMICS 5—FAMILY AND COMMUNITY HEALTH REFERENCE GUIDE

	CONCEPT I		CONCEPT II		CONCEPT III		CONCEPT IV	
REFERENCES	A	B	A	B	A	B	A	B
Fleming		Ch. 9	Ch. 1	Ch. 8	Chs. 2-7	Pp. 245-254		
Florio & Stafford				Ch. 11				
Jones	Unit 7			Chs. 17, 19,22	Ch. 12		Pp. 391-395	
McKinney							All	All
Meredith & Others	Chs. 1,41	Chs. 2, 42-46	Unit 3	Chs. 33,34	Unit 8	Chs. 42-46		
Nickell & Others	Ch. 21	Ch. 21		Ch. 21	Ch. 21	Ch. 21		
Phillips							All	All
Rhodes & Samples		Ch. 15		Ch. 15	Ch. 15	Ch. 15		
Riehl			Ch. 2	Ch. 16 Pp. 74,75	Chs. 6-15			
Schifferes	Ch. 1	Ch. 17	Chs. 2-6	Ch. 18	Chs. 11-14	Ch. 17		
Stearn & Stearn	Chs. 28,29	Ch. 29	Unit II		Chs. 2,3, 26,27		Pp. 14,15	
Tate							All	All

HOME ECONOMICS 6—HOUSING, FURNISHINGS, AND EQUIPMENT (½ unit)

OVERVIEW

This special interest course for girls and boys in grades 11 and 12 is designed to provide a basic understanding of the broad subject of housing as it relates to individuals, families, and communities. Cultural influences upon housing at home and abroad, trends and developments in local housing, and considerations in selecting, decorating, furnishing, and maintaining living space are included for study.

Housing represents the single largest expenditure of family income for the majority of households, according to consumer spending indices. It is related importantly to the social, psychological, and aesthetic aspects of family living. Mobility trends have put housing, with its many components, into focus as an area of repeated concern rather than of once-in-a-lifetime or infrequent status. In addition, increasing variety in the consumer market adds complexity to the choices which must be made.

The concepts and subconcepts for this course are organized as follows:

CONCEPT I—HOUSING AND SOCIETY

- Housing at Home and Abroad
- Housing Improvement as a Social Concern

CONCEPT II—HOUSING FOR THE INDIVIDUAL AND FAMILY

- Housing Selection
- Housing Expenditures
- Interior Design and Decoration
- Selection of Equipment and Furnishings

CONCEPT III—MAINTENANCE OF LIVING SPACE

- Organization and Management
- Cleaning and Repair

CONCEPT IV—EMPLOYMENT RELATED TO HOUSING, EQUIPMENT, AND FURNISHINGS

- Occupational Opportunities Related to Housing, Equipment, and Furnishings
- Suitability of Self for Employment in Occupations Related to Housing, Equipment, and Furnishings

CONCEPT I considers housing as a basic concern of peoples everywhere. Differences in housing and housing requirements are explored, as well as influences that affect the quality of housing available. CONCEPT II focuses upon information and competencies important in providing appropriate housing for families and individuals. The interrelationships between family housing needs, aesthetics, family resources, and availability are considered. In CONCEPT III the pupil will be exposed to the important aspects of management, maintenance, and upkeep of living space for maximum family satisfaction and for economic implications. CONCEPT IV stresses occupational opportunities in fields of housing, furnishings, and equipment and the personal qualities appropriate for such vocations.

CONCEPT I—HOUSING AND SOCIETY

Subconcepts:	Time Allocation: (percent)
A. Housing at Home and Abroad	5
B. Housing Improvement as a Social Concern	5
Percent of total time	10

A. HOUSING AT HOME AND ABROAD

Behavioral Outcomes:

- Understands factors that lead to variations in housing in different cultures
- Knows ways in which housing varies in other countries and at home
- Sees ways in which housing influences family and community living

Generalization 1: A variety of societal characteristics defines and directs the type of housing in any culture.

Essential Learning: Housing in various cultures

... Factors influencing housing in various cultures
Population density and mobility patterns; family composition and living patterns; traditions and religious beliefs; health and sanitation standards; educational, social, and political conditions; geography and climate; building materials available; economic levels; technological and scientific development; work and residence patterns; taste and aesthetics

... Aspects of housing which vary among cultures
Amount of shelter, style of housing, size of unit, materials and construction, equipment and convenience features

Generalization 2: Standards and patterns of living in a given household or country are greatly influenced by housing.

Essential Learning: Impact of housing on living

... Areas of living influenced by housing
Interpersonal relationships, health status, standard of living, self-respect

.... Aspects of housing influenced by availability and utilization of space
Comfort, convenience, health and safety, privacy, pursuit of interest, opportunities for beauty and self-expression

B. HOUSING IMPROVEMENT AS A SOCIAL CONCERN

Behavioral Outcomes:

- Is aware of problems related to inadequate housing
- Identifies housing conditions in own community which may lead to or aggravate social problems
- Is aware of activities under way for the improvement of housing and the agencies and organizations which promote these activities
- Recognizes the responsibility of the individual for the improvement of housing for self and society

Generalization 1: A complex interrelationship exists between inadequate housing and many societal and family problems.

Essential Learning: Housing as cause and effect of social problems

... Housing conditions which contribute to social problems

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Shortage of housing, substandard housing, overcrowding in a given unit, lack of living space around housing in populated areas

... Social conditions which contribute to housing needs or problems
    Shifts in population, concentration of elderly, segregation practices, deterioration of neighborhoods, industrial development in communities, de-evaluation of property, unemployment

... Human problems frequently associated with conditions of housing
    Illness and disease, abuse and neglect of children, conflicts in family relationships, educational and cultural deprivation, youth and adult crimes, illegitimacy, feelings of apathy and resignation

Generalization 2: Improved housing in communities and in the world is a complex problem that requires the concerted efforts of individuals, agencies, and governments on all levels.

Essential Learning: Action toward housing improvement

... Types of public and group activity toward solution of housing problems
    Legislation and regulation: antidiscrimination, building codes and inspection, investment protection
    Financial: public housing, slum clearance and urban renewal, redevelopment, conservation, rehabilitation, emergency housing, aids to private housing, loans
    Educational: surveys; home shows, fairs; help in locating and financing housing: information on maintenance

... Types of individual activity and efforts toward housing improvement
    Care and upkeep of own housing, contributions to group efforts, self-help programs for community improvement, responsible citizenship, utilization of educational aids and assistance available

... International efforts toward housing improvement
    United Nations activities; national government aid and loan programs; exchange of technicians in areas of housing, home living, sanitation, health; business investment

... Types of agencies and organizations assisting in solving housing problems
    Local, State, and national governments: housing authorities, public welfare, Veteran's Administration, Federal Housing Administration, Home Loan Bank Board, Federal National Mortgage Association, Farm Home Administration
    Private: business and professional organizations, banks and loan associations, private investors, insurance companies, churches, schools and educational programs

CONCEPT II—HOUSING FOR THE INDIVIDUAL AND FAMILY

Subconcepts:	Time Allocation: (percent)
A. Housing Selection	15
B. Housing Expenditures	10
C. Interior Design and Decoration	20
D. Selection of Equipment and Furnishings	15
Percent of total time	60

A. HOUSING SELECTION

Behavioral Outcomes:

- Knows sources of information about available housing
- Is aware of variations in forms and styles of architecture and housing construction features
- Is able to identify factors important to consider when choosing the location for living
- Recognizes factors in own family situation which have influenced present housing
- Shows skill in weighing and evaluating alternate housing possibilities for various families

Generalization 1: The type of dwelling unit selected by an individual or family is influenced by personal circumstances and by local conditions.

Essential Learning: Selection of the dwelling unit

... Types of architectural forms and styles
    Forms: one family, duplex, apartment, mobile home

Styles: Colonial, Georgian, Regency, English half-timbered, French Provincial, Modern

... Factors influencing space needs and choice of housing

Family composition: stage of family cycle: health status of family members; values, goals, and interests of individuals and the family as a whole; types of activities carried on in the home: family economic and social situation

... Factors to consider in floor plan or layout

Size of floor space; exposure of rooms: number and potential use of rooms: relationships of rooms in terms of safety, ease of care, flow of traffic, convenience, privacy, attractiveness, shapes of rooms; amount of wall space; placement of fixed equipment

... Construction features to consider in relation to material, safety, durability, cost of upkeep

Exterior: foundations and footings, walls, porches, window and door frames, roofing, gutters, downspouts, drainpipes, chimneys

Interior: walls, floors, ceilings, joists, posts, beams, insulation, doorknobs, locks, hinges, cabinets, closets, shelves

Utilities: heating and cooling systems; plumbing fixtures, pipes; electrical wiring, branch circuits, switches, outlets, type of circuit, lighting fixtures

Placement on site: drainage factors, natural light

... Personal and aesthetic factors to consider in selecting housing

Response of individuals and family members to space, colors, style; acknowledgment of what can be changed and what cannot; feeling or intuitive reaction as to whether the housing "fits" the family

... Factors influencing individual or family decision to buy or rent a home

Availability, local housing market fluctuations, cost, ability to finance, permanency in community, personal choice

... Responsibilities in relation to acquiring and keeping up a dwelling unit

Home ownership: obtaining deed, certificate or title, mortgage; meeting mortgage and tax payments, other assessments; maintaining and improving buildings and grounds

Rental of housing: checking required deposits and regular payments of rent: caring for property, understanding terms of lease

Generalization 2: Evaluation of community factors aids in appropriate selection of a location for individual or family housing.

Essential Learning: Location of the dwelling unit

... Sources of information

For available housing and building lot: newspapers, realtors, renting agencies, church groups, place of employment, individuals

For zoning and building codes: municipal government offices, architects, builders, contractors

... Considerations in selecting the community in which to live

Type of community and neighborhood, developmental prospects in area, services available, type and proximity of neighbors, employment opportunities, cost of housing, zoning and building codes

B. HOUSING EXPENDITURES

Behavioral Outcomes:

- Is aware of types of expenses related to housing
- Assists family in planning for meeting financial expenditures in relation to housing
- Knows advantages and disadvantages of cash and credit and the sources of credit available for housing purchases
- Is able to integrate the many costs related to housing into a workable financial plan for families of varying circumstances

Generalization 1: Careful planning for housing expenditures helps families and individuals meet obligations and derive maximum satisfaction from money available for these purposes.

Essential Learning: Financial obligations related to housing

... Types of housing costs

House: payments on home ownership, rented property, insurances

Household operation: utilities, maintenance and improvement of interior and exterior of dwelling

Furnishings and equipment: purchase of new or used items, upkeep and repair, insurances
Auxiliary costs: commutation costs, assessments for community improvements, services and other expenditures resulting from location or type of housing

... Practices which help families meet financial obligations for housing
Select type of housing within range of ability to pay, evaluate personal and family goals in relation to housing in light of available money, allocate definite amount to meet varied housing costs, distribute costs for major items by making a long-range plan, use time and talent of family members for improvement and maintenance, keep cumulative records of expenditures for operating and maintaining the home which can serve in making needed adjustments, utilize payment procedures in relation to ability to pay, use reliable sources of help in solving housing financial problems

Generalization 2: Knowledge of factors involved in the use of cash or credit for the purchase of housing and furnishings helps individuals make discerning judgments in methods of payment selected.

Essential Learning: Meeting financial obligations related to housing

... Ways individuals and families pay for housing costs
Cash: save in advance, pay from current salary, use gift money
Credit: borrow from banks, loan companies, credit union, family friends; obtain sales credit from retail stores, commercial hanks, finance companies

... Advantages of using cash and credit
Cash: no carrying or service charge, freedom from worry about meeting payment dates, immediate ownership, possibility of lower purchase costs
Credit: immediate use of desired articles, establishment of credit rating, ease of exchange of unsatisfactory item, availability of major purchases when most needed

C. INTERIOR DESIGN AND DECORATION

Behavioral Outcomes:

- Thinks of home decoration as a means of individual expression and enhancement to family living
- Realizes that beauty and function are often unrelated to cost or price
- Is able to apply principles of design in home decoration
- Recognizes ways taste is expressed in home decoration
- Uses imagination and creativity in decorating

Generalization 1: Application of design principles can lead to the achievement of pleasing effects in home decoration.

Essential Learning: Interior design

... Types of design
Structural: basic style of article
Decorative or ornamental: real, realistic, stylized, simplified, abstract

... Elements and effects of design
Line and pattern: diagonal, horizontal, vertical, curved for effects of repose, tranquility, strength, action, grace, transition, height, width, change in apparent size
Form: weight, mass, shape for interest, variety, dimension
Texture: rough, smooth, shiny, dull, soft, stiff, heavy, sheer for effects of femininity, masculinity, richness, dignity, reflection or absorption of light
Color and color harmony: primary, secondary, intermediate; hue, value intensity; monochromatic, analogous, complementary, triadic, accented neutral for effects of warmth, coolness, change in apparent size, advancement, dominance

... Principles governing use of design elements
Proportion, balance, rhythm, emphasis, harmony or unity

... Aspects in home decoration where design elements and principles may be applied effectively
Placement of furniture, planning centers of interest, use of color in relation to exposure and for advancing and receding effect, choice of arrangement of accessories to complete groupings

... Factors influencing application of design elements in selection and arrangement of equipment and furnishings

Individual and family tastes, personalities, activities, traditions, way of life; composition of family; existing furnishings, lighting; use of room, physical characteristics of room; trends in use of color, design

Generalization 2: Taste in home decorating may be developed by widening knowledge and understanding of the expression of elements and principles of design.

Essential Learning: Taste in decorating

. . . Conceptions of taste held by individuals
Beauty, utility, convenience, order, harmony in design, fitness, artistic excellence, complexity or simplicity, individual expression

. . . Ways decorating taste can be developed
Reading and studying art and design in own and other cultures; observing objects and arrangements in homes, stores and store windows, studios, historical sites, on television, in pictures; experimenting with varied arrangements, materials, and accessories; analyzing elements and relationships in nature

Generalization 3: Individual creativity and imagination permit beauty with decorating skill to be expressed in the home in simple or complex ways.

Essential Learning: Decorative expression

. . . Basic and conventional avenues for expression
Furnishings, floor coverings, walls, lighting, window treatments, color schemes

. . . Opportunities for making ordinary furnishings in the home unique
Functional objects and equipment displayed or hung attractively, drapes used to hide defects or problem spots, paper and children's art used in decorative ways, dividers used as partitions, foods arranged and served imaginatively, color and design introduced through everyday market boxes and packages

D. SELECTION OF EQUIPMENT AND FURNISHINGS

Behavioral Outcomes:

- Recognizes factors which influence the selection of equipment and furnishings in own home
- Knows types of items available to furnish and equip homes
- Assists family in making discerning judgments in the purchase of equipment and furnishings
- Is aware of sources of assistance in the purchase of equipment and furnishings and evaluates information provided

Generalization 1: Each family and each housing situation implies different equipment and furnishing requirements.

Essential Learning: Need for equipment and furnishings for the home

. . . Factors determining number, type, and quality of items needed or wanted
Personal and family influences: composition and size of family; interests and activities, health status, pattern of living of members; permanency of residence; money available
Housing influences: style, decorative theme, size, and location of housing; number and layout of rooms

. . . Types of items needed for the home
Furniture for sitting, sleeping, eating, storage, work or study, recreation and play; equipment and appliances for cooking, serving, food preservation, cleaning; floor coverings; linens; window coverings; accessories including lamps, mirrors, clocks, pictures

. . . Ways of obtaining items for the home
Purchase new, used, made to order, or ready-to-assemble-and-finish pieces; rent or borrow items; build, make, or renovate from new materials, from discards, by combining inexpensive building materials or remnants; receive as gift or inherit items

Generalization 2: Furnishings and equipment purchases can be approached with a greater degree of confidence if available information is utilized and alternatives carefully considered.

Essential Learning: Purchase of equipment and furnishings

. . . Decisions to weigh prior to purchase of items
Paying for quality and predicted long service versus less investment for frequent replacement; urgency of need versus time to

shop or wait for sales; potentially permanent residence versus likelihood of moving; furnishing or refurnishing complete room versus item-by-item purchase; buying on credit versus saving for cash purchase

... Sources of information for quality and price comparisons
Labels, advertisements, examination of actual products, information from salesman, advice and experience of friends and relatives, independent experts, consumer magazines, college and university extension services, business and commercial organizations

... Considerations in evaluating quality of items
Materials of construction, structural design and construction details, ease of use and care, finishes, operating expenses, warranty, guarantee, performance

... Sources for purchase of equipment and furnishings
Department stores, outlet or discount stores, door-to-door salesmen, mail order houses, secondhand stores, auction sales, redemption center for stamp plans

... Sources of consumer protection
Federal Trade Commission, Bureau of Standards, Better Business Bureau

CONCEPT III—MAINTENANCE OF LIVING SPACE

Subconcepts:	Time Allocation: (percent)
A. Organization and Management	5
B. Cleaning and Repair	15
Percent of total time	20

A. ORGANIZATION AND MANAGEMENT

Behavioral Outcomes:

- Is able to analyze relationships between family health, safety, harmony, and the maintenance and upkeep of living space
- Is able to evaluate care, repair, and home improvement in economic and aesthetic terms and in terms of legal and moral responsibility
- Recognizes values of organizing and managing for upkeep and maintenance of home
- Utilizes systematic approach to decision making when choices are critical

Generalization 1: Management procedures contribute to smooth operation of households and to systematic maintenance and upkeep of the home.

Essential Learning: Management of resources for housing

... Resources available in home and community
Human resources: knowledge, ability, skill, talent, attitude, time, energy of family and community members
Nonhuman resources: money, material goods, community facilities such as education, maintenance

... Steps in management of resources
Plan and organize: view job to be done, consider ways to accomplish job and resources available, determine who will carry out job, decide on best way to complete the job
Carry out plans: initiate, demonstrate, if necessary, check progress, adjust plan as needed
Evaluate: compare results with original intent, consider alternative methods for future endeavors

... Values related to successful management of resources
Economic gains or savings, shared responsibility, satisfaction and pride, enhancement of home

Generalization 2: Management is based on decision making and the establishment of priorities.

Essential Learning: Decision making as an integral part of management

... Steps in decision making
Definition of objectives or goals, comparison of alternatives, selection of course of action, evaluation of results, development of further plans as needed

... Values in utilizing group thinking in making decisions
Greater respect for decisions made, more incentive for action, greater chance of success

B. CLEANING AND REPAIR

Behavioral Outcomes:

- Selects processes, products, and tools appropriate to the cleaning or conditioning job to be done
- Is able to analyze a cleaning or conditioning job, locate information on processes, select products and tools, carry out the job
- Analyzes conditions of disrepair or weakness that signals potential health or safety hazards
- Is able to evaluate own competencies regarding home maintenance jobs

Generalization 1: The specific area, items, and materials requiring cleaning within and outside the home determine the processes, products, and tools necessary.

Essential Learning: Cleaning the home

... Areas and items in the home needing cleaning
Interior: walls, windows, cabinets, floors, bathroom fixtures, furnishings, kitchen equipment, furniture
Exterior: windows, walls, porches, patios, grounds

... Types of materials and finishes to be cleaned
Materials: fabrics, metals, plastics, reeds, paper, glass, rubber, leather, linoleum
Finishes: porcelain, paint, varnish, wax, shellac, stain

... Processes, products, and tools needed for cleaning
Processes: removing dirt; polishing and waxing; exterminating rodents and insects; caring for grounds
Products: soaps and detergents, abrasives, cleaning solvents, polishes, waxes, bleaches.

Essential Learning: Repair of the home and its furnishings

... Reasons for keeping the home in repair
Reduces accident hazards, increases value of property, improves appearance, gives personal satisfaction

... Areas of the home most frequently needing repair
Electrical wiring, furniture joints, plumbing, wall plaster, flooring, hinges, upholstery, wooden surfaces

... Processes, products, and tools needed for repair of the home and its furnishings
Processes: mending tears; correcting minor blemishes, burns, scratches, stains; refinishing; replacing wiring, plumbing, hinges: mending plaster
Products: glues, lubricants, paints, and related products
Tools: carpenter, electrical, and plumbing tools; sewing machine

... Factors influencing the decision to "do-it-yourself" in home repair
Amount of money available, accessibility of materials and tools, skill required, availability of hired help to do the job, safety hazards involved, and product desired, frequency of repetition of job

CONCEPT IV—EMPLOYMENT RELATED TO HOUSING, EQUIPMENT, AND FURNISHINGS

Subconcepts:	Time Allocation: (percent)
A. Occupational Opportunities Related to Housing, Equipment, and Furnishings	5

to housing, equipment, and furnishings and level of training required

- Is able to identify factors which affect availability of employment in housing-related occupations

- Utilizes sources for obtaining pertinent information about occupational opportunities related to housing, equipment, and furnishings

Generalization 1: Understanding the factors affecting employment opportunities helps individuals make vocational choices.

Essential Learning: The nature of occupations related to housing, equipment, and furnishings

... Occupations in relation to level of training
High school courses: salesclerk in furnishings store or department, gift wrapper, florist's assistant, landscape helper, window dresser's aide, housekeeping assistant in home or institution
Two years beyond high school: manager, owner of furnishings shop, florist shop; buyer for retail stores; sales promotion assistant in furnishing, equipment; commercial art worker; decorator's assistant; textile tester; new home mortgage investigator
Four or more years beyond high school: interior decorator, decorating consultant; lighting, housing, kitchen consultant; home service director; architect; furniture, textile designer; work simplification consultant; research specialists in equipment, laundry, textiles

... Places of employment
Florist, furniture, equipment, textile retail shops; architectural and consumer service

Generalization 2: Use of available sources of information will provide background for weighing decisions regarding choice of occupation.

Essential Learning: Securing information about occupational opportunities

... Sources for information about types and location of opportunities
School and public libraries, school guidance office, friends and relatives, newspaper advertisements, employment agencies

... Types of information to investigate
Scope of job opportunity within field, geographic location with greatest potential, stability of jobs in the field

B. SUITABILITY OF SELF FOR EMPLOYMENT IN OCCUPATIONS RELATED TO HOUSING, FURNISHINGS, AND EQUIPMENT

Behavioral Outcomes:

- Identifies personal qualities which contribute to personal employability

- Evaluates personal interests and potential for employment in occupations related to housing and home furnishings

Generalization 1: Careful analysis of personal assets and liabilities will help one determine a suitable choice of occupation.

Essential Learning: General employability of self

... Factors to consider when assessing personal qualifications for employability
Physical and mental health, physical and mental capabilities and limitations, physical habits, personal appearance, emotional behavior, communication skills, personality

Social skills: ability to relate well to others, preference for working alone or in groups

Generalization 2: When one's personal qualifications and interests are suited to the type of occupation chosen, employment can be more satisfying and rewarding.

Essential Learning: Relationship of self to specific housing-related occupations

... Aspects to consider when analyzing specific occupations

Job title, description of work, personal competencies required, working conditions, remunerative potential, other benefits, opportunities for advancement, inherent worth of the job

... Factors to consider in assessing personal qualifications for specific occupations

Similarity of personal characteristics to those required, degree of interest in work of position, present and potential aptitude for required work, possible personal satisfaction to be gained, possible personal contributions to be made

HOME ECONOMICS 6—HOUSING, FURNISHINGS, AND EQUIPMENT REFERENCE GUIDE

	Concept I		Concept II				Concept III		Concept IV	
References	A	B	A	B	C	D	A	B	A	B
Austin & Parvis				Units II-V	Unit I	Units II-IV				
Craig			Ch. 18	Ch. 18	Ch. 15			Ch. 15		
Craig & Rush			Unit 2-Chs. 2-6	Unit 1-Ch. 2 Unit 2-Ch. 1	Units 4-7	Units 7, 8		Unit 9		
Fitzsimmons & White				Ch. 13			Pt. 1	Ch. 11		
Foote & Others	All									
McKinney									All	All
Meyerson		All								
Peet & Thye			Chs. 3, 11, 12			Chs. 1, 2, 4-9		Ch. 10		
Phillips									All	All
Rhodes & Samples		Ch. 10	Ch. 11	Ch. 10	Ch. 12					

HOME ECONOMICS 9—MONEY MANAGEMENT (½ unit)

OVERVIEW

This special interest course for girls and boys in grades 11 or 12 is especially appropriate to their present needs, as well as to their future family orientation. It relates personal and family economic action to the broader framework of a democratic society and focuses upon money as a resource for reaching [illegible] and reflecting values. Economic decisions connected in all aspects of personal and family living, [illegible] values and benefits of financial planning, and various approaches to skilled buymanship are included for study.

Although money management means vastly different things to different people, these principles and learnings are adaptable and useful to girls and boys from any economic circumstance.

The concepts and subconcepts for this course are organized as follows:

CONCEPT I—THE INDIVIDUAL AND FAMILY IN THE LARGER ECONOMY

- Relationship of Individual and Family to the National Economy
- Relationship of National to the International Economy

CONCEPT II—INTERRELATIONSHIP OF MONEY INCOME AND PERSONAL AND FAMILY VALUES AND GOALS

- Personal and Family Money Income
- Personal and Family Values and Goals

CONCEPT III—MANAGEMENT OF PERSONAL AND FAMILY MONEY

- Planning Use of Personal and Family

income is earned and spent are considered with their local, national, and international implications. CONCEPT II views income and expenditures in relation to values and goals. The desirability of definite goals and consciously recognizing values is emphasized. CONCEPT III provides understandings necessary for controlling and using money to achieve particular individual and family goals. In CONCEPT IV, employment opportunities in the area of money management are studied.

CONCEPT I—THE INDIVIDUAL AND FAMILY IN THE LARGER ECONOMY

Subconcepts:	Time Allocation: (percent)
A. Relationship of Individual and Family to the National Economy	5
B. Relationship of National to the International Economy	5
Percent of total time	10

A. RELATIONSHIP OF INDIVIDUAL AND FAMILY TO THE NATIONAL ECONOMY

Behavioral Outcomes:

- Identifies those aspects in personal and family living which combine to form personal and family economic status
- Recognizes some ways individuals and families influence the American economy
- Sees ways American economy influences individuals and families

the economic climate of the individual and family

Personal and family values and goals, standard and level of living, marital status, family composition and stage in life cycle, residence, employment of individuals, employability of individual and family, money income, goods produced at home, special knowledge and skills, community services used, satisfactions derived from use of mone [illegible] me, shared resources, [illegible] ual family members, personal and family crises

Generalization 2: The economic practices of individuals and families influence and are influenced by the American economic climate.

Essential Learning: The role of the individual and family in the American economy

... Individual and family practices which influence the American economy

Participation and support of programs of organizations which promote personal and public well-being; cooperation in neighborhood, community, State, national improvement efforts; investment in business and industry, education; compliance with fair practices in buying and selling goods; support of legislation affecting the economy; care of private and public facilities

... Results of the larger economy upon individuals and families

Determines employment possibilities, social and welfare services available, educational and cultural opportunities, fixes tax rates, legalities relative to money and debt, kinds of goods and services available; influences level of living and relationships within family, nation, and world

Generalization 1: The international economic climate is created by forces within and among countries.

Essential Learning: The nature of the international economy

... Forces which combine to create an international economy

Type and number of people in the various countries, supply and demand for goods and services; interdependence of individuals and countries, transportation and communication, political climate, resources of countries; relationships among people, methods of exchange for goods and services, national and international leadership, controls and regulations

... Factors influencing need for and availability of resources

Geographic location, population growth trends, cultural heritage and traditions, employment trends, production and distribution practices, distribution of wealth, standard and level of living, wars and crimes, natural disaster

Generalization 2: Because the United States is one of the rich nations of the world, its policies have significant effect on nations and peoples everywhere.

Essential Learning: The United States in the international economy

... Aspects of America's economy which affect the rest of the world

Economic growth, population and employment trends, monetary policies, ratio of production to consumption of goods and services, national and local economic practices and policies, natural resources, national values and goals

Examples of ways the United States functions

Subconcepts:	Time Allocation: (percent)
A. Personal and Family Money Income	10
B. Personal and Family Values and Goals	10
Percent of total time	20

A. PERSONAL AND FAMILY MONEY INCOME

Behavioral Outcomes:

- Examines critically personal and family need for money income
- Evaluates influences upon personal desire for money
- Knows sources of money income and influences upon amount available to the individual and family

Generalization 1: When the need for and importance of money income is recognized, money tends to become less of an end in itself.

Essential Learning: Importance of money income

... Reasons individuals and families need money income

As medium of exchange for goods and services to meet basic needs, special wants; to achieve financial security for future, contribute to the needs of society

... Factors influencing the importance of money to individuals and families

Family traditions, values, goals; activities and possessions of friends; exposure to desirability of events, goods, and services

ings; compensation from insurance programs; gifts from others, benefits from social security, welfare, retirement plans

... Personal qualities of earner influencing availability of money income

Educational background; skills and experience in relation to employment. use of money; values and goals in relation to money; relationships with others

... Situations in daily living causing fluctuation in availability of money income to individuals and families

Change in number of wage earners; receipt of gifts or inheritance, raises in salary, expenses incurred in carrying out job, emergencies, variations in costs of living

B. PERSONAL AND FAMILY VALUES AND GOALS

Behavioral Outcomes:

- Identifies personal and family values and goals and reasons for them
- Recognizes factors which influence variation in values and goals among individuals and families
- Identifies personal attitudes and practices relating to money

Generalization 1: Each individual and family has values and goals unique to his and its own living situation which give direction to behavior and meaning of life.

Essential Learning: The nature of values and goals

... Examples of values and goals important in varying degrees to individuals and families variation in values and goals of individuals and families

Family factors: traditions, habits, composition, socioeconomic level, health, interests, attitudes, tastes, religion

Societal factors: culture, facilities and services, geographic location

Generalization 2: Attitudes and practices in relation to money reflect values and goals.

Essential Learning: Relationship of values and goals to money income

... Aspects of money income influenced by personal and family values and goals

Attitudes developed toward the importance of money, practices used in acquiring and spending money income

... Existing attitudes and practices of individuals and families in the acquisition and use of money income

Attitudes: "The world owes me a living," "If you can get away with it, take it!" "Finders keepers," "What's yours is mine and what's mine is my own," "Easy come, easy go," "A penny saved is a penny earned"

Practices: stealing, borrowing, working, gambling, investing, giving, spending, saving

CONCEPT III—MANAGEMENT OF PERSONAL AND FAMILY MONEY

Subconcepts:	Time Allocation: (percent)
A. Planning Use of Personal and Family Money	20
B. Spending of Personal and Family Money	40

Generalization 1: Careful financial planning helps individuals and families move toward the realization of goals.

Essential Learning: Importance of financial planning

... Reasons for financial planning

Helps one live within income, helps prevent wasteful spending, helps one work toward long-range goals, helps one to see where his money goes

... Satisfactions which may be gained through financial planning

Reduced tension and family friction in use of money, ability to supply needs and satisfy more desires, feeling of security if money is planned to meet obligations and emergencies

Generalization 2: A workable financial plan tends to result when an organized pattern of operation is followed.

Essential Learning: Development of financial plans

... Factors to consider in developing a workable plan

Allocation of money for all necessary areas of family needs, flexibility to allow for changes, provision for short- and long-range plans, simplicity and convenience of format

... Procedures in developing a yearly financial plan

Record total family money income including salary and wages, earnings from rent, stock, dividends, interest, gifts and bonuses; analyze past expenditures; list fixed amounts and recurring expenses; estimate present and future needs and desires; allocate approximate amounts for various items;

... Types of assistance available

Personnel: banking, loan, investment personnel; lawyers: insurance agents: social welfare personnel; extension service

Published material: brochures from commercial concerns and agencies, books and periodicals

Conferences and courses: public school adult education program, programs presented by public and private agencies

B. SPENDING OF PERSONAL AND FAMILY MONEY

Behavioral Outcomes:

- Identifies areas of expenditures for self and family
- Recognizes factors influencing personal and family spending
- Knows principles of buymanship and is able to apply them in the purchase of specific goods and services
- Uses credit discriminately in the purchase of goods and services

Generalization 1: Many factors combine to influence the nature of personal and family spending.

Essential Learning: Forces affecting spending

... Areas of common expenditures

Foods, clothing, housing, health and recreation, education, transportation, income taxes, contributions, gifts, dues, investments, savings, life insurance

... Factors influencing personal and family spending practices

Stage of family, values and goals, attitudes variation in income from employment and investments

Presence of organizations working for employees: dictate length of earning periods and age at which retirement is imperative, usually resulting in less income: promote strikes which may mean reduced income

Introduction of labor-saving machines on new production processes: creates unemployment resulting in less available [illegible] quires spending money for retraining for job

... Expenditures caused by other expenditures

Precipitating effect of purchase of home: furnishings and equipment, upkeep, emergency, neighborhood standards, changes in transportation and education costs, differences in local shopping costs, taxes

Precipitating effect of purchase of car: insurance, emergency repairs, operating expenses, changed availability of activities and entertainment, parking and storage

Generalization 2: Skilled buymanship contributes to the level of living that can be achieved within a particular income.

Essential Learning: Buying of goods and services

... Principles of consumer buying

Compare quality and prices of goods and services, read labels carefully, examine advertisements and actual product; check advantages of types of stores, know reputation of dealer; choose quality of item in relation to use, when possible make purchases at a favorable time when goods are plentiful or at end of season; utilize reliable source of information about goods and services

... Sources of consumer assistance

. . . Effective practices for buying specific goods and services

Foods: balance expenditures for meals and snacks at home and away from home, select most nutritious and highest quality foods for money available, buy only amounts which can be stored adequately and used efficiently

Housing: consider all expenditures involved in owning and renting a home, in renting a room to get best values for money available: preplan carefully before purchasing equipment and furnishings; evaluate quality and costs of home maintenance services by family members versus others

Clothing: make long-range plans for family clothing expenditures, compare quality and cost of caring for and storing clothing at home versus in commercial establishments

Health and Recreation: select grooming and health aids discriminately, carry health insurance, allot some of income for emergencies, balance expenditures for recreational activities for all family members

Education: utilize public libraries, evaluate costs of attending various institutions of higher learning, take advantage of free or inexpensive community educational programs

Transportation: compare initial and maintenance costs of various types of cars, compare costs of public vs. private transportation

Investments and Insurance: consult reliable agents, compare advantages of various types

Generalization 3: Individuals and families need to consider the pros and cons of the use of credit before deciding to use it as a means of paying for goods and services.

Essential Learning: Using credit to

. . . Bases for extending credit

Personal character, interest in obligation to pay, ability to pay, collateral

. . . Factors to consider in the selection of credit source

Cost of carrying charge, penalties, fees; time and number of payments; period of repayment, method of repayment; reputation of the lender, legal safeguards; obligations of terms of contract

. . . Positive and negative results of use of credit

Establishment of credit rating, use of goods and services prior to ability to pay, availability of major purchases such as home or car when needed, convenience as a medium of exchange, tendency to buy more than can afford and endangering job from lien on wages, possibility of bankruptcy from overextension, feelings of never getting ahead or always being in debt

CONCEPT IV—EMPLOYMENT RELATED TO MONEY MANAGEMENT

Subconcepts:	Time Allocation: (percent)
A. Occupational Opportunities Related to Money Management	5
B. Suitability of Self for Employment in Occupations Related to Money Management	5
Percent of toal time	10

A. OCCUPATIONAL OPPORTUNITIES RELATED TO MONEY MANAGEMENT

Generalization 1: Understanding factors affecting employment opportunities helps individuals make vocational choices.

Essential Learning: The nature of occupations related to money management

... Occupations in relation to level of training
High school courses: cashier, bookkeeper, teller, personal shopper, clerk
Two years beyond high school: credit interviewer, consultant on family budgets
Four or more years beyond high school: teacher, field supervisor in family service or welfare, journalist, research specialist, banker, insurance manager, financing advisor, stockbroker, tax specialist

... Places of employment
Retail stores: clothing, food, furniture
Business and industrial firms: finance companies, insurance companies, banks, real estate firms, newspapers offices
Homes: private, public
Schools: elementary, secondary, college, professional and business

... Factors affecting number and types of occupations available
Type of community: urban, suburban, rural, small town
Kind of economic area: agricultural, industrial, resort, residential
Conditions of economic growth and decline: unemployment rate, turnover of employees, income level, industry, automation

Generalization 2: Use of many available sources of information will provide background for weighing decisions regarding choice of occupation

B. SUITABILITY OF SELF FOR EMPLOYMENT IN OCCUPATIONS RELATED TO MONEY MANAGEMENT

Behavioral Outcomes:

- Identifies qualities which contribute to personal employability
- Evaluates personal potential for employment in occupations related to money management.

Generalization 1: Careful analysis of personal assets and liabilities will help one determine a suitable choice of occupation.

Essential Learning: General employability of self

... Factors to consider when assessing personal qualifications for employability
Physical and mental health, physical and mental capabilities and limitations, physical habits, personal appearance, emotional behavior, communication skills, personality traits

... Factors to consider when analyzing personal aspirations regarding employment
Ability for and interest in further training; desire for money, prestige, position, status; desire to be of service

... Factors to consider when examining personal competence
Manipulative skills: manual dexterity, strength, endurance
Mental skills: attention to detail, memory, knowledge, imagination, common sense
Social skills: ability to relate well to others, preference for working alone or in groups

Generalization 2: When one's personal qualifications

. . . Factors to be considered in assessing personal qualifications for a specific occupation

Similarity of personal characteristics to those required, degree of interest in work of position, present and potential aptitude for required work, possible personal satifaction to be gained, possible personal contributions to be made

HOME ECONOMICS 9—MONEY MANAGEMENT

REFERENCE GUIDE

References	Concept I		Concept II		Concept III		Concept IV	
	A	B	A	B	A	B	A	B
Abbott	Chs. 1, 3-33	Chs. 2, 34-37	Chs. 27-33	Pp. 17-19		Ch. 14		
Fitzsimmons						All		
Fitzsimmons & White			Ch. 13	Ch. 12	Ch. 13	Ch. 14		
Gordon	Pts. 1, 2	Pts. 1, 2			Ch. 16	Chs. 15, 17-26		
Kreisman			Chs. 2, 7, 8, 13		Ch. 2	Chs. 3-6, 9-11, 15		
Landis & Landis				Ch. 19	Ch. 19	Ch. 20		
McDermott & Nicholas (Book 2)			Pp. 668-672		Pp. 656-667			
McKinney							All	All
Nickell & Others			Chs. 11,12	Chs. 2, 3	Chs. 10,14	Chs. 13, 15-21		
Phillips							All	All
Quinn (1)	Ch. 19	Ch. 17						
Rhodes & Samples				Ch. 17	Ch. 17	Chs. 17,18		
Starr	Unit III-Ch. 2		Unit III-Ch. 1	Unit III-Ch. 1	Unit III-Ch. 3	Unit III-Ch. 3		
Tate							All	All

HOME ECONOMICS 10—NUTRITION AND MEAL MANAGEMENT (½ unit)

OVERVIEW

This special interest course is planned for girls and

CONCEPT II—MEAL MANAGEMENT

- Planning Healthful Meals
- Buying Food and Food Products
- Providing and Using Efficient Kitchen Facilities
- Preparing and Serving Meals

CONCEPT III—EMPLOYMENT RELATED TO NUTRITION AND MEAL MANAGEMENT

- Occupational Opportunities Related to Nutrition and Meal Management
- Suitability of Self for Employment in Occupations Related to Nutrition and Meal Management

CONCEPT I considers the roles food plays in daily living, eating patterns of various cultures, and practices and programs in relation to the use of worldwide food resources. CONCEPT II leads youth to recognition of the importance of meeting daily nutritive needs and provides opportunity for the development of skill in planning nutritionally adequate meals for themselves and others. Pupils will be helped to make discerning judgments in the purchase of foods and in the selection and use of tools appropriate to meal management tasks. CONCEPT III stresses analysis of employment opportunities in occupations related to nutrition and meal management.

CONCEPT I—RELATIONSHIP OF FOOD TO PERSONAL LIVING

Subconcepts:	Time Allocation: (percent)
A. Relationship of Food to Personal Living	5

- Recognizes the various forces influencing food habits

Generalization 1: Food plays many roles in the life of man.

Essential Learning: Importance of food in daily living

... Roles food plays in daily living

Provides survival, health, and well-being to man; sets the tone for gatherings of people: defines holidays and nationalities; symbolizes wealth, poverty, freedom, tyranny, reward or punishment, love and affection; defines role of homemaker and wage earner

... Personal benefits derived from food

Physical well-being, creative expression and aesthetic application. social growth. development of tolerance and appreciation of others. means of expressing feminity or masculinity through type of food served or eaten

... Benefits to the individual who has a wide acceptance of food

Adaptability in varied social environments and differing economic circumstances, greater range of choice in meeting nutritional requirements, experience with new taste pleasures

Generalization 2: Many complex forces combine to establish personal and family food habits.

Essential Learning: Personal and family food habits

... Forces within the family affecting food habits

Home environment: economic status, ethnic traditions, religious customs, social practices, meal management practices

Individual circumstances: age and maturity

... Ways forces inside and outside the home influence food habits
Nutritional adequacy of meals, food preferences and taboos, pleasures received at mealtime, social acceptance by others, meaning and importance of food to an individual, manner of preparing and serving food

B. INTERCULTURAL SIGNIFICANCE OF FOOD

Behavioral Outcomes:

- Is aware of eating patterns of various cultures
- Recognizes the importance of worldwide sharing of food resources

Generalization 1: Though eating customs of various cultures differ widely, food needs can be equally met.

Essential Learning: Eating patterns of various cultures

... Factors causing variation in eating patterns
Geographic location, types of food available, edible food as defined by the culture, economic status, educational level, tradition

... Types of variation in eating patterns among cultures
Variety and kind of foods eaten, procedures in food preparation, combination of foods in menus, practices in serving and eating foods

Generalization 2: The adequacy of the food supply of people in any part of the world has an effect upon people everywhere.

Essential Learning: Food as a worldwide concern

... Problems related to use of food resources in the world

CONCEPT II—MEAL MANAGEMENT

Subconcepts:	Time Allocation: (percent)
A. Planning Healthful Meals	20
B. Buying Food and Food Products	15
C. Providing and Using Efficient Kitchen Facilities	10
D. Preparing and Serving Meals	35
Percent of total time	80

A. PLANNING HEALTHFUL MEALS

Behavioral Outcomes:

- Knows own nutritional requirements
- Recognizes the importance of meeting daily nutritive needs
- Is able to plan nutritionally adequate meals for self and others

Generalization 1: A nutritionally adequate diet contributes to normal physical and mental health.

Essential Learning: Relationship of nutrition to personal health

... Aspects of health affected by food intake
Physical: conditions of such body features as hair, skin, nails; general body longevity and functioning
Mental-emotional: attitudes toward life, extent of emotional control, type of relationships with others

... Functions of nutrients required for good health
Proteins for building and repairing body tissues, carbohydrates and fats for energy, minerals and vitamins for regulating body

Generalization 2: Meals can be satisfying and adequate when planned in terms of recognized nutritional needs and food preferences.

Essential Learning: Menu development

. . . Methods for planning menus
  Follow recommended patterns for regular meals and snacks, use daily food guide for arriving at nutritional adequacy

. . . Special dietary problems requiring variations in menu patterns
  Weight, heart condition, diabetes, allergies, acne

. . . Factors to consider when planning menus for any occasion
  Maintenance of health: special dietary needs and preferences of individuals, daily nutritional requirements for all persons, hour of day food will be served
  Aesthetics of food: palatability and attractiveness of food and food products, personal taste preferences, variety
  Utilization of resources: use of time, energy, skill, money; availability of food; utensils, equipment, and space available

. . . Ways of expressing creativity in menu planning
  Vary color, texture, form of food and food products; vary and combine methods of preparation; garnish and decorate foods with fruits and vegetables, cut in interesting ways; combine foods of different flavors; vary recipes through the addition of herbs, seasonings, fruits, nuts, leftover food items; use foods representative of different cultures

B. BUYING FOOD AND FOOD PRODUCTS

Behavioral Outcomes:

- Is aware of factors contributing to cost and

foods, place of production, type and amount of research conducted
  Processing of food and food products: types of processing, number of processors, types of packaging
  Types of food additives: use of flavoring materials, mold inhibitors, emulsifiers, coloring agents, antioxidants, bleaching agents; type and amount of research conducted
  Distribution of food: mode of transportation, number and location of distributors, type of research conducted, kind and amount of advertising

. . . Aspects of quality affected by production, processing, and distribution factors
  Attractiveness and palatability of product, purity of product, storage life of product, nutritive value

Generalization 2: Both nutrition and meal management are dependent upon discriminating choices in the purchase of food.

Essential Learning: Selection and purchase of food

. . . Criteria for judging effectiveness of shopping practices
  Time and energy of shopper used wisely, supply of food adequate to need, quality of food purchased, food needs met within budget

. . . Techniques for food purchasing
  List needed items, check supplies on hand, choose type and location of market appropriate to purchase, weigh information provided through advertising, compare price and quality, buy variety and grade suitable to use, purchase in quantity when funds and storage are available, buy usable or stock items during special sales

. . . Forms in which processed foods can be purchased

eral and State agencies
Types: bulletins, testing and inspection of products, legal regulations

C. PROVIDING AND USING EFFICIENT KITCHEN FACILITIES

Behavioral Outcomes:

- Uses tools appropriate to specific tasks
- Recognizes the influence of arrangement of facilities upon ease and efficiency in meal management
- Plans storage of tools and foods in the kitchen for order and convenience

Generalization 1: Efficiency in meal management is promoted when utensils, appliances, equipment, and supplies appropriate to tasks are used.

Essential Learning: Utensils, appliances, equipment, and supplies for meal management

... Factors to consider in deciding which tool to use for a particular task
Job to be done, ease of use and care, skill required for use

... Types of kitchen tools in relation to specific use, care, and storage
Utensils: measuring—cups, spoons, spatula, scales; mixing and preparation—bowls, spoons, sifter, beater, rubber scraper; cutting and chopping—knives, boards, grinder, can opener; baking and roasting—casserole, pans, baking sheets, racks, timer, thermometer; top-of-range cooking—saucepans, skillets, turners
Appliances: preparation—mixer, toaster, coffee maker, skillet, saucepan; food storage, preparation, and cleanup—refrigerator, freezer, range, waste disposer, dishwasher
Other equipment: preparation and cleanup—sink, rubber mat, work counters, service cart, pot holders, asbestos mats, garbage pail; storage—cupboards, cabinets, stepstool, canister sets, breadboxes, refrigerator dishes; eating—tables, chairs
Supplies: paper toweling, aluminum foil, waxed paper, plastic bags, scouring pads, detergents, dish towels, sponges

Generalization 2: Well-arranged kitchen facilities aid in organizing meal management.

Essential Learning: Kitchen arrangements

... Meal management activities performed in the kitchen
Planning menus, work schedules, market orders; preparing foods, mixing ingredients; cooking and baking; serving foods, cleaning up following preparation and eating

... Guides to efficient kitchen arrangement
Group equipment around activity areas, provide traffic lanes, locate work counters adjacent to major appliances and equipment, provide work surfaces for carrying out activities

... Basic kitchen layouts for efficient meal management
U-shaped, L-shaped, one wall, two wall, broken U

Generalization 3: Storage planned and arranged according to specific needs contributes to efficient meal management.

Essential Learning: Storing food and equipment

... Types of storage needed in the kitchen
Partitions in drawers, adjustable shelves in cabinets, pegboards on walls and doors, door shelves, hooks, step shelves

... Storage facilities which supplement those in kitchen
Basement, storerooms, closets, community food lockers

... Guides to efficient storage of kitchen tools
Group like items together, locate near point of most frequent use, place frequently used items within easy reach, outfit storage areas with accessories designed to fit items

... Storage factors influencing conditions of food
Amount of heat and cold, moisture and dryness, light and darkness; storage containers and location; circulation of air; condition of food; length of time food has been stored

D. PREPARING AND SERVING MEALS

(See TEACHING BASIC LEARNINGS THROUGH MEAL PREPARATION, Appendix)

Behavioral Outcomes:

- Finds pleasure and success in meal preparation
- Is able to apply principles and follow procedures for preparing foods and food products
- Understands table setting and food service

- Organizes mealtime for speed, efficiency, casualness, hospitality, formality, according to the need or appropriateness

Generalization 1: Organization simplifies meal preparation.

Essential Learning: Organizing meal preparation

... Steps in preparing foods identified in menu
  Review recipe, determine sequence of preparing foods according to time and method, assemble ingredients and utensils in appropriate work area, prepare food

... Methods of time management and work simplification in preparation of foods
  Working in a logical sequence, dovetailing activities, using best tool for task, using as few utensils as possible, keeping things within easy reach, using both hands when possible, working right to left if right-handed, using trays, serving carts, appropriate posture

Generalization 2: Knowledge and application of accepted principles and procedures in preparation help maintain nutritive value and enhance palatability of food.

Essential Learning: Preparing specific foods and food products

... Factors affecting choice of foods and methods used in their preparation
  Menu pattern followed, type of service to be used, personal and material resources available, persons to eat the foods

... Reasons for following principles applied to food preparation
  Retain nutrients, improve appearance and digestibility of food, obtain desired result

... Guides in use of equipment and tools for food preparation
  Identify cooking process to be used; select appropriate equipment for food, process, and individual performing the process; follow approved procedures in care of equipment and foods

Generalization 3: Human satisfactions from food are directly related to the conditions under which it is served and eaten.

Essential Learning: Table setting, food service, and mealtime atmosphere

... Types and kinds of table appointments
  Coverings: cloth, plastic, fiber
  Flatware: stainless steel. silver plate, sterling, plastic
  Dinnerware: pottery, china, plastic
  Glassware: crystal. glass, plastic
  Decorative items: flowers, candles, bowls, baskets, place cards, accessories

... Factors influencing the choice of place and manner of serving
  Type and time of meal, convenience of those serving, attitudes and preference of persons eating, time available for eating, amount of emphasis on congeniality and interaction

... Ways of managing meal service
  Manner of serving: buffet, plate and tray service, formal, picnic or cookout
  Establishing atmosphere: clean and attractive appointments; dishes and utensils chosen and placed for convenient use; sufficient room to avoid crowding of diners; orderly surroundings, controlled noise level
  Presentation of food: appearance on individual and service plates; amount, kind, grouping of foods
  Organization of serving tasks: communicating instructions to those helping, using same plan regularly for routine tasks, preplanning sequence of tasks, cleaning up during preparation and serving

... Personal practices contributing to a pleasing mealtime climate
  Being well groomed, using table implements correctly, contributing to conversation, carrying out individual responsibilities, making others feel comfortable, responding appropriately in emergencies

CONCEPT III—EMPLOYMENT RELATED TO NUTRITION AND MEAL MANAGEMENT

Subconcepts:	Time Allocation: (percent)
A. Occupational Opportunities Related to Nutrition and Meal Management	5
B. Suitability of Self for Employment in Occupations Related to Nutrition and Meal Management	5
Percent of total time	10

A. OCCUPATIONAL OPPORTUNITIES RELATED TO NUTRITION AND MEAL MANAGEMENT

Behavioral Outcomes:

- Is aware of a variety of occupations related to nutrition and meal management and level of training required
- Is able to identify factors which affect availability of employment in nutrition and meal management-related occupations
- Utilizes sources for obtaining pertinent information about occupational opportunities related to nutrition and meal management

Generalization 1: Understanding factors affecting employment opportunities helps individuals make vocational choices.

Essential Learning: The nature of occupations related to nutrition and meal management

... Occupations in relation to level of training
High school courses: waitress, hostess, short order cook, bakery-delicatessen assistant, sample distributor in food promotion, food service worker, food service assistant in nursing home, food laboratory tester trainee
Two years beyond high school: school lunch cook manager, hospital dietetic aide, food service manager for nursery school, family dinner service specialist
Four or more years beyond high school: teacher, dietitian, nutritionist, journalist, research specialist, home economist in business concern

... Places of employment
Food production, manufacturing and distribution concerns, eating places, schools, hospitals, retail food sales

... Factors affecting number and types of occupations available
Type of community: urban, suburban, rural, small town
Kind of economic area: agricultural, industrial, resort, residential
Conditions of economic growth and decline: unemployment rate, turnover of employees, income level, industry

Generalization 2: Use of many available sources of information will provide background for weighing decisions regarding choices of occupation.

Essential Learning: Securing information about occupational opportunities

... Sources for information about types and location of opportunities
School and public libraries, school guidance office, friends and relatives, newspaper advertisements, employment agencies

... Types of information to investigate
Scope of job opportunity within field, geographic location with greatest potential, stability of jobs in the field

B. SUITABILITY OF SELF FOR EMPLOYMENT IN OCCUPATIONS RELATED TO NUTRITION AND MEAL MANAGEMENT

Behavioral Outcomes:

- Identifies personal qualities which contribute to personal employability
- Evaluates personal potential for employment in occupations related to nutrition and meal management

Generalization 1: Careful analysis of personal assets and liabilities will help one determine a suitable choice of occupation.

Essential Learning: General employability of self

... Factors to consider when assessing personal qualifications for employability
Physical and mental health, physical and mental capabilities and limitations, physical habits, personal appearance, emotional behavior, personality traits, communication skills

... Factors to consider when analyzing personal aspirations regarding employment
Ability for and interest in further training, desire for money, prestige, position, status; desire to be of service

... Factors to consider when examining personal competence
Manipulative skills: manual dexterity, strength, endurance
Mental skills: attention to detail, memory, knowledge, imagination, common sense
Social skills: ability to relate well to others, preference for working alone or in group

Generalization 2: When one's personal qualifications and interests are suited to the type of occupation chosen, employment can be more satisfying and rewarding.

Essential Learning: Relationship of self to specific nutrition and meal management-related occupations

... Aspects to consider when analyzing specific occupations

Job title, description of work required, personal competences required, working conditions, remunerative potential, other benefits, opportunities for advancement, worth of job

... Factors to consider in assessing personal qaulifications for specific occupations

Similarity of personal characteristics to those required, degree of interest in work of position, present and potential aptitude for required work, possible personal satisfaction to be gained, possible personal contributions to be made

HOME ECONOMICS 10—NUTRITION AND MEAL MANAGEMENT REFERENCE GUIDE

	CONCEPT I		CONCEPT II				CONCEPT III	
REFERENCES	A	B	A	B	C	D	A	B
Bogert	Chs. 1, 22, 23	Ch. 1	Chs. 2-20, 24-28	Ch. 21				
Carson & Ramee			Chs. 4, 5	Chs. 11-25	Ch. 26	Chs. 2, 3, 6-10		
Fitzsimmons				Ch. 10				
Leverton	All		Chs. 8, 9	Ch. 16				
Lewis & Others (2)	Unit 1-Pt. 1		Units I, IV-VI	Unit III-Pt. 4	Unit III-Pts. 1, 2	Units II, IV, V		
Martin	Chs. 1, 2, 10	Chs. 1, 11	Chs. 3-9					
McDermott & Others	Ch. 13	Ch. 1	Chs. 2, 4-10	Ch. 13	Chs. 3, 12	Chs. 4-10, 13		
McHenry	Chs. 3, 14, 15	Ch. 2	Chs. 1, 4-10					
McKinney							All	All
Oerke	Ch. 1	Pt. IV	Chs. 2, 6	Pt. II	Ch. 5	Chs. 7, 8		
Peyton	Ch. 1		Chs. 2-11	Chs. 30-40				
Phillips							All	All
Pollard (2)	Unit 6		Ch. 1, Units 2, 4, 5	Ch. 9	Ch. 8	Units 2, 4, 5		
Rhodes & Samples	Ch. 6		Chs. 8, 9	Ch. 7	Ch. 7	Chs. 8, 9		
Shank & Others			Pts. I, IV, VI	Ch. 5	Ch. 6	Ch. 4, Pts. III, IV		
Stevenson & Miller	Ch. 11		Chs. 1, 2-10	Chs. 11, 12		Chs. 2-10		
Tate							All	All

HOME ECONOMICS 11—TEXTILES AND CLOTHING (½ unit)

OVERVIEW

This special interest course for pupils in grades 11 and 12 offers opportunity for concentrated study in the field of apparel. Learnings explore the technology of textiles and sociological and aesthetic aspects of clothing. Sewing is treated as a creative art, as well as a practical skill. Analyzing decisions involved in purchasing clothing will interest pupils personally and afford opportunity for them to reflect on the clothing problems of families of various economic means.

The concepts and subconcepts for this course are organized as follows:

CONCEPT I—DYNAMICS OF FASHION AND CLOTHING

- The Nature of Fashion
- The Significance of Clothing

CONCEPT II—CLOTHING SELECTION

- Beauty in Dress
- Economic Aspects of Clothing Selection

CONCEPT III—TEXTILE SCIENCE

- Construction and Use of Textiles
- Care of Textiles

CONCEPT IV—CLOTHING CONSTRUCTION

- Appreciating Clothing Construction
- Processes in Clothing Construction

CONCEPT V—EMPLOYMENT RELATED TO TEXTILES AND CLOTHING

- Occupational Opportunities Related to Textiles and Clothing
- Suitability of Self for Employment in Occupations Related to Textiles and Clothing

CONCEPT I involves study of societal origins of fashion, as well as ways in which clothing affects individual personality. CONCEPT II presents the consumer aspects of clothing. Whether approached from the standpoint of marginal economy or circulation of plentiful resources, the basic principles in selection are similar.

Study of textiles and their use and care through CONCEPT III is important either as general education or as a basis for preemployment or preprofessional training. CONCEPT IV provides the pupil with experience and knowledge of clothing construction built on previous skills or as a new set learnings. Employment possibilities in clothing and textiles are explored through CONCEPT V.

CONCEPT I—DYNAMICS OF FASHION AND CLOTHING

Subconcepts:	Time Allocation: (percent)
A. The Nature of Fashion	5
B. The Significance of Clothing	5
Percent of total time	10

A. THE NATURE OF FASHION

Behavioral Outcomes:

- Understands how fashion is ever-changing due to societal and economic factors and forces
- Is aware of the variety of situations and events which have an influence on fashion trends

Generalization 1: Some understanding of how the world of fashion works gives the consumer a greater appreciation of available clothes.

Essential Learning: Meaning of fashion

. . . Terms used in the fashion world
High fashion, style, fad, trend, original, collection, couturier, fashion cycle, mode, salon

. . . Aspects of a garment considered by a designer when creating a fashion
General style, combination of fabrics, type and amount of decorations and details, type and combination of colors

. . . Facts regarding acceptance and evolution of fashions
Styles recur, fashion acceptance is gradual, slight variations of dominant style occur each year, fashions are always in transition, not all fashions are adopted

Generalization 2: Fashion is influenced by social changes, national and world situations, and economic conditions.

Essential Learning: Influences upon fashion

... Trends affecting fashion

Social changes: women gainfully employed, informal entertaining, large teen-age consumer market, much time spent in play and other recreational activities

National and world situations: international trading, quick transfer of fashion ideas, publicity given to styles worn by noted international personalities, research done in relation to clothing for space travel

Economic conditions: more money devoted to research in types, use, and care of fabrics; availability of central heating, air conditioning and laborsaving devices in home and business places; more money available to buy ready-made clothing

... Aspects of fashion affected by trends

Amount, types, and styles of clothing in demand; types of fabrics used in clothing; comfort incorporated in garment design; year around use of garments; cost of clothing for the consumer

B. THE SIGNIFICANCE OF CLOTHING

Behavioral Outcomes:

- Recognizes the impact of clothing on individuals and families
- Relates clothing to own expressiveness and behavior

Generalization 1: To understand clothing in full perspective means to recognize it as a force directing and protecting human life, as well as an incidental of everyday living.

Essential Learning: Clothing as a force in everyday living

... Roles clothing plays in life

Protects from heat and cold, occupational hazards; makes individual more attractive, acceptable to society; promotes feelings of security, ease, self-confidence; expresses personality

... Aspects of family living affected by family clothing practices

Relationships among members, amount of family income spent for clothing, employability of members, health and safety of members, use and arrangement of storage facilities

Generalization 2: The practices one follows in dress reflect the way one lives and thinks.

Essential Learning: Clothing as a means of expressing self

... Impressions of self given through clothing

Indication of occupation, social standing, age group, nationality, personality, activities; reflection of values and goals and pride in self and family

... Practices contributing to being a well-dressed individual

Dress according to age group, avoid imitating dress of friends and business associates, select clothing which brings out physical assets and minimizes limitations, use accessories which enhance the costume and total appearance, follow current fashions only if becoming to self and way of life

CONCEPT II—CLOTHING SELECTION

Subconcepts:	Time Allocation: (percent)
A. Beauty in Dress	10
B. Economic Aspects of Clothing Selection	15
Percent of total time	25

A. BEAUTY IN DRESS

Behavioral Outcomes:

- Dresses attractively and appropriately
- Recognizes personal figure characteristics and selects clothing accordingly
- Selects aesthetically pleasing and appropriate clothing for self

Generalization 1: An understanding of design principles, as applied to clothing, contributes to the use of them in creating an aesthetically pleasing appearance.

Essential Learning: Design in clothing

... Types of design

Structural: basic style of garment

Decorative or ornamental: real, realistic, stylized, simplified, abstract

... Elements and their effects on design

Line and pattern: diagonal, horizontal, vertical, curved for effects of repose, tranquility, strength, action, grace, transition, height, width, change in apparent size

Form: weight, mass, shape for interest, variety, dimension

Texture: rough, smooth, shiny, dull, soft, stiff, heavy, sheer for effects of femininity, masculinity, richness, dignity, reflection or absorption of light

Color and color harmony: primary, secondary, intermediate; hue, value, intensity; monochromatic, analagous, complimentary, triadic, accented neutral for effects of warmth, coolness, change in apparent size, advancement, dominance

... Principles governing use of design elements

Proportion, balance, rhythm, emphasis, harmony or unity

... Aspects of clothing involving application of principles of design

Garment style, fabric design, trim, accessories, combination of garments or parts of one garment, combination of colors, relation to physical characteristics of wearer

Generalization 2: Evaluation of personal and environmental influences is essential in choosing appropriate and becoming clothes for self.

Essential Learning: Pleasing and appropriate clothing for self

... Physical features affecting choice of clothing

Size and shape of face, neck, shoulders, waist, hips, thighs, legs; torso proportion; color of skin, hair, eyes; type of posture and physical handicaps

... Personality factors influencing choice of clothing

Femininity or masculinity, personal taste, preferred activities

... Environmental influences on choice of design and color in clothing

Family and peer group customs; type of occasion, place, activity for which clothing is being selected; climate, season of year; present fashion styles; financial resources

... Guides in selecting pleasing and appropriate clothing

Choose or make items in relation to color and design in present wardrobe; select garments and accessories which enhance good physical features and minimize limitations; check fit of garment in terms of general ease, waistline, shoulders, length for comfort and aesthetic appearance; evaluate appropriateness in terms of related environmental influences

B. ECONOMIC ASPECTS OF CLOTHING SELECTION

Behavioral Outcomes:

- Follows good procedures in planning for clothing purchases
- Is aware of factors influencing the price of clothing
- Is able to select some garments for self and family members
- Is aware of trends in retailing and legislation which affect the consumer
- Assumes some personal responsibility in promoting consumer protection

Generalization 1: Many factors and practices are involved in the planning for clothing purchases.

Essential Learning: Planning for clothing purchases

... Factors to consider in planning clothing purchases for individuals and family

Sex, age, occupation, activities, special health problems; present wardrobe; individual and family income; the importance of clothing to the individual; skill of family members in constructing and remodeling garments

... Practices contributing to wise clothing purchases

Study information from advertising, research findings, and on labels regarding purchase to be made; make decisions regarding the price range, place of purchase, method of payment most suited to the individual and family

Generalization 2: The purchaser who can analyze and evaluate items of clothing from many different standpoints is in a position to make selections with less element of risk or chance.

Essential Learning: Evaluation of clothing purchases

... Factors influencing the price of clothing
Fiber and fabric, design and construction of garment, markup from wholesale price added by retailer, trademarks, place of purchase, supply and demand of the type of article

... Places where clothing may be bought
Department stores, speciality shops, mail-order companies, factory-outlet stores, discount stores

... Factors to consider in purchasing any article of clothing
Type and amount of care required, quality and type of construction in relation to use and price, durability and suitability of fabric, fit in relation to comfort and amount of alteration needed, versatility of article, style and becomingness to individual, initial and upkeep costs, type of storage required

Generalization 3: The consumer receives protection and assistance in a variety of ways and in turn has certain obligations for responsible attitudes and actions.

Essential Learning: Consumer protection and practice in relation to clothing

... Types of consumer protection and assistance
Government regulations: Wool Products Labeling Act of 1941, Fur Products Labeling Act of 1951, Flammable Fabrics Act of 1953, Textile Fiber Products Identification Act of 1960
Agencies, organizations, and testing laboratories: National Bureau of Standards, Federal Trade Commission, Extension Service, American Home Economics Association, Wool Bureau, Cotton Council, Irish Linen Guild, Better Business Bureau, magazine laboratories, private research centers

... Responsibilities of consumer for promoting quality clothing
Inform retailer of faulty or superior merchandise, understand and support appropriate legislation, know characteristics of quality clothing, cooperate in studies designed to improve clothing

CONCEPT III—TEXTILES SCIENCE

Subconcepts:	Time Allocation: (percent)
A. Construction and Use of Textiles	15
B. Care of Textiles	10
Percent of total time	25

A. CONSTRUCTION AND USE OF TEXTILES

Behavioral Outcomes:

- Knows characteristics of some natural and man-made fibers
- Is able to make intelligent decisions in selection and use of textiles
- Sees fiber and fabric as an integral part of garment appearance, cost, and comfort

Generalization 1: Differences in fiber content and quality, yarns, construction, and finish are responsible for the uniqueness of each textile.

Essential Learning: Fabric production

... Types of fibers from which fabrics are made
Natural: cotton, linen, silk, wool
Man-made: rayon, acetate, arnel, nylon, dacron, orlon, dynel

... Procedures in the production of fabrics
Making yarns from fibers: simple, ply, and novelty yarns
Making fabrics from yarns: woven knitted, felted, bonded, lace and net
Applying design to fabric: woven directly into cloth by variations of yarns and weaves; applied on surface by direct, discharge, resist, or screen block printing
Applying color to fabric: solution, stock, yarn, and piece dying
Adding finishes to fabrics: mercerizing, napping, sizing, shrinkage, crease resistance, permanent stiffness, water repellency, mothproofing, perspiration resistance

... Qualities which vary among fabrics
Absorbency; drying time; washability; pilling; strength; luster; resistance to sun, creasing, fumes, chemicals

Generalization 2: The fabric plays an important part in the durability and comfort of garments.

Essential Learning: Relationship of fabric to clothing

. . . Characteristics desired in fabrics used in clothing for various occasions
  Travel: wrinkle resistant, ability to hold shape, crease resistant, soil resistant
  Career or school: sturdy, static resistant, easy care, waterproof, slow to show wear, crease resistant
  Recreation: lightweight, fast drying, absorbent, warmth without weight, color fastness, waterproof, coolness
  Work at home: washability, durability, easy care, flame-proof
  Parties: crispness; softness

. . . Fabrics from which inner and outer garments and accessories are made
  Cotton: gabardine, corduroy, gingham, chambray, organdy, terry cloth, canvas
  Linen: crash
  Silk: satin, silk tweeds, shantung, chiffon, crepe, faille
  Wool: flannel, jersey, tweed, twill, challis, covert, eiderdown, felt
  Synthetics: nylon, orlon, rayon, dacron, dynel, imitation fur
  Animal hair: angora, camel hair, cashmere, mink, mouton
  Blends: dacron and cotton; nylon, acetate, rayon; cashmere and nylon; cotton and rayon

B. CARE OF TEXTILES

Behavioral Outcomes:

- Recognizes properties of fabrics in relation to proper care
- Shows judgment and responsibility in care of garments

Generalization 1: Full value from fabrics is more apt to be achieved when appropriate cleaning techniques are employed.

Essential Learning: Cleaning and ironing of fabrics

. . . Procedures in daily cleaning of garments
  Removing stains, airing, brushing, shaking, pressing, laundering, dry cleaning

. . . Properties of fabrics affecting type of care given
  Color fastness, shrinkage, stretch, fiber content, surface decoration

. . . Considerations in laundering fabrics
  Temperature and condition of water; aids as soaps, detergents, bleaches, softeners; laundry equipment

. . . Guides for spot and stain removal
  Use absorbent if fabric is not washable and will waterspot; test section of garment that doesn't show; use cleaning fluid on a grease spot; when using water on an unknown stain, try it cool, not warm, first; go to work on any stain as soon as possible

. . . Procedures in using and caring for self-service laundry and dry cleaning equipment
  Read and follow directions accurately, know how equipment works prior to operating it, report defects immediately, leave equipment clean

. . . Guides for ironing clothing
  Use temperature control suitable for fabric type; press dark-colored fabrics and fabrics which shine on wrong side; steam pile fabrics and use needle board; smooth seams, double edges, and wrinkles on drip-dry fabrics with fingers; iron with lengthwise grain; follow general procedures of ironing sleeves, collar, trimming, facings, pockets first and then seams, front and back

Generalization 2: The serviceability of and the satisfaction derived from one's wardrobe are greatly increased with careful storage.

Essential Learning: Storage of clothing

. . . Characteristics of good storage
  Accessibility; protection from dust, unusual atmospheric conditions, moths, mildew; use of storage aids to help garments retain their original shape

. . . Aids for use in storage of apparel
  Tie, belt, purse, shoe racks; hat boxes; garment bags; hanging shelves; pegboards with hooks; hangers; trays and drawers

. . . Benefits derived from organized storage of clothing
  Saving in time and motions in dressing; less time and energy spent in picking up,

putting away, and searching for things: better-looking and longer-wearing clothing

CONCEPT IV—CLOTHING CONSTRUCTION

Subconcepts:	Time Allocation: (percent)
A. Appreciating Clothing Construction	5
B. Processes in Clothing Construction	25
Percent of total time	30

A. APPRECIATING CLOTHING CONSTRUCTION

Behavioral Outcomes:

- Finds increased personal satisfaction in clothing construction
- Becomes more creative in use of fabrics and notions and in adaptation of pattern
- Recognizes a well-fitted garment

Generalization 1: Construction of clothing is a means of expressing creativity and deriving satisfactions.

Essential Learning: Creativity through clothing construction

... Ways to be creative in construction of clothing
 Make belts, purses, hats from bright felt from any source; design and make own patterns from original ideas or pictures; tint fabric to freshen or deepen its color; match, contrast, or harmonize colors and fabrics; use interesting trimming and buttons

... Satisfactions to self and family that may be derived from clothing construction
 Self: pleasure in doing for others, creative use of leisure time, individuality in garments, improved skills with possibility of a wage-earning job related to sewing
 Family: increased wardrobe, extended clothing budget, family pride in individual accomplishment

Generalization 2: Properly fitted clothes contribute to being attractively and comfortably dressed.

Essential Learning: Fitting of garments

... Considerations for obtaining a well-fitted garment
 Hang and drape of the garment: grain and grain control: control of fullness for the type of fabric, body proportion, silhouette: balance of the parts of the garment on the figure

... Ways to obtain a good fit
 Make necessary adjustments before the fabric is cut, make adjustments after garment is put together

... Common alterations frequently needed in patterns
 Changes in length, width, shoulder line, darts, sleeves of bodice; changes in length, width, and location; direction or size of darts in the skirt: changes in waistlines in dresses

B. PROCESSES IN CLOTHING CONSTRUCTION

(See SEQUENCE OF LEARNINGS IN CLOTHING CONSTRUCTION, Appendix)

Behavioral Outcomes:

- Selects patterns and fabrics that suit individual needs
- Selects appropriate sewing equipment and uses it properly
- Finds satisfaction in sewing at own ability level and strives for continued improvement

Generalization 1: Skill in the selection of equipment and tools, pattern, and fabric leads to greater satisfaction in clothing construction.

Essential Learning: Planning for a sewing project

... Personal and environmental factors influencing the choice of a sewing project
 Personal: amount of sewing skill, time available to make item, personal desire to sew
 Environmental: availability of suitable patterns, fabrics, notions, equipment, space for sewing; type and amount of guidance available

... Types of equipment needed for sewing
 Sewing machine and attachments; tools for measuring, pinning, cutting, marking, pressing, stitching; ironing board and iron

... Considerations in pattern purchasing
 Size, manufacturer's features, information

given, amount of material required, difficulty of details, appropriate fabrics

... Factors to consider in selecting fabrics for garment construction

Suitability of color and design of fabric to individual and pattern; ease of working with the fabric in relation to amount of sewing experience of the individual; special qualities found in fabrics such as finishes, color fastness, wrinkle resistance, shrinkage; special problems resulting from fabrics having nap, with one-way, plaid or stripe designs

... Benefits derived from careful planning for a sewing project

Project commensurate with ability to sew; appropriate and needed equipment, supplies, materials on hand; an environment conducive to sewing; a satisfactory finished product suited to the individual; pattern and fabric coordinated

Generalization 2: Proficiency in basic construction skills is the foundation for independence and creativity in sewing.

Essential Learning: Constructing a garment

... Sewing processes involved in the construction of various garments

Making seams: plain, lapped, flat-fell; finishing edges: pinking, edge stitching, overcasting, binding with bias, making plain or rolled hems; providing fullness in garments: darts, tucks, pleats, shirring, gusset, shrinkage, gathering, easing; attaching collars, sleeves and cuffs; joining waist and skirt; constructing pockets: patch, set-in, welt, slash, bound; making plackets: fly, continuous bound; attaching fasteners: buttons, hooks and eyes, snaps, zippers, loops

... Basic procedures used in construction of a garment

Preparation of material by straightening, shrinking; laying, pinning, cutting of pattern; transferring pattern markings; stay stitching and basting darts, tucks, seams; fitting and altering garment; final stitching; pressing

... Shortcuts in clothing construction

Unit methods, machine and pin basting, iron-on facings, garment and lining cut together, machine hemming with straight stitch machine

CONCEPT V—EMPLOYMENT RELATED TO TEXTILES AND CLOTHING

Subconcepts:	Time Allocation: (percent)
A. Occupational Opportunities Related to Textiles and Clothing	5
B. Suitability of Self for Employment in Occupations Related to Textiles and Clothing	5
Percent of total time	10

A. OCCUPATIONAL OPPORTUNITIES RELATED TO TEXTILES AND CLOTHING

Behavioral Outcomes:

- Is aware of a variety of occupations related to textiles and clothing and level of training required
- Is able to identify factors which affect availability of employment in textiles and clothing related occupations
- Utilizes sources for obtaining pertinent information about occupational opportunities related to textiles and clothing

Generalization 1: Understanding factors affecting employment opportunities helps individuals make vocational choices.

Essential Learning: The nature of occupations related to textiles and clothing

... Occupations in relation to level of training

High school courses: salesclerk in clothing areas; demonstrator of sewing machines and notions; assistant alterationist; assistant dressmaker; hand presser, mender, spotter; dry cleaning and laundry aide; milliner's assistant; textile laboratory tester trainee; stock clerk, sewing room worker; factory machine operator

Two years beyond high school: assistant buyer, comparison shopper, director of fashion shows, textile research assistant, personal shopper, bridal consultant, fashion photographer assistant, market research interviewer, educational director

Four or more years beyond high school: designer of garment fabrics, buyer, costumer, fashion copywriter, fashion artist, director of fabric research and testing, fashion editor, high school or college teacher, fashion photographer, coordinator of consumer information

... Places of employment

Retail store, magazine company, theater, school or college, business or industrial firm, home

... Factors affecting number and types of occupations available

Type of community: urban, suburban, rural, small town

Kinds of economic area: agricultural, industrial, resort, residential

Conditions of economic growth and decline: unemployment rate, turnover of employees, income level, industry

Generalization 2: Use of many available sources of information will provide background for weighing decisions regarding choice of occupation.

Essential Learning: Securing information about occupational opportunities

... Sources for information about types and location of opportunities

School and public libraries, school guidance office, friends and relatives, newspaper advertisements, employment agencies

... Types of information to investigate

Scope of job opportunity within field, geographic location with greatest potential, stability of jobs in the field

B. SUITABILITY OF SELF FOR EMPLOYMENT IN OCCUPATIONS RELATED TO TEXTILES AND CLOTHING

Behavioral Outcomes:

- Identifies personal qualities which contribute to personal employability
- Evaluates personal interests and potential for employment in occupations related to textiles and clothing

Generalization 1: Careful analysis of personal assets and liabilities will help one determine a suitable choice of occupation.

Essential Learning: General employability of self

... Factors to consider when assessing personal qualifications for employability

Physical and mental health, physical and mental capabilities and limitations, physical habits, personal appearance, emotional behavior, communication skills, personal traits

... Factors to consider when analyzing personal aspirations regarding employment

Ability for and interest in further training: desire for money, prestige, position, status; desire to be of service

... Factors to consider when examining personal competence

Manipulative skills: manual dexterity, strength, endurance

Mental skills: attention to detail, memory, knowledge, imagination, common sense

Social skills: ability to relate well to others, preference for working alone or in groups

Generalization 2: When one's personal qualifications and interests are suited to the type of occupation chosen, employment can be more satisfying and rewarding.

Essential Learning: Relationship of self to specific textile and clothing-related occupations

... Aspects to consider when analyzing specific occupations

Job title, description of work, personal competencies required, working conditions, remunerative potential, other benefits, opportunities for advancement, worth of job

... Factors to consider in assessing personal qualifications for a specific occupation

Similarity of personal characteristics to those required, degree of interest in work of position, present and potential aptitude for required work, possible personal satisfaction to be gained, possible personal contributions to be made

HOME ECONOMICS 11—TEXTILES AND CLOTHING

REFERENCE GUIDE

	Concept I		Concept II		Concept III		Concept IV		Concept V	
References	A	B	A	B	A	B	A	B	A	B
Chambers & Moulton	Chs. 1,2	Ch. 3	Chs. 4, 5, 7	Chs. 6.8-10; 14-26	Ch. 13	Ch. 11				
Denny					All					
Fitzsimmons		Ch. 12		Ch. 12		Ch. 12	Pp 319-321			
Lester & Kerr	All									
Lewis & Bobroff									All	All
Lewis & Others (1)		Chs. 5, 11	Pt. II	Chs. 12, 15	Ch. 14	Pt. V		Pp. 58-88;162-174; 376-534	Ch. 20	
McKinney									All	All
Nickell & Others						Ch. 20	Pp. 479-480			
Phillips									All	All
Pollard (1)	Ch. 6	Ch. 5	Ch. 6	Chs. 1, 7	Ch. 9	Ch. 3		Chs. 2,4, 8-10		
Rathbone & Others		Ch. 2	Chs. 3,4	Unit 3, Ch. 17	Ch. 5	Unit 4			Pp. 493-511	
Stout					All	Ch. 13				
Sturm & Grieser		Ch. 1	Chs. 2,4	Ch. 5	Ch. 3	Ch. 6		Pt. 2		
Tate									All	All
Tate & Glisson	Ch. 4	Ch. 2		Chs. 3,6	Ch. 5		Pp. 32-34			
Todd & Roberts		Ch. 1	Ch. 5	Chs. 4,6	Ch. 12	Ch. 2		Chs. 7-11,13		
Zapoleon									All	All

HOME ECONOMICS 12—FAMILY VALUES FOR DEMOCRATIC LIVING (1 or ½ unit)

OVERVIEW

This course is designed for academically talented girls and boys who are seniors. It explores individual and family concerns of contemporary living. The pupils toward whom the course is directed will one day be charged with roles of responsible leadership in the community and nation. It is important that their education and experience include the opportunity to analyze and reflect upon the intrinsic values of the family as the basic unit in a dynamic democratic society.

Growing public attention to problems resulting from divorce, mental illness, moral irresponsibility, delinquency, narcotics cast into focus the family and its responsibility in molding individuals and stabilizing any culture. This course draws upon available scientific research and philosophical thought to provide depth and breadth of learning in the area of human relationships. Above all, it is designed to encourage critical thinking and clarification of personal values.

The concepts and subconcepts for this course are organized as follows:

CONCEPT I—FAMILIES IN OUR SOCIETY

- The Contemporary Family
- Families in a Changing Society
- Management of Family Resources
- The Family in the Community

CONCEPT II—FAMILIES IN OTHER CULTURES

- Cultural Heritage
- Intercultural Understanding

CONCEPT III—THE INDIVIDUAL IN THE FAMILY

- Development of the Individual
- Communication Among Individuals Within the Family

CONCEPT IV—MARRIAGE AS A WAY OF LIFE

- Preparation for Marriage
- Adjustment in Marriage
- Children in the Family

CONCEPT I focuses on the composition and functions of the contemporary family; the effects of social, economic, cultural, and technological changes on individuals and families; significance of management in daily living; the interaction of families and communities. CONCEPT II provides a background for understanding the meaning and significance of cultural heritage to man, for understanding families in different cultures by considering similarities and differences among families and influences of various cultures upon each other. CONCEPT III explores individual behavior as a basis for analyzing family communication and interaction. CONCEPT IV deals with preparation for marriage, adjustments in marriage, and children in the family.

The teacher of this course needs to keep in mind that allied concepts are included in other disciplines, such as biology, health, and social studies. The resourceful teacher will examine the course outlines in other departments to determine reciprocal opportunities in teaching family values.

An environment conducive to implementing teaching techniques in home economics is important for an effective study of this course. The environment should provide adequate space and equipment for experimentation and discovery. It should foster creativity and permit realistic problem solving. Above all, it must set the atmosphere for impartial analysis of values and opinions. Facilities should reflect new dimensions in quality teaching and furnish background for studies that help students form and transfer generalizations.

Facilities which promote a desirable atmosphere for teaching family living include: informal, attractive, homelike atmosphere to stimulate creative thinking about lasting and changing family values: flexible use of space to accommodate both large and small groups and to permit the use of diverse instructional equipment; accessible storage for such items as books, resource materials, equipment, and student materials: lightweight, movable tables and chairs to accommodate various arrangements for presentations, discussions, individual, and group work: efficiency kitchen in close proximity to encourage realistic, problem-solving situations.

This course is planned for a full year for 1 unit of credit. All four concepts should be included. Any two concepts may be taught on a one-semester basis for ½ unit of credit. When taught for one term only, include the two concepts which appear to be of most interest or potential usefulness to the pupils and which the teacher feels most competent to teach. The skillful teacher seeks help to provide enrichment and authority for course content. Each concept taught should be based on available research, authoritative thinking, scientific principles, and experimentation. The vital role of the family in developing and stabilizing any culture must form a dominant and continuous thread through all plans for learning in this course.

Pupils in grades 11 and 12 who wish a general family living course, but do not qualify for the high academic standards required of this course, may be scheduled in HE 3, Personal and Family Relationships.

A NEW GOAL IN HOME ECONOMICS EDUCATION

A new goal for the home economics program focuses on preparing youth and adults for the dual role of homemaker and wage earner. Rapid increases in the number of women entering the labor force, coupled with expanding job opportunities in home service fields have precipitated the need to capitalize on the contribution of home economics education in preparation for gainful employment outside the home as well as for homemaking.

Societal changes and technological developments have influenced the role of women and the type of job opportunities available to them. Today's trend toward specialization demands particular skills and knowledge for most types of employment. This has reduced the number of jobs previously available to high school graduates and dropouts.

Evidence indicates that jobs will grow at the fastest rate in professional, technical, clerical, sales, and service occupations. Many sales and service occupations require skills that stem from home economics subject matter. Home economics has an obligation to provide programs through which youth and adults may prepare for home-related occupations. At the same time, the home economics program must continue to help youth and adults prepare for their home responsibilities in order to more effectively accept their dual role as homemaker and wage earner.

The Employment Preparation Program

The study of home economics contributes to the development of many skills, attitudes, and understandings required in certain areas of employment. Programs have been planned in time sequences to help secondary school youth develop competencies necessary for home-related occupations.

Sequence I—4-Year Program

This sequence is planned to provide high school students with competencies in one or more home-related occupational areas. It is comprised of three essential elements:

- A 3-unit core of basic home economics courses in grades 9-11, to include Home Economics 1, 2, and 3; or any two of these in combination with two special interest courses
- A one-unit 12th-year course, Home Economics 13, Preparation for Employment, which emphasizes development of specific skills and attitudes toward employment
- Related work experience where feasible in local school-community

Sequence II—2-Year Program

This sequence is planned for pupils who have not met with success in school and have been identified as potential dropouts. It has been designed to aid these pupils in developing a favorable self-image and some salable skills in home-related occupational areas. Three important elements of this sequence are:

- A 9th-year 1-unit course—Home Economics 14, Becoming Employable. This course focuses on individual development
- A 10th-year 1-unit course—Home Economics 15, Training for Wage Earning. The emphasis of this course is on the development of entry-level skills pertaining to one of five specific occupational areas
- Related work experience where pupil's age and local factors permit

The Program for Out-of-School Youth and Adults

Persons who may benefit from employment preparation in home economics at the adult level include youth who left school prior to graduation and now recognize the need for employable skills; adults who must remain at home, yet want to capitalize on personal skills to increase family income; adults whose responsibilities are reduced and who now seek regular employment; and those who are regularly both wage earners and homemakers and are interested in improving present or gaining new skills. The employment preparation program at this level, determined by the needs of the adults in the school-community and the types of employment opportunities available to them, may include:

- A course to assist individuals in adjusting to new and changed employment situations, adapted for this level from content in Home Economics 13
- One or several courses in sequence to develop those skills needed for successful employment in home-related occupations available in the community
- Related work experience if desirable

Additional information in relation to employment preparation for out-of-school youth and adults is given in the section "Home Economics Education at the Adult Level."

Guidelines for Developing an Employment Preparation Program in Home Economics

Determining Need for Program

- Consult with administrators, guidance personnel, attendance officer, labor department and examine pupil records to determine:
  - — number of pupils who do not continue formal education after high school graduation,
  - — number of pupils who drop out of school,
  - — number of unemployed out-of-school youth and adults.
- Determine from guidance counselor the kinds of employment entered by former students.
- Survey community and surrounding areas to identify available home-related occupations.
- Contact employers in business and industrial firms to determine types of jobs available, qualifications required, projected need for future, numbers employed, frequency of turnover.
- Seek information from such community organizations and agencies as employment services, manufacturers' organizations, local PTA groups, service organizations.
- Check existing programs of employment preparation in school and area in order to coordinate efforts and avoid duplication.

Forming an Advisory Group

- Membership on a rotation basis may be composed of five or more representatives of employment services, school administrators, parents, interested community members, existing advisory committees for home economics, cooperative vocational education, adult programs, others.
- Functions of this committee may include study of the need for occupational preparation in home economics and continual guidance in developing, expanding, and evaluating the program.

Planning the Local Program

- Identify the group or groups for which employment preparation is desired.
- Analyze the job opportunities found to be available, and determine which occupational service area will be emphasized.
- Determine which employment sequence, I and/or II, is most appropriate for groups to be served.
- Determine job descriptions and competencies needed for specific jobs, including legal and other limitations.
- Identify competencies common to all jobs within a service area.
- Develop criteria to encourage high standards for the program.
- Explore possibilities for interdepartmental cooperation.
- Determine whether or not job experience should be a part of the program. If such experience is desired, the following plans may be helpful.
  - — Work experience in conjunction with existing school programs: Vocational Industrial Cooperative Program, Business and Distributive Education, General Work Experience Program
  - — Work experience for home economics only: school and/or community
  - — Work experience on the job obtained independently by pupils: Saturday, after school, summer
- Develop instructional materials.
  - — Begin with limited number of occupations to ensure success.
  - — Prepare training outlines and teaching materials to develop competencies for specific occupations or groups of occupations selected.
- Plan public relations program for interpretation of program potential; use status-achieving terminology.
- Plan for and carry out follow-up activities to evaluate effectiveness of program.

Administering the Program

- Select teaching personnel who have such qualities as
  - — background experience with occupations

other than teaching, either through observation or direct participation;

- an awareness of employment needs of the community;
- understanding and appreciation of varied working conditions and problems of employers and employees;
- ability to establish continuous contact and good working relations with employers.

- Provide sufficient time in teacher's schedule for investigation of needs, contact with employers, development of curricular and instructional materials, counseling of pupils, supervision of work experience where desired.
- Add a half- or full-time teacher as needed to meet the demand for high school and/or out-of-school youth and adult programs.

Courses of Study for Employment Preparation Sequence I and II

Program offerings for which courses of study are presented on the following pages include:

Home Economics 13	Preparation for Employment	(Grade 12)
Home Economics 14	Becoming Employable	(Grade 9)
Home Economics 15	Training for Wage Earning	(Grade 10)

EMPLOYMENT SEQUENCE I
HOME ECONOMICS 13—PREPARATION FOR EMPLOYMENT (1 unit)

OVERVIEW

This course is the fourth in Employment Sequence I and has as prerequisites three units of study in home economics which may be Home Economics 1, 2, and 3 or any two of these in combination with two special interest courses. The course is designed for those pupils who major in home economics and plan to enter the labor market upon graduation from high school. It is planned to promote the development of understandings, attitudes, and competences necessary for employment in entry-level home-related occupations.

The study of home economics contributes to the development of many skills, attitudes, and understandings which influence success in areas of home-related employment. The country is faced with an unprecedented growth in the number of young people who will be available for work in the future and a substantial reduction in the number of entry-level jobs traditionally open to youth. In a rapidly changing labor market, demand is increasing for personnel trained in areas of service to individuals, families, and institutions which were formerly carried out in the home. More girls and women are working for pay than ever before. In all probability a woman will enter, leave, and reenter the labor market one or more times throughout her life cycle. The woman who can apply her skills as a homemaker to the labor market will find the transition from home to work more satisfying and rewarding and, at the same time, serve a vital need in the nation's economy.

The concepts and subconcepts for this course are organized as follows:

CONCEPT I—ADJUSTMENT TO THE WORLD OF WORK

- Orientation to Employment
- Sharing in the World of Work

CONCEPT II—MANAGEMENT FOR EFFECTIVE LIVING AT HOME AND ON THE JOB

- Management of Resources
- Management as a Means of Effective Living

CONCEPT III—DEVELOPMENT OF COMPETENCES IN HOME-RELATED OCCUPATIONS

- Child Care Services
- Clothing Services
- Food Services
- Home Furnishings Services
- Home and Institutional Services

Concept I helps the pupil develop an appreciation for the significance of work through a study of the relationship of employment to society. Adjustment to the working world is facilitated by the identification and development of those personal qualities essential for employment. Concept II focuses on management practices which promote effective living at home and on the job. Concept III is concerned with the development of competencies necessary to the performance of specific home-related occupations. Instruction in this concept may cover job preparation in one or more service areas as determined by job availability and pupil interest in the local school-community. Work experience may be a part of this course if desired.

Courses of study for the development of job competencies in the service areas are to be adapted to meet local needs, following the content identified in supplementary materials available from the Bureau of Home Economics Education.

Time allocation for Concept III has not been identified, since this will depend on the number of jobs for which training is provided and the degree of competence to be achieved. The suggested time allocations for Concepts I and II are flexible and need to be adjusted in terms of decisions made regarding Concept III.

CONCEPT I—ADJUSTMENT TO THE WORLD OF WORK

Subconcepts:	Time Allocation: (percent)
A. Orientation to Employment	10
B. Sharing in the World of Work	20
Percent of total time	30

A. ORIENTATION TO EMPLOYMENT

Behavioral Outcomes:

- Is able to identify factors which affect availability of employment
- Understands the meaning of work in a democratic society
- Recognizes the changing employment picture and the importance of preparation for work now and in the future
- Knows where to seek information regarding jobs
- Is aware of the changing role of women in the world of work

Generalization 1: An appreciation of the world of work in a democratic society helps individuals understand the importance of each worker.

Essential Learning: Nature of employment in society

. . . Factors affecting the job market
  Economic growth and decline, change in employee income level
  Economic area: agricultural, industrial, resort, residential
  Community type: urban, suburban, rural
  Social customs: mores, traditions, changes

. . . National, State, and local employment trends
  Demand for skilled workers, decrease in unskilled jobs, automation, increase in service-type jobs
  Current employment patterns for men and women
  Increase in part-time jobs, women in labor force, shorter work week

. . . Implications of employment trends for workers
  More education required, greater competition among workers, preparation for dual roles for women

. . . Benefits to society through work by individuals
  Supports local, State, and national economy
  Improves living standard, reduces social problems
  Promotes democratic ideas of individual freedom, concern for other countries

Generalization 2: When personal benefits of work are recognized, individuals are more likely to participate effectively in the world of work.

Essential Learning: Influence of work on individuals

. . . Benefits derived by individuals and families
  Personal satisfaction, security, financial independence, personal advancement, improved living standards, self-respect

. . . Considerations in preparing for employment
  Developing wholesome attitude toward work, developing personal values and goals in relation to employment, education, and training; analyzing skills and capabilities; developing positive attitude toward work

. . . Sources of information about qualifications and availability of jobs
  N. Y. State Employment Service, school guidance office, local Chamber of Commerce, want ads, neighbors, friends

Generalization 3: Societal changes have a direct bearing on the contribution of women to the working world.

Essential Learning: Relationship of women to the world of work

... Changes in society in regard to women working

Decreased emphasis on the woman's role in the home, technological advances which have reduced time required to maintain a home, increased desire by women for personal fulfillment, financial need, pressure from labor market for more trained workers, increased recognition of the abilities of women

... Work patterns of women

Uninterrupted patterns: women who do not marry, who marry and continue careers from choice, who marry and work from economic necessity, who become full-time homemakers and do not work for gainful employment

Interrupted patterns: women who work before marriage or until children arrive, who work after children are in school or away from home, who return to work because of loss of husband's income through illness, separation, or death or for supplemental income

... Benefits to women in preparing for wage earning

Helps women develop own abilities and contribute to working world, permits opportunity for choice of whether or not to marry, provides secure base for married person in emergency, provides means of supplementing family income as necessary, allows full use of women's potential during periods when full-time homemaking is not required

... Benefits of continuing education

Enables maintenance of up-to-date skills or development of new as needed by changing job picture, increases opportunity for job advancement, provides widened horizons for personal development

... Ways of continuing education

Enrolling in adult education courses, participating in company and government sponsored training programs, pursuing higher education in public or private institutions, independent reading and study, observation of people and activities, taking correspondence courses, attending community educational and cultural functions

B. SHARING IN THE WORLD OF WORK

Behavioral Outcomes:

- Is aware of elements which influence the employment situation
- Recognizes importance of personal attitudes, behavior, and appearance in the world of work
- Begins to exhibit some judgment as to when and when not to work throughout life cycle
- Is able to analyze personal qualities in relation to work

Generalization 1: When employers and employees recognize the contribution each makes to the job, mutual satisfaction and effective job performance tend to result.

Essential Learning: The scope of employment

... Essential elements of employment

Qualifications: job skills and competencies, educational and physical requirements

Laws and regulations related to employment: wage and salary standards, working hours; unemployment insurance; workmen's compensation; health insurance; social security; consumer protection laws; legal rights of the employee; antidiscrimination laws

Fringe benefits of employment: pension or bonus plan, profit sharing plan, cooperative insurance; vacations with pay; employment associations; payment of dues; group life insurance, employee savings and loan association, sickness and accident payments, medical services at work, group hospitalization; cooperative medical care plan; cafeterias and restaurants

... Aspects of the employer-employee team

Employer practices affecting employee: hiring and firing policies; working conditions; respect for employee as an individual; programs for employee recreation, welfare, self-improvement; systems of arbitration

Employee practices affecting employer: loyalty to employer, interest in optimum job performance and making suggestions for improvement, participating intelligently in employee organizations and labor unions, understanding operational procedures

Benefits derived from harmonious employer-employee relationships: personal satisfactions to worker and employer, optimum productivity, contribution to economy

Generalization 2: When workers recognize their personal qualifications in relation to the essential elements involved in employment, they are likely to achieve satisfaction on the job.

Essential Learning: The successful employee

... Personality factors important in getting and keeping a job

Character traits: promptness, dependability, loyalty, integrity, moral and ethical standards

Skills in getting along with others: communication, cooperation, compatibility, social behavior, sense of humor, friendliness, interest in others, tactfulness

Attitudes toward work: interest in doing a job well; willingness to accept direction and correction

... Physical factors important in getting and keeping a job

Personal appearance and grooming: clothes appropriate, clean, becoming to individual; hair clean and attractively arranged; makeup appropriate to wearer and occasion

General health conditions: stamina, posture, vitality, absence of disease

... Personal qualifications for work

Values and goals: reason for seeking job, sincerity in needing or wanting work, interest and belief in the particular job

Education and qualifications: education, training, experience, personal assets and limitations, willingness to practice or study for improvement of self or skills

... Factors affecting choice of job

Personal preference: interest in work, location, opportunities for learning and advancement

Job availability: requirements, conditions of work, pay and benefits, community

... Special considerations relating to woman's decision to combine marriage and work

Attitude of husband, personal and economic considerations, management of household, facilities for care of children, personal rewards of work, security of maintaining salable skills throughout lifetime, career contributions of women in various occupations, responsibilities to husband and children, changes throughout family life cycle

... Guides in applying for the job

Ask permission to list persons as references: prepare resumé of personal qualifications, experience, and references: write a letter of application indicating interest, summary of qualifications, availability for job, and requesting interview: complete application form if provided: try to make favorable impression at job interview: be punctual, mannerly, dress appropriately and be well groomed: ask intelligent questions and respond in a clear, concise, and interested manner: be sincere, enthusiastic, at ease: be familiar with possible questions likely to be asked by interviewer

CONCEPT II—MANAGEMENT FOR EFFECTIVE LIVING AT HOME AND ON THE JOB

Subconcepts:	Time Allocation: (percent)
A. Management of Resources	5
B. Management As a Means of Effective Living	15
Percent of total time	20

A. MANAGEMENT OF RESOURCES

Behavioral Outcomes:

- Understands the importance of managing resources at home and on the job
- Is able to identify available resources
- Knows the elements of effective management of resources
- Recognizes relationship of use of resources to achievement of goals

Generalization 1: Management tends to become a part of everyday living at home and on the job when its values are recognized.

Essential Learning: Importance of managing resources at home and on the job

... Values to the family

Provides for achievement of family needs with maximum efficiency, encourages sharing of responsibility, provides for balance of activity, aids in work simplification

... Values to the individual

Provides for the achievement of individual goals as well as those of the family, leads to satisfaction in achievements, permits a view of total job to be done, leads to increased productivity, creates an efficient work environment, permits best use of resources

Generalization 2: Knowledge of resources available helps individuals plan for the achievement of goals.

Essential Learning: Nature and organization of resources

... Types of resources

Human: knowledge, ability, skill, talent, attitude, time, energy, personality traits, past experiences, other people

Nonhuman: money, material goods, and equipment

... Elements of organization in the achievement of goals at home and on the job

Goal setting, information gathering, planning, carrying out plan

B. MANAGEMENT AS A MEANS OF EFFECTIVE LIVING

Behavioral Outcomes:

- Recognizes situations where management practices may be applied
- Is able to apply the elements of organization for the achievement of goals

Generalization 1: Management practices have universal application at home and on the job.

Essential Learning: The basis for management

... Situations requiring management by the single worker

Finding a place to live: room, apartment, shared or single basis; with family or friends; becoming familiar with a new community

Maintaining good health: balanced diet, adequate sleep, rest, and exercise, variations in recreational activities; making new friends

Improving self: courses, organizations, hobbies; developing a financial plan; purchasing goods and services

... Situations requiring management by the married woman worker

Maintaining the home: daily, weekly, seasonal; providing for special and regular activities of the family members, joint and individual, school, work, social; marketing and preparing meals; providing for care of children; planning specific time to be with children; planning time for self-improvement and relaxation; developing and executing a family financial plan

Generalization 2: Effective management practices contribute significantly to the achievement of satisfying personal and family living at home and on the job.

Essential Learning: Management for achieving personal and family goals at home and on the job

... Guides to planning for the achievement of goals

Identify particular tasks to be accomplished; establish priority of steps to be taken in terms of total results and resources available; determine individual or group who best can carry out tasks; plan methods, techniques most appropriate to particular jobs and efficient use of resources; identify equipment and supplies needed

... Guides to carrying out the plan

Carry out tasks as planned; adapt methods and resources; follow directions carefully when using new techniques and equipment; use healthful procedures; good posture, working heights; consult helpful resources

... Guides for evaluating procedures used

Assess results of efforts; determine ways to improve methods of carrying out task, to select more appropriate equipment, to use time, energy, and other resources more advantageously; experiment with shortcuts, different tools to determine most efficient use of resources, sharing of responsibilities

CONCEPT III. DEVELOPMENT OF COMPETENCES IN HOME-RELATED OCCUPATIONS

(Units for this concept to be adapted from supplementary courses according to specific employment opportunities in the local school-community)

SERVICE AREAS—Job Titles

CHILD CARE SERVICES

Day care center assistant, community and private nursery school assistant, public facilities nursery school aide, recreational center aide

Employee in home care of children, assistant in children's home, assistant in pediatric ward of hospital, assistant in care of handicapped children

Salesclerk in a store or department specializing in children's needs

Self-employed worker: care of children in own home, making children's toys, clothes

CLOTHING SERVICES

Demonstrator of sewing machines, salesclerk in clothing store or department, textiles or notions department

Assistant in alterations in clothing store or department, assistant dressmaker, seamstress specializing in infants' and children's clothing at home, small business or factory, milliner's assistant

Textile laboratory tester trainee

Seamstress at home—specialty items: aprons, knitwear, clothing

Laundress at home: shirts, linens, children's clothes

Dry cleaning and laundry aide—commercial or self-service: sorter, spotter, presser, inspector

FOOD SERVICES

Fountain service worker, cook in private home, caterer's assistant, short order cook's assistant, bakery-delicatessen assistant, self-employed worker making specialty items at home: cakes, cookies, relishes, bread, tea sandwiches, candy, jelly

Food laboratory tester trainee, worker in food production or processing plant, bakery industry

Food demonstrator, sample girl for bakery and other foods: in food sales promotion, food store worker; wrapper, salesclerk, checker, stock clerk

Food service assistant, diet aide in nursing home, hospital

Food service worker: salads, sandwiches, bakery, tray service in hospital, other institutions

Waitress, hostess

HOME FURNISHINGS SERVICES

Salesclerk or stock clerk in furnishings, houseware, linens, gift shop, or department store

Gift wrapper, florist's assistant, window dresser's assistant, interior decorator's assistant, appliance demonstrator

Factory worker: lampshades, curtains, rugs; worker in curtain, drapery, or slip cover department or firm; assistant to furniture refinisher or renovator

Self-employed worker at home: specialty items, candles, dried flower arrangements, chair and table mats, weaving

HOME AND INSTITUTIONAL SERVICES

Nursing home aide, hospital aide, patient care or housekeeper

Companion for aged, sick, assistant in home for aged, welfare service aide

Assistant institutional housekeeper, dormitory, nursing home, hospital, children's home, housekeeper in private home, housekeeping assistant in hotel, motel, bell girl in hotel

SUGGESTED OUTLINE FOR LOCAL DEVELOPMENT OF EACH SERVICE AREA

Behavioral Outcomes:

- Knows employment opportuntites in the particular service area
- Exhibits skills necessary for employment in one or more jobs identified

Generalization 1: A variety of opportunities exist for satisfying and rewarding employment in the particular service area.

Essential Learning: Entry-level employment

... Job titles

... Places of employment

... General qualifications

... Satisfactions and benefits

Generalization 2: When one develops skills suitable to the type of occupation chosen, employment tends to be satisfying and rewarding.

Essential Learning: Preparation for work in entry-level jobs

... Responsibilities of the job

... Skills required to do the job

... Techniques and equipment used in carrying out job

HOME ECONOMICS 13

REFERENCE GUIDE

BOOKS AND PAMPHLETS*	CONCEPT I		CONCEPT II	
	A	B	A	B
American Hotel-Motel Association	All			
Dreese		All		
Fitzsimmons				All
N. Y. State Dept. of Labor		All		
Packard		All		
Paulson		All		
Peyton				Ch. 40
Raines			Pt. I	Pt. II: Chs. 1,2
Sinick		All		
U.S. Dept. of Labor (1)	All			
U.S. Dept. of Labor (2)	All			
Weingarten				All
Wolfbein & Goldstein	All			
Worthy	All			
Wright		All		
Zapoleon	All	All		

* Information about where to secure references is included in the Appendix and following "Reference Guide" for Concept III.

HOME ECONOMICS 13 **CONCEPT III** **REFERENCE GUIDE**

(The following references are also suggested for use with Home Economics 15, Concept II)

OCCUPATIONAL SERVICE AREAS

CHILD CARE	CLOTHING	HOME FURNISHINGS	FOOD	HOME AND INSTITUTIONAL
Barkley & Champion, Ch. 20	Barkley & Champion, Chs. 7,8,13	Editors-Architectural Record	Barkley & Champion. Chs. 10,14-16	American National Red Cross (1),(2)
Greer & Gibbs, Unit 3	Beck	Greer & Gibbs, Ch. 27	Charley	Arthur
Langford	Denny	Peet & Thye	Editors-Architectural Record	Blaine
Mayer	Greer & Gibbs, Chs. 22-24	Raines, Pt. II: Ch. 5	Fowler & Others	Bradley
Peyton, Chs. 13,14	Logan & Moon	Schuler	Greer & Gibbs, Ch. 30	Dahl
Raines, Pt. III: Ch. 3	Moore	Warner	McLean	Editors-Architectural Record
Riehl, Chs. 17,18	Raines, Pt. II: Ch. 4	Waugh	Parker & Litchfield	Fleming & Benson
Shuey & Others			Peyton, Chs. 15, 18-29	Greer & Gibbs. Chs. 28,29
Smart & Smart			Raines, Pt. II: Ch. 3	Iowa State Department of Health
			School of Hotel Administration	Pfeiffer & Voegele
			Shank & Others	Raines, Pt. III: Chs. 1,2
			Stokes	Riehl, Chs. 1-16
			Voegele & Wooley	Schifferes
			West & Wood	Schuler
				Stitt & Todhunter
				Thompson & LeBaron
				Valentine

BULLETINS AND PAMPHLETS

(The following references are also suggested for use with
Home Economics 14 and 15)

American Hotel and Motel Association. Will hotel-motel work be your career? New York. The Association. n.d.

Byrne, K.M. & Byrne, John. You and your abilities. Chicago, Ill. Science Research Associates. 1960

Dreese, Mitchell. How to get the job. Rev. ed. Chicago, Ill. Science Research Associates. 1960

Humphreys, J.A. Choosing your career. Chicago, Ill. Science Research Associates. 1961

Murphy, J.M. Handbook of job facts. Chicago. Ill. Science Research Associates. n.d.

Neff, M.V. Ethics for everyday living. Chicago. Ill. Science Research Associates. n.d

New York State Department of Labor. Division of Labor Standards. Albany, N. Y. An abstract of laws governing the employment of minors in New York State 1962. p

Packard, Vance. Do your dreams match your talents? Chicago. Ill. Science Research Associates. 1960

Paulson, B.B. Discovering your real interests. Rev. Chicago. Ill. Science Research Associates. 1961

Shacter, Helen. Getting along with others. Rev. Chicago. Ill. Science Research Associates. 1960

Sinick, Daniel. Your personality and your job. Rev. Chicago. Ill. Science Research Associates. 1960

Weingarten, Violet. The mother who works outside the home. New York. The Child Study Association of America. 1961

Wolfbein, S.L. & Goldstein, Harold. Our world of work. Rev. Chicago. Ill. Science Research Associates. 1961

Worthy, J.C. What employers want. Chicago, Ill. Science Research Associates. 1960

EMPLOYMENT SEQUENCE II

OVERVIEW FOR HOME ECONOMICS 14 AND HOME ECONOMICS 15

Many school districts are faced with the problem of many students leaving school before they have completed their high school education. Frequently, these youth have met failure throughout their school years and, lacking interest in any phase of education, regard the working world as a panacea. However, upon entering the labor market with few skills to offer, they soon find it difficult to secure and maintain employment due to lack of understanding of self and the needs of the working world.

The school has a responsibility to help these pupils increase their employability and to salvage for society this potential wealth of human resources. Programs must be provided that motivate pupils' interest and direct their energies toward preparing for employment. Home economics can contribute toward this end by providing training for pupils in basic phases of homemaking necessary for employment.

Home Economics Employment Sequence II, composed of Home Economics 14 and 15, has been planned to help pupils who may leave school early develop a favorable self-image and some salable skills.

The concepts and subconcepts for Home Economics 14—Becoming Employable—are organized as follows:

HOME ECONOMICS 14—
BECOMING EMPLOYABLE

CONCEPT I—THE WORLD OF WORK

- Learning About Jobs
- Recognizing Jobs Possible for Self

CONCEPT II—PERSONAL DEVELOPMENT

- Personal Appearance
- Relationships on the Job
- Management at Home and Work

CONCEPT III—THE INDIVIDUAL ON THE JOB

- Learning Through Part-Time Work
- Getting and Keeping a Part-Time Job

Home Economics 14, Becoming Employable, is taught for a single period daily in grade 9. Concept I introduces the pupil to opportunities for employment in home-related occupations and helps him explore the world of [illegible] in relation to himself. Concept II will focus on improving personal assets, effective relationships with others, and ability to manage personal resources. Concept III emphasizes the value of learning through work and the steps in securing a job.

The concepts and subconcepts for Home Economics 15—Training for Wage Earning—are organized as follows:

HOME ECONOMICS 15— TRAINING FOR WAGE EARNING

CONCEPT I—PHILOSOPHY OF WORK

- Nature of Work
- Importance of Training and Education
- A Dual Role as Employee and Homemaker

CONCEPT II—TRAINING FOR JOBS IN HOME-RELATED SERVICE AREAS

- Child Care Services
- Clothing Services
- Food Services
- Home Furnishings Services
- Home and Institutional Services

Home Economics 15, Training for Wage Earning, is offered in grade 10 and follows Home Economics 14. Concept I considers the nature of work, the importance of training and education, and the dual responsibilities of the employed homemaker. Concept II offers basic training in one of five occupational areas: Child Care, Clothing, Food, Home Furnishings, and Home and Institutional Services. The particular area selected will be determined by job availability and pupil interest in the local school-community. If competences in other service areas are desired, a second unit of credit may be offered by scheduling an additional class for training in two different service areas.

Pupils who may decide to remain in school for the 11th year may continue with Home Economics 15, focusing on service areas not covered during the 10th year.

HOME ECONOMICS 14—BECOMING EMPLOYABLE CONCEPT I—THE WORLD OF WORK

Subconcepts:	Time Allocation: (percent)
A. Learning About Jobs	5
B. Recognizing Jobs Possible for Self	10
Percent of total time	15

A. LEARNING ABOUT JOBS

Behavioral Outcomes:

- Is able to look at, study, and analyze jobs
- Knows what jobs are available in own community
- Knows some employee interests and abilities which lead to success in home-related occupations

Generalization 1: Learning about jobs and what it takes to be successful on the job helps one recognize available work opportunities.

Essential Learning: The employment picture

. . . Guides to exploring a job
Job responsibilities, working conditions, starting pay, qualifications required opportunities for advancement

. . . Types of jobs in own community
Industrial, retailing, institutional, home

Generalization 2: All home-related occupations have some common elements but differ in work activities and characteristics needed by workers.

Essential Learning: Employment in home-related occupations

. . . Types of jobs possible in home-related services
Child care services, clothing services, food services, home furnishings services, home and institutional services

. . . Ways of learning more about jobs
Reading books and pamphlets, newspapers; talking with guidance personnel, employers, workers; securing part-time employment; closely observing workers on a job

. . . Interests and abilities leading to successful employment in home-related services

Child care services: enjoyment of children, patience, understanding of children's needs

Clothing services: interest in textiles, clothes, appreciation of color, line, design, enjoyment in working with hands

Food services: enjoyment of food, good health and health habits, understanding of nutrition

Home furnishings services: interest in arrangements and decoration, enjoyment of combining colors, designs, textures, understanding of furniture construction

Home and institutional services: enjoyment in serving others, interest in orderly routines, appreciation for neatness and cleanliness, understanding of procedures in care of furnishings, equipment

B. RECOGNIZING JOBS POSSIBLE FOR SELF

Behavioral Outcomes:

- Is able to identify particular personal interests and characteristics which affect own job preparation
- Shows interest in examining job opportunities in terms of own interests, abilities, education, and training

Generalization 1: When one is well suited to the job, he will benefit as a person and a worker.

Essential Learning: Importance of recognizing jobs possible for self

. . . Factors influencing personal qualifications for work

Interest, activities, abilities, characteristics, values and goals, education, training

. . . Reasons for matching personal qualifications to job requirements

Enjoyment of work, development as a person, good performance on the job; happy, full life

Generalization 2: Examining one's interests and aptitudes in relation to possible job opportunities helps one focus preparation for future work.

Essential Learning: Inventory of employability

. . . Considerations in determining areas of interests

Ability to enjoy and get along well with people, understanding differences in people, personal values and interests of importance, types of activities enjoyed most, interest in creativity

. . . Factors influencing personal employability

Condition of health: manual, mental, and social skills; personal traits and habits; desire to be employed

CONCEPT II—PERSONAL DEVELOPMENT

Subconcepts:	Time Allocation: (percent)
A. Personal Appearance	25
B. Relationships on a Job	25
C. Management at Home and Work	25
Percent of total time	75

A. PERSONAL APPEARANCE

Behavioral Outcomes:

- Exhibits improvement in personal appearance
- Is aware of personal appearance expected of an employee

Generalization 1: Looking one's best helps open doors to job opportunities.

Essential Learning: Analyzing personal appearance

. . . Benefits derived from a pleasing personal appearance

Poise and self-respect, standing and walking confidently; a feeling of well-being, acceptance by others, feeling comfortable with others; evidence of respect for others

. . . Influences on personal appearance

Personal grooming, physical health, mental health, clothing, nutritional status

. . . Ways to analyze own appearance

Ascertain qualities of desirable appearance, evaluate self in terms of strengths and areas in need of improvement, develop a plan for improving personal appearance, accept and live comfortably with features which cannot be changed.

Generalization 2: Careful personal grooming increases self-confidence.

Essential Learning: Improving personal grooming

... Characteristics of being well groomed
Body: hair—clean, becomingly arranged; nails—neat and well shaped; cosmetics—appropriate, carefully applied
Clothing: clean, neatly pressed, appropriate, shoes polished and in good repair

... Practices in achieving good grooming
Cleanliness: bathing regularly, using deodorant, choosing and using makeup tastefully, cutting and shampooing hair as needed
Clothing: keeping underclothing clean, hems even, straps out of sight

Generalization 3: Good physical health helps one enjoy a happy and useful life.

Essential Learning: Improving personal physical health

... Characteristics of being physically healthy
Body: skin clear, hair glossy, eyes bright, sweet breath, appropriate weight and energy, good appetite, resistance to infection
Posture: good when standing, sitting, walking
Attitude: enthusiastic, alert, calm, sunny disposition, positive outlook

... Practices in achieving physical health
Acquire adequate rest and sleep in relation to individual needs; carry out regular, frequent physical exercise for body development and maintenance; plan caloric and nutrient intake, according to age, sex, weight, activity; have regular medical and dental examinations

Generalization 4: A mentally healthy person is comfortable with himself and behaves acceptably in the eyes of others.

Essential Learning: Improving personal mental health

... Characteristics of being mentally healthy
Tolerant, easygoing attitude toward self and others; sense of humor; acceptance of own shortcomings; respect for self and others; ability to give love and consider interests of others; acceptance of responsibility, new experiences and ideas; independent thinking and decision making

... Practices in achieving good mental health
Treat others as you would like to be treated; engage in work for usefulness and energy outlet; enjoy relationships with family, friends, and others; use acceptable outlets to express feelings and discuss problems; develop interests in sports, games, hobbies; identify spiritual and moral values to serve as guiding purposes; show appreciation to and of other people; face responsibilities; strike a balance of work, play, love, quiet, and worship in daily cycle of activities

Generalization 5: Clothing which is well cared for and appropriate to the individual and occasion adds to a pleasing appearance.

Essential Learning: Improving personal appearance through clothing

... Characteristics of being well dressed
Clothing functional, appropriate to activity; well-fitted garments, becoming to figure in line, color, and design; in good repair, clean, well pressed, easy to maintain

... Practices in selecting and caring for the wardrobe
Use good shopping procedures; select garments according to income and present wardrobe; make inexpensive accessories to enhance and expand wardrobe; alter clothing as needed to achieve proper fit and current style; develop a schedule of daily, weekly, seasonal care of wardrobe

Generalization 6: Good nutrition is a genuine aid to healthier living, improved personal appearance, and general outlook on life.

Essential Learning: Improving personal appearance through nutrition

... Characteristics of the well-nourished employee
(Refer to characteristics identified under physically healthy employee)

... Practices in achieving good nutrition
Plan total day's food intake in relation to individual body requirements; develop regular eating habits; purchase foods in terms of nutritive value, cost, and conditions; prepare to retain nutritive value; serve attractively;

part IV

Programs for Elementary and Adult Levels

PART IV

Programs for Elementary and Adult Levels

HOME ECONOMICS EDUCATION AT THE ELEMENTARY LEVEL

No one institution is solely responsible for educating children for home and family living. The home, church and school must constantly strive to reinforce each other in this endeavor. Since pupils in grades K-6 are of necessity close to their homes, the elementary school years serve as a particularly significant time to help establish and reinforce habits and attitudes which will guide their living through the years.

Experiences in home and family living can

- strengthen areas of personal and family living through increasing each child's understanding and appreciation of his home, encouraging his respect for other family members, helping him to recognize his responsibility to the total family, broadening his understanding of varied patterns of family living;
- enlarge and broaden some of the understandings and learnings basic to the elementary curriculum;
- help to meet the needs of the elementary school child in developing physically, intellectually, emotionally, and socially

Although the regular classroom teacher incorporates many learning experiences in home and family living within the elementary school curriculum, the home economics teacher because of her background preparation can make a valuable contribution when she is available. A maximum contribution can be made through cooperative efforts of the elementary and the home economics teachers.

The home economics teacher serving the elementary school may be a full-time consultant, concerned specifically with one or more elementary schools, or a junior or senior high teacher with time assigned to assist at the elementary level. This part of the syllabus will help home economics teachers recognize areas where they might help to strengthen learnings in the elementary curriculum.

I. OBJECTIVES OF THE ELEMENTARY PROGRAM

What a child needs and what society expects him to acquire constitute the framework within which subject matter and activities are planned in the elementary curriculum. Five basic categories have been identified, and each offers scope for enrichment through home economics experiences. These are: self-development: interpersonal and intergroup relations: understanding of the world of people and things: control of the communicating arts and skills: moral and spiritual values.

II. THE ROLE OF A CONSULTING HOME ECONOMICS TEACHER

Each particular school situation will suggest unique possibilities for incorporating services of a consulting home economics teacher. Some suggestions are:

- Assisting the classroom teacher in planning experiences revolving around home and family living. Planning can be accomplished through informal conferences or scheduled meetings, when a series of lessons can be developed
- Locating and providing instructional materials in areas of home economics
- Assisting the classroom teacher and pupils in carrying out experiences
- Helping make facilities available either through sharing regular home economics space and equipment or improvising arrangements for the elementary classroom
- Helping with in-service meetings for teachers and/or administrators where home economics is concerned
- Acting as a resource person to elementary school personnel and/or parents
- Assisting with interpretation of cooperative plans and programs to parents and community groups

Continuing assessment of the contribution of home economics to the total program will indicate further direction. Such evaluation should involve classroom teachers, home economics teachers, administrators, and frequently pupils and parents.

III. ORGANIZING HOME ECONOMICS AT THE ELEMENTARY LEVEL

Recognition of the desirability of a home economics emphasis within an elementary school curriculum may prompt administrators, supervisors, classroom teachers, or home economics teachers to initiate the idea. Development of a program in any school or district should involve all of these key persons early in the planning. Some general guides for organization and implementation follow:

Planning the program

- Determine ways in which a consulting home economics teacher may serve the program
- Determine ways to finance supplies and resources
- Assess physical facilities. Although most experiences for elementary pupils can be carried out within regular classrooms, the use of portable units and other areas such as lunchroom, auditorium, PTA room, or all-purpose homemaking room should be considered. Spaces for planning, filing, storage of resource material and equipment are also important
- Select a consulting home economics teacher who is certified in home economics education and has at least 1 year of previous teaching experience. Adaptability, flexibility, ability to work with others and communicate ideas, organizational ability, creativity, patience, and the ability to identify easily with young children are important qualifications

Implementing the program

- Exchange and study related materials. Familiarity of the consulting home economics teacher with the elementary curriculum and familiarity of the classroom teacher with the scope of home economics is essential to cooperation
- Provide opportunity for cooperative planning by the classroom and home economics teachers in developing experiences based on mutual objectives and within limitations of time, money, and facilities
- Establish regular times and places for consultation and planning. Be sure that responsibility is clearly established and understood
- Employ a variety of methods, materials, and resources suitable to the area of study and the interest and ability of the learners

The following chart identifies six home economics concepts which are supportive of the objectives of the elementary program, namely, Family Living and World Understanding, Health and Grooming, Nutrition and Foods, Home Management and Safety, Entertainment and Manners, Textiles and Clothing. Suggested behavioral outcomes represent those important to achieve through learning experiences in education for home and family living throughout the elementary school years. Proposed teaching ideas illustrate the way in which learning experiences may be adapted to each grade level. Study of elementary curricula for each subject area will reveal points at which these learning experiences can be incorporated for mutual enrichment of other subjects and home economics. If the services of a home economics consultant are not available, the regular elementary classroom teacher will find the chart helpful in stimulating related learnings in the area of home and family living.

INTEGRATING HOME ECONOMICS LEARNINGS IN THE ELEMENTARY CURRICULUM

Concepts and Behavioral Outcomes for Home Economics Learnings	Kindergarten	Grade 1	Grade 2
Family Living and World Understanding • Recognizes the importance of the family as the basic unit in society • Understands own role in the family and assumes responsibility in relation to it • Displays some understanding and respect for individuals and families in other cultures • Realizes that the American family is a mixture of cultures, traditions, mores, races, creeds, and color • Appreciates the cultural heritage of own family • Recognizes that the surroundings and history shape different ways of life	"Just wait 'til I am twenty-three I'll treat my children like my folks treat me. I'll make them go to bed on time, While I stay up late, until after nine. They'll pick up their toys; be good as can be, But I'll love them too, as my parents love me." * Generalizations: • My family is very important to me. • We give and receive from each other. Teaching Idea: Make a family of puppets, and use them to demonstrate duties and responsibilities of each family member. The puppet family can be used throughout the year to teach other learnings.	"Let's have a party; I'll be the host. I'll help my mother, but she'll do the most." Generalizations: • A good family member assumes responsibility in the home. • Holidays are times when families can have fun together. Teaching Idea: Have children plan a home-type party centered around an important holiday. With teacher acting as mother, plan invitations, activities, decoration, and refreshments. Each child learns to issue invitations over the telephone and other ways he may help.	"Tent and palace, Hut and igloo, Each called home, By someone like you." Generalizations: • Although houses throughout the world are different, families within them are much the same. • Boys and girls around the world have jobs to do to help the home run smoothly. Teaching Idea: Study and compare the living habits of children in different parts of the world. Place emphasis on the responsibilities these children have in the family and upon similarities of children everywhere.
Health and Grooming • Realizes the value of daily hygiene • Appreciates the importance of being well groomed • Recognizes own basic needs for health and care of body • Follows good health and grooming practices • Is aware of the role of the family doctor and appreciates his help • Is able to assume responsibility in the care of the sick	"I wash my hands And then my face And at the table I take my place." Generalizations: • Washing makes us look better to others. • Washing before meals helps everyone keep healthy. Teaching Idea: Demonstrate ways to wash, rinse, and dry hands and face. Show use of washcloth, paper towels, liquid, dry and bar soap. Emphasize neat use of sink and facilities.	"Mother thinks I like to bathe Because I'm nearly seven But really I take my bath each night 'Cause floating boats is a delight" Generalizations: • Regular care of the body helps it to perform properly. • Good habits of cleanliness result from daily practice. Teaching Idea: Show film on keeping clean. Follow up with class discussions on practices for keeping clean and why each is important.	"The science of keeping teeth In good health, and clean Is known in school By the name 'dental hygiene.' " Generalizations: • Care of teeth is important to health. • Healthy teeth need daily care and a good diet. Teaching Idea: Have dental hygienist explain importance of first and permanent teeth and demonstrate correct brushing. Follow with a flannel board discussion of kinds of food which promote healthy teeth. Have children develop a large chart to check daily care of teeth and foods eaten for a week.
Nutrition and Foods • Knows the contribution of nutrients to good health • Is aware of the importance of good nutrition to growth, development, and performances • Knows the importance of vegetables and fruits in the diet • Understands the biological needs of the body and the importance of proper diet • Is able to read, understand, and compare information on food containers in order to buy wisely • Is familiar with new and different foods in order to add variety to the diet	"The farmer is our friend, you know. He grows food That helps us grow." Generalizations: • Our bodies need good food in order to grow properly. • Our food comes from plants and from animals. Teaching Idea: Use food models to help children associate names and food items commonly eaten. Take class on a field trip to one or two farms to see the sources of food items.	"Raw fruits and vegetables Are good to chew. And more than that, They're good for you." Generalizations: • Fruits and vegetables are needed every day for energy and growth. • Many foods are eaten without cooking. Teaching Idea: Serve over a period of weeks a variety of fruits and vegetables for a midmorning or midafternoon snack. Encourage children to try all of them. Demonstrate on the first day procedures for washing and serving. Have children carry out these procedures on the following days.	"Through a straw, in a glass or cone, Soft, hard, liquid and foam Milk just can't be beat For a snack or special treat." Generalizations: • Snacks and treats can be healthful as well as good to eat. • Milk can be served in many ways. Teaching Idea: Prepare an exhibit of milk and milk products showing why they are important to body growth and maintenance. Have children list ways they have eaten these foods. Demonstrate the preparation of simple milk-based foods suitable for snacks and treats.
Home Management and Safety • Demonstrates ability to care for various areas and items found in the home and school • Knows some ways to maintain a safe home • Is aware that sharp tools are not dangerous if properly handled and stored • Is able to manage small amounts of money and save regularly • Takes pride in appearance of classroom • Is aware of the importance of planning for group activities	"Helpful children, Girls and boys, Always remember To put away toys." Generalizations: • Toys that are neatly stored are ready for another day. • Putting things away can prevent accidents at school and at home. Teaching Idea: Have children help make a picture or symbol that indicates what is stored in each area of the classroom. Help each child make something symbolic to identify own locker space. During reading time, read a story that illustrates what happens when things are out of place. Have children take responsibility for returning toys and equipment to proper place after each activity.	"Pencils, scissors and tools All have their place. If you carry sharp objects You must walk, not race." Generalizations: • Safe handling of sharp objects prevents injury. • Storing sharp objects in protected places keeps them in good condition for use. Teaching Idea: Demonstrate the proper use of such sharp objects as scissors, knives, and craft tools which children may use. Talk about places and ways to store such items for safety and future use. Demonstrate and have children practice correct ways to carry scissors, handle knives, pass craft tools from one to another.	"Playing with safe toys By girls and boys Can be lots of fun For everyone." Generalizations: • Accidents can be avoided when children play with safe toys. • The way toys are played with affects the safety of self and others. Teaching Idea: Have each child bring to class one or two toys from home. Discuss safety hazards of each, and make an exhibit of those which would be safe for children. Consider safe ways of playing with the toys.
Entertainment and Manners • Is aware that good manners help foster a pleasant home and school atmosphere • Practices good manners in daily living situations • Knows that each family member can help some way in meal preparation and serving • Is considerate of others • Understands the meaning and joy of holidays • Shows some social ease when eating out and entertaining	"When she smiled and said, 'I'm glad I came.' We smiled in return and said, 'Come again.' " Generalizations: • People enjoy visiting us if we make them feel welcome. • People enjoy visiting with us if we behave well. Teaching Idea: Have a party for a few adult guests and later for all mothers. Give each child a special task. Beforehand, hold a trial run with pupils acting as guests.	"Let me help To set the table. I learned in school And I am able." Generalizations: • A table can be set attractively by following a few simple rules. • The way the table is set influences table manners. Teaching Idea: Demonstrate setting a table and discuss table etiquette for various occasions. Post pictures of tables set attractively. Arrange one place setting to serve as a guide, and have each child practice setting the table.	"Thank you— So easy to say. Why don't we say it More often each day?" Generalizations: • Showing appreciation when things are done for us makes others happy. • Thank you can be said in person or by a written note. Teaching Idea: Have children bring in the name and address of someone from whom they have received a gift. Have them make their own notepaper and compose an appropriate thank you note.
Textiles and Clothing • Recognizes that clothing is used for protection in different climates • Practices approved procedures in care of various garments • Knows fiber sources and is able to recognize some fibers • Knows that climate and custom affect the dressing habits of a people • Appreciates the influence of changes in society upon the clothing industry • Is aware of the types of garments appropriate for various occasions	"In winter I wear My warmest clothes, And even try To wrap up my nose." Generalizations: • We need to wear different kinds of clothes in different weather. • Going outside without the right clothing sometimes causes us to be sick. Teaching Idea: Have class arrange an exhibit using dolls to demonstrate appropriate clothing for rainy days, snowy days, warm days, and cold days.	"Cloth is made From fibers and yarns; Wool from the sheep's coat, Cotton from farms." Generalizations: • Plants and animals provide raw fibers which are spun into yarns. • Yarns are woven into fabrics for clothing. Teaching Idea: Show children samples of raw cotton, wool, and silk. Relate to cotton plant, sheep, and the silkworm. Show children how the raw material is spun into thread and woven into fabric. Visit the art department to see how a loom is operated.	"What to wear— and when; Each day We decide again." Generalizations: • Clothing looks better when it is cared for. • Clothing should be suitable for the occasion. Teaching Idea: Have children role-play ways in which they might help care for their own clothing in the morning, after school, when going to bed. Talk about why we have different types of clothing for different occasions.

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* Original verses in this section from Bureau of Home Economics, N.Y. State Education Department.

INTEGRATING HOME ECONOMICS LEARNINGS IN THE ELEMENTARY CURRICULUM

Grade 3	Grade 4	Grade 5	Grade 6
"From China, from Holland From England, from Spain Your parents' parents And their parents came." Generalizations: • Most of what we call our culture is a mixture of cultures from all over the world. • Our families have contributed to our nation's heritage. Teaching Idea: Have children report on national or ethnic origins of their families. Have each child bring in an object that represents this origin for a class display. Children can tell about the objects they have brought to class.	"Little boy from the isle of Japan You are welcome to our land. Tell me of your country far away I may be a stranger there some day." Generalizations: • The kindness and understanding we give to others is more of an investment than it is a gift. • Strangers to our country have special problems of adjustment and need our help and understanding. Teaching Idea: Have a foreign exchange student tell the class the difficulty one has in adjusting to a new culture. Study one phase of a child's daily life in several countries.	"From a seed of kindness Comes a harvest of good will Joy of neighborliness, Understanding, love, respect." Generalizations: • Neighborhood living becomes enjoyable when we treat our neighbors with respect. • Sharing activities with people of different backgrounds helps develop understanding. Teaching Idea: Describe a situation where neighbors might disagree. Have pupils role-play ways the problem may have been prevented or resolved through acts of kindness and better understanding.	"For trinkets, for jewelry For clothing to wear, Come, come, Come to the fair." Generalizations: • Europeans, Africans, Americans, and Asians continually add to world culture. • Exchange of goods makes life better and more interesting for all. Teaching Idea: Have a little World's Fair in the classroom. Children may bring in clothing, food, and artifacts from distant lands that show the never-ending cultural exchange between nations.
"Early to bed and early to rise, Makes a man healthy, wealthy, and wise. My mother says it 'cause her mother said The very same thing when she went to bed." Generalizations: • Sleep and rest are necessary for good health. • Lack of sleep makes one feel tired and grouchy the next day. Teaching Idea: Show film on health. Follow with discussion of what takes place in our bodies during sleep and what factors help us sleep well.	"When digestion is complete Of the many foods we eat Every cell from head to toe Is nourished well and ready to go." Generalizations: • The food we eat enters the cells of the body through the process of digestion. • Since foods are digested differently, a variety is needed to keep the body healthy. Teaching Idea: Use a large chart of the digestive system. Have pupils trace what happens to food as it travels through the body, showing the process of digestion in relation to carbohydrates, proteins, vitamins, minerals. Discuss digestibility of cooked and raw foods.	"Should we call someone, do somthing. Run away scared? In case of emergency We'd better be prepared" Generalizations: • Simple, first aid measures help in case of emergency in the home. • Calling for help is the best first step when accidents occur. Teaching Idea: Have children list some experiences they have had at home where first aid measures were needed. Discuss first aid supplies needed at home, their use and storage. Fill a first aid kit for classroom. Have children develop for home use a list of persons and telephone numbers to call in times of emergency.	"To the dentist and doctor we must go For regular checkups, you know If our teeth and bodies are to be Healthy, strong and disease free." Generalizations: • Doctors and dentists assist family members to keep healthy. • Quiet fun and thoughtfulness can help cheer a family member who is ill. Teaching Idea: Invite the school physician to talk to the class and explain the services of the medical profession to families. Have class discuss ways they can help at home when some member of the family is sick.
"Oats, corn, wheat, And barley grow. How they get to the table, We'd like to know. Generalizations: • Grains are a valuable food. • Many foods we eat are made of grain products. Teaching Idea: Have a class study breads, flours, cereals, and other food products that contain grains and trace them back to the grain farms. Take class through a bakery so they may see how the grains become bread and cakes.	"The food we eat, Not gasoline, Is the fuel that runs Our 'supermachine.' " Generalizations: • The body, like any machine, needs fuel to keep it running. • The body has devices to tell it when it needs refueling. Teaching Idea: Use a visual to show the way in which food supplies the biological needs of the body. Follow with class discussion of which foods provide nutrients to build, maintain, and repair the body and identify ways the body indicates a need for food.	"Fresh, frozen, packaged, canned Assorted shapes and sizes, too You must choose those That are good for you." Generalizations: • Children can learn about food by assisting mother with the marketing. • Nourishing foods can be found in many forms in the market. Teaching Idea: Take class on a field trip to a grocery store to become familiar with the variety of foods available. Examine information given on labels. Help members select foods for the preparation of a simple luncheon, including several forms of packaging. Guide class in preparing and serving luncheon.	"Boys and girls Far away Eat their foods In a different way." Generalizations: • Eating foreign foods can be an exciting adventure. • Keeping an open mind toward new and different foods can mean added eating pleasure. Teaching Idea: Discuss typical foods from various countries and how they are eaten. Practice using chopsticks, carved spoons of the Orientals, Pacific Islanders. Use them for a school lunch on a day when rice or other characteristic foods are served.
"Sometimes I think I'm very small And don't contribute much at all But someday soon I'll gain some rank 'Cause I'll save my pennies in a bank." Generalizatioue: • Knowing how to save and spend money wisely is important. • Mistakes can be avoided when money is counted accurately. Teaching Idea: Have committees for collecting and counting money for milk breaks and school lunches as needed. Use bank accounts in school banking program to help gain an understanding of the principles of interest and saving.	"Because my room's so many things, A clipper, a raceway, a fair, I want it always neat and clean When somebody visits me there." Generalizations: • Every member of the family shares responsibilities for keeping the home neat and clean. • Keeping the home and classroom neat and clean can be easy when everyone helps. Teaching Idea: Identify ways children may help in keeping the home clean. Have children report on home activities for keeping their rooms or the space they share clean. Rotate responsibility for housekeeping tasks to be performed in the classroom.	"Coming to us without being heard It can make people talk and not say a word; It can brighten our homes like the noonday sun; Electricity helps to get the housework done." Generalizations: • Care in using electric appliances promotes safety in the home. • Electric appliances perform better and last longer when cared for properly. Teaching Idea: Discuss ways the home uses electricity and substitutes for electricity in times of emergency. Demonstrate techniques in using electric appliances: reading manufacturer's directions carefully, drying hands before using, connecting and removing plugs, cooling hot appliances, storing properly.	"Knowing how to make Plans in advance A trip with family or friends Does enhance." Generalizations: • Planning together and sharing responsibilities leads to a successful activity. • Making arrangements in advance helps the trip proceed smoothly. Teaching Idea: Have class plan and take a 1-day trip that includes sightseeing, eating in a restaurant, and observing a formal program such as a concert. Have committees carry out arrangements for the trip: writing letters, collecting money, purchasing tickets, making reservations. Correlate this activity with learnings in concept "Entertainment and Manners."
"For home or school mealtime Or dining out for a special treat, We must always bear in mind Manners tell a story when we eat." Generalizations: • People who practice good manners are more pleasant to be with. • Many accidents and unpleasant situations may be avoided when good manners are used. Teaching Idea: Role-play acceptable table manners setting the scene at home, in school, and when dining out. Discuss reasons for the use of good mealtime manners. Arrange to eat as a group in the school lunch dining room, selecting a host and hostess for each table. Practice using good table manners throughout the year.	"Over the river and through the woods Once was the way to go. Now we use auto or subway or plane But the holiday's the same, you know." Generalizations: • Holidays are associated with special traditions and forms of entertainment. • Entertaining friends and relations provides opportunity for developing social ease and acceptable manners. Teaching Idea: Ask class to trace the history and meaning of several of the holidays celebrated by their families. Make a table decoration, a place card, and prepare a food suitable for one occasion.	"May I please? And thank you, sir. Miss Brown, May I present Mr. Kerr." Generalizations: • Manners involve being thoughtful of others in everyday living. • Making suitable introductions is one way of showing good manners. Teaching Idea: Discuss ways to make introductions and greet guests who visit the classroom. Assign, on a rotating basis, a host and hostess who assume responsibility for greeting and introducing guests. Role play different situations involving manners identified by pupils through a question box.	"When you are out among the crowd No need to wonder what to do Please don't laugh or talk too loud Respect for others gives the clue." Generalizations: • Behaving in an acceptable manner helps us to feel at ease in new situations. • Respect for public property benefits everyone. Teaching Idea: Have class plan and take a 1-day trip that includes sightseeing, eating in a restaurant, and observing a formal program such as a concert. Discuss appropriate behavior and dress when dining out, at the theatre, on a bus. Correlate this activity with learnings in concept "Home Management and Safety."
"I laughed and laughed in my usual way, When I saw the Chinese children last May. The clothes they wore were something to see, I wonder why they were laughing at me?" Generalizations: • Boys and girls in other lands dress in a way different from ours. • Climate and customs affect the dressing habits of a people. Teaching Idea: Investigate clothing of country under study. Have individuals from community who have lived in other countries show real garments and describe influences on clothing worn.	"America's parade of fashion appears When we trace its history through the years: From Indian skins to helmets for space, Clothes designed to fit the pace." Generalizations: • Clothing throughout the years has been designed to meet both the aesthetic and functional needs of the times. • Clothing worn reflects the way in which people live. Teaching Idea: Arrange an exhibit of mannequins dressed in clothing representative of periods under study. Discuss how inventions during these years have influenced clothing of the times.	"Textiles produced in an industry Which spans the world by land and sea Stem from animals, plants and minerals galore For shoppers' choice in a favorite store." Generalizations: • Many countries of the world contribute to the textile industry. • Natural resources and scientific developments have led to a wide variety of natural and man-made fibers. Teaching Idea: Have children develop a display attaching fiber and fabric samples to a world map. Show textiles produced in Western hemisphere countries and those imported. Discuss factors which influence the textile industry. Carry out common fiber tests to identify chracteristics of natural and synthetic fibers.	"When you go out, you should be dresse In clothes clean and well pressed With tears, wrinkles and buttons missed You'll not rate on the best dressed list." Generalizations: • Knowing how to make simple clothin repairs prepares one for emergency situations. • Proper care of clothing improves one' personal appearance. Teaching Idea: Hold a clothing clinic for demonstratio and pupil practice in shining shoes; sewing on buttons; mending simple rips an tears; pressing slacks, shirts, blouses laundering socks. Assemble a clothin repair kit to carry out simple clothing car in the classroom.

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American Dietetic Association, 620 No. Michigan Ave., Chicago, Illinois 60611

American Home Economics Association, 1600 Twentieth St. N.W., Washington, D.C. 20209

American Medical Association, 535 No. Dearborn St., Chicago, Illinois 60610

The Children's Bureau, United States Dept. of Health, Education and Welfare, Washington, D.C. 20202

Elementary Instructional Service, National Education Association. 1201 Sixteenth St. N.W., Washington, D.C. 20206

National and Consumer-Use Research, Agricultural Research Service. United States Dept. of Agriculture. Washington, D.C. 20251

HOME ECONOMICS EDUCATION AT THE ADULT LEVEL

Education in a changing society is a continuing process. No one can expect to learn all that is needed for living in today's world during the brief years of formal education. Individuals reach points of readiness where they become interested and willing to pursue particular forms of further study as they see greater personal meaning and direct relationship to their daily living.

Based on the needs and resources of the community, and of the particular group to be served, the home economics program at the adult level adjusts to concerns of living that are significant and challenging. The modern world demands homes where adults are concerned with the deeper meanings of life, where family members appreciate the unique contribution each has to make to family living, where each can find satisfaction in achievement and enjoyment in living, where parents recognize their responsibility for education and guidance of children, where the family fosters attitudes and abilities enabling its members to participate as responsible citizens in a free society. The home economics program, therefore, offers courses designed to prepare out-of-school youth and adults for useful employment in the home.

Since women in large numbers are joining the labor market and can expect to work for the greater part of their lives, the need for training and retraining them for employment is growing rapidly. Married women often experience interrupted patterns of gainful employment during the years when they have young children. Many jobs now available demand much more skill and training than in the past. New employment opportunities, especially in the areas of sales and services, are open to women who have some preparation for them. Since many of these occupations require background knowledge and skills in home economics, it is significant that home economics provide preparation for gainful employment outside the home.

The home economics program for youth and adults has, therefore, been planned to prepare women for their dual responsibility, that of worker and of homemaker.

I. SCOPE OF THE ADULT HOME ECONOMICS PROGRAM

Preparation for Homemaking

The adult home economics education program is planned in terms of five broad areas in personal and family living: (1) Personal and Family Relationships, (2) Personal and Home Management, (3) Housing for the Individual and the Family, (4) Personal and Family Clothing, and (5) Family Food and Nutrition. Within each area, a series of courses has been developed, each emphasizing one significant aspect. The general outline of content for each course provides for the development of information, understandings, and skills in relation to special needs of individual class members. Where the need arises for a course not included in the program as defined, a locally developed course outline may be submitted for approval.

The following chart presents an overview of the five areas of concern in the home economics program at the adult level. Detailed course outlines can be found in the Bureau of Home Economics Education publication concerned with the adult program.

COURSE TITLE	CONTENT EMPHASES
PERSONAL AND FAMILY RELATIONSHIPS	
Creating a Home Environment for Satisfying Family Living	● Influences on family life ● Basic needs of individuals and families
The Family in the Community	● Importance of family in community ● Organizations and groups serving families ● Participation in community services
Family Adjustment to Illness in the Home	● Adjustment in time of illness ● Ways families adjust to illness ● Community resources for family health emergencies

COURSE TITLE	CONTENT EMPHASES
Improving Family Unity Through Leisure Time Activities	● Importance of family group activities ● Provision for leisure time activities in home and community

PERSONAL AND HOME MANAGEMENT

Management for Satisfying Family Living	● Purpose of management in the home ● Influences on family management practices ● Improvement of management practices
Personal and Family Economics	● Influences on family use of money ● Common expenditures ● Financial planning ● Community resources for family financial management
Consumer Education for the Home	● Choice-making for family satisfaction ● Consumer buying practices ● Financing purchases ● Consumer protection

HOUSING FOR THE INDIVIDUAL AND FAMILY

Selecting a Place for the Family to Live	● Trends in family living affecting housing ● Housing for individual and family satisfaction
Home Care and Improvement	● Importance of maintaining and improving housing ● Remodeling and renovating housing ● Maintenance and improvement practices
Choosing, Constructing, and Renovating Accessories for the Home	● Purchasing vs. constructing accessories for the home ● Planning and constructing accessories for the home
Home Decoration	● Satisfactions from an attractive home ● Influences on personal preference and home decoration ● Resources available for decorating the home ● Principles of interior decoration

COURSE TITLE	CONTENT EMPHASES
Selection and Care of Home Furnishings	● Importance of making wise selections in furnishings ● Influences on choice of furnishings ● Selection and care of furnishings

PERSONAL AND FAMILY CLOTHING

Three Courses Planned in Sequence: Selection, Care, and Construction of Clothing ● Basic ● Intermediate ● Advanced	Clothing construction projects will advance in degree of difficulty as class member progresses from one level to the next. Each course will consider the following content emphases: ● Selection of project, pattern, and fabric ● Selection, use, and care of equipment for clothing construction ● Construction of garments ● Selection of accessories appropriate to garments ● Wardrobe planning for individual and/or family
Children's Clothing	● Selection of clothing for children ● Care of infant's and children's clothing ● Construction of children's clothing
Two Courses Planned in Sequence: Tailoring ● Basic ● Advanced	Tailoring projects will increase in degree of difficulty from basic to advanced course. The following content emphases will be included in each: ● Selection of project, pattern, fabric, and supplies for garment and lining ● Construction of tailored garments ● Repair and renovation of tailored garments
Personal Appearance and Grooming	● Factors affecting personal appearance ● Good grooming practices ● Selection and care of clothing and accessories for attractive appearance
Selection and Care of Personal and Family Clothing	● Selection of ready-made clothing and accessories ● Alteration of ready-made clothing ● Care and storage of clothing
Buying Clothing for the Family	● Planning for clothing expenditures ● Resources to aid in wise clothing purchases ● Financing clothing purchases

COURSE TITLE	CONTENT EMPHASES
FAMILY FOOD AND NUTRITION	
Nutritious Meals that Save Energy, Time, and Money	● Considerations in family meal management ● Management practices in planning, preparing, and serving family meals
Meeting Food Differences of Family Members	● Dietary problems of family members ● Adjustment of family meals to meet special dietary problems
Two Courses Planned in Sequence: Foods and Hospitality ● Basic ● Advanced	Occasions for which food is prepared increase in complexity from basic to advanced course. Constant emphasees in each course include: ● Satisfactions from entertaining in or away from home ● Organizing for preparation and service of food, both indoors and outdoors ● Preparation of foods for special occasions
Facilities for Preparing and Serving Family Foods	● Planning functional and attractive kitchens ● Selection, use, and care of kitchen equipment ● Safety in the kitchen

Preparation for employment

The employment preparation program will focus on the needs of adults and home-related occupations available in the local district. The purpose of the program is to provide training that will help those who:

- with additional education, have ability to advance in the occupational area in which they are employed;
- need to improve skills used in present jobs;
- need new or additional skills to adjust to technological changes in their occupational area;
- are presently employed in jobs which are becoming limited or obsolete as a result of changes in production methods, international markets, consumer demands, and general economic conditions;
- are interested in entering the labor market but have no basic preparation for employment.

Some occupations using home economics knowledge and skills that have been identified for adult employment preparation are listed below. Others may be found by exploring possibilities in the local community.

- Child Care Center Worker
- Clothing Alterer
- Clothing Maintenance Specialist
- Companion to an Elderly Person
- Family Dinner Service Specialist
- Food Service Worker
- Homemaker's Assistant
- Hotel and Motel Housekeeping Aide
- Management Aide in Low Rent Housing Project
- Visiting Homemaker

Schools are urged to give thoughtful consideration to the current need for continuing education for adults. This need includes preparation for both useful and gainful employment. A new approach to determining the groups to be served, the courses to be offered, methods and materials used, and organization of the program is called for.

II. GUIDELINES FOR DEVELOPING THE LOCAL ADULT HOME ECONOMICS PROGRAM

Careful study should precede the development of the program to be administered by the local school to avoid unnecessary duplication of effort in relation to courses offered and groups to be served. An adult home economics program should be planned and developed as an integral part of the total community program for home and family life education and for employment preparation in related areas. Guidelines for developing and operating a program follow.

A Cooperative Approach in Planning Adult Programs

The scope and content for continuing education in home economics are such that many individuals should be involved in planning the program. School administrators, guidance counselors, adult directors, home economics teachers, and individuals in areas related to home economics should all contribute to determining the kind of program which will meet the needs of out-of-school youth and adults in the community.

The role of home economics teachers is a significant one, since they are familiar with the needs of adults in the area of homemaking and the content of the area to be studied. In schools with more than [illegible] home economics teacher, one might be given the responsibility to work with others in developing [illegible] plan. Frequently the home economics teacher will be the one to identify and analyze the need and secure data that will help others recognize the significance of a local program. Other ways in which the home economics teachers may share in the adult program are to:

- Help locate instructors who are qualified by experience, background, and preparation for the particular courses to be taught. Adult education teachers can be recruited from day school and/or college home economics educators, former home economics teachers. An up-to-date file of names of available teaching personnel and pertinent information about each can be a ready reference.
- Recommend appointment of one home economics teacher to be responsible for development of adult program.
- Teach some phases of the adult program, where possible.
- Assist adult education director and teacher of adult home economics class in recruiting students, planning course content, selecting suitable teaching procedures and facilities.
- Share teaching aids and or help director and instructor be aware of teaching resources.
- Plan with adult teacher for cooperative and effective use of facilities in the home economics center.
- Maintain a friendly, interested attitude that promotes good working relationships with adult director and teacher.

Identification of Local Home Economics Program Needs

Recognition of the needs and interests of out-of-school youth and adults for both useful and gainful employment is a prerequisite in determining suitable courses, course content, space, and facilities for the home economics adult program. Although many needs and interests are common among adults, they vary in degree of importance to individuals. Some ways to identify local program needs are:

- Analyze existing opportunities in the community for adult learning in areas of home economics before planning the courses to be offered. Sources for information include: local colleges, settlement houses, social agencies, home demonstration units, church and community groups.
- Use State Education Department guides when planning a program for gainful employment. Refer to courses of study in the Employment Preparation Sequences.
- Develop a profile of adults in the school district, including such data as: observable standards of home life, ethnic or local customs, economic status, occupations, educational background, size of families, leisure pursuits. Information for the profile may be obtained from: village, city, and town clerk offices, local employment and industrial personnel offices, public library, organization headquarters. Draw implications for needed home economics courses.
- College data on types of problems adults face for which home economics courses can provide assistance. Persons from whom such information can be secured are: former class members, parents of present secondary school pupils; officers and members of club groups; local business men such as bankers, realtors, merchants, lawyers; clergymen

Establishment of a Home Economics Program

The adult home economics program should be varied and adaptable to individual and group. The size and type of community and extent of its resources influence the kind of program developed. Each course should be educationally sound and not limited to skill development alone. For example, the elements of knitting can be included in a broader course in selection, care, and construction of clothing or a course in choosing and constructing home accessories. Courses designed to develop marketable skills for gainful employment are necessarily more specialized and, therefore, more limited in scope. Some ways to organize local program are:

- Formulate basic philosophy and objectives for the total adult home economics program at the local level in terms of persons to be served, scope of program, and plan of organization.
- Utilize an advisory committee to help determine program goals, offerings, needed space and facilities and to assist in stimulating participation in the program. Members of the committee may be appointed by the Board of Education, school administrators, or other school personnel who are well acquainted with the school district. Membership should represent varying family types, organizations, club groups, businesses, professions, and differing social and economic backgrounds.
- Plan with representatives of other disciplines for coordination of some areas of study.
- Develop a flexible program structure to afford learning opportunities for men and women who vary in age, ability, socioeconomic status.
- Plan for scheduling variations in terms of number and length of sessions, time and place of meeting, sequence of courses.

Promotion of Home Economics Program Participation

Adults tend to participate with interest when they see immediate personal benefits. Therefore, adult program directors, teachers, and advisory committee members must maintain a high level of enthusiasm and a continuing program of interpretation and program promotion. Some ways to promote interest in program participation are:

- Plan courses in total program which center on special needs and interests of individuals and families in local district.
- Be specific when communicating information about courses. Use descriptive, appealing titles which define content and its importance to the individual.
- Appeal to all groups of potential students through use of varied media, such as exhibits in school and community of actual articles and/or photographs of results of class instruction; articles and pictures in local newspapers about class activities; personal contacts through home visits, letters, telephone calls; descriptive brochures and/or circulars.

Procedures in Teaching Home Economics to Adults

The teacher's selection and use of methods, materials, and media influence the extent and type of learning that takes place in the teaching-learning situation. Some ways to provide for effective teaching are:

- Utilize information about the background, preparation, and ability levels of learners in determining appropriate selection of methods and techniques. Ascertain such information by means of checklists, questionnaires, personal interviews, and observations.
- Select methods appropriate to size of group and goals to be achieved. For instance, a panel discussion is suitable for larger groups. Actual practice of an activity should be provided when ability in performance is the desired outcome. If the adult prefers to practice at home, a discussion with demonstration followed by work at home between classes may be planned.
- Vary methods, materials, and media to stimulate and maintain interest. Among those from which to choose are various types of discussion groups, panel, symposium, debate, brainstorming; talks and reports; teacher, student, or guest demonstration; committee work; field trips; independent study; interview and conferences; observations; commercial television; films and filmstrips, programmed instruction; books, pamphlets, periodicals; posters, charts, models, overhead projection.
- Help each class member to feel welcome and accepted by the group and to experience some measure of satisfaction.

Provision of Home Economics Space and Facilities

The environment in which experiences take place is important to the kind of growth that will occur. The adult home economics program should be taught in an attractive setting conducive to use of a variety of teaching procedures. Some ways to provide facilities which promote learning by adults are:

- Utilize space and facilities most appropriate to group and goals to be achieved. The most effective facilities usually are located in the school home economics center. but sometimes may be found in other places in the school. or in churches, organization headquarters, or homes.

- Follow a specific plan for obtaining. maintaining, replacing equipment and supplies used by adult class members. When facilities are shared, hold periodic meetings of personnel involved to regulate standards for use and care of equipment.

Evaluation of the Home Economics Program

The success of any adult program can be determined through usual evaluative procedures. Evaluation will identify needed adjustments in course content and teaching method. Some ways to evaluate the program are:

- Look continually for signs which may indicate success of a program. Success may be judged by the persistence and promptness of attendance. participation in discussions. evidence of application of learning to home situation. requests for help with problems not considered in class.

- Make an objective appraisal of the total program by contacting all class members or a representative sample. and/or by contacting members of the advisory committee. Focus attention on the adequacy of the curriculum, the training experience and effectiveness of the instructional staff, the quality of instruction. Analyze results as a basis for further program planning and interpretation.

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Appendix

PART I

Sequence of Learnings in Clothing Construction

This plan identifies skills to be mastered in the clothing construction phase of Home Economics Grade 8, Home Economics 1, 2, and 3, and will assist teachers when developing detailed course content. No learnings are identified in relation to Home Economics 11, Textiles and Clothing. Due to pupils' special interest and individual abilities, many of the listed learnings in other courses would automatically be covered in Home Economics 11 during the construction of a carefully selected project, and not all pupils would cover the same learnings. Each new skill should be developed sufficiently for pupils to be ready for more advanced ones. The following techniques will lead to more efficient use of class time: pretesting to determine pupil's level of ability; using illustrative materials to stimulate pupil self-direction; giving group demonstrations; encouraging pupils to work on projects outside of class; maintaining a level of expected achievement.

Learnings have been grouped in six categories: 1) selection, use, and care of sewing equipment; 2) hand sewing techniques; 3) use and care of sewing machines; 4) selection, use, and care of patterns; 5) selection, use, and care of fabrics; 6) construction processes. Guides for selecting appropriate projects for each course are given. The selection of an individual construction project, chosen according to the pupil's interest and abilities, should encompass as many of the suggested learnings in the course as possible. This material is to be used in conjunction with the course outlines for Home Economics Grade 8 and Home Economics 1, 2, and 3.

LEARNINGS IN CLOTHING CONSTRUCTION —HOME ECONOMICS GRADE 8

Within Concept II, Subconcepts Personal Grooming and Clothing Construction, emphasis is placed on learning fundamental sewing techniques. Adequate skills should be developed so that a pupil can be self-sufficient in repair of own clothes and construction of a simple garment. Learnings appropriate for this course follow:

1. *Selection, use, and care of sewing equipment*
    - Pins, needles and thread appropriate for task
    - Pincushion and emery for care and use of pins and needles
    - Thimble as helpmate toward efficient sewing
    - Rulers, tape measures, and skirt marker as measuring devices
    - Scissors, shears, pinking shears including safety procedures in use of each
    - Seam ripper for use in removing basting and machine stitching
    - Tracing wheel and paper for transferring pattern markings
    - Iron and ironing board including safety and efficiency in use
2. *Hand sewing techniques*
    - Using a thread knot or two-in-place stitches to begin and end hand sewing
    - Fastening snaps, hooks and eyes, buttons including making thread shank
    - Using vertical hemming on an edge machine stitched hem
3. *Use and care of sewing machine*
    - Knowing functions of various parts of the machine
    - Threading and operating the machine and winding a bobbin

- Adjusting the stitch regulator, seam guide for seam width, zipper foot
- Cleaning feed dog and bobbin case

4. *Selection, use, and care of patterns*
    - Methods of taking bust, waist, and hip meaurements
    - Pattern types and sizes according to body measurements, height and figure type
    - Adjustments of pattern for length
    - Uses of information on pattern envelope and instruction sheet
    - Uses of pattern markings
    - Methods of pinning pattern on fabric
    - Procedures in care of pattern
5. *Selection, use, and care of fabrics*
    - Source and physical characteristics of cotton, cotton blends, and linen
    - Characteristics of plain, twill, satin weaves, and types of fabrics woven by each method
    - Uses of selvage, straight of fabric, lengthwise and crosswise grain line in garment construction
6. *Construction processes*
    - Cutting of pattern pieces and transferring markings
    - Stay stitching in appropriate places
    - Stitching of darts and tucks, including backtracking
    - Making a plain seam with a pinked edge
    - Applying facing, using under stitching on a neck or armhole
    - Applying zipper, using the lapped seam method
    - Making unlined or lined patch pocket, placing emphasis on right-angle corners

Guides for Selecting Appropriate Projects

Pattern:	No more than four pieces exclusive of facings; no sleeves and collars
Fabric:	Closely woven cotton or cotton blend, i.e., denim, percale, broadcloth, solid color or small, nondirectional, overall design
Suggested Projects:	Sleeveless blouse, weskit, one-piece jumper, one-piece sleeveless dress

LEARNINGS IN CLOTHING CONSTRUCTION —HOME ECONOMICS I

Within Concept II, Subconcept Clothing and Individual Growth, focus is placed on the coordination of fabric and pattern, methods that lead to a properly fitted garment, and the introduction of more specialized equipment and machine attachments. New learnings appropriate for this course follow:

1. *Selection, use, and care of sewing equipment*
    - Slide measure for use in spacing buttons, snaps and hem width
    - Hem markers for various styles and fullness of skirts
    - Scalloping shears for practical and decorative use
    - Seam ripper to cut buttonholes
    - Tailor's chalk and wax for various fabrics
    - Press cloth, tailor's cushion, tailor's ham, sleeve board, seam board, clapper for fabric and area to be pressed
2. *Hand sewing techniques*
    - Using tailor's tacks for transferring pattern markings
    - Basting pieces together using even and uneven stitches
    - Applying slant hemming on a hem finished with single fold bias or seam binding
    - Using overcasting stitch on seams
    - Gathering small amount of fullness
3. *Use and care of sewing machine*
    - Selecting size of needle, number and type of thread, size of stitch and tension adjustment according to fabric being used

- Adjusting broken needle, burned out bulb, jammed bobbin case
- Oiling parts periodically
- Using buttonhole and ruffle attachments
- Adjusting stitch regulator and tension for gathering

4. *Selection, use, and care of patterns*
   - Characteristics of pattern pieces contributing to sight recognition, i.e., bust line wider in front than back, cut of armhole deeper in back than in front
   - Techniques of pin fitting a pattern
   - Adjustments of pattern for dart positions, waist and hip-line size
5. *Selection, use, and care of fabrics*
   - Sources and physical properties of wool, silk, and such synthetics as nylon, orlon, acetate
   - Characteristics of fabrics made by knitting and felting
   - Characteristics of fabrics in relation to style of pattern
6. *Construction processes*
   - Straightening and shrinking of fabrics
   - Using pin basting
   - Making knife pleats
   - Applying waistband
   - Shaping skirts with partial lining
   - Making a French seam
   - Finishing a seam edge with machine stitching
   - Attaching a collar using a fitted facing or bias strip
   - Setting in sleeve
   - Fitting a waistline seam
   - Hanging a skirt
   - Making fabric belt, thread and belt guides

Guides for Selecting Appropriate Projects

Pattern:	A simple garment incorporating a fitted waistline seam, set-in sleeves, collar, knife pleats, and lining
Fabric:	Firmly woven, nonravelling, nonstretchable wool, silk or synthetic, solid colors, small prints
Suggested Projects:	One-piece dress, unlined jacket with skirt, blouse and skirt

LEARNINGS IN CLOTHING CONSTRUCTION —HOME ECONOMICS 2

Within Concept II, Subconcepts Maintenance of the Home and Furnishings and Management in Clothing, stress is placed on the effective use of sewing techniques that help in upkeep, alteration, or remodeling of clothes and household items. New learnings appropriate are:

1. *Selection, use, and care of sewing equipment*
   - Buttonhole scissors, blades, pointed shears for cutting buttonholes
   - Needle board for pressing pile fabrics
   - Iron as a means of steaming pile fabrics
2. *Hand sewing techniques*
   - Using slip basting
   - Applying eyelet snaps
   - Making covered buttons
   - Using invisible hemming on heavy fabrics
   - Making hand-worked buttonhole
   - Darning, patching
3. *Use and care of sewing machines*
   - Adjusting machine parts for fabric thickness, mending, and darning
   - Using attachments for decorative stitching
4. *Selection, use, and care of patterns*
   - Patterns and pattern parts suitable to fabric limitations in items to be remodeled

- Ways to adjust pattern pieces to meet fabric limitations

5. *Selection, use, and care of fabrics*
   - Ways of renovating fabrics
   - Fabrics suitable for combining in repair and remodeling of an item

6. *Construction processes*
   - Using machine basting
   - Making a slashed faced or bound placket
   - Making bound buttonhole
   - Mending
   - Adjusting fit and hemline
   - Adding, or removing, decorative features on garments

Guides for Selecting Appropriate Projects

Pattern:	A design in keeping with fabric limitation: no pattern for some types of alteration or remodeling; combination of parts of several patterns
Fabrics:	With pile: suitable combination of textiles; up and down prints, plaids, or stripes

Suggested Projects:

Remodeling:	Jacket, skirt, or jumper from a coat; blouse, skirt, or jumper from a dress; decorative features added to or removed from garments; pillows, belts, hats from garments
Altering:	Fitting garments; hanging hems; shortening sleeves; replacing buttons

LEARNINGS IN CLOTHING CONSTRUCTION —HOME ECONOMICS 3

Within Concept III, Subconcept Clothing for the Family, emphasis is placed on the perfection of previously learned skills, knowledge of intricate sewing techniques, and increasing speed and developing greater self-direction. New learnings appropriate are:

1. *Selection, use, and care of sewing equipment*
   - Point turner for pushing turned corners into shape
   - Point presser and seam roll for tailored appearance

2. *Hand sewing techniques*
   - Using catch stitch and tacking
   - Making arrowhead tack at end of pleat

3. *Use and care of sewing machine*
   - Recognizing symptoms and causes of stitching troubles, and adjusting to overcome them
   - Using different types of machines
   - Using appropriate techniques for stitching sheer materials, knitted materials, plastics

4. *Selection, use, and care of patterns*
   - Variations in helps given on different patterns
   - Sizes and pattern types for garments for children and men

5. *Selection, use, and care of fabrics*
   - Types of sheer and knitted fabrics suitable for tailored design
   - Types of plastics appropriate for storage accessories and precautions in use of sheer and knitted fabrics, plastics

6. *Construction processes*
   - Making lapped or flat-felled seams
   - Trimming excess materials from seams
   - Distributing or shrinking excessive fullness
   - Making a raglan sleeve, a gusset, cuffs

Guides for Selecting Appropriate Projects

Pattern:	A tailored design incorporating sleeves with cuffs, gusset, lapped or flat-felled seams
Fabrics:	Sheer, knitted, or plastic materials
Suggested Projects:	A man's or boy's shirt, a dress, blouse, bathrobe, pajamas

PART II

Teaching Basic Learnings Through Meal Preparation

TEACHING BASIC LEARNINGS THROUGH MEAL PREPARATION

Home economics teachers are challenged to plan ways of teaching foods so that pupils will receive knowledge and practice in planning, preparing, and serving nutritious meals for individuals and families. Obviously, it is not possible or desirable to teach everything there is to know about preparing and serving meals, nor can it all be taught in one course. This means that (1) only the basic learnings should be taught in school and that (2) learnings should be taught in sequence, beginning with the simpler learnings in grade 7 and moving to more difficult ones in Home Economics 3. The most realistic way to teach nutrition, meal planning, food buying, food preparation, serving of the meal, and the use and care of equipment is on the meal basis and in relation to the particular foods in a given menu.

This material includes basic learnings in relation to suggested meal patterns. All meal patterns for each course should be completed, since each involves different learnings. Selection for menu should be from suggested food ideas. This material should be used in connection with courses of study for grades 7 and 8, Home Economics 1, 2, and 3. Reference is made in each course of study where this material is to be used.

When the meal preparation approach is used, pupils have an opportunity to:

- use family-size recipes and equipment
- see cost of individual food items in relation to the total meal cost
- apply nutrition principles in planning and preparing foods
- practice management principles in preparation and serving a meal
- relate class learnings to home situations
- plan menus within meal patterns, adjusting selection and preparation to socioeconomic and cultural backgrounds and to differences in age and health needs of family members
- experience different types of meal service and practice approved etiquette in realistic situations

A suggested plan for developing a series of lessons in relation to a meal pattern follows:

- Introduce and explain purposes of the specific meal pattern and food ideas. Give approximate time allocation for this experience.
- Divide class into small groups for food preparation lessons. Have each group plan menu to be prepared in class within the meal pattern and other meals which would complete the day's requirements. All groups within a class need not prepare the identical menu: however, each menu should include foods of the general type suggested. All groups need not prepare meals at the same time. The number of kitchens will determine the number of groups that can prepare meals at any one time.
- Plan class time for exploration of nutritive value of foods in the menu; how to buy, handle, and store foods in menu; methods and principles in preparing each food; selection and use of appropriate utensils and equipment for preparation of each item; ways of setting table, serving and eating foods in the menu; management practices in planning, preparing, and cleanup.
- Check within each group previous cooking experiences each pupil has had with foods in menu. Use this information to plan within the group for division of responsibility, so each pupil will have new experiences.
- Make plans regarding number of groups which will prepare foods at one time, and the experiences related to the specific patterns which pupils not engaged in actual food preparation will undertake. Meals may be served in entirety or in parts depending upon menu, class time, experiences of pupils.

- Plan with pupils for experiences at home which will further develop skill in preparation of foods in the serving, and cleanup after meals.

The use of appropriate methods, materials, and media is essential in bringing about effective learnings in the many aspects of meal preparation. Some methods, materials, and media with suggested uses are:

Methods:

Supervised or independent study—for getting background information on such topics as food habits in various cultures prior to preparation of foods of different nationalities, studying characteristics of utensils and equipment used in preparation and service of foods for oral class reports, determining types of storage areas and appropriate ways to store various foods in the home as a basis for evaluating storage practices in the home economics department

Demonstration—for showing approved procedures in using new processes and equipment, comparing various types of food products, emphasizing managerial aspects of food preparation. Demonstrations are especially effective when class periods are short, classes are large, and equipment and space are limited.

Field trip—for seeing various kitchen arrangements, comparing different types of table appointments, observing shopping practices of individuals and families, experiencing eating away from home

Discussion—for analyzing research studies in nutrition, clarifying principles in food preparation, evaluating food preparation lessons

Committee or small group work—for planning, preparing, serving, and evaluating food preparation lessons, dividing responsibilities for such class projects as a faculty tea, a buffet for parents

Laboratory work—for developing managerial ability, preparing and serving foods, applying generalizations and principles in preparing various foods

Materials and Media:

Filmstrips, movies, television programs—for demonstrating processes in food preparation and serving; showing results of good and poor nutritional practices; bringing new ideas regarding use of foods, table appointments, equipment

Bulletin boards—for motivating interest in the study of nutrition, showing variety in table settings and in methods of preparing foods, illustrating work simplification procedures

Chalk boards—for formulating generalizations, summarizing discussions, instructing, lesson goals

Opaque projector—for showing charts on food values, analyzing menus made by pupils, studying lines of traffic in various kitchen arrangements

Text and reference books—for getting authentic information regarding principles of food preparation and nutrition information, obtaining various points of view regarding table service and management practices, learning facts about various food products and equipment

Duplicated materials—for indicating standards of work and behavior in food preparation lessons, giving criteria for evaluating experiences, giving recipes and policies regarding classroom procedures

Commercial materials—for illustrating procedures in food preparation and service, obtaining historical material about a product or process, getting background information about steps in manufacturing or processing a product, showing techniques in using and caring for products and equipment

SUGGESTIONS FOR MEAL PATTERNS—HOME ECONOMICS GRADE 7

Within Concept II, Personal Development Through Foods, emphasis is placed on acquiring basic skills in mealtime management and in the selection and buying of foods. Suggested meal patterns, food to be prepared, and related learnings follow. The planning of specific foods for each meal pattern should be done in relation to the socioeconomic and cultural backgrounds of pupils. Availability and costs of foods in the community should also be considered.

LEARNINGS I

- Principle regarding change in nutritive value of citrus fruit when exposed to air
- Ways and equipment for preparing citrus fruits
- Principle regarding the effect of heat on protein
- Methods and equipment for preparing eggs
- Garnishes appropriate to serve with eggs
- Procedures in using toaster and broiler

- Ways of serving toast
- Principle regarding the scalding of milk
- Techniques and equipment for using prepared mix, syrup, individual ingredients for cocoa

Meal Pattern I	*Food Ideas*
Appetizer	Fresh citrus fruit
Main dish	Eggs: scrambled, poached
Breadstuff	Toast: plain, cinnamon
Beverage	Cocoa, chocolate

LEARNINGS II

- Principle regarding the effect of hot liquid on flour
- Comparisons of canned, frozen, and homemade soup in relation to nutritive value, cost, flavor, time of preparation
- Techniques and equipment for making white sauce
- Uses of white sauce
- Techniques of making mixed minced sandwich filling
- Procedures for making sandwiches
- Ways of cutting and serving sandwiches
- Types of breads and rolls suitable for sandwiches
- Principles in reconstituting dried fruit
- Ways of serving cooked and uncooked dried fruit
- Procedures and equipment in preparing and serving dried fruit

Meal Pattern II	*Food Ideas*
Soup	Cream style: corn, asparagus, spinach, celery, tomato
Sandwiches	Bread: any type, rolls Filling: minced bologna and pickle, cream cheese and olive, ground cheese and pimento
Dessert	Cooked dried fruit: individual fruits, mixed fruits

LEARNINGS III

- Principle regarding the effect of heat on protein
- Variations in recipes and baking dishes for meat loaf
- Procedures and equipment for making meat loaf
- Techniques and equipment for preparing vegetables
- Ways of keeping vegetables crisp
- Ways of arranging vegetables attractively
- Comparison of commercially made and homemade refrigerator cookies in relation to cost, appearance, flavor, and preparation time
- Procedures and equipment in making refrigerator cookies
- Ways of storing sandwiches for future use

Meal Pattern III	*Food Ideas*
Main dish	Meat loaf: beef, ham, pork, veal
Relishes	Finger vegetables: carrot strips; radish roses; celery curls; green pepper rings; cauliflower flowerettes
Dessert	Cookies: refrigerator

LEARNINGS IV

- Principle regarding effect of heat on protein
- Procedure in cooking such starchy foods as noodles, macaroni, rice
- Advantages in using casserole dishes
- Types of toppings for casseroles
- Types of foods to be combined with carbohydrate foods in a casserole
- Kinds of green vegetables available in frozen form
- Procedures in cooking frozen vegetables
- Comparisons of frozen, canned, and fresh green vegetables in relation to food value, flavor, texture, and cost

- Principles regarding mixing and handling of a flour mixture; use of leavening agent
- Techniques and equipment for making muffins
- Ways of keeping and reheating muffins
- Ways frozen vegetables are packaged
- Ways of serving frozen vegetables
- Techniques and equipment for making fruit gelatin
- Arrangement of fruits in gelatin
- Procedures for unmolding and serving gelatin desserts

Meal Pattern II	*Food Ideas*
Main dish	Casserole: tuna fish and noodles, macaroni and cheese, rice and chopped meat
Vegetable	Frozen green vegetable
Breadstuff	Muffins: plain, variations
Desserts	Molded fruit gelatin: single or combination of fruits

SUGGESTIONS FOR MEAL PATTERNS—HOME ECONOMICS GRADE 8

Within Concept I, Subconcept, Care of the 2-6-Year-Old Child, and Concept II, Subconcept, Personal Grooming, focus is on ways teen-agers can promote health of younger children through serving nutritious snacks and meals and ways teen-agers can maintain personal health through well-balanced diets. Suggested meal patterns, foods to be prepared, and related learnings follow. The planning of specific foods for each meal pattern should be done in relation to the socio-economic and cultural background of pupils. Availability and costs of foods in the community should also be considered.

LEARNINGS I

- Principles involved in the cooking of fresh vegetables
- Types of vegetables which provide pleasing color and texture combinations
- Techniques and equipment for preparing fresh vegetables by different methods
- Types of cheese suitable for serving as accompaniments with other foods
- Methods of preparing slices and cubes of cheese
- Ways of arranging foods attractively on plate
- Principles regarding baking powder as leavening agent
- Types of fruits suitable for cobblers
- Toppings appropriate for cobblers
- Techniques and equipment used in making cobblers
- Ways of garnishing and serving fruit cobblers
- Variations in doughs used in fruit cobblers

Meal Pattern I	*Food Ideas*
Main dish	Fresh vegetable plate with cheese slices: three different vegetables cooked by boiling and broiling, one served creamed
Dessert	Fruit cobbler with biscuit dough

LEARNINGS II

- Principles regarding change in color of fresh fruit when exposed to air
- Ways of preventing discoloring of fresh fruits
- Procedures in preparing and serving fresh fruits for salads
- Principle regarding the effect of heat on protein
- Techniques and equipment in hard cooking eggs, in preparing egg salad mixture, and in making finger sandwiches
- Principles involved in cooking starchy products and protein foods used in desserts
- Comparisons of ready prepared, partially prepared, and instant puddings with those made from scratch in terms of cost and flavor
- Ways of garnishing puddings

Meal Pattern II	*Food Ideas*
Main dish	Fresh fruit salad with at least three fruits and fruit salad dressing
Breadstuff	Finger sandwich: with egg salad filling Bread: any type
Dessert	Pudding: tapioca, rice, cornstarch

LEARNINGS III

- Types of snacks appropriate for children and teen-agers
- Techniques and equipment for preparing and baking drop cookies
- Calories and food values found in various types of drop cookies
- Combinations of fruit juices making tasty drink
- Ways of preparing ice cubes with pieces of fruit and ice in different shapes for use in punches

Meal Pattern III	*Food Ideas*
Dessert	Cookies: drop
Beverage	Punch: fruit

LEARNINGS IV

- Principles regarding baking powder as a leavening agent, cooling bread before slicing
- Procedures and equipment for preparing quick bread
- Types of equipment suitable for making milk shakes: blender, shaker, can
- Nutritive values of whole, skimmed, and homogenized milk
- Variations of plain milk shake

Meal Pattern IV	*Food Ideas*
Breadstuff	Quick bread: fruit, nut
Beverage	Milk shake: plain, variations

SUGGESTIONS FOR MEAL PATTERNS—HOME ECONOMICS 1

Within Concept II, Subconcept, Food for Health and Development, emphasis is placed on preparing and serving safe and nutritious food to children, ages 6 to 12, and to adolescents, in discovering possibilities for growth and self-expression through food preparation and service, and building some appreciation of foods of other cultures. Suggested meal patterns, foods to be prepared, and related learnings follow. The planning of specific foods for each meal pattern should be done in relation to the socioeconomic and cultural backgrounds of pupils. Availability and costs of foods in the community should also be considered.

LEARNINGS I

- Principles regarding cooking of meats
- Types of fresh and canned vegetables appropriate for stew
- Techniques for preparing meat and vegetables for stew
- Types of equipment suitable for preparing stews: electric fry pan, pressure saucepan, skillet
- Principles regarding change in color of fresh fruit when exposed to air
- Procedures and equipment in preparing ingredients for fruit salad
- Ways of serving salad attractively
- Principles involved in using air as leavening agent
- Procedures and equipment in preparing, baking, and serving sponge cake
- Ways of expressing creativity in use of icing, fruit, confectionary sugar for cakes

Meal Pattern I	*Food Ideas*
Main dish	Meat stew: beef, veal, lamb
Salad	Waldorf salad: apples in combination with such foods as: raisins, nuts, bananas, grapes, celery
Dessert	Cake: sponge

LEARNINGS II

- Principle regarding change in color in fresh fruit when exposed to air
- Types of fruit for interesting color and texture combinations
- Ways of serving fruit cup attractively
- Techniques and equipment for preparing, cooking, and serving poultry
- Forms of poultry available in markets and methods of cooking each type
- Techniques and equipment for preparing and serving baked and scalloped vegetables
- Comparisons of fresh and frozen baked potatoes in terms of cost and flavor
- Toppings suitable for scalloped dishes
- Techniques and equipment for preparing corn bread
- Comparisons of packaged quick bread with that made from scratch in relation to cost, flavor, texture
- Types of equipment suitable for mixing cake batter: electric mixer, spoon
- Procedures and equipment for making and baking cupcakes
- Ways of expressing creativity in icing cakes
- Comparisons of recipes for different types of cupcakes in relation to ingredients
- Types and functions of ingredients used in making cupcakes

Meal Pattern II	*Food Ideas*
Appetizer	Fruit cup: fresh, frozen, canned fruit
Main dish	Poultry: fricassee, baked, roast
Vegetables	Baked: white or sweet potato Scalloped: corn, tomatoes, onion
Breadstuff	Corn bread
Dessert	Cupcakes

Select one or two countries and plan a meal appropriate for each, following the meal pattern and example of a Japanese meal below.

LEARNINGS III

- Variations in ways of preparing and serving foods compared to American ways
- Equipment used in preparing foreign foods
- Foods typical of specific countries

Meal Pattern III	*Food Ideas*
Soup	Clear consomme (Suimono)
Main dish	Sukiyaki
Salad	Spinach (Aemona)
Dessert	Japanese sponge cake (Katsetura)
Beverage	Tea

SUGGESTIONS FOR MEAL PATTERNS—HOME ECONOMICS 2

Within Concept II, Subconcept, Management of Family Meals, focus is on good management of resources in planning, preparing, and serving meals. Suggested meal patterns, foods to be prepared, and related learnings follow. The planning of specific foods for each meal pattern should be done in relation to the socioeconomic and cultural backgrounds of pupils. Availability and costs of foods in the community should also be considered.

LEARNINGS I

- Methods of preparing canned and frozen fish for salad
- Foods suitable for combining in salad to extend the fish
- Ways of serving fish salad attractively
- Principles involved in using yeast as leavening agent

- Procedures in making and baking yeast rolls
- Comparisons of mixes, brown and serve, and homemade yeast rolls
- Ways of reheating rolls
- Principles regarding the freezing of ice cream
- Procedures and equipment in making and freezing ice cream
- Toppings to serve with ice cream
- Comparisons of ice cream completely home prepared and that made from mixes, in terms of texture, cost, flavor

Meal Pattern I	*Food Ideas*
Salad	Fish: salmon, tuna, crabmeat, shrimp
Breadstuff	Yeast rolls: any shape
Dessert	Ice cream: any flavor

LEARNINGS II

- Cuts of meat which are less tender
- Principles involved in cooking less tender cuts of meat
- Procedures for roasting less tender cuts of meat
- Advantages of oven meals
- Procedures for cooking vegetables in a roast
- Principles involved in preparing and baking meringue and cream pie filling
- Techniques and equipment in preparing all parts of the pie
- Comparisons of packaged pie filling and completely home-prepared filling in relation to cost, ease, and time of preparing
- Types of vegetables appropriate for oven cooking
- Ways to use the oven economically in preparing meals
- Ways of preparing vegetables for cooking in a roast
- Types of utensils for roasting meat

Meal Pattern II	*Food Ideas*
Main dish	Roast meat: economy cuts of beef, pork, veal, lamb
Vegetables	Cooked in roast: potatoes, carrots, onions
Dessert	Pie: cream with graham cracker or cookie crust and meringue topping

LEARNINGS III

- Cuts of meat suitable for broiling
- Procedures in oven broiling tender cuts of meat
- Precautions in oven broiling
- Types of vegetables suitable for pan frying
- Procedures in sautéing foods
- Ways of using leftover vegetables in gelatin salads
- Procedures for unmolding and serving gelatin salad
- Techniques and equipment in making and baking pastry
- Ways of thickening fruits for pastry
- Variations in top crust in pies

Meal Pattern III	*Food Ideas*
Main dish	Broil meat: tender cuts of beef, pork, veal, lamb
Vegetables	pan-fried: potatoes, eggplant, parsnips,
Salad	Gelatin with raw and cooked vegetables
Dessert	Pastry: fruit in pie, tart, turnover

LEARNINGS IV

- Cooking processes suitable for variety meats
- Procedures and equipment for preparing variety meats
- Garnishes commonly served with different variety meats

- Principles in making and baking vegetable souffles
- Techniques and equipment in making and serving vegetable souffles
- Types of fruits suitable for upside-down cake
- Techniques and equipment used in making upside-down cake
- Ways of serving upside-down cake

Meal Pattern II	*Food Ideas*
Main Dish	Variety meats. liver. heart. kidney. tongue. sweetbreads
Vegetable	Souffle: corn, spinach
Dessert	Cake: Upside down cake with fruit

SUGGESTIONS FOR MEAL PATTERNS—HOME ECONOMICS 3

Within Concept III, Subconcept, Meeting Family Food Needs and Concept IV, Subconcept, Meeting Special Needs of the Aging, emphasis is placed on adjustments in family meals to meet special food needs of members and on appropriate foods for various types of entertaining. Suggested meal patterns, foods to be prepared, and related learnings follow. The planning of specific foods for each meal pattern should be done in relation to the socioeconomic and cultural background of pupils. Availability and costs of foods in the community should also be considered.

LEARNINGS I

- Ways to vary fruit juices as appetizers by combining several, serving with sherbet or carbonated beverage
- Accompaniments to serve with fruit juices
- Techniques and equipment in preparing a main dish, molded salad
- Ways of serving molded salads attractively
- Types of dishes suitable for baking and serving vegetables
- Combinations of vegetables in casserole in relation to compatible flavors, colors
- Toppings suitable for baked vegetables
- Procedures for heating breads in aluminum foil
- Types of breads and spreads that combine well
- Principles regarding the freezing of sherbet
- Procedures and equipment in making sherbet
- Types and characteristics of coffee
- Variations in types of coffee makers and methods of making coffee

Meal Pattern I	*Food Ideas*
Appetizer	Fruit juice
Main dish	Molded salad: fish, meat, poultry
Vegetables	Baked: carrot, cabbage, eggplant
Breadstuff	Hot bread: Italian, French, served with plain or garlic butter
Dessert	Sherbet
Beverage	Coffee

LEARNINGS II

- Types of hot, main dishes suitable for buffet
- Ways of serving main dish at buffet type meal
- Ways of shredding raw vegetables
- Foods which combine well with shredded raw vegetables
- Types of salad dressings
- Ways of serving salads for a large group
- Types of breadstuffs suitable for serving buffet style
- Procedures in preparing and storing sandwiches prior to meal
- Principles regarding egg and flour cookery
- Types of filling for cream puffs and eclairs when used as dessert
- Procedures and equipment for making, baking, and filling puff pastry
- Ways of using puff pastry other than dessert

Meal Pattern II	*Food Ideas*
Main dish	Chafing dish: Swedish meat balls; creamed chicken, mushroom and peas served with noodles or rice
Salad	Shredded raw vegetables: cabbage, carrots, beets
Bread	Commercially prepared: nut, Boston brown, fruit-nut made into butter sandwiches
Dessert	Puff pastry: eclairs, cream puffs

LEARNINGS III

- Principles regarding cooking of fish
- Ways of cooking fish
- Types of fresh and frozen fish
- Types of garnishes appropriate for fish
- Variations in preparation of fish for small children and older people
- Principles involved in cooking strong flavored vegetables
- Methods of cooking and serving vegetables
- Adjustments which may be needed in kinds of vegetables for small children and older people
- Types of vegetables or fruits which go well together in a salad
- Types of greens appropriate for salads
- Methods of preparing foods for salad
- Ways of arranging salad items for attractiveness and appeal
- Adjustments needed in type of salad dressing to meet needs of family members
- Principles involved in making custard
- Ways of serving custard appropriate for family members of various ages
- Toppings which add interest and variety to custard
- Variations in ingredients in custard pies

Meal Pattern III	*Food Ideas*
Main dish	Baked fish: sole, salmon, haddock, halibut, trout
Vegetables	Boiled, strong flavored: cabbage, cauliflower, onions, turnips with butter or sauce
Salad	Raw vegetable or fresh fruit: at least two different fruits or vegetables arranged on greens with dressing
Dessert	Custard: pie, pudding

LEARNINGS IV

- Types of meat and poultry suitable for outdoor cooking
- Procedures and equipment in cooking meat and poultry outdoors
- Variations in commercially and home-prepared barbecue sauces
- Ways of serving broiled or barbecued meat and poultry
- Types of beans suitable for baking
- Techniques and equipment for baking dried beans
- Ways of keeping baked beans hot for serving at a picnic
- Accompaniments appropriate to serve with baked beans
- Types of homemade and commercially prepared relishes
- Ways of arranging relishes for serving at an outdoor picnic or inside meal
- Procedures and equipment for making molded, pressed, and filled cookies
- Types of fillings suitable for cookies
- Ways of decorating cookies for various occasions
- Dessert foods appropriate for serving with cookies

Meal Pattern IV	*Food Ideas*
Main dish	Broiled or barbecued meat, poultry
Vegetables	Dried beans: lima pea, black-eyed
Relishes	Commercially home canned: olives, pickles, beets, peaches, apples
Dessert	Cookies: molded, pressed, filled

LEARNINGS V

- Principles regarding use of leavening agents
- Procedures and equipment for making batter quick bread and meat to accompany it
- Toppings suitable for serving with waffles and griddle cakes
- Ways of preparing and serving fresh fruits
- Equipment used in preparing fresh fruit desserts

Meal Pattern V	*Food Ideas*
Main dish	Quick bread: waffles, griddle cakes Meat: sausage, bacon
Dessert	Fresh fruit: grapefruit, melon, berries, oranges

PART III

Bibliography for Courses of Study

BIBLIOGRAPHY FOR COURSES OF STUDY

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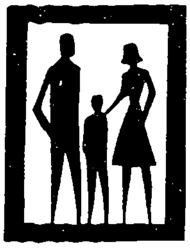

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VT 017 667
WORK EXPERIENCE PROGRAM COURSE
AUTHORIZED COURSE OF INSTRUCTION FOR THE
QUINMESTER PROGRAM.

DADE COUNTY PUBLIC SCHOOLS, MIAMI, FLA. DIV.
OF VOCATIONAL, TECHNICAL AND ADULT EDUCATION.
MF AVAILABLE IN VT-ERIC SET.
TEXTBOOK SERVICES, 2210 S.W. THIRD STREET,
MIAMI, FLORIDA 33135
PUB DATE - 71 239P.

DESCRIPTORS - *LEADERS GUIDES; *JUNIOR HIGH SCHOOL STUDENTS; *UNITS OF STUDY (SUBJECT FIELDS); SEQUENTIAL PROGRAMS; *VOCATIONAL EDUCATION; VOCATIONAL DEVELOPMENT; BEHAVIORAL OBJECTIVES; GOAL ORIENTATION; BIBLIOGRAPHIES; POST TESTING; CAREER CHOICE; EMPLOYMENT QUALIFICATIONS; CAREER OPPORTUNITIES; *WORK EXPERIENCE PROGRAMS

ABSTRACT - THESE SEVEN COURSE OUTLINES FOR A SEQUENTIAL WORK EXPERIENCE PROGRAM AT THE JUNIOR HIGH SCHOOL LEVEL WERE DEVELOPED THROUGH THE COOPERATIVE EFFORTS OF INSTRUCTIONAL AND SUPERVISORY PERSONNEL, THE QUINMESTER ADVISORY COMMITTEE, THE VOCATIONAL TEACHER EDUCATION SERVICE, AND THE DADE COUNTY VOCATIONAL CURRICULUM COMMITTEE AS GUIDES FOR THE PROGRAM'S TEACHER-COORDINATOR. EACH 45-HOUR UNIT OF STUDY IN THE QUINMESTER PROGRAM CONTAINS A COURSE RATIONALE, GENERAL AND SPECIFIC BEHAVIORAL GOALS AND OBJECTIVES, A BRIEF INSTRUCTIONAL OUTLINE, AND A BIBLIOGRAPHY. SAMPLE POSTTESTS WITH ANSWER KEYS ARE APPENDED. TOPICS COVERED INCLUDE: (1) AN INTRODUCTION TO THE WORK EXPERIENCE PROGRAM, (2) LABOR AND EMPLOYMENT LAWS, (3) THE EMPLOYER EMPLOYEE RELATIONSHIP, (4) CAREER CHOICE, (5) CAREER OPPORTUNITIES AND JOB REQUIREMENTS, (6) CONSUMER ECONOMICS AND MONEY MANAGEMENT, AND (7) EXPLORATORY FIELD EXPERIENCES. TEACHING TECHNIQUES INCLUDE THE USE OF LECTURES, RESOURCE PERSONS, TEXTBOOKS, AND AUDIOVISUAL AIDS. ACCEPTANCE INTO THE WORK-EXPERIENCE PROGRAM REQUIRES A DEMONSTRATION OF SPECIAL NEED, A PARENTAL CONFERENCE, A CHECK OF SCHOOL RECORDS, AND AN AGE OF AT LEAST 14 YEARS. ([illegible])

AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

WORK-EXPERIENCE PROGRAM - 8769
[Introduction to the Work-Experience Program]
Department 48 - Course 8769.01

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION•1971

DADE COUNTY PUBLIC SCHOOLS
1410 NORTHEAST SECOND AVENUE
MIAMI, FLORIDA 33132

Course Outline

WORK-EXPERIENCE PROGRAM - 8769
(Introduction to the Work-Experience Program)

Department 48 - Course 8769.01

the division of

VOCATIONAL, TECHNICAL AND ADULT EDUCATION

5494

Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

Published by the Dade County School Board

Copies of this publication may be obtained through

Textbook Services
2210 S.W. Third Street
Miami, Florida 33135

Price: $.75

Course Description

8769	48	8769.01	Introduction to the Work-Experience Program
State Category Number	County Dept. Number	County Course Number	Course Title

This is the first of five quinmester programs for the Junior High School Work-Experience Program. It indicates the requirements for admission and an overview of the entire program. The theoretical and practical experiences needed for successful employment will be offered.

Indicators of success: Applicants must be accepted by the Teacher-Coordinator by showing a need which might be served by admission to the Work-Experience Program.
Clock hours: 45

PREFACE

For many years, educators were undecided about the ways to meet the needs of the junior high school student who is required by circumstances to work while attending school.

A program has evolved over the years which is now called the Junior High School Work-Experience Program. This program is designed to aid those students with special needs.

Students desiring entrance into this program are required to show a need, either through referral or a personal interview with the Work-Experience Coordinator. A check of cumulative records and a parental conference are also criteria for acceptance by the coordinator of the student before admission to the program. He must also be at least 14 years of age.

Since the needs of the Work-Experience students vary greatly, it is necessary to use varied teaching methods to meet their goals. The lecture, audio-visual, text and use of resource personnel are some of the ways used to meet these needs.

In this ever-expanding process of development, to ease the over-crowding of classrooms and to improve plant utilization, the Dade County Public Schools, Division of Instruction, has requested the development of the Quinmester Program for the Junior High School Work-Experience Program.

This course outline for Quinmester I includes the concepts necessary to make the student aware of the general requirements and objectives of the entire work-experience program. It comprises 11 blocks of material to be covered in 45 class periods. It has been prepared as a guide to the teacher coordinator of the work-experience program to further aid his students in job preparation, job experiences, social and academic growth.

The requirements of this program necessitate the maintenance of its "structured flexibility." This outline, presented in its recommended sequence, should be offered to meet the needs of all students.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the quinmester advisory committee, and the Vocational Teacher Education Service, and has been approved by the Dade County Vocational Curriculum Committee.

TABLE OF CONTENTS
with Suggested Hourly Breakdown

GOALS

Upon completion of this program, the Work-Experience student should be able to demonstrate:

1. Knowledge of the procedures involved in securing employment.
2. The generally accepted procedures in preparing for a job interview.
3. The need for good health habits and grooming as preparation for employment.
4. An awareness of the federal, state, and local laws that pertain to student employment.
5. The duties, responsibilities, and qualifications needed for selected occupations.
6. The necessary attributes required for good employer-employee relationships, as well as employee-employee relationships.
7. An awareness of the attributes and general job talents needed for advancement in a chosen field.
8. The need for maintaining harmonious relationships and better understanding for one's self and others.
9. The necessity and importance of wise money management.
10. The need and advantages of additional vocational skills and training for employment and future job success.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - PURPOSE OF THE PROGRAM

The student must be able to:

1. State orally the objectives of the course.
2. Discuss the advantages and disadvantages of the course.
3. Explain the necessary requirements for admission to the Work-Experience Program.
4. Demonstrate an understanding of why the Work-Experience Program exists.

BLOCK II - PERMISSION TO ENTER WORK-EXPERIENCE PROGRAM

The student must be able to:

1. Demonstrate the ability to complete the Vocational Cooperative Student Application Form.
2. Exhibit the ability to show an understanding of the Student Cooperative Agreement, either through group or individual discussion.
3. Demonstrate an understanding of the need for the teacher-coordinator to make a parental visit and the obligations of the parent.

BLOCK III - PERFORMANCE OF ASSIGNED TASKS

The student must be able to:

1. Demonstrate an ability to differentiate between listening and hearing.
2. Write instructions for assignments.
3. Exhibit the ability to follow instructions, when given orally or in writing.
4. Perform assigned tasks, both oral and written.

BLOCK IV - SCHOOL ATTENDANCE

The student must be able to:

1. Attend school on a daily basis.
2. Attend regularly scheduled classes.
3. Demonstrate the ability to be punctual to school, his classes, and his job.
4. Explain the reasons he is obligated to attend school before reporting to his place of business.

BLOCK V - RECORD KEEPING

The student must be able to:

1. Demonstrate an understanding of, the need for, and the required method of completing the Work-Experience Time and Earning Card.

2. Explain the need for and methods used in completing the Employees' Time Card.
3. Demonstrate an understanding of the Student Progress Form.
4. List his earnings and expenses.

BLOCK VI - LAWS AND SOCIETY

The student must be able to:

1. Exhibit the ability to obey all laws by performance.
2. Explain the need for decent behavior and respect for rules.
3. Demonstrate the ability to understand and fill in the Florida Industrial Commission Form AT-22-A. (Application for Work Permit)
4. List those requirements needed to obtain the various types of working papers.
5. Explain the reasons for obtaining a Health Card for employment in various occupations.
6. Complete and understand the need for the Cooperative Student Identification Card.

BLOCK VII - SELF DISCIPLINE

The student must be able to:

1. Demonstrate the ability and need to be punctual in school and on the job.
2. List his individual values and goals.
3. Demonstrate the ability to live up to and possibly attain these values and goals.
4. Exhibit good emotional control and classroom behavior.
5. Explain the need for advising the coordinator and employer of an anticipated absence.

BLOCK VIII - REQUIREMENTS FOR EMPLOYMENT

The student must be able to:

1. Examine and fulfill the requirements set forth on the Promise of Employment Form.
2. Demonstrate an understanding of, the limitations of, and the requirements for obtaining a work permit.
3. Prepare and explain the Social Security Withholding Form.
4. Explain the reasons a Health Card is required on certain jobs.
5. Explain where to obtain a Police Identification Card when employed on Miami Beach.
6. List the reasons why a Police Identification Card is required when employed on Miami Beach.

BLOCK IX - INTEREST INVENTORY

The student must be able to:

1. Follow oral instructions as evidenced by performance.
2. Exhibit the ability to take a vocational standardized test which shows the individual vocational interest of each student.

3. Demonstrate an understanding of the results of such tests.
4. Examine the test results on an individual basis.
5. Read and show comprehension of written instructions on a vocational standardized test.
6. Examine and show the ability to understand the test results when offered in graph form.
7. List possible vocational choices from the results shown on the standardized tests.
8. Determine what additional training might be necessary to attain his individual vocational choice - by written report.

BLOCK X - JOB APPLICATION

The student must be able to:

1. Perform in an acceptable manner in various class interview situations.
2. Demonstrate the ability to apply for employment in a telephone conversation.
3. Demonstrate the ability to respond to questions presented to him by the interviewer in a clear and intelligent manner.
4. Exhibit the ability to show how questions might be asked of a potential employer.
5. Explain the generally accepted types of clothing which can be worn to various types of job interviews.
6. Explain the need for cleanliness in relationship to job opportunities.
7. List character traits which might be looked upon more favorably by a potential employer.
8. Demonstrate good taste in clothes and general appearance.
9. Prepare several different types of job application forms.

Course Outline

WORK-EXPERIENCE PROGRAM - 8769
(Introduction to the Work-Experience Program)

Department 48 - Course 8769.01

I. PURPOSE OF THE PROGRAM

A. The Advantages and Disadvantages
   1. Need for existence
   2. Need for continued growth

B. Student and Parental Involvement and Obligations
   1. School
   2. Regularly scheduled classes
   3. Home
   4. Job
   5. Community

II. PERMISSION TO ENTER WORK-EXPERIENCE PROGRAM

A. Student Application (VTA-98)
   1. Information necessary
   2. Picture
   3. Past records
   4. Vocational goals

B. Student Cooperative Agreement (VTA-102)
   1. Student understanding
   2. Parent understanding
   3. Signatures needed

III. PERFORMANCE OF ASSIGNED TASKS

A. Compliance with Oral Instruction
   1. Listening
   2. Hearing

B. Compliance with Written Instruction
   1. Listening
   2. Hearing
   3. Follow-up

IV. SCHOOL ATTENDANCE

A. Regularity and Punctuality
   1. School
   2. Job

IV. SCHOOL ATTENDANCE (Contd.)

B. Adjustment to Varying Class Schedules
   1. Academic
   2. Vocational

V. RECORD KEEPING

A. Time Cards
   1. School
   2. Employer

B. Student Progress Form
   1. Self evaluation
   2. Teacher evaluation
   3. Employer evaluation

C. Income and Expense Form
   1. Computation of hourly wages
   2. Computation of weekly wages
   3. Computation of weekly expenses

VI. LAWS AND SOCIETY

A. Observation and Obedience to Laws
   1. Civil
   2. Criminal
   3. Labor

B. Personal Responsibilities and Behavior
   1. School
   2. Home
   3. Community
   4. Job

VII. SELF DISCIPLINE

A. Punctuality
   1. School
   2. Job

B. Individual Values and Attitudes
   1. Peer group acceptance
   2. Parental acceptance
   3. Self appraisal
   4. Teacher appraisal

C. On the Job
   1. Employer-employee
   2. Employee-employee
   3. Customer
   4. Competition

VII. SELF DISCIPLINE (Contd.)

- D. Normally Accepted Standards
  - 1. Social
  - 2. Moral

VIII. REQUIREMENTS FOR EMPLOYMENT

- A. Promise of Employment Form (VTA-102)
  - 1. Employee obligation
  - 2. Employer obligation

- B. Work Permits
  - 1. Pink (under 16 years of age)
  - 2. Yellow (over 16 years of age)

- C. Social Security
  - 1. Withholding statement
  - 2. Card

- D. Health Card
  - 1. Food service and handling
  - 2. Requirements for obtaining
  - 3. Where to obtain

IX. INTEREST INVENTORY

- A. California Picture Interest Inventory
  - 1. Types of employment pictorially illustrated
  - 2. Hand scoring

- B. Hall Occupational Orientation Inventory
  - 1. Employment recommendations made
  - 2. High reading level required

X. JOB APPLICATION

- A. Preparation for Job Interview
  - 1. Personal
  - 2. Telephone
  - 3. Response to questions
  - 4. Seeking information
  - 5. Completion of application form

- B. Proper Grooming When Seeking Employment
  - 1. Dress for type of job
  - 2. General character traits
  - 3. Cleanliness:
    - a. Clothing
    - b. Personal

XI. POST TEST SAMPLE

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35. Stay in School. Local Office. U. S. Navy Recruiting.

36. Study Your Way Through School. Chicago: Science Research Associates.

37. What Good Is High School. Chicago: Science Research Associates.

38. You, Today and Tomorrow. Princeton: Educational Testing Service.

39. Your Social Security. Washington, D. C.: U. S. Department of Health, Education and Welfare.

Films:

1. Acts of Courtesy. 16 mm. 11 min. B/W. Sound. Dade County, 1-00909.

2. Adults in a Hurry. 16 mm. 25 min. Color. Sound. Detroit: Jam Handy Corp.

3. Aptitudes and Occupations. 16 mm. 13 min. B/W. Sound. Chicago: Coronet Instructional Films, Inc.

4. Banks and Credit. 16 mm. 10 min. B/W. Sound. Dade County, 1-00398.

5. Barney Butt. 16 mm. 13 min. Color. Sound. New York: American Heart Association.

6. Be Punctual. 16 mm. 10 min. B/W. Sound. Chicago: Coronet Instructional Films, Inc.

7. Being on Time. 16 mm. 10 min. Color. Sound. Dade County, 1-00147.

8. Bennies and Goofballs-FDA Report. 16 mm. 20 min. B/W. Sound. Dade County, 1-13529.

9. Beyond LSD. 16 mm. 28 min. Color. Sound. Local Office. Federal Bureau of Narcotics and Dangerous Drugs.

10. Beyond a Reasonable Doubt. 16 mm. 28 min. Color. Sound. Dade County, 1-31714.

11. Big Question, The-Choosing Your Career. 16 mm. 28 min. Color. Sound. Atlanta: Association Films, Inc.

12. Body Care and Grooming. 16 mm. 20 min. B/W. Sound. Dade County, 1-12958.

13. Bridge, The. 16 mm. 20 min. Color. Sound. New York: National Association of Manufacturers.

14. Careers for Girls. 16 mm. 20 min. B/W. Sound. Urbana, Illinois: University of Illinois Press.

15. Changing Face of Florida, The. 16 mm. 15 min. Color. Sound. Dade County, 1-13381.

16. Choosing for Happiness. 16 mm. 14 min. B/W. Sound. Dade County, 1-10094.

17. Citizenship in Action. 16 mm. 28 min. B/W. Sound. Dade County, 1-30035.

18. College Perspectives. 16 mm. 29 min. B/W. Sound. New York; College Entrance Examination Board.

19. Credit Loans. 16 mm. 20 min. B/W. Sound. Dade County, 1-10196.

20. Developing Responsibility. 16 mm. 15 min. B/W. Sound. Chicago: Coronet Instructional Films, Inc.

21. Developing Self Reliance. 16 mm. 15 min. B/W. Sound. Chicago: Coronet Instructional Films, Inc.

22. Dressing Up. 16 mm. 15 min. Color. Sound. Atlanta: Association Films, Inc.

23. Earning Money While Going to School. 16 mm. 10 min. B/W. Sound. Dade County, 1-00498.

24. Fight or Flight. 16 mm. 28 min. Color. Sound. Local Office. Federal Bureau of Narcotics and Dangerous Drugs.

25. Finding Your Life's Work. 16 mm. 22 min. B/W. Sound. Dade County, 1-10315.

26. Finding the Right Job. 16 mm. 11 min. B/W. Sound. Dade County, 1-00574.

27. Getting a Job. 16 mm. 16 min. B/W. Sound. Dade County, 1-10320.

28. Getting Along with Others. 16 mm. 15 min. B/W. Sound. Ch Coronet Instructional Films, Inc.

29. Good Looks. 16 mm. 20 min. Color. Sound. Atlanta: Modern Talking Picture Company.

30. Good Place To Work. 16 mm. 14 min. B/W. Sound. Dade County, 1-10319.

31. Going Steady. 16 mm. 20 min. Color. Sound. Chicago: Coronet Instructional Films, Inc.

32. Hooked. 16 mm. 20 min. B/W. Sound. Dade County, 1-13216.

33. Horizons Unlimited. 16 mm. 30 min. Color. Sound. Atlanta: Modern Talking Picture Company.

34. How To Be Well Groomed. 16 mm. 10 min. B/W. Sound. Dade County, 1-03991.

35. How To Investigate Vocations. 16 mm. 10 min. B/W. Sound. Dade County, 1-00576.

36. How To Keep a Job. 16 mm. 10 min. B/W. Sound. Dade County, 1-00578.

37. How We Make a Living. 16 mm. 30 min. Color. Sound. Washington, D.C.: U. S. Bureau of the Census.

38. Human Reproduction. 16 mm. 21 min. Color. Sound. Dade County, 1-11252.

39. Innocent Party. 16 mm. 18 min. Color. Sound. Dade County, 1-11370.

40. Introducing the New Worker to His Job. 16 mm. 16 min. B/W. Sound. Dade County, 1-11582.

41. Is Smoking Worth It? 16 mm. 13 min. Color. Sound. New York: American Cancer Society.

42. Losers, The. 16 mm. 31 min. B/W. Sound. Dade County, 1-31716.

43. LSD-Insight or Insanity. 16 mm. 28 min. Color. Sound. Dade County, 1-31731.

44. Manage Your Money. 16 mm. 20 min. B/W. Sound. New York: Sterling Publishing Company.

45. Marijuana. 16 mm. 20 min. Color. Sound. Local Office. Federal Bureau of Narcotics and Dangerous Drugs.

46. Molested. 16 mm. 25 min. B/W. Sound. Dade County, 1-31408.

47. Money Talks. 16 mm. 11 min. B/W. Sound. Dade County, 1-00397.

48. Morning for Jimmy, A. 16 mm. 28 min. B/W. Sound. New York: Association Films, Inc.

49. Narcotics-Pit of Despair. 16 mm. 28 min. Color. Sound. Dade County, 1-31609.

50. No Limit to Learning. 16 mm. 29 min. Color. Sound. New York: College Entrance Examination Board.

51. No Reason To Stay. 16 mm. 28 min. Color. Sound. New Orleans: Canadian Consulate General.

52. Next Year Is Now. 16 mm. 28 min. Color. Sound. New York: John Hancock Life Insurance Company.

53. Opportunities Unlimited. 16 mm. 13 min. B/W. Sound. Dade County, 1-10181.

54. Penny Saved, A. 16 mm. 15 min. Color. Sound. New York: Association Films, Inc.

55. Personal Finance Planning. 16 mm. 15 min. B/W. Sound. New York: Association Films, Inc.

56. Personal Health for Girls. 16 mm. 11 min. B/W. Sound. Dade County, 1-03199.

57. Personal Hygiene for Boys. 16 mm. 11 min. B/W. Sound. Dade County, 1-03197.

58. Personal Qualities for Job Success. 16 mm. 15 min. B/W. Sound. Chicago: Coronet Instructional Films, Inc.

59. Quarter Million Teenagers. 16 mm. 16 min. Color. Sound. Dade County, 1-11376.

60. Responsibility. 16 mm. 15 min. B/W. Sound. New York: McGraw-Hill Book Company.

61. Riddle, The. 16 mm. 20 min. Color. Sound. Local Office. Federal Bureau of Narcotics and Dangerous Drugs.

62. Road Ahead, The. 16 mm. 25 min. B/W. Sound. New York: Association Films, Inc.

63. Rules at School. 16 mm. 13 min. B/W. Sound. Chicago: Coronet Instructional Films.

64. Samuel and Social Security. 16 mm. 15 min. Color. Sound. Local Office. Social Security Administration.

65. Say What You Mean. 16 mm. 20 min. B/W. Sound. Dade County, 1-13332.

66. Secret Service Story. 16 mm. 18 min. Color. Sound. Local Office. Federal Reserve Bank.

67. Seekers, The. 16 mm. 30 min. Color. Sound. Dade County, 1-31719.

68. Stay in School and Graduate. 16 mm. 14 min. Color. Sound. Charleston, S. C. U. S. Navy Department.

69. Story of Distributive Education. 16 mm. 21 min. Color. Sound. New York: Association Films, Inc.

70. This Way Up. 16 mm. 20 min. B/W. Sound. Atlanta: Modern Talking Pictures, Inc.

71. 'Til Debt Do Us Part. 16 mm. 14 min. B/W. Sound. New York: Association Films, Inc.

72. Time of Our Lives, The. 16 mm. 27 min. Color. Sound. New York: Association Films, Inc.

73. Thin Blue Lines. 16 mm. 28 min. B/W. Sound. New York: Association Films, Inc.

74. Where Is Prejudice - Part I. 16 mm. 30 min. B/W. Sound. Dade County, 1-31614.

75. Where Is Prejudice - Part II. 16 mm. 30 min. B/W. Sound. Dade County, 1-31619.

76. When I'm Old Enough-Goodbye. 16 mm. 28 min. B/W. Sound. Dade County, 1-30086.

77. Who Will Come to My Party. 16 mm. 18 min. Color. Sound. Atlanta: Modern Talking Pictures, Inc.

78. Why Budget? 16 mm. 15 min. B/W. Sound. New York: McGraw-Hill Book Company.

79. Your Cleanliness. 16 mm. 10 min. B/W. Sound. Dade County, 1-03503.

80. Your Earning Power. 16 mm. 11 min. B/W. Sound. Dade County, 1-00582.

81. Your Income Tax. 16 mm. 20 min. Color. Sound. Washington, D. C.: U. S. Treasury Department.

82. Your Social Security. 16 mm. 15 min. B/W. Sound. Albany, N. Y.: New York State Department of Education.

83. Your Teeth. 16 mm. 10 min. B/W. Sound. Dade County, 1-03503.

84. You and Your Money. 16 mm. 15 min. B/W. Sound. Local Office. Federal Reserve Bank.

Filmstrips:

1. Applying for a Job. Chicago: Society for Visual Education.

2. Applying for a Job. New York: McGraw-Hill Book Company.

3. Belonging to a Crowd. Chicago: Society for Visual Education.

4. Choosing Your Career. Pleasantville, New York: Guidance Associates.
5. Developing Social Maturity. New York: McGraw-Hill Book Company.
6. Dropout, The. Pleasantville, New York: Guidance Associates.
7. Fundamentals of Thinking. New York: McGraw-Hill Book Company.
8. Finding the Right Job for You. New York: McGraw-Hill Book Company.
9. First Year in High School. Pleasantville, New York: Guidance Associates.
10. Getting Along with Others. New York: McGraw-Hill Book Company.
11. Going Steady. New York: McGraw-Hill Book Company.
12. How To Make a Career Decision. New York: The New York Times, Filmstrip of the Month.
13. Job Interview, The. Jamaica, New York: Eye-Gate House Inc.
14. Let's Look at Careers. New York: The New York Times, Filmstrip of the Month.
15. Occupational Education Series. Jamaica, New York: Eye-Gate House Inc.
16. Road to Nowhere. Pleasantville, New York: Guidance Associates.
17. Smoking Problem, The. Chicago: Society for Visual Education, Inc.
18. Speaking and Writing. Jamaica, New York: Eye-Gate House Inc.
19. What You Should Know Before You Go to Work. Pleasantville, New York: Guidance Associates.
20. World of Work Series. Pleasantville, New York: Guidance Associates.
21. Your Job Interview. New York: Reader's Digest Inc., Funk & Wagnalls Company.

Standardized Tests:

1. Picture Inventory Test, California Test Bureau,
   Division of McGraw-Hill Book Company
   Del Monte Research Park, Montery, California

2. Ohio Vocational Interest Survey
   Harcourt, Brace and World Inc.
   757 Third Avenue, New York, N. Y.

SOURCES OF MATERIALS

1. American Cancer Society, Inc.
   219 East 42nd Street
   New York, N. Y. 10017

2. Association Films, Inc.
   347 Madison Avenue
   New York, N. Y. 10017

3. College Entrance Examination Board
   College Board Film Library
   267 West 25th Street
   New York, N. Y. 10001

4. Coronet Instructional Films
   65 East South Water Street
   Chicago, Illinois 60601

5. Educational Testing Service
   Princeton
   New Jersey 08540

6. Eye-Gate House, Inc.
   146-01 Archer Avenue
   Jamaica, New York 11435

7. Filmstrip of the Month
   The New York Times
   Office of Educational Activities
   Times Square
   New York, N. Y. 10036

8. Florida Industrial Commission
   Tallahassee
   Florida

9. Follett Publishing Company
   201 North Wells Street
   Chicago, Illinois 60606

10. Funk and Wagnalls Company
    Division of Reader's Digest Books
    380 Madison Avenue
    New York, N. Y. 10017

11. Guidance Associates
    Harcourt, Brace and World, Inc.
    Pleasantville, N. Y. 10570

12. Jam Handy Corporation
    2821 East Grand Boulevard
    Detroit, Michigan 48211

13. John Hancock Life Insurance Company
Public Relations Department
200 Berkley Street
Boston, Mass. 02117

14. Harcourt, Brace and World, Inc.
757 Third Avenue
New York, N. Y. 10017

15. McGraw-Hill Book Company
Text-Film Division
330 West 42nd Street
New York, N. Y. 10022

16. McKay, David, Company, Inc.
750 Third Avenue
New York, N. Y. 10017

17. McKnight and McKnight Publishing Company
Towanda Avenue and Route 66
Bloomington, Illinois 61701

18. Modern Talking Picture Service, Inc.
714 Spring Street, N.W.
Atlanta, Georgia 30308

19. New York Department of Education
Albany
New York 12210

20. New York Life Insurance Company
51 Madison Avenue
New York, N. Y. 10010

21. Prentice-Hall, Inc.
70 Fifth Avenue
New York, N. Y. 10011

22. Science Research Associates
259 East Erie Street
Chicago, Illinois

23. Scott, Foresman and Company
3145 Piedmont Road, N.E.
Atlanta, Georgia

24. Simon and Schuster
630 Fifth Avenue
New York, N. Y.

25. Society for Visual Education, Inc.
1345 Diversey Parkway
Chicago, Illinois 60614

26. South-Western Publishing Company
5101 Madison Road
Cincinnati, Ohio 45227

27. Sterling Publishing Company, Inc.
419 Park Avenue South
New York, N. Y. 10016

28. U. S. Employment Service
Division of U. S. Department of Labor
Washington 25, D. C.

29. U. S. Government Printing Office
Washington, D. C.

30. University of Illinois Press
Urbana
Illinois 61803

APPENDIX

QUINMESTER POST TEST SAMPLES

Test 1 - True-False
WORK-EXPERIENCE
Quinmester I
Introduction to the
Work-Experience Program
Block I-X
Page 1 of 1 pages

Name_______________________________ Date_______________ Score__________

True-False Test Items

Each of the following statements is either true or false. If the statement is true, draw a circle around the letter T following it; if the statement is false, draw a circle around the F. If a statement is false in part, it is entirely false. (Value 20 Points)

---

1. You must carry your Social Security Card at all times. T F
2. A high school education is not important if you don't want to go to college. T F
3. You must have your parents' approval to work during school hours. T F
4. The Work-Experience Program is only for those who plan on dropping out of school T F
5. It is more important to get to your job on time than it is to get to school on time. T F
6. The money you actually receive in your pay check each week is your gross pay. T F
7. It is normal practice to receive time and one half for overtime. T F
8. Your working day starts at 8:30 a.m. (7:15 for those on a 10-hour day). T F
9. At the present time, it is more important to learn job attitude rather than job skill. T F
10. You are not permitted to work past 10 p.m. T F

Test 1 - Multiple Choice
WORK-EXPERIENCE
Introduction to the
Work-Experience Program
Blocks I-X
Page 1 of 1 pages

Name ______________________ Date ____________ Score ______

Multiple Choice Test Items

Each statement needs a word, a figure, or a phrase to make it correct. Only one of the choices listed is correct. Place the number of the choice you make in the space provided at the right edge of the sheet. (Value 20 points)

---

1. The income tax form you receive from your employer at the end of the year is the (1) 1040, (2) W-2, (3) W-4 form ( )

2. The best job for you is the one which (1) pays most, (2) shows room for advancement, (3) your parents approve of. ( )

3. The normal work day is (1) 6, (2) 4, (3) 8 hours long. ( )

4. If you do not plan on going to college, a high school education is important because (1) it will make your parents happy, (2) it prepares you for the future, (3) you can't get a job without it. ( )

5. If you bring home $35.96 each week, this is your (1) gross pay, (2) net pay, (3) neither of above. ( )

A Job Interview

1. You arrive at the interview (1) along, (2) with your mother, (3) with a friend, (4) with several buddies. ( )

2. You are dressed (1) in sport clothes, (2) as a clerk in a department store might dress, (3) in fancy "date" clothes, (4) in the latest far out fashion. ( )

3. When offered a seat you (1) slouch in it to show you are relaxed, (2) say you would rather stand, (3) sit up straight and pay attention, (4) ask why you must sit down. ( )

4. When the man asks you about your school record you (1) tell him what schools you have attended and subjects taken, (2) tell him you have gone to too many schools to remember, (3) ask him why he wants to know, (4) tell him it's not very important. ( )

Test 1 - Essay
WORK-EXPERIENCE
Introduction to the
Work-Experience Program
Blocks I-X
Page 1 of 1 pages

Name ______________________________ Date _______________ Score _________

Essay Question

Read the question carefully before attempting to answer it. Write the answer on the front and back of this paper as space permits. Be accurate and neat in your work. (Value 20 Points)

---

1. Why is getting a high school education important, even if you do not plan on going to college?

KEY TO POST TEST

Work-Experience Program

TRUE OR FALSE (Value 20 Points)

1. True
2. True
3. True
4. False
5. False
6. False
7. True
8. True
9. True
10. True

MULTIPLE CHOICE (Value 20 Points)

1. b
2. b
3. c
4. b
5. b

A JOB INTERVIEW (Value 20 Points)

1. a
2. b
3. c
4. a
5. c
6. c
7. d
8. b
9. b
10. b

ESSAY (Value 20 Points)

Teacher judgment

MATH (Value 20 Points)

1. $86.45
2. $130.83
3. $230.14
4. $495.60
5. $8515.52

Test 1 - Computation
WORK-EXPERIENCE
Introduction to the
Work-Experience Program
Blocks I-X
Page 1 of 1 pages

Name ______________________ Date ____________ Score ______

Computation

Read each question carefully before attempting to answer it. Do all your figuring on the back of this page and put your answer in the space provided. Do not read something into the question which is not there. (Value 20 Points)

---

1. Joe works 44 hours per week. He works 37 hours at $1.82 per hour and gets time and one half for overtime. What is his gross pay? ____________

2. Sam works 42 hours per week. He works 35 hours at $2.67 per hour and gets double time for overtime. What is his gross pay? ____________

3. John works 43 hours per week. He works 36 hours at $4.95 per hour and gets time and one half for overtime. What is his gross pay? ____________

4. Harry works 46 hours per week. He works 33 hours at $2.10 per hour and double time for overtime. What is his MONTHLY gross pay? ____________

5. Ted works 41 hours per week. He works 34 hours at $3.68 per hour and time and one half for overtime. What is his YEARLY gross pay? ____________

WORK-EXPERIENCE - Multiple Choice (Contd.)

5. The man wants to know if you have any work experience, so you (1) tell him the other jobs are not worh talking about, (2) tell him you can't remember all the jobs you have had, (3) tell him where you have worked before or if you have not worked, (4) ask why he wants to know. ( )

6. When the man asks for proof of age, you (1) say you forgot your wallet, (2) say you are old enough to work, (3) show something which proves your age, (4) tell him to check with school. ( )

7. The man calls you by your first name so you call him (1) "Man," (2) "Mister," (3) "Jack," (4) "Mr.________." ( )

8. He asks many questions, so you (1) get bored and lose interest, (2) be polite and pay attention, (3) tell him to mind his own business, (4) tell him your personal problems. ( )

9. When the man asks if you have any questions, you (1) are too tired to ask, (2) ask about those things he did not discuss to your satisfaction, (3) ask if you may leave, (4) ask if you may smoke ( )

10. When it is time to leave, you (1) say if you are not hired, they are unfair, (2) ask if you have gotten the job, (3) ask if you should call back or wait to hear from him, (4) just walk out. ( )

AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

Course Outline
WORK EXPERIENCE - 8769
(Occupational Explorations)
Department 48 - Course 8769.10

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION•1971

DADE COUNTY PUBLIC SCHOOLS
1410 NORTHEAST SECOND AVENUE
MIAMI, FLORIDA 33132

Course Outline

WORK EXPERIENCE - 8769
(Occupational Explorations)

Department 48 - Course 8769.10

the division of
VOCATIONAL, TECHNICAL AND ADULT EDUCATION

5527

Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

Published by the Dade County School Board

Copies of this publication may be obtained through

Textbook Services
2210 S. W. Third Street
Miami, Florida 33135

Course Description

8769	48	8769.10	Occupational Explorations
State Category Number	County Dept. Number	County Course Number	Course Title

This course serves as a pre-employment period, and is designed to acquaint students with the myriad of occupations included in the world of work. Students observe employees on the job or undertake different work activities in order to increase their understanding of various occupations. Students are given the opportunity also to enroll in courses that can increase their skills and abilities so that they may be better qualified for entry into the world of work.

Indicators of Success: Applicants must show a need which might be served by admission to the Work Experience Program.

Clock Hours: 45

PREFACE

This quinmester course outline has been prepared for students enrolled in the senior high school Work Experience Program. It is designed to meet the needs of those students who will be enrolled in the program during the fifth quinmester, the summer session.

Students enrolled in this optional course must be at least fourteen years of age and in ninth or tenth grade, depending on the grade composition of the student body. For selection, students should be identified as those with special needs as determined by various patterns of characteristics including poor attendance, overage in grade, or the need to work in order to continue their education. In the scope of the total Work Experience Program curriculum, this course would normally be considered the final sequence. However the flexibility inherent in the program makes it possible to incorporate the outline at any time during the school year.

The material contained in the outline is designed to cover a period of forty-five classroom hours. The work is organized into four blocks of instruction and the contents of the course should enable the students to become better prepared for entry jobs in various occupations, as well as aid them in acquiring general skills and knowledge applicable to selected areas of vocational interest. The material should also increase the students' chances for advancing on the job.

Through a cursory exploration of the vocational offerings in the school, the students should develop a deeper understanding regarding the world of work, become more proficient in carrying out assigned tasks, acquire salable skills before being placed in a training station, and become more self-confident about entering the world of work.

The teacher-coordinator may utilize several methods for teaching this course including lectures (teacher or guest speakers), demonstrations, intra-class visitations, audiovisual aids, and field to selected places of interest in the community. The teacher-coordinator may set up the classroom into small work-laboratories, or enlist the cooperation of other school personnel to provide experiences, equipment, and training for selective vocational areas of interest.

The bibliography included in this outline lists the reference material that may be used in teaching the course. A post-test is also included as a means of evaluation.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee, and the Vocational Teacher Education Service of the Dade County Public Schools, Division of Vocational, Technical, Technical and Adult Education, and has been approved by the Dade County Vocational Curriculum Committee.

TABLE OF CONTENTS
with Suggested Hourly Breakdown

GOALS

The work experience student must be able to demonstrate:

1. An understanding of the prerequisites for becoming employable.
2. An awareness of the vocational areas available in the school, and the ability to select intelligently the occupational area relating to his interest, capabilities, and need to acquire marketable skills.
3. Knowledge of the basic occupational and communication skills which aid in becoming employable.
4. An awareness of, and an interest in, the economic outlook as reflected by the employment opportunities in the community.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - VOCATIONAL DEVELOPMENT

The student must be able to:

1. Discuss and list the factors a potential employee should consider prior to seeking employment in most areas.
2. Discuss, list, and analyze the nine major occupational groups in the United States.
3. Research and report on the employment opportunities related to area of vocational interest in terms of vocational trends; past, present, and future.
4. Demonstrate and exhibit an awareness of the desired characteristics important to becoming employable.

BLOCK II - EXPLORING THE FIELD

The student must be able to:

1. Explain in writing the vocational programs in the school in relation to his career objectives.
2. Evaluate himself in terms of capabilities, needs and goals.
3. Investigate the job requirements for his chosen area of interest, list and discuss them.
4. Select a vocational area in which to gain marketable skills, and perform the required activities.
5. Exhibit evidence of acquisition of vocational skills learned in chosen area of interest.

BLOCK III - EDUCATION FOR WORK

The student must be able to:

1. Demonstrate, through oral and written activities, an understanding and mastery of the four basic fundamentals of mathematics.
2. Demonstrate a practical understanding of managing money through role playing and record keeping.
3. Demonstrate, through accurate calculations, an understanding of the mathematical skills involved in borrowing money, making installment purchases, and computing interest.
4. Accurately perform computations involving basic measurements of length and weight.
5. Exhibit the desire to improve communication skills.
6. Demonstrate the ability to prepare personal and business correspondence.
7. Express ideas intelligently and correctly in oral and written activities.
8. Exhibit improved penmanship.
9. Make written and oral reports on specified material.
10. Exhibit the ability to obtain information accurately.
11. Exhibit correct spelling and word usage in written and oral activities.

BLOCK IV - WIDENING HORIZONS

The student must be able to:

1. Discuss and list some observations made as a result of visits to business establishments.
2. Analyze the relationship between the world of work and education.
3. Show by discussion a broader perspective about diversified occupations.
4. Establish and list goals related to future occupational choices.
5. Make a desirable transition from school to work as evidenced by performance.

Course Outline

WORK EXPERIENCE - 8769
(Occupational Explorations)

Department 48 - Course 8769.10

I. VOCATIONAL DEVELOPMENT

A. Preparation for Employment
  1. Training
  2. Skills
  3. Interest
  4. Attitude
  5. Aptitude
  6. Education
  7. Appearance

B. Major Occupational Groups
  1. Professional and technical
  2. Agriculture
  3. Managers
  4. Clerical
  5. Sales
  6. Craftsmen
  7. Operatives
  8. Service workers
  9. Laborers

C. Economic Trends
  1. History
  2. Present
  3. Future outlook

D. Traits Required
  1. Sociability
  2. Efficiency
  3. Manners
  4. Flexibility

II. EXPLORING THE FIELD

A. Vocational Choices
  1. Office occupation areas:
    a. Typing:
      (1) Fundamentals of machine operation
      (2) Typing techniques
      (3) Attitudes and habits
      (4) Following directions
      (5) Writing business letters
    b. Office machines:
      (1) Adding-listing machine

        (2) Rotary
        (3) Printing
    c. Office practice:
        (1) Filing
        (2) Record keeping
        (3) Figuring payrolls
        (4) Using the telephone
        (5) Using the switchboard
        (6) Operating the calculator
        (7) Adding machines
        (8) Typing stencils
        (9) Typing masters
2. Trade and industrial areas:
    a. Air conditioning and heating mechanics:
        (1) Installation
        (2) Maintenance
        (3) Repair of refrigeration units
    b. Auto body:
        (1) Body repair
        (2) Paints
        (3) Automotive finishes
    c. Diviersified mechanics:
        (1) Repair of metal and wood furniture
        (2) Small engines repair
        (3) Lawn mower repair and maintenance
        (4) Use and handling of tools
    d. Automotive mechanics:
        (1) Care of basic tools and equipment
        (2) Automotive operations
        (3) Automotive repair practices and techniques
    e. Power machines:
        (1) Small engines
        (2) Automotives
        (3) Appliance repair
        (4) Machine repair
        (5) Fundamental mechanical principles
    f. Printing:
        (1) Typecase
        (2) Typesetting
        (3) Proofing
        (4) Measurement
        (5) Operation of press equipment
        (6) Use of materials
        (7) Safety
        (8) Offset
        (9) Binding
3. Diversified occupational areas:
    a. Sales and service:
        (1) Techniques of selling
        (2) Customer relations
        (3) Handling stock

II. EXPLORING THE FIELD (Contd.)

(4) Recording sales
(5) Communicating with customers
b. Cashiering:
(1) Fundamentals of cash register
(2) Checkout procedures
(3) Making change
(4) Computing taxes
(5) Check-cashing procedures
(6) Computing split group prices

B. Vocational Selection
1. Criteria:
a. Need
b. Capabilities
c. Experiences
d. Goals
2. Job requirements:
a. Qualifications:
(1) Indoor
(2) Outdoor
(3) Mental
(4) Physical
b. Attire:
(1) Standard uniform
(2) Conservative
(3) Casual
3. Safety and health hazards
4. Duties and responsibilities
5. Opportunity for advancement

C. Developing Skills in Areas
1. Become totally involved
2. Learn fundamentals
3. Display effort and interest
4. Perform job tasks
5. Complete all assignments

III. EDUCATION FOR WORK

A. Mathematical Skills
1. Computational skills:
a. Fundamental operations:
(1) Addition
(2) Subtraction
(3) Multiplication
(4) Division
2. Business mathematics:
a. Personal cash and bank records:
(1) Budget
(2) Savings account

- b. Everyday buying problems:
  - (1) Unit price
  - (2) Fractional qualities
- c. Personal finances:
  - (1) Figuring earnings
  - (2) Deductions
  - (3) Timecard record
  - (4) Figuring percent
  - (5) Borrowing money

3. Everyday measurements:
   - a. Length
   - b. Weight

B. Communication Skills
1. Reading:
   - a. Building vocabulary
   - b. Reading for information
   - c. Developing comprehension skills
   - d. Reading critically
2. Writing:
   - a. Preparing an autobiography
   - b. Alphabetizing information
   - c. Preparing a job description
   - d. Writing a letter of application
   - e. Writing business letters
   - f. Spelling correctly
3. Speaking:
   - a. Grammatical usage
   - b. Use of the telephone
   - c. Classroom discussions
   - d. Improvement of speech patterns
4. Listening:
   - a. Taking messages
   - b. Interpreting information

IV. WIDENING HORIZONS

A. Field Trips
1. Business
2. Industry
3. Intra-school visitations

B. Vocational Speakers
1. Motivation
2. Information
3. Recruitment

C. Follow-Up
1. Observations:
   - a. Description of work activities
   - b. Size of company

c. Number of employees
d. Employment opportunities
e. Personal interest in field

2. Relationship of work to education:
   a. Greater selectivity of occupational choices
   b. Increased monetary benefits
   c. Personal satisfaction and success
   d. Reduced chance for unemployment
3. Future occupational goals:
   a. Area of interest
   b. Educational requirements
   c. Training required
   d. Job outlook
4. Personal improvement:
   a. Added skills
   b. Attitudinal changes
   c. Practical experiences
   d. Increased employment opportunities

V. QUINMESTER POST TEST

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87. Waitress, The. Color. Eye Gate.

88. Your Boss Is Proud of You. Color. McGraw-Hill.

APPENDIX

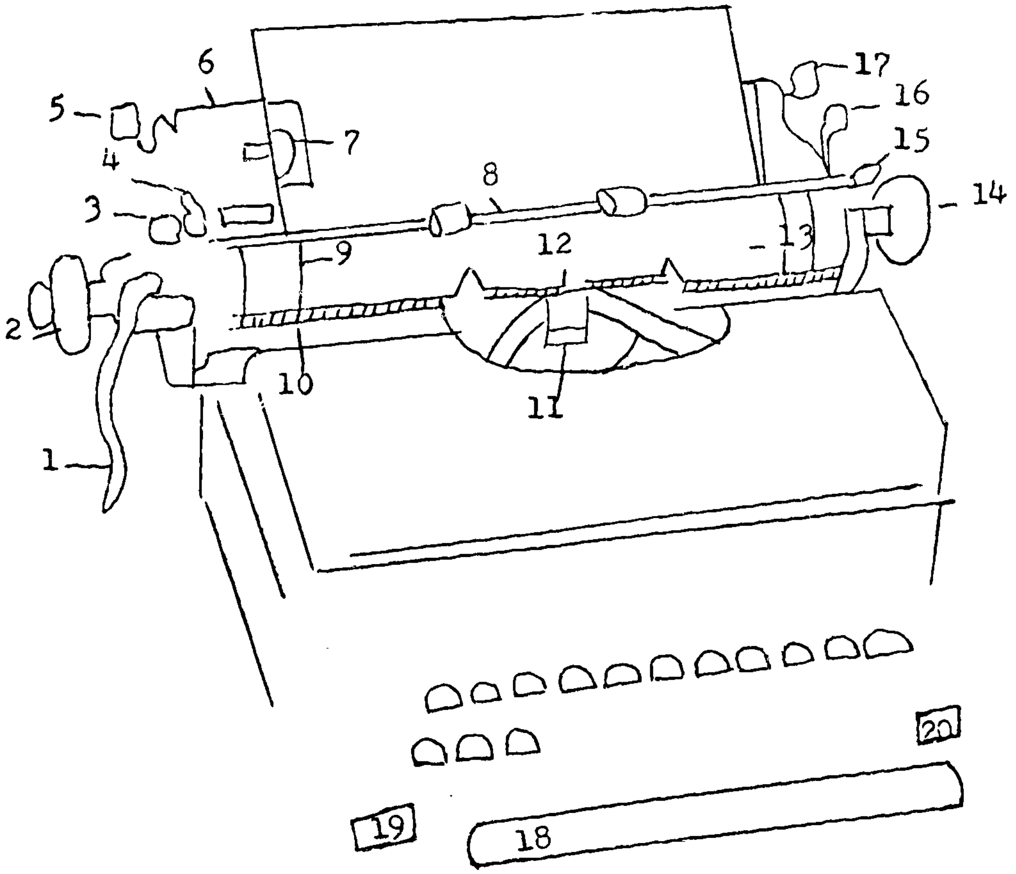
Quinmester Post Test Sample

Quinmester Post Tests

Typing Test

Name ______________________________ Date ______________ Score ____

I. The picture below shows the basic parts of a typewriter. You are to identify each numbered part and write the names by the number that corresponds with the parts on the lines beside the number under the picture. Score - 2 points for each correct identification.



1. ______________________
2. ______________________
3. ______________________
4. ______________________
5. ______________________
6. ______________________
7. ______________________
8. ______________________
9. ______________________
10. ______________________
11. ______________________
12. ______________________
13. ______________________
14. ______________________
15. ______________________
16. ______________________
17. ______________________
18. ______________________
19. ______________________
20. ______________________

II. Oral Test

The instructor will ask the students each question orally and evaluate the responses in terms of the printed answer. Record the score for each item immediately after the student completes his response. Score- 2 points for each correct response.

Score

1. Which part of the typewriter supports the paper after it is in place? ______
2. Which part holds the paper firmly against the cylinder? ______
3. Which part is used in indenting for paragraphs and in typing columns? ______
4. Which part is used in removing or in straightening a sheet of paper in the typewriter? ______
5. Which part guides the left edge of the paper as it is inserted into the typewriter? ______
6. Which part enables the typist to move the carriage freely to any point on the scale? ______
7. Which part is used in returning the carriage and in spacing up for a new line of writing? ______
8. Which part is used to establish the left edge of the writing line? ______
9. Which part is used to turn the cylinder by hand when the paper is inserted into the machine? ______
10. Which part enables the typist to type a capital letter controlled by the right hand? ______
11. Typing paper is usually how many inches wide? ______
12. How many spaces are paragraphs usually indented? ______
13. Elite type has how many spaces to the horizontal inch? ______
14. Pica type has how many spaces to the horizontal inch? ______
15. How many spaces should you allow between paragraphs? ______

III. Performance

You are to reproduce the letter shown below. 100% accuracy is expected. Score - 30 points.

1260 Bridge Road
Miami, Florida
July 18, 1971

Mrs. Eloise M. Coleman
Teacher-Coordinator
Work Experience Program
Main High School
Miami, Florida

Dear Mrs. Coleman:

If you have several competent typists who are ready for office work, ask them to call for an interview with me.

Before the interview, each applicant should complete an application form in ink. If the writing is neat and legible, I am impressed.

Our Employment Test includes English, spelling, arithmetic, and typewriting. Competence in these areas is necessary, but we consider attitudes just as important as aptitudes, and use the job interview to evaluate the applicant's attitudes.

We expect to have two or three positions open for beginning office workers early next month.

Sincerely yours,

Albert N. Tommason
Personnel Director

ANSWER KEY TO QUINMESTER POST TESTS

Typing

Identification

1. Carriage return (lever)
2. Cylinder knob
3. Carriage release
4. Line-space regulator
5. Margin set
6. Paper rest
7. Paper guide
8. Paper bail
9. Cylinder
10. Carriage-position scale
11. Printing-point indicator
12. Printing point
13. Carriage
14. Cylinder knob
15. Carriage release
16. Paper release
17. Margin set
18. Space bar
19. Shift key
20. Shift key

Oral Test

1. The paper table
2. The paper-bail rollers
3. The tabulator bar (or key)
4. The paper-release lever
5. The paper guide
6. The carriage-release lever
7. Return lever and line spacer
8. The left margin set
9. The platen (cylinder) knob, right
10. The left shift ket
11. 8-1/2 inches
12. 5 spaces
13. 12 spaces
14. 10 spaces
15. 2 spaces (double space)

Office Practice Test

Name ______________________________ Date ____________ Score ____

Upon completion of the course in office practice, the students will be expected to do the following:

1. Perform fundamental arithmetic operations on the ten-key adding machine.
2. Reproduce a mimeograph and a ditto copy.
3. Operate the mimeograph and ditto machines.
4. File alphabetically and correctly.
5. Perform more complexed mathematical operations using the calculators.
6. Receive and place calls using the telephone and switchboard.

Air Conditioning and Heating Mechanics

Name ______________________________ Date _____________ Score ____

Upon completion of the introductory course to the fundamental of this course, the students will be expected to be familiar with the nomenclature of the units involved in domestic, commercial and industrial units. The students are expected to explain the major parts of equipment in the air-conditioning cycle, and the principle behind its operation.

ANSWER KEY TO QUINMESTER POST TEST

Air Conditioning and Heating Mechanics

The principal pieces of equipment in the air-conditioning cycle are: fan, supply duct, supply outlet, room, return duct, filter, heating coil or combustion chamber and cooling coil.

The fan moves the air.
The supply duct guides the air to the room outlet.
The room outlet directs the air flow in the room.
The room provides an enclosed space in which the air can be confined.
The return outlets allow air to pass from the room.
The return duct guides the air back to the fan and usually contains the filter and the heating or cooling device.
The filter cleans the air by removing dirt, dust, and dirt particles.
The heating coil or combustion chamber heats the air usually during winter operation.
The cooling coil cools and dries the air usually during summer operation.

Automotive Body and Automotive Mechanics

Name ______________________________ Date _____________ Score ____

At the completion of the c[illegible] course in auto body and the course in automotive mechanics, the students will demonstrate an understanding of the skills learned in the courses by explaining the types of operations necessary in repairing and painting an automobile. Students will draw a diagram of the basic tools and types of equipment used in the basic operations.

Diversified Mechanics and Power Mechanics

Name ______________________________ Date _____________ Score ____

Upon completion of the introducion to the fundamentals of diversified mechanics and power mechanics, the students will exhibit understanding of the skills learned by demonstrating the principles learned in the courses. The student will bring to class a project and explain the operation involved in working on the project, as well as the nomenclature of the tools and equipment involved in its completion

Printing Test

Name ______________________________ Date ______________ Score ____

Upon completion of the cursory introduction to basic printing skills, the students will exhibit evidence of the skills learned by submitting an original project showing his own originality and creative ability in constructing a job. In presenting his project, each student will follow these guidelines in explaining his project:

1. Tell where he got the general idea for setting this job.

2. Name the fundamental processes or operations involved in composing the job.

3. Explain the tools and equipment involved in carrying out the project.

Sales and Service Test

Name ______________________________ Date _____________ Score ____

You will demonstrate salesmanship in action by giving an oral demonstration of the correct techniques that should be used in making a sales presentation. In presenting your demonstration, you will be asked to follow these guidelines and include them in your presentation:

1. Gain attention
2. Arouse interest.
3. Build desire.
4. Win conviction.
5. Get action.
6. State buying motives.
7. Demonstrate product.
8. Close the sale.

Checker-Cashier Test

Name ______________________________ Date ______________ Score ____

Read each statement below very carefully before attempting to answer it. Write your answer in the space below the statement. Answer each statement as intelligently and as accurately as you can. Score - 10 points for each correct response.

1. List the names of six parts of a cash register.

a. ________________________ d. ________________________

b. ________________________ e. ________________________

c. ________________________ f. ________________________

2. Discuss five qualities that you think a good checker-cashier should possess.

a. ________________________ d. ________________________

b. ________________________ e. ________________________

c. ________________________

3. List the names of five keys found on the cash register keyboard.

a. ________________________ d. ________________________

b. ________________________ e. ________________________

c. ________________________

4. Describe the function of the checkout station.

5. Describe the procedure for correcting wrong registrations.

6. Describe three other responsibilities of the checker-cashier.

a. ________________________ c. ________________________

b. ________________________

7. List three things that a checker-cashier should do before cashing a check for a customer.

a. ______________________ c. ______________________

b. ______________________

8. Describe how you would compute the cost of single items when sold as a part of a complete group.

9. Describe the procedure that a checker-cashier should follow in closing her checkout station.

10. List the procedure that a checker-cashier should follow in packing a customer's order.

ANSWER KEY TO QUINMESTER POST TEST

Checker-Cashier

1. a. Keyboard
   b. Indication
   c. Change plate
   d. Cash drawer
   e. Sales journal window
   f. Activity counter
   g. Motor bar
   h. Receipt slot

2. a. Neat in appearance
   b. Honesty
   c. Friendly
   d. Courteous
   e. Responsible
   f. Punctual
   g. Dependable

3. a. Salesperson or clerk key
   b. Amount key
   c. Department key
   d. Transaction key
   e. No-sale key
   f. Correction key
   g. Total or change/balance key

4. The checkout station is the final point of customer contact in most stores. It is here that the customer brings her purchases to be checked and bagged.

5. When an amount or departmental error occurs, the checker-cashier should correct the error immediately. Many cash registers are designed to handle corrections automatically. These registers contain a printing table located to the left of the amount keys and below the receipt tape slot. When a correction is to be made, the credit summary form is placed on the printing table. The void key, and the corresponding department keys are then depressed. The credit summary form is removed from the register once the correction is made. The correct amount is then entered on the keyboard, and the remainder of the order is checked in the usual manner. Another method of correcting overring errors is by entering the error on an overring sheet.

6. The checker-cashier is to observe and report, but not apprehend, shoplifters. She, or he, also has some responsibility for customer safety. The cashier should also be on the alert for customers who may be till dippers, change buffers, short-change artists, split-bill passers, and counterfeiters.

7. a. Check the date, amount in figures with the written amount, endorsee.
   b. Ask for identification.
   c. Call the store manager if there is some question about the check or for his approval, if it is the policy of the store.
   d. Initial the check.

8. The cost of a single item in a group is computed by dividing the group price by the number of group items. The price of one item is then multiplied by the number purchased.

9. Each day the cashier is responsible for checking the money in his cash drawer. Stores differ in their procedure for receiving the money. Some stores require that the money be placed in a bag provided for this purpose. Some stores require the cashier to remove the currency and checks and prepare a <u>proof of cash</u>.

10. When placing merchandise in bags, heavy items are placed on the bottom to give a solid base. Medium weight and glass items should be placed in the middle, and light weight, easily crushable items should be placed on top.

Mathematical Skills Test

Name ______________________________ Date _____________ Score ____

Solve the following problems. Show all calculations on your test paper. 100% accuracy is expected. Score - 5 points for each correct answer.

1. Add the following:

   a. $\begin{array}{r}64925\\ \underline{4669}\end{array}$

   b. $\begin{array}{r}456\\ 985\\ 679\\ 842\\ 974\\ 414\\ \underline{891}\end{array}$

2. Subtract the following:

   a. $\begin{array}{r}4461\\ -\underline{2162}\end{array}$

   b. $\begin{array}{r}34906\\ \underline{14921}\end{array}$

3. Find the product:

   a. $\begin{array}{r}461\\ \underline{x468}\end{array}$

   b. $\begin{array}{r}12769\\ \underline{358}\end{array}$

4. Divide:

   a. $72\overline{)9648}$

   b. $146\overline{)136009}$

5. A family budgets 1/4 of its annual income of $5400 for food, 3/10 for shelter including operating expenses and furnishings, 1/8 for clothing, 3/20 for savings, and the remainder for miscellaneous expenses. How much is allowed for each item annually:

   ____________________ food

   ____________________ shelter (operating expense and furnishings)

   ____________________ clothing

   ____________________ savings

   ______________ miscellaneous expenses

6. Find the price per dozen for each article listed below:

   a. Cucumbers @ 2 for 19¢ ____________

   b. Oranges @ 3 for 10 ____________

   c. Grapefruit @ 4 for 99¢ ____________

7. Joe Green is employed on a 40-hour per week basis at an hourly rate of $1.90. What are his total wages for a 40-hour week?

____

8. Frank Morse is employed at $2.40 an hour on the basis of a 40-hour week with time and a half for overtime. Last week he worked 48 hours. Deductions from his total earnings were as follows:

   3-5/8% for social security
   $13.60 for federal withholding tax
   $1.75 for group insurance and hospitalization

How much did Frank receive as take-home pay?

9. Find the interest on $1,000 at 6% for 3 years.

10. Change to inches: (In order to receive credit both problems must be answered.)

9 yards __________ inches

Change to pounds:

32 ounces __________ pounds

ANSWER KEY TO QUINMESTER POST TEST

Mathematical Skills Test

1. a. 69,594
   b. 5,241

2. a. 2,299
   b. 19,985

3. a. 315,748
   b. 4,571,302

4. a. 134
   b. 931.57

5. $1,350 food
   1,620 shelter
   675 clothing
   750 savings
   1,005 miscellaneous
   $5,400 Total

6. a. $1.14
   b. .40
   c. 1.17

7. $76.00

8. $104.93

9. $180.00

10. 324 inches
    2 pounds

Communication Skills Test

Name ______________________________ Date _____________ Score ____

I. Read each incomplete sentence below. Decide which of the two words in parentheses is the correct word to complete the sentence. Draw a line under the correct word. Score - 2 points for each correct sentence.

1. These books (is, are) heavy.
2. He (doesn't, don't) have a car.
3. I have (saw, seen) you many times.
4. When the work is (did, done), you may leave.
5. They (was, were) late getting home from work.
6. (It's, Its) time to begin.
7. I believe (there, they're) at home.
8. This dress (is, are) very pretty.
9. Mary (saw, seen) Harold working at the grocery store.
10. I (were, was) on time for work.
11. Sally went (to, too) the store an hour ago.
12. Watch where (your, you're) going!
13. They (doesn't, don't) help him at home.
14. Sue (did, done) her work and left at nine o'clock.
15. She did not have (nothing, anything) to read during the afternoon.
16. Jane is the (smarter, smartest) person in our class.
17. The new car ran (smoothly, smooth).
18. It did not make (any, no) difference to Mr. Jones.
19. The people (come, came) running down the street.
20. Mary was (setting, sitting) down when her boss saw her.

II. Look at the occupations listed below. You are to arrange the list in alphabetical order with 100% accuracy. Score - 1 point for each correct answer.

Plumber
Florist
Salesman
Typist
Banker
Artist
File clerk
Repairman
Beautician
Engraver
Printer
Jeweler
Actress
Mechanic
Cook
Dentist
Carpenter
Model
Dancer
Bricklayer

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________
8. ____________________
9. ____________________
10. ____________________
11. ____________________
12. ____________________
13. ____________________
14. ____________________
15. ____________________
16. ____________________
17. ____________________
18. ____________________
19. ____________________
20. ____________________

III. Look at the words listed below. Some of them are spelled correctly and some of them are misspelled. If the word is spelled correctly, draw a circle around the C following the the word. If the word is spelled incorrectly, draw a circle around the I on the line following the word. Score - 2 points for each correct answer.

1. Hankerchief C I
2. Recieve C I
3. Admission C I
4. Certain C I
5. Occupation C I
6. Loseing C I
7. Conveneint C I
8. Opportunity C I
9. Congradulate C I
10. Casheir C I

IV. You have been given three plain sheets of paper. You are to use the paper to do the following: (Score - 10 points for each correct form)

1. Copy the business letter shown below using the block style. You are to include the parts of a business letter and punctuate the letter correctly. You may write or type the letter.

2. Copy the business letter shown below using the semiblock style. You are expected to include the parts of a business letter and punctuate the letter correctly. You may write or type the letter.

3. Write a letter of application applying for a job. Remember to mention the job you are applying for; tell how you heard about it; indicate your age and details of your education; give the names of three people who would be able to write meaningful recommendations for you; and try to secure action by stating your availability for an interview. You may type or write the letter in your best handwriting.

Business Letter

coldwater high school coldwater florida january 19 1971
mr. richard freni president gilberton company 101 fifth avenue
new york city new york 10003

dear mr freni our class has been studying about various occupations for this past nine weeks several of us are interested in sales occupations and would like to know more about the field we feel sure that you as the successful owner of one of our largest department stores would be able to answer many of our questions will it be possible for you to speak to our class on monday may 15 between the hours of 9:00 and 11:00 am we shall greatly appreciate hearing from you regarding this invitation sincerely yours sandra brown class president.

V. The words and phrases in the left-hand column are significant in connection with a word in the right-hand column. Match them by placing the figure preceding the item in the left-hand column in the brackets at the right of the matching item. Score - 1 point for each correct answer.

1. Automation
2. PBX
3. Clerical
4. Homonyms
5. Switchboard
6. Communication
7. Synonyms
8. Aptitude
9. Mechanic
10. Autobiography

a. Transferring thoughts of information ( )

b. Ability or quickness to learn ( )

c. Words that sound alike but are spelled differently ( )

d. An apparatus fitted with plugs that controls electric currents ( )

e. Information about an individual written by the person himself ( )

f. Abbreviation for private branch exchange ( )

g. A skilled worker who understands the use and construction of machines ( )

h. The operation of machines by other machines rather than by human hands ( )

i. Words that have the same or almost the same meaning ( )

j. Pertaining to a clerk, writer, or copyist ( )

ANSWER KEY TO QUINMESTER POST TEST

Communication Skills

I. 1. Are
2. Doesn't
3. Seen
4. Done
5. Were
6. It's
7. They're
8. Is
9. Saw
10. Was
11. To
12. You're
13. Don't
14. Did
15. Anything
16. Smartest
17. Smoothly
18. Any
19. Came
20. Sitting

II. 1. Actress
2. Artist
3. Banker
4. Beautician
5. Bricklayer
6. Carpenter
7. Cook
8. Dancer
9. Dentist
10. Engraver
11. File clerk
12. Florist
13. Jeweler
14. Mechanic
15. Model
16. Plumber
17. Printer
18. Repairman
19. Salesman
20. Typist

III. 1. I
2. I
3. C
4. C
5. I
6. I
7. I
8. C
9. I
10. I

IV. See Business Letters

V. a. 6
b. 8
c. 4
d. 5
e. 10
f. 2
g. 9
h. 1
i. 7
j. 3

AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

Course Outline

WORK EXPERIENCE PROGRAM - 8769
(Getting Your Money's Worth)

Department 48 - Course 8769.08

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION•1971

DADE COUNTY PUBLIC SCHOOLS
1410 NORTHEAST SECOND AVENUE
MIAMI, FLORIDA 33132

Course Outline

WORK EXPERIENCE PROGRAM - 8769
(Getting Your Money's Worth)

Department 48 - Course 8769.08

the division of

VOCATIONAL, TECHNICAL AND ADULT EDUCATION

Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

Published by the Dade County School Board

Copies of this publication may be obtained through

Textbook Services
2210 S. W. Third Street
Miami, Florida 33135

Course Description

8769	48	8769.08	Getting Your Money's Worth
State Category Number	County Dept. Number	County Course Number	Course Title

This course will provide an opportunity for students to gain practical application in the wise use of money management, and the knowledge of the American economic system.

Indicator of success: Applicants must show a need which might be served by admission to the Work Experience Program.

Clock hours: 45

PREFACE

This third quinmester course outline has been designed basically to provide students, enrolled in the senior high Work Experience Program, the opportunity to receive practical learning experience in exercising sound principles associated with successful money management as they plan the best use of their personal income.

The students enrolled in the program should be in tenth grade, however, a program may include ninth grade students if the school is organized on a ninth through twelfth grade basis. The students should be at least fourteen years of age, and selected in terms of basic individual needs, including over-age in grade or the need to obtain part-time employment in order to remain in school on a full-time basis.

The quinmester is divided into five blocks, and covers a total of forty-five classroom hours. The material covered by the students in this course should enable them to become better informed individuals regarding their role as consumers and contributors to our American economy; enable them to become more competent in handling their finances; develop social maturity as well as the kinds of attitudes and knowledge that will better prepare them for their future adult responsibilities, and make them more productive citizens in our society.

The material contained in this course can be presented in a variety of ways including lectures, role-playing, audio-visual aids, field trips, class-room discussions, and student presentations based on independent study assignments. The bibliography included in this outline lists the reference material that may be used in teaching the course. A post-test is also included as a means of evaluation.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee, and the Vocational Teacher Education Service of the Dade County Public Schools, Division of the Vocational, Technical, and Adult Education, and has been approved by the Dade County Vocational Curriculum Committee.

TABLE OF CONTENTS
with Suggested Hourly Breakdown

Page

BLOCK

I. WHAT MAKES US TICK (10 Hours)

II. INCOME AND SPENDING (10 Hours)

III. CREDIT COSTS MONEY (15 Hours)

IV. BUYING INSURANCE (8 Hours)

V. QUINMESTER EVALUATION (2 Hours)

GOALS

The Work Experience student must be able to demonstrate:

1. An awareness of the characteristics of our economic system and knowledge regarding his role as an investor in our American way of life.
2. The ability to make wise decisions in determining how to manage his personal finances.
3. The importance of knowing the function that credit serves and its implications on individual standards of living.
4. An awareness, and an understanding, of the principle of insurance and the purpose it serves.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - WHAT MAKES US TICK

The student must be able to:

1. State in writing and orally at least ten features of the American economic system.
2. List in writing [illegible] purposes of our economic system.
3. Explain orally and in writing the relationship between the consumer and our economic system.
4. Discuss some of the difficulties of being a wise consumer.

BLOCK II - INCOME AND SPENDING

The student must be able to:

1. Prepare a personal budget.
2. Discuss and list in writing at least ten functions of banks.
3. Describe the five types of financial institutions.
4. Critically analyze at least two forms of advertisements that may affect consumer buying.
5. State orally and in writing the different kinds of contracts, and demonstrate an example of each form.
6. Prepare a written contract containing the five essentials of the legal instrument.

BLOCK III - CREDIT COST MONEY

The student must be able to:

1. State the difference between the major credit plans.
2. List at least four advantages and four disadvantages of using credit.
3. Explain the five types of credit plans used most often by consumers.
4. Calculate interest involved in obtaining credit.

BLOCK IV - BUYING INSURANCE

The student must be able to:

1. Explain orally and in writing the difference between the four types of insurance.
2. Exhibit the ability to use common insurance terms through conversation and in writing.
3. Analyze and list in writing at least five factors related to insurance cost.

Course Outline

WORK EXPERIENCE PROGRAM - 8769
(Getting Your Money's Worth)

Department 48 - Course 8769.08

BLOCK I - WHAT MAKES US TICK

A. Our Economic System
  1. Features
    a. Free Enterprise
    b. Production
    c. Competition
    Specialization
    Employment
    f. Capital
    g. Consumer demand
    h. Business
    i. Industry
    j. Governmental Influence
    k. Distribution
    l. Fluctuation in Business Activity
      (1) Depression
      (2) Inflation
      (3) Prosperity
  2. Purposes
    a. Satisfies needs and wants
    b. Raises standard of living
    c. Creates market for goods
    d. Provides employment
    e. Develops products
    f. Provides tools and equipment
    g. Contributes to governmental cost
    h. Supplies services
    i. Provides income

B. The Role You Play
  1. Working
  2. Purchasing
  3. Crediting
  4. Producing
  5. Saving
  6. Investing
  7. Influencing production
  8. Consuming goods

C. Problems of the Consumer
  1. Complex market
  2. Greater selectivity
  3. Changing pattern of living
  4. Changing economy
  5. Insufficient income
  6. Inadequate buying skills
  7. Method of purchasing
  8. Buying inpulsively
  9. Fraud

D. Factors Influencing Consumer Choice
   1. Values
   2. Customs
   3. Traditions
   4. Fashion
   5. Advertising
   6. Impression

BLOCK II - INCOME AND SPENDING

A. Setting Your Sites
   1. Personal Finances
      a. Establishing goals
         (1) Needs
         (2) Wants
         (3) Income
      b. Planning a budget
         (1) Personal
         (2) Household
   2. Banks Work for You
      a. Classification
         (1) Savings and Loans
         (2) Commercial
         (3) Trust Companies
         (4) Investment
         (5) Federal Reserve
      b. Services Performed
         (1) Checking accounts
         (2) Savings accounts
         (3) Loans
         (4) Advice
         (5) Protection for valuables
         (6) Trust
         (7) Charge accounts
         (8) Managing money and property
         (9) Investments
         (10) Financial statements
         (11) Checks
         (12) Money orders
         (13) Drafts
         (14) Government bonds
         (15) Exchange currency

B. What You See Is Not Always What You Get
   1. Buying Wisely
      a. Budgeting
      b. Planning
      c. Selecting quality
      d. Using time element
      e. Researching
   2. Sources of Information
      a. Labels
      b. Trade Associations
      c. Consumer Testing Organizations

2.
    d. Better Business Bureau
    e. Magazines
    f. Newspapers
    g. Major firms
    h. Specialists
3. Consumer Protective Organizations
    a. Food and Drug Administration
    b. Federal Trade Commission
    c. Department of Agriculture
    d. Post Office Department
    e. Securities and Exchange Commission
    f. Better Business Bureau
    g. Federal National Bureau of Standards
    h. Private firms
        (1) Consumer Research, Incorporated
        (2) Consumers Union of the United States
        (3) Underwriter's Laboratories
4. Contracts
    a. Classification
        (1) Verbal
        (2) Written
        (3) Implied
    b. Elements
        (1) Mutual assent
        (2) Competent parties
        (3) Legal agreement
        (4) Consideration
        (5) Legal form

BLOCK III - CREDIT COSTS MONEY

A. Consumer Credit Plans
    1. Installment
    2. Noninstallment

B. Buying on Credit
    1. Advantages
        a. Convenience
        b. Emergencies
        c. Better service
        d. Personal benefits
        e. Establish credit rating
        f. Lack of sufficient cash
    2. Disadvantages
        a. Being Expensive
        b. Having incentive to overspend
        c. Decreasing income
        d. Increasing cost of merchandise
    3. Credit Plans
        a. Charge accounts
        b. Lay-away
        c. Installment
        d. Service charge
        e. Loans

C. Figuring the Cost of Credit
  1. Interest
  2. Finance charge
  3. Service charge

BLOCK IV - BUYING INSURANCE

A. Purposes
  1. Personal security
  2. Business activity
  3. Economic growth
  4. Educational service

B. Types
  1. Property
    a. Real
    b. Personal
  2. Life
    a. Straight-life
    b. Term
    c. Limited payment life
    d. Endowment
    e. Annuity
    f. Industrial
    g. Group
  3. Liability
    a. Bodity-injury
    b. Property damage
  4. Health
    a. Hospital
    b. Surgical
    c. General medical
    d. Major medical
    e. Loss of income

C. Cost Factors
  1. Risks involved
  2. Age of applicant
  3. Method of purchasing
  4. Firm's operating costs
  5. Earnings received from investments of firm
  6. Benefits provided

BLOCK V - QUIN EVALUATION

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57. How Money Expands and Contracts. 16 mm. 29 min. B/W. Sound Dade County, 1-31230.

58. Inflation. 16 mm. 22 min. B/W. Sound. Dade County, 1-10190.

59. Installment Buying. 16 mm. 10 min. B/W. Sound. Dade County, 1-04054.

60. Introducing Factor Markets. 16 mm. 29 min. B/W. Sound. Dade County, 1-31251.

61. Introducing the Price System. 16 mm. 29 min. B/W. Sound. Dade County, 1-31252.

62. Levels of Business Activity, The: Knowns and Unknowns, Pt. 1 16 mm. 29 min. B/W. Sound. Dade County, 1-31279.

63. Levels of Business Activity, The: Knowns and Unknowns, Pt. 2 16 mm. 29 min. B/W. Sound. Dade County, 1-31280.

64. Money and the "Fed", Pt. 1. 16 mm. 29 min. B/W. Sound. Dade County, 1-31265.

65. Money In The Bank - And Out. 16 mm. 15 min. Color. Sound. Dade County, 1-10185.

66. Money On The Move. 16 mm. 28 min. Color. Sound. Dade County, 1-31173.

67. Money Talks. 16 mm. 11 min. B/W. Sound. Dade County, 1-00397.

68. Most For Your Money, The. 16 mm. 14 min. B/W. Sound. Dade County, 1-10216.

69. Old Age and Family Security. 16 mm. 10 min. B/W. Sound. Dade County, 1-00489.

70. Patterns in Income Distribution. 16 mm. 29 min. B/W. Sound. Dade County, 1-31250.

71. Pay To The Order Of. 16 mm. 12 min. B/W. Sound. Dade County, 1-00404.

72. Percents for Taxes and Loans. 16 mm. 28 min. B/W. Sound. Dade County, 1-30182.

73. Percent In Everyday Life. 16 mm. 10 min. B/W. Sound. Dade County, 1-01465.

74. Personal Financial Planning. 16 mm. 12 min. Color. Sound. Dade County, 1-10217.

75. Story of Money. 16 mm. 16 min. Color. Sound. Dade County, 1-10188.

76. Story of Our Money System. 16 mm. 11 min. Color. Sound. Dade County, 1-00401.

77. Understanding the Dollar. 16 mm. 10 min. B/W. Sound. Dade County, 1-00399.

78. Using Bank Credit. 16 mm. 8 min. B/W. Sound. Dade County, 1-00396.

79. What Is A Contract? 16 mm. 10 min. B/W. Sound. Dade County, 1-00451.

80. What Is Money? 16 mm. 10 min. B/W. Sound. Dade County, 1-00400.

81. What Money Is And Is Not. 16 mm. 29 min. B/W. Sound. Dade County, 1-31232.

82. What We Have. 16 mm. 15 min. B/W. Sound. Dade County, 1-10175.

83. When Output Was Low: The 1930's. 16 mm. 29 min. B/W. Sound. Dade County, 1-31248.

84. When Prices Were High: The 1950's. 16 mm. 29 min. B/W. Sound. Dade County, 1-31249.

85. Wise Use of Credit. 16 mm. 12 min. Color. Sound. Dade County, 1-10199.

86. Work of the Stock Exchange. 16 mm. 15 min. B/W. Sound. Dade County, 1-10194.

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89. Your Thrift Habits. 16 mm. 11 min. B/W. Sound. Dade County, 1-00441.

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91. Economics For Our Times Series. 40 Frames. Color. McGraw-Hill Publishing Company.

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95. The World of Economic Series. 35 Frames. Color McGraw-Hill Publishing Company.

APPENDIX

QUINMESTER EVALUATION

QUIN EVALUATION

I. TRUE-FALSE QUESTIONS

DIRECTIONS: Each of the following statements is either true or false. If the statement is true, draw a circle around the letter T following it; if the statement is false, draw a circle around the F. If a statement is false in part, it is entirely false. Score - 2 points for each correct answer.

1. The purpose of production is to satisfy human wants. T F

2. Most businessmen sell their goods and services on a cash-and-carry plan. T F

3. Our government permits a businessman to operate his business without regulations of any kind. T F

4. A check is a form of receipt for money deposited in a bank. T F

5. Costs that are necessary and difficult to change are called fixed expenses. T F

6. Spending without thought or plan is called impulse buying. T F

7. A system in which the government makes the economic decisions for the people is called a free enterprise system. T F

8. Banks earn most of their money by charging rent on safe-deposit boxes. T F

9. A Federal Reserve bank handle checking accounts for individuals. T F

10. The Federal Deposit Insurance Corporation guarantees deposits in insured banks up to $15,000 for each depositor. T F

11. A person usually has a chance to spend all that he earns. T F

12. As income increases, the amount for all types of spending also increases. T F

13. The consumer can usually expect uniform quality among goods of the same brand name even if the goods are purchased in different stores. T F

14. One way for the consumer to avoid costly buying mistakes is to do more impulse buying. T F

15. Different people place different values on things. T F

II. MATCHING

DIRECTIONS: Read the word or phrase in Column A. Find the definition in Column B that best defines or describes the word or phrase in Column A. Write the alphabet for the definition or phrase on the line in front of the word under Column A. Score - 2 points for each correct identification.

COLUMN A

________ 1. capital

________ 2. standard of living

________ 3. credit

________ 4. specialization

________ 5. consumer

________ 6. Medicare

________ 7. liability insurance

________ 8. prosperity

________ 9. inflation

________ 10. depression

________ 11. free enterprise

________ 12. budget

________ 13. term insurance

________ 14. interest

________ 15. competition

________ 16. endowment

________ 17. goodwill

________ 18. beneficiary

________ 19. contract

________ 20. fraud

COLUMN B

A. The amount paid for the use of money.
B. A slump in business activity.
C. An act of deceiving or misrepresenting.
D. A system in which individuals and businesses make their own economic decisions.
E. Rivalry between two or more businesses
F. Insurance with cash value.
G. A legal agreement
H. A general increase in prices.
I. Insurance with no cash value.
J. A reputation for good business practices built up by a business.
K. A means of obtaining something of value in exchange for a promise to pay at a future date.
L. A way of dividing production so that each worker performs only one job.
M. The way a family or the people of a nation live.
N. A plan that offers hospital and regular medical insurance for people sixty-five or older.
O. A plan for spending and saving.
P. A period when business acitivity is rising.
Q. A person who receives money or property through an insurance policy or a will.
R. Anyone who buys or uses the goods and services of business.
S. Insurance against loss, because of one's responsibility for injury to others or for damage to property.
T. All equipment and man-made facilities used by businesses to produce goods and services.

III. ESSAY

DIRECTIONS: Read each statement below very carefully, and answer each one in the space provided below the statement. You are expected to answer each statement with the required number of responses. Score - 1 point for each correct answer. Total =

1. List ten characteristics of our American economic system.
   a.
   b.
   c.
   d.
   e.
   f.
   g.
   h.
   i.
   j.

2. Explain five purposes of our economic structure.
   a.
   b.
   c.
   d.
   e.
3. Name five ways in which you, as a consumer, influence our economic system.
   a.
   b.
   c.
   d.
   e.

4. List four problems faced by a consumer in determining how to buy goods and services.
   a.
   b.
   c.
   d.

5. Name ten ways in which banks serve.
   a.
   b.
   c.
   d.
   e.
   f.
   g.
   h.
   i.
   j.

6. State four advantages of using credit to purchase goods and services.
   a.
   b.
   c.
   d.

III. ESSAY

7. Name four disadvantages of using credit.
   a.
   b.
   c.
   d.

8. List the five essentials of a contract.
   a.
   b.
   c.
   d.
   e.

9. Name three factors related to insurance cost.
   a.
   b.
   c.

IV. COMPUTATIONS:

4. James Stull, a tenth grade student, estimates that for the current year he will have an income of $460 from part-time jobs and from allowances. Based on the information shown in the pie chart, show how James's total income might be spent during the year.

School lunches.............................. $ ________

Sports .... ________

Dates .... ________

Snacks .... ________

Movies, records .... ________

Clothing .... ________

Savings .... ________

School supplies .... ________

Reading .... ________

Cars, gas................................. ________

Hobbies .... ________

Grooming .... ________

All others .... ________

Total .... $ ________

ANSWER KEY FOR QUIZ EVALUATION

I. TRUE-FALSE

1. T
2. F
3. F
4. F
5. T
6. T
7. F
8. F
9. F
10. T
11. F
12. T
13. T
14. F
15. T
16. F
17. T
18. F
19. T
20. F

II. MATCHING

1. T
2. M
3. K
4. L
5. R
6. N
7. S
8. P
9. H
10. B
11. D
12. O
13. I
14. A
15. E
16. F
17. J
18. Q
19. G
20. C

III. ESSAY (Answers may vary)

1. a. Free enterprise
   b. Production
   c. Competition
   d. Specialization
   e. Employment
   f. Capital
   g. Distribution
   h. Fluctuation in business activity
   i. Governmental influence
   j. Industry

2. a. Satisfying needs and wants
   b. Raises standard of living
   c. Creates a market for goods
   d. Contributes to governmental cost
   e. Provides income

3. a. Saving
   b. Investing
   c. Crediting
   d. Working
   e. Purchasing

4. a. Complex market
   b. Greater selectivity
   c. Inadequate buying skills
   d. Fraud
   e. Changing economy

5. a. Loans
   b. Savings
   c. Checking accounts
   d. Advice
   e. Protection for valuables
   f. Drafts
   g. Exchange currency
   h. Government
   i. Investments
   j. Trust

ANSWER KEY FOR QUIZ EVALUATION

6. a. Convenience
   b. Emergencies
   c. Establish credit rating
   d. Better service

7. a. Expensive
   b. Incentive to overspend
   c. Decreases income
   d. Increases cost of goods

8. a. Mutual assent
   b. Competent parties
   c. Legal agreement
   d. Consideration
   e. Legal form

9. Risks
   Applicant's age
   Benefits provided

IV. COMPUTATIONS:

1. Interest = $15.00
   Total due at maturity is $315.00

2. 18

3. $5.75

4.

School lunches	=	$105.80
Sports	=	50.60
Dates	=	46.00
Snacks	=	41.40
Movies, records	=	41.40
Clothing	=	32.20
Savings	=	32.20
School supplies	=	27.60
Reading	=	23.00
Car, gas	=	18.40
Hobbies	=	13.80
Grooming	=	9.20
All others	=	18.40
Total	=	$460.00

AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

WORK-EXPERIENCE PROGRAM - 8769
(You and Your Occupation)

Department 48 - Course 8769.07

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION•1971

DADE COUNTY PUBLIC SCHOOLS
1410 NORTHEAST SECOND STREET
MIAMI, FLORIDA 33132

Course Outline

WORK-EXPERIENCE PROGRAM - 8769
(You and Your Occupation)

Department 48 - Course 8769.07

the division of
VOCATIONAL, TECHNICAL AND ADULT EDUCATION

5603

Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

Published by the Dade County School Board

Copies of this publication may be obtained through

Textbook Services
2210 S. W. Third Street
Miami, Florida 33135

Course Description

8769	48	8769.07	You and Your Occupation - General Related
State Category	County Dept. Number	County Course Number	Course Title

This course will serve to acquaint students with the various career and occupational opportunities available to them, as well as the requirements necessary for becoming desirable employees.

Indicators of success: Applicants must show a need which might be served by admission to the Work Experience Program.
Clock hours: 45

PREFACE

The course is designed to orient students to the variety of career opportunities available to them on a part-time basis, the duties and responsibilities involved in various occupations, and the qualifications necessary for employment in their selected career.

The students in the program should be in tenth grade; however, those schools organized on the basis of grades nine through twelve would include ninth grade students in the program. The students should be at least fourteen years of age and should be selected in terms of certain cultural deprivations or other basic needs, including over-age in grade, or the need to find part-time employment in order to remain in school on a full time basis.

This second quinmester course is organized in four blocks, and covers a period of forty-five classroom hours. The instruction received by the students should aid them in developing desirable attitudes and opinions regarding occupational opportunities, as well as increase their skills and abilities in making critical analysis and judgements regarding the world of work. Because of their exposure to the material covered in this course, the students should also become more mature thinking individuals as they evaluate themselves realistically and establish goals that will aid them in preparing for future gainful employment, thereby making them more productive citizens of our society. Coverage of the matérial should also aid in ensuring success in students' areas of employment.

The nature of the course offers an excellent opportunity for the teacher-coordinator to employ a variety of techniques in presenting the material. Students can be encouraged to engage in a great deal of independent study in gathering data related to class assignments. The materials may also be presented through lectures, student participation in class discussions, audio-visual aids, demonstrations, and field trips to various business and industrial centers for first-hand observations.

The bibliography included in this outline lists the reference materials that may be utilized in teaching the course. A post-quin test is also included in the appendix to serve as a means of evaluating the students' understanding of the material presented.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee, and the Vocational Teacher Education Service of the Dade County Public Schools, Division of the Vocational, Technical, and Adult Education, and has been approved by the Dade County Vocational Curriculum Committee.

TABLE OF CONTENTS
with Suggested Hourly Breakdown

GOALS

The Senior High Work Experience student must be able to demonstrate:

1. An awareness of the prerequisites needed for entry into the world of work.
2. The ability to investigate occupational possibilities related to interests, capabilities, and expectations.
3. Skill and accuracy in compiling data regarding careers and career goals.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - EMPLOYMENT READINESS

The student must be able to:

1. Evaluate himself in determining occupational goals.
2. Demonstrate an awareness of his abilities and limitations in selecting an occupation.
3. Display evidence of character, personality, and social traits related to job success.
4. Demonstrate skill in communicating ideas orally, and in writing.
5. Perform basic computational problems.

BLOCK II - SURVEYING THE WORLD OF WORK

The student must be able to:

1. Gather data regarding job availability in community.
2. List three occupations for which he could qualify.
3. State orally, and in writing, ten factors that should be considered in selecting an occupation.
4. Discuss five things that an employee can expect from his employer.
5. State orally, and in writing, a plan for making advancements on the job.
6. Demonstrate the proper procedure for leaving a job.

BLOCK III - OCCUPATIONAL AND CAREER INVESTIGATION

The student must be able to:

1. Establish realistic goals based on present needs and career objectives.
2. Demonstrate skill and competency in compiling and communicating information related to occupational choice.
3. Make a comparison of major occupations.
4. Exhibit an understanding of the duties and responsibilities associated with various occupations.
5. Redefine occupational goals, if necessary, in terms of research on occupational outlook.

Course Outline

WORK-EXPERIENCE PROGRAM - 8769
You and Your Occupation

Department 48 - Course 8769.07

I. EMPLOYMENT READINESS

A. Personal Assessment
  1. Interests
  2. Skills
  3. Aptitude
  4. Experience
  5. Attitudes
  6. Hobbies
  7. Health
  8. Education
  9. Needs
  10. Goals
  11. Appearance
  12. Other strengths or weaknesses

B. Factors for Success
  1. Pleasing personality
  2. Positive attitudes
  3. Good grooming habits
  4. Initiative
  5. Honesty
  6. Productivity
  7. Dependability
  8. Self-confidence
  9. Punctuality
  10. Enthusiasm
  11. Ability to get along with others
  12. Efficiency

C. Building Skills for Job Success
  1. Communication
  2. Mathematical

II. SURVEYING THE WORLD OF WORK

A. Job Opportunities in the Community
  1. Location
  2. Work involved
  3. Transportation
  4. Training required
  5. Stability of occupation

B. Job Requirements
  1. Duties and responsibilities
  2. Level of entry

B. Job Requirements (Contd.)
  3. Hours
  4. Education

C. Benefits to Look for
  1. Salary
  2. Fringe
  3. Opportunity for advancement
  4. Job security
  5. Working conditions

D. Standards of the Job
  1. Attire
  2. Release time
  3. Signing in and out
  4. Attendance
  5. Punctuality
  6. Smoking regulations

E. What to Expect from an Employer
  1. Training
  2. Reasonable rate of pay
  3. Safe working conditions
  4. Explanation of duties, policies and regulations
  5. Evaluation of work
  6. Discipline
  7. Consideration
  8. Change of duties
  9. Introduction to other employees
  10. Honesty
  11. Partial payment of Social Security Tax

F. Your Progress on the Job
  1. Initiative
  2. Cooperation
  3. Additional training
  4. Seniority
  5. Productivity
  6. Reliability
  7. Leadership ability
  8. Thoroughness
  9. Improvability
  10. Adaptability
  11. Maturity

G. Terminating the Job
  1. Consult teacher-coordinator
  2. Consult employer
  3. Give ample notice
  4. Self-evaluation

III. OCCUPATIONAL AND CAREER INVESTIGATION

A. Finding Your Job
  1. Immediate needs

   2. Career objectives.

B. Learning About Occupations
   1. Writing a job description
   2. Conducting interviews
   3. Writing for career information
   4. Observing workers on the job
   5. Securing part-time employment

C. Where People Work
   1. Major occupational groups
      a. Professional and Technical
      b. Clerical
      c. Sales
      d. Agriculture
      e. Managers
      f. Craftsmen
      g. Operatives
      h. Service
      i. Laborers
   2. Nature of the occupations
      a. Occupational monographs
      b. Trends
      c. Employment outlook
      d. Educational implications

IV. QUINMESTER POST TEST

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(SHWP - YOU AND YOUR OCCUPATION)

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45. Marijuana. 16 mm. 20 min. Color. Sound. Local Office. Federal Bureau of Narcotics and Dangerous Drugs.

46. Molested. 16 mm. 25 min. B/W. Sound. Dade County, 1-31408.

47. Money Talks. 16 mm. 11 min. B/W. Sound. Dade County, 1-00397.

48. Morning for Jimmy, A. 16 mm. 28 min. B/W. Sound. New York: Association Films, Inc.

49. Narcotics-Pit of Despair. 16 mm. 28 min. Color. Sound. Dade County, 1-31609.

50. No Limit to Learning. 16 mm. 29 min. Color. Sound. New York: College Entrance Examination Board.

51. No Reason To Stay. 16 mm. 28 min. Color. Sound. New Orleans: Canadian Consulate General.

52. Next Year Is Now. 16 mm. 28 min. Color. Sound. New York: John Hancock Life Insurance Company.

53. Opportunities Unlimited. 16 mm. 13 min. B/W. Sound. Dade County, 1-10181.

54. Penny Saved, A. 16 mm. 15 min. Color. Sound. New York: Association Films, Inc.

55. Personal Finance Planning. 16 mm. 15 min. B/W. Sound. New York: Association Films, Inc.

56. Personal Health for Girls. 16 mm. 11 min. B/W. Sound. Dade County, 1-03199.

57. Personal Hygiene for Boys. 16 mm. 11 min. B/W. Sound. Dade County, 1-03197.

58. Personal Qualities for Job Success. 16 mm. 15 min. B/W. Sound. Chicago: Coronet Instructional Films, Inc.

59. Quarter Million Teenagers. 16 mm. 16 min. Color. Sound. Dade County, 1-11376.

60. Responsibility. 16 mm. 15 min. B/W. Sound. New York: McGraw-Hill Book Company.

61. Riddle, The. 16 mm. 20 min. Color. Sound. Local Office. Federal Bureau of Narcotics and Dangerous Drugs.

62. Road Ahead, The. 16 mm. 25 min. B/W. Sound. New York: Association Films, Inc.

63. Rules at School. 16 mm. 13 min. B/W. Sound. Chicago: Coronet Instructional Films.

64. Samuel and Social Security. 16 mm. 15 min. Color. Sound. Local Office. Social Security Administration.

65. Say What You Mean. 16 mm. 20 min. B/W. Sound. Dade County, 1-13332.

66. Secret Service Story. 16 mm. 18 min. Color. Sound. Local Office. Federal Reserve Bank.

67. Seekers, The. 16 mm. 30 min. Color. Sound. Dade County, 1-31719.

68. Stay in School and Graduate. 16 mm. 14 min. Color. Sound. Charleston, S. C. U. S. Navy Department.

69. Story of Distributive Education. 16 mm. 21 min. Color. Sound. New York: Association Films, Inc.

70. This Way Up. 16 mm. 20 min. B/W. Sound. Atlanta: Modern Talking Pictures, Inc.

71. 'Til Debt Do Us Part. 16 mm. 14 min. B/W. Sound. New York: Association Films, Inc.

72. Time of Our Lives, The. 16 mm. 27 min. Color. Sound. New York: Association Films, Inc.

73. Thin Blue Lines. 16 mm. 28 min. B/W. Sound. New York: Association Films, Inc.

74. Where Is Prejudice - Part I. 16 mm. 30 min. B/W. Sound. Dade County, 1-31614.

75. Where Is Prejudice - Part II. 16 mm. 30 min. B/W. Sound. Dade County, 1-31619.

76. When I'm Old Enough-Goodbye. 16 mm. 28 min. B/W. Sound. Dade County, 1-30086.

77. Who Will Come to My Party. 16 mm. 18 min. Color. Sound. Atlanta: Modern Talking Pictures, Inc.

78. Why Budget? 16 mm. 15 min. B/W. Sound. New York: McGraw-Hill Book Company.

79. Your Cleanliness. 16 mm. 10 min. B/W. Sound. Dade County, 1-03503.

80. Your Earning Power. 16 mm. 11 min. B/W. Sound. Dade County, 1-00582.

81. Your Income Tax. 16 mm. 20 min. Color. Sound. Washington, D. C.: U. S. Treasury Department.

82. Your Social Security. 16 mm. 15 min. B/W. Sound. Albany, N. Y.: New York State Department of Education.

83. Your Teeth. 16 mm. 10 min. B/W. Sound. Dade County, 1-03503.

84. You and Your Money. 16 mm. 15 min. B/W. Sound. Local Office. Federal Reserve Bank.

Filmstrips:

1. Applying for a Job. Chicago: Society for Visual Education.

2. Applying for a Job. New York: McGraw-Hill Book Company.

3. Belonging to a Crowd. Chicago: Society for Visual Education.

4. Choosing Your Career. Pleasantville, New York: Guidance Associates.

5. Developing Social Maturity. New York: McGraw-Hill Book Company.

6. Dropout, The. Pleasantville, New York: Guidance Associates.

7. Fundamentals of Thinking. New York: McGraw-Hill Book Company.

8. Finding the Right Job for You. New York: McGraw-Hill Book Company.

9. First Year in High School. Pleasantville, New York: Guidance Associates.

10. Getting Along with Others. New York: McGraw-Hill Book Company.

11. Going Steady. New York: McGraw-Hill Book Company.

12. How To Make a Career Decision. New York: The New York Times, Filmstrip of the Month.

13. Job Interview, The. Jamaica, New York: Eye-Gate House Inc.

14. Let's Look at Careers. New York: The New York Times, Filmstrip of the Month.

15. Occupational Education Series. Jamaica, New York: Eye-Gate House Inc.

16. Road to Nowhere. Pleasantville, New York: Guidance Associates.

17. Smoking Problem, The. Chicago: Society for Visual Education, Inc.

18. Speaking and Writing. Jamaica, New York: Eye-Gate House Inc.

19. What You Should Know Before You Go to Work. Pleasantville, New York: Guidance Associates.

20. World of Work Series. Pleasantville, New York: Guidance Associates.

21. Your Job Interview. New York: Reader's Digest Inc., Funk & Wagnalls Company.

Standardized Tests:

1. Picture Inventory Test, California Test Bureau,
   Division of McGraw-Hill Book Company
   Del Monte Research Park, Montery, California

2. Ohio Vocational Interest Survey
   Harcourt, Brace and World Inc.
   757 Third Avenue, New York, N. Y.

SOURCES OF MATERIALS

1. American Cancer Society, Inc.
219 East 42nd Street
New York, N. Y. 10017

2. Association Films, Inc.
347 Madison Avenue
New York, N. Y. 10017

3. College Entrance Examination Board
College Board Film Library
267 West 25th Street
New York, N. Y. 10001

4. Coronet Instructional Films
65 East South Water Street
Chicago, Illinois 60601

5. Educational Testing Service
Princeton
New Jersey 08540

6. Eye-Gate House, Inc.
146-01 Archer Avenue
Jamaica, New York 11435

7. Filmstrip of the Month
The New York Times
Office of Educational Activities
Times Square
New York, N. Y. 10036

8. Florida Industrial Commission
Tallahassee
Florida

9. Follett Publishing Company
201 North Wells Street
Chicago, Illinois 60606

10. Funk and Wagnalls Company
Division of Reader's Digest Books
380 Madison Avenue
New York, N. Y. 10017

11. Guidance Associates
Harcourt, Brace and World, Inc.
Pleasantville, N. Y. 10570

12. Jam Handy Corporation
2821 East Grand Boulevard
Detroit, Michigan 48211

13. John Hancock Life Insurance Company
Public Relations Department
200 Berkley Street
Boston, Mass. 02117

14. Harcourt, Brace and World, Inc.
757 Third Avenue
New York, N. Y. 10017

15. McGraw-Hill Book Company
Text-Film Division
330 West 42nd Street
New York, N. Y. 10022

16. McKay, David, Company, Inc.
750 Third Avenue
New York, N. Y. 10017

17. McKnight and McKnight Publishing Company
Towanda Avenue and Route 66
Bloomington, Illinois 61701

18. Modern Talking Picture Service, Inc.
714 Spring Street, N.W.
Atlanta, Georgia 30308

19. New York Department of Education
Albany
New York 12210

20. New York Life Insurance Company
51 Madison Avenue
New York, N. Y. 10010

21. Prentice-Hall, Inc.
70 Fifth Avenue
New York, N. Y. 10011

22. Science Research Associates
259 East Erie Street
Chicago, Illinois

23. Scott, Foresman and Company
3145 Piedmont Road, N.E.
Atlanta, Georgia

24. Simon and Schuster
630 Fifth Avenue
New York, N. Y.

25. Society for Visual Education, Inc.
1345 Diversey Parkway
Chicago, Illinois 60614

26. South-Western Publishing Company
5101 Madison Road
Cincinnati, Ohio 45227

27. Sterling Publishing Company, Inc.
419 Park Avenue South
New York, N. Y. 10016

28. U. S. Employment Service
Division of U. S. Department of Labor
Washington 25, D. C.

29. U. S. Government Printing Office
Washington, D. C.

30. University of Illinois Press
Urbana
Illinois 61803

APPENDIX

QUINMESTER POST TEST SAMPLES

QUINMESTER POST TEST

True-False Test Items

Each of the following statements is either true or false. If the statement is true, draw a circle around the letter T following it; if the statement is false, draw a circle around the F. If a statement is false, in part, it is entirely false. Score - 2 points for each correct answer.

---

1. Personality is the sum total of every quality you have. T F
2. The largest increases in employment are taking place in the occupations that require the least education and training. T F
3. Going to college is the only way to continue one's education. T F
4. The most important factor in job success is attitude. T F
5. A person who works for another is called an employer. T F
6. A skilled employee who has responsibility for scheduling the work of others is known as a supervisor. T F
7. People generally do best those things that they enjoy doing. T F
8. In most occupations today, being able to communicate is a key requirement. T F
9. High school graduates on the average earn about the same as college graduates. T F
10. The best way to decide on the occupation you prefer is to have the coordinator select what is best for you. T F
11. The impression that one makes upon others is based largely on appearance, voice, and behavior. T F
12. Special interests and abilities cannot be revealed by aptitude tests. T F
13. An aptitude is your natural ability to do something. T F
14. A skill is an accomplishment. T F
15. Ads in the Help Wanted section of a newspaper never have any abbreviations in them. T F

16. Automation has changed many jobs, eliminated others, and created many new occupations. T F

17. The ability to get things done without being urged by others is called initiative. T F

18. At the beginning of the century, more than one-half of all the jobs were in the laboring area. T F

19. Sick pay is a fringe benefit. T F

20. Strength is the main factor in most unskilled occupations. T F

QUINMESTER POST TEST

Completion

You are to fill in the blank or blanks with the word or words that make the statement correct. Score - 1 point for each correct answer.

---

1. The nine major occupational groups are ____________________,
____________________, ____________________, ____________________,
____________________, ____________________, ____________________,
____________________, and ____________________.

2. A brief description of an individual's education, experience, and other information--used in seeking employment is called a
____.

3. Working with others in a cooperative manner is known as
____.

4. A fund that your employer pays a portion of is called
____.

5. A detailed study of an occupation is known as a ______________
____.

6. A major type of occupation found in Miami is that of ____________
____.

7. Ten factors that should be considered in selecting an occupation
are ______________, ____________________, ______________,
______________, ____________________, ______________,
______________, ____________________, ______________,
and ____________________.

QUINMESTER POST TEST

Essay

Read each statement below very carefully, and answer each one in the space provided below the statement. You are expected to answer each statement in its entirety in order to receive credit. Score - 2 points for each complete answer.

---

1. List five things that an employee can expect from his employer.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

2. List in order of your choice the occupation at which you hope to be working ten years from now.

a. ____________________

b. ____________________

c. ____________________

3. State three occupations in which you now feel qualified.

a. ____________________

b. ____________________

c. ____________________

4. State three qualities of your personality you think are best.

a. ____________________

b. ____________________

c. ____________________

5. What are three qualities of your personality you think are the worst?

a. ____________________

b. ____________________

c. ____________________

Essay (Contd.)

6. List three ways by which you plan to improve yourself to become better qualified to reach your goals listed in Question 1.

   a. ____________________

   b. ____________________

   c. ____________________

7. Based on the information that you have gathered regarding your choice of occupation in which you are currently most interested, complete the form below by supplying the necessary information.

   Title of my occupation ____________________

   Nature of the job:

   Duties to be performed:

   Related duties:

   Qualifications:

   Method of entry:

   Earnings:

   Working conditions:

   Opportunity for advancement:

   Fringe benefits:

   Advantages and disadvantages:

   Outlook for this occupation:

QUINMESTER POST TEST

The chart below is to be used in answering the questions regarding employment opportunities in the '70s. In Column I are seven incomplete statements relating to the chart. Complete each of the statements by writing in Column 3 the letter of the appropriate choice in Column 2.

HOW EMPLOYMENT OPPORTUNITIES LOOKED IN 1970

OCCUPATIONAL GROUP	AVERAGE YEARS OF SCHOOL COMPLETED - 1959	PERCENT CHANGE IN EMPLOYMENT 1960-1970 -20 -10 0 10 20 30 40 50
Professional and Technical	(16.2 yrs.)	
Proprietors and Managers	(12.4 yrs.)	
Clerical and Sales Workers	(12.5 yrs.)	
Skilled Workers	(11.0 yrs.)	
Service Workers	(9.9 yrs.)	
Semi-skilled Workers	(9.7 yrs.)	
Unskilled Workers	(8.6 yrs.)	No change
Farmers and Farm Workers	(8.6 yrs.)	

Source: U. S. Dept. of Labor, Manpower: Challenge of the 1960;s

COLUMN I	COLUMN 2	COLUMN 3
1. The number of unskilled workers is expected to	a. increase b. decrease c. show no change	
2. The number of professional and technical workers is expected to increase by about	a. 10% b. 20% c. 30% d. 40%	

QUINMESTER POST TEST (Cont.)

COLUMN 1	COLUMN 2	COLUMN 3
3. The group of clerical and sales workers will increase by about...	a. 5% b. 5% c. 30% d. 50%	
4. The number of skilled workers will increase (?) than the number of semi-skilled workers.	a. more b. less	
5. The worker group that will show an actual decrease in the number employed is......	a. service workers b. unskilled workers c. managers d. farmers and farm workers	
6. On the average, the group that completes the most years of school is	a. professional and technical workers b. proprietors and managers c. clerical and sales workers d. service workers	
7. Proprietors and managers have (?) years of schooling on the average than clerical and sales workers	a. more b. fewer	

QUINMESTER POST TEST

Computations

Solve each problem below. 100% accuracy is expected. Score 10 points for each correct answer. Show all calculations on your test paper.

---

(1)
Add:
\$1.29
2.36
7.88
3.63
4.27
\+ .60

(2)
Subtract:
\$13.47
\- 3.48

(3)
Multiply:
5,280
x 487

(4)
Multiply:
\$139.50
x 20

(5)
Divide:
$6 \overline{)\ \$1.38}$

(6)
Divide:
$144 \overline{)\ 1{,}285{,}776}$

(7)
Add:
$3\frac{11}{16}$
$1\frac{5}{32}$
$+\ 2\frac{3}{4}$

8. Find 4% of \$20.00. ____________________

9. Find the cost of $\frac{1}{4}$ pound of butter, if a pound cost \$ .75. ________

10. Homer Greene will work for 50 years. Each year he will earn \$6,000. Find his lifetime earnings. ______________________.

QUINMESTER POST TEST

Matching

Listed below are some types of occupations. Place the major occupational group titles in the blank spaces, and under each heading correctly list the job that would be classified under that occupational group.

JOBS

ACTOR BARBER SERVANT LONGSHOREMAN FARMER
SALES CLERK ELECTRICIAN TEACHER COOK CASHIER POSTMASTER
PARKING LOT ATTENDANT NURSE TELEPHONE OPERATOR WAITRESS

MAJOR OCCUPATIONAL GROUPS

GROUP: ____________________ (JOBS)

GROUP: ____________________ (JOBS)

GROUP: ____________________ (JOBS)

GROUP: ____________________ (JOBS)

GROUP: ____________________ (JOBS)

GROUP: ____________________ (JOBS)

GROUP: ____________________ (JOBS)

GROUP: ____________________ (JOBS)

GROUP: ____________________ (JOBS)

KEY TO QUINMESTER POST TEST
Work-Experience Program

TRUE OR FALSE

1. True
2. False
3. False
4. True
5. False
6. True
7. True
8. True
9. False
10. False
11. True
12. False
13. True
14. True
15. False
16. True
17. True
18. False
19. True
20. True

COMPLETION

1. a. Professional, technical and managerial
   b. Clerical and sales
   c. Service
   d. Farming, fishery, forestry
   e. Processing
   f. Machine trades
   g. Bench work
   h. Structural
   i. Miscellaneous
2. Personal data sheet
3. Human relations
4. Social Security or Social Security Tax

5. Job description (or occupational monograph, or job analysis, etc.)

6. (Answers will vary)

7. (Answers will vary) Location, salary, transportation involved, working conditions, training required, stability of job, responsibilities, hours, fringe benefits, and advancement opportunities.

8. Goals

ESSAY

1. (Answers will vary) Training, evaluation, reasonable rate of pay, partial payment of Social Security Tax, safe working conditions.

2. (Answers will vary)

3. (Answers will vary)

4. (Answers will vary)

5. (Answers will vary)

6. (Answers will vary)

TEST 4

(Answers will vary due to individual research on occupation)

TEST 5

1. show no change

2. 40%

3. 30%

4. less

5. farmers and farm workers

6. professional and technical workers

7. less

KEY TO QUINMESTER POST TEST (Contd.)

1. $20.00
2. $9.99
3. 2,571,360
4. $2,791.80
5. $.23
6. 8922 1/8
7. 7 19/32
8. $.80
9. $ .18 3/4 or $ .19
10. $300,000

MATCHING

1. Professional and Technical: actor, teacher, nurse
2. Clerical: cashier, telephone operator
3. Sales: salesclerk
4. Agriculture: farmer
5. Managers: postmaster
6. Craftsmen: electrician
7. Operatives: parking lot attendant
8. Service: barber, servant, waitress, cook
9. Laborers: longshoreman

AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

Course Outline
WORK-EXPERIENCE PROGRAM - 8769
[A Career Choice for the individual Student]
Department 48 - Course 8769.05

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION•1971

DADE COUNTY PUBLIC SCHOOLS
1410 NORTHEAST SECOND AVENUE
MIAMI, FLORIDA 33132

Course Outline

WORK-EXPERIENCE PROGRAM - 8769
(A Career Choice for the Individual Student)

Department 48 - Course 8769.05

the division of

VOCATIONAL, TECHNICAL AND ADULT EDUCATION

5639

Dr. E.L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

Published by the Dade County School Board

Copies of this publication may be obtained through

Textbook Services
2210 S.W. Third Street
Miami, Florida 33135

Price: $.75

Course Description

8769	48	8769.05	A Career Choice for the Individual Student
State Category Number	County Dept. Number	County Course Number	Course Title

This is the last of five Quinmester Courses of Study for the Junior High School Work-Experience Program. It is designed to involve the greatest number of students who, because of varied circumstances, are required to work, and gain some knowledge pertaining to the World of Work during this summer program. Quinmester V is based on two, four-week cycles, plus one week for student selection and evaluation offering the basic concepts of job opportunities, interview procedures, laws and attitudes in relation to the accepted employment practices.

PREFACE

The offering of this quinmester is made on an optional basis. A student must be at least 14 years of age and show a definite need for the Work-Experience Program. The one standard of admission which can provide some flexibility for this quinmester is that a student who might or might not be an anticipated full time Work-Experience student can be offered the benefits of this summer session.

The limitation of numbers of students to be aided by a single teacher-coordinator can be increased from the State recommended 15 students, to a maximum of 25.

It would be considered useful to the students and the Work-Experience Program if exposure to the vocational concepts could be made to as many students as possible. This could be accomplished by offering four blocks of material for two four-week cycles to a maximum of 25 students per cycle. The fifth week of this quinmester is to be used by the teacher-coordinator in the evaluation and selection of those students to be involved in the program during the second session.

A superficial view of job opportunities, interview procedures, laws relating to employment and general business responsibilities and attitudes will be offered during each four-week cycle.

It is further recommended, and in certain cases required, that the Work-Experience students during this quin will elect to take one of the many high school vocational offerings. This decision will be made on the basis of need for exposure to, or desire to be involved in, a possible job opportunity which requires this additional vocational training.

The selection of all students in the Work-Experience Program is ultimately made by the teacher-coordinator after personal evaluation and parental authorization.

The use of lecture, audio-visual aids, texts and resource personnel are some of the methods to be used in meeting the needs of the Work-Experience student during Quin V.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee, and the Vocational Teacher Education Service, and has been approved by the Dade County Vocational Curriculum Committee.

TABLE OF CONTENTS
with Suggested Hourly Breakdown

GOALS

Upon completion of this program, the Work-Experience student should be able to demonstrate:

1. Knowledge of the procedures involved in securing employment.
2. The generally accepted procedures in preparing for a job interview.
3. The need for good health habits and grooming as preparation for employment.
4. An awareness of the federal, state, and local laws that pertain to student employment.
5. The duties, responsibilities, and qualifications needed for selected occupations.
6. The necessary attributes required for good employer-employee relationships, as well as employee-employee relationships.
7. An awareness of the attributes and general job talents needed for advancement in a chosen field.
8. The need for maintaining harmonious relationships and better understanding for one's self and others.
9. The necessity and importance of wise money management.
10. The need and advantages of additional vocational skills and training for employment and future job success.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - INTRODUCTION TO THE WORK-EXPERIENCE PROGRAM

The student must be able to:

1. State orally the objectives of the course.
2. Demonstrate an understanding of why the program exists.
3. Explain the meaning of cooperative education.
4. Discuss the advantages and disadvantages of the Work-Experience Program.
5. Demonstrate the ability to complete and have an understanding of the Cooperative Student Application Form.
6. Explain the rules set forth on the Student Cooperative Agreement Form.
7. Determine and state orally the parental obligation and involvement in the program.
8. Exhibit the ability to differentiate between listening and hearing.
9. Attend his classes regularly and punctually.
10. Perform assigned tasks, both oral and written.
11. Exhibit and explain the need for a Social Security card.
12. Explain how to obtain a Social Security card for the first time or if it is lost.

BLOCK II - PREPARING FOR EMPLOYMENT

The student must be able to:

1. Explain the various methods used in seeking employment.
2. Demonstrate the ability to complete different types of job application forms.
3. Discuss the general rules of grooming which would aid in attaining and maintaining employment.
4. Prepare and be involved in several mock employment interviews.
5. Write about his future employment aspirations.
6. Explain what additional training might be needed to attain these aspirations.
7. Perform a prepared talk on a subject of his own choice before the class.
8. Speak extemporaneously on a teacher chosen subject pertaining to the world of work.

BLOCK III - LABOR LAWS AND YOU

The student must be able to:

1. Exhibit the ability to obey all laws.
2. Demonstrate the ability to understand and fill in the Florida Industrial Commission Form AT-22-A. (Application for work permit)
3. Explain the reasons why the Child Labor Laws exist.

4. Demonstrate an understanding of the reasons a minor is required to obtain working papers when employed.
5. Discuss the different types of work permits.
6. Explain the requirements needed to obtain individual work permits.
7. Explain and show an understanding of the differences between the Federal and State Child Labor Laws.
8. List those jobs which are considered hazardous, and therefore unacceptable for student employment.
9. Demonstrate an understanding of the various health laws which pertain to food service and handling.
10. Explain how to obtain a Health Card.
11. Discuss where and with whom additional Labor Law information might be obtained.
12. Explain the need for the Cooperative Student Identification Card.
13. Indicate an understanding of the Social Security Law.
14. Explain the meaning of Income Tax.
15. Demonstrate an understanding of what the Payroll Deduction Plan is.

BLOCK IV - ATTITUDE, RESPONSIBILITY, AND YOU

The student must be able to:

1. Exhibit the ability to be punctual to school and on the job.
2. List his individual goals and values.
3. Demonstrate the ability to live up to and possibly attain these goals.
4. Exhibit good emotional control and classroom behavior.
5. Explain the need for advising the coordinator and employer of an anticipated absence.
6. Explain why it is necessary to maintain good relationships with the employer, fellow employees, customers, and the coordinator.
7. Discuss the need to abstain from gossiping.
8. Explain the need for continued awareness about personal hygiene.
9. Demonstrate an understanding of wise money management.
10. Explain why additional vocational skills lead to better jobs and job success.

BLOCK V - TEACHER-COORDINATORS STUDENT SELECTION

During this one week period, the teacher-coordinator is to seek, interview and register those students who will be involved in the second phase of Quin V. The material covered in BLOCKS I through IV will again be offered to meet the needs of the new Work-Experience students.

BLOCK VI - POST TEST OR EVALUATION

Course Outline

WORK-EXPERIENCE PROGRAM
(A Career Choice for the Individual Student)

Department 48 - Course 8769.05

I. INTRODUCTION TO THE WORK-EXPERIENCE PROGRAM

A. Objectives of the Course
  1. Individual:
    a. School
    b. Job
    c. Maturation
  2. Employment:
    a. Initial employment
    b. Job experiences
  3. Parental:
    a. Acceptance of maturity
    b. Vocational concepts
  4. Vocational:
    a. Awareness of opportunities
    b. Areas available
  5. Academic:
    a. College bound
    b. Non-college bound

B. Cooperative Education
  1. Understanding of concepts
  2. Need for program
  3. Anticipated growth

C. Required Forms
  1. Cooperative student application
  2. Cooperative student agreement

D. Student Responsibility
  1. School:
    a. Regularity
    b. Punctuality
  2. Job:
    a. Regularity
    b. Punctuality
  3. Self
  4. Home
  5. Community

E. Student Awareness
  1. Oral instruction
  2. Written instruction

II. PREPARING FOR EMPLOYMENT

A. Seeking Employment
  1. Newspaper want ads:
    a. County
    b. Local
  2. Radio
  3. Employment agency
  4. Friends
  5. Relatives
  6. School:
    a. Guidance Department
    b. Work-Coordinator
  7. State Employment Agency
  8. Telephone
  9. Random sampling
  10. Store front signs

B. Application Forms
  1. Standard form
  2. Resume

C. Grooming and Attire
  1. General appearance:
    a. Personal
    b. Clothing
  2. Type of job:
    a. White collar
    b. Blue collar

D. Preparation for the Interview
  1. Personal data sheet:
    a. Qualifications
    b. References
    c. Social Security card
    d. Proof of age
    e. Letters of recommendation
  2. Grooming checklist:
    a. Personal
    b. Clothing

E. Arranging for the Interview
  1. Procedures used:
    a. Letter
    b. Phone
    c. In person
    d. Appointment made by others
  2. Process to be used:
    a. Typewritten
    b. Printed
    c. Speech
    d. Promptness

F. The Interview
  1. Rules to follow:

II. PREPARING FOR EMPLOYMENT (Contd.)

        a. Time
        b. Place
        c. Approach
        d. Speech
        e. Eye contact
        f. Courtesy
        g. Posture:
            (1) Sitting
            (2) Standing
        h. Employment tests
        i. Closing of interview
    2. Other personnel:
        a. Secretary
        b. Receptionist

G. Post Interview
    1. Techniques of job acceptance
    2. Techniques of job rejection
    3. Employer rejection:
        a. Self-evaluation
        b. Employer evaluation
        c. Peer evaluation

H. Individual Employment Aspirations
    1. Type of job:
        a. Technical
        b. Non-technical
        c. Training needed
        d. Experience needed
    2. Reason for choice:
        a. Self
        b. Parent
        c. Family
        d. Guidance Department
        e. Work-Coordinator
        f. Friend

III. LABOR LAWS AND YOU

A. Obedience of All Laws
    1. Federal
    2. State
    3. Local
    4. Child Labor:
        a. Under 16 years of age
        b. Over 16 years of age

B. Employment Forms
    1. Florida Industrial Commission Form AT-22-A:
        a. Student
        b. Employer

III. LABOR LAWS AND YOU (Contd.)

2. Work Permits:
    a. Yellow (over 16 years):
        (1) Student
        (2) Employer
    b. Pink (under 16 years):
        (1) Student
        (2) Employer
        (3) Parent
3. Methods of obtaining forms:
    a. Work-Coordinator
    b. Lindsey Ho[illegible] Building
    c. Florida Employment Office

C. Unacceptable Employment
1. Hazardous:
    a. Federal Bulletin 101
    b. Florida State Bulletin (Labor Laws in a Nutshell)
2. Age limitations

D. Food Service and Handling
1. Health Card
    a. Jobs requiring card
    b. Where to obtain card
    c. How to obtain card
2. Reasons for obtaining Health Card:
    a. Federal laws
    b. State laws
    c. Local laws

E. Social Security
1. Where to obtain card:
    a. New
    b. Replacement of lost card
2. Social Security benefits:
    a. Monthly income
    b. Medical care and service

F. Payroll Deductions
1. Federal Income Tax:
    a. Reason for
    b. Number of dependents
    c. Filing of 1040 form
    d. Additional payment
    e. Overpayment
2. Savings Plans:
    a. Individual
    b. Company involvement

G. Student Identification Card
1. Need for personal identification:
    a. Police
    b. Check cashing
    c. Personal pride

III. LABOR LAWS AND YOU (Contd.)

2. Suggested use in Cooperative Program

IV. ATTITUDE, RESPONSIBILITY, AND YOU

A. Need for Punctuality
    1. School
    2. Job

B. Individual Goals and Values
    1. How choice of goals is made:
        a. Vocational research
        b. Exposure to varied occupations
        c. Recommendations
        d. Parental influence
        e. Peer influence
        f. Teacher influence
        g. Family influence
    2. Methods of attaining goals:
        a. High school education
        b. College education
        c. Vocational training
        d. Specialty schools
        e. Family business
    3. Setting and accepting a value system:
        a. Generally accepted values:
            (1) School
            (2) Community
            (3) Peer
            (4) Family
            (5) Religious
        b. Individual values:
            (1) Need to conform
            (2) Need not to conform
            (3) Limitations

C. Need for Good Relationships
    1. Job:
        a. Employer-employee
        b. Employee-employee
        c. Customer-employee
    2. School:
        a. Student-teacher
        b. Student-student
        c. Extra curricular activities

D. Personal Health Habits
    1. Individual daily checklist:
        a. Hair
        b. Teeth
        c. Deodorant
        d. Clean shaven
        e. Clothing

- 2. Physical hygiene:
  - a. Opposite sex
  - b. Venereal disease
  - c. Skin blemishes

E. Budgeting
- 1. Saving your money:
  - a. Payroll deduction
  - b. Individual banking:
    - (1) Saving
    - (2) Checking
  - c. Rate of interest
- 2. List expenses:
  - a. Standard
  - b. Anticipated
  - c. Possible emergencies

F. What the Future Holds in Store
- 1. Specialty trades (apprenticeship required):
  - a. Carpentry
  - b. Electrician
  - c. Plumbing
- 2. Specialist (additional training required):
  - a. Computer Programing
  - b. X-Ray Technician
  - c. Other medical fields
- 3. Is college a must:
  - a. Opportunities available without a degree
  - b. Opportunities available with a degree
  - c. Decision--attend or not attend

V. TEACHER-COORDINATORS STUDENT SELECTION

VI. POST TEST OR EVALUATION

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5662

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200 Berkley Street
Boston, Mass. 02117

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757 Third Avenue
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New York 12210

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New York, N. Y. 10011

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259 East Erie Street
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419 Park Avenue South
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Washington 25, D. C.

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Illinois 61803

APPENDIX

QUINMESTER EVALUATION

QUINMESTER EVALUATION

Junior High School Work-Experience Program

Since this quin is to consist of two cycles of four weeks, plus one week evaluation, credit may or may not be given at the discretion of the individual school principal.

This grade is to be given by the teacher-coordinator on the basis of teacher observation and student participation.

AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

Course Outline
WORK EXPERIENCE - 8769
(Employer - Employee Relationships)
Department 48 - Course 8769.03

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION•1971

5667

DADE COUNTY PUBLIC SCHOOL
1410 NORTHEAST SECOND AVENUE
MIAMI, FLORIDA 33132

Course Outline

WORK EXPERIENCE - 8769
(Employer - Employee Relationships)

Department 48 - Course 8769.03

the division of
VOCATIONAL, TECHNICAL AND ADULT EDUCATION

Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

Published by the Dade County School Board

Copies of this publication may be obtained through

Textbook Services
2210 S. W. Third Street
Miami, Florida 33135

Course Description

8769	48	8769.03	Employer-Employee Relationships
State Category Number	County Dept. Number	County Course Number	Course Title

This quinmester course of study is designed to expose the work experience student to the need for improvement in the area of personality development, human relations and generally accepted rules of conduct on the job. These concepts will be discussed in the classroom and practiced by the students in their employment situations.
Clock hours: 45

PREFACE

We have pushed, we have pulled, we have prodded, and certainly by this time we have placed.

The placing of a student on the job is only the first of many steps which can lead to an interesting, productive and enjoyable working experience. For many, this will be the first exposure to the world of work. This initial exposure can be a traumatic experience if the foundations have not been laid well and if the coordinator, student, employer and parent do not work as a functioning unit.

During this third quinmester, those most important attributes in human relations, personal development and generally accepted rules of behavior on the job will be discussed, shown visually, explained by invited speakers, and seen on various visitations. The exposure to these varied methods should aid the student in his process of becoming a successful employee.

After a period of self evaluation, the student will be more aware of what method is best for him as an individual. This process of self evaluation and selection is a very important step in his maturation and development. The need to conform in some job experiences will be covered in [illegible] depth.

This third quinmester, consisting of four blocks of instruction will be covered during a nine week period of time in forty-five class periods.

Quinmester three could possibly be the most important to the student because the theory of the classroom will be put to the test on the job. The needs of the student might vary greatly at this point more so than at any other point. It is, therefore, imperative that the coordinator work very closely with all those involved in his learning situations to meet these individual needs.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee, and the Vocational Teacher Education Service, and has been approved by the Dade County Vocational Curriculum Committee.

TABLE OF CONTENTS
with Suggested Hourly Breakdown

BLOCK

I. PERSONALITY DEVELOPMENT (15 hours)

II. CONDUCT ON THE JOB (15 hours)

III. HUMAN RELATIONS (13 hours)

IV. QUINMESTER POST TEST (2 hours)

GOALS

Upon completion of this program, the Work-Experience student should be able to demonstrate:

1. Knowledge of the procedures involved in securing employment.
2. The generally accepted procedures in preparing for a job interview.
3. The need for good health habits and grooming as preparation and maintainance of employment.
4. An awareness of the Federal, State and Local laws that pertain to student employment.
5. The duties, responsibilities and qualifications needed for selected occupations.
6. The necessary attributes required for good employer-employee and employee-employee relationships.
7. An awareness of the general talents needed for advancement within a chosen field.
8. The need to maintain harmonious relationships and better understanding of one's self image.
9. The necessity and importance of wise money management.
10. The need and advantages of additional vocational skills and training for employment and future job success

SPECIFIC BLOCK OBJECTIVES

BLOCK I - PERSONALITY DEVELOPMENT

The student must be able to:

1. List the personal attributes, which would be considered positive as an employee.
2. List the personal attributes, which would be considered negative.
3. Explain those positive attributes which would lead towards success on the job, in school and in society.
4. Explain the necessity to conform in some job experiences.
5. Discuss those areas in which non-conformity might be practiced.
6. Exhibit the ability to "sell himself" and discuss the reasons why this is important.
7. Explain why it is important to develop the ability to speak in front of a group.
8. Exhibit the ability to speak in front of a group.
9. Demonstrate through written and oral material, the importance of improving penmanship and diction.

BLOCK II - CONDUCT ON THE JOB

The student must be able to:

1. List at least eight obligations an employee has to his employer.
2. Discuss five reasons for these obligations.
3. Explain a problem which might exist on his job, and through group discussion, attempt to find solutions to these varied problems.
4. List the rules and regulations set up by the individual employers.

5. Explain how changes might be made if these rules are found to be inequitable.

6. Demonstrate the ability, through word and deed, to abide by the rules of good personal hygiene.

7. Exhibit the ability to follow the basic rules of respect for himself, peers, employer, coordinator, parents and community.

8. Demonstrate, through role playing, situations involving employer-employee relationships.

BLOCK III - HUMAN RELATIONS

The student must be able to:

1. List the desirable attitudes a person should exhibit with his employer and fellow employees.

2. Demonstrate the ability to offer and accept corrective criticism.

3. Exhibit the ability to respect the views of others.

4. List those human traits that might aid in job success and promotion.

5. Discuss the reasons why it is improper to gossip and lie.

6. Exhibit the ability to follow the rules set up by the majority, even though his vote might have been overruled.

7. Demonstrate the ability to strive for success in a given task, even after repeated failures.

8. Explain why an employee's attitude is a reflection on the company he represents.

9. Demonstrate the ability to accept the views of others

Course Outline

WORK EXPERIENCE - 8769
(Employer - Employee Relati

Department 48 - Cours

I. PERSONALITY DEVELOPMENT

A. Positive Personality Traits
- 1. To self:
  - a. Ambitious
  - b. Cooperative
  - c. Courteous
  - d. Dependable
  - e. Enthusiastic
  - f. Honest
  - g. Sense of humor
- 2. To employer:
  - a. Punctual
  - b. Loyal
  - c. Cleanliness
  - d. Initiative
  - e. Cooperative
  - f. Dependable
  - g. Industrious
- 3. To employees:
  - a. Honest
  - b. Sense of humor
  - c. Cooperative
  - d. Loyal
  - e. Tactful

B. Negative Personality Traits
- 1. To self:
  - a. Dishonesty
  - b. Inability to accept criticism
  - c. Poor hygienic habits
  - d. Lazy
  - e. Lack self control
- 2. To employer:
  - a. Gossiping
  - b. Stealing
  - c. Uncooperative
  - d. Not loyal
  - e. Nonindustrious

3. To employees:
    a. Lying
    b. Poor health habits
        (1) Body odor
        (2) Venereal disease
    c. Punctuality
    d. Uncooperative

C. Public Speaking
1. Reading:
    a. Assigned material
    b. Self chosen material
    c. Spontaneous choice
2. Oral (with and without notes)
    a. Free choice of topic
    b. Assigned topic
    c. Ad lib
3. Formal debate:
    a. Group
    b. Individual
4. Voice:
    a. Diction
    b. Grammar
    c. Range
    d. Inflection
    e. Eye contact

D. Penmanship
1. School:
    a. Printing
    b. Script
2. On the job:
    a. Need for clarity
    b. Need for accuracy

II. CONDUCT ON THE JOB

A. Employee To Employer Obligations
1. Promptness:
    a. Arrival on time
    b. Dismissal time
    c. Lunch
    d. Breaks
2. Following directions:
    a. Oral
    b. Written

    3. Initiative
    4. Responsibility
    5. Housekeeping:
        a. Need for
        b. Effect on fellow employees
    6. Attitudes:
        a. Self
        b. Employer
        c. Employees
    7. Personal hygiene:
        a. Effect on self
        b. Effect on others
    8. Safety rules:
        a. Purpose for
        b. Time lost when not followed

B. Employer To Employee Obligations
    1. Promptness:
        a. Materials
        b. Salary
    2. Directions:
        a. Clear (written)
        b. Distinct (oral)
    3. Advancement:
        a. Due to performance
        b. Due to longevity
    4. Example:
        a. By doing
        b. By experience

C. Employee To Employee Obligations
    1. Promptness:
        a. Arrival
        b. Dismissal
        c. Lunch
        d. Breaks
    2. Personal hygiene
    3. Housekeeping
    4. Complaining
    5. Follow directions
    6. Safety rules

D. Improvement on the Job
    1. Technical training
    2. In-service training
    3. Home study

4. College courses
5. Learning by doing
6. Learning by observing

III. HUMAN RELATIONS

A. Personality
   1. Generousity
   2. Dependabi
   3. [illegible]
   4. Cooperativeness
   5. Mannerisms
      a. Speech
      b. Facial
      c. Oral
      d. Physical

B. Individuality
   1. Strengths
   2. Weaknesses
   3. Lack of perfection

C. Speak Up
   1. What to say
   2. How to say it
   3. When to say it.

D. Be Yourself
   1. Delop strengths:
      a. Observing others
      b. Speaking with peers
      c. Counseling
   2. Diminish weaknesses:
      a. Self appraisal
      b. Reduced use
      c. Anxiety
      d. Sensativity
      e. Fatigue
      f. Self pity
      g. Procrastination

E. Negative Responses
   1. Complaining
   2. Gossiping
   3. Lying

4. Tactfulness
5. Discourteous

F. Customer Relations
1. Know your facts
2. Know your merchandise
3. Sell yourself
4. Don't oversell
5. Listen:
    a. To customer
    b. To supervisor
    c. Proficient salesman

G. Accentuate the Positive - Eliminate the Negative
1. Think positively
2. Act positively
3. Talk positively

IV QUINMESTER POST TEST

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APPENDIX

QUINMESTER POST TEST

Test I - Essay
Employer-Employee Relationships
Junior High School
Work-Experience Program
Page 1 of 3

Name ____________________ Date ______________ [illegible] __________

Essay Questions

Read each item carefully before attempting to answer it. Write the answers on the answer sheet which will be supplied by your coordinator. Be accurate and neat in your work. Do not copy the question; number each answer in the left hand margin.

---

1. What steps should a new worker take to insure success on his new job?

2. What has been the experiences of any of your friends who may have dropped out of school?

3. You are successful. Why?

4. You are unsuccessful. Why?

5. You have been told to do something by your employer which you feel is wrong. How do you react?

Test 2 - Multiple [illegible]
Employer-Employee Relationships
Junior High School
Work-Experience Program
Page 2 of 3

Name ______________ Date ______________ Score ______________

Multiple Choice Test Items

Each statement needs a word or phrase to make it correct. Only one of the choices is correct. Place the number of choice you make in the space provided at the right edge of the sheet.

---

1. Your employer yells at you, so you (A) yell back (B) walk away (C) remain calm (D) quit ( )

2. A positive social attitude is to be (A) shy (B) excitable (C) stable (D) untidy ( )

3. A positive mental attitude is to be (A) impulsive (B) a drifter (C) fearful (D) alert ( )

4. A positive work attitude is to be (A) haphazard (B) a quitter (C) persistent (D) Slow worker

5. You want to advance on your job, so you (a) think before you speak (B) learn when to speak (c) take in-service training (D) all of these ( )

Test [illegible] - Matching
Employer-Employee Relations
Junior High School
Work-Experience Program
Page 3 of 3

Name ________________ Date ______________ Score ___________

Matching Test Items

The words and phrases in the left hand column are significant in connection with a word or expression in the right-hand column. Match these items properly, by placing the letter next to the word in the right hand column which best describes the comment in the left column in the space provided.

---

1. It is essential in almost every kind of work.
2. The ability to procced on your own.
3. Many times this will make up for inexperience and often leads to advancement.
4. It is required for success in business as well as athletics.
5. The inner feeling of confidence that comes from knowledge and skills.
6. Some are born with this ability to be too serious.
7. Do not betray a confidence.
8. The ability to say the right thing at the right time.
9. Look to the future as well as the present.
10. Be considerate of others.

A. Tact (
B. Sense of humor. (
C. Poise (
D. Initiative (
E. Dependability (
F. Friendliness (
G. Cooperation
H. Willingness
I. Loyalty
J. Foresight (

POST TEST -- KEY

ESSAY

1. punctuality, dependability, industrious, cheerful or tactful
2. Teacher judgement
3. Teacher judgement
4. Teacher judgement
5. polite, tactful, calmly, honestly

MULTIPLE CHOICE

1. (C)
2. (C)
3. (D)
4. (C)
5. (D)

MATCHING

1. (E)
2. (D)
3. (H)
4. (G)
5. (C)
6. (B)
7. (I)
8. (A)
9. (J)
10. (F)

5780 A

AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

WORK-EXPERIENCE PROGRAM - 8769
(The Laws and the World of Work)

Department 48 - Course 8769.02

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION•1971

DADE COUNTY PUBLIC SCHOOLS
1410 NORTHEAST SECOND AVENUE
MIAMI, FLORIDA 33132

Course Outline

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Department 48 - Course 8769.02

the division of

VOCATIONAL, TECHNICAL AND ADULT EDUCATION

5702

Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

Published by the Dade County School Board

Copies of this publication may be obtained through

Textbook Services
2210 S. W. Third Street
Miami, Florida 33135

Price: $.75

Course Description

8769	48	8769.02	The Laws and the World of Work
State Category Number	County Dept. Number	County Course Number	Course Title

During this second quinmester, the Junior High School Work-Experience student will be exposed to the basic fundamentals of those laws which pertain to student employment, including income and social security taxes. The procedures used in choosing and securing various types of employment will be discussed in some detail.
Clock hours: 45

PREFACE

When the foundation is strong, we can assume the building will last. So it is in the world of work. If the fundamental processes are learned, if the choice of occupation is made in more than a haphazard manner, if those laws pertaining to the world of work are known, it is then thought that the working experience will be enjoyable, lucrative, worthwhile and long lasting. Hopefully, we have prepared the mortar well, so now we can begin construction. During this quinmester, the methods used in choosing an occupation, seeking that occupation and what additional training might be necessary to insure success within the occupation are covered in some depth. The various labor laws and their relationship to the young worker will be offered to the Junior High School Work-Experience student.

Quinmester II will consist of 45 class hours, over a nine week period of time in which four blocks of material will be covered. This course of study should enable the teacher-coordinator to further aid his students in job selection, job placement and the fundamentals of what it takes to be a desirable employee. Once again, it is desired that the teacher-coordinator attempt to meet the needs of all his students.

This outline was developed throught the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee, and the Vocational Teachers Education Service, and has been approved by the Dade County Vocational Curriculum Committee.

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with Suggested Hourly Breakdown

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BLOCK

I. LAWS RELATING TO EMPLOYMENT (10 hours)

II. CHOICE OF OCCUPATION (20 hours)

III. SECURING A JOB (15 hours)

IV. QUINMESTER POST TEST

GOALS

Upon completion of this program, the Work-Experience student should be able to demonstrate:

1. Knowledge of the procedures involved in securing employment.
2. The generally accepted procedures in preparing for a job interview.
3. The need for good health habits and grooming as preparation for employment.
4. An awareness of the federal, state and local laws that pertain to student employment.
5. The duties, responsibilities, and qualifications needed for selected occupations.
6. The necessary attributes required for good employer-employee relationships, as well as employer-employee relationships.
7. An awareness of the attributes and general job talents needed for advancement within a chosen field.
8. The need for maintaining harmonious relationships and better understanding of one's self and others.
9. The necessity and importance of wise money management.
10. The need and advantages of additional vocational skills and training for employment and future job success.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - LAWS RELATING TO EMPLOYMENT

The student must be able to:

1. Demonstrate an understanding of the basic child labor laws pertaining to a youngster 14 and 15 years of age.
2. Demonstrate an understanding of the basic child labor laws for a student 16 through 18 years of age.
3. List those jobs which are considered unsafe for both age groups.
4. Explain the need for a promise of employment form.
5. Explain what is required by the teacher-coordinator as proof of age.
6. Discuss the minimum wage regulation.
7. Demonstrate an understanding of withholding tax.
8. Perform mathematically several problems which would indicate an understanding of how to compute weekly and monthly gross salaries, when paid on an hourly basis.
9. Demonstrate what is meant by the term income tax.
10. Compute net salaries with the use of an income withholding schedule.
11. Explain payroll deduction.
12. List and discuss at least three items other than social security and withholding tax which might be withheld on salary.
13. Write his social security number on all written work turned in to the coordinator.

BLOCK II - CHOICE OF OCCUPATIONS

The student must be able to:

1. List the duties and responsibilities of various types of employment including crafts, distributive, mechanical and service.
2. Demonstrate an understanding of what additional training might be necessary to attain these various jobs.
3. Explain what job opportunities are more available to students while attending school.
4. Discuss those jobs which are unattainable and the reasons why.
5. List at least five types of employment they might seek.
6. Explain the methods which might best be used in attempting to secure these jobs.
7. Classify various jobs with and without the use of the Dictionary of Occupational Titles.
8. Demonstrate an understanding of the difference between a job and an occupation.
9. Explain what he feels will be the job needs of the future and why.
10. Make a job choice, pursue it and gain employment.

11. Explain, through self evaluation, why a rejection of a sought after job might have been made.

BLOCK III - SECURING A JOB

The student must be able to:

1. Explain the reasons for seeking or desiring a specific job.
2. List those positive attributes he has which might aid in securing this specific job.
3. List those negative attributes which might handicap his gaining specific employment.
4. Demonstrate the proper use of "Want Ads."
5. Explain at least five means of obtaining employment.
6. Perform in various classroom interview situations.
7. Tape record an interview and determine through class, teacher and self evaluation any corrections which might be made.
8. Explain which job seeking procedure is best for him as an individual and why.
9. List those things, in sequence, that he must do from the time of arising in the morning of his interview until he reports to the place of the interview.

Course Outline

WORK-EXPERIENCE PROGRAM
(The Laws and the World of Work)

Department 48 - Course 8769.02

I. LAWS RELATING TO EMPLOYMENT

A. Florida Industrial Commission Form A-22-A
(Promise of Employment)

1. Employer
   a. Name of company
   b. Address
   c. Type of business
   d. Hours of employment
   e. Signature
2. Employee
   a. Name
   b. Address
   c. Birth date
   d. Social security number
   e. School attending
   f. Grade level

B. Working Papers

1. Pink - 14 and 15 years of age
   a. Parental signature required
   b. No work past 8 p.m.
   c. Work day not to exceed 3 hours on week days
   d. Can work 8 hours on weekend or non school day
   e. Work week not to exceed 28 hours
   f. Student signature
   g. Social security number
   h. Coordinator signature, title and address
   i. Unacceptable jobs
      (1) State (Labor Laws in a Nutshell)
      (2) Federal (Bulletin #101)
   j. Involvement in cooperative program
2. Yellow - 16 through 18 years of age
   a. Student signature
   b. No work past 10 p.m.
   c. Can work 8 hours daily
   d. Weekly total not to exceed 40 hours
   e. Coordinator signature, title and address
   f. Unacceptable jobs
      (1) State (Labor Laws in a Nutshell)
      (2) Federal (Bulletin #101)
   g. Involvement in cooperative program

C. Acceptable proof of age

1. Birth certificate
2. Passport
3. School record

4. Parental letter
5. Residency card
6. Baptismal certificate
7. Insurance policy (at least two years old)

D. Minimum wage
   1. Intra-state
   2. Inter-state
   3. Amount of business

E. Income tax
   1. Withholding schedule
   2. Computation of gross salary
   3. Deductions
   4. 1040 form
   5. W-2 form
   6. Computation of net salary
   7. Refunds or payment

F. Social Security
   1. Obtaining a card
   2. Age of benefits
      (1) Male
      (2) Female
   3. Health benefits
   4. Deduction from salary

G. Payroll Deductions
   1. Social security
   2. Income tax
   3. Credit Union
   4. Hospitalization
   5. U. S. Savings Bonds
   6. Stock options
   7. Life insurance
   8. Annuities
   9. Retirement
   10. Other deductions

II. CHOICE OF OCCUPATION

A. Types of employment
   1. Crafts
   2. Professional, technical and managerial
   3. Distributive
      a. Sales
      b. Merchandising
      c. Clerical
      d. Shipping and Receiving
         (1) Wholesale
         (2) Retail
      e. Farming, fishery and related occupations
      f. Machine trades
      g. Structural trades

4. Dictionary of Occupational Titles
5. Dictionary of Occupational Information

B. Current and future needs
   1. Department of Health, Education and Welfare (Federal)
   2. Florida State Employment Service
   3. Community survey
      a. County
      b. State
      c. Local
   4. Private employment services

C. Finding a job
   1. Want ads
      a. Newspaper
         (1) Daily
         (2) Weekly
      b. Relative
      c. Friend
      d. Window sign
      e. Employment service
      f. Guidance department
      g. Work-Experience Coordinator
      h. Specific job agencies
   2. Corresponding for employment
      a. Business letter
         (1) Requesting interview
         (2) Requesting hiring
      b. Resume'
         (1) Past experiences
         (2) Current experiences
         (3) Age
         (4) School training
         (5) Extra curricula activities

D. The job for you
   1. Requirements for employment
      a. Mental
      b. Physical
      c. Emotional
      d. Training
      e. Age
      f. Uniforms or special clothing
      g. Recommendations
         (1) Teachers
         (2) Past employers
         (3) Guidance Department
   2. Job readiness
      a. Self evaluation
      b. Class evaluation
      c. Coordinator evaluation

III. SECURING A JOB

- A. Need for employment
  - 1. Money
  - 2. Stay in school
  - 3. Academic problems
  - 4. Desire for work experience
  - 5. Help parents or other in family
- B. Preparation for the interview
  - 1. Job application forms
    - a. Specific
    - b. Standard
  - 2. Personal information check list
    - a. Past employment experiences
    - b. Addresses of past employers
    - c. Your immediate past supervisor
    - d. Type of work done
    - e. Years of experience
    - f. Social security number
    - g. References (other than relatives)
    - h. Height and weight
    - i. Small picture (sometimes required)
    - j. Hobbies
    - k. Extra curricula school activities
  - 3. Speech
    - a. Clear and distinct
    - b. Eye contact
    - c. Direct answers to questions
    - d. General attitude
  - 4. Clothing
    - a. General interview
    - b. Specific job
  - 5. Choice of clothing
    - a. Current fashion magazine
    - b. Resource person from clothing store
    - c. General observation of styles
    - d. Personnel director
    - e. Fellow students
    - f. Observe clothing of those on the job he is attempting to get
  - 6. Personal hygiene
    - a. Shower or bath
    - b. Deodorant
    - c. Perfume
    - d. Clean nails
    - e. Combed hair
    - f. Shine shoes
    - g. Pressed pants
    - h. Ironed dress
    - i. Proper make-up

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    - The Town You Live In
    - The Jobs You Get
    - The Person You Are
    - The Friends You Make
    - The Family You Belong To
2. Turner-Livingston Communication Series. 1st ed. Chicago: Follett Publishing Co., 1965.
    - The Television You Watch
    - The Phone Calls You Make
    - The Newspapers You Read
    - The Letters You Write
    - The Language You Speak
3. Turner-Livingston Guidance Series. 1st ed. Chicago: Follett Publishing Co., 1968.
    - How To Find a Job
    - How To Get a Job
    - How To Keep a Job
    - Starting a Job
    - Paycheck
4. The Job You Want. New York: McGraw-Hill Book Co., 1968.
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Supplementary References:

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26. Facts About Alcohol. McCarthy. Chicago: Science Research Associates.

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28. Hurrying Kind, The. Local Office. U. S. Army Recruiting.

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30. How To Prepare Your Income Tax on Form 1040. Washington, D. C.: Internal Revenue Service.

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32. Know Your Money. Washington, D. C.: U. S. Government Printing Office.

33. Learning How To Study. Chicago: Science Research Associates.

34. LSD Insight or Insanity. Chicago: Science Research Associates.

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36. Study Your Way Through School. Chicago: Science Research Associates.

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38. You, Today and Tomorrow. Princeton: Educational Testing Service.

39. Your Social Security. Washington, D. C.: U. S. Department of Health, Education and Welfare.

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8. Bennies and Goofballs-FDA Report. 16 mm. 20 min. B/W. Sound. Dade County, 1-13529.

9. Beyond LSD. 16 mm. 28 min. Color. Sound. Local Office. Federal Bureau of Narcotics and Dangerous Drugs.

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12. Body Care and Grooming. 16 mm. 20 min. B/W. Sound. Dade County, 1-12968.

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16. Choosing for Happiness. 16 mm. 14 min. B/W. Sound. Dade County, 1-10094.

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347 Madison Avenue
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267 West 25th Street
New York, N. Y. 10001

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65 East South Water Street
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Princeton
New Jersey 08540

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146-01 Archer Avenue
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The New York Times
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Times Square
New York, N. Y. 10036

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Tallahassee
Florida

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201 North Wells Street
Chicago, Illinois 60606

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Division of Reader's Digest Books
380 Madison Avenue
New York, N. Y. 10017

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Pleasantville, N. Y. 10570

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2821 East Grand Boulevard
Detroit, Michigan 48211

13. John Hancock Life Insurance Company
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200 Berkley Street
Boston, Mass. 02117

14. Harcourt, Brace and World, Inc.
757 Third Avenue
New York, N. Y. 10017

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Text-Film Division
330 West 42nd Street
New York, N. Y. 10022

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750 Third Avenue
New York, N. Y. 10017

17. McKnight and McKnight Publishing Company
Towanda Avenue and Route 66
Bloomington, Illinois 61701

18. Modern Talking Picture Service, Inc.
714 Spring Street, N.W.
Atlanta, Georgia 30308

19. New York Department of Education
Albany
New York 12210

20. New York Life Insurance Company
51 Madison Avenue
New York, N. Y. 10010

21. Prentice-Hall, Inc.
70 Fifth Avenue
New York, N. Y. 10011

22. Science Research Associates
259 East Erie Street
Chicago, Illinois

23. Scott, Foresman and Company
3145 Piedmont Road, N.E.
Atlanta, Georgia

24. Simon and Schuster
630 Fifth Avenue
New York, N. Y.

25. Society for Visual Education, Inc.
1345 Diversey Parkway
Chicago, Illinois 60614

26. South-Western Publishing Company
5101 Madison Road
Cincinnati, Ohio 45227

27. Sterling Publishing Company, Inc.
419 Park Avenue South
New York, N. Y. 10016

28. U. S. Employment Service
Division of U. S. Department of Labor
Washington 25, D. C.

29. U. S. Government Printing Office
Washington, D. C.

30. University of Illinois Press
Urbana
Illinois 61803

APPENDIX

QUINMESTER POST TEST SAMPLES

QUINMESTER POST TEST

True-False Test Items

Each of the following statements is either true or false. If the statement is true, draw a circle around the letter T following it; if the statement is false, draw a circle around the F. If a statement is false in part, it is entirely false. (Value 10 points)

---

1. If you are under the age of 16 you can grease and change the oil on a car. T F

2. Under 16 years of age you can mow but not edge a lawn. T F

3. A 15-year-old can work 6 hours a day, as long as school and work does not exceed 8 hours. T F

4. A 16-year-old can work where liquor is sold, as long as he does not serve it. T F

5. If you are told to do something on your job which you feel is illegal, contact the local labor law commission immediately. T F

6. One of your parents must sign your work permit if you are under 16. T F

7. Each state sets their own minimum wage. T F

8. Regardless of the amount you make, the same amount is deducted from your pay check. T F

9. You should declare more deductions, so you will get more money each paycheck. T F

10. There is someone in another state who has the same social security number as you. T F

QUINMESTER POST TEST

Multiple Choice Items

Each statement needs a word, a figure, or a phrase to make it correct. Only one of the choices listed is correct. Place the number of the choice you make in the space provided at the right edge of the sheet. ([illegible] 5 points)

---

1. The income form you receive from your employer at the end of the year is the (a) 1040 (b) W-2 (c) W-8 (d) 1050 ( )

2. Of the following jobs, the only one which is not in the distributive field is the (1) window dresser (2) plumber (3) salesman (4) receiving clerk ( )

3. An X-ray technician needs an additional (a) 2 years (b) 4 years (c) 1 year (d) 3 years of training after he completes high school. ( )

4. Mechanization in the future will lead to an (1) increase (2) maintenance (3) decrease (4) none of these, in jobs. ( )

5. A 16-year-old can work a total of (1) 28 (2) 30 (3) 40 (4) 35 hours per week. ( )

QUINMESTER POST TEST

Essay Questions

Read each question carefully before attempting to answer it. Write the answers on a standard answer sheet which you can secure from your instructor. Be accurate and neat in your work. Do not copy the question; simply number the question in the left-hand margin. (Value 25 points)

---

1. The need for additional training is often required after high school. Why?

2. If you need additional information about a specific job, where would you seek it?

3. What changes would you make in the Child Labor Laws if give the opportunity and why?

QUINMESTER POST TEST

Computation

Read each question carefully before attempting to answer it. Do all your figuring on the back of this page and put your answer in the space provided. Do not read something into the question which is not there. (Value 50 points)

---

1. John works 38 hours per week at 1.73 per hour. His expenses are $4 for food, $2.50 for entertainment and $1.25 for transportation. What is his gross salary after expenses? ______

2. George works 43 hours per week. He works 36 hours at 1.97 per hour and time and one half for overtime. His expenses total $9.76. What is his gross salary? ______

3. Jack works 42 hours per week. He works 37 hours at $2.46 per hour and double time for overtime. His expenses total $\frac{1}{4}$ of his total salary. What is his gross? ______

4. Juan works 87 hours per month. He gets $1.67 per hour for 73 hours and time and one half for overtime. His expenses are $6.83 weekly. What is his gross salary? ______

5. Harry gets $2.68 per hour and works 33 hours per week. He puts $10 in the bank each week. His expenses are $6.20 weekly. How much money including savings does he gross each year? ______

KEY TO QUINMESTER POST TEST

Work-Experience Program
The Law and the World of Work

TRUE OR FALSE (Value 10 points)

1. False
2. True
3. False
4. False
5. False
6. True
7. False
8. False
9. False
10. False

MULTIPLE CHOICE (Value 15 points)

1. #2 (W-2)
2. #2 (Plumber)
3. #1 (2 years)
4. #1 (increase)
5. #3 (40)

ESSAY (Value 25 points)

Teacher judgement

COMPUTATION (Value 50 points)

1. $57.99
2. $82.81
3. $86.72
4. $129.59
5. $4276.48

SKETCHING

Note to Instructor

Many feel that sketching is far more useful to the planner than is mechanical drawing (drafting). Most of the principles of graphic representation can be taught through sketches. At a later time you might want to introduce instrument drawing. This procedure is much easier for the student. Learning to sketch pictorial views is the easiest means of transition from experience with photographs of objects to working drawings.

Objectives

The students will be able to
1. Explain the importance of this universal graphic language.
2. Demonstrate the ability to adequately present technical ideas by means of freehand sketches.
3. Demonstrate the ability to visualize three-dimensional objects in space.

Time Required One week

Instructional Aids

1. Film, "The Language of Drawing," Georgia Department of Education, Film Libraries
2. Textbook and references
3. Chalkboard
4. Models of cars, furniture, toys, appliances
5. Birdhouse
6. Tools and materials
    a. Rule
    b. Pencil and pape
    c. Clipboard
7. Charts
    a. Lettering charts (Eberhard faber)
    b. Decimal equivalent and tap drill sizes (L. S. Starrett Co.)
    c. Mechanical Drawing Wall Chart (F. Post Co.)
8. Blueprints
    a. Machines
    b. Tools
    c. House or building
9. Projection box

Introduction

The work of the inventor, engineer, designer, craftsman, builder and others would be hopelessly involved if there were not a language which all of these people could understand. The language which is used by all people who build or service things is the universal graphic language of the working drawing.

Builders and service people are not the sole users of drawings or blueprints. Doctors use much electrical and mechanical equipment which requires a knowledge of wiring diagrams and blueprints. Lawyers frequently are called upon to interpret diagrams and drawings in the courtroom. Almost any magazine or newspaper one sees today has many charts, diagrams, and section views used to convey information. Purchasing department personnel, sales people, home planners and owners all need a knowledge of this graphic language.

Subject Matter Outline

1. The importance of a graphic language
   a. To industry
   b. To other areas of work
   c. To home owners and planners
   d. To the student
      (1) In reading books, magazines, newspapers
      (2) In building things

   (Display several blueprints and diagrams and, in general, explain what they portray. Display a blueprint and the article made from it.)

   (Present the film "The Language of Drawing." Review the film after presentation.)

2. Sketching* is used by those in authority to convey ideas to others.
   a. Industrial designers and engineers make sketches for draftsmen to reproduce as tracings and blueprints.
   b. Draftsmen make sketches before making a drawing to plan and organize their work.
   c. Most ideas can be adequately presented by means of a sketch.

3. Materials for sketching (demonstrate use of each)
   a. Paper
   b. Pencil (soft)
   c. Rule--to measure object after sketch is made

4. Sketch with a pencil (demonstrate technique)
   a. Lines
      (1) Horizontal lines
      (2) Vertical lines
      (3) Inclined lines
      (4) Arcs and circles
      (5) Parallel lines

      (Have students sketch football field, baseball diamond, basketball floor, ladder, etc., but be certain that what they draw is something they can recognize.)
   b. Sketch pictorial views (demonstrate each).
      (1) Oblique - sketch a book, birdhouse, tool - 45 degree angle.
      (2) Isometric - sketch as above - 120 degree angles.
      (3) Pictorials are realistic--pictures-like.
         (a) Easy to visualize--artist's drawings.
         (b) Show details poorly.
   c. Sketch orthographic views (working drawings).
      (1) Most frequently used drawing
      (2) Object imagined in a box (demonstrate projection box)

* Write underlined words on chalkboard

        (3) Views (point out relationship of views)
            (a) Top
            (b) Front
            (c) Side
        (4) For the sketch to look well, it must have same proportions as object. Estimate ratio of height to width of front of object and side. Do not measure the object.
        (5) Lightly sketch a large "L" on the paper. The vertical and horizontal lines of the "L" should be about 1" from the left and bottom of the paper.
        (6) Using the ratios estimated in "4" block out the outlines of the necessary views. (Point out the relationship of views.)
    d. Sketch in the details.
    (Sketch three views of birdhouse on chalkboard. Point out advantages of true size and shape as applicable. Have students help complete sketch.)

    (Have students sketch three views of a book, birdhouse, cannister, school building, tool, machine part, bicycle part, baseball, etc..)

5. Notes and dimensions
    a. Drawing alone is incomplete.
    b. Notes--convey meaning not elsewise indicated.
        (1) Alphabet - (demonstrate strokes)
        (2) Numerals - (demonstrate strokes)
            (a) Indicate size
            (b) Indicate location
            (c) Read from bottom or bottom and right.

    (Have students practice lettering their names, school names, tool names, typical notes on drawings.)

6. Alphabet of lines (demonstrate each)
    a. <u>Object outline</u>
    b. <u>Dimension line</u> and <u>arrow head</u> (Place between and outside of views if possible.) (Illustrate dimensioning of arcs, circles and narrow spaces.)
    c. <u>Extension line</u>
    d. <u>Center line</u>
    e. <u>Hidden line</u>
    f. <u>Border line</u>
    g. <u>Cutting plane line</u>
    h. <u>Section line</u>

7. After object is sketched and the dimension lines placed where needed, measure the object with a rule and place the necessary dimensions on the sketch. Check carefully.

(Have students place necessary notes and dimensions on sketches.)

8. Reading a rule (sketch rule on board)
    a. Divisions - 1/32, 1/16, 1/8, 1/4, 1/2, 1"
    b. Stand rule on edge for accuracy in reading

Summary Questions

1. Who uses drawings?
2. How does the engineer convey his ideas to the draftsman?
3. What is the meaning of horizontal? Vertical? Parallel? Arc?
4. How does an oblique drawing differ from an isometric? What are the advantages of these drawings? Disadvantages?
5. What is a working drawing? What information does it give?
6. Name the various lines used on a drawing and explain what each is used for.
7. Why is it unnecessary to measure an object before the sketch is made?

Assignment

1. Select some object in your home, sketch it, dimension it and bring to class tomorrow.
2. Make a sketch or graph reporting sales or other data.
3. Make a sketch of some object that you have designed and that you believe you can construct in this class.
4. Study your text.

Methods of testing

1. Objective test
2. Sketching problems
3. Evaluation of application of techniques throughout year

References

1. Coover, S. L., Drawing and Blue Print Reading, McGraw Hill, New York, 1966.
2. Fuller, Functional Drafting Today, Farnesworth Publ., 1966.
3. Giachino, Engineering and Technical Drafting and Graphics, American Technical Society, 1966.
4. Giachino, Freehand Sketching, American Technical Society, 1955.
5. Stephenson, Drawing for Product Planning, Bennett, 1970.

Lesson 6

PLANNING

Note to Instructor

During this unit you might notice that students cannot purposefully plan their work when they have little or no understanding of the tools, materials and processes called for. For this reason this unit might be used as motivational material for the lessons which follow. The instructor should return to this lesson and review it with the class frequently.

Objectives

The students will be able to
1. Plan a job carefully and then to work the plan.
2. Think in an orderly and logical manner.
3. Perform any task in an orderly manner.
4. Make a bill of material that is complete and accurate.

Time Required One to two days

Instructional Aids

1. Job plan sheet
2. Birdhouse or some other simple object
3. Drawing of object in 2

Introduction

After an object has been designed and after you make your drawings, you will be ready to bring your ideas, your tools, and your materials together. This is known as "planning the procedure." Actually it is a way of deciding on what to do and on how to do it. In industry these and other functions are carried out in the product engineering and industrial engineering or production planning departments.

If you wanted to take a vacation trip, you would undoubtedly make careful plans to insure getting to your intended destination. Similarly, before constructing an object, it is necessary that you carefully plan in order to save time, materials and effort. To be most successful, you must "plan your work; then work your plan."

Subject Matter Outline

(Motivate student. Point out examples of the value of planning a vacation, a ballgame, a fishing trip, a trip to the moon, a better mousetrap.)

1. Write the specifications for the job.
    a. Material
    b. Construction
    c. Finish
    d. Other unusual details

2. Make the bill of material. Most of your laying out will be done by referring to the sizes listed on this bill rather than by again constructing the drawing.
    a. Number of pieces, names of pieces
    b. Sizes--rough and/or finished
    c. Material
    d. Total amount of material of a kind
    e. Cost, unit and total

3. Plan the procedure for the job.
    a. Determine what is to be done and how it is to be done.
    b. Determine best order in which steps are to be performed.
    c. Provide instructor checkpoints.
    d. General procedure for most constructional activities. (List on chalkboard.)
        (1) Design, draw and plan
        (2) Select materials
        (3) Layout--instructor check
        (4) Cut to rough size
        (5) Record material sizes on stock card
        (6) Cut to exact size
        (7) Provide for fastening
        (8) Assemble--instructor check
        (9) Prepare for finish--instructor check
        (10) Apply finish--instructor check

(Explain and illustrate on a typical example the above steps. Emphasize that student must indicate what he will do and how he will do it. Let students help analyze the operations insofar as possible.)

Summary Questions

1. Why is it necessary to plan the procedure for a job?
2. Why does your instructor limit you in your choice of jobs at first?
3. When can you design and plan a job yourself?
4. Of what value is the bill of material when laying out?

Assignment

1. Write the specifications, make a bill of material, and plan the procedure for the problem, product or activity you have selected.
2. Study your text.
3. Evaluate student's job planning throughout year.

Method of Testing

1. Objective test.
2. Evaluate student's thoroughness in planning and care in following his plan.

SELECTING MATERIALS

Note to Instructor

The materials outlined in this lesson should be found in most general laboratories. If you have other materials which you use often, add their names to this lesson.

The purpose of this lesson is to give students an overview of the materials commonly used in industry and to place the responsibility for learning with the student. He should be required to make choices on the basis of adequate instruction, textbook study, and reference to notes taken in class.

Objectives

The students will be able to
1. Describe the common materials of construction, their characteristics and uses.
2. Describe the relative values of the materials available.
3. Demonstrate ways of conserving materials.

Time Required One to two days

Instructional Aids

1. Material samples--rough, dressed and finished
    a. White pine
    b. Poplar
    c. Walnut
    d. Mahogany
    e. Plywood, fir, gum, etc.
    f. Tin plate
    g. Black iron sheet, 28 ga.
    h. Copper, 24 oz.
    i. Aluminum, 16 ga. 22 ga.
    j. Cold rolled steel rods
    k. Hot rolled steel, band iron, angles, squares
    l. Insulated wire
        1. Cotton
        2. Rubber - plastic
        3. Enamel
    m. Plastics
2. Chalkboard

Introduction

Selecting the best material for a job is one of the steps you must take early in the process of planning a successful product. In this unit we will study those factors that go into making a good selection from the materials which are available in the laboratory.

Subject Matter Outline

1. Woods (Display samples of each)
    - a. Kinds of wood
        - (1) White pine
            - (a) Characteristics
                1. Soft
                2. Easy to work
                3. Inexpensive, cost ... (quote cost)
                4. Color--white to tan
                5. Close, straight grain
                6. Light weight
            - (b) Uses
                1. For items not subjected to great strain or wear
                2. For items to be painted
                3. For building purposes
        - (2) Poplar
            - (a) Characteristics
                1. Color--greenish to white
                2. Very close grain
                3. Light in weight
                4. Soft, straight grain
                5. Medium strong
                6. Easy to work
                7. Inexpensive, costs
            - (b) Uses
                1. Construction, boxes
                2. Cheap furniture
                3. Imitation for mahogany and walnut
        - (3) Walnut
            - (a) Characteristics
                1. Color--dark rich brown
                2. Open grained
                3. Medium weight, fairly hard
                4. Straight grain
                5. Works easily
                6. Warps very little
                7. Very durable
                8. Expensive, costs
                9. Finishes well
            - (b) Uses
                1. For all high grade work
                2. Boat building
        - (4) Mahogany (Philippine, African or Honduras)
            - (a) Characteristics
                1. Color--tan to dark reddish brown
                2. Very strong
                3. Warps very little
                4. Sometimes hard to work due to crooked grain

5. Finishes well
6. Expensive, costs
7. Open grained

(b) Uses

1. Best of cabinet woods
2. Interior finishes
3. Boat building

(5) <u>Plywood</u>

(a) Sold by <u>square foot</u>
(b) Standard sheet is 4' x 8'; thickness is 1/4", 3/8", 1/2", 3/4"
(c) Price varies with thickness and material
(d) Light, inexpensive, strong

b. Computing cost of wood

(1) Computed in <u>board feet</u>
(2) All thicknesses under 1" computed as 1" thick
(3) All thicknesses over 1" computed to next higher 1/4 inch.
(4) Formula for computing board feet (write on chalkboard)

$$\frac{\text{Thickness x Width x Length (in inches)}}{144}$$

Example: $\frac{1'' \text{ x } 6'' \text{ x } 144''}{144} = 6$ bd. ft.

c. Conservation

(1) Select stock as near size of piece as possible
Example: for a piece 1/2" x 5" x 12" cut rough stock 3/4" x 6" x 12 1/4"
(2) Always layout from end of board, but watch for checks or other defects in board
(3) Measure correctly and have instructor check work.

d. Check questions and summary

(1) What are some of the characteristics of white pine, poplar, walnut, mahogany?
(2) What are some of the uses of white pine, poplar, walnut, mahogany?
(3) How does the thickness of wood affect the calculation of board feet?
(4) What is the difference between board measure and square measure?

2. Metals (Display samples of each)

a. Types of metal

(1) <u>Tin Plate</u> - Sheet steel covered with tin

(a) Characteristics

1. Light weight
2. Inexpensive, costs
3. Easy to work
4. Easy to assemble by soldering

(b) Uses
Example: Small sheet metal objects such as tin cans, trays, funnels, boxes.

(2) <u>Black iron sheet</u>

(a) Characteristics

1. Relatively inexpensive, costs
2. Difficult to work in heavy gauges, easy in light
3. Assembled by most methods
4. Should be painted.

- (b) Uses
  Example: Sheet metal objects such as signs, boxes, cabinets.
- (3) <u>Copper</u>
  - (a) Characteristics
    - 1. Easy to work
    - 2. Expensive, costs
    - 3. Polishes well
    - 4. Tarnishes easily
    - 5. Easy to solder
  - (b) Uses
    - 1. Art metalwork
    - 2. Metal spinning
- (4) <u>Aluminum</u>
  - (a) Characteristics
    - 1. Easy to work
    - 2. Relatively inexpensive, costs
    - 3. Polishes well
    - 4. May be welded or soldered with special techniques
  - (b) Uses
    - 1. Art metalwork
    - 2. Metal spinning
- (5) <u>Mild Steel</u>
  - (a) Characteristics
    - 1. Soft
    - 2. Easy to work
    - 3. May be case hardened only
    - 4. Relatively inexpensive, costs
  - (b) Types
    - 1. Hot roll - scale
    - 2. Cold roll - exact size, harder than hot rolled.
  - (c) Shapes
    - 1. Band
    - 2. Bars
    - 3. Round
    - 4. Squares
    - 5. Angle
    - 6. Hollow tubing
  - (d) Uses
    Example: Legs, scrolls, lamps
- (6) <u>Galvanized Steel</u>
  - (a) Characteristics
    - 1. Light weight
    - 2. Easy to work
    - 3. Relatively inexpensive, costs
    - 4. Zinc protective coating
  - (b) Uses
    - 1. General sheet metal work
    - 2. Roofing construction
    - 3. In Weather

b. Computing cost of metal
- (1) Computed in square feet or <u>lineal</u> feet
- (2) Formulas for computing square feet (write on chalkboard)

- (a) $\frac{\text{Length x Width}}{144}$ (in inches)
  Example: $\frac{6'' \times 6''}{144} = 1/4$ sq. ft.
- (b) $\frac{\text{Length (in feet) x Width (in inches)}}{12}$
  Example: $\frac{4' \times 18''}{12} = 6$ sq. ft.
  (Have students work several examples.)

c. Conservation
- (1) Select stock as near size as piece as possible.
- (2) Always cut from end of piece.
- (3) Design project to make maximum use of sizes of stock available.
- (4) Have instructor check layout.

d. Check Questions and Summary
- (1) What are some of the uses of tin plate, black iron sheet, copper, aluminum, mild steel?
- (2) What are some of the characteristics of tin plate, black iron sheet, copper, aluminum, mild steel?
- (3) In what shapes are metals available?
- (4) What are the advantages and disadvantages of woods and metals?

3. Wire

a. Types of wire
- (1) Annealed iron
  - (a) Characteristics
    - 1. Inexpensive, costs
    - 2. Easy to work
    - 3. Poor conductor of electricity
    - 4. Annealed means softened--by heat
  - (b) Uses
    - 1. Ornamentation
    - 2. Providing support
- (2) Copper
  - (a) Characteristics
    - 1. Good conductor of electricity
    - 2. May be single or multiple stranded
    - 3. Relatively inexpensive, costs
    - 4. Easy to work
  - (b) Uses--for electrical conductors
  - (c) Types of insulation
    - 1. Cotton
    - 2. Rubber
    - 3. Enamel

b. Computing Cost of Wire
- (1) Wire is sold by pound or by lineal foot
- (2) Diameter or wire gauge must be considered

c. Check Questions and Summary
- (1) What are some of the characteristics of annealed iron and copper wire?
- (2) What are some of the uses of annealed iron, and copper wire?
- (3) What are three types of insultation?
- (4) How is cost of wire computed?

4. Plastics

5. (Add other materials you can provide.)

Summary

As you can see, there are many things which go into determining the material you will use in a product. Study each of the materials we have discussed carefully before making your choice and also consider using materials which we have not discussed.

You should take care in designing your product to make maximum conservation of the materials available.

Summary Questions

1. How is the cost of wood computed?
2. What are the two formulas for computing board feet? How are they used?
3. What are some of the woods we have in this laboratory and their characteristics?
4. How do we compute the cost of metals?
5. What general shapes and sizes does wood come in?
6. What are some of the products made from wood and metal?
7. How would you go about choosing the right material for your project?

Assignments

1. Choose the materials for your product and prepare a short summary on why you chose them.
2. Study your text.

Methods of Testing

1. Objective test
2. Identification of materials
3. Problems dealing with materials and industrial design
4. Evaluate summary of material choice

Lesson 8

MEASURING AND LAYING OUT

Note to Instructor

Measuring and laying out tools and procedures are most important in industry and to the student working in the laboratory. The purpose of this lesson is to make the student aware of the various layout tools and their use. Success in the laboratory will depend greatly on his ability to use layout tools and follow layout procedures. Every effort should be made to make sure all students have a thorough knowledge of layout procedures and tools.

Objectives

The students will be able to
1. Demonstrate the ability to read and use the common tools for measuring and laying out work.
2. Describe a proper layout procedure.
3. Demonstrate an understanding of precise layout and measurement through good craftsmanship.

Time Required One to two days

Instructional Aids

1. Film "Measuring and Layout Tools" - #5260, one reel, color, Georgia State Department of Education Film Library
2. Lufkin Rule Chart (Lufkin Rule Co.)
3. Chalkboard
4. Textbook
5. Blueprint or completed plan sheet
6. Tools and materials
    a. Pencil
    b. Knife
    c. Scriber
    d. Prick punch
    e. Center punch
    f. Bench rule
    g. Push pull tape
    h. Calipers - inside and out
    i. Dividers, toolmakers and wings
    j. Sliding "T" bevel
    k. Ball peen hammer
    l. Try and miter square
    m. Combination square
    n. Framing square
    o. Small piece of metal and wood
    p. 12" rule (one per student)

Introduction

1. What is layout? -- Mar ircles and arcs on material surface
2. Who uses layout and mea
   a. Auto mechanic
   b. Cabinet maker
   c. Carpenter
   d. Furniture maker
   e. Engineer and architect
   f. Contractor
   g. Sheet metal worker
   h. Machinist
   i. Welder
   j. Any craftsman or technician
3. Importance of layout and measurement
   a. Necessary for accuracy
   b. Necessary for good design
   c. Necessary for function of any construction

Subject Matter Outline

1. Layout is the process of transferring a pattern to the material.
   a. The finished job can be no more accurate than the layout.
   b. Always check layouts carefully before cutting.
   c. Process is similar on wood, metal or plastics.

2. Measuring - (Display lufkin rule* chart)
   a. Various types
      (1) Bench rule is 12-24" long, used for accurate work
      (2) Folding rule is 6-8-10-12 ft. long, not too accurate
      (3) Push-pull tape is 6, 8, 10, 12 ft. long, handy to carry
   b. How to read 1/2", 1/4", 1/8", 1/16" (Draw large rule on board and explain the markings)
      (1) Use on edge for accurate measurement
      (2) Transfer of dimensions from paper to work
      (3) Measure twice, cut once

   (Pass out 12" rules and have each student measure some small objects and record findings on paper. Check each student for accuracy.)

   c. Calipers -- (outside and inside)
      (1) Used to transfer and check measurements
      (2) Difference between outside and inside calipers
      (3) How to set-touch and feel

3. Marking lines and points on materials (demonstrate use and care of each)
   a. Pencil
      (1) Use on wood, aluminum and copper
      (2) Gauge with pencil
      (3) Use a "V" for accurate location of point
   b. Knife -- Use on wood for greatest accuracy in layout
   c. Scriber
      (1) On metal -- scratches line, won't rub off
      (2) Handle with care

*Write underlined words on chalkboard.

d. Prick punch
   (1) Mark points on metal that were located with scriber
   (2) Tap with ball peen hammer
e. Center punch
   (1) Mark centers for drilling
   (2) Tap with ball peen hammer
f. Dividers (toolmakers and wing)
   (1) Set to dimension on the rule
   (2) Divide lines or spaces in equal parts
   (3) Transfer dimensions
   (4) Bisect angles
   (5) Squeeze legs of toolmakers dividers together and spin nut
g. Marking gauge
   (1) To scratch lines parallel to an edge
   (2) Keep spur sharp
   (3) Do not use across the grain

4. Making square and angular layouts (demonstrate each) (Emphasize the importance of squareness, the advantages to the worker)
   a. Try and miter square
      (1) Check right and forty-five degree angles
      (2) Used on small pieces
      (3) Handle with care

   (Let several students check for squareness.)

   b. Combination square
      (1) Similar to try and miter square in purpose
      (2) Importance of lock--if not locked will be inaccurate
      (3) Can use rule by loosening lock and nut and sliding square head off
      (4) Point out advantages over try and miter square
      (5) Handle with care
   c. Framing square
      (1) Used on large work
      (2) Mention various markings and tables
      (3) Handle with care
   d. Selecting proper square for the job--select the square that will give the degree of accuracy desired and that fits the size of the work.
   e. Sliding "T" bevel
      (1) Check and transfer angles
      (2) Importance of lock

   (Have a student check angle of slanting table leg and point out how to transfer this to other legs.)

5. Patterns and templates
   a. Full scale layout on paper, cardboard or sheet metal
   b. Transfer to wood, metal and other materials by tracing shape
   c. Mother uses one in making dresses

Summary

(Introduce and present film "Measuring and Layout Tools.")

1. Measuring
    a. Rule on edge
    b. Measure twice, cut once
    c. Calipers used to check [illegible]ions
2. Marking - depends on care in [illegible]ing points
   Question: What tools are [illegible] make points?
3. Squaring is of utmost importance to the function.
    a. Try square
    b. Combination square
    c. Framing square
    d. Sliding "T" bevel - for other than 45 degrees or 90 degrees
4. Other layout tools
    a. Template - trace around easiest method
    b. Dividers - arcs and circles
    c. Marking gauge - parallel lines
5. Steps for laying out on wood, metal, plastics, etc.
    a. Select tools needed
    b. Work from a trued edge if possible
    c. Locate arcs and circles first
    d. Draw straight lines
    e. Check accuracy against drawing

Summary Questions

1. Who uses layout and measuring tools?
2. What are the steps and tools used for making a layout on wood? On metal?
3. Why should care be taken to assure accuracy?
4. What relation is there between layout and craftsmanship?
5. Give the name and use of each layout and measuring tool.
6. What is "layout"?

Assignment

1. Make study assignments concerning layout and measurement in the industrial arts book adopted for the school.
2. Special reports concerning other layout methods should be assigned to the accelerated students and some should visit an industrial shop that uses layout materials and report their findings to the class.
3. Lay out your pattern on the material you selected.

Method of Testing

1. Teacher should evaluate students on their independent and craftsman-like application of instruction to their work.
2. Objective test
3. Evaluate reports

Lesson 9

CUTTING TO ROUGH SIZE

Note to Instructor

The purpose of this lesson is to make the students aware of the more common hand tools and the processes of roughing out materials. Demonstrate each process, ask questions as you proceed and invite various students to assist you in presenting the lesson to your class. You may wish to add instruction in the use of the jig saw, band saw, lathe and drill press to this unit.

Objectives

The students will be able to
1. Choose cutting tools wisely.
2. Perform common cutting operations.
3. Work safely and with regard for others.
4. Cooperate in sharing tools and maintaining an awareness of the welfare of others.

Time Required One to two days

Instructional Aids

1. Chalkboard
2. Tools and materials
   a. Board - 1" x 4" x 24"
   b. Crosscut saw
   c. Ripsaw
   d. Backsaw
   e. Compass saw
   f. Coping saw
   g. Piece of plywood - 1/4" x 6" x 6"
   h. Band iron - 1/8" x 3/4" x 6"
   i. Sheetmetal - 6" x 6", 28 ga.
   j. Hacksaw
   k. Sawhorses
   l. Wire-cutting pliers
   m. 1/4" x 6" round steel
   n. Cold chisel
   o. Ball peen hammer
   p. Rule
3. Charts
   a. Disston File and Hacksaw
   b. Disston Handsaw Cuts
   c. Disston Special Purpose Saws
   d. Disston - How to Use a Handsaw

Introduction

After the pattern has been transferred to the material, it should be checked carefully against the bill of material. Then you are ready to cut the material to its rough size.

Most materials are cut slightly oversize so that the cutting marks of the tools may be removed and so that the parts can be later reduced to exact dimensions. Sometimes it is permissible to cut materials to exact dimensions with the roughing-out tools because the cutting marks will be concealed by further construction. Always insure that no tool marks will appear in a piece of material after it is assembled. One indication of fine craftsmanship is the complete absence of tool marks in the finished product.

After cutting your stock to rough size, enter the amount of material used on your stock card.

Subject Matter Outline

1. Saws (Woods and most heavy metals are generally cut to rough size with saws of one kind or another)
    a. Handsaws - for cutting wood only
        (1) Selection
            (a) Crosscut saw*
                1. 60 degrees pointed, "V" teeth (Refer to Disston Saw Chart)
                2. "Cuts" across grain
                3. 8-12 points per inch
            (b) Rip Saw
                1. 90 degrees chisel shaped teeth filed straight across (Refer to Saw Chart)
                2. Saw with the grain
                3. 5-7 points per inch
        (2) Sawing (Demonstrate grip on handle and sawing)
            (a) Keep work horizontal, if possible, on saw horse or in vise.
            (b) Use thumb of left hand for guide (note left-handed students).
            (c) Cut 1/16" from line in waste stock.
            (d) Start cut on back stroke.
            (e) Crosscut at 45 degrees, rip at 60 degrees.
            (f) Use long, even strokes.
            (g) Change direction by twisting slightly on forward stroke.
            (h) Use short, light strokes to complete cut.
            (i) Hold piece being cut off.
            (j) Protect teeth against foreign objects.
        (3) Safety
            (a) Keep fingers away from teeth.
            (b) Keep saw in kerf.
            (c) Do not force saw.
            (d) Replace saw on tool panel when through.
            (e) Report injuries to instructor.

* Write underlined words on chalkboard.

(Have a student or two demonstrate sawing.)

b. Special purpose saws for wood
    (1) Back saw (Display)
        (a) Used for very accurate sawing as in joint and cabinet work
        (b) 16 points per inch, filed like crosscut saw
        (c) Reinforced back
        (d) May be used for plastics

(Demonstrate use and care.)

    (2) Coping saw (Display)
        (a) For sawing irregular shapes
        (b) Blades replaceable
        (c) Ripsaw teeth
        (d) Hold work in vise or on coping saddle
            1. Vise -- teeth point forward
            2. Saddle -- teeth point to handle
        (e) Tighten blade by turning handle
        (f) Blade may be turned 360 degrees so work clears frame
        (g) May be used for plastics

(Demonstrate use and care.)

c. Hacksaw
    (1) For metal or plastics sawing
    (2) Replaceable blades
        (a) 16 teeth, thick and soft materials
        (b) 24 teeth, general purposes
        (c) 32 teeth, thin materials, conduit
        (d) Select blade that permits at least 2 teeth on material to avoid stripping teeth
        (e) Tension blade tightly
    (3) Adjustable frames for blades 6" - 12" long
    (4) Sawing (Demonstrate)
        (a) Start as you would crosscut saw or--
        (b) File notch at proper location and start saw in notch.
        (c) Hold handle and end of frame.
        (d) Use long even strokes, use body and arms.
        (e) Apply pressure on forward stroke only.
        (f) Cut at 40-50 strokes per minute.
        (g) Ease up on final strokes.
        (h) Allow 1/32" for filing to exact size.

(Have student demonstrate hack sawing.)

d. Jig Saw and Band Saw

2. Snips
    a. Types (Display each)
        (1) Straight
        (2) Curved

        (3) Compound
        (4) Aviation
    b. For cutting sheet metals only, not wire
    c. Capacity
        (1) Sheet steel - 22 ga
        (2) Aluminum, copper - 16 ga
    d. Use as you would scissors to cut paper
    e. Usually cut on line

(Demonstrate use of each snip.)

3. Cold chisels
    a. For shearing cold metals sheet, band iron, rivets, etc.
    b. Check cutting edge - sharp, 60 degrees bevel, no mushroomed head
    c. Hold work in vise or on scrap.
    d. Wear goggles.
    e. Grasp chisel firmly.
    f. Place on line, watch head of chisel and strike sharp blows with ball peen hammer.
    g. Warn and watch for others.

(Demonstrate shearing piece of band iron.)

4. Pliers -- Use only wire cutting pliers to cut wire
    a. Diagonals
    b. Linemans
    c. Common -- slip joint

5. Lathe

6. Drill Press

Summary

1. This unit prepares you to cut wood, metals and plastics to rough size.
2. Names of tools used to cut rough size
    a. Ripsaw
    b. Crosscut saw
    c. Backsaw
    d. Coping saw
    e. Compass saw
    f. Tinner's snips
    g. Hacksaw
    h. Cold chisel
    i. Pliers
3. Safety and care of tools
    a. Pay attention to what you are doing.
    b. Never place hand in front of an edge tool.
    c. Exercise caution especially when starting a cut with saws.
    d. Report all injuries to instructor.
    e. Keep your tools in an orderly array on the work bench.
    f. Return tools to panel as soon as you are through with them.

Summary Questions

1. Which tool would you use to
    a. Cut a board to length?
    b. Cut a board to width?
    c. Cut a 4" circle in sheet rock?
    d. Cut out a star in 3/8" plywood?
    e. Cut a curved layout in 24 ounce copper?
    f. Saw a diagonal line in 3/4" board?
    g. Cut off 3/8" steel rod?
    h. Cut a figurine in 1" white pine?
2. Why are the teeth on a crosscut saw filed to a knife like point?
3. Why is a block of wood sometimes used as a guide when cutting with a backsaw?
4. How many teeth should always be touching when cutting metal with the hacksaw?
5. Why is it important to check your layout before cutting?
6. Name six kinds of saws.
7. Why is a cold chisel sometimes used instead of a hacksaw?
8. Which tools may be used to cut wood only? Metal only? Wood or metal?
9. Why should tools be returned to the panel as soon as possible?

Assignment

1. Be prepared to give a demonstration to class on the use of any cutting tool.
2. Study your text for further information.
3. Cut your stock to rough size.

Method of Testing

1. Objective test
2. Evaluate student's choice, use, and care of tools.
3. Have student investigate a material cutting method in industry and report to class or write the report.

Lesson 10

CUTTING TO EXACT SIZE

Note to Instructor

Most students eagerly await the moment when they can begin cutting materials to size and assembling them. It is important that they know the basic tools used and the procedures for cutting to exact size. This lesson should provide students with knowledge and skills that will help them in cutting to exact size. Although all students are not expected to develop the same degree of skill in this lesson, they should obtain the necessary information and procedures so they can further develop skills as they work in the laboratory. You may wish to add instruction in the use of the bench grinder and the belt and disc sanders to this lesson.

Objectives

The students will be able to
1. Select and demonstrate the proper use of the common tools.
2. Explain the importance of accuracy to good craftsmanship.
3. Describe and demonstrate the best procedure for accomplishing a task.

Time Required One to two days

Instructional Aids

1. Chalkboard
2. Charts -- Stanley Tool Charts
3. Textbook
4. Tools
    a. Jointer plane
    b. Fore plan
    c. Jack plane
    d. Smooth plane
    e. Block plane
    f. Spokeshave
    g. Rabbet plane
    h. Wood chisel
    i. Mallet
    j. Try square
    k. Square file
    l. Round file
    m. Three-square file
    n. Mill file
    o. Flat file
    p. File card
    q. Wood and metal samples

Introduction

After your material has been cut to rough size, enter the exact amount of material used on your stock record card.

You are then ready to cut the material to its exact size prior to assembly or prior to making provision for fastening. In some instances you will find that after cutting to rough size no further processing is necessary. Tin snips, for example, are usually used to cut sheet metals to exact size.

When you made your layout, you made lines on your materials. When you cut it to rough size you cut outside of the line or in the waste stock. At all times you were careful not to cut into the line. While cutting to exact size you must also be careful not to cut past the line. A craftsman attempts to "split" the line when cutting to exact size. If you cut past the layout lines, the accuracy and precision of the part will be destroyed.

Subject Matter Outline

1. Planes* - for wood or plastics
    - a. Kinds (Display each)
        - (1) Block plane, 5" - 7"
        - (2) Smoothing plane, 8" - 9"
        - (3) Jack plane, 11" - 14"
        - (4) Fore plane, 18"
        - (5) Jointer plane, 22" - 24"
        - (6) Rabbet plane
    - b. Employ bevel edged cutter, plane iron
        - (1) Chip breaker (plane iron cap) curls chip
        - (2) Must be sharp
    - c. Adjustments (Demonstrate)
        - (1) Depth
        - (2) Lateral
    - d. Selection (Demonstrate)
        - (1) Block plane for end grain
        - (2) Largest hand plane you can handle and that will fit surface to be planed (Use jack plane for general purpose.)
        - (3) Rabbet plane, for rabbets or similar cuts
    - e. Use (Demonstrate)
        - (1) Clamp material in vise or against bench dog.
        - (2) Hold knob in left hand, handle in right.
        - (3) Apply pressure on knob at start of cut; on handle at end of cut.
        - (4) Hold parallel and square with surface.
        - (5) Use body to help push plane.
        - (6) Plane with grain.
        - (7) Plane end grain slightly over halfway from both ends.
        - (8) Plane to line only.
        - (9) Lay on side when not in use

*Write underlined words on chalkboard.

f. Squaring a board (Demonstrate procedure) (List on chalkboard)
    (1) True working face.
    (2) Plane working edge true and square with working face.
    (3) Plane working end true and square with face and edge.
    (4) Plane other end true and square.
    (5) Plane other edge true and square.
    (6) Mark and plane to thickness.

2. <u>Spokeshave</u>
    a. A plane with a short bed and two handles
    b. Use to plane irregular surfaces
    c. Push or pull (Demonstrate)

3. <u>Chisels</u>
    a. Most dangerous hand tool
    b. Keep both hands on chisel or behind cutting edge.
    c. Must be sharp
    d. Use to trim or pare (Demonstrate)
    e. Drive with mallet only.

4. <u>Files</u>
    a. Kinds (Display each) (Refer to file chart)
        (1) Flat - double cut
        (2) Mill - single cut
        (3) Round
        (4) Square
        (5) Triangular
        (6) Half round
    b. Selection
        (1) Choose file to fit surface.
        (2) Double cut files cut rapidly--wood, metal or plastics.
        (3) Single cut files produce smooth finish--metal or plastics.
        (4) Rasps - for wood or soft metals
        (5) Shear tooth - soft metals
        (6) Always fit handle to file.
        (7) Files are hard and brittle.
    c. Use (Demonstrate)
        (1) <u>Crossfiling</u>*
            (a) Clamp or hold work securely.
            (b) Use long even strokes.
            (c) Relieve pressure on backstroke.
            (d) Clean with file card or brush.
            (e) Protect teeth.
        (2) <u>Drawfiling</u> - metals only
            (a) Use mill file.
            (b) Hold at right angles to surface.
            (c) Move back and forth.
            (d) Clean teeth frequently.

5. <u>Grinder</u>

* Write underlined words on chalkboard.

6. Belt and Disc Sander

Summary

Bevel-edged tools are used to cut woods principally, but may be used on plastics also. Files are principally for use on metals, but they find uses on wood and plastics also. Rasps are generally used on wood or soft metals such as lead.

Summary Questions

1. Name the different kinds of planes and identify each.
2. Name the different kinds of files and identify each.
3. What is the procedure for squaring a board?
4. How can you keep end grain from splitting?
5. Describe drawfiling. Crossfiling.
6. Compare the cutting action of a plane, chisel and a file.
7. What would probably happen if you should drop a plane on a concrete floor?
8. Why should the plane be placed on its side when not in use?
9. Why is it important to just "split" the line when cutting to exact size?

Assignment

1. Read your text.
2. Cut your materials to exact size.

Method of Testing

1. Objective test
2. Evaluate student's selection, use and care of tools.

ASSEMBLING AND FASTENING

Note to Instructor

With the methods of fastening and assembling materials changing rapidly it will be impossible to cover all types and procedures in detail during this unit. However, the basic methods used for fastening and assembling are presented so the student can select a method most suitable for his situation. The tools and equipment used to fasten and assemble are also covered since they are common to the basic methods of fastening and assembling.

Objectives

The students will be able to
1. Describe and identify several kinds of fasteners and methods of assembly.
2. Select proper fasteners and fastening techniques for a job.
3. Identify the common joints used in construction.

Time Required One - two days

Instructional Aids

1. Display board of common wood and metal fasteners
2. Display of common joints used in wood
3. Display of common seams and joints used in metals
4. Chalkboard
5. Tools and materials
   a. Scrap wood
   b. 3/8" dowel rods or pins
   c. Brace
   d. Automatic screwdriver
   e. Drift punch
   f. Sheer metal scraps
   g. Handscrew, "C" clamp
   h. Bar clamp
   i. Hammer (claw and ball peen)
   j. Screwdrivers
   k. Nail set
   l. Hand drill
   m. Countersink
   n. Glue
   o. Rivets
   p. Riveting hammer
   q. Rivet set
   r. Solder
   s. Soldering iron
   t. Flux
   u. Twist drill

    v. Hand groover
    w. Gas welding outfit
    x. Nail assortment
    y. Screw assortment
    z. Hand seamer - brake
6. Charts
    a. Nail chart (General Motors)
    b. Screw chart (General Motors)
7. Film #556, "Using Screws and Nails." Georgia Department of Education, Film Library.

Introduction

There are dozens of different kinds of fasteners used to hold materials together. We cannot hope to study all of them in this course. We will, however, learn something about some of the more common fasteners and fastening techniques.

Basically, materials are held together by adhesion (gluing, soldering), cohesion (welding, solvent cementing) and mechanical linkage (nails, screws, bolts).

Your choice of a fastener or fastening technique will depend upon the nature of the article you plan to assemble. For high quality furniture you would choose joints and glue and possibly screws. For a crate to ship a dog in, you would probably use common nails. To fasten metal together you might solder, braze or weld, or you might use a joint, bolt, rivet or screw of some type.

The film you are about to see deals with nails and screws and the technique for using each. Make notes of the different kinds. When the film is finished, let us see how many you can identify.

(Present film - "Using Screws and Nails." After film, ask students to identify various nails and screws and tell where they are used.)

Subject Matter Outline

1. Nails commonly used
    a. Kinds (Refer to nail chart. Display each kind.)
        (1) Common*
        (2) Finish
        (3) Box
        (4) Wire nails
        (5) Wire brads
    b. Size is referred to as penny - "d." (Note nail chart for lengths of various penny designations.)
    c. Wire nails and brads are sized in inches of length and wire gauge diameter.

* Write underlined words on chalkboard as these are new words in industrial arts students' vocabularies.

- d. Selection of nails
    - (1) Rough work - common or box
    - (2) Finish work - finishing
    - (3) Wire nails, brads - for small pieces
    - (4) In general, length should be 3 times thickness of top piece being nailed.
- e. Drive nails with a hammer (Demonstrate).
    - (1) Choose 7-13 oz. claw hammer.
    - (2) Grasp near end of handle.
    - (3) Hold nail near head in thumb and forefinger.
    - (4) Tap nail lightly to start.
    - (5) Remove fingers from nail and drive nail home.
    - (6) Use wrist and forearm motion.
    - (7) Set finishing nails with nail set.

2. Screws hold more securely than do nails.
    - a. Kinds (Refer to screw chart)
        - (1) Flathead
        - (2) Roundhead
        - (3) Ovalhead
        - (4) All are available in wood screws and machine screws.
    - b. Sizes
        - (1) Length in inches
        - (2) Diameter in wire gauge (Compare this with gauges of wire brads.)
    - c. Selection of screws
        - (1) Available as blued, bright, chrome, brass
        - (2) Flathead - should not be visible in use
        - (3) Round or oval head - where visible in use
        - (4) In general, length should be 2-2 1/2 times thickness of top piece.
        - (5) All kinds are available with a standard slot or a crossed slot.
    - d. Drive screws with a <u>screwdriver</u> (Demonstrate)
        - (1) Drill pilot and shank holes with <u>hand drill</u> and twist drill.
        - (2) Counter sink for flat or oval head screws.
        - (3) Point of screwdriver should fill slot in screw head (standard or crossed slot) to prevent damage to screw and screwdriver.
        - (4) Wax or soap screw for hard wood.
        - (5) Guide tip of screwdriver with left hand.
        - (6) Automatic screwdriver requires care in using.
    - e. Machine screw nuts should be tightened with a wrench.

3. Glues and gluing (Demonstrate)
    - a. Variety of kinds
        - (1) Animal
        - (2) Casein
        - (3) Resin
        - (4) Contact cement
    - b. Pieces of wood must fit well
    - c. Apply glue to surface - work rapidly.
    - d. <u>Clamp</u> - prepare clamps prior to applying glue
        - (1) Bar or cabinet
        - (2) "C"
        - (3) Hand screws

    e. Remove excess glue with damp cloth.
    f. Observe drying time.

4. Joints for wood (Display each)
    a. Butt - common, cheap construction
    b. Rabbet - good corner joint for boxes
    c. Dado - good for shelves
    d. Dowel - table tops, rails and legs (butt joint with dowels added)
    e. Mortise and tenon - good furniture joints
    f. Miter joint - picture frames, window screen frames

5. Soldering sheet metals (Demonstrate)
    a. Clean metals - copper, gal. iron, black iron, tin plate.
    b. Clean soldering copper or iron.
    c. Heat and tin tip.
    d. Select acid core solder - 50-50.
    e. Apply tip to joint and heat.
    f. Apply solder and sweat joint, avoid fumes.
    g. Solder must be in joint - not on surface.
    h. Wash off acid flux.

6. Brazing and welding (Demonstrate)
    a. Clean metals, chamfer if necessary.
    b. Place pieces in position on welding table.
    c. Put on welding goggles.
    d. Open tank valves.
    e. Adjust regulators, light and adjust touch.
    f. Braze with brazing rod and flux.
        (1) Heat to cherry red.
        (2) Apply rod.
        (3) Allow to cool slowly.
    g. Weld with filler rod.
        (1) Puddle.
        (2) Add filler rod.
        (3) Allow to cool slowly.
    h. Shut off equipment.

(Compare welded, brazed and soldered joints and the processes involved.)

7. Riveting sheet metals (Demonstrate)
    a. Locate holes.
    b. Drill or punch holes in metal on end grain wood block.
    c. Insert rivet and draw.
    d. Upset rivet shank with riveting or ball peen hammer. Use least number of sharp blows to avoid work hardening rivet.
    e. Ornament rivet with rivet set or peen.

8. Sheet metal joints
    a. Grooved seam - for stove pipe, cans, etc.
        (1) Provide sufficient material for seam.
        (2) Bend edges to be joined in opposite directions.
        (3) Form sheet and join.

    - (4) Set down with hand groover and hammer over conductor stake.
    - (5) Solder.
  - b. Lap joint - for boxes, trays, etc.
    - (1) Provide a tab for joint.
    - (2) Bend with hand seamer or brake.
    - (3) Solder.

9. Plastics may be fused together with a solvent cement or a plastic cement.

Summary Questions

1. What advantage does a dowel joint have over some of the other joints?
2. In making the bends for a lap joint, how are the bends made?
3. What is a rivet set?
4. Name three kinds of nails.
5. What are the advantages of using nails? Disadvantages?
6. Why is a pilot hole necessary when driving screws?
7. What is the difference between brazing, welding and soldering?
8. What is the difference between gluing and cementing?

Assignment

1. Read your text.
2. Select the proper fasteners for your job.

Methods of Testing

1. Objective test.
2. Fastener identification.
3. Evaluation of selection and use of fasteners and assembly techniques.

FINISHING

Note to Instructor

Most students eagerly await the moment when they can apply a finish to the project. Be sure the project is ready for a finish by making the student aware of the fact that once a scratch or blemish is covered by the finish it will remain there, visible evidence of a lack of craftsmanship.

A cooperative attitude must be developed toward using the finishing facilities as they will be more crowded at times than desirable. Also, an attitude toward keeping the finishing room clean and neat at all times should be developed.

As you introduce this unit, ask the students to look at your finished samples and to react to them. Also show them the samples with defects. Ask for their comments.

Objectives

The students will be able to

1. Select the various materials and demonstrate the techniques involved in applying finishes.
2. Cooperate in the use of the facilities for finishing.
3. Recognize various finishes and explain their advantages and disadvantages.

Time Required One to two days

Instructional Aids

1. Film, "Industrial Arts: Wood Finishing," #4386, Georgia Department of Education Film Library
2. Display illustrating the steps in the finishing process
3. Finished samples (Rubbed down where appropriate)
    a. Pine - enamel
    b. Maple - varnish
    c. Walnut - stain, fill, lacquer
    d. Mahogany - stain, fill, lacquer
    e. Copper - clear, lacquer
    f. Mild steel - enamel
4. Finished samples with defects
    a. Tool marks
    b. Sanding scratches
    c. Improper filling
    d. Rubbing defects
    e. Runs and sags
    f. Laps
5. Chalkboard
6. Tools and Materials
    a. Pieces of wood (dressed)
    b. Hand scraper

c. Garnet paper (1/2, 1/0, 2/0, 3/0, 4/0)
d. Crack fillers
e. Shellac and alcohol
f. Stain (water, oil, NGR)
g. Paste wood filler
h. Copper (sheet)
i. Buffing wheel
j. Lacquer and thinner
k. Pumice stone
l. Rubbing oil
m. Rubbing block
n. Wax
o. Brushes
p. Spray gun
q. Soldering copper and damp cloth
r. Rags
s. Varnish
t. Paint or enamel

Introduction

Finishes are classified as opaque or transparent. Opaque finishes, such as paint and enamel, hide the material under them. They are usually used on inexpensive woods and metals. Transparent finishes, such as shellac, lacquer and varnish, permit the material under them to show through. Fine woods should always have a transparent finish applied. Nonferrous metals, such as copper and brass usually have a transparent finish applied so that the color of the metals is visible. Aluminum requires no finish as an oxide forms on its surface and protects it from tarnishing.

Finishes are applied for several reasons. On wood, the finish keeps moisture out, prevents decay, helps keep it sanitary and beautifies. On metals, finishes beautify and prevent oxidation.

When you are preparing your work for a finish, you must remove all visible tool marks, sanding scratches, dirt, oil, glue and the like. The adage, "cleanliness is next to Godliness," applies here too.

While work is being finished you must exercise care not to spoil your classmate's work.

The finishing material and application techniques discussed in this lesson are presented in the order in which they usually occur. See if you can develop the correct procedure for applying each type of finish by the time we complete the lesson.

Subject Matter Outline

1. Prepare the surface - wood (Display materials and demonstrate use).
   a. Repair damaged portions.
   b. Remove mill marks, scratches, etc..
      (1) Scraper*
      (2) Abrasives - garnet paper 1/2, 1/0, 2/0, 3/0, 4/0
         (a) With grain only

*Write underlined words on chalkboard.

(b) Use sanding block
(c) Finish sand with 3/0 or 4/0.
c. Fill cracks and holes.
(1) Shellac stick
(2) Plastic wood
(3) Putty
(4) Water putty
(5) Glue and sawdust
d. Remove all glue, oil, and dirt.
e. Raise dents, damp cloth and soldering copper.
f. Inspect for scratches.
g. Raise grain of open grain woods.
h. Sand with 4/0 garnet finishing paper.

2. Prepare the surface - metals and plastics
a. Copper
(1) Remove scratches.
(a) Files
(b) Abrasives
1. Aluminum oxide
2. Silicon carbide
(2) Polish and buff.
(3) Clean in one part nitric acid and four to six parts water.
(4) Rinse in water.
b. Aluminum and Plastics
(1) Remove scratches.
(a) Files
(b) Water and pumice
(2) Polish and buff.
c. Galvanized iron - remove oil film and etch with vinegar.

3. Stains - transparent (Display each)
a. Purpose - To color wood more uniformly. Woods such as cherry, walnut, mahogany, etc., except when bleached, are always stained in good furniture. Stains may be very light.
b. Types
(1) Water - used on best furniture
(a) Deep penetration
(b) Great variety of colors
(c) Does not fade
(d) Inexpensive
(e) Raises grain
(f) Apply with brush or spray
(g) Drying time - six hours
(2) Oil - turpentine
(a) Rich, mellow tones
(b) Available in colors of most important furniture woods
(c) Easy to mix
(d) Easy to apply - brush on and wipe off with rag
(e) Color fades with exposure to light
(f) Drying time - 24 hours
(3) Non-grain raising - NGR
(a) Recently developed
(b) Good penetration

        - (c) Light fast
        - (d) Apply by spraying
        - (e) Expensive
        - (f) Dries in two to four hours
    - c. Application (Demonstrate)
        - (1) Brush with grain - full length. May be sprayed.
        - (2) Stain removable parts separately.
        - (3) Stain inside surfaces first.
        - (4) After dipping the brush, begin on unstained part and brush into stained portion.
        - (5) Stain sapwood first and allow to dry. Do general staining afterward.
        - (6) When dry, apply wash coat of shellac (one part shellac - five alcohol). (Sand lightly with 4/0 when dry.)
        - (7) Apply stain solvent to end grain before staining to limit absorption of stain.
        - (8) Clean brushes.
    - d. Some articles may be dipped.

4. <u>Wood fillers</u>
    - a. Purpose - to fill pores of open-grained woods to produce a perfectly smooth surface.
    - b. Available in natural or colored pastes. Quick dry requires about two hours to dry; others 24 hours. Quick dry has a special thinner.
    - c. Uses
        - (1) May be used as the stain on dark wood (not good practice).
        - (2) Two-tone effects possible.
    - d. Application (Demonstrate)
        - (1) Mix filler with proper thinner to consistency of thick cream.
        - (2) Add color if necessary.
        - (3) Brush on with stiff brush, across grain.
        - (4) Rub off when gloss begins to dull, use burlap and rub across grain. Best work requires at least two applications.
        - (5) If filler has set, moisten rag with proper thinner to remove excess.
        - (6) Stir filler each time before dipping out.
        - (7) Polish lightly with soft cloth, with grain.
        - (8) Allow two to 24 hours to dry, depending on type of filler used.
    - e. Close-grained woods are given a coat of shellac to fill the pores. Woods like cherry require a very thin paste wood filler.

5. <u>Shellac</u>
    - a. Available in "four-lb cut" in orange or white. Alcohol is solvent.
    - b. Application (Demonstrate)
        - (1) Use one part shellac to three to four parts alcohol for first coat; one part shellac to two alcohol for last coats.
        - (2) Brush with the grain.
        - (3) Pick up runs immediately.
        - (4) Difficult to avoid laps
        - (5) Allow two to six hours to dry.
        - (6) Rub down between coats with 2/0 steel wool - with grain.
        - (7) Finish rubbing with FFF powered pumice stone and oil.
        - (8) Clean and wax.
        - (9) Store brush with bristles in shellac or clean brush.

c. French Polish
   (1) Apply thin films of shellac with pad.
   (2) Use linseed oil to lubricate pad.
   (3) Difficult and tedious to apply except on lathe

6. Varnish
   a. Available in many grades
   b. Transparent, dries hard and resists heat
   c. One of the best finishes for furniture
   d. Cracks, dulls and becomes ugly with age if not cared for
      (1) Avoid oily polishes.
      (2) Avoid rapid temperature changes.
      (3) Avoid sunlight.
      (4) Keep waxed.
   e. Application
      (1) Room, clothes and article must be dust-free.
      (2) Room temperature - 80 degrees
      (3) Use varnish as it comes from can. Thinning with turpentine causes it to lose its luster.
      (4) Easy to apply; brush out well, avoid piling up. Brush with grain.
      (5) Allow 24-48 hours to dry.
      (6) Clean brush or store with bristles in covered 50%-50% turpentine-linseed oil.
      (7) Three to four coats usually applied.
      (8) Sand with 2/0 paper between coats.
      (9) Rub down last coat with FFF pumice stone and oil for a satin finish. Rottenstone and oil will produce a highly polished finish.

7. Linseed Oil Finish
   a. Purpose - to produce a soft sheen and to bring out the color and grain in the wood.
   b. Application
      (1) Add two to three parts of turpentine to one part of boiled linseed oil.
      (2) Fill the article and allow 48 hours to dry.
      (3) Apply oil with a rag - use plenty of oil; allow to soak in for 30 minutes.
      (4) Rub surface hard and vigorously with a dry clean cloth to prevent surface from becoming sticky.
      (5) Allow 24 hours between coats; apply at least three to four coats.
      (6) Repeat (3) and (4) every three months for two to three years.

   CAUTION: Rags used for this finish are apt to start fires due to spontaneous combustion. Store them in a covered metal container.

8. Lacquer
   a. Available in colors, clear and water white; also made specifically for wood or metal. The best furniture finish. Clear metal lacquer keeps copper from oxidizing.
   b. Difficult to apply on all but small objects by brushing. Usually sprayed.

c. Dries quickly, withstands heat and cold, does not crack easily, resistent to water.
d. Application - brushing (Demonstrate)
    (1) Usually must be thinned. Use lacquer thinner only.
    (2) Apply with soft brush and work rapidly. Lay on rather than brush.
    (3) Two to three coats should be sufficient.
    (4) Sanding between coats necessary only to remove imperfections.
    (5) Final coat may be sanded with 5/0 wet or dry paper and water and then rubbed down with FFF pumice stone and oil, cleaned and waxed.
    (6) Care for brush.
e. Application - spraying
    (1) Select spray gun.
    (2) Apply sanding sealer to wood. Primer to metal.
    (3) Sand.
    (4) Apply three to four coats of lacquer.
    (5) Thin as necessary.
    (6) Hold spray gun at right angles six inches to eight inches from work. Keep gun moving.
    (7) Use 35-40 lbs. air pressure.
    (8) Spray in booth only.
    (9) Insure adequate ventilation.
    (10) Clean gun.

9. Paint and enamel
    a. Opaque finishes - conceal material on which applied
    b. Available in many colors
    c. Easy to apply
    d. Application
        (1) Surfaces must be smooth and free of oil and grease.
        (2) Soft and pitchy woods should be shellacked first.
        (3) Porous woods should be filled.
        (4) Add about one pint of boiled linseed oil to one gallon of flat paint for a prime coat for paint or enamel.
        (5) Sand lightly between coats; apply two or three coats after primer.
        (6) Apply last coats without thinning.
        (7) Allow 24-48 hours to dry.
        (8) Enamels may be rubbed with FFF pumice and oil when dry.
        (9) Clean brushes.
    e. Some articles may be dipped.

NOTE: A primer and one coat of paint may be applied first and a coat of enamel used for the finish coat. Good enamels dry slowly and about two to four days should be allowed for thorough drying.

10. Brushes
    a. Use only the best quality brushes.
        (1) Bristle, hog
        (2) Nylon bristle (not for NGR stain or lacquer)
    b. Cleanliness is extremely important.
    c. Clean brushes in proper solvent after using and wash in good household detergent and water.

11. Pumice stone and rotten stone
    a. Used for rubbing down last coat of finish. Rubbing compounds are also available.
    b. Pumice stone and water may be used for rubbing down between coats as well as last coat.
    c. Use with rubbing oil or 50-50 kerosene-lubricating oil mixture for final coat only. Oily film left between coats creates problems.
    d. Rotten stone is finer than pumice stone and is used to produce a polished finish. Pumice stone produces a lustrous finish.
    e. Use a heavy piece of felt for rubbing down.
    f. After rubbing, wipe clean and spirit off oil film with cloth dampened in alcohol.

12. Protect a good finish with an application of good paste wax. The wax is replaced more easily than the finish.
    a. Rub on.
    b. Allow to dry for 10-20 minutes.
    c. Polish.

Summary Questions

1. When would you use an opaque finish? A transparent finish?
2. Why should you apply a transparent finish to a piece of mahogany or copper?
3. Aluminum is given a silvery appearance by polishing and buffing. Why is it good practice not to lacquer aluminum as we do copper?
4. Why are finishes applied to materials?
5. Describe the procedure for applying the following finishes
    a. Paint
    b. Enamel
    c. Oil
    d. Natural maple lacquered
    e. Maple, stained and varnished
    f. Lacquered walnut

(Present display of steps in the finishing process.)

6. Why are most fine furniture woods stained to at least a small degree?
7. Which is the best stain? Which is the easiest to apply?
8. Why are open-grain woods filled?
9. Explain how one may remove paint from a can and avoid filling the rim with paint?
10. Describe the proper technique for applying paint to a surface with a brush.

(Present the film "Industrial Arts: Wood Finishing" as a review of this lesson.)

Assignment

1. Study your text.
2. Select and apply a suitable finish to your work.
3. Have selected students prepare reports on the manufacture of one of the various finishes.
4. Have a student or two visit a local industry that applies finishes and report on the process to the class.

Methods of Testing

1. Objective tests
2. Procedure tests
3. Evaluation of student's application of knowledge

Lesson 13

CARING FOR AND MAINTAINING TOOLS AND EQUIPMENT

Note to Instructor

This lesson is planned to help the student become familiar with how the tools in the laboratory are cared for and maintained. He should have some responsibility in caring for and maintaining tools and equipment. The importance of this should be stressed constantly.

At the start of the course all tools and equipment should be in good condition. As the course proceeds, all students should be required to share in tool sharpening and equipment maintenance. Only a few may be trusted to sharpen saws, auger bits, drills, etc.

Objectives

The students will be able to

1. Explain the necessity of caring for and maintaining tools and equipment.
2. Determine when a tool is not in the best condition and explain what remedial measures are necessary.
3. Demonstrate and explain the proper care and maintenance of machines.

Time Required

Two to three days

Instructional Aids

1. Chalkboard
2. Film - "ABC of Hand Tools" (General Motors Corporation)
3. Tools
    a. Plane iron
    b. Oil stone and oil
    c. Grinder
    d. Wheel dresser
    e. Oily rag
    f. Claw hammer
    g. Screwdriver
    h. Brace and bit
    i. Hand drill
    j. Scraper
    k. Mill file
    l. Burnisher
    m. Try-square

Subject Matter Outline

1. Introduction
    a. Essential to keep tools and equipment free from rust and in good operating condition.
    b. Treat tools as if they were your own, which they are while in this course.
    c. Store the tool properly when through using it.
    d. A good craftsman places his tools on the bench in an orderly manner.

2. Maintaining and caring for cutting edge of tools
    a. Cutting edge tools
        (1) Plane iron

        - (2) Chisels and turning tools
        - (3) Hand scrapers
        - (4) Spoke shave
        - (5) Sloyd knife
    - b. Inspect for
        - (1) Dullness
        - (2) Nicks
        - (3) Bevel rounded or worn down
    - c. Sharpening bevel edge tools (Demonstrate)
        - (1) Grind only if nicked or bevel worn.
            - (a) Square with side.
            - (b) Length of bevel, 2-2 1/2 times thickness (25-30 degrees).
            - (c) Concave bevel results from shape of grinding wheel.
            - (d) Wear goggles.
            - (e) Keep tool cool.
        - (2) Whet when dull or after grinding.
            - (a) Place whetting oil on stone.
            - (b) Use entire surface of stone.
            - (c) Remove wire edge.
            - (d) Wipe stone clean.
            - (e) Replace cover on stone.
    - d. Sharpening scrapers (Demonstrate)
        - (1) Cross file true and square, round corners slightly.
        - (2) Draw file
        - (3) Whet
        - (4) Burnish

3. Maintaining and caring for hand planes
    - a. Check for missing parts.
    - b. Prevent rust.
    - c. Sharpen plane iron.
    - d. Check all adjustments.
    - e. Lay on side when not in use or return to panel.

4. Maintaining and caring for saws
    - a. Properly place on panel when not in use.
    - b. Use care in laying on bench.
    - c. Do not turn saw in cut to split off waste.
    - d. Avoid cutting foreign material in wood.
    - e. Do not bend blade.
    - f. Wipe with oily rag to prevent rust.
    - g. Notify instructor when saw becomes dull.

5. Maintaining and caring for auger bits and drills
    - a. Place in rack when not in use.
    - b. Keep free from rust.
    - c. Do not drop.
    - d. Report broken or dull bits to instructor.

6. Maintaining and caring for miscellaneous hand tools
    - a. Hammers
        - (1) Keep head tight by setting wedges deeper.
        - (2) Avoid hitting faces of two hammers together.
        - (3) Do not strike handle.

    - (4) Always use face of claw hammer when striking a nail.
    - (5) Use a block to assist leverage when drawing nails.
  - b. Screw drivers
    - (1) Keep tip properly shaped (Illustrate).
    - (2) Store in rack.
    - (3) Prevent rusting.
    - (4) Use correct size.
    - (5) Do not use as pry bar.
  - c. Squares
    - (1) Check parts for straightness.
    - (2) Check for squareness (Demonstrate).
    - (3) Prevent rusting.
    - (4) Do not drop.
  - d. Vises
    - (1) Lubricate working parts once a month.
    - (2) Check to see if securely fastened to bench.
    - (3) After using, tighten all the way and loosen one turn.
    - (4) Check jaws to prevent damage to material.
  - e. Wrenches
    - (1) Select proper size.
    - (2) Prevent rust.
    - (3) Return to proper storage.
    - (4) Clean after use.
    - (5) Report broken parts.
  - f. Files
    - (1) Clean after use with filecard.
    - (2) Do not use without handle.
    - (3) Right file for right job.
    - (4) Keep file in individual compartments on panel.
    - (5) Do not use oil on file (use chalk).
    - (6) Do not drag file on back stroke.
    - (7) Avoid too little pressure.
    - (8) Use carbon tetrachloride to clean.
  - g. Brace
    - (1) Place properly in rack.
    - (2) Lubricate moving parts with light oil.
    - (3) Do not tighten jaws too tightly without bit.
  - h. Hand drill
    - (1) Keep properly oiled.
    - (2) Do not tighten without drill in chuck.
    - (3) Return to rack when not in use.
    - (4) Use only round shank bits.
  - i. Oilstones
    - (1) Use 50% kerosene - 50% light oil.
    - (2) Keep covered when not in use.
    - (3) Use entire surface of stone.
    - (4) Do not place stone in vise.
    - (5) Do not drop.

7. Maintaining and caring for power equipment
  - a. Grinder
    - (1) Keep wheels true and sharp by dressing.
    - (2) Lubricate when necessary.
    - (3) Keep guards in place; rest 1/16" from wheel.

        - (2) Chisels and turning tools
        - (3) Hand scrapers
        - (4) Spoke shave
        - (5) Sloyd knife
    - b. Inspect for
        - (1) Dullness
        - (2) Nicks
        - (3) Bevel rounded or worn down
    - c. Sharpening bevel edge tools (Demonstrate)
        - (1) <u>Grind</u> only if nicked or bevel worn.
            - (a) Square with side.
            - (b) Length of bevel, 2-2 1/2 times thickness (25-30 degrees).
            - (c) Concave bevel results from shape of grinding wheel.
            - (d) Wear goggles.
            - (e) Keep tool cool.
        - (2) <u>Whet</u> when dull or after grinding.
            - (a) Place whetting oil on stone.
            - (b) Use entire surface of stone.
            - (c) Remove wire edge.
            - (d) Wipe stone clean.
            - (e) Replace cover on stone.
    - d. Sharpening scrapers (Demonstrate)
        - (1) <u>Cross file</u> true and square, round corners slightly.
        - (2) <u>Draw file</u>
        - (3) <u>Whet</u>
        - (4) <u>Burnish</u>

3. Maintaining and caring for hand planes
    - a. Check for missing parts.
    - b. Prevent rust.
    - c. Sharpen plane iron.
    - d. Check all adjustments.
    - e. Lay on side when not in use or return to panel.

4. Maintaining and caring for saws
    - a. Properly place on panel when not in use.
    - b. Use care in laying on bench.
    - c. Do not turn saw in cut to split off waste.
    - d. Avoid cutting foreign material in wood.
    - e. Do not bend blade.
    - f. Wipe with oily rag to prevent rust.
    - g. Notify instructor when saw becomes dull.

5. Maintaining and caring for auger bits and drills
    - a. Place in rack when not in use.
    - b. Keep free from rust.
    - c. Do not drop.
    - d. Report broken or dull bits to instructor.

6. Maintaining and caring for miscellaneous hand tools
    - a. Hammers
        - (1) Keep head tight by setting wedges deeper.
        - (2) Avoid hitting faces of two hammers together.
        - (3) Do not strike handle.

    (4) Always use face of claw hammer when striking a nail.
    (5) Use a block to assist leverage when drawing nails.
  b. Screw drivers
    (1) Keep tip properly shaped (Illustrate).
    (2) Store in rack.
    (3) Prevent rusting.
    (4) Use correct size.
    (5) Do not use as pry bar.
  c. Squares
    (1) Check parts for straightness.
    (2) Check for squareness (Demonstrate).
    (3) Prevent rusting.
    (4) Do not drop.
  d. Vises
    (1) Lubricate working parts once a month.
    (2) Check to see if securely fastened to bench.
    (3) After using, tighten all the way and loosen one turn.
    (4) Check jaws to prevent damage to material.
  e. Wrenches
    (1) Select proper size.
    (2) Prevent rust.
    (3) Return to proper storage.
    (4) Clean after use.
    (5) Report broken parts.
  f. Files
    (1) Clean after use with filecard.
    (2) Do not use without handle.
    (3) Right file for right job.
    (4) Keep file in individual compartments on panel.
    (5) Do not use oil on file (use chalk).
    (6) Do not drag file on back stroke.
    (7) Avoid too little pressure.
    (8) Use carbon tetrachloride to clean.
  g. Brace
    (1) Place properly in rack.
    (2) Lubricate moving parts with light oil.
    (3) Do not tighten jaws too tightly without bit.
  h. Hand drill
    (1) Keep properly oiled.
    (2) Do not tighten without drill in chuck.
    (3) Return to rack when not in use.
    (4) Use only round shank bits.
  i. Oilstones
    (1) Use 50% kerosene - 50% light oil.
    (2) Keep covered when not in use.
    (3) Use entire surface of stone.
    (4) Do not place stone in vise.
    (5) Do not drop.

7. Maintaining and caring for power equipment
  a. Grinder
    (1) Keep wheels true and sharp by dressing.
    (2) Lubricate when necessary.
    (3) Keep guards in place; rest 1/16" from wheel.

        (4) Always wear goggles.
    b. Drill press
        (1) Keep belt tight.
        (2) Oil when needed.
        (3) Always remove key from chuck.
        (4) Clean when finished.
        (5) Wear goggles.
        (6) Always clamp metals before drilling.
        (7) Lubricate as necessary.
    c. Wood lathe
        (1) Keep live center sharp.
        (2) Lubricate as necessary.
        (3) Do not use oversize stock.
        (4) Use correct speeds.
        (5) Keep lathe tools sharp.
        (6) Clean when finished.
        (7) Wear goggles.
    d. Jigsaw
        (1) Keep blade tight.
        (2) Oil when needed.
        (3) Clean when through using.
        (4) Use proper speeds.
        (5) Keep hold down on work.
    e. Band saw
        (1) Relieve tension when not in use.
        (2) Oil when needed.
        (3) Keep table clean and waxed.

Summary Questions

1. Name six cutting edge tools.
2. When should an edge tool be ground?
3. What gives the edge a concave shape?
4. What is used to achieve a razor sharp edge?
5. What precautions should be observed to prevent rust on tools and equipment?
6. How is a grinding wheel sharpened?
7. What is the shape of a correctly ground screwdriver tip?
8. Explain why an auger bit should not be placed in the hand drill chuck.
9. What is the reason for using the entire surface of an oilstone when whetting?
10. Explain why a craftsman keeps his tools in good condition and arranges them neatly on his work bench while working with them.

(Introduce and present film "ABC's of Hand Tools.")

Assignment

1. Be prepared to sharpen various tools.
2. Oil machinery as directed.
3. Read your text.

Methods of Testing

1. Give objective tests.
2. Evaluate students' ability to maintain tools and equipment.
3. Observe and evaluate students' care of tools and equipment.

Lesson 14

PRODUCT ENGINEERING

Product Engineering is specifying, interpreting and modifying for manufacture and marketing purposes the nature, performance, and quality characteristics of a product. This function may be performed by a person or group of persons in industry. They would specify certain materials, processes and procedures which have to do with the manufacture of the product. These persons will also check for performance and quality characteristics of the product before it is manufactured in any great quantity.

Product Design is specifying by means of drawings, instructions, standard practices and otherwise, the shape, composition, performance and quality characteristics required of products.

Engineering Testing is verifying the intended product compliance with established standards for quality, performance, reliability, manufacturability and serviceability. These engineers evaluate products for their performance, reliability, quality and serviceability. In addition to this, they evaluate the manufacturing systems, operations and facilities to help manufacture the best product for the least possible cost. They make charts and graphs to indicate the performance of the products and the performance of the manufacturing system to produce the product.

Sales Assistance provides engineering aid in adapting products to customers' requirements. These people prepare estimates and proposals on nonstandard products. They also consult with the engineers and designers on product applicability. These are the persons in industry who work with sales representatives and the manufacturing firm to assure the proper installation of the product for the best service results.

Factory Follow-Up provides engineering assistance to eliminate manufacturing difficulties. When there is a change in design by the designers, factory follow-up is responsible for getting the changes to the production lines.

Objectives

The students will be able to
1. Make an evaluation of a saleable product that will meet the conditions of effective competition.
2. Create plans for a product to meet new needs, or new models of old products to serve new uses.
3. Make a determination of the attributes of a finished product.
4. Evaluate the values of the service a product is expected to render.
5. Write a brief report on how industrial testing functions and makes a contribution to the consumer.
6. Evaluate testing functions as they apply to the product, materials, and processes.
7. Evaluate, modify and consolidate the individual estimates to get a product sales forecast.

Time Required One to two weeks

Instructional Aids

1. Films
    a. "A Better Way"
    b. "Cross Section of America"
    c. "Men and Machines, Of"
    d. "Aluminum Is Not Only Aluminum"
2. Filmstrips
    a. "Industrial Engineering," SVE A636-2
    b. "Production Engineering," SVE A636-3
3. Samples of various types of materials wood, wire, metal, plastic, paper, etc.
4. Charts
    a. How Steel Is Made - U. S. Steel
    b. Mechanical Drawing Wall Charts (F. Post Co.)
    c. Decimal Equivalent and Tap Drill Sizes (L. S. Starrett Co.)
    d. Products of American Forest - American Forest Products Industries, Inc.
5. Pamphlets
    a. "Engineering"
    b. "Engineering Development"
    c. "Industrial Engineering Management"
    d. "System Analyist: A Software Specialist"
    e. "Student Workbook: Widening Occupational Roles Kit"

Introduction

There are two major design functions, product design and process design. Product design determines what attributes the finished product should have to enable it to give the required customer service. Process design determines the methods and conditions that are required to make a product that has these attributes. Both design functions must be realistic in dealing with the requirements of quantity, time and cost. Both functions result in or affect the determination of all basic types of standards in a manufacturing enterprise. These functions, therefore, affect all classes of management decisions, directly and indirectly.

Subject Matter Outline

1. Product design
    a. Specifying by means of
        (1) Drawing
        (2) Instructions
        (3) Standard practices
        (4) Shape
        (5) Composition
        (6) Performance
        (7) Quality characteristics required of products
    b. Prepare working drawings
    c. Prepare instructions, standard practices, materials, specifications and the like.

2. Engineering test
   a. Verifying intended product compliance with established standards for
      (1) Quality
      (2) Performance
      (3) Reliability
      (4) Manufacturability
      (5) Serviceability
   b. Evaluate product performance, reliability, quality and serviceability.
   c. Evaluate manufacturing systems, operations and facilities.

3. Factory follow-up
   a. Provide engineering assistance to eliminate manufacturing difficulties.
   b. Interpret product designs and specifications.
   c. Define manufacturing problems.
   d. Secure product design and specification changes.
   e. Provide engineering advice.

4. Sales assistance
   a. Provide engineering aid in adapting products to customers use requirements.
   b. Prepare estimates and proposals on nonstandard products.
   c. Consult on product applicability.
   d. Direct product installations.

Counselor Interaction

Begin filling out student record book in "work." Invite students to review pamphlets on occupations.

Summary

1. The functions of product design are
   a. Experimentation
   b. Establishing preliminary specification
   c. Making preliminary sketches and drawings
   d. Making models or prototypes
   e. Testing the models
   f. Analyzing the performance of the models
   g. Making the final drawings
2. The function of product engineering
   a. Instigating ideas
   b. Planning on the projects
   c. Selection of the projects
   d. Establishment of the priority of projects
   e. Programming of projects
   f. The controlling of projects
3. Engineering tests
   a. Saleable product, that will meet the conditions of competition
   b. Requests for new products to meet new needs, or new models of old products to serve new uses
   c. Involves considerations of many marketing, manufacturing and financial problems

    d. Coordinates the work of the plants in the technical design and development of product
    e. Participates in long-range company planning with particular reference to technical developments that may affect new-product offering and requirements for new facilities
4. Sales assistance
    a. Make sales forecasting with prediction of some future time periods.
    b. Forecasting methods with the distinguish characteristics basis
        (1) Method of coordinating opinion
        (2) Statistical forecasting techniques
        (3) Method based directly on market research
    c. Promotes selling activities that supplement both advertising and personal selling.

Student Activities

1. Have students organize into groups and design a product (if not previously done) that can be produced in the laboratory.
2. Have students test product to see if it holds up to the standards set when the product was designed.
3. Have students evaluate the product that they have designed and produced to see if they have produced a quality product.
4. Have students list and discuss the problems involved in manufacturing their product.
5. Have students make out a list including instruction, standard practices, specifications and materials to be used in producing the product.
6. Have students study and compare the quality of two identical products manufactured by different corporations.
7. Have students invite a sales assistant from an industry to talk about product installation.
8. Have students study and then list some of the qualifications of a good sales assistant.
9. Have students involved in product engineering help provide advice on manufacturing problems.
10. Have students list and discuss the manufacturing problems in their group.
11. If changes are needed, have students follow the procedures set by industry for corrections.

Evaluation

1. Product engineering should
    a. Prepare working drawings.
    b. Evaluate product performance, reliability and serviceability.
    c. Secure product design and specification changes.
    d. Prepare estimates and proposals on nonstandard products.
2. Product design should
    a. Prepare working drawings.
    b. Evaluate product performance, reliability and serviceability.
    c. Secure product design and specification changes.
    d. Prepare estimates and proposals on nonstandard products.
3. There are two major design functions, product design AND process design.

[✓ T] F 4. One of the functions of factory follow-up is to secure product design and make specification changes when necessary.

Lesson 15

PATENT FOR NEW PRODUCTS

Note to Instructor

After the search has been completed, it is necessary to determine the exact extent of coverage that can be obtained on the original ideas or inventions. This is the final phase of the determination as to whether or not it is desirable to file patent applications. Here the advice of a good patent attorney is most valuable. With their background of experience in patent matters, they will probably be able to guide the inventors in making an intelligent decision in this matter. The actual preparation of the patent should be done by those experienced with the rigid requirements pertaining to drawings, descriptions and other details which are specified by the patent office.

Objectives

The students will be able to
1. Make out a patent audit sheet.
2. List the facts and details required for a patent grant.
3. Explain the importance of patents to the inventor, industry, the nation.

Time Required Two days

Instructional Aids

1. Pamphlet "The Story of The American Patent System," U. S. Govt. Printing Office, Washington, D. C. 20402
2. Chart Patents Issued Since 1790
3. Copies of
   a. New Product Audit Sheet
   b. New Product Data Sheet
   c. New Product Survey Sheet

Introduction

Under the patent system, American Industry has flourished. New products have been invented, new uses for old ones discovered, and employment given to millions.

Under the patent system a small, struggling nation has grown into the greatest industrial power on earth.

The patent laws require that patent specifications provide an adequate description of the invention. This description should be sufficiently clear so that a person skilled in the field of applicability of the patented item can make and use it. The patent must also contain definite statements or claims which describe the uniqueness of the invention and which distinguish it from other patents already in force.

Subject Matter Outline

1. Patent for new product
    a. Product audit sheet
    b. Product audit conference
        (1) Those permanently rejected
        (2) Those set aside for reconsideration
        (3) Those selected for further screening
    c. Facts about the new product
        (1) Facts are needed to support the audit
        (2) Conclusions concerning the product
            (a) Is it practical?
            (b) Can it compete?
            (c) Can it be protected by a patent?
    d. Data sheet on new product
    e. Patent survey
        (1) Patentability and validity
        (2) Patent infringement survey
        (3) Conflicting patent rights

2. The patent office
    a. History
    b. Procedure for obtaining a patent
    c. Period covered by a patent, copyright

Student Activities

1. Have students construct and fill out a New Product Audit Sheet centered around product made in class.
2. Have students write a brief report explaining the importance of having a new product patent.
3. Have a student write and present a report on the operation of the patent office.

Evaluation

1. What is a patent?
    ANSWER: A patent is a grant by the Federal Government giving an inventor the right to exclude all others from making, using, or selling his invention within the United States and its territories.
2. Patents related to mechanical, chemical or electrical are good for
    a. four, seven, or fourteen years
    b. <u>seventeen years</u>
    c. no certain number of years
    d. no restriction
3. Patents related to design are good for
    a. <u>four, seven, or fourteen years</u>
    b. seventeen years
    c. no certain number of years
    d. no restriction

PRODUCTION

Production involves developing the most economical methods and plans for manufacturing authorized products; coordinating the required manpower; securing and coordinating materials, facilities, tools and utilities; producing products, and consigning them to the marketing activity or the customer.

Production may be broadly defined as the area or phase of manufacturing that is concerned with the actual changing of natural resources into useful products.

This unit on production is one of the most important units of the study of manufacturing. In no way is it implied that production is more important than another area of activity, but all other activities of manufacturing either lead to the production department or away from it. Planning, finance, personnel, engineering, management, etc. are all supported by the efforts and outcomes of production.

Production may be divided into six sub-functions within an industry (1) plant engineering, (2) industrial engineering, (3) purchasing, (4) production planning and control, (5) manufacturing, and (6) quality control. These six sub-functions must be studied individually, but they should be viewed as fully integrated activities of production. The chart on the following page shows a typical production organization.

Note to Instructor

At this point students should have completed a very important phase in their study of manufacturing. They have been orientated to the objectives of the course and have mass produced their first product. Further, the students have been informed of the organization for manufacturing as well as the functions of the research and development and product development departments. They should now be ready for a study of the functions of production.

Objectives

The students will be able to

1. Observe five in-plant operators and accurately record the time each operator spends on a single operation and then make an analysis of the operation and write suggestions as to how the operation may be made more efficient.
2. Make an analysis of and list the operations and processes necessary for production of a given prototype.
3. Make drawings of necessary jigs, fixtures and patterns for production.
4. Construct necessary jigs, fixtures and patterns for production.
5. Construct a flow chart designating the location of equipment and the sequence of processes from receiving to shipping.
6. List at least 10 methods of material handling.
7. List six rules governing the selection of equipment utilized in material handling.

8. Demonstrate his understanding of equipment safety by scoring 100% (more than one test if necessary after further instruction) on a teacher-made test.
9. Compile a list of the utility services available in and to the plant.
10. Sketch a floor plan of the plant showing the location of each utility service.
11. Develop a form to be used as facilities maintenance records.
12. Demonstrate ability to keep maintenance records by maintaining a record of all utility repairs and services.
13. Develop a system for maintaining a clean and safe plant. The system to be developed is to include all students in the plant, provide a time limit of five minutes and meet with the instructors approval.
14. Locate and identify all capital equipment on a floor plan of the plant.
15. Compile a list of specifications of capital equipment from information presented him by the instructor.
16. Study and be able to list at least 10 duties of a purchasing agent of an industry.
17. Express his understanding of uninterrupted flow of materials and services by listing at least five ways an industry would lose profits should production cease due to lack of materials and/or services.
18. Compile a list of two suppliers of a given material and obtain price quotations from each.
19. Devise a purchase agreement which will contain sufficient amounts of material with which to produce a specified product.
20. Establish a method of disposing of surplus items or by-products to maximize profit for the industry.
21. Keep student management informed of developments concerning materials which could affect company profit or performance.
22. Contact at least two freight carriers and obtain rates and shipping routes of each.
23. Prepare an acceptable package in terms of freight carrier requirements and product being shipped.
24. Assist in unloading carriers and correlate shipping tickets with purchase orders and place them on file and inform those affected.
25. Prepare a requisition form to obtain from storage sufficient amounts of materials to produce a given number of selected products.
26. Utilizing recommendations of plant engineering, prepare a flow chart in accordance with equipment load records and specify time and place for every activity.
27. Analyze operation instruction sheets from industrial engineering and requisition needed tools, jigs, fixtures and patterns from storage.
28. Inventory all parts at each work station to determine compliance with schedule and report schedule deviations as well as manufacturing accomplishments to those concerned at the end of each work session.
29. Perform necessary operations to produce parts and combine parts to produce finished products to conform to standards established by quality control.
30. Adjust rejected, improperly manufactured or worn parts and products to meet quality control standards.
31. Establish adequate inspection methods as well as designate inspection locations and analyze product quality in accordance with limitations specified by engineering.

PRODUCTION ORGANIZATION

PLANT ENGINEERING	INDUSTRIAL ENGINEERING	PURCHASING	PRODUCTION PLANNING AND CONTROL	MANUFACTURING	QUALITY CONTROL
Utilities Design and Operation	Methods	Buying	Traffic	Part Manufacture	Control Methods Development
Facilities Design and Specification	Plant Layout	Purchase Expediting	Factory Receiving	Subassembly	Gauge Control
Plant Equipment Control	Work Measurement	Purchase Records and Files	Factory Shipping	Final Assembly	Inspection and Testing
Maintenance	Materials Handling Study	Purchase Research	Materials Procurement	Service and Repair	Customer Complaints
	Tool, Jig Fixture and Pattern Manufacture and Repair	Salvage Sales	Operation Scheduling		Salvage
			Tool, Jig, Fixture and Gauge Procurement		
			Production Instruction Distribution		
			Dispatching		
			Production Expediting		
			Performance Report		
			Stores Keeping		
			Stores Control		

32. Appraise quality of products, produce and maintain control charts and indicate acceptance or rejection of a product in accordance with an established schedule.
33. Communicate orally or in writing to others about occupational abilities, interests and plans.
34. Explain the importance of all work in our society.
35. Elicit and consider suggestions and evaluations regarding given work performance.
36. Participate in individual and group experiences which contribute to personal development (e.g. discussion, reading, observation.)
37. Demonstrate the ability to depend on others and to be depended upon in the work environment.
38. Seek information about what skills are needed to get a preferred job.

Time Required Four to six weeks

Instructional Aids

1. Films
    a. "Productivity - Key to American Economic Growth"
    b. "Our Mr. Sun"
    c. "Men and Machines, Of"
    d. "Tools"
    e. "Industrial Arts: A Safe Shop"
    f. "Air Cargo"
    g. "Future In Steel"
    h. "The Hough Story"
    i. "For Every Wheel That Turns"
2. Filmstrips
    a. "Plant Engineering" #A636-4
    b. "Industrial Engineering" #A636-2
    c. "Production Engineering" #A636-3
    d. "Quality Control" #A636-6
    e. "Manufacturing" #A636-5
3. Booklets
    a. "Keys To Vocational Decisions"
    b. "Planning My Future"
4. Samples of
    a. materials handling symbols
    b. order forms, production report forms, monthly report forms, etc.
5. Overhead projector and transparencies

Introduction

Production is only one activity area of the manufacturing process and must be approached with this fact in mind. Production is charged with the responsibility of producing a product using the most economical methods and plans. This responsibility is fulfilled by organizing the department into functional groups. One approach to this would include: plant engineering, in charge of specifying or approving, installing, maintaining and occasionally constructing the buildings, utility services and facilities required to produce the product; industrial engineering, in charge of planning the utilization of men, facilities, tools, jigs and fixtures to attain the desired quantity and quality of output at minimum cost; purchasing, in charge of securing, when required and at minimum cost, the quantity and quality of materials, supplies, services and equipment needed to operate the company; production planning and control, charged with preparing, issuing and encouraging compliance with schedules of the men, materials, facilities, instructions and all additional items required to complete manufacturing orders so they will be available when and where required; manufacturing, charged with making products for sale by changing the shape, composition or combination of materials, parts or sub-assemblies; quality control, in charge of establishing acceptable limits of variation in the attributes of a product and reporting the status of maintaining the product in respect to those limits. (Show film #1 "Productivity - Key to American Economic Growth")

Subject Matter Outline

1. Plant engineering (specifying or approving, installing, maintaining and occasionally constructing the buildings, utility services and facilities required to produce the product. Show filmstrip #A636-4 "Plant Engineering")
   a. Utilities design and operation (providing all electricity compressed air, water, heat and similar services needed)
      (1) Analyze utility service requirements.
      (2) Design or specify utility service system.
      (3) Direct and approve utility service installations.
      (4) Operate utility service systems.
   b. Facilities design and specification (specifying or approving all factory and office equipment and buildings and directing their proper installation)
      (1) Analyze facilities requirements.
      (2) Design or specify facilities.
      (3) Direct or approve facility installation or construction.
   c. Maintenance (installing and maintaining buildings, facilities and utility services in safe operating condition and occasionally constructing buildings and facilities)
      (1) Maintain facilities, utility services and grounds.
      (2) Relocate and install facilities and utility services.
      (3) Clean buildings.
      (4) Keep repair records.
      (5) Construct minor facilities and buildings.
   d. Plant equipment control (maintaining specification and location records on all capitalized equipment)
      (1) Keep location records of capital equipment.
      (2) Keep equipment specifications.
      (3) Identify capital equipment.

Counselor Interaction

Introduce students to Keys to Vocational Decisions and Planning My Future.

Have students study in detail the specific jobs that seem to fall within their range of interests, abilities and personality patterns. Ask students to give oral or written reports on the occupations which they have studied.

Show and review a film such as b, "Our Mr. Sun."

Student Activities

1. Analyze the utility service requirements of the plant.
2. Make a list of all utility systems used in the plant.
3. Check to see how each is installed and operated.
4. Maintain records of all facility repairs.
5. Make a record of the modificiations of any facility or utility.
6. Maintain a clean plant using a predesigned plan.
7. Fill out an inventory chart.
8. Prepare a list of the equipment and record the condition that the tools and equipment are in.
9. Fill out maintenance reports on the machines.
10. Draw a plant layout, designating the placement of the capital equipment.

Teacher Discussion Topics

1. Point out the major utility services supplying the plant.
2. Point out that the industrial arts lab will be the "plant."
3. Point out why we have different utility services.
4. Utilities might need to be modified.
5. Modification of facilities, if needed, should be discussed.
6. Establish the types of records needed to identify capital equipment, equipment specifications and the location of capital equipment.
7. Repair records should be established.
8. Develop and post a plan for cleaning the facility.

2. Industrial Engineering (planning the utilization of men, facilities, tools, jigs and fixtures to attain the desired quantity and quality of output at minimum cost. Show filmstrip A636-2 "Industrial Engineering."
   a. Methods study (establish the best methods of performing necessary direct or indirect production tasks excepting materials handling)
      (1) Establish operations and processes required
      (2) Establish facilities required, design tools, jigs, fixtures and patterns
      (3) Establish standard job motions
   b. Plant layout (establishing the best physical arrangement of facilities, utilities and work areas)
      (1) Analyze operations and processes required
      (2) Analyze facilities and utilities required
      (3) Establish space requirements
      (4) Select adequate plant area
      (5) Establish relationships of facilities and utilities
   c. Work measurement (establishing time standards for performing necessary direct and indirect production tasks)
      (1) Measure operation time
      (2) Appraise performance
      (3) Compute allowed time
   d. Materials handling study (establishing the best ways of transporting within the company its products or items used in their manufacture)
      (1) Analyze operations and processes
      (2) Establish equipment
   e. Tool, jig, fixture and pattern manufacture and repair (producing and maintaining the required tools, jigs, fixtures and patterns)

(1) Produce authorized tools, jigs, fixtures and patterns
(2) Repair tools, jigs, fixtures and patterns
(3) Maintain custody of tools, jigs, fixtures and patterns

Counselor Interaction

Encourage students to explore surrounding industries. Craftsmen and other workers may be invited to discuss their jobs with the class or specific members of the class might visit selected industries and report to class on their experience. Students should formulate questions to be asked of persons in industry. These questions should be designed to explore the work requirements and job opportunities and to learn about the psychological and sociological dimensions of work-role relationship, social demand on the worker, satisfactions, degree of independence, etc.

Student Activities

1. Study methods of operation and process requirements to find the best method of performing necessary operations for the production of a product.
2. Study detail drawings and design the necessary jigs, fixtures and patterns.
3. Draw a plant layout including machines and tools in accordance with facility and utility study and modification.
4. Plan a flow chart.
5. Keep time chart operations of production in order to standardize work.
6. Study and recommend the best materials handling methods.
7. Inspect the plant and list those items which are unsafe.

Teacher Discussion Topics (Review and show film c "Of Men and Machines," or film d "Tools.")

1. Point out the difference between direct and indirect production tasks.
2. Point out the difference between production and materials handling.
3. Demonstrate necessary tools and machines which are essential to the production of jigs, fixtures and patterns.
4. Emphasize safety measures. (Review film e "Industrial Arts: A Safe Shop.")
5. Demonstrate ways of establishing time standards.
6. Discuss various ways of moving materials within the plant.
7. Discuss working drawings of the product to be manufactured and point out various necessary fixtures, jigs and patterns to be made.
8. Demonstrate plant layout on the chalkboard being sure to include all aspects in the make up of a flow chart and see that one is made.
9. Remember!! The arrangement of machines, tools and functions should be made in accordance with existing or modified utilities, facilities and materials handling expediency.

3. Purchasing (securing when required and at minimum cost the quantity and quality of materials, supplies, services, and equipment needed to operate the company)
   a. Buying (locating and negotiating with vendors to secure needed items or services of the desired quality, in the desired quantity, at the desired time, at a minimum cost)

    (1) Locate suppliers
    (2) Secure quotations
    (3) Select supplier
    (4) Prepare purchase agreement
    (5) Advise on specifications for purchased items
b. Purchase expediting (seeing that purchased items and services arrive as promised by vendors)
    (1) Analyze need for purchase items
    (2) Secure items when required
c. Purchase records and files (maintaining vendor catalogs, quotation requests, purchase orders, material specification and the like)
    (1) Keep file of purchase agreements
    (2) Keep library of supplier catalogs
    (3) Keep file of supplier quotations and records
d. Purchase research (analyzing market trends, purchased items usage, buying methods, and the like and recommending improved purchasing practices)
    (1) Analyze market statistics and purchasing practices
    (2) Recommend courses of action
e. Salvage sales (securing purchasers for items not in regular line of products)
    (1) Secure purchasers for by-products and obsolete or surplus items
    (2) Determine methods of disposal for items not sold

Counselor Interaction

Help students develop a procedure for evaluating performance and thereby gain an understanding of the standards industry requires.

Conduct class discussion to share observations, experiences and information. Rotate leadership role in group discussions.

Student Activities

1. From the working drawings compile a list of materials and services needed to produce the product.
2. Consult "Yellow Pages" of the telephone directory and make a list of suppliers of needed materials.
3. Check vendor catalogs and compile list of needed materials.
4. Create a records keeping system for vendor catalogs, quotation requests, purchase orders, materials specifications, etc.
5. Sample vendors and obtain prices of materials needed.
6. Prepare purchase agreements for enough materials and supplies to produce the product.
7. Devise a method of disposing of by-products or surplus items.
8. Select a material which is usually advertised in a newspaper and record prices weekly for approximately six weeks and determine the amount of increase or decrease in the price.

Teacher Discussion Topics

1. Point out that we must have quality materials in the quantity needed at a minimum price.
2. Point out difference between a firm contract and an estimate.
3. Emphasize the importance of writing the exact specifications.
4. Discuss purchased parts as opposed to parts that we must construct or produce.
5. Stress the importance of accurate record keeping.
6. Emphasize the importance of analyzing market trends before submitting a purchase order.
7. Surplus items must be taken care of and turned into a profit if possible.
8. Be sure to use a vendor that can and will make delivery on time.

4. Production planning and control (preparing, issuing and encouraging compliance with schedules of the men, materials, facilities, instructions and all additional items required to complete manufacturing orders so they will be available when and where required. Show and review filmstrip #A636-3 "Production Engineering.")
   a. Traffic (specifying and securing transportation media that best satisfy the receiving and shipping requirements of the company)
      (1) Forecast freight rates
      (2) Specify routings and carriers for purchased and sold items
   b. Factory receiving (accepting shipments from vendors, reporting on items received and disposing of them as authorized)
      (1) Unload carriers
      (2) Correlate receipt with orders
      (3) Communicate data concerning receipts
   c. Factory shipping (preparing products for shipment to the customer or to storage, consigning them to carriers and reporting their actions to those concerned. Show film # "Air Cargo.")
      (1) Prepare items for carriers
      (2) Load carriers
      (3) Communicate data concerning shipments
   d. Materials procurement (supply when needed all direct and indirect materials required to complete an order)
      (1) Analyze sales orders and bills of materials
      (2) Issue requisitions
   e. Operation scheduling (specify the most practicable combination of where and when to perform every activity required to complete an order)
      (1) Maintain equipment load records
      (2) Specify best alternative processes
      (3) Specify time and place for every activity
   f. Tool, jig, fixture and gauge procurement (supplying when needed all facilities, tools and gauges required to complete an order)
      (1) Analyze operation instruction sheets
      (2) Requisition needed tools, jigs, fixtures and gauges
   g. Production instruction distribution (issuing communication media to guide and collect information on the performance of every task required to complete an order)
      (1) Collect or prepare all instructions and related papers
      (2) Reproduce required copies
      (3) Distribute copies to affected areas

5. Manufacturing (making products for sale by changing the shape, composition or combination of materials, parts or subassemblies)
    a. Parts manufacture (creating basic units of a complete product)
        (1) Check equipment
        (2) Produce parts
    b. Subassembly (joining two or more parts to form a portion of a complete product)
        (1) Combine parts
        (2) Preliminary assembly
    c. Final assembly (joining two or more parts or subassemblies to form a complete product)
        (1) Produce finished products
        (2) Preliminary check
    d. Service and repair (reworking worn or improperly manufactured products, subassemblies or parts to meet established quality specifications)
        (1) Repair improperly manufactured parts and products
        (2) Repair or replace worn parts and products

NOTE: The necessity of providing instructions and learning experiences necessary for machine and tool manipulation cannot be overstressed. Training for operation and safety procedures on a machine or tool in relation to the task to be accomplished precedes all operations in industry.

Counselor Interaction

Give the students an opportunity to instruct others when they have learned a new operation. Help them to test and improve their ability to give instructions.

When a student shows interest or skill in a particular operation performed in class, he should be encouraged to become familiar with the occupation in which the operation is performed. This may be accomplished by having him study job descriptions to identify related occupations or by letting him interview local industrial firms to find out what job opportunities are available for a worker with this skill and interest.

Student Activities

1. Perform necessary operations to produce parts for the product.
2. Combine parts to produce finished product.
3. Repair improperly manufactured or worn parts and products.
4. Learn how to operate machines and use the tools necessary to produce the product.

Teacher Discussion Topics (Show and discuss film h "The Hough Story" and filmstrip #A636-5 "Manufacturing.")

1. Discuss the steps and procedures for the production of parts.
2. Discuss parts fabrication.

- h. Dispatching (initiating production tooling by releasing production planning instructions to those affected in accordance with established time schedules and task sequence)
  - (1) Issue paperwork to those concerned
  - (2) Verify time schedules and task sequences
- i. Production expediting (aiding manufacturing activities to follow the schedule established by the production planning function)
  - (1) Investigate compliance with schedule
  - (2) Report schedule deviations to those concerned
- j. Performance reporting (advertising of production accomplishments relative to instructions issued)
  - (1) Collect data on work performed
  - (2) Report manufacturing accomplishments
- k. Stores--keeping (protecting and issuing when authorized items used to produce a product, perform a service or operate a company)
  - (1) Receive items
  - (2) Protect items
  - (3) Issue stocked items
- l. Stores control (establishing what materials, other than finished products made for stock, are to be warehoused, how much of it and where, as well as implementing these decisions through records and requisitions)
  - (1) Determine economic lot quantities
  - (2) Determine reorder quantities
  - (3) Standardize stocked items
  - (4) Plan storage area locations
  - (5) Requisition stocked items

Student Activities

1. Obtain rates from local freight lines.
2. Procedure necessary for jigs, fixtures, patterns and gauges.
3. Devise a customer order.
4. Devise a sales stock and/or shop order.
5. Devise one route sheet, load chart, schedule chart and job ticket.
6. Prepare a bill of lading.
7. Compile a package of engineering specifications to include blueprints, bills of materials, shop order and route sheets.
8. Prepare a package for product to be produced.
9. Create a method of stores--keeping and stores control.
10. Assist in unloading carriers (delivery trucks).

Teacher Discussion Topics (Show and review film g "Future in Steel.")

1. Discuss traffic patterns in your locality.
2. Discuss receiving and shipping procedures.
3. Discuss charts: load, route, scheduling and job ticket.
4. Discuss procedure for work simplifications: fixtures, jigs, patterns and gauges.
5. Discuss orders: customer, sales, stock and shop.
6. Discuss engineering specification.
7. Discuss measurements of effectiveness and performance reporting.
8. Discuss procedures for stores--keeping and stores control.
9. Discuss method of packaging.

3. Discuss maintenance of products, worn parts and manufactured parts.
4. The teacher must provide learning experiences on how to operate machine and perform tool and manipulative tasks necessary in producing the product.

6. Quality control (establishing acceptable limits of variation in the attributes of a product and reporting the status of maintaining the product in respect to those limits. Show and discuss film #9 "For Every Wheel That Turns.")
    a. Control methods development (establishing ways of preventing or limiting production of unacceptable parts, subassemblies or products)
        (1) Analyze product quality specifications
        (2) Specify inspection locations
        (3) Specify inspection methods
        (4) Specify control methods
    b. Gauge control (maintaining the accuracy of instruments used in inspection activities)
        (1) Keep gauge location and maintains records
        (2) Store idle gauges
        (3) Inspect and repair gauges
    c. Inspection and test (conducting quality control measurements and analyses, rejecting products, recommending the halting of substandard production processes and notifying those affected)
        (1) Appraise quality of product
        (2) Maintain control charts
        (3) Reject or accept products
    d. Customer complaints (investigating and reporting manufacturing responsibility for products alleged faulty by dissatisfied purchasers and taking steps to correct operations found substandard)
        (1) Investigate validity of customer complaints
        (2) Advise those affected of company liability to customer
        (3) Secure modifications of operations and products
    e. Salvage (determining the most economical methods of using or disposing of rejected or obsolete items and scraping and preparing them for those users or disposition)
        (1) Analyze by-products and surplus or obsolete items
        (2) Determine disposition of items
        (3) Prepare items for sale or use

<u>Student Activities</u>

1. Establish ways of preventing or limiting production of unacceptable parts, subassemblies or products.
2. Maintain the accuracy of those devices used in the inspection activities.
3. Establish procedures for halting production of substandard parts.
4. Maintain inspection records as to number of parts, subassemblies or products rejected or accepted.
5. Devise methods for investigating and reporting manufacturing responsibilities for products alleged faulty by dissatisfied purchasers.
6. Devise a method for disposing of obsolete or rejected items and scrap material.

Teacher Discussion Topics (Show and discuss filmstrip #A636-6 "Quality Control.")

1. Discuss product quality specifications.

2. Point out importance of methods of inspection.
3. Discuss inspection tolerances.
4. Discuss inspection devices.
5. Discuss inspection and test charts.
6. Discuss customer complaints and ways of dealing with such complaints.
7. Discuss methods for the disposition of by-products and other usable items.

Suggested Evaluation Items

TRUE - FALSE

1. The engineering department is responsible for obtaining patents for new products.
2. Mass production is responsible for our high standard of living.
3. Selection of a product transportation medium would take into consideration cost, time and safe handling.
4. Jigs and fixtures are materials holding devices which are usually made in the plant and not bought with a machine.
5. Some type of quality control is a necessary part of any industry.
6. Quality control may be defined, in part, as the department of industry which establishes acceptable limits of variations.
7. Instead of "acceptable limits of variations," we can use "within tolerance allowed" and mean the same thing.

MULTIPLE CHOICE

8. One of the following is <u>not</u> a function of the industrial engineering department in industry.
    (a) produce authorized tools, jigs, fixtures and patterns
    (b) secure product design and specification changes
    (c) establish facilities required
    (d) establish relationships of facilities and utilities
9. Plant engineering is concerned with
    (a) plant layout
    (b) operation scheduling
    (c) methods study
    (d) plant equipment control
10. Which of the following is <u>not</u> a function of the manufacturing department of industry?
    (a) produce parts
    (b) combine parts
    (c) repair tools, jigs, fixtures and patterns
    (d) produce finished products

MATCHING

11. Listed below are the functions and sub-functions of the production department of industry. Place the letter of the function on the left in the blank by the proper sub-function on the right. The letters may be used more than once.

A. Plant engineering
B. Industrial engineering
C. Purchasing
D. Production planning and control
E. Manufacturing
F. Quality

___Gauge control
___Salvage
___Buying
___Part manufacture
___Service and repair
___Salvage sales
___Material procurement
___Performance reporting
___Plant layout
___Work measurement
___Plant equipment control
___Maintenance

COMPLETION

12. Before a new employee is hired to work in the production department, he must be interviewed by the ____(production foreman)____.

13. Mass production in industry has brought about the ability to __(produce)__ products in greater __(quantities)__, more __(rapidly)__ and at a __(reduced)__ cost to the consumer.

Lesson 17

MARKETING

By definition, marketing is "directing and encouraging the flow of goods from producer to the consumer or user." It is generally thought of as just the selling of a product, but there is actually a great deal more involved than that. Facts relating to the sale and transfer of products must be gathered, recorded and analyzed in order to determine who and where the customers are, their needs and wants, when and how they will buy and how much they are willing to pay.

Marketing is the business activity through which human wants and needs are satisfied by the exchange of goods and services for something of value, such as money. It involves the planning necessary to offer the right merchandise at the right place, at the right time, in the right quantities and at the right price.

Marketing consists of researching the potential market, advertising and promoting the product, planning the sales and obtaining the order, getting the product to the customer promptly, in good condition and as it was represented to the customer by the sales force.

Marketing, in general, may be divided into six areas or phases within an industry -- market research, advertising, sales promotion, sales planning, sales operations and physical distribution.

Note to Instructor

The purpose of this lesson is to acquaint the student with the problems the manufacturer faces in determining the potential demand which will affect his choice of a product to be made, the procedures followed in planning the advertising which will induce the customer to buy the product and the development of the sales promotion and planning for the product.

In addition, the actual selling operation will be presented along with the methods of handling the product and transporting it to the customer.

Finally, the student will be shown the importance to a manufacturer of maintaining good relations with the product user through a reasonable and comprehensible plan of product service.

Students whose family members are involved in any of the areas of marketing and sales should be especially urged to take an active part in the classroom activities when they have some first-hand information concerning the subject being discussed.

Objectives

The students will be able to

1. Recognize the importance to an industry of good market research. This to be demonstrated by an evaluation of the extent to which interest is shown by the school's student body in a proposed industrial arts class product.

2. Explain the meaning of good customer-manufacturer relations.
3. Evaluate consumer products found in the home and the satisfaction or dissatisfaction of the actual consumers or users.
4. Survey the community's citizens actively engaged in selling and servicing products to ascertain the size and scope of such organizations.
5. Describe the importance of a marketing area to a manufacturing organization.
6. Explain the opportunities available in the marketing areas of manufacturing.

Time Required Two to three weeks

Instructional Aids

1. Films
   a. "Effective Listening"
   b. "Prospecting"
   c. "Breakthrough In Transportation"
   d. "Banking In Action"
   e. "Follow It All the Way"
   f. "Trucks and Your Town"
   g. "How To Investigate Vocations"
   h. "Choosing Your Occupation"
2. Overhead projector and transparencies
3. Price tags
4. Packages, cans, boxes, wrappers
5. Job descriptions
6. Radio scripts, newspaper mats
7. Mail order catalogs
8. Questionnaires
9. Pamphlets on advertising and marketing

Introduction

Stated briefly, marketing is directing and encouraging the flow of goods from producer to consumer or user. In everyday practice selling is looked on only as the act of pricing the product and then trying to persuade the prospective buyer to buy. There is a great deal more to marketing than this limited conception. It has been remarked that in any business "nothing happens until somebody sells something." And this selling something is a highly specialized procedure.

The potential market must first be researched to determine the product to be offered to the buying public, advertising of the product must be carried out through its many phases, the sale of the product must be promoted, the sales effort must be planned, the actual selling operations must be carried out, and finally, the product must be delivered into the hands of the consumer and serviced under the terms of the warranty.

The following body of subject matter will cover all of the above and is designed to give the student an insight into all the areas of marketing a product.

Subject Matter Outline

1. Marketing Research (the gathering, recording and analyzing of facts relating to the transfer and sale of products)
   a. Market analysis is carried out through

        (1) questionnaires
        (2) public polls
        (3) determining past customer preferences
        (4) determining the extent of the potential market
        (5) determining the characteristics of the market
    b. Product requirements
        (1) Getting customer attitudes toward product
        (2) Getting customer reactions to product specification and prices
        (3) Finding preferences of color, form and shape
    c. Distribution problems
        (1) Recommending policies to the manufacturer
        (2) Determining the location of the market in relation to the manufacturer's facilities

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Counselor Interaction

Assist students in suggesting and selecting a basic list of questions to be asked about occupations. Have students simulate a group conference and then summarize and discuss group conference findings. Ask students to suggest means of improving classroom participation. Show the film a, "Effective Listening."

Help the students explore occupational literature. Have some students question community employers and personnel concerning jobs in marketing. Have interested students prepare class reports on jobs in marketing and then let them act out the job roles. Have students prepare bulletin board display of job activities. Show film b, "Prospecting."

Student Activities

1. Obtain a report of a poll dealing with some product from a newspaper, magazine or weekly reader.
2. Devise a form for and take a sample of customer preference by mail, (class, school or community) for a specified product.
3. Tabulate and evaluate the information gathered through (2) above.
4. Conduct a written poll to determine which color preference prevails for a chosen product.

Teacher Discussion Topics

1. Discuss how a market is measured and evaluated.
2. Explain how distribution problems can affect selection of the product to be manufactured.
3. Relate some ways by which customer preference can be ascertained.

2. Advertising (the non-personal presenting and promoting of ideas, products or services paid for by a sponsor)
    a. Campaign planning
        (1) Preparing the advertising budget
            a. predicting the volume of sales
            b. apportioning funds for advertising
        (2) Choosing an advertising agency
        (3) Testing advertising program effectiveness

- b. Copy presentation
    - (1) Conducting consumer motivation studies
        - a. by age groups
        - b. by income levels
        - c. by consumer needs and luxuries
    - (2) Selecting the most promising appeals
    - (3) Preparing the advertising copy
- c. Selection of advertising medium
    - (1) Choosing the medium
        - a. to get the most coverage for the money spent
        - b. finding the medium most suited to the product and its price range
        - c. considering the time element involved
    - (2) Analyzing the medium coverage
        - a. newspapers
        - b. radio
        - c. direct mailing
        - d. handbills
        - 3. television
    - (3) Testing medium effectiveness through sample areas
- d. Production of the advertising copy
    - (1) Developing the advertising layouts
        - a. from photographs
        - b. using charts and graphs
        - c. drawings or other art work
    - (2) Procuring plates, art work and scripts
        - a. writing
        - b. recording
    - (3) Printing methods based on volume requirements

<u>Counselor Interaction</u>

1. Conduct a group discussion comparing requirements and opportunities in marketing personnel.
2. Have students obtain information from people in marketing other than in a company, (i.e., shoe salesman).
3. Have students compare interests, responsibility, skills, education, rewards, etc. of various marketing personnel.
4. Have students role-play shoe salesman and computer salesman.
5. Have students verbally relate jobs in marketing to their interests and needs.

Show film g, "How To Investigate Vocations."

<u>Student Activities</u>

1. Select and prepare an item of advertising copy for the sale of some product.
2. Determine the different rates of the mediums for the prepared copy.
3. List some of the advantages and disadvantages of advertising by radio, television, newspaper, direct mail and handbills.

4. Design and produce a two-color sign by the silk-screen process.
5. Take a photograph of some product, process the film and the print and write copy listing the product's good features.

Teacher Discussion Topics

1. Explain and show how planning and scheduling of advertising is carried through.
2. Draw a comparison between the costs of radio, newspaper, television and direct mail advertising.

3. Sales promotion (supplementing and coordinating personal selling and advertising for greater effectiveness)
    a. Program development
        (1) Selecting programs
            a. beyond initial advertising
            b. concentration on programs which produce most results
        (2) Preparing and directing programs
            a. personnel for programs
            b. directing and coordinating
            c. capitalizing on sales trends
    b. Sales aids
        (1) Selecting sales aids
            a. select those most suited to product and market
            b. consider most factor of sales
        (2) Preparing and distributing sales aids
            a. kits
            b. displays
            c. mobiles
            d. sample accounts

Student Activities

1. Prepare a listing of commonly used sales aids.
2. Design, sketch and build a display to be used as a sales aid for marketing a bicycle.

Teacher Discussion Topics

Display and explain the importance of catalogs to several kinds of industries.

4. Sales Planning (planning for marketing the right product at the right time, time, in the right place, in the right quantities, at the right price)
    a. Sales policies
        (1) Need for sales policies
        (2) Formulating selling plans
            a. timing of product introduction
            b. seasonal demands
    b. Budgeting
        (1) Forecasting sales (from market analysis)
        (2) Selling sales quotas

        - a. profit on salesman's time
        - b. coverage of market territory
    - (3) Estimating sales costs
        - a. volume of production
        - b. salesman's compensation
- c. Pricing
    - (1) Establishing price-profit policies
        - a. how much to get
        - b. competition in the market
    - (2) Pricing products and preparing price lists
        - a. lists to dealers and consumers
        - b. discounting prices
- d. Buying
    - (1) Selecting goods for purchase
        - a. what materials are cheapest and best
        - b. possible material changes due to product modification during manufacturing process
    - (2) Determining purchasing quantities
        - a. advantages of quantity buying
        - b. storage factors
        - c. price fluctuations
    - (3) Selecting sources of supply
        - a. reliability of supplier
        - b. transportation considerations
        - c. prices to be paid
    - (4) Terms and delivery dates
        - a. lowest price not always best
        - b. cash or time payment
        - c. delivery scheduling
    - (5) Placing firm orders
- e. Packaging
    - (1) Determining the functional requirements
        - a. weight of product
        - b. size of product
        - c. form of product
        - d. durable or perishable product
    - (2) Determining requirements to aid sales
        - a. eye appeal
        - b. ease of customer handling
    - (3) Developing package specifications

Student Activities

1. Write a 200 word report on how a final selling price for a product is arrived at by a manufacturer or a dealer.
2. Write a 100 word report on the importance of packaging to the sale of a product.
3. Determine the packaging requirements for a certain product to be shipped to a specified destination.
4. Design, sketch and write specifications for a package to be used for shipping a table model radio.

5. Sales Operations (transferring products to customers in exchange for money)
  a. Salesmen procurement
    (1) Analyzing job requirements
      a. educational level required
      b. type of market sought
    (2) Analyzing sources of potential customers
      a. from trade sources
      b. from educational institutions
    (3) Attracting potential employees
      a. by word of mouth
      b. through want-ads
      c. through trade journals
    (4) Testing applicants
      a. personal interviews
      b. previous work records
      c. aptitude tests
    (5) Investigating references
      a. former employers
      b. credit bureaus
      c. personal sources
  b. Salesman training
    (1) Sales tools and training classes
      a. familiarization with product
      b. customer relations
      c. type of market
      d. customer prejudices
    (2) Field training
      a. introduction to territory
      b. working with experienced personnel
  c. Salesman direction
    (1) Assigning territories and routes
      a. geographical factors
      b. potential volume of territory
      c. sales personnel seniority
    (2) Setting performance standards
      a. costs of selling
      b. expense accounts
    (3) Supervision of salesmen
      a. structure of sales department
      b. sales reports
  d. Salesman compensation
    (1) Selecting plans or bases
      a. salary
      b. salary and commission
      c. commission
      d. bonuses
    (2) Psychic satisfactions
  e. Order service
    (1) Answering inquiries
      a. telephone
      b. mail

- (2) Quoting prices
  - a. inquiry level
  - b. discount levels
- (3) Processing orders
  - a. shipping goods
  - b. inventory control
  - c. salesman credit
  - d. back-ordering and cancellations

f. Selling
- (1) Selecting potential customers
  - a. those in the product field
  - b. financial reliability
- (2) Convincing prospective customers
  - a. demonstrating product
  - b. showing how customer can benefit
  - c. giving customer edge over competitors
- (3) Securing orders
  - a. presentation
  - b. closing sales
  - c. handling customer complaints
  - d. following up sales

Counselor Interaction

1. Have students prepare a checklist of facts about a job (occupational information) and then apply the checklist to jobs previously studied.
2. Have students write their preferences to checklist items and compare their interests to that of the job study.
3. Have students ask parents or friends to complete checklist in reference to their job.
4. Industrial arts teacher and counselor complete checklist in classroom in reference to their job.
5. Show and discuss film h, "Choosing Your Occupation."

Student Activities

1. List three ways in which salesmen are paid.
2. Make a list of the qualifications you would want to find in an applicant for a job in your manufacturing company.

Teacher Discussion Topics

1. List some good features and some drawbacks to a career in selling. Show film e, "Follow It All the Way."
2. Show openings in the fields of sales appearing in want-ad pages of local newspapers.

6. Physical Distribution (moving and handling products from the point of storage to the point of consumption or use)
    a. Warehousing
        (1) Determining storage location and capacities
            a. strategic location in reference to market
            b. determining necessary stock level
            c. time necessary for delivery
        (2) Performing storekeeping activities
            a. damaged merchandise
            b. shifting stock for convenience or freshness
            c. keeping inventory of stock on hand
    b. Shipping
        (1) Assembling orders
            a. shipping personnel
            b. preparing product for carriers
        (2) Selecting transportation medium
            a. best way costwise
            b. best way timewise
            c. best way for safe handling of product
        (3) Delivering products
            a. customer pickup
            b. FOB shipments
            c. company transportation routing
            d. common carriers
    c. Product service
        (1) Handling returned products
            a. crediting customer
            b. repairing or replacing
            c. lost or stolen goods
            d. soothing irritated customers
        (2) Developing and administering warranties
            a. probability of product going bad
            b. warranty an edge over competition
            c. relative cost of repairing or replacing
            d. value set on customer satisfaction
        (3) Providing technical service to customers
            a. manufacturers associations
            b. technical aspects of use of product

Student Activities

1. List examples of currently used methods of transportation.
2. Design, sketch and build a 36" x 48" display board showing the progress to date in transportation mediums.

Teacher Discussion Topics

1. Discuss the use of the warehouse in marketing and the relationship between warehousing and shipping for prompt customer service. Show film c, "Breakthrough in Transportation."
2. Point out the importance of good product service policies.

Summary

This lesson should have given the student a clearer understanding of the part played by the marketing division of any manufacturing industry. Emphasis and concentration of effort should be placed on the principal divisions of the marketing effort as follows

1. Marketing Research - The facts relating to the sale and transfer of the product are gathered, recorded and evaluated.
2. Advertising - The non-personal presentation and promotion of ideas and methods which will induce the prospect to buy the product.
3. Sales Promotion - Supplements and coordinates the personal selling effort and increases its effect.
4. Sales Planning - Endeavors to market the right product at the right time, in the right place, in the right quantities and at the right price for both the user and the manufacturer.
5. Sales Operations - The actual selling effort made to put the product in the hands of the customer in exchange for money.
6. Physical Distribution - Handles and moves the product from the point of manufacture and/or storage to the point of consumption or use.

The student should realize through this lesson on marketing that the entire effort of manufacturing is directed at and is dependent upon getting the product into the hands of the customer in exchange for his money.

Summary Questions

1. Why is the marketing organization a most important part of any manufacturing effort?
2. How can market research be used to find out if a certain product has a good chance of selling.
3. In what ways does packaging aid in the sale of the product?
4. Can public opinion polls, such as Gallup's, be effectively used in market research?
5. Explain what is meant by "customer preference."
6. Why is the careful selection of an advertising medium so important to the selling effort?
7. Are there times when radio advertising would be better than television advertising? Why?
8. Why is the catalog of products so important in selling one type of product and not another?

Assignment

1. Prepare a list of 10 different products which are not manufactured locally, but are warehoused in your home city for local distribution.
2. Locate and bring to class three articles appearing in magazines or newspapers which deal with marketing.
3. Prepare a list of the common carriers in your area which transport goods or products for local sale.
4. Bring to class one item of advertising which has come to your home through the United States mail.
5. Compile a list of topics about marketing from publications found in the school library or your home.

6. On a 24" x 30" piece of corrugated board or hardboard, mount as many different types of packaging as you can find (i.e., boxes, bottles, bags, tubes, etc.).

Evaluation

The following are some representative items which can be used for evaluating the efforts of the teacher in the area of marketing

A. Objective testing
  1. Matching
    In the left-hand column are listed five major divisions of marketing. In the right-hand column are some phases of those divisions. Match the phase in the right-hand column with the proper division, writing the letter representing the phase in the blank space provided.

Market research	B	A. Company transportation routing
Advertising	D	B. Questionnaires
Sales promotion	E	C. Securing orders
Sales operations	C	D. Direct mailing
Product distribution	A	E. Display materials
		F. Drilling and reaming

  2. Completion
    a. The gathering, recording and analyzing of facts relating to the tramsfer and sale of products is called market research .
    b. Insuring that all positions in a manufacturing industry are filled by competent persons is the responsibility of the personnel department.
    c. The money paid to a stockholder as a result of the company's profit on operations is called a dividend .

  3. a. [✓ T] F Any selection of a product transportation medium should take into consideration cost, time to deliver and safe handling.
    b. [✓ T] F A product warranty should give a manufacturer a selling edge over a competitor who issues no such warranty.

B. Performance test
  1. Given the necessary information, write, revise, time and otherwise prepare a one-minute radio advertising script for reading at the local radio station.
  2. An alarm clock manufactured in your home town must be shipped overseas by air transport. Design and build a shipping carton which will weigh no more than eight ounces, measure no more than six inches on any side and keep the clock free from damage when dropped from a height of 10 feet on a concrete floor.

C. Subjective test
  1. In not over 500 words, explain the function of the product service personnel employed by a washing machine manufacturer.
  2. In one page or less describe the relation of an advertising agency to a lawnmower manufacturer.

Lesson 18

FINANCE AND CONTROL

If a new enterprise is to be solidly launched, attention must be paid to the problem of financing. The capital structure of the new enterprise must be planned, the current need for working capital must be evaluated and methods must be worked out to assure its availability. The industrial promoter or business administrator must be familiar with the sources of capital and the methods of raising it.

There are different kinds of capital. Usually the common meaning of the word capital is the single term used to cover the land, buildings, machinery, tools and materials of a productive enterprise. Although land is technically capital, it is distinguished from the other means of production because they can be reproduced and land cannot. However, businessmen seldom make this distinction. They think of capital in terms of money.

Financial administration requires two things. One is an organized system of accounting that gives the financial administrator a record of past operating results and the current financial condition. There must be an accurate understanding and interpretation of these financial records to appraise the current situation at any time. The other tool is budgeting--a matter of financial planning for a period of time.

Finance can best be described by dividing it into six basic departments. The financial planning department deals with obtaining and investing funds in a way that will be most beneficial to the company. The tax management department plans and manages the company's tax liabilities. The financial relations people make sure that relationships with existing and potential companies stay on good terms when dealing with monetary matters. The custody of funds department controls the actual handling of receipts and money to be paid out. The credit and collections department investigates credit and collects overdue payments. The final section of finance is the insurance department which secures and maintains adequate financial protection against the hazards to which a company is exposed.

The control department maintains records on company operations and provides accounting services for use by the managers in planning and controlling the business. The job of control is the keeping of a file of records and preparing reports for the stockholders to meet the legal and tax requirements of the company. The records are kept on all company operations for the use of the managers in case the records are needed again for a similar production job.

Note to Instructor

This lesson is planned to help the student become familiar with the various financial aspects of industry. It is not meant to be all inclusive, but to relate the basic knowledge of the major role in financing an enterprise. Emphasize that finance in industry consists of planning, directing and measuring use of company money.

Objectives

The students will be able to

1. Identify several ways of producing capital for industry.
2. Explain the importance of financial affairs in industry.
3. Analyze and apply methods of financing.
4. Without the aid of references, list and briefly describe three basic methods utilized in industry to obtain operating funds.
5. Given a list of items (including size, name of parts, etc.) for producing a product and a blank bill of materials form, fill in the necessary information on the form correctly with a minimum of one error.
6. With the aid of four different materials price lists, compare the lists and select the one most beneficial to the company.
7. Given a standard tax rate schedule and the gross intake figures for one company, calculate the amount of money to be paid by the company in taxes.
8. From a list of 15 items, identify and circle only those items that might be given on a report of the financial status of the company with a minimum of two errors.
9. Given a blank receipt, write a receipt of a specified amount to John Doe for a payment on a bill, exclusive of errors.
10. Given a standard two column bookkeeping form, write the definition of each of the terms.
11. Given a group of five credit reference forms on prospective creditors, compare and select only one that would be most desired by the company.
12. From a group of three insurance policies, select the one most adequate for a company of given assets.
13. Identify by name at least five of the seven monetary receipts used in class.
14. Given five of the monetary receipts used in class, fill out four of the five forms correctly.
15. Identify by name the bookkeeping form used by the class to record the money taken in and paid out in salaries, rent, utilities and other necessary materials.
16. Given a set of job cards (including one incorrectly filled out), select the one with errors and make all the necessary corrections.
17. Given a list of five employees, including their hourly wage and hours worked, compute the total wages for each employee with a minimum of one error.
18. Given a bill of materials (exclusive of cost) and a price list of the materials for a product, calculate the total cost of the materials to within 1 percent of the actual cost.
19. Given the expenses for raw materials, direct costs and indirect costs for producing a product, calculate the profit from the product within five cents of the correct amount.
20. From a list of expenses for raw materials, direct costs and indirect costs for producing a product, calculate the manufacturer's price for the product within five cents of the correct amount.
21. Given a list of five manufacturing expenses for producing a product, circle those expenses directly related to direct cost and underline those related to indirect cost with a minimum of one incorrect item.
22. With the aid of a chart indicating the financial status of the company, demonstrate his understanding of the information by orally explaining the information on the chart.

23. With the aid of a flow chart for a production operation, identify the sequential order through which the material will flow.
24. Exhibit the ability to express occupational goals in terms of financial status by reacting to a hypothetical situation involving occupational goals and financial status of a person seeking to obtain these goals.
25. Exhibit the ability to differentiate between different kinds of investments and savings by preparing and presenting a program emphasizing investments and savings to his class and/or to another I. A. class.
26. Exhibit the ability to recognize the importance of investment in terms of both the psychological and tangible aspects. His decision-making ability will be enhanced by his going through the procedure of purchasing stock in the company formed in the class and evaluating the wisdom of his selection by determining his net profit or loss at the end of the course.

Time Required One to two weeks

Instructional Aids

1. Films
   a. "American Business System: Financial Management"
   b. "The Shareowner"
   c. "Personal Financial Planning"
   d. "Your Earning Power"
   e. "How To Get Where You Want To Go"
2. Two-column bookkeeping record book, receipt book
3. Materials price list (for materials being used)
4. Samples of
   a. Credit applications
   b. Credit cards
   c. Sales receipts from purchases on credit
   d. Business Forms from local bank (statements, checks, etc.)
   e. Job cards, flow charts
5. Resource Persons
   a. Business teacher and/or math teacher
   b. Representative from the local bank and/or an insurance salesman; accountant

Introduction

Like all other things that bear the label finance or financial, corporation finance has to do with money. As a field of study, it embraces all the theories, procedures, institutions, instruments, problems and policies that are involved in the acquisition and use of money by business corporations. For small manufacturing firms, financial needs are relatively small and may be met initially through the personal savings of the promoter, the investments of funds by his friends or a small inheritance. As financial needs increase, the corporate system relies to a greater extent upon stocks being sold to the public and investment institutions.

Subject Matter Outline

1. Finance in industry (securing adequate operating funds at minimum cost, investing surplus funds to best advantage and maintaining a good pecuniary reputation for the company. It consists of six basic departments.)

- a. Financial planning (predicting the need for obtaining or investing funds)
  - (1) Predicts needs for capital
    - (a) materials
    - (b) miscellaneous
  - (2) Develop optimum methods of obtaining funds
    - (a) sale of stocks and bonds (stock represents ownership in a corporation, while a bond is like an IOU. They represent money lent to a corporation or a government)
    - (b) common stocks (payment of dividends is determined by business trends - gives voting rights)
    - (c) preferred stocks (paid dividends at a specified rate regardless of company's growth - some have voting rights)
  - (3) Profits received from previous products
  - (4) Credit (the power to get goods or services by giving the promise to pay money or goods on demand or at a certain time in the future)
    - (a) consumer (short-term - small amounts - seldom over three years)
      - 1. installments (payments at regular intervals - fixed amount)
      - 2. collateral plans (made in respect to amount of collateral the borrower has control of)
      - 3. charge accounts (many different time plans available - convenient and low cost)
      - 4. mortgage (long-term credit but has a disadvantage of high interest rate)
    - (b) corporate (long-term - loans vary into the millions)
      - 1. commercial credit (used to finance production cost - short-term credit - 60 days to six months)
      - 2. investment (for purchase of capital goods - long-term credit - usually several years)
  - (5) Forecast money-market conditions
    - (a) questionnaire
    - (b) samples of product
    - (c) personal contact
  - (6) Plan working capital requirements
- b. Tax management (planning and managing the company's tax liabilities)
  - (1) Evaluate tax liability
  - (2) Minimize the cost of taxes
  - (3) Deal with taxing bodies
- c. Financial relations (maintaining relationships with existing and potential companies, their creditors and investors on all monetary matters, including obtaining of all accounting for funds)
  - (1) Maintain goodwill of financiers and investors
  - (2) Report to financially interested parties
  - (3) Negotiate financing agreements
  - (4) Manage investments
  - (5) Administer pension and similar funds
- d. Custody of funds (controlling the physical handling of receipts and disbursements)
  - (1) Receive and disburse funds
  - (2) Protect funds

  - e. Credit and collections (controlling exposure to bad debts and losses and collecting overdue payments)
    - (1) Establish credit policies
    - (2) Investigate credit references
    - (3) Collect overdue funds
  - f. Insurance (securing and maintaining adequate financial protection against the hazards to which the company is exposed)
    - (1) Appraise and evaluate insurance policies
    - (2) Plan and negotiate coverage

Student Activities

1. Financial planning
   - a. Determine how much capital is required in acquiring the materials needed for a particular company's operation.
   - b. Compute the amount of money to be paid out in wages in the company (wages paid in relation to importance of the job).
   - c. Obtain the cost of the materials to be used in the manufacture of their product.
   - d. Formulate a bill of materials to be used in purchasing, then pass to other departments for evaluation and approval and voted on by the board of directors.
   - e. Select method of financing the production of all products.
   - f. Either go to the bank or have a representative of the bank speak to the class on obtaining loans.
   - g. Distribute questionnaires to determine the market probability for a proposed product.
   - h. Sell and buy stock in the company.
2. Tax management
   - a. Obtain the price of all their tools, fixtures and machines and calculate the percentage of all their holdings to find out what amount would be taxable.
   - b. Develop a scale to determine how much money would go for taxes and how much would be grossed by the company.
   - c. Have a representative from the finance department in a local industry to come in and speak to the class on tax management.
3. Financial relations
   - a. Give a report on the financial status of the company at each organized meeting. Include total capital on hand, money paid out for wages and materials, profits and expected capital gain for a specified time.
4. Custody of funds
   - a. Organize a bookkeeping system that would include money taken in, money paid out in salaries, rent, utilities and necessary materials.
   - b. Write receipts for all monetary transactions.
5. Credit and collecting
   - a. Establish a standard credit policy for their company (COD, full payment within 30 days - etc.).
6. Insurance
   - a. Take inventory of the laboratory to determine how much capital is tied up in materials, machines, tools and basic facilities.
   - b. Contact an insurance salesman and negotiate an insurance policy for their company.
   - c. Review and evaluate several insurance policies and decide which would be best for the company.

2. Control (maintaining and preparing reports to meet corporate legal and tax requirements and measure the results of the company operations and providing accounting services structured for use by managers in planning and controlling the business)
    a. General accounting
        (1) Maintain tax and related records
        (2) Maintain accounts receivable and issue bills
        (3) Maintain accounts payable and initiate payments
        (4) Prepare periodic accounting reports and statements
    b. Cost accounting
        (1) Record incurred costs
        (2) Maintain supporting records for, compute and initiate payment of employee earnings and deductions
        (3) Develop cost standards
        (4) Estimate cost
    c. Planning and budgeting
        (1) Project profit results of alternative courses of action
        (2) Develop planned costs for operations and for products and services
        (3) State authorized plans in budgetary and planned cost formats
        (4) Measure actual results against plans and standards and analyze variances
    d. Internal auditing (assuring the accuracy of accounting records and adherence to standard practices)
        (1) Audit financial records
        (2) Establish clerical work flow
        (3) Establish clerical work methods
        (4) Measure clerical work
    e. System and procedures
        (1) Control creation and use of forms and reports
        (2) Establish clerical work flow
        (3) Establish clerical work methods
        (4) Measure clerical work

<u>Counselor Interaction</u>

1. Secure various forms to demonstrate the services offered by a bank. (The I.A. or math teacher can serve as the resource person.)
2. Have the students explore and determine the approximate cost of reaching their occupational goals. (Utilize <u>Occupational Outlook Handbook</u>, Chronicle Career Kit, A Summary of Colleges and Universities, Chronicle and/or college catalogs.)
3. Have the students make a budget for financing their occupational goals. (Bring in math teacher to explain budgets and budgeting.) Utilize
    a. Film c, "Personal Financial Planning"
    b. Film d, "Your Earning Power"
    c. Film e, "How To Get Where You Want To Go"
    d. Book, <u>Planning My Future</u>
    e. Pamphlets, <u>Finance and Accounting Management</u> .

4. Counselor should prepare a hypothetical situation involving the occupational goals and financial status of a person seeking to attain these goals. Ask students to react individually or collectively.
5. Have students prepare and present a program emphasizing investments and savings to his class and/or to another I.A. class.

Student Activities

1. General accounting
   a. Keep a filing system on the flow of the money in the company that they established in class.
   b. Give periodic statements to the board on the financial standing of their company.
   c. Make up a bill that could be given to persons owing the company money.
   d. Visit a local industry to observe how the general accounting department operates.
   e. Set up a two-column bookkeeping system (may solicit help from business teacher).
2. Cost accounting
   a. Determine the cost of all the materials that they are going to use in the production of their product.
   b. Estimate the cost of materials and then check the actual cost against their estimated cost to see how the figures compare.
   c. Set up a pay scale for the employees of their company and see that they are paid (may be points for so many hours worked).
   d. Prepare regular financial statements on sales and cost of sales - product profit and loss statements.
   e. Make a job card for each worker.
   f. Check job card for errors or insufficient information.
3. Planning and budgeting
   a. Compare the cost of their product with the profit to see if the product was worthy of being produced.
   b. Set up a budget for the product they plan to produce.
   c. Determine the costs for materials, direct cost (labor) and the indirect expense (overhead).
   d. Calculate the manufacturer's price for their product.
   e. Determine the percentage of total costs to be used for profit.
4. Internal auditing
   a. Make charts and graphs to show the financial status of the company.
5. System and procedures
   a. Set up a flow chart for the mass production operations of their product.
   b. Arrange machines in the lab to facilitate the flow of parts when mass producing a product.

Summary Questions

1. Why is it important for a company to keep an accurate financial record of its business?
2. List and explain three methods by which a new company might acquire funds for its operations.

3. We usually refer to capital in terms of money, but it also applies to other things. Name five other items that are considered to be capital.
4. Why would a large company utilize a double entry or a more complicated bookkeeping system preferably to a single entry system?
5. What items are included in the indirect cost of producing a product? Direct cost?
6. How does a person become a shareowner in a corporation?
7. What is the basic difference between stocks and bonds?
8. What are the three major items needed to calculate the manufacturer's price of a product?
9. What items are included in a bill materials?
10. What are the three major items you should consider when selecting prospective creditors?

Lesson 19

PERSONNEL ADMINISTRATION

Personnel administration includes developing and administering policies and programs for providing an effective organization structure, qualified employees, equitable treatment, advancement opportunities, job satisfaction and adequate job security.

Personnel administration may be broadly defined as that activity area of industry which is concerned with maintaining the manpower of an enterprise or organization. This area involves the quality of employees, their fitness for work, their development, their attitudes of cooperation and loyalty and control of labor turnover. At the same time, the cost of manpower must be held within limits dictated by the economic necessities of the enterprise. Obviously, wages and salaries are vital factors in employee relations.

This area of an industry serves a vital role. It insures that all positions are filled by competent people at reasonable cost. This department sees that new employees receive the training and information required to perform their duties effectively. The personnel section determines dollar value of positions, insures that they are fair and equitable in relation to other positions and makes sure that employees are fairly compensated for their labor.

The functions or responsibilities of personnel administration may be grouped into five major classes--employment, wage and salary administration, industrial relations, organization planning and development and employee services. These different divisions could be considered a service agent of an industrial enterprise because their primary objective is to provide aid and assistance to the other areas of the organization.

Employee services section is concerned with the welfare of each individual employee. The making of a happy and satisfied work force is another objective of this section. There are two reasons for these goals--one is that the worker's effort is greatly increased when the morale is high, and the other reason is to make employment more attractive to prospective applicants.

Employee services may be grouped under five headings (1) medical services which consist of providing medical treatment for employees and their families and other things such as insurance, (2) recreation which is the providing of programs and facilities for the enjoyment of the employees, (3) personal service or the providing of help, such as counselors or financial aid, to assist employees in their daily lives, (4) safety which consist of the establishment and maintenance of a safety program, (5) protection and security which involves precautionary measures against theft, fire and other hazards. The providing of guards or watchmen, security people and the like would be under this heading.

These services are often referred to as fringe benefits because they usually are offered free of charge to the employees. The importance of this division is rather obvious because a satisfied worker will exert his full potential for the betterment of the company.

The prime task of the wage and salary section of the personnel department is to insure that each employee receives a fair wage for the work he does. In order to perform this function efficiently, the job description must be evaluated in order to establish salary that is fair and equal in relation to the other positions in the company and in competitive companies. A major consideration is the determination of the best method for paying the employees. Some are paid on a piece basis (for example, an inspector may be paid according to the number of pieces he inspects each day) Another group of employees might be paid on an hourly basis (a machine shop operator would probably be paid this way because the operations that are performed are constantly changing). Other employees might be paid on a weekly or yearly basis, such as the management personnel.

The wage and salary section must also evaluate the performance of each employee to determine the appropriate salary increase. This is known as merit ratings.

In order for a company to obtain the maximum effort from an employee, he must feel that he is a part of the organization. The wage and salary section promotes this by planning and administering incentives such as profit sharing, stock ownership, bonus plans, retirement plans and others.

The wage and salary division plans and administers the policies on working hours and absences, work schedules, vacation schedules, etc. that are fair to both the employees and the company alike.

The primary responsibilities of this section could be grouped into the five major headings of employee classification, rate determination, merit rating, supplemental compensation and work schedule control. From this one can see the prime role this section has in the overall efficiency of an industrial organization.

Industrial relations could be defined as the insuring of a harmonious working relationship between management and employees. In order to achieve this goal, the communications, collective bargaining, employee discipline and personnel research functions must be carried out.

One of the prime means of maintaining a good relationship is through communicating. The industrial relations division is responsible for providing the ways and the climate for the exchange of information between labor and management. Some of the more common methods are suggestion systems, opinion surveys, grievance procedures and others.

The industrial relations department works with local union officials in negotiating contracts and any other business that may be necessary to maintain accord.

Employee discipline is another major function which requires the development and maintenance of work regulations. Some examples of this would be the rules and regulations for conduct, disciplinary measures and others.

The development of ways to improve employee attitudes and conditions of work are responsibilities of the industrial relations section. To accomplish this objective, personnel techniques and problems must be studied and improved practices recommended.

In summary, we could say that maintaining a satisfied working force is the primary responsibility of industrial relations. Management must be made aware of problems of labor and, in turn, labor must be provided explanations for the actions of management. The industrial relations area acts as an established channel through which these communications flow.

The object of organization planning is to determine the structure and manpower requirements of the company. They determine how many people will be needed for the different operations performed on a product.

Manpower development actually states its objectives. This area is responsible for setting up performance standards and determining what positions require extra or specialized training.

In order to develop the manpower of the organization, training must be administered. The development of the personnel to their full potential is the third area of responsibility of this section.

At first glance, one might conclude that this section is not as important as the others in the personnel department. In making this evaluation, the purpose of any industry must be kept in mind and that is to make money. The personnel must develop and work to their full potential if this purpose is to be achieved. So the final conclusion should be that this is another vital link in the structure of industry.

The primary responsibility of the employment section in a personnel department is to make sure that each position or vacancy in the organization is filled with a person qualified to do the work. This involves a great deal more than simply hiring a person. The requirements and specifications of the job must be studied in order to determine what qualifications are demanded. The employment section must let the public know of the vacancy, and they must select the best means such as radio, newspaper, etc.

After a person has applied for the position, the employment division must analyze his qualifications and make a decision regarding his potential for the job. Once the person is employed, this section is responsible for indoctrination (the responsibility of seeing that new employees receive the training and information that is needed to do the job).

Another duty of the employment division is that of promotion and transfer. In order to do this, the job requirements and employee qualifications are carefully studied. If more information concerning an employee's aptitude and abilities is needed, tests are administered. When an employee is chosen for promotion or transfer, they must determine the training he will need before he can take over the new job.

The employment section is also responsible for releasing or firing employees. This must be done in a manner that is most beneficial to the individual and the company.

From the above list of duties, one can easily see that the employment division is another vital area for the progress of industry. If this area breaks down the entire organization suffers as a result.

Objectives

The students will be able to
1. Describe the personnel services provided by industry.
2. Compare different forms of wage and salary administration charts.
3. Solve problems related to wage and salary administration in the student company.
4. Carry out wage and salary administration role in the class industry.
5. Develop and administer a fair and equitable compensation for all of the company employees.
6. Explain the relationship between management and labor as it is related to communications, collective bargaining, employee discipline and personnel research.
7. Demonstrate an understanding of the belief that "all work has dignity."
8. Construct a line and staff organization chart for use in a class group study of a major industry.
9. Apply the principles of good organization in his leadership role in the class.
10. Carry out a management role in industry.
11. Solve problems related to the management of the student company.
12. Explain and solve problems related to personnel administration.

Time Required Two to four days

Instructional Aids

1. Films
   a. "Don't Drop Your Guard"
   b. "Labor Movement: Beginning and Growth In America"
   c. "You Are There at the Bargaining Table"
   d. "Aptitudes and Occupations"
   e. "The Bright Young Newcomer"
   f. "Job Evaluation"
   g. "Personal Qualities for Job Success"
2. Time and motion study sheets
3. Medical service plan from an industry
4. Bulletins of employee services offered by a company
5. An organization chart for an industry
6. Booklets
   a. Safety and Prevention of Accidents, National Safety Council, 425 North Michigan Avenue, Chicago, Illinois 60611
   b. First Aid Fire Appliances, National Board of Fire Underwriters, 85 John Street, New York, New York
   c. Learn and Train for That Job Under M.D.T.A., Georgia Department of Labor
   d. You Can Get That Job, Georgia Department of Labor
7. Guest speakers
   a. School nurse
   b. Safey engineer
   c. Employment service representative

Subject Matter Outline

1. Employee services (maintaining the general welfare of employees on the job and assisting them with problems related to their security and personal well-being)

a. Medical services (preventing diseases and physical ailments and injuries while on the job)
    (1) Develop and administer prevention programs
    (2) Examine employees and job applicants
    (3) Provide medical treatment
    (4) Educate in health matters

Counselor Interaction

1. Have the school nurse talk with the students on health practices.
2. Have a personnel manager discuss his medical plan.

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b. Recreation services (making company employment more attractive and satisfying by providing recreational programs and facilities for employees)
    (1) Conduct athletic activities
    (2) Conduct social activities
    (3) Provide and direct employee use of recreational facilities

c. Personal services (provide services that assist employees in their daily living. Contribute to their job satisfaction.)
    (1) Provide insurance counsel or protection
    (2) Provide legal counsel
    (3) Assist with housing and transportation problems
    (4) Operate credit union
    (5) Provide cafeteria and vending machines

d. Safety (develop and maintain adequate facilities and procedures for preventing on-the-job accidents.) (Invite a safety engineer to speak to the class.)
    (1) Establish safety rules
    (2) Conduct safety inspection
    (3) Prevent or eliminate hazards
    (4) Educate safe practices
    (5) Investigate accidents

Student Activities

1. Conduct safety inspection
2. Make safety slogans

Counselor Interaction

1. Assist students in preparing a graph of accidents.
2. Show and discuss film "Don't Drop Your Guard."

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e. Protection and security (take adequate precautionary measures to safeguard the company, its employees and property from theft, fire, espionage and similar hazards)

(1) Provide guard or watchman service
(2) Organize fire fighting service
(3) Develop and administer security regulations

Student Activities

1. Role playing as security guard
2. Fire chief
3. Check with local law enforcement officers for police protection and local fire department for equipment and information on fire protection.

Summary

Some of the services which we have listed are at least partly self-supporting, i.e., food service, housing, company stores and insurance. All of them, however, represent some cost to management in the usual practice. This cost is equivalent to tangible compensation to employees in addition to their regular pay--a form of compensation known as fringe benefits. The cost must be justified by indirect returns to the enterprise in the form of interest, loyalty, cooperation and low labor turnover.

2. Wage and salary administration (insuring that employees are fairly and equitably compensated)
   a. Employee classification (assigning officially each employee a position that is clearly and accurately defined as to its responsibilities and requirements)
      (1) Prepare job descriptions
      (2) Assign a proper title to each position
      (3) Periodically audit correctness of job descriptions

Student Activities - Prepare a job description and title.

   b. Rate determination (setting dollar values on positions that are fair and equitable in relation to other positions in the company and to similar positions in the competitive labor market)
      (1) Analyze jobs as described in job descriptions
      (2) Evaluate rate jobs (display time and motion study sheets)
      (3) Conduct rate surveys
      (4) Develop rate scales
   c. Merit ratings (appraising objectively the performances of each employee in relation to the duties and responsibilities of his assigned position)
      (1) Develop merit rating programs (display job description)
      (2) Conduct merit rating reviews
      (3) Analyze merit rating results

Student Activity - Develop a merit rating program.

   d. Supplemental compensation (provide monetary incentives, in addition to basic wages and salaries, to promote initiative and achievement)
      (1) Plan and administer profit sharing plans
      (2) Plan and institute stock option plans
      (3) Plan and administer bonus plans
      (4) Plan and institute retirement plans

(5) Plan and administer incentive plans

Student Activity

1. Develop a profit sharing plan.
2. Develop a credit union.

e. Work schedule control (establishing working hours and periods of absence with and without pay that are fair to employees and company alike)
   (1) Plan and administer policies on working hours and absences (some companies use three eight-hour shifts; some four six-hour shifts)
   (2) Plan and administer work schedules
   (3) Plan and administer vacation schedules

Student Activity - Make a plan for absences from class.

Summary

It is important to bear in mind that satisfactory personnel relations are not solely the result of skillful and considerate dealings with people. Employees are obviously concerned with tangible benefits of pay, hours, working conditions, job security and an opportunity to get ahead. These matters, often beyond the scope of personnel staff activity, are usually reflections of the policies, character and prosperity of the company.

3. Industrial relations (insuring that the working relationship between management and employees, the job satisfaction and work opportunities for the company's personnel are developed and maintained in the best interests of the company and its employees)
   a. Communications (providing the means and climate for developing ideas and exchanging information throughout the company)
      (1) Develop channels for presenting information to employees
      (2) Plan and administer a suggestion system
      (3) Conduct opinion surveys
      (4) Develop grievance procedures

Student Activities

1. Make a suggestion box.
2. Conduct an opinion survey.

Counselor Interaction

1. Invite an industrial relations director to talk.
2. Show and discuss film b, "Labor Movement: Beginning and Growth In America."

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b. Collective bargaining (attain accord with officially recognized and established employee organizations in the manner best meeting the interests of the company and its employees)
    (1) Negotiate agreements
    (2) Interpret and administer agreements

Student Activity - Form a labor organization

Counselor Interaction

1. Invite a lawyer to discuss legal aspects.
2. Invite a labor leader (business manager) to discuss labor unions.
3. Show and discuss film c, "You Are There at the Bargaining Table."

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c. Employee discipline (develop and maintain effective work regulations and create and promote harmonious working relationships with employees)
    (1) Establish rules and regulations for conduct
    (2) Establish and administer disciplinary measures

Student Activity - Make a list of your likes and dislikes concerning your class experiences.

Counselor Interaction

1. Make a short survey of what students like and dislike about their company.
2. Show and discuss film d, "Aptitudes and Occupations."

Summary

The control of attitudes and the promulation of company policies, ideals and objectives are problems in communication between management and employees. Morale, loyalty and cooperation are corollaries of mutual understanding. The worker must be confident of the integrity, fairness and ability of management. Similarly, management must be aware of the problems and attitudes of the employees. Communications are difficult when the enterprise is so large that personal contacts between the high command and the men in the ranks cannot be maintained. Breakdown of communications is one of the frequent causes on inroads of labor agitators into the ranks of organizations that previously enjoyed close relationships between management and labor.

4. Organization, planning and development (insuring that the company is effectively organized and capably staffed)
    a. Organization planning (determining the organizational structure and manpower requirements that will most effectively and economically meet company objectives)
        (1) Analyze key position requirements

(2) Analyze organizational structure
(3) Recommend organizational changes
(4) Forecast manpower requirements
(5) Forecast manpower resources

Student Activities

1. Make an organization chart.
2. Compile ads for jobs - chart trends.

Counselor Interaction

1. Assist the students in conducting a job survey.
2. Invite an industrialist to speak.

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b. Manpower development (establishing performance standards for key positions and identifying areas in which incumbents must grow in order to attain them)
   (1) Develop performance standards
   (2) Appraise performance
   (3) Plan individual development programs

Student Activity - Perform a motion and time study.

Counselor Interaction

Invite representative from industry to discuss their production program.

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c. Training (develop existing personnel to their full potential for attaining established performance standards)
   (1) Plant training programs
   (2) Prepare training programs
   (3) Train leaders
   (4) Conduct training programs
   (5) Evaluate training results

Counselor Interaction

1. Introduce students to catalog information on sources of training.
2. Have an area vocational-technical school director review training opportunities.

Summary

Organization of some sort has always existed among groups of people engaged in a common objective. In the simplest form, there is no more "structure" than that of boss or leader with one level of subordinates. As needs arise, the boss assigns tasks to subordinates and directs their efforts. Stable divisions of responsibility or systematized grouping of individuals may not exist.

5. Employment (insuring that all positions are filled by competent personnel at reasonable cost is the most basic responsbility of a personnel staff in an organization. It often involves extensive recruiting, scientific appraisal of qualifications, screening of applicants and the actual assignment to jobs in some cases)
    a. Recruitment (searching for and attracting applicants qualified to fill vacant positions)
        (1) Analyze job requirements
        (2) Develop job specifications for each position
        (3) Analyze sources of potential employees
        (4) Develop methods for attracting potential employees

Student Activities - Show and discuss film e, "The Bright Young Newcomer" and/or film f, "Job Evaluation.")

    b. Selection (analyzing the qualifications of applicants and deciding upon those who show the most potential)
        (1) Interview applicants
        (2) Test applicants
        (3) Investigate references
        (4) Evaluate applicants

Student Activities

1. Fill out a self-inventory form.
2. Participate in job interviews and give company test.
3. Formulate interview procedures and forms.
4. Role play as employer or employee.

    c. Indoctrination (seeing that new employees receive the training and information required to perform their duties effectively)
        (1) Orient new employees
        (2) Determine training requirement of new employees
        (3) Follow-up performance of new employees
        (4) Show films on safety
    d. Promotion and transfer (placing current employees in positions that better utilize their capabilities)
        (1) Analyze job specifications
        (2) Analyze employee qualifications
        (3) Test employees
        (4) Evaluate employees
        (5) Determine training requirement of employees
        (6) Follow-up performance in new position

Student Activities - Plan and present a training program for an operative. Show and discuss film g, "Personal Qualities for Job Success."

e. Separation (severing connections with employees in a manner most beneficial to the company)
   (1) Conduct exit interviews
   (2) Analyze turnover
   (3) Employees execute evaluation of company (prepared form of employees' feelings about company employment practices.)

Summary

Most employment transactions in industry are to satisfy immediate needs. The substantial enterprise also builds for the future. In planning for the future, many concerns periodically employ new men for apprenticeships and as long-term trainees for key positions. The trade schools, colleges and educational institutions within large industries are the principal sources for this type of employee.

Summary Questions

1. What is an organization?
2. What is meant by the line of an organization?
3. Define staff.
4. What is the difference between authority and responsibility? How are they related?
5. In what ways does collective bargaining affect government?
6. Explain how a union uses collective bargaining?
7. Give example of two rules that would affect employee discipline.
8. What are some of the rules that govern company employees?
9. What is a closed shop? How is it related to industry?
10. How do economic and social factors affect wages and salary policy?
11. What is the effect of supply and demand on wages and salaries?
12. What is meant by merit rating?
13. State some objectives which may be served by merit rating.
14. Discuss the importance of wage and salary policy in an industrial enterprise.
15. What is labor turnover? Explain its significance.
16. Discuss the employment activities as to methods of locating candidates and methods of selection.
17. Describe the ways in which employee training may be accomplished.
18. What is a time and motion study?
19. What constitutes employees' services or welfare in the personnel program?
20. Describe health service as a personnel division function.
21. Give three reasons for employees' services, and their limitations.
22. Why should health services be extended to workers families?
23. Describe the procedures which may be used for determining a candidate's fitness for a job, including job specifications and application forms.

EXTERNAL RELATIONS

The Industrial Revolution has had an effect on the growth of external relations. About 1800, little need existed for extensive stockholder relations. Relationships with employers were on a face to face basis. There was little competition with other companies to worry about. Community relations progress was not needed. Everybody knew everyone else.

Now, instead of family owned operations, firms have evolved into corporations with perhaps over 100,000 stockholders who may live all over the world. Somewhere along the line, a department for communicating with these people had to be evolved. A company might have 50,000 salesmen, office help, accountants and production employees. These people need to be informed, their morales must be built and suggestions need to be made to them. A company might have 25 plants in ten different states and foreign countries. Communication is needed. A company has thousands of customers and fierce competition. There is a problem to keep alive the already established interests in the company and new interests must be won.

It is the responsibility of management to see that policies are understood, accepted and intelligently applied by all employees in developing good relations with people inside as well as outside the organization.

External relations is a function of every operating department head as well as line and staff executives of the manufacturing, marketing and finance departments. The policies of each department of a company was designed to maintain good relations with one or more specific publics. Sales policy seeks good relations with customers, distributors and dealers; purchasing policy cultivates the goodwill of suppliers; and personnel and labor policy works toward improved employee relations.

Note to Instructor

External relations is concerned with the image a company has in the community and nation. Its primary objective is the development of goodwill with the public. In order to achieve this goal, attitudes and opinions must be gathered and evaluated. For example, company newsletters or newspapers, magazines and financial reports may be made available to creditors and investors. Other approaches may be news releases for local newspapers, radio or television. Social, civic and charitable organizations may be evaluated and the extent of company participation determined. Also, company participation in industrial, technical and professional organizations should be decided. All of these responsibilities are handled by this department.

External relations may be divided into two groups. The communications and information section is responsible for collecting and releasing information that will have a favorable influence on the public toward the company. The second section is concerned with public activities and coordination. This division recommends and coordinates company participation in civic, social, industrial, technical and professional organizations.

Objectives

The students will be able to
1. Define the role which the external relations department plays in industry.
2. Identify the kinds of work done by external relations personnel.
3. List the requirements, opportunities and working conditions of external relations personnel.

Time Required Three to four days

Introduction

External relation, as a profession or organizational activity, has grown amazingly within the last few decades. Large corporations, medium-sized businesses and even small companies spend millions of dollars on their external relations department. Six basic areas are involved in external relations. These six are

1. Communication and information. Communications and information is an important factor in the running of a company. The attitude of the surrounding public--both affiliates and non-affiliates--have great bearing on the company. Without the goodwill, so to speak, of the people, the industry itself will suffer. An example of how an industry will gain with the support of the poeple is a general one...an industry informs the people what the industry can do for them--how it will aid and benefit them. Favorably convinced, the people support the industry, and the industry thrives.

2. Attitude and opinion appraisal. Attitude and opinion appraisal is important to the company. By conducting opinion polls they learn the attitudes the people have about products, procedures and the company as a whole. When the opinions are learned, they are kept up with. The policies and practices can be evaluated by surveys measuring attitudes and opinions. If through evaluation, a company finds that public opinion is not good, they can plan and recommend methods of improvement.

3. Employee information exchanges. Keeping employees informed about what they are doing and how the public feels about what they are doing has a great bearing on their attitudes. Keeping the employees up to date can be done by giving them published or verbal information. This information should be distributed as much and as quickly as possible through announcements, special bulletins and verbal interpretation.

4. Creditor and investor communications. This phase of communications prepares an annual report on pertinent data concerning the company. The mobile home industry uses this technique heavily in their business. Charts showing company growth or sales are most prominent. The information found and presented gives a visual support to the reports.

The creditor and investor communications are in charge of the planning of special and annual stockholder meetings. In this planning, the material to be presented comes from every department. This data is compiled for the presentation to the stockholders. Through this form of communication, the stockholders will get a clear view of the company's movement.

5. Public communication. Public communications is probably the <u>busy</u> department in communications and information. This department filters all data to be presented to the open public through written and oral presentation. Before any information can be released, it must be approved or recommended by the public communications department. Effective relations must be maintained with the mass communication media for proper presentation of data. The data that is filtered through this department reflects the company and its activities. Therefore, the importance of this department cannot be measured.

6. Public activities coordination. Public activities coordination is responsible for determining the extent of participation in public affairs. This division recommends and coordinates the company's participation in public projects. Some examples of this would be evaluating civic, social, educational and charitable organizations; recommending form and extent of company support; and coordinating company participation.

   Another activity that this department is responsible for is the extent of company participation in business associations such as industrial, technical and professional organizations. The same steps are involved in this activity as those previously stated -- evaluation, recommendation and coordination.

   This division plays an important role in the image that a company has in the community, state and nation. This image also affects the economic status of the enterprise by the attitude that is exhibited by public toward the product and employment.

<u>Subject Matter Outline</u>

1. Communications And Information
   a. Attitude and opinion appraisal
      (1) Gather and evaluate public opinions
      (2) Recommend methods for their improvement
   b. Employee information exchanges
      (1) Questionnaires
      (2) Management and employees
      (3) Working conditions
   c. Creditor and investor communications
      (1) Stockholders
      (2) Profit
      (3) Wages
      (4) Services
   d. Public communications
      (1) Bulletin boards
      (2) Letters

    (3) Magazines
    (4) Newspapers

Student Activities

1. Produce products needed by a charitable organization such as retarded children's school or orphan's home.
2. Discuss industries or businesses found in the area and discuss the general feelings of the class toward the industry or business.
3. Divide into groups, select an established business and evaluate that business through interviews with the public.
4. Have a public external relations representative from a nearby industry visit the class and give a short lecture on the importance of the communication and information link between the public and the industry.
5. Set up a mock industry producing a certain product. Have groups take a poll among their peers to determine their general opinions and attitudes. If both good and bad opinions are presented, have the students evaluate the effects of their opinions. With this evaluation, have students plan methods of correcting and improving opinions and attitudes pertaining to their project.
6. Compile examples of publications containing internal information. Have the students publish and distribute comparable announcements.
7. Present a report on the phase of production of greatest interest.
8. Stage a special stockholders meeting. Have students participate by giving reports and discussing the findings.

Counselor Interaction

Secure resource person from external relations department to talk on requirements and opportunities in his field.

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2. Public Activities Coordination
    a. Civic affair participation (Recommend and coordinate company participation in a public project to benefit the nation, community or some segment of the population.)
    b. Association and society relations (Recommend and coordinate company participation in industry, management, technical and professional organizations.)

Student Activities

1. Prepare information release to public through news media about the operation of company.
2. Have a company representative speak to the class on maintaining effective relations with mass communications media.
3. Prepare an article for the local newspaper which will contain information about the mass production project.
4. Determine what will be done with the profit from the company. Also determine what technical and professional organizations the company should be members of.

5. Bring in clippings from newspapers and periodicals on industrial participation in public projects.
6. Visit a local industry and make a list of the civic affairs and business associations in which they participate.

3. Career in industrial and public relations
   a. Requirements
   b. Opportunities

Student Activities

Obtain information on jobs, wages and fringe benefits from industries and employment agencies.

Summary

1. The external relations department must know the corporations plans and policies in order to decide what information to release.
2. It is important that the external relations department portray a favorable image of the company to the public.

Summary Questions

Completion

1. Planning what information to release is one of the ____________________ ___________ departments activities.
2. Stimulating better feelings between ______________________________ and ______________________________ is one function of the external relations.
3. The ______________________________ department helps in the preparation and distribution of facts to stockholders.

Essay

1. Name a corporation that you think has a good external relations department and explain why you feel this way.
2. What relation does the external relations department have with the news media?

Lesson 21

SECRETARIAL AND LEGAL AFFAIRS

Secretarial functions in a corporation are advising, preparing, executing and protecting announcements and records. Also involved are documenting actions, or intended actions of company owners, their elected representatives and the corporation as a legal entity.

The primary responsibility of the secretarial section is to keep the stockholders well informed on the wide range of activities that contribute to corporate growth and health. The secretarial staff is in constant touch with the financial community, passing on information about the company, good or bad, which will be helpful in the public evaluation of company performance and prospects. The staff keeps the corporation informed about the annual meeting. This meeting is really a forum, an opportunity for management and shareholders to meet on a face-to-face personalized basis.

The secretarial staff prepares a report which informs stockholders who were unable to attend the annual meetings of the discussions, questions and answers between management and stockholders.

The legal functions include performing, or causing to be performed, such duties as are required by law or the by-laws of the corporation and appraising and advising the company on all phases of its operations and relations from a legal viewpoint.

A company, corporation or industry in general is governed and regulated first, by the laws of the land; second, by the provisions of its charter; and third, by its by-laws. This part of the activity can be broadly defined as performing all duties and actions that are required in following the statutory obligations of the local, state and national governments plus the charter and by-laws of the company.

Legal affairs must appraise, advise, counsel and prepare documents for the company in accordance with the charter and by-laws. Provisions are made in the charter affecting the charter itself, the by-laws, stock, voting and director's responsibility. By-laws provide for such details as organization, administration and business routine which are not prescribed by the charter. The legal aspects of this activity area may be divided into corporate affairs, employee affairs, financial affairs and patent affairs.

Note To Instructor

This lesson deals with the secretarial affairs and might be received better by the students if they could visualize a setting such as the secretary's office. The equipment would include desks, chairs, typewriters, adding machines, dictaphone or other recording machines and secretary-size filing cabinets.

This facility, if not an integral part of the corporation business office, would probably be very close to it because outgoing correspondence, signed by company' representatives, frequently has binding consequences.

Objectives

The students will be able to
1. Participate in meaningful experiences of secretarial affairs.
2. Exhibit a basic knowledge of the background information, advantages and disadvantages of secretarial affairs.
3. Negotiate an agreement.
4. Demonstrate a basic knowledge and ability to perform the activities related to secretarial work.
5. Demonstrate an understanding of corporate affairs and corporation law.
6. Explain the function of the stock exchange and how it affects corporations.
7. Demonstrate an understanding of the importance of legal and secretarial affairs in a corporation and relate this understanding to everyday problems and decision making.

Time Required Three to five days

Instructional Aids

1. Films
    a. "Fortune Seekers," #1029
    b. "What Is A Corporation?" Coronet Films, Chicago, Illinois, 50501
2. Filmstrips
    a. "Are Manners Important"
    b. "Are You A Good Citizen"
    c. "Control Your Emotions"
3. Charts
    a. New York Stock Exchange Common Stock Index
    b. How an order is executed on the New York Stock Exchange
    c. Stock certificate
4. References
    a. Portfolio of Teaching Aids, New York Stock Exchange, 11 Wall Street, New York, 10005
    b. Index to Legal Periodicals, H. W. Wilson Company, Vol. 62, 6-69, No. 9.
    c. Dacev, Norman, How to Avoid Probate, Crown Pub. Inc., N.Y., 1965
    d. Using Bank Credit, Am. Bankers Assn., 12 East 36th St., N.Y., 10017
    e. Roscoe, Organizing For Production, page 90-91, 481, 482, 515
    f. Amrine, Organizing For Production, page 444-445.
    g. The Story of the American Patent System, U. S. Patent Office, Washington, D. C.
5. Newspapers
    a. Wall Street Journal
    b. Local papers
6. Examples of union badges and union membership cards
7. Employer's first report of injury form

Introduction

Every company or industry must have a system for leadership and organization. The primary responsibilities of the secretarial and legal affairs sections are to keep the stockholder well informed on the wide range of activities that contribute to corporate growth and health.

The functions of a complete secretarial and legal affairs staff may be summarized as stockholder, board of directors and corporate affairs.

Subject Matter Outline

1. Stockholder Affairs
    a. Advising stockholders
        (1) The duties of stockholders
        (2) The legal counsel of stockholders
            (a) The individual stockholders
            (b) The rights of collective stockholders
            (c) Stockholders right to sell, vote and inspect records
    b. Preparing for use of stockholders
        (1) Agenda
        (2) Proxy statements
        (3) Resolutions

Counselor Interaction

1. Introduce game - collective bargaining -- SRA
2. Introduce Occupational Exploration Kit -- SRA
3. Introduce Widening Occupational Roles Kit -- SRA
4. Show and discuss filmstrips (1) "Are Manners Important?" (2) "Are You A Good Citizen?" (3) "Control Your Emotions"

Student Activities

1. Make a job analysis of secretary.
2. Invite the school secretary to speak to the class.
3. Make a chart listing the responsibilities of a secretary in a corporation.
4. Form a company and sell stock to other members of the company.
5. Make up shares and determine how much each share of stock should sell for.
6. Write claims for the stockholders.
7. Give a financial report.
8. Attend a stockholders meeting. Take minutes and other records of stockholder actions and report this information to those members who could not attend.

2. Secretarial affairs and the board of directors
    a. The owners or stockholders elect a board of directors
        (1) The board elects officers
        (2) Determines the profits

        - (a) Shares of stock
        - (b) Actions of owners
    - b. The secretary prepares and advises on
        - (1) Agendas and resolutions
        - (2) Minutes and records
        - (3) Committee structure

Student Activities

1. Elect a board of directors for the company. Each share of stock counts as one vote.
2. Have a board of directors meeting in regard to the project.
3. Attend a board of directors meeting of some company close to the school.

(Show and discuss film a, "Fortune Seekers.")

3. Corporation and secretarial affairs
    - a. Prepare report
    - b. Stockholders approval
        - (1) Prepare and maintain legal documents
        - (2) Advise on
            - (a) taxes
            - (b) subsidiary companies
            - (c) power of directors
            - (d) power of officers
            - (e) power of stockholders

Student Activities

1. Draw up a charter for their corporation.
2. Check into the legal aspects of selling the product.
3. Check to see if the product has ever been patented.

Teacher Discussion Topics

1. Select ads in paper showing salaries, experience necessary and education required for jobs.
2. The board of directors has final authority in all corporate matters except those reserved for the stockholders.
3. The term of office is usually one to three years, but it is common for members to be re-elected.
4. Each state has laws which tax the corporation's income. These taxes regulate the sale of its securities.
5. Whether or not the corporation has interstate business, the federal tax on the income must be paid.
6. In a merger one company is absorbed into another and the absorbed company ceases to exist.
7. An agenda is a list of things to be dealt with at a meeting.

Introduction to Legal Affairs

The functions of the legal affairs department of industry may be divided into corporate affairs, employee affairs, financial affairs and patent affairs.

(Show and discuss film b, "What Is A Corporation?")

1. Corporate affairs
    a. Company incorporation
        (1) Stockholder approval
        (2) Preparing legal documents
        (3) Advising on
            (a) Taxes
            (b) Subsidiary company
            (c) Affiliated companies
            (d) Power of directors
            (e) Power of officers
            (f) Power of stockholders

Student Activities

1. Bring in daily New York Stock Exchange reports from the local paper.
2. Bring in examples of stock and/or legal documents.

2. Employee affairs
    a. Counseling the company; advising
    b. Compensation matters
        (1) Welfare matters
        (2) Employee agreements

Student Activities

1. Find an article in the newspaper or magazine concerning collective bargaining and write an interpretation of it.
2. Write a report on labor unions, their advantages and disadvantages. Be prepared to give this report in class.
3. Have the union and management groups draw up a plan for the payment of compensation in the event of illness.
4. After reading union articles, discuss the question, "What is a Union?"
5. Elect union officers: president, vice-president, secretary and treasurer.

Counselor Interaction

1. Invite a lawyer to speak to the class
2. Orient students by preparing questions prior to the lawyer's visit.
3. Make a job analysis of the field of law.
4. Discuss a lawyer conducting personal affairs in court.
5. Role playing - "A lawyer defending an employee in the corporation" and "a lawyer defending the corporation."

6. Secure an application for a workers permit. Discuss the Child Labor Law. If possible, invite a labor representative from the state employment office.
7. Write a short story depicting the importance of loyalty to the corporation or when legal counsel is necessary.

3. Financial affairs
    a. Credits (When one uses trade credit one merely relies on credit purchases of materials, tools or equipment. Credit instruments used in this manner are legally called notes.)
    b. Advantages and disadvantages of credit
    c. Advantages and disadvantages of owner financing
    d. Advantages and disadvantages of bonds
    e. Advantages and disadvantages of common stock
    f. Advantages and disadvantages of perferred stock

Student Activities

1. Take a field trip to observe the finance department of an industry.
2. Have a speaker from a finance department come in to speak to the class.
3. Set up a finance department to determine the flow of money in the company.

4. Patent affairs
    a. Counseling on protection of products and processes
        (1) Trade names
        (2) What is a patent
            (a) What is the term of a patent
            (b) May the term of a patent by extended
            (c) Who may obtain a patent
            (d) How does one apply for a patent
            (e) Where may a search be conducted

Student Activities

1. Draw up a protective patent for some element of design in the product being manufactured.
2. Make a list of questions to ask a corporation president before an interview or class visit.

Teacher Discussion Topics

1. Give a brief introduction to collective bargaining. Ask the question, "If all of you were working for a company and you wanted a 25¢ raise, what would be the best method to use to insure a raise? "
2. Collective bargaining is people joining together collectively for a common goal.
3. Divide class into two groups. One group to represent members of a union; the other group to represent management. Decide on a grievance and have the group negotiate it.
4. What compensations, other than salary or wages, are sometimes given employees by corporations?
5. What advantages can be derived from appointing key persons to form a committee and assigning them a problem that each can contribute to the solution.

INSTRUCTIONAL AIDS APPENDIX
for
Industrial Arts for the Middle Grades

MANUFACTURING
1970

Note: In addition to the instructional aids referred to in the bulletin, this appendix lists other films that may be substituted for those indicated.

ORIENTATION

Films

1. WORKING SAFELY IN THE SHOP #1483

Presents the three essential points of shop safety--how to keep a shop safe for work; how to dress for safety while working in the shop and how to operate safely such tools as the grinder, circular saw, jig saw, drill press, jointer, lathe and disk sander. 10 min. FS 1

Source: Georgia State Department of Education Film Libraries

2. SURVEY OF OCCUPATIONAL MATURITY

Prepared by participants in EPPA Institute.

3. PERSONAL DATA QUESTIONNAIRE

Prepared by participants in EPPA Institute.

4. KUDER GENERAL INTEREST SURVEY, FORM E

This survey measures an individual's degree of preference for activities in 10 areas. Particularly effective for use with junior high school students as part of a comprehensive exploratory program. Vocabulary is on sixth grade level. Suitable for grades 6-12.

Source: Science Research Associates
259 East Erie Street
Chicago, Illinois 60611

5. WHAT I LIKE TO DO, A SURVEY OF CHILDREN'S INTERESTS

This easy-to-read interest inventory identifies a youngster's preference in art, music, social studies, active play, quiet play, manual arts, home arts and science. Suitable for grades 4-7.

Source: Science Research Associates
259 East Erie Street
Chicago, Illinois 60611

6. OHIO VOCATIONAL INTEREST SURVEY

Designed to assist students with their educational and vocational plans. With its data-people-things approach to occupational counseling, OVIS is ideally suited for group and individual exploration of the world of work. Must be computer scored by company.

Source: Harcourt, World & Brace
757 Third Avenue
New York, New York 10017

ORGANIZATION

Films

1. PRODUCTIVITY - KEY TO AMERICA'S ECONOMIC GROWTH Free (1964) Color 28 min.

This film reviews some of the new innovations developed through research. Some of these are improved cars, cyclotrons, airplanes and gem machining. What's in the future? Proving grounds and market surveys will tell this to some extent. (sh)

Source: Doall Company
Film Librarian
254 North Laurel Ave.
Des Plaines, Illinois 60016

2. TO REACH THE DAWN Free (1966) Color 28½ min.

This is the story of the Reynolds Metals Company. It follows R. S. Reynolds from his courting days, his cleanser factory, World War I, his four sons, World War II, aluminum production and products of peace to a world wide organization. (jh,sh)

Source: Elliott Film Company
1114 Nicollet Avenue
Minneapolis, Minnesota 55403

3. WORLD OF HENRY FORD, THE Free (1963) Color 35 min.

This film follows the life of Henry Ford. It begins at his birth and looks at the world scene at that time. Topics covered are the quadracycle, early auto racing, better roads, urbanization, tractors, international relations, rouge plant, modern facilities and trends. (jh)

Source: Ford Motor Company
Ford Film Library
The American Road
Dearborn, Michigan 48121

OR

4316 Telegraph Avenue
Oakland, California 94609

4. GOING PLACES Rental $2.40 Color 10 min. #CSC-322

In this animated film a fictitious company is formed and develops into a huge industry. The film covers all major concepts of American industry. A good introduction and follow-up discussion is needed to reduce the humor that is present.

Source: Audio-Visual Center
Indiana University
Bloomington, Indiana 47405

5. MODERN CORPORATION Free (1966) Color 30 min.

This is the story of the formation and operation of a corporation. It starts from a single owner proprietorship, goes to a partnership and leads to a corporation. Each is explained very well. Such topics as balance sheets, liabilities, dividends, assets, net worth and stock exchanges are discussed. There is also a discussion of competition among corporations. (jh, sh)

Source: Educational Films Inc.
201 North Occidental Road
Los Angeles, California

6. EDDIE INCORPORATED Rental $1.50 (1960) Color 30 min.

This film describes some of the basic principles of a corporation. A youngster wants to set up a lemonade stand and goes to see a lawyer about incorporating. The lawyer points out the need to keep a balance between employers, investors, and customers. Such things as community relations, research and marketing also are covered. (elem. jh)

Source: The American Legion

7. HELP YOURSELF TO OWNERSHIP Free (1955) B&W 10 min.

This film takes a brief look at cooperatives. Many different types of cooperatives are discussed as well as what benefits the members receive from belonging to a cooperative. (jh)

Source: Midland Cooperatives
Attention: Library
739 Johnson Street, N. E.
Minneapolis, Minnesota 55413

8. SMALL BUSINESS, U.S.A. Free (1958) B&W 33 min.

This is the story of main street. Enterprises come and go because they can or cannot meet competition. There is no one formula for success, but necessary ingredients include merchant instinct, know-how, buying skill, selling skill, financial management, record keeping, willingness to take advice and integrity. (jh, sh)

Source: Georgia State Film Libraries

9. BRIDGE, THE Free (1964) B&W 20 min.

This film shows how industry can work with school officials in fighting against high school students dropping out of school. Several programs are described. These include STEP (Solution To Employment Problems), work-study and Knock-Out Drop-Out programs. (jh)

Source: National Association of Manufacturers

Filmstrips (May be purchased under ESEA and NDEA)

WIDENING OCCUPATIONAL ROLES KIT, Grades 6-9

Work gives each student the opportunity to explore for himself the complex areas of career opportunity. Th [illegible] designed to help the student expand his knowledge of the world of work, [illegible] recognize families of related jobs, to develop a deeper understanding of his own abilities and interests and to learn about the type and extent of education needed to prepare adequately for various occupations.

Source: Science Research Associates, Inc.
259 East Erie Street
Chicago, Illinois 60611

5-2200 Widening Occupational Role Kit List: $199.00
Net: 149.50

PREPARING FOR THE JOBS OF THE 70's #D-213

Investigates the changing economic and cultural patterns as we move into the 1970's, and relates them to the education and training required today to meet the needs of the next decade. Two full-color filmstrips; 2 2"(p seconds) Part 1: 76 frames /15 min. Part 2: 69 frames /14 min. Library of Congress #Fi A 663626 $35.00

Source: Guidance Associates/Harcourt Brace and World
Pleasantville, New York 10570

PREPARING FOR THE WORLD OF WORK D-188

Underscores the need for the student to begin planning early for many occupations and suggests what kind of information his counselor can provide. Helps establish some guideline for students in judging whether or not they possess the aptitudes required for specific job families. Five major areas of home economics, trade and industry, agricultural, distributive and business are discussed. Two color filmstrips; 2 12" lp second Part 1: 60 frames, 12½ min. Part 2: 84 frames, 16½ min. - Library of Congress A66-3119 $35.00

Source: Guidance Associates

RESEARCH AND DEVELOPMENT

Films and related materials

1. RESEARCH AND DEVELOPMENT

Source: P. [illegible] e Co.
Public Relations Office
Box 599
Cincinnati, Ohio

2. SCIENTIFIC METHOD

Presents the scientific method as a tool for the logical solution of problems. Outlines the steps of the scientific method, illustrates that the method can work in many areas and demonstrates the phases of the method.

Source: Georgia State Film Libraries

3. INDUSTRIAL RESEARCH - KEY TO PROGRESS Free B&W 14 min.

This film reviews some of the new innovations developed through research. Some of these are improved cars, cyclotrons, airplanes and gem machining. What's in the future? Proving grounds and market surveys will tell this to some extent.

Source: National Association of Manufacturers
Film Bureau
277 Park Avenue
New York, New York 10017

4. PHOTOGRAPHY AT WORK Free Color 60 min.

This film, narrated by Chet Huntley, shows the vast uses of photography in industry for the purpose of research. They use time lapse and fast and slow motion photography. Some of the interesting processes that are shown are explosive metal forming and multiple soldering in electronics. The first half of the film is very applicable to manufacturing.

Source: Eastman Kodak Film Library
Rochester, New York 14650

5. JOBS IN ATOMIC ENERGY

Shows various diversifications of employment opportunities provided by development of atomic energy. Scientists, technicians and labors are seen at work in atomic research, power production, agriculture, medicine and industrial application.

Source: Georgia State Film Libraries

6. SCIENTIFIC METHOD IN ACTION

Uses experiments of Galileo and Dr. Jonas Salk to illustrate steps in the scientific method and also man's use of this method in his daily activities and understanding the world about him.

Source: Georgia State Film Libraries

7. MEN AND MACHINES, OF Free Color 27 min.

A group of production research men work to improve production of telephone parts. The film shows many of the problems that men encounter in new methods of production and how they are solved.

Source: Sterling Movies, U.S.A., Inc.
43 West 61 Street
New York, New York 10023

8. CAVALCADE OF FIBERS Free Color 18 min.

This film is concerned with the evolution of synthetic fibers. It starts by giving a brief history of natural fibers and early methods of weaving them. It then goes into the development of rayon, acetate and nylon. There is also a discussion of fundamental and applied research.

Source: Dupont Denemours & Co., Inc.
Motion Picture Section
Advertising Department
Wilmington, Delaware 19898

9. MAN-MADE MIRACLES -- INDUSTRY ON PARADE Free B&W 12 min.

This film looks briefly at synthetic materials that man has developed. Included are artificial plasma, cortisone, rubber, gems, plastics and clothing.

Source: National Association of Manufacturers
Film Library
277 Park Avenue
New York, New York 10017

10. CROSS SECTION OF AMERICA Free Color 22 min.

This film shows all of the tests given automobiles at the General Motors proving grounds at Milford, Michigan.

Source: General Motors Corporation
Public Relations Staff
Film Library
General Motors Building
Detroit, Michigan 48202

11. AMERICAN LOOK -- INTRODUCTORY AND DEVELOPMENT AREAS Color Free 29 min.

The film shows modern designs brought about by designers today. Discusses packaging and design principles along with design procedures. They make use of many materials.

Source: Jam Handy Organization
2821 East Grand Boulevard
Detroit, Michigan 48211

12. AGRICULTURE, RESEARCH AND YOU Free (1964) Color 28 min.

Research has created a new dynamic agriculture with the primary need being to change unproductive land into productive land. Work is being done to fight plant diseases, produce better quality products, return land to production through irrigation, meet the demands of the customer and control animal diseases.

13. CHANGE FOR THE BETTER Free Color 20 min.

This film is concerned with change and how aluminum is the cause and result of modern change. Change has also been advanced by the television and transistor radio. There are some good shots of the "good old days."

Source: Association Films, Inc.
561 Hillgrove Avenue
LaGrange, Illinois 60525

14. A BETTER WAY Free Color 30 min.

There must always be a better way. Numerical control is the answer to making things better. Tapered run machines used in shipbuilding are much more efficient than ordinary tooling methods. Instead of handfilling candle forms, automatic machines now do this with the use of a computer, telecredit nabs a burglar in the act. Many industries are finding numerical control the answer to more efficient, more economical and more profitable business.

Source: Modern Talking Pictures

15. ALUMINUM IS NOT ONLY ALUMINUM Free Color 12 min.

This film is centered around the theme, "you get more than 16 ounces in every pound from Alcoa." It is a summation of the various extras given an Alcoa customer. These include design services, research and development facilities, manufacturing assistance, sales aids and advertising support. Alcoa's modern handling equipment is thoroughly explained. Early movie flash backs add a bit of delightful nonsense to the film.

Source: Association Films, Inc.
561 Hillgrove Avenue
LaGrange, Illinois 60525

16. WONDERFUL WORLD OF QUALITY PAINTS, THE Free Color 15 min.

The O'Brien Corporation is constantly working to improve the beauty, methods of application and life of their paints. This film looks briefly at the various activities of their research department. Quality control is emphasized. There is a short section on the manufactured paint from raw materials.

Source: The O'Brien Corporation

17. BIGGEST SHOVEL Free Color 12 min.

This is the story of the world's largest shovel. It was designed and built by Bucyrus-Erie to pick up their sales. It's formally called the 38-50B stripping shovel and stands 220 feet high. The film shows the design, the making of parts, putting it together on the scene and its actual operation.

Source: Bucyrun-Erie Company
Sales Promotion Division
P. O. Box 56
South Milwaukee, Wisconsin 53172

18. MOLTEN MAGIC Free Color 12 min.

A brief history of glass blowing as done in Jamestown is shown. The need for glass bottles became evident and bottling machines had to be invented. Animation shows how these bottling machines work.

Source: Glass Containers Manufacturers Institute, Inc.
Director of Information
99 Park Avenue
New York, New York 10016

19. PORTRAIT IN PLASTICS Free Color 20 min.

This is the story of George Eastman and his work. His first work was with photographic films and cameras. Then he stumbled onto plastics. The process of producing some of these is shown along with testing and their applications.

Source: Eastman Kodak
Film Library
Rochester, New York 14650

20. SEEING IS BELIEVING Free B&W 10 min.

This film shows the development of a movie camera that will take 400 pictures per second. It was developed to aid the engineer or repairman in using slow motion to analyze how a machine is working. Such things as milk dropping into coffee, popcorn popping, soap bubbles bursting, milling machines, cutting and switching equipment working are shown with the aid of this slow motion camera.

Other Related Guidance Films and Materials

1. PLANNING YOUR CAREER

   Advises students to plan their careers by (1) learning about themselves, (2) finding out about careers that interest them and (3) comparing themselves to the requirements of selected vocations.

   Source: Georgia State Film Library

2. FINDING YOUR ORBIT - Student Record Book

   The purpose of this booklet is to develop in the student the ability to think of himself in terms of his abilities, interests and aptitudes and to utilize this information in investigating realistic post-school occupational and educational opportunities. It attempts to help the student ascertain, accept, understand and apply the revelant facts about himself to the pertinent facts about the occupational and educational world which he will learn through a program of planned exploratory activities.

   Source: Chronical Guidance Publications, Inc.
   Moravia, New York

3. MOMENT OF DISCOVERY (about the work of scientists)

   Source: Educators Guide to Free Filmstrips
   Educators Progress Service
   Randolph, Wisconsin

4. MARKET RESEARCH MANAGEMENT

   Source: Proctor and Gamble Company
   Public Relations Department
   P. O. Box 599
   Cincinnati, Ohio

5. INDUSTRIAL ENGINEERING MANAGEMENT

   Source: Proctor and Gamble Company
   Public Relations Department
   P. O. Box 599
   Cincinnati, Ohio

6. ENGINEERING DEVELOPMENT

   Source: Proctor and Gamble Company
   Public Relations Department
   P. O. Box 599
   Cincinnati, Ohio

7. ENGINEERING

Source: Proctor and Gamble Company
Public Relations Department
P. O. Box 599
Cincinnati, Ohio

8. HIGH SCHOOL SELECTION AND YOUR CAREER, Parts 1 and 2

Source: Guidance Associates
Pleasantsville, New York

Type: Records and filmstrips

9. JUNIOR OCCUPATIONAL BRIEFS

The kit contains 400 briefs arranged according to interests and educational levels. Interests are arranged by jobs dealing with things, people, animals and ideas. Educational levels are based on jobs requiring high school or less, high school plus special training and college graduation or graduate school.

Source: Science Research Associates, Inc.
259 East Erie Street
Chicago, Illinois 60611

10. WIDENING OCCUPATIONAL ROLES KIT (WORK)

A student record book, grades 5-9. The purpose of this booklet is to foster vocational maturity by an understanding of himself, broaden his knowledge of the world of work, acquaint him with the training necessary for a variety of vocations and promote his understanding of other people and their work.

Source: Science Research Association

11. THE MANY FACES OF TECHNOLOGY

Source: U. S. Department of Labor
Bureau of Labor Statistics
Suite 540, 1371 Peachtree Street, N. E.
Atlanta, Georgia 30309

Cost: Free in single copies

12. SYSTEM ANALYST: A SOFTWARE SPECIALIST

Source: U. S. Department of Labor
Bureau of Labor Statistics
Suite 540, 1371 Peachtree Street, N. E.
Atlanta, Georgia 30309

Cost: Free in single copies

13. CAREERS IN TECHNICAL OCCUPATIONS (OE-80032)

Source: U. S. Department of Health, Education and Welfare
Office of Education
Washington, D. C. 20202

14. USAEC: WHAT IT IS, WHAT IT DOES

Source: U. S. Atomic Energy Commission
Division of Technical Information Extension
P. O. Box 62
Oak Ridge, Tennessee 37830

Type: Short papers and booklets

15. RADIOLOGICAL HEALTH SPECIALISTS AND TECHNICIANS

Source: U. S. Atomic Energy Commission
Division of Technical Information Extension
P. O. Box 62
Oak Ridge, Tennessee 37830

Type: Short papers and booklets

16. SHOULD YOU BE A SCIENTIST

Source: U. S. Atomic Energy Commission
Division of Technical Information Extension
P. O. Box 62
Oak Ridge, Tennessee 37830

Type: Short papers and booklets

17. THE TECHNICIANS AND TOMORROW

Source: General Electric Company
Room 801
570 Lexington Avenue
New York, New York 10022

Brochures: Free

Sources of References

1. RESEARCH AND DEVELOPMENT FUNCTION
The Market Orientation of Research and Development
COMMON BODY OF KNOWLEDGE
American Management Association
347 Madison Avenue
New York, New York

2. CHEMISTRY OF PETROLEUM REFINING
American Petroleum Institute

3. THIS IS OIL - REFINING OIL FOR ENERGY - THE STORY OF MANUFACTURING
Shell Oil Company
Public Relations Department
Tulsa, Oklahoma

4. THE STORY OF THE AMERICAN PATENT SYSTEM
Supt. of Documents, U. S. Printing Office
Washington, D. C. 20402

5. INDUSTRIAL RESEARCH REPORT or magazine
P. O. Box 2689
Clinton, Iowa 52732

6. HOW BASIC TOOLS CREATED CIVILIZATION
DoAll Company
254 North Laurel Avenue
Des Plaines, Illinois

7. GENERAL INDUSTRY
Lindbeck and Lathrop
Chas. A. Bennett, Inc.
Peoria, Illinois

8. DESIGN FOR DECISION
Bross, Irwin
The Macmillan Co.
New York, New York

9. MANUFACTURING IN THE SCHOOL SHOP
Hawes, Robert & Schaefer
American Technical Society
Chicago, Illinois

10. AMERICAN FOREST PRODUCT INDUSTRIES
1835 K. Street, N. W.
Washington, D. C. 20006

PRODUCTION

Films

1. PRODUCTIVITY -- KEY TO AMERICA'S ECONOMIC GROWTH Free (1964) Color 28 min.

   Through the years increased productivity has been the key to America's economic growth. Various industries are explored to see how they have progressed through the years and added to economy of the United States. Mechanical inventions have greatly helped the farmer increase production. Competition has helped provide better products at lower prices. Problems resulting from this ever changing economy are also discussed.

   Source: #7011 Georgia State Film Libraries and
   DoAll Company
   Film Librarian
   254 North Laurel Avenue
   Des Plaines, Illinois 60016

2. OUR MR. SUN Free Color 60 min.

   "Our Mr. Sun" combines entertainment and information, using actors, animated characters and filmed scenes from all over the world. It is a story within a story and opens with Dr. Research and the writer trying to tell the story of the sun and what it means to life on the earth. Some of the things covered are attitudes held by ancient man, physical properties of the sun, how the sun burns, how the sun produces food and man's attempts to harness the sun's energy.

   Source: Wisconsin Telephone Company
   Public Relations Department
   740 North Broadway
   Room 240
   Milwaukee, Wisconsin 53202

3. MEN AND MACHINES, OF Free (1963) Color 27 min.

   A group of production research men work to improve production of telephone parts. The film shows many of the problems that men encounter in new methods of production and how they are solved.

   Source: Sterling Movies
   43 West 61 Street
   New York, New York 10023

4. TOOLS Free #2001 11 min.

Depicts the development of tools from sticks, antlers, shells and bones by early man. Explains how each man made his own tools for survival. Points out that similar tools are still being used and shows many modern hand tools and equipment.

Source: Georgia State Film Library

5. INDUSTRIAL ARTS: A SAFE SHOP Free #497 12 min.

Describes safety rules applicable to the industrial arts shop. Shows such measures as the use of proper clothing, goggles and shields; the spacing of work areas; the use of power tools and hand tools; the disposal of waste; the storage of lumber and inflamable liquids; the care of electrical equipment and proper conduct in the shop.

Source: Georgia State Film Library

6. AIR CARGO Free Color 30 min.

This film stresses the importance of air freight in today's world where time is so crucial. Several different kinds of jets are looked at. Also, different methods of loading planes are covered. The film touches upon pre-transit, packaging, loading, muscle action, mechanical action, pressure, storage, distribution, limitations and facilities.

Source: Association Films Inc.
561 Hillgrove Avenue
LaGrange, Illinois 60525

7. FUTURE IN STEEL Free Color 28 min.

This film ties together very well the processes of the steel industry and the vast array of engineering opportunities available. Every aspect of the steel industry from mining and unloading the raw materials to the management and office work is covered. It offers an excellent overview of the steel industry.

Source: Roa's Films
1696 North Astor Street
Milwaukee, Wisconsin 53202

8. HOUGH STORY, THE

"There is no such thing as a doubtful unit." This is the central theme of the film. The Hough Division of International Harvester produces rubber tire tractors such as the Payloader and Paydozer. The film takes the audience through the factory and shows how special, high alloy steel is made; how automatic tooling is used; how parts are assembled; how units are shot, blasted and painted and, finally, how information is processed to be used in the distribution of parts. Inspection in all areas and with complicated equipment is emphasized constantly.

Source: Modern Talking Picture Service
114 Nicollet Avenue
Minneapolis, Minnesota 55403

OR

16 Spear Street
San Francisco, California 94105

9. FOR EVERY WHEEL THAT TURNS Free Color 30 min.

This is the story of a tire from design to actual road testing. The main part of the film is devoted to the process of making a tire. This begins by mechanically conditioning made by molecular modification. Using pressure, the tire begins to take shape. In a large heated press the final forming is done. Inspection then takes place and actual road tests are made before the tire is considered 100% ready.

Source: Association Films, Inc.
561 Hillgrove Avenue
LaGrange, Illinois 60525

10. HEART OF THE MATTER Free Color 20 min.

The film is concerned with the production of steel tools. Performance value and maximum life as far as production is concerned are of prime importance in producing tool steel. The operations in forming the tool are discussed. These include machining, heat treating, grinding and the final measuring of the carbide concentration of the steel (which determines the character of the tool).

Source: Latrobe Steel Company
Latrobe, Pennsylvania 15650

OR

L. S. Starrett Company
Educational Division
121 Crescent Street
Athol, Massachusetts 01331

11. DIE CASTING -- HOW ELSE WOULD YOU MAKE IT Free Color 44 min.

Die casting is the process of injecting pressurized molten metal into a die. Many areas of conditioning are discussed. Some of the outstanding areas are mechanical, heat, forming and finishing. Many ways of forming are shown to emphasize the point that die casting is the only economical way in certain instances. The machinery used is also discussed.

Source: Alcoa Aluminum
Aluminum Company of America
Motion Picture Section
794 Alcoa Building
Pittsburgh, Pennsylvania 15219

12. DRAMA OF METAL FORMING Free Color 30 min.

Metal forming can be divided into pressing, squeezing and rolling operations. Each of these and the machines used are discussed in detail. The processes included are hot rolling, shearing, cold rolling, annealing, forging, drop forging, rotary forging and extrusion.

Source: Shell Oil Company
Film Library
450 North Meridian Street
Indianapolis, Indiana 46204

OR

430 Peninsular Avenue
San Mateo, California 94401

13. STORY OF PRODUCTIVITY, THE Free Color 30 min.

This film is a discussion of the Hall of Progress that is operated by the DoAll Company. In lecture form, a narrator describes a large sun wheel on which America's industrial growth is outlined.

Source: DoAll Company
Film Librarian
254 North Laurel Avenue
Des Plaines, Illinois 60016

14. TOOLS AND RULES FOR PRECISION MEASURING Free B&W 40 min.

This film begins by giving early means of measurement such as the cubit, hand, span and foot. It then stresses the need for uniformity and precision in interchangeable parts. A short history of Leroy Starrett and his business is presented. The film is mainly devoted to the application of the many precision tools manufactured by Starrett.

15. STYLING AND THE EXPERIMENTAL CAR Free Color 18 min.

This film discusses the role of the stylist in designing car styles that are functional, yet pleasing to look at. Ideation and planning are covered thoroughly. Also, prototype and model are discussed. Several experimental cars are examined.

Source: Ford Motor Company
Ford Film Library
The American Road
Dearborn, Michigan 48121

16. B-D CONTROLS-THE CONSCIENCE OF A COMPANY Free Color 10 min.

Quality control at Becton-Deckinson Company makes them a leader in the production of quality sterile, disposable syringes. Some control methods are shown.

Source: Associated Films, Inc.
561 Hillgrove Avenue
LaGrange, Illinois

17. HULL 1679 Free Color 30 min.

"Hull 1679" is the story of the fabrication and assembly of a 106,500 ton tanker. Actual construction is shown. There is a discussion on the number of specialized skills necessary to complete the job. Some sea trials are shown.

Source: Roa's Films
1696 North Astor Street
Milwaukee, Wisconsin 53202

18. DUPONT STORY, THE Free Color 40 min.

Mr. Dupont, an immigrant from France, began by producing gunpowder. The company grew and changed hands many times, but it never fell apart. There was continuous research being conducted. Dynamite was produced. Then they diversified and such products as lacquers, artificial leather, plastics, dyes and nylon resulted. Management policies are also touched upon.

Source: Dupont and Company
Motion Picture Section
Advertising Department
Wilmington, Delaware 19898

19. WORLD OF HENRY FORD, THE Free Color 35 min.

The film goes through the life of Henry Ford. It begins at his birth and looks at the world scene at the time. Topics covered are the quadracycle, early auto racing, the Model T, the assembly line, better roads, urbanization, tractors, international relations, Rouge Plant, modern facilities and trends.

Source: Ford Motor Company
Ford Film Library
The American Road
Dearborn, Michigan

20. NEW HORIZONS IN ALUMINUM BRAZING Free Color 24 min.

Research has led the way to economical and efficient aluminum brazing. There are three types of aluminum brazing: torch brazing, furnace brazing and dip brazing. Each is discussed thoroughly. Alcoa has also done much research on filler metal and now offers many sizes and forms. The latest development is brazing sheet that already contains a layer of filler metal.

Source: Association Films
561 Hillgrove Avenue
LaGrange, Illinois 60625

21. AMERICAN ROAD Free Color 39 min.

The mud trail was a way of life, but as transportation methods improved so did the roads. This film follows the development of the Ford Motor Company from Henry Ford's quadracycle to the luxurious Lincoln. The Model "A" and "T" are covered along with the assembly line methods needed to produce them cheaply. Roads were made better, filling stations grew and travel all over the country became relatively inexpensive.

Source: Ford Motor Company
Ford Film Library
The American Road
Dearborn, Michigan 48121

22. MACHINES Free #1344 10 min.

Shows a small boy running vainly to keep up with older members of the Rangers Club who are riding bicycles, thus illustrating man's dependence upon machines. Exhibits and demonstrates the operation of simple machines such as the lever, the inclined plane, the pulley, the wedge and the screw. Explains how a door knob and a pencil sharpener are elaborations of quite primitive machines.

Source: Georgia State Film Library

23. ABC OF HAND TOOLS, THE Free Color 26 min.

Completely animated, a primitive pete demonstrates the wrong use of hand tools. The correct way is then shown. The film covers hammers, screwdrivers, pliers, wrenches, files, saws, chisels, drills and punches.

Source: General Motors
Public Relations Staff
Film Library
General Motors Building
Detroit, Michigan 48202

24. DON'T DROP YOUR GUARD Free Color 10 min.

Machine guards should always be used by the operator. The film shows a few scenes of different kinds of guards and what happens if they are not used.

Source: Aetna Life Affiliated Companies

Filmstrips

1. INDUSTRY IN TWENTIETH CENTURY AMERICA

A set of five color filmstrips with 33-1/3 RPM recordings dealing with the following subjects and relating them to industrial arts. Price--about $40.00.

Manufacturing - #A636-5
Plant Engineering - #636-4
Production Engineering - #636-3
Industrial Engineering - #636-2
Quality Control - #636-6

Source: Society for Visual Education, Inc.
1345 Diversey Parkway
Chicago, Illinois 60614

Books and Booklets

1. Lifton, Walter M. *Keys to Vocational Decisions*
Science Research Associates, Inc., 1964
Chicago, Illinois

This text combines 10 of the SRA Guidance Series Booklets in a sequence that leads the student to learn about himself, his study habits, skills, future education and career.

2. Hill, Wendell P. *Planning My Future*
Science Research Associates, Inc.
Chicago, Illinois

This text contains self-administered tests and inventories that help guide the student in making preliminary educational as well as vocational decisions.

Lesson 17

MARKETING

Films

1. EFFECTIVE LISTENING

Demonstrates the importance of effective listening in the communication process, points out the major obstacles of effective listening and discusses the ways in which good listening habits can be developed.

Source: Georgia State Film Library

2. PROSPECTING

An animated training film which explains that the foundation of successful selling is a systematic method of locating prospective buyers. Presents, through interviews with salesmen, three effective systems for selecting prospective buyers.

Source: Georgia State Film Library

3. BREAKTHROUGH IN TRANSPORTATION Free Color 20 min.

Examines the development of the semi-trailer traveling on rails as a boxcar. Special attention is given to the materials-handling aspects of this form of freight hauling. A brief section is shown on coupling and getting the cars ready for transit.

Source: Baltimore & Ohio Railways
3900 Terminal Tower
Cleveland, Ohio 44113

4. BANKING IN ACTION

A brief history of banking is given which includes such things as the National Currency Act, the Federal Reserve System and the Federal Deposit Insurance Corporation. It also shows how the automobile industry led to business and consumer financing.

Source: Association Films, Inc.
561 Hillgrove Avenue
LaGrange, Illinois 60525

5. FOLLOW IT ALL THE WAY Free Color 25 min.

This is the story of a salesman trying to sell a new line of women's apparel to the J. C. Penney Company. The buyer takes the salesman on a tour of the plant and shows how they test materials before purchasing.

Source: Association Films, Inc.
561 Hillgrove Avenue
LaGrange, Illinois 60525

6. TRUCKS AND YOUR TOWN

This film stresses the importance of the moving of industry from urban to rural areas. It gives a short history of trucking and delves into the many uses of and kinds of trucks operating today.

Source: Sterling Movies U.A.A. Inc.
43 West 61st Street
New York, New York 10023

7. HOW TO INVESTIGATE VOCATIONS

Considers how to interpret vocational guidance tests, how to apply this information to different vocations, how to raise questions related to a specific job and how to gain actual job experience.

Source: Catalog of Classroom Teaching Films
Georgia State Department of Education
Atlanta, Georgia

8. CHOOSING YOUR OCCUPATION

Outlines the services available for helping one to choose an occupation; describes various tests to determine one's interests, abilities and personality pattern; suggests information which one needs concerning his chosen occupation.

Source: Catalog of Classroom Teaching Films
Georgia State Department of Education
Atlanta, Georgia

9. ALUMINUM IS NOT ONLY ALUMINUM

This film is a summation of the various extras given each Alcoa customer. These include design services, research and development facilities, manufacturing assistance, sales aids and advertising support.

10. AMERICAN LOOK

This film shows modern designs brought about by designers today. It discusses packaging and design principles along with design procedure. Many materials are shown being used.

Source: Jam Handy Corporation
2821 East Grand Boulevard
Detroit, Michigan 48211

11. STEADY WORK STEADY PAY

Factories have to keep full employment to maintain a strong economy. To eliminate unemployment, industry has to have different products for seasonal periods, produce what is demanded, find new uses for old products, anticipate needs and find year-round jobs. Examples for each are given.

Source: National Association of Manufacturers
Film Bureau
277 Park Avenue
New York, New York 10017

12. ONWARD AND UPWARD

This film is concerned with in-service training of employees to keep them familiar with modern trends. Such things as training aids, conventions, customers and mobile school units are discussed.

Source: National Association of Manufacturers
Film Bureau
277 Park Avenue
New York, New York 10017

Book

Hoppock, Robert *Occupational Information*, New York, McGraw-Hill Book Company, 1967.

Pamphlets

"Advertising/Brand Management"
"Field Advertising Management"
"Market Research Management"
"Research and Development"

Source: The Proctor and Gamble Company
Public Relations Department
P. O. Box 599
Cincinnati, Ohio 45201

FINANCE

Films

1. AMERICAN BUSINESS SYSTEM: FINANCIAL MANAGEMENT Rental: $5.40 B&W 29 min. #BS-100

   First and/or second level American industry developmental area. The film starts by showing the financial workings of a simple business (restaurant), then moves to the National Cash Register Company and shows how a business of this size goes about obtaining more capital funds. (jh, sh, coll)

   Source: Audio-Visual Center
   Indiana University

2. THE SHAREOWNER Free Color 12 min.

   A small child gets a share of stock for his birthday, but he would rather have a train. A resident of Shareownersville explains to him some basic facts about the stock he owns. These include the types of people that own stocks and what his share in a company means to him.

   Source: Sterling Movies

3. PERSONAL FINANCIAL PLANNING 11 min. 799

   Emphasizes the need for prudent financial habits even in times of economic prosperity. Helps students see the relationship between financial planning and their own attainment of long-range as well as immediate goals. (j-s)

   Source: Georgia State Film Library

4. YOUR EARNING POWER 9 min. 1370

   Presents five conditions which influence earning power: economic conditions, the kind of job selected, the amount of one's education, personal qualities and one's ability to produce. Suggests preparation for work while still in school, with these points in mind. (j-s)

   Source: Georgia State Film Library

5. HOW TO GET WHERE YOU WANT TO GO

   Source: Jam Handy Organization
   Film Distribution Department
   2821 East Grand Boulevard
   Detroit, Michigan 48211

6. SPECIAL REPORT TO STOCKHOLDERS Free (1952) Color 10 min.

This completely animated film shows how General Mills did financially in a one year period. A train starts out full of money and it makes stops at expenses, taxes and stockholders. Working dollars are then discussed in some detail. (jh, sh)

Source: General Mills

7. BEHIND THE TICKER TAPE Free (1956) Color 21 min.

Most of this film is concerned with the history of the American Stock Exchange. It goes back to the gold rush and explains how brokers become necessary when corporations began to form. It shows the New York Curb Agency. There is also an example of how stocks are bought over the telephone. (jh, sh)

Source: Ideal Pictures

8. THE SPECULATORS Free 20 min.

This film discusses the necessity of having speculators in the commodity (grain) market. It discusses such things as debt, profit and bear. It explains the function of the Chicago Board of Trade. There is also a small section on information processing as it applies to the stock market.

Source: Sterling Movies

9. BANKING IN ACTION Free (1963) Color 20 min.

Banks lend money to all kinds of industries. They also sell savings bonds for the federal government. A brief history of banking is given which includes such things as the National Currency Act, the Federal Reserve System and the Federal Deposit Insurance Corporation. It ends with information showing how the auto industry led to business and consumer financing. (jh)

Source: Association Films

10. WHAT IS A CORPORATION?

Source: Coronet Films
Coronet Building
Chicago, Illinois 60601

11. USING BANK CREDIT

Source: American Banker Association
12 East 36th Street
New York, New York 10017

12. FINANCIAL MANAGEMENT

Source: Indiana University Audio-Visual Center
Bloomington, Indiana 47401

Books

Planning My Future Grades 7-9 5-1127 (paperback)

This text contains self-administered tests and inventories that help guide the student in making preliminary as well as vocational decisions.

Source: Science Research Associates, Inc.
259 East Erie Street
Chicago, Illinois 60611

Cost: List--$1.20; Net--$0.90

Pamphlets

Finance and Accounting Management

They Play For Money

Source: The Proctor and Gamble Company
Public Relations Department
P. O. Box 599
Cincinnati, Ohio 45201

Cost: Free if ordered on school letterhead stationary

PERSONNEL

Films

1. DON'T DROP YOUR GUARD Free Color 10 min.

   First level American industry developmental area. Machine guards should always be used by the operator. The film shows a few scenes of different kinds of guards and what happens if they are not used. (elem, jh)

   Source: Aetna Life Affiliated Companies

2. LABOR MOVEMENT: BEGINNINGS AND GROWTH IN AMERICA 14 min. 4191

   Highlights the significant developments in labor's organization in the United States from 1873 through the merger of the AFL and CIO. Depicts the role played by Samuel Gompers in the development of American trade unions. Points out the factors which helped and hindered the growth of labor unions. Uses still pictures from contemporary publications to illustrate the violence of the railroad strike of 1877, the 1892 Homestead Steel strike and the 1894 pullman car strike in Chicago. Relates the importance of organized labor to American industry and commerce. C (j-s)

   Source: Georgia State Film Library

3. YOU ARE THERE AT THE BARGAINING TABLE Free B&W 38 min.

   Second or third level American industry developmental area. Collective bargaining between the Roger's Corporation and the International Brotherhood of Papermakers is the topic of this film. The discussion depicted is one concerning wage rates. An actual bargaining session is viewed. The narrator gives some explanatory material throughout. (sh, coll, ad)

   Source: Illinois Central Railroad Company

4. APTITUDES AND OCCUPATIONS (SECOND EDITION) 16 min. 4002

   Shows a group of students and their counselor examining scholastic achievement, aptitude and interest test -- the basic types used to guide students toward the selection of a satisfying occupation. Basic groups of aptitudes and interests are illustrated in relation to occupational categories. Stresses that tests must be supplemented by individual counseling and consideration of one's scholastic record and extracurricular activities. c (j-s-c)

   Source: Georgia State Film Library

5. BRIGHT YOUNG NEWCOMER, THE 8 min. #921

Shows that by failing to properly channel the initiative of a new worker, a supervisor is presented with an unpleasant ultimatum by his senior clerk. Asks what the supervisor could have done to avoid friction among his staff. MCGH (s)

Source: Georgia State Film Library

6. JOB EVALUATION 10 min. 1636

Considers how job evaluations aid management in determining requirements, duties and pay scales of jobs. The work of job analysts and time-study engineers is described. MGHT (sh, c)

Source: Georgia State Film Library

7. PERSONAL QUALITIES FOR JOB SUCCESS 10 min. 1502

Through job interviews of several high school graduates, the personality requisite for job success are illustrated. Initiative, good personal appearance, businesslike habits, willingness to accept criticism and the ability to get along with people are discussed. C (j-s)

Source: Georgia State Film Library

8. PLANNING YOUR CAREER 11 min. 4858

Students are advised to plan their careers in three main steps: first, to learn about themselves; second, to find out about careers that interest them and third, to compare themselves to the requirements of selected vocations. Follows a high school student as he works with his school guidance counselor in seeking occupational information relative to his selection of a career. EB (j-s)

Source: Georgia State Film Library

9. SAFETY IN THE SHOP C-T 11 min. 408

Dramatizes three typical shop accidents and shows how poor supervision or inadequate training may have been the real cause. Emphasizes the supervisor's responsibility in teaching and maintaining safe practices in the shop. DU

Source: Georgia State Film Library

10. SAFETY WITH EVERYDAY TOOLS 11 min. 1524

Cites three safety rules to help children avoid accidents - keep tools neatly, use the right tool and use tools correctly. Demonstrates how children can work with scissors, knives, saws and other tools. C (p-e-j)

Source: Georgia State Film Library

11. ABC OF HAND TOOLS, THE Free Color 26 min.

First level American industry introduction area of safety. Completely animated. Primitive Pete demonstrates the wrong use of hand tools. The correct way is then shown. The film covers hammers, screwdrivers, pliers, wrenches, files, saws, chisels, drills and punches. (jh, sh)

Source: General Motors

12. CHOOSING YOUR OCCUPATION 11 min. 615

Outlines the services available for helping one to choose an occupation. Describes various test to determine one's interests, abilities and personality pattern. Suggests information which one needs concerning his chosen occupation. C (j-s)

13. WRONG WAY BUTCH Rental: $3.75 B&W 10 min. #3014

First level American industry safety area of industrial relationships. Film shows what not to do as far as safety measures in the shop are concerned. (jh, sh)

Source: Bureau of Audio-Visual Instruction

14. ONWARD AND UPWARD: INDUSTRY ON PARADE #415 Free B&W 12 min.

First level American industry developmental area. This film is concerned with in-service training of employees to keep them familiar with modern trends. Such things as training aids, conventions, customers and mobile school units are discussed. (jh)

Source: National Association of Manufacturers

15. APPRENTICE TRAINING Free (1952) B&W 25 min.

First or second level American industry developmental area. This film takes a comprehensive look at an apprentice program beginning with applying for an apprenticeship and ending with the certificate of completion. Various aspects of an apprentice program are shown. Some of these are the apprenticeship committee, vocational school, on-the-job experience, theory work and promotion. (jh, sh)

Source: U. S. Department of Labor

16. STEADY WORK, STEADY PAY (1964) B&W 20 min.

First level American industry developmental area. Factories have to keep full employment to keep a strong economy. To eliminate unemployment industry has to have different products for seasonal periods, produce what is demanded, find new uses for old products, anticipate needs and find year round jobs. Examples of each are given. (jh, sh)

Source: National Association of Manufacturers

17. EASIER WAY Rental $2.25 B&W #0627

First level American industry developmental area. The film shows the easiest way of doing work is also the most efficient. Movements are analyzed so that motions become easier and shorter. (jh, sh)

Source: Bureau of Audio-Visual Instruction

ADDRESSES

Aetna Life Affiliated Companies
Information and Education Department
151 Farmington Avenue
Hartford, Connecticut 06115

Bureau of Audio-Visual Instruction
Post Office Box 2093
1312 West Johnson Street
Madison, Wisconsin 65701
Telephone: 262-1644

General Motors Corporation
Public Relations Staff
Film Library
General Motors Building
Detroit, Michigan 48202

OR

General Motors Corporation
Public Relations Staff
Film Library
504 Montgomery Street
San Francisco, California 94104

National Association of Manufacturers
Film Bureau
277 Park Avenue
New York, New York 10017

Illinois Central Railroad
Library of Audio-Visual Aids
Room 302A
135 East 11th Place
Chicago, Illinois 60605

U. S. Department of Labor
Bureau of Apprenticeship and Training
819 North 6th Street
Milwaukee, Wisconsin

EXTERNAL RELATIONS

Films

1. MR. PUSH-A-BUTTON Free Color 28 min.

   First level American industry developmental area. In this film a Navy missile officer is concerned more with the proper functioning of his equipment than with his crew. He wanted the whole system mechanized until he dreamed one day how a ship could not operate without a crew of men. His attitude then changed.

   Source: Ninth Naval District
   Public Affairs Film Library
   Building 1
   Great Lakes, Illinois

2. FIRE FIGHTING IN THE NUCLEAR AGE Free Color 14 min.

   First level American industry developmental area. In fighting an atomic fire, there are special precautions necessary. The important considerations are time, distance and shielding. The technique is illustrated on a practice fire.

   Source: Ideals Pictures
   1010 Church Street
   Evanston, Illinois 60605

3. GROUP PORTRAIT Free Color 28 min.

   First level American industry developmental area. Twelve independent merchants belong to the National Automobile Dealers Association that constantly perform some civic duty are looked at. Service ranged from coaching little league baseball to rescue work during the Alaskan earthquake in 1964.

   Source: Roa's Films
   1696 North Astor Street
   Milwaukee, Wisconsin 53202

SECRETARIAL AND LEGAL

Kits

1. OCCUPATIONAL EXPLORATION KIT

   Provides students with a systematic, personalized approach to job investigation.

   Source: Science Research Associates, Inc.

2. WIDENING OCCUPATIONAL ROLES KIT

   WORK gives each student the opportunity to explore for himself the complex areas of career opportunities.

   Source: Science Research Associates, Inc.

3. CHRONICLE GUIDANCE CAREER KIT

   Source: Chronicle Guidance Publication
   Maravia, New York

4. Game COLLECTIVE BARGAINING $1.90 15-902

   Participants play roles of either management or union negotiators at a collective bargaining session.

   Source: Science Research Associates, Inc.

Filmstrips

Source: Catalog of Classroom Teaching Films
State Department of Education - Georgia

1. ARE MANNERS IMPORTANT? 11 min. 788

   Emphasizes the importance of good manners in getting along with people. (j-s)

2. ARE YOU A GOOD CITIZEN? 11 min. 653

   Stresses the need for organized youth activities and shows how they can be influencial in establishing such a program. (j-s)

3. CONTROL YOUR EMOTIONS 15 min. 4014

   Illustrates the need for well balanced emotions. (e-j-s) ms

1. FORTUNE SEEKERS #1029

   Source: Georgia State Film Library

2. WHAT IS A CORPORATION?

   Source: Coronet Films
   Coronet Building
   Chicago, Illinois 50501

3. SECRETARY, THE: A NORMAL DAY (Second edition) 11 min. 1926 Color page 189

   Follows Joan's activities through a normal day in a modern office. As an executive, she makes appointments, greets visitors, processes mail, supervises files, organizes a business trip, takes dictation and transcribes. Emphasizes desirable personal qualities in a secretary. C

   Source: Georgia State Film Library

4. SECRETARY, THE: TAKING DICTATION (Second edition) 11 min. 1925 page 189

   Demonstrates that a good secretary has the proper materials organized to respond quickly to the boss's dictation call. She knows correct posture, how to indicate special instructions, when to interrupt and when not to, how to "key" dictation to letters being answered and other routine dictation procedures. Also includes recording telephone conversations and taking the minutes of a meeting. C

   Source: Georgia State Film Library

5. SECRETARY, THE: TRANSCRIBING (Second edition) 10 min. 1924 page 189

   Demonstrates how a good secretary does transcription efficiently. She places work materials to avoid wasting motion, establishes priorities so that rush items get out first and uses typing techniques which produce neat letters quickly. Also includes basic letter forms and procedures for transcribing from a dictating machine. C

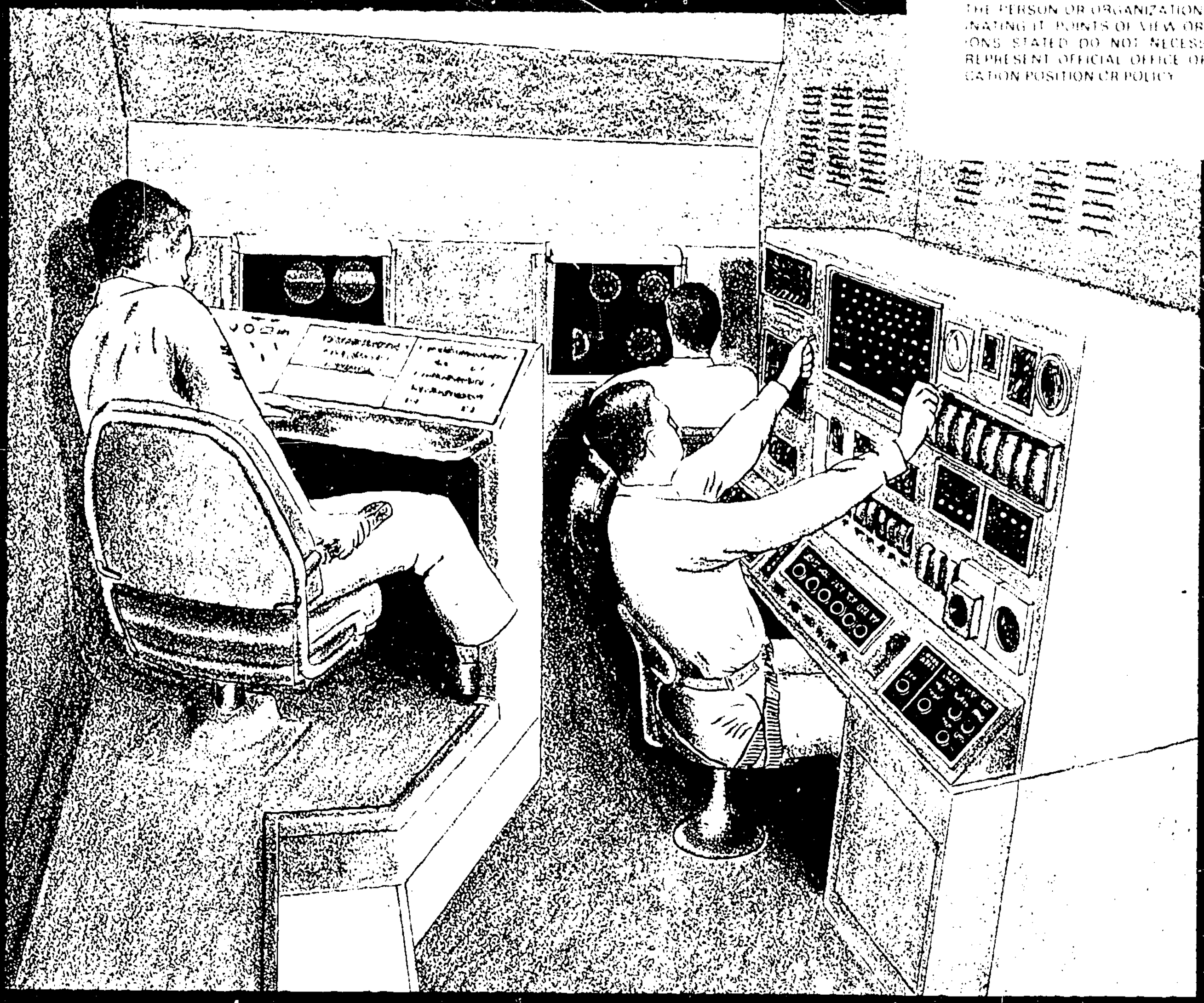
   Source: Georgia State Film Library

VT 016 399
TRADEVMAN 1 AND C. RATE TRAINING MANUAL.

DEPARTMENT OF THE NAVY, WASHINGTON, D.C.
BUREAU OF NAVAL PERSONNEL.
MF AVAILABLE IN VT-ERIC SET.
NAVPERS-10378-C
PUB DATE - 70 356P. 1969 EDITION

DESCRIPTORS - *OFFICER PERSONNEL; *MILITARY TRAINING; *MANUALS; VISUAL AIDS; *EQUIPMENT MAINTENANCE; ELECTRONIC EQUIPMENT; AIR CONDITIONING EQUIPMENT; INDEXES (LOCATERS); *PROMOTION (OCCUPATIONAL); ADULT VOCATIONAL EDUCATION; VOCATIONAL DEVELOPMENT; SUPERVISORY TRAINING
IDENTIFIERS - TRADEVMAN 1 & C

ABSTRACT - THIS TRAINING MANUAL IS ONE OF A SERIES DEVELOPED ESPECIALLY FOR ENLISTED U.S. NAVY AND NAVAL RESERVE PERSONNEL WHO ARE PREPARING FOR ADVANCEMENT TO THE PETTY OFFICER RATES OF TRADEVMAN 1 & C. THE 12 TOPICAL CHAPTERS COVER A DESCRIPTION OF THE TRADEVMAN RATING, INFORMATION ON ORDERING AND RECORDING TRAINING EQUIPMENT, SUPERVISION OF MAINTENANCE ACTIVITIES, AIR CONDITIONING, CLOSED CIRCUIT TELEVISION, ANALOG AND DIGITAL COMPUTERS, AND TACTICAL TRAINEES. A WIDE RANGE OF PHOTOGRAPHS AND LINE DRAWINGS ILLUSTRATES THE TEXT. AN INDEX IS INCLUDED, AS WELL AS A LIST OF ELECTRIC AND ELECTRONIC SYMBOLS. (AG)



TRADEVMAN 1 & C

BUREAU OF NAVAL PERSONNEL

RATE TRAINING MANUAL NAVPERS 10378-C

PREFACE

This Rate Training Manual is one of a series of training manuals prepared especially for enlisted personnel of the U.S. Navy and Naval Reserve who are preparing for advancement to TD1 and TDC.

The Manual of Qualifications for Advancement, NavPers 18068 (Series), has been used as a guide in the selection of content for this training manual. Trainees should become familiar with the qualifications for advancement prior to starting work on this manual. Also, the trainees should carefully study the bibliography contained in NavPers 10052 (latest revision) and the material recommended there in conjunction with this training manual.

Of the 12 chapters in this training manual, 11 are concerned with the technical aspects of the TD rating. Chapter 1 contains introductory information with which the trainee should familiarize himself before studying the other chapters.

Basic Electricity, NavPers 10086 (current edition), and Basic Electronics, NavPers 10087 (current edition), contain essential background information for the TD rating. Some U.S. Armed Forces Institute courses, the content of which are closely related to the TD rating, are listed in the Reading List.

This Rate Training Manual has been prepared by the Navy Training Publications Center, NAS Memphis, Millington, Tennessee, for the Bureau of Naval Personnel. Credit is given to the Naval Air Technical Training Center, located at NAS Memphis, Millington, Tennessee, the Naval Examining Center, Great Lakes, Illinois, and the Naval Training Device Center, Orlando, Florida, for technical reviews.

1969 Edition

THE UNITED STATES NAVY

GUARDIAN OF OUR COUNTRY

The United States Navy is responsible for maintaining control of the sea and is a ready force on watch at home and overseas, capable of strong action to preserve the peace or of instant offensive action to win in war.

It is upon the maintenance of this control that our country's glorious future depends; the United States Navy exists to make it so.

WE SERVE WITH HONOR

Tradition, valor, and victory are the Navy's heritage from the past. To these may be added dedication, discipline, and vigilance as the watchwords of the present and the future.

At home or on distant stations we serve with pride, confident in the respect of our country, our shipmates, and our families.

Our responsibilities sober us; our adversities strengthen us.

Service to God and Country is our special privilege. We serve with honor.

THE FUTURE OF THE NAVY

The Navy will always employ new weapons, new techniques, and greater power to protect and defend the United States on the sea, under the sea, and in the air.

Now and in the future, control of the sea gives the United States her greatest advantage for the maintenance of peace and for victory in war.

Mobility, surprise, dispersal, and offensive power are the keynotes of the new Navy. The roots of the Navy lie in a strong belief in the future, in continued dedication to our tasks, and in reflection on our heritage from the past.

Never have our opportunities and our responsibilities been greater.

CONTENTS

READING LIST

For trainees that have not had high school algebra and trigonometry.

E164	Beginning Algebra I
E165	Beginning Algebra II

or

PA 164-165	Beginning Algebra I-II

(Programed)

For trainees that have had high school algebra and trigonometry.

A 424	Intermediate College Algebra
B 887	Intermediate Radio
C 440	Calculus I
C 441	Calculus II
C 517	College Physics I
C 518	College Physics II
C 858	The Slide Rule
D 700	General Aeronautics
D 893	Introduction to Television I
D 894	Introduction to Television II
E 435	Plane Geometry
F 425	College Algebra

"Members of the Unites States Armed Forces Reserve Components, when on active duty, are eligible to enroll for USAFI courses, services, and materials if the orders calling them to active duty specify a period of 120 days or more, regardless of the time specified in the active-duty orders."

CHAPTER 1

TRADEVMAN RATING

This Rating Training Manual is designed to aid the TD2 in preparing for advancement to TD1 and the TD1 in preparing for advancement to TDC. It is based primarily on the professional requirements or qualifications for TD1 and TDC, as specified in the Manual of Qualifications for Advancement, NavPers 18068 (Series). In preparing for advancement examinations, this manual should be studied in conjunction with Military Requirements for Petty Officers 1 & C, NavPers 10057 (Series). The latter covers the military requirements for all senior petty officer.

It should be kept in mind that any changes in the professional qualifications occurring after the Change 4 revision of the "Quals" Manual may not be reflected in the information given in this manual.

In preparing this Rate Training Manual, every effort has been made to cover professional matters adequately and yet within reasonable bounds. It has been designed to give the prospective TD1 or TDC a good working knowledge of all subjects covered by the professional qualifications for advancement. It includes a great deal of new material required as a result of new equipment and new or revised maintenance programs.

Since senior TD's are largely occupied with planning, supervision, and training, this manual has been slanted for maximum use in these phases. A manual of this type cannot present all the detailed knowledge which is required in every duty assignment. Particular details should always be checked in applicable manuals or instructions.

A brief summary of the contents of this Rate Training Manual is given in the following paragraphs.

Chapter 2 presents information concerning the various records and reports required for training equipment. It also provides informa-

Chapter 3 continues the discussion of administering the training device activity with information relative to maintaining the equipment with maintenance personnel.

Chapter 4 presents a description of some of the newer test equipment in the maintenance of trainers.

Chapter 5 and 6 contain the principles of air conditioning with applications to air conditioners used with training equipment.

Chapters 7 and 8 concern the principles of television with specific application to closed circuit television used with training devices.

Chapters 9, 10, and 11 contain descriptions of analog and digital computers. Chapter 11 specifically provides information for the maintenance of digital computers used in training equipment.

Chapter 12 provides descriptions of tactical trainers used to train individuals and crews to develop proficiency in their tactical mission.

The remainder of this chapter contains information that will help you in preparing for advancement. It is strongly recommended that you study this chapter carefully before beginning intensive study of the remainder of this Rate Training Manual.

ENLISTED RATING STRUCTURE

The present enlisted rating structure includes two types of ratings: general ratings and service ratings.

GENERAL RATINGS are designed to provide paths of advancement and career development. A general rating identifies a broad occupational field of related duties and functions requiring similar aptitudes and qualifications. General ratings provide the primary means to identify billet requirements and personnel qualiand Naval Reserve personnel may hold general ratings.

Subdivisions of certain general ratings are identified as SERVICE RATINGS. These service ratings identify areas of specialization within the scope of a general rating. Service ratings are established in those general ratings in which specialization is essential for efficient utilization of personnel. Although service ratings can exist at any petty officer level, they are most common at the PO3 and PO2 levels. Both Regular Navy and Naval Reserve personnel may hold service ratings.

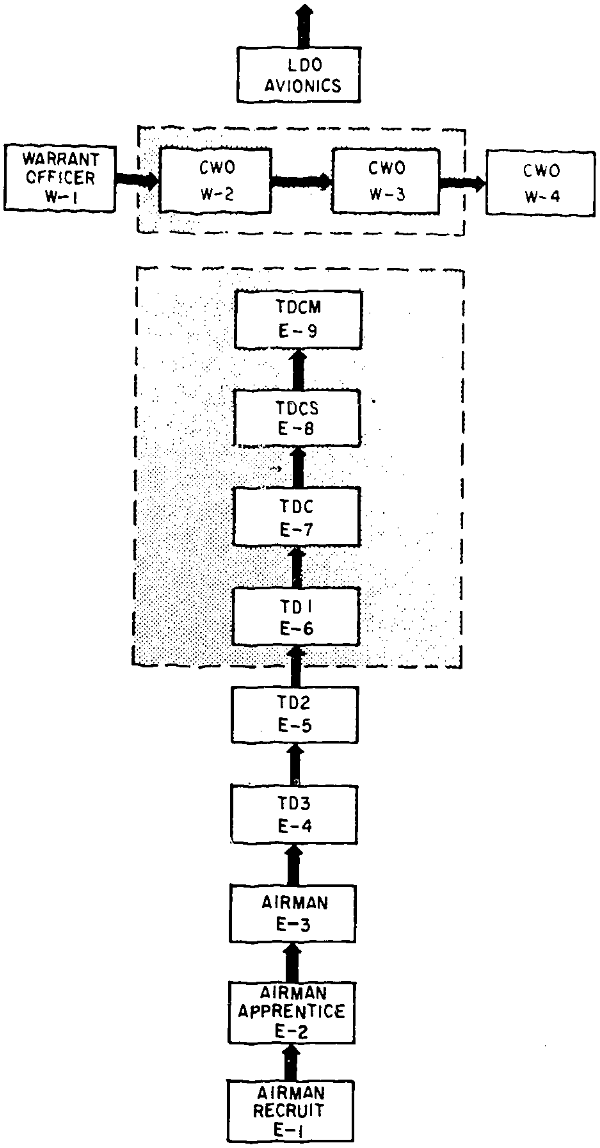
THE TD RATING

The Tradevman rating is a general rating and is included in the Navy Occupational Aviation Group IX. This grouping, however, does not limit the assignment of Tradevman to aviation activities; it only groups the ratings with the activities having primary interest in the training and performance of TD personnel.

Figure 1-1 illustrates the paths of advancement for Airman Recruit to Master Chief Tradevman, Warrant Officer (W-4), or Limited Duty Officer. The advancement path through the TD rating is emphasized by the illustration.

Shaded areas in figure 1-1 indicate career status from which qualified enlisted personnel may advance to Warrant Officer (W-1), and selected Commissioned Warrant Officers (W-2 and W-3) may advance to Limited Duty Officer. Personnel in enlisted rates and Warrant ranks not in a shaded area (fig. 1-1) may advance only as indicated by the connecting arrows. Additional information concerning promotion to Warrant Officer and Commissioned Officer is presented later in this chapter.

The Manual of Qualification for Advancement, NavPers 18068 (Series), states that Tradevmen install, repair, modify, and maintain audio/visual aids; perform organizational and intermediate level maintenance on training devices; operate and maintain equipment used in conjunction with training devices; operate training devices and ancillary equipment to train and maintain the proficiency of individuals and/or teams; assist in development, operation, and/or improvement of training programs of supported activities; and construct, devise, or obtain training aids.



TD.395

Figure 1-1.—Paths of advancement.

records and prepare reports; order and identify publications; maintain current shop files of directives and other publications; identify and order parts, tools, and equipment; maintain inventory records; use schematic diagrams, In addition to the above listed requirements for TD1, the TDC must be qualified to review and evaluate completed inspection forms and reports; analyze reports of discrepancies and malfunctions and determine corrective action; schedule and assign workload, determine repair procedures for training devices; interpret directives from higher authorities; and maintain quality control of work performed.

A wide variety of assignments is available to the Tradevman. In addition to the various types of maintenance activities to which lower rates personnel are assigned, the TD1 and TDC are eligible for assignment to instructor duty as well as a number of other desirable billets. Most of these billits are under the management control of BuPers and are directly associated with training. Others are associated with research, testing, or evaluation. Some of the billets to which the TD1 and TDC may be assigned are described briefly as follows:

1. Fleet submarine and fleet ballistic missile submarine trainers: Operating and maintaining trainers used to train submarine crews. These trainers are located at New London, Connecticut; Charleston, South Carolina; Key West, Florida; Mare Island, California; and Pearl Harbor.

2. Guided missile ships: Operating and maintaining guided missile simulation equipment.

3. Radar bomb scoring unit: Evaluation of tactical bombing operations. They are located at Pinecastle, Florida; Sigonella, Italy; Seattle, Washington; and Japan.

4. Naval Training Device Center, regional and area Offices: Assisting in the procurement, installation, evaluation, and maintenance of training devices. Regional and area offices are located at activities within the area assigned to the particular office. The TD conducts acceptance tests and evaluation of training devices.

5. Fleet Airborne Electronics Training Units: Operating and maintaining instrument trainers, operational flight trainers, weapon system trainers, and radar trainers.

6. Closed Circuit Television Systems: Operating and maintaining of closed circuit television systems along with producing and directing educational telecasts. These systems are located at Dam Neck, Virginia; Charleston, South Carolina; and Pearl Harbor, Hawaii.

There are a number of special programs and of these involve research: others may involve testing or evaluation. An example of such an assignment is the Air Crew Equipment Laboratory, Philadelphia, Pennsylvania. Its mission is to test and evaluate new flight clothing for high speed and space flight.

For a listing of other programs and projects, reference should be made to the Enlisted Transfer Manual.

Instructor duty is available to senior Tradevman in the following schools:

1. Aviation Familiarization School (Class P).
2. Avionics Technician (Class A).
3. Tradevman School (Class A).
4. Tradevman School (Class B).
5. Avionics Intermediate Course (Class B).
6. Avionics Advanced Course (Class B).

It is also possible that the senior TD may be assigned to the Navy Training Publications Center, Memphis, as a technical writer in the preparation of Rate Training Manual materials. This Rate Training Manual is an example of such materials.

Another possibility is assignment to the Examining Center, Great Lakes as an item writer for the examination materials for the Tradevman rating.

Instructor billets are normally filled on a voluntary basis. Detailed information concerning assignment to instructor duty is contained in the Enlisted Transfer Manual, NavPers 15909-A.

Personnel may indicate their desire for assignment to a specific program or project by indicating it in the "remarks" block of their TD Data Card, NavPers 2926.

You have now worked within the Tradevman's rating long enough to realize the importance of the rating to naval aviation and shipboard training. The personnel who man naval aircraft and ships depend upon you for much of their training. The operational commanders rely upon you to help keep their personnel in the highest state of readiness for the successful accomplishment of their assigned missions. You must realize that the utmost care and efficient workmanship are demanded of men of your rating.

In order to acquire the skills and knowledge necessary to maintain the high degree of compeseveral schools and courses that TD's are eligible to attend. These are as follows:

1. Tradevman (Class A).
2. Tradevman (Class B).
3. Avionics Advanced Course (Class B).

In addition to the above listed schools, there are several factory and class "C" schools that are available to TD's in particular billets.

With newly developed weapons and associated equipment, the work of the TD is more important than ever before. Advanced methods of tactical operations; the increased use of detection equipment, special weapons, and guided missiles; more efficient training methods; and more sophisticated support equipment demand their share of attention. New types of computers, launching and handling equipment, surface craft, aircraft, and testing equipment are rapidly becoming part of the daily stock-in-trade of the TD. It is imperative that he keep abreast of these fast-breaking technological developments to remain a leader in the Tradevman rating.

Among the duties of all Tradevman is to contribute to the maximum availablility and utilization of training devices by proper maintenance supervision of the electrical, electronic, and mechanical equipment used in a trainer.

Thus as the leading TD you are going to be vitally concerned with carrying out the activities' mission, and the Navy's Mission, through people—which is naval leadership.

As a result of the naval leadership program a considerable amount of material related to naval leadership for the senior petty officer is available to you. Studying this material will make you aware of your many leadership responsibilities as a senior petty officer and will also be of great help to you in developing your leadership qualities. However, it will not, in itself, make you a good leader. Leadership principles can be taught, but a good leader acquires that quality only through hard work and practice.

As you study this material containing leadership traits, keep in mind that probably none of our successful leaders possessed all of these traits to a maximum degree, but a weakness in some traits was more than compensated for by strength in others. Critical self-evaluation will enable you to realize the traits in which you are strong, and to capitalize on them. At the same time you must constantly strive to improve on the traits in which you are

Your success as a leader will be decided, for the most part, by your achievements in inspiring others to learn and perform. This is best accomplished by personal example.

ADVANCEMENT

By this time, you are probably well aware of the personal advantages of advancement—higher pay, greater prestige, more interesting and challenging work, and the satisfaction of getting ahead in your chosen career. By this time, also, you have probably discovered that one of the most enduring rewards of advancement is the training you acquire in the process of preparing for advancement.

The Navy also profits by your advancement. Highly trained personnel are essential to the functioning of the Navy. By advancement, you increase your value to the Navy in two ways: First, you become more valuable as a person who can supervise, lead, and train others and second, you become more valuable as a technical specialist and thus make far-reaching contributions to the entire Navy.

Since you are studying for advancement to PO1 or CPO, you are probably already familiar with the requirements and procedures for advancement. However, you may find it helpful to read the following sections. The Navy does not stand still. Things change all the time, and it is possible that some of the requirements have changed since the last time you went up for advancement. Futhermore, you will be responsible for training others for advancement; therefore, you will need to know the requirements in some detail.

HOW TO QUALIFY FOR ADVANCEMENT

To qualify for advancement, a person must:

1. Have a certain amount of time in grade.
2. Complete the required military and professional training manuals.
3. Demonstrate the ability to perform all the PRACTICAL requirements for advancement by completing applicable portions of the Record of Practical Factors, NavPers 1414/1 (formerly NavPers 760).
4. Be recommended by his commanding

5. Demonstrate his KNOWLEDGE by passing a written examination on (a) military requirements, and (b) professional qualifications.

Some of these general requirements may be modified in certain ways. Figure 1-2 gives an overall view of the requirements for advancement of active duty personnel; figure 1-3 gives this information for inactive duty personnel.

Remember that the requirements for advancement can change. Check with your educational services office to be sure that you know the most recent requirements.

When you are training lower rated personnel, it is a good idea to point out that advancement is not automatic. Meeting all the requirements makes a person ELIGIBLE for advancement, but it does not guarantee his advancement. Such factors as the score made on the written examination, length of time in service, performance marks, and quotas enter into the final determination of who will actually be advanced.

HOW TO PREPARE FOR ADVANCEMENT

Preparation for advancement includes studying the qualifications, working on the practical factors, studying the required Rate Training Manuals, and studying any other material that may be specified. To prepare yourself for advancement, you will need to be familiar with (1) the "Quals" Manual, (2) the Record of Practical Factors, NavPers 1414/1, (3) a NavPers publication called Training Publications for Advancement, NavPers 10052 (Series), and (4) Rate Training Manuals. The following sections describe these materials and give some information on how to use them to the best advantage.

"Quals" Manual

The Manual of Qualifications for Advancement, NavPers 18068 (Series), gives the minimum requirements for advancement to each rate within each rating. This manual is usually called the "Quals" Manual, and the qualifications themselves are often called "quals." The qualifications are of two general types: (1) military requirements, and (2) professional or technical qualifications. Military requirements apply to all ratings rather than to any one rating alone. Professional qualifications are technical or professional requirements that are directly related to the work of each rating.

Both the military requirements and the professional qualifications are divided into subject matter groups. Then, within each subject matter group, they are divided into PRACTICAL FACTORS and KNOWLEDGE FACTORS.

The qualifications for advancement and a bibliography of study materials are available in your educational services office. The "Quals" Manual is changed more frequently than Rate Training Manuals are revised. By the time you are studying this training manual, the "quals" may have been changed. Never trust any set of "quals" until you have checked the change number against an UP-TO-DATE copy of the "Quals" Manual.

In training others for advancement, emphasize these three points about the "quals":

1. The "quals" are the MINIMUM requirements for advancement. Personnel who study MORE than the required minimum will have a great advantage when they take the written examinations for advancement.

2. Each "qual" has a designated rate level—chief, first class, second class, or third class. You are responsible for meeting all "quals" specified for the rate level to which you are seeking advancement AND all "quals" specified for lower rate levels.

3. The written examinations for advancement will contain questions relating to the practical factors AND to the knowledge factors of BOTH the military requirements and the professional quafications.

Record of Practical Factors

A special form known as the Record of Practical Factors, NavPers 1414/1, is used to record the satisfactory performance of the practical factors. This form lists all military and all professional practical factors. Whenever a person demonstrates his ability to perform a practical factor, appropriate entries must be made in the DATE and INITIAL columns. As a PO1 or CPO, you will often be required to check the practical factor performance of lower rated personnel and to report the results to your supervising officer.

As changes are made periodically to the "Quals" Manual, new forms of NavPers 1414/1 are provided when necessary. Extra space is allowed on the Record of Practical Factors for entering additional practical factors as they are

ACTIVE DUTY ADVANCEMENT REQUIREMENTS

REQUIREMENTS *	E1 to E2	E2 to E3	# † E3 to E4	# E4 to E5	† E5 to E6	† E6 to E7	† E7 to E8	† E8 to E9
SERVICE	4 mos. service—or completion of recruit training.	6 mos. as E-2.	6 mos. as E-3.	12 mos. as E-4.	24 mos. as E-5.	36 mos. as E-6. 8 years total enlisted service.	36 mos. as E-7. 8 of 11 years total service must be enlisted.	24 mos. as E-8. 10 of 13 years total service must be enlisted.
SCHOOL	Recruit Training.		Class A for PR3, DT3, PT3, AME 3, HM 3			Class B for AGC MUC, MNC.		
PRACTICAL FACTORS	Locally prepared check-offs.	Records of Practical Factors, NavPers 1414/1, must be completed for E-3 and all PO advancements.						
PERFORMANCE TEST			Specified ratings must complete applicable performance tests before taking examinations.					
ENLISTED PERFORMANCE EVALUATION	As used by CO when approving advancement.		Counts toward performance factor credit in advancement multiple.					
EXAMINATIONS**	Locally prepared tests.	See below.	Navy-wide examinations required for all PO advancements.				Navy-wide, selection board.	
NAVY TRAINING COURSE (INCLUDING MILITARY REQUIREMENTS)		Required for E-3 and all PO advancements unless waived because of school completion, but need not be repeated if identical course has already been completed. See NavPers 10052 (current edition).					Correspondence courses and recommended reading. See NavPers 10052 (current edition).	
AUTHORIZATION	Commanding Officer		U.S. Naval Examining Center			Bureau of Naval Personnel		

* All advancements require commanding officer's recommendation.
† 1 year obligated service required for E-5 and E-6; 2 years for E-6, E-7, E-8 and E-9.
# Military leadership exam required for E-4 and E-5.
** For E-2 to E-3, NAVEXAMCEN exams or locally prepared tests may be used.

Figure 1-2.—Active duty advancement requirements.

INACTIVE DUTY ADVANCEMENT REQUIREMENTS

REQUIREMENTS *	E1 to E2	E2 to E3	E3 to E4	E4 to E5	E5 to E6	E6 to E7	E8	E9
TOTAL TIME IN GRADE	4 mos.	6 mos.	15 mos.	18 mos.	24 mos.	36 mos.	36 mos.	24 mos.
TOTAL TRAINING DUTY IN GRADE †	14 days	14 days	14 days	14 days	28 days	42 days	42 days	28 days
PERFORMANCE TESTS			Specified ratings must complete applicable performance tests before taking examination.					
DRILL PARTICIPATION	Satisfactory participation as a member of a drill unit.							
PRACTICAL FACTORS (INCLUDING MILITARY REQUIREMENTS)	Record of Practical Factors, NavPers 1414/1, must be completed for all advancements.							
NAVY TRAINING COURSE (INCLUDING MILITARY REQUIREMENTS)	Completion of applicable course or courses must be entered in service record.							
EXAMINATION	Standard Exam	Standard Exam or Rating Training.	Standard Exam required for all PO Advancements.			Standard Exam, Selection Board. Also pass Mil. Leadership Exam for E-4 and E-5.		
AUTHORIZATION	Commanding Officer		U.S. Naval Examining Center			Bureau of Naval Personnel		

* Recommendation by commanding officer required for all advancements.

† Active duty periods may be substituted for training duty.

Figure 1-3.—Inactive duty advancement requirements.

published in changes to the "Quals" Manual. The Record of Practical Factors also provides space for recording demonstrated proficiency in skills which are within the general scope of the rate but which are not identified as minimum qualifications for advancement. Keep this in mind when you are training and supervising other personnel. If a person demonstrates proficiency in some skill which is not listed in the "quals" but which is within the general scope of the rate, report this fact to the supervising officer so that an appropriate entry can be made in the Record of Practical Factors.

When you are transferred, the Record of Practical Factors should be forwarded with your service record to your next duty station. It is a good idea to check and be sure that this form is actually inserted in your service record before you are transferred. If the form is not in your record, you may be required to start all over again and requalify in practical factors that have already been checked off. You should also take some responsibility for helping lower rated personnel keep track of their practical factor records when they are transferred.

A second copy of the Record of Practical Factors should be made available to each man in pay grades E-3 through E-8 for his personal record and guidance.

NavPers 10052

Training Publications for Advancement, NavPers 10052 (Series) is a very important publication for anyone preparing for advancement. This publication lists required and recommended Rate Training Manuals and other reference material to be used by personnel working for advancement. NavPers 10052 (Series) is revised and issued once each year by the Bureau of Naval Personnel. Each revised edition is identified by a letter following the NavPers number. When using this publication, be SURE you have the most recent edition.

The required and recommended references are listed by rate level in NavPers 10052 (Series). It is important to remember that you are responsible for all references at lower rate levels, as well as those listed for the rate to which you are seeking advancement.

Rate Training Manuals that are marked with an asterisk (*) in NavPers 10052 (Series) are MANDATORY at the indicated rate levels. A mandatory training manual may be completed by (1) passing the appropriate Enlisted Correspondence Course that is based on the mandatory training manual, (2) passing locally prepared tests based on the information given in the mandatory training manual; or (3) in some cases, successfully completing an appropriate Navy school.

When training personnel for advancement, do not overlook the section of NavPers 10052 (Series) which lists the required and recommended references relating to the military requirements for advancement. All personnel must complete the mandatory military requirements training manual for the appropriate rate level before they can be eligible to advance. Also, make sure that personnel working for advancement study the references which are listed as recommended but not mandatory in NavPers 10052 (Series). It is important to remember that ALL references listed in NavPers 10052 (Series) may be used as source material for the written examinations, at the appropriate levels.

Rate Training Manuals

There are two general types of Rate Training Manuals. Manuals (such as this one) are prepared for most enlisted rates and ratings, giving information that is directly related to the professional qualifications for advancement. Basic manuals give information that applies to more than one rate and rating.

Rate Training Manuals are revised from time to time to bring them up to date. The revision of a Rate Training Manual is identified by a letter following the NavPers number. You can tell whether a Rate Training Manual is the latest edition by checking the NavPers number (and the letter following the number) in the most recent edition of List of Training Manuals and Correspondence Courses, NavPers 10061 (Series).

Rate Training Manuals are designed for the special purpose of helping naval personnel prepare for advancement. By this time, you have probably developed your own way of studying these manuals. Some of the personnel you train, however, may need guidance in the use of Rate Training Manuals. Although there is no single "best" way to study a training manual, the following suggestions have proved useful for many people:

1. Study the military requirements and the professsional qualifications for your rate before you study the training manual, and refer to the

"quals" frequently as you study. Remember, you are studying the training manual primarily to meet these "quals."

2. Before you begin to study any part of the training manual intensively, get acquainted with the entire manual. Read the preface and the table of contents. Check through the index. Thumb through the manual without any particular plan, looking at the illustrations and reading bits here and there as you see things that interest you.

3. Look at the training manual in more detail, to see how it is organized. Look at the table of contents again. Then, chapter by chapter, read the introduction, the headings, and the subheadings. This will give you a pretty clear picture of the scope and content of the manual.

4. When you have a general idea of what is in the training manual and how it is organized, fill in the details by intensive study. In each study period, try to cover a complete unit--it may be a chapter, a section of a chapter, or a subsection. The amount of material you can cover at one time will vary. If you know the subject well, or if the material is easy, you can cover quite a lot at one time. Difficult or unfamiliar material will require more study time.

5. In studying each unit, write down questions as they occur to you. Many people find it helpful to make a written outline of the unit as they study, or at least to write down the most important ideas.

6. As you study, relate the information in the training manual to the knowledge you already have. When you read about a process, a skill, or a situation, ask yourself some questions. Does this information tie in with past experience? Or is this something new and different? How does this information relate to the qualifications for advancement?

7. When you have finished studying a unit, take time out to see what you have learned. Look back over your notes and questions. Without looking at the training manual, write down the main ideas you have learned from studying this unit. Do not just quote the manual. If you cannot give these ideas in your own words, the chances are that you have not really mastered the information.

8. Use Enlisted Correspondence Courses whenever you can. The correspondence courses are based on Rate Training Manuals or other appropriate texts. As mentioned before, completion of a mandatory Rate Training Manual can be accomplished by passing an Enlisted Correspondence Course based on the training manual. You will probably find it helpful to take other correspondence courses, as well as those based on mandatory training manuals. Taking a correspondence course helps you to master the information given in the training manual, and also gives you an idea of how much you have learned.

INCREASED RESPONSIBILITIES

When you assumed the duties of a PO3, you began to accept a certain amount of responsibility for the work of others. With each advancement, you accept an increasing responsibility in military matters and in matters relating to the professional work of your rate. When you advance to PO1 or CPO, you will find a noticeable increase in your responsibilities for leadership, supervision, training, working with others, and keeping up with new developments.

As your responsibilities increase, your ability to communicate clearly and effectively must also increase. The simplest and most direct means of communication is a common language. The basic requirement for effective communication is therefore a knowledge of your own language. Use correct language in speaking and in writing. Remember that the basis purpose of all communication is understanding. To lead, supervise, and train others, you must be able to speak and write in such a way that others can understand exactly what you mean.

Leadership and Supervision

As a PO1 or CPO, you will ge regarded as a leader and supervisor. Both officers and enlisted personnel will expect you to translate the general orders given by officers into detailed, practical, on-the-job language that can be understood and followed by relatively inexperienced personnel. In dealing with your juniors, it is up to you to see that they perform their jobs correctly. At the same time, you must be able to explain to officers any important problems or needs of enlisted personnel. In all military and professional matters, your responsibilities will extend both upward and downward.

Along with your increased responsibilities, you will also have increased authority. Officers and petty officers have POSITIONAL authority—that is, their authority over others lies in their positions. If your CO is relieved, for example, he no longer has the degree of authority over you that he had while he was your CO, although he still retains the military authority that all seniors have over subordinates. As a PO1, you will have some degree of positional authority; as a CPO, you will have even more. When exercising your authority, remember that it is positional—it is the rate you have, rather than the person you are, that gives you this authority.

A Petty Officer conscientiously and proudly exercises his authority to carry out the responsibilities he is given. He takes a personal interest in the success of both sides of the chain of command . . . authority and responsibility. For it is true that the Petty Officer who does not seek out and accept responsibility, loses his authority and then the responsibility he thinks he deserves. He must be sure, by his example and by his instruction, that the Petty Officers under him also accept responsibility. In short, he must be the leader his title—Petty Officer—says he is.

Training

As a PO1 or CPO, you will have regular and continuing responsibilities for training others. Even if you are lucky enough to have a group of subordinates who are all highly skilled and well trained, you will still find that training is necessary. For example, you will always be responsible for training lower rated personnel for advancement. Also, some of your best workers may be transferred; and inexperienced or poorly trained personnel may be assigned to you. A particular job may call for skills that none of your personnel have. These and similar problems require that you be a training specialist—one who can conduct formal and informal training programs to qualify personnel for advancement, and one who can train individuals and groups in the effective execution of assigned tasks.

In using this training manual, study the information from two points of view. First, what do you yourself need to learn from it? And second, how would you go about teaching this information to others?

Training goes on all the time. Every time a person does a particular piece of work, some learning is taking place. As a supervisor and as a training expert, one of your biggest jobs is to see that your personnel learn the RIGHT things about each job so that they will not form bad work habits. An error that is repeated a few times is well on its way to becoming a bad habit. You will have to learn the difference between oversupervising and not enough supervising. No one can do his best work with a supervisor constantly supervising. On the other hand, you cannot turn an entire job over to an inexperienced person and expect him to do it correctly without any help or supervision.

In training lower rated personnel, emphasize the importance of learning and using correct terminology. A command of the technical languages of your occupational field enables you to receive and convey information accurately and to exchange ideas with others. A person who does not understand the precise meaning of terms used in connection with his work is definitely at a disadvantage when he tries to read official publications relating to his work. He is also at a great disadvantage when he takes the examinations for advancement. To train others in the correct use of technical terms, you will need to be very careful in your own use of words. Use correct terminology and insist that personnel you are supervising use it too.

You will find the Record of Practical Factors, NavPers 1414/1, a useful guide in planning and carrying out training programs. From this record, you can tell which practical factors have been checked off and which ones have not yet been done. Use this information to plan a training program that will fit the needs of the personnel you are training.

On-the-job training is usually controlled through daily and weekly work assignments. When you are working on a tight schedule, you will generally want to assign each person to the part of the job that you know he can do best. In the long run, however, you will gain more by assigning personnel to a variety of jobs so that each person can acquire broad experience. By giving people a chance to do carefully supervised work in areas which they are relatively inexperienced, you will increase the range of skills of each person and thus improve the flexibility of your working group.

Working With Others

As you advance to PO1 or CPO, you will find that many of your plans and decisions affect a large number of people, some of whom are not even in your own occupational field. It becomes increasingly important, therefore, for you to understand the duties and the responsibilities of personnel in other ratings. Every petty officer in the Navy is a technical specialist in his own field. Learn as much as you can about the work of others, and plan your own work so that it will fit into the overall mission of the organization.

Keeping Up With New Development

Practically everything in the Navy—policies, procedures, publications, equipment, systems—is subject to change and development. As a PO1 or CPO, you must keep yourself informed about changes and new developments that affect you or your work in any way.

Some changes will be called directly to your attention, but others will be harder to find. Try to develop a special kind of alertness for new information. When you hear about anything new in the Navy, find out whether there is any way in which it might affect your work. If so, find out more about it.

SOURCES OF INFORMATION

As a PO1 or CPO, you must have an extensive knowledge of the references to consult for accurate, authoritative, up-to-date information on all subjects related to the military and professional requirements for advancement.

Publications mentioned in this chapter are subject to change or revision from time to time—some at regular intervals, others as the need arises. When using any publication that is subject to revision, make sure that you have the latest edition. When using any publication that is kept current by means of changes, be sure you have a copy in which all official changes have been made.

As listed in NavPers 10052, the following training manuals and publications will be extremely helpful for additional study in preparing for advancement:

1. Basic Electricity, NavPers 10086-B.
2. Basic Electronics, NavPers 10087-B.
3. Basic Handtools, NavPers 10085-A
4. Basic Machines, NavPers 10624-A
5. Tradevman 3 & 2, NavPers 10376-C.
6. Fluid Power, NavPers 16193-A.
7. Manual for Navy Instructors, NavPers 16103-B.
8. Aerodynamics for Naval Aviators, NavWeps 00-80T-80.
9. All Weather Flight Manual, NavWeps 00-80T-60.

The reading list at the beginning of this manual also includes USAFI courses that offer additional background material. The educational services officer will always have the most up-to-date information and training manuals applicable to the TD.

In addition to training manuals and publications, training films furnished a valuable source of supplementary information. Films that may be helpful are listed in the U.S. Navy Film Catalog, NavAir 10-1-777.

ADVANCEMENT OPPORTUNITIES FOR PETTY OFFICERS

Making chief is not the end of the line as far as advancement is concerned. Proficiency pay, advancement to Senior (E-8) and Master (E-9) Chief, and advancement to Warrant Officer and Commissioned Officer are among the opportunities that are available to qualified petty officers. These special paths of advancement are open to personnel who have demonstrated outstanding professional ability, the highest order of leadership and military responsibility, and unquestionable moral integrity.

PROFICIENCY PAY

The Career Compensation Act of 1949, as amended, provides for the award of proficiency pay to designated enlisted personnel who possess special proficiency in a military skill. Proficiency pay is given in addition to regular pay and allowances and any special or incentive pay to which you are entitled. Certain enlisted personnel in pay grades E-4 through E-9 are elibible for proficiency pay. Proficiency pay is allocated by ratings and NEC's, with most awards being given in the ratings and NEC's which are designated as critical. The eligibility requirements for proficiency pay are subject to change. In general, however, you must be recommended by your commanding officer, have a certain length of time on continuous active duty, and be career designated.

ADVANCEMENT TO SENIOR AND MASTER CHIEF

Chief petty officers may qualify for the advanced grades of Senior and Master Chief which are now provided in the enlisted pay structure. These advanced grades provide for substantial increases in pay, together with increased responsibilities and additional prestige. The requirements for advancement to Senior and Master Chief are subject to change but, in general, include a certain length of time in grade, a certain length of time in the naval service, a recommendation by the commanding officer, and a sufficiently high mark on the Navy-wide examination. The final selection for Senior and Master Chief is made by a regularly convened selection board.

Examination Subjects

Qualifications for advancement to Senior Chief Petty Officer and Master Chief Petty Officer have been developed and published in the Manual of Qualifications for Advancement NavPers 18068 (Series). They officially establish minimum military and professional qualifications for Senior and Master Chief Petty Officers.

Training Publications for Advancement, NavPers 10052 (Series) contains a list of study references which may be used to study for both military and professional requirements.

The satisfactory completion of the correspondence course titled Navy Regulations, Navpers 10740-A, is mandatory for advancement to E-8, and the course titled Military Justice in the Navy, NavPers 10993, is required of all personnel advancing to E-9.

ADVANCEMENT TO WARRANT AND COMMISSIONED OFFICER

The Warrant Officer program provides opportunity for advancement to warrant rank for E-6 and above enlisted personnel. E-6's, to be eligible, must have passed an E-7 rating exam prior to selection.

The LDO program provides a path of advancement from warrant officer to commissioned officer. LDO's are limited , as are warrants, in their duty, to the broad technical fields associated with their former rating.

If interested in becoming a warrant or commissioned officer, ask your educational services officer for the latest requirements that apply to your particular case.

CHAPTER 2

ADMINISTRATION AND SUPPLY

Chief and first class petty officers must recognize the fact that they are an important part of the administration organization. As leading petty officers, their duties entail not only the ability to instruct with, operate, and maintain highly specialized training devices, but they must also be able to perform many administrative duties. These include the preparation of correspondence and reports; using the proper supply procedures for the procurement, issue accountability, and disposition of equipment, parts, and supplies; and supervision of enlisted personnel.

Their duties also include making recommendations to the training device officer relative to the improvement of procedures and practices as well as operational improvement, modification, and alteration of training devices and training aids. Each TD plays an important role in formulating operational procedures, improving maintenance techniques, and overall improvement of the division to better accomplish its assigned mission. He can do this properly only when he has a clear understanding of policies and procedures as well as his place within the organization.

OFFICE ADMINISTRATION AND SUPERVISION

CORRESPONDENCE PROCEDURES

The petty officer in charge of the training device office must be able to prepare and supervise the preparation of official correspondence. Since uniformity in the preparation of correspondence is necessary in the Department of the Navy, all official correspondence must be prepared in accordance with the base instructions contained in chapter 16, U.S. Navy Regulations; BuPers Manual, NavPers 15791-A; Navy Correspondence Manual, SecNav Instruction 5216.5 (Series); SecNav Instruction 5211.3 (Series); and communications instructed and related publications issued by the Chief of Naval Operations.

Naval Letters

In preparing a naval letter, bond paper is used for the original, while plain manifold (tissue) paper is used for carbon copies. When letterhead paper is not available, the letterhead is typed or stamped in the center of the page, six lines or 1 inch from the top of the paper. The file number, serial number, etc., are blocked 2 inches from the right of the page.

"From" is typed seven lines below the last line of the address in the letterhead or four lines below, when prepared for mailing in a window type envelope. "From," "To", and "Via" are singled spaced. "Subject," "Reference," "Enclosure," and the space between paragraphs are doubled spaced. The signature begins at the center of the page, four lines below the last line typed. "Copy to" is blocked at the left margin, two lines below the last line of the signature information. The left margin is 1 inch wide. Sample copies are shown in the Navy Correspondence Manual.

Official letters assigned a security classification (Top Secret, Secret, etc.) are required to have a serial number assigned for identification purposes. Routine correspondence need not be assigned a serial number unless a serial number is required by the officer in charge of the activity preparing the correspondence. Procedures for preparing and handling classified correspondence are contained in the Department of the Navy Security Manual for Classified Information, OpNav Instruction 5510.1 (Series), and Automatic, Time-Phased Downgrading and Declassification System, OpNav Instruction 5500.40 (Series).

Naval Speedletters

A naval speedletter is a form of correspondence intended primarily for use within the Department of the Navy. It is used for an urgent routine communication and is prepared on NavGen Form 1006. With approval of the appropriate official, the speedletter may also be used for correspondence with persons or agencies outside the Department of the Navy.

The primary purpose of the speedletter form is to call attention to the communication so that it is handled as promptly as possible by the recipient. When it is necessary to expedite the delivery of a speedletter, it may be sent by airmail or special delivery, or both. The speedletter blank is so designed that, if space permits, a reply may be made on the same blank if the originator has supplied an extra copy of the letter. When an extra copy has not been received, the reply may be made on the same form if an official record copy is not required. A sample speedletter is shown in the Navy Correspondence Manual.

Business Form Letters

The business form letter is used for correspondence addressed to persons or agencies outside the Department of the Navy. However, if the outside addressee is familiar with the naval letter, it may be used instead of the business form letter.

The first page of the business form letter is typed on letterhead paper. If printed letterhead paper is not available, the name and address of the activity are typed on plain bond paper. Continuation pages are typed on plain bond paper. Further instructions regarding stationery and copies are given in the Navy Correspondence Manual.

A business letter of less than one page in length is centered on the page so that is presents a well-balanced appearance. A short letter may be doubled spaced, and it may be typed with the left and right margins as wide as 2 inches. Full page and multiple page letters are typed with 1-inch margins.

Messages

The TD may be required to send a message when time does not permit the use of a naval letter or speedletter. For example, an immediate replacement may be required for a malfunctioning training device to continue a specific training program.

Messages are released by an authorized officer who is thoroughly familiar with the existing instructions concerning drafting and preparation of messages. They must be brief and concise, and the number sent should be kept to a minimum. Maximum use should be made of the United States Mail and [illegible] service.

Endorsements

Endorsements are used to approve, disapprove, or comment on the content of a letter which is forwarded through one or more addressees before reaching its final destination. When there is adequate space remaining on a page, the first and subsequent endorsements are placed on the same page containing the basic letter or prior endorsement. Plain bond paper is used for the original of an endorsement and manifold (tissue) paper is used for carbon copies.

When an endorsement is typed below the preceding basic letter or a preceding endorsement, a dash line is placed one line below the last line in the preceding communication. The originator's code is placed one line below the dash line. If endorsements are started on a new page where no dash line is required, the originator's code is typed six lines from the top of the paper.

The format of an endorsement is much the same as that of a naval letter except for the heading as illustrated in the Navy Correspondence Manual.

Enclosures

Enclosures to naval letters are used to further describe or identify the subject or item(s) for which the letter is written.

Enclosures to naval letters, joint letters, multiple address letters, speedletters, endorsements, or business form letters are labeled to associate them with the communication of which they are a part. Multiple copies of the same material may be considered as a single enclosure and only the first copy need be labeled. The number of copies transmitted must, however, be indicated in the enclosure notation in the letter. The label, placed in the lower margin of the first page of the enclosure, may be typed, stamped, or written.

Enclosures may be sent with the letter or under separate cover with a copy of the letter. Enclosures to be sent under separate cover without a copy of the forwarding letter attached are identified by the word "Enclosure" and the number, the abbreviated functional title of the addresser, the abbreviation "ltr," and the date of the letter as follows:

Enclosure (2) NAVTRADEVCEN
ltr 1 July 1969

Enclosures to be forwarded with the letter are numbered consecutively beginning with 1 as follows: Enclosure (1); Enclosure (2); etc.

When a multiple page document is forwarded as an enclosure, only the top page need be labeled. For detailed instructions on the preparation and forwarding of enclosures, consult the Navy Correspondence Manual.

FILING PROCEDURES

The Navy filing system is set forth in the Navy Directives System, SecNav Instruction P5215.1 (Series). This system is used by the entire Navy as the standard subject classification system for the filing of all correspondence, records, reports, and other documents.

It is the responsibility of the petty officer in charge of an office to set up an adequate filing system in accordance with that outlined in the Navy Directives System. The filing system is established in relation to the size and volume of correspondence processed by the particular office concerned. The larger the volume of material which must be filed, the more elaborate the filing system must be to handle the traffic. The main objective of any filing system is to facilitate the finding of any item in the files with the minimum amount of time and effort.

An index should be prepared and placed in the front of each file, listing the contents in the proper classification number order. The standard subject classification numbers (outlined in SecNav Instruction P5215.1 (Series) are used in the Navy for filing all correspondence and directives and consist of 13 major groups. Small activities may adapt these groups to their needs by preparing file folders for a minimum number of these major subject groups and arranging material within the folders according to the classification number assigned. Larger activities may adapt the filing system to their needs by preparing folders not only for the major subject groups but also for the primary and secondary groups.

RECORDS AND REPORTS

In order to have a smooth-running division, it is important to develop an efficient system for keeping records and reports. Reports normally required by training device divisions are listed in table 2-1 and in the Training Device Guide, NAVSO P-530-2. Certain other reports pertaining to device utilization and training of personnel are often required by the local command. A tickler file in which all reports are listed according to date required (weekly, monthly, or quarterly) is most helpful. Organizing this file, however, is only the first step in establishing a workable system. The petty officer who is responsible for training device reports must also develop a well-organized method for compiling the information required.

TD Data Card

The TD Data Card (NavPers 2926) is used by all rated TD'S and TD designated strikers to submit to BuPers (B2141) information required for the distribution and rotation of TD personnel. Instructions for making this report are contained in Chapter 9 of the Enlisted Transfer Manual. Since the contents of this report are used in determining duty assignments for TRADEVMAN, it is imperative that all information submitted be complete, accurate, and up to date.

Each man must submit a TD Data Card 120 days after reporting to a new duty station and again 6-7 months prior to his tour completion date, listing such information as date enlistment expires, Navy Enlisted Classification Code, schools completed, previous duty stations, present duties, devices on which he is qualified, marital status, number of dependents, and whether he is a maintenance man, an instructor, or both. Choices for future duty assignments should also be listed. Information on these cards should be kept up to date; therefore, changes that would affect future assignments should be reported promptly.

Utilization and Maintenance Report, NavTraDevCen Form 10171/4.

This report is made to show utilization and maintenance of certain cognizance symbol "20" training devices.

OpNavInstruction 10171.4 promulgates responsibilities and procedures for Navy and Marine activities to report utilization and maintenance data monthly on the specified devices, using NavTraDevCen Report Form 10171/4, which is an automatic data processing card. This form replaces OpNav Form 10171.1A (Major Aviation Training Device Utilization Reports), and OpNav Form 10171-2 (Major Surface/Submarine Training Device Use and Maintenance Reports).

The instruction directs that reporting activities send the filled-in report to the Naval Training Device Center (Code 4211), Orlando, Florida 32813, no later than the 7th working day of the month following the reporting period. Objectives of the revised reporting system are as follows:

1. To standardize the reporting of utilization and maintenance data on selected aviation, surface subsurface, and land warfare training devices.
2. To reduce reaction time for training device support.
3. To improve training device effectiveness in support of Navy and Marine Corps training requirements.

Additional information on this reporting system can be obtained through the appropriate NavTraDevCen Regional or Area office, or by referring to OpNavInstruction 10171.4.

Request for funds Form NTDC 7303/1 (Rev)

Information for making an allotment request for installation, maintenance, and modification is contained in NavTraDevCen Instruction 7303.1 (Series), which can be found in the Training Device Guide, NavTraDev P-530-2. Although this request may be handled by the Comptroller's Office rather than by the training device office, all Tradevmen should be familiar with procedures involved in requesting and utilizing an allotment. Alltoments are discussed later in this chapter in the section on supply procedures.

Contract Field Services Report, NTDC 4700/2

This report notifies the Naval Training Device Center of the work performed by contract service engineers and signifies that their work has been performed in a satisfactory manner and that proper use is being made of their services. If such is not the case, the officer signing the report adds an appropriate endorsement stating the facts.

The procedure for requesting the help of contract service engineers is described later in this chapter in the section on administrative assistance by the Center.

Report of Damaged or Improper Shipment, DD6

The purpose of this report is to improve shipping materials and methods. As shown in table 2-1, it is used for reporting any unsatisfactory packing and/or shipping procedures. It must be carefully filled out and photographs or sketches should be included whenever they will serve to clarify the report. Any suggestions for improving shipping procedures should also be included in the report.

If an urgently needed device is received in a damaged condition and is beyond local repair, two additional copies of the report are filled out and sent to the Training Device Center, along with a request for replacement of the device. The Center then takes steps for prompt replacement of the device, as well as overhaul of the damaged device.

Training Device Modification Request, NTDC Form 4720-2

Device modification is discussed in detail in this chapter in the section on administrative assistance furnished by the Center. NavTraDevCen Instruction 4720.1 (Series), contained in the Training Device Guide, NavTraDev P-530-2, gives complete instructions for making out the modification request form.

Modification Completion Report, TDC 4720/4

This report is a post card which is filled out and sent to the center as soon as a modification is completed.

SUPERVISION OF PERSONNEL

As a Tradevman First Class or Chief, you may be assigned to a billet in which you may be required to supervise instructors who teach in a classroom, shop, or on some type of synthetic training device. In such a billet, it is your responsibility to insure that the correct subject matter and skills are being taught. In addition, the presentation must be so effective that the trainees learn the required knowledge and skills well enough to perform the jobs for which they are responsible. Supervision must be constructive and, at the same time, eliminate mediocre teaching.

NavPers 799, Guide for Observation of Instruction, is designed for use in supervision of actual instruction. This form particularly adapted for group instruction in classrooms and in situations where the usual lesson plan organization is required and practical.

All supervisory personnel should review the Manual for Navy Instructors, NavPers 16103-C, before beginning observations. The use of NavPers Form 799, Guide for Observation of Instruction, is prescribed there, and the procedure is explained on the reverse side of the form. It is desirable to make written suggestions or comments on as many items as possible in preference to merely checking satisfactory, excellent, poor, or otherwise. Write in favorable comments on excellent items as well as suggestions on items which need improvement.

Training device learning situations involve additional factors not usually present in classroom instruction. Safety first and prevention of damage to expensive equipment and training devices are often items of paramount importance when the students are being taught in training devices. Most of this type of instruction centers around student practice. Actual instruction procedures in a trainer may vary from one student to another due to individual differences and different levels of experience. For this reason, instructor supervisors must not only be thoroughly familiar with the technical skills required but also the best methods to present information to the students.

A continuing program of training is necessary to make the TD's better at their jobs and eligible for advancement. Usually about an hour each day is a reasonable amount of time to set aside for training purposes. Of course, the training should not always be formal; it may be a group discussion on maintenance and operating problems. As a senior TD, you may be given the responsibility of establishing such a program.

An excellent program of training is to have each TD give a series of lessons on the equipment that he operates and maintains. He can point out the characteristics and special troubles that may be peculiar to certain of his equipments. He can also point out short cuts in servicing his equipment. One of the principal objectives is to have each TD know as much as possible about each training device at his activity. This type of program gives the entire division information and some working knowledge of each equipment. One of its benefits is flexibility in assignment of personnel.

Pay particular attention to the training of men who are weak in one or two phases of the work. If a man lacks skill in a certain type of work, give him a chance to practice it alongside a skilled worker.

Do not use hit-or-miss methods of teaching. Give the man a definite job to do and check him occasionally on the job. Give him all the help you can. Try to plan his training so that he can acquire the most knowledge and skill in the least amount of time.

When one of your better men is working on an unusually difficult job, have some of the other men watch the operation. This procedure is invaluable from the standpoint of training, and it also serves as a well-deserved compliment to the man who is doing the work.

In addition to training on specific trainers or equipment, overall training in basic principles should be stressed. Through lecture and discussion and correspondence course study, the man may be taught the theory and principles of electronic equipment maintenance. Through demonstration they may be shown the right way to analyze the trouble in a piece of electronic equipment and to effect a repair. However, assuming that he has the proper background information, a TD learns best by doing. On-the-job training produces the real skill in the repair of equipment. Dexterity, precision, and the feeling for the tools used in repair work come only with experience.

As a senior Tradevman, you are responsible for seeing that the lower-rated petty officers and strikers in your unit receive the proper training to enable them to advance in rating. This requires knowledge, thought, and planning.

Table 2-1.--Training

Name of report	Instructions for making report	Form No.	Frequency	Date due
TD Data Card.	Enlisted Transfer Manual, NavPers 15909, Chapter 9	NavPers 2926 (Rev).	120 days after reporting to a new duty station, 6-7 months prior to TCD, and when significant data changes occur.	Not specified.
Utilization and Maintenance Report.	OpNavInst 10171.4.	NavTraDevCen Form 10171/4.	Aviation, Surface, Subsurface and land training devices: Monthly.	Must be submitted no later than the 7th working day of the month following the reporting period.
Request for Funds.	NavTraDevCen Instruction 7303.1 (series).	TDC 7303/1.	Quarterly.	Must be received by: 1 June for 1st quarter, 15 Sept. for 2nd quarter, 15 Dec. for 3rd quarter, 15 Mar. for 4th quarter.
Contract Field Service Report.	NavTraDev P-530-2 and back of report form. (Contract service engineer is responsible).	TDC 4700/2 (Rev).	Weekly, or at conclusion of engineer's services if such services were for a period of less than a consecutive week. A report is completed for each type of device serviced.	Not specified.
Report of Damaged or Improper Shipment.	NavSup Manual, Vol. II Paragraph 27059. NavTraDev P-530-2.	Form DD 6.	As required.	Report promptly when damaged shipment is received.

for valuable tools and equipment. He should see that custody cards are made out for series 12000 (formerly title "B") tools and equipment. These include such items as portable power tools, gages, micrometers, and special sets of handtools. Tools which are of a high "pilferable" nature should be accounted for at regular intervals.

Tools and equipment used outside the shop should be made up in kits and stowed in convenient toolboxes. Tools used in the shop may be marked with a distinctive color for identification. If so marked, they are not easily mixed with tools that belong to other shops.

SAFETY PRECAUTIONS

The development of safety consciousness is an important part of every supervisor's responsibility. Safety in shops cannot be taught in a lesson or even in a series of lessons. Safety is actually a combination of attitudes and proper work habits which can best be developed by repeated emphasis of safety practices at all times and focusing attention on the prevention of accidents.

Safety instruction should emphasize both the physical elements (those inherent in a machine or in the operation of a machine) and the human elements (ignorance, carelessness, fatigue, etc.). Every operation should call attention to the safety factors involved. The supervisor should be alert at all times for evidences of carelessness and call them to the attention of the personnel immediately.

Accidents do not just happen--they are caused. Many accidents can be prevented by discovering and eliminating the causes. All analyses of operations that will be carried out in the shop should include analyses of safety factors. Investigating and analyzing accidents will help prevent their recurrence.

TRAINING MAINTENANCE PERSONNEL

If the TDC in charge of a shop has a well-planned program for introducing new personnel to the work in the shop, he has taken a most constructive step toward building shop morale. One of the best stimulants for the development of high morale among new personnel is to have them realize that the CPO appreciates their feeling of strangeness and is aware of their desire to make good. There is often a gap between the point at which a new man is assigned and the time at which he has developed into a satisfied worker. Proper introduction to the new work bridges this gap, turning an ill-at-ease person into a confident and interested worker. The chief is responsible for acquainting him with the working area and for developing him into a satisfied, well-balanced worker in his unit. During the early employment period, many of the things told to the new man "go in one ear and out the other" because his interest is centered on getting to the job, rather than on what he is told about the job.

The TDC will find it a profitable procedure to review with each man such matters as his duties, drills, liberty and leave regulations, and similar policies. This initial indoctrination need not take long, but the senior TD should be sincerely interested in becoming acquainted with the man and providing essential information about the department and work. The initial contact should be made primarily to win the man's confidence. The chief may later turn the man over to a qualified petty officer who is capable of completing the introduction process and the early training necessary. In most cases, considerable information can be given by an experienced petty officer selected by the chief.

In carrying out this responsibility the CPO must do a certain amount of planning if the instructions necessary for the proper indoctrination of the new worker are to be accomplished effectively.

At this point, it may be well to indicate one fundamental difference between the work of a supervisor and that of his men. The men work with machines and material, while the supervisor works through people to produce the desired results with the machines and material. The machines may be operating perfectly and the materials may be of the best quality, but unless the men who handle them are properly instructed, adjusted to their work, and cognizant of their place in the organization and of the policies of the department, they will not be satisfied workers.

The chief is responsible for developing high morale in his shop. The first step is attained by properly indoctrinating each man at the time he reports aboard. The three general areas of indoctrination are:

1. Those dealing with facts, such as the rules and regulations.

2. Those dealing with the man's attitudes or feelings, his confidence in the organization,

pride in the job, and respect for his fellow rkers.

3. Those dealing with skills, safe working habits, and quality of work.

To aid in developing men for greater responsibilities is an all hands job. Each person not only must be receptive to that which helps to develop himself, but must also help to develop those who assist him. However, th CPO in charge has the direct responsibility to see that all subordinate petty officers understand their work and its relation to the function of the shop.

Additional information which will aid in the training of maintenance personnel is contained in Military Requirements Petty Officer 1 & C, NavPers 10057-B. NTDC field service engineers may be used to provide specialized on-the-job training for maintenance personnel. Arrangements for such assistance is normally made through the cognizant Regional or Area Office of the Naval Training Device Center.

MAINTENANCE AND REPAIR

The advanced Tradevman has already developed certain techniques in troubleshooting training devices. However, this portion of the chapter summarizes in a general way certain techniques or methods that may be applied to almost any type of electronic equipment.

The necessity for a thorough knowledge of the fundamentals of electricity, and electronics cannot be emphasized too strongly in performing any type of logical and systematic troubleshooting. The entire concept of effect-to-cause reasoning is based on a thorough knowledge of these fundamentals.

Because of the complexity of most naval electronic circuits, a malfunction can be the result of the complete failure of a small component or a small change of value of a critical characteristic of a component. The first situation requires the replacement of a part; the second situation may frequently be corrected by adjustments. It is this complexity that requires the development of a practical and logical approach whereby the possible simple causes are established or eliminated first. The difficult ones can then be pinpointed quickly. If necessary, replacements should be made prior to adjustments, otherwise the difficulty in isolating a faulty component may be greatly increased.

In all failures of electronic equipment, telltale evidence exists that will reveal the system, major unit, or component in which the trouble exists. Therefore, the first step in troubleshooting should be localization. This localization process must be broken down into three phases—system localization, unit localization, and component localization. System localization involves localization of the trouble to a system primarily by operational responses and, in the case of operational trainers, by instrument indications. Unit localization involves localization of the trouble to a unit, primarily by using a system data flow chart, block diagram, or signal flow chart. Component localization involves localization of the trouble to the defective component within the unit by voltage tests, signal tracing, and resistance tests.

System troubleshooting, or localization of a trouble to a particular system, is a logical application of equipment familiarization and a practical utilization of symptom indication. In operational trainers the task of locating the trouble may be simplified by operational checks or instrument indications. Instrument indications should give sufficient information to enable the TD to localize the trouble to one of the major systems.

Unit troubleshooting requires the use of block diagrams, signal flow charts, and the system data flow which are usually found in the maintenance handbook. The use of an oscilloscope permits the comparison of waveforms in isolating a trouble to a faulty unit.

Component troubleshooting is the localization of the trouble to a particular component. The schematic diagram, wiring diagram troubleshooting charts, tube location diagrams, and other maintenance information, which are found in the equipment instruction book, assist the TD in localizing the faulty component. Obvious troubles, such as open filaments and fuses, loose connections, or arcing, can usually be determined by visual inspection and the presence of unusual odors.

Tube failures are common; therefore, tubes that are thought to be faulty should be tested and the bad ones replaced by tubes known to be good. Intermittent troubles may be caused by loose elements in tubes, and the shock test may be used to locate the trouble.

Signal tracing through the unit to a faulty stage is the most often used procedure. The size of the unit would determine whether signal tracing by states or isolating the unit into subunits by checking input and output waveforms would be the best procedure to follow. Once the stage is determined, voltage and resistance checks should be made. When incorrect voltages are found, resistance checks may be made to establish the cause. Voltage and resistance indications are also included in the equipment instruction book.

If the TD is observant and employs analytical and logical effect-to-cause reasoning, the troubleshooting procedure can be shortened considerably. Often the faulty unit, or even the component, may be singled out before removing a single panel or inspecting a single computer.

PREVENTIVE MAINTENANCE

Most training devices comprise both complex electronic units and delicate mechanical equipment. Satisfactory operation, therefore, requires employment of the best standard maintenance procedures for both types of equipment in order to maintain the trainers in the best operating condition. It is necessary to adopt a systematic procedure for both daily and periodic inspection and servicing with the objective of anticipating and forestalling trouble, making immediate repairs, and in general assuring uninterrupted and smooth functioning of all units of the trainers.

Failure in the equipment during continued use may range from sudden breakdown, where the seat of the trouble is at once clear, to general overall wear and deterioration of the various components over a long period of time. Particularly, guard against general overall deterioration by conducting complete inspections and tests, both daily and at periodic intervals.

A log must be maintained to record all failures, alterations, and observations concerning the equipment, thus permitting a valuable systematic use of accumulated operational and maintenance experience.

Periodic Inspections

The main operating units of the trainer must be checked each day. It is desirable to make daily visual and operational inspections to anticipate functional difficulties. The Handbook of Operation and Maintenance gives detailed information on how the checks and inspections should be conducted.

The daily inspection should include both a visual and an operational check. The trainer should be checked visually for loose leads, improper connections, leaking capacitors, etc., prior to applying power to the equipment. The observations of the operational function of a trainer and the indications received will aid in establishing whether the trainer is functioning properly. An improper indication will aid in localizing the trouble to a component assembly or subassembly.

The daily inspection will often reveal discrepancies that may be corrected at that time with minimum amounts of labor and parts. Such discrepancies, if left uncorrected, might result in a major maintenance problem.

The complete system should be checked at regular intervals. Experience will determine how often these checks are necessary. However, it is better to check too often than to permit breakdown to occur. The Handbook of Operation and Maintenance Instructions will provide information on how periodic inspections should be carried out. To insure that the equipment is maintained in its best condition and at peak performance, the following general procedures should be followed:

1. Always keep equipment clean.
2. Measure the outputs of all power supplies at frequent intervals. Make any necessary adjustments.
3. Make visual checks of functioning of all mechanical units, such as motors, gears, differentials, bearings, etc., that are visible when equipment is in operation.
4. Become familiar with normal sounds of relays and rotating parts; characteristic appearance of tubes and dials; and temperatures of tubes, transformers, motors, and resistor assemblies while the equipment is in operation.
5. Always tighten all holddown screws on cable mounting lugs and terminal boards whenever maintenance is performed on the trainer. However, it is not advisable to tighten setscrews on gears, shaft couplings, and other rotating components as a routine procedure while performing other maintenance. Such tightening could introduce backlash, disturb critical adjustments, or strip the screw threads.

CORRECTIVE MAINTENANCE

In maintaining and servicing operational trainers, it is of primary importance to look for simple malfunctions. The method suggested below offers a good procedure for recognition and location of trouble:

1. Observation of controls and instruments.
    a. Do all controls have proper loading for the operational condition existing?
    b. Do all instruments register the appropriate indications?
    c. Do all instruments follow properly when operational conditions change?
2. Analysis for possible cause.
    a. If trouble exists, is it confined to a single system?
    b. Is it electrical or mechanical in nature?
    c. If electrical, can it be caused by
        (1) a faulty power supply?
        (2) a bad tube or tubes?
        (3) an open circuit?
        (4) a short circuit?
        (5) an open potentiometer?
    d. If the trouble is mechanical, can it be caused by
        (1) a loose cam?
        (2) a broken microswitch?
        (3) a jammed shaft?
        (4) fouled gear teeth?

3. Study of schematic drawings.

a. Before using tools or test instruments, study the system and chassis schematics and analyze the problem as follows:

(1) Break the trouble down into causes which could originate in a certain system or systems.

(2) Localize the trouble to an area of the trainer.

(3) Determine, if possible, which chassis is originating the trouble.

4. Preliminary testing.

a. After the system or chassis causing the trouble has been tentatively determined, use the necessary tools and test instruments to determine which components are causing the trouble and adjust or replace them as required.

b. It is rarely necessary to realine the entire trainer. It may be assumed that since the trainer was operating properly prior to the occurrence of the trouble, all potentiometers, cams, switches, etc., were then in proper alinement. Minor adjustments are normally made as required during regular inspection and maintenance periods. Therefore, an adjustment must never be undertaken until it first has been definitely ascertained that the adjustment is necessary. In many cases what appears to be misalinement will prove to be a defective tube, potentiometer, or some similar fault.

c. In no case should any adjustment be attempted until the equipment has been turned on for sufficient time to assure that all components have arrived at a stable operating temperature condition. Adjustments made before the equipment has had time to warm up will ordinarily be faulty.

d. Testing and alinement cannot be performed with inaccurate or inferior test equipment and instruments. The instruction handbook for the trainer will itemize the approved test equipment.

Not until the above checks are made should additional tests be undertaken. The troubleshooting charts in the maintenance handbooks give typical troubles and their causes, but for obvious reasons they are not intended as complete guides to troubleshooting.

By maintaining accurate maintenance logs it can be determined if troubles occurring in the trainer are caused from particular parts or circuits. A particular component may continually break down because of unusually high voltage, or methods used when operating the trainer. The records of continuing trouble will show a trend of future breakdowns. A study of the operation of the circuitry may indicate that a change in operating procedures is necessary, or a modification to the trainer should be made.

The procedures set forth in the latest edition of NavTraDevCen Instruction 4[illegible]0.1 are to be followed when accomplishing a modification or when an activity desires assistance in developing a modification.

(See the Training Device Guide, NAVSO P-530-2.)

SUPERVISING REPAIR WORK

One of the most important duties of a senior Tradevman is that of supervising repair work. He instructs personnel concerning the different repair jobs which must be done. He checks on the progress of the work, and gives additional advice or instructions when necessary. He should also check the job to see that it has been performed and completed properly and in accordance with his instructions.

After the CPO in charge has obtained complete information on a new job and has decided what repairs or replacements are necessary, he must then decide who is to do the job. In order to make this decision, the chief must know what experience the men have had with different types of repair work, and what skills they have in operating test equipment and in using tools.

When the workload is light and time is available, the chief can assign new jobs to relatively inexperienced personnel in order to give them training and experience. However, if a job must be performed in a short time, the chief will generally assign the job to one of the best men. In routine assignments, the more complicated and difficult repair work is given to the higher rated men and the less difficult jobs are given to the lower rated men. The assignment of a new job also depends a great deal upon the availability of tools, test equipment, and personnel.

STARTING THE JOB

The man who is going to do the repair job must be given detailed information on how the job is to be performed. The senior TD should be careful to see that the man fully understands what he is going to do, so as to prevent any mistakes due to misunderstanding of instructions. The amount of instruction depends upon the knowledge and experience of the man concerned. If he is an experienced rated man, it may only be necessary to tell him what repairs must be accomplished. Inexperienced men will need additional instructions on what test equipment to use, and the proper procedure to follow. Men should understand that they are free to ask any questions in case they are in doubt about any details in doing their assigned work. Men will ask questions when it is to their advantage to do so.

In addition to giving instructions on how a job should be accomplished, it is also advisable to give information concerning the importance of the job, the origin of the job, and the part that each person will play in accomplishing the complete repair job. In general, men are interested in why a job is necessary, and how it is to be accomplished, and will usually turn out better work when they have a clear picture of the total job.

CHECKING PROGRESS OF WORK

The assignment of work is only the first step in processing a job. The chief who is in charge must know his men. He should have a fairly good idea of each man's skill and ability, as well as his knowledge regarding the operation of equipment and accomplishing repair work.

The best way in which the TD supervisor can obtain this knowledge is to make frequent inspections and check the progress of work being performed. In that way, he will have a good idea as to which jobs, or which men, will require the most supervising.

When checking on the progress of work, the senior TD should be sure that the men are observing proper safety precautions in regard to themselves and the equipment they are operating. In addition, he should see that each man is using the proper tools, and note the quality of work being performed.

In case of any doubt, the chief should check to see that the men understand his instructions properly and are doing the work correctly. If necessary, the chief should provide additional instructions to give a better understanding of the job, or to improve workmanship. By frequently talking to the men and answering their questions, the chief can prevent work and material from being wasted, as could be the case if he were not available to give the correct details. The chief who has interest and confidence in his men and their work will find that men have confidence in him as a good supervisor.

Complications may develop on some repairs which may require additional planning and revised repair procedures. By observing the progress of the various jobs, and whether any are ahead or behind the planned schedule, the supervisor will be able to change the schedule in order to prevent "bottlenecks."

CHECKING ON COMPLETED JOBS

When a job has been completed, the senior TD in charge should inspect and approve the work. Inspection is necessary to insure that the repair job or the replacement parts will be satisfactory. Inspection of repaired equipment and replacement parts may be accomplished either visually or by means of measuring instruments. In addition, tests are performed to check the condition of repaired equipment.

The senior PO is responsible for determining whether the repair job, including replacement parts, meets the following standards:

1. Have the repaired parts been correctly installed in accordance with instructions?
2. Is the repaired item or replacement part free from defects in material and workmanship?

3. Have all parts or accessories to the repaired equipment been replaced or reinstalled correctly?

4. Has the proper replacement part been used in making repairs?

5. Has the part or item been properly checked and deemed ready for service?

The above are some of the things a chief must consider before the job is completed and the equipment ready to be used. No one should allow repair work to be considered complete until the chief, the TD repairman, and the operator of the equipment are satisfied.

INSTALLATION OF TRAINING DEVICES

In order to have the device available for utilization as soon after its arrival as possible and to insure optimum maintenance and performance, certain preparations should be made as soon as delivery of a device is anticipated. If assistance in planning is required, the cognizant Regional or Area Office of the Naval Training Device Center (NTDC) should be contacted.

Space and power requirements for the device should be ascertained in advance of delivery. The necessary arrangements for installation of the device should be made. This may include building modifications, additional electrical power and power equipment, and any other pertinent equipment or supplies. If power requirements are unusual, or if the device or training system is large, it may be necessary to obtain the assistance of the local public works department. These requirements are usually stated in the publications pertaining to the device, or they may be obtained from the appropriate regional or area office.

Personnel requirements for installation and maintenance of the device should be anticipated prior to its arrival. If additional TD's are required, an increase in the station personnel allowance must be made.

If a new device is of such complexity that the NTDC considers factory training of Tradevmen to be necessary, then the NTDC will automatically make arrangements for [illegible] training. Key personnel from the receiving [illegible] attend the course. The course is usually conducted in advance of shipping the device to allow planning details to be completed.

Specialized technical assistance is often necessary for the installation and initial maintenance period of complex devices. NTDC normally provides this assitance under the terms of the contract with the manufacturer.

Special tools, which may be required for [illegible] maintenance, are usually furnished as device accessories. Requirements for repair parts should be anticipated and action taken as soon as receipt of the new device is made known.

Early planning for the device's arrival also includes the provisions for the funding of the installation. Allotments are provided for this program and requests for funds are made in accordance with NTDC Instruction 7303.1 (through current change).

After the device arrives, the CPO in charge of the installation should see that adequate precautions are taken during the installation, both as to safety of personnel and care of the device. If a NTDC field service engineer or contract engineer is assigned, the CPO should see that the necessary manpower and facilities are available.

Evaluation of the device is conducted after all adjustments have been accomplished and a predetermined operating time has elapsed. This evaluation is accomplished with or without the assistance of NTDC. From the results of this evaluation, the cognizant training agency will be advised of the feasibility of further procurements and possible modifications if necessary.

INSTRUCTIONAL USE OF TRAINING DEVICES

In the utilization of training devices, considerable emphasis is often placed upon the number of hours of training time secured. While it is important that a trainer be used as many hours per day as possible, quantity without quality will probably result in a comparatively small increase in student proficiency. The devices alone do not train men; a well-planned and well-managed program is necessary.

It is essential that a device be used at its full training potential. A poor training program or negligence in administering a good program may have adverse effects on the student's performance in the aircraft. Poorly devised and badly administered training programs can be da[illegible].

It is an urgent and time-consuming administrative responsibility to secure and maintain a smoothly functioning program which adequately trains students in those areas which are required for the safe and efficient performance of their missions in the aircraft.

The development and administration of an effective program is not an easy task, nor is it something that can be done and then forgotten. Once a program is put into operation, it is continually necessary to locate deficiencies and to correct malpractices. Responsible authorities cannot blithely assume that any training program is being conducted in an effective manner. Ineffective and dangerous practices may not be apparent to the casual observer; therefore, a system of quality control must be devised for identifying these practices.

REQUIREMENTS FOR QUALITY CONTROL

Training device utilization to date has brought to the forefront four requirements which appear critical for controlling the quality of training. These requirements are discussed in the following paragraphs.

Adherence to the Training Program

Once a training program has been developed, that program should be followed until changed for good and sufficient reasons. When individual instructors deviate from a prescribed program, they often detract from the effectiveness of training. Even small deviations are often harmful because they seem to breed further alterations, and the end result is frequently a chaotic program in which no one knows what type of training, if any, the average student is receiving. Once a training program is established, provisions should be made to insure that the training program is carried out as it was planned.

Validity of Information

Every effort should be made to insure that instructors are giving students the correct information on each procedure taught during a course. The teaching of incorrect procedures must be identified as soon as possible to protect the student.

Frequently these incorrect, and possibly dangerous, procedures are hard to detect. They usually enter the program because of insufficient information regarding the procedure or because of unauthorized deviations from the training program. Constant research is necessary to obtain accurate and definite information on procedures used in the air. To this end, flight trainer personnel must actively seek and secure the support of student and flight training personnel.

Maintenance of Equipment

Irregular trainer malfunctions will occur which can have extremely undesirable training consequences. If training is given when malfunctions are present, the possibility exists that the unorthodox procedures required to by pass trainer malfunctions will carry over to the aircraft. This is especially likely when inexperienced pilots and/or crewmembers are being trained. If malfunctions are not corrected within a reasonable period of time, training personnel may give up and begin to "live with" the deficiencies. When instructor or administrative personnel discover malfunctions that result in the teaching of procedures which do not apply to the aircraft, they should take steps immediately to insure the correction of these malfunctions.

Scheduling of Students

Improper scheduling can have serious effects on student and instructor morale as well as reduce the effectiveness of training. The primary requirements for proper scheduling are:

1. Each student must receive all the training time that has been allocated to him.
2. Each student should meet the proficiency requirements specified for the particular course to which he is assigned.
3. In the case of crew trainers, crew integrity should be maintained for training, if permanent crews are used in the aircraft.
4. Each student should be allowed to complete the prescribed course without unnecessary interruptions.
5. A pilot or crewmember who has recently completed a course must not be sent back for more training just to "fill quotas."

OBTAINING INFORMATION FOR USE IN IMPROVING TRAINING QUALITY

This section suggests a number of procedures for securing information which can be used to correct deficiencies in training programs. If this type of information is not available, it will be found very difficult to make worthwhile improvements, since real deficiencies will probably remain undetected.

Methods for correcting the deficiencies are discussed later.

Monitoring Training Sessions

Frequent monitoring of flights, briefings, critiques, and other instructional sessions by supervisory personnel are effective ways to obtain information regarding the degree to which instructors adhere to the prescribed program, and to insure accuracy in the information given to students by instructors.

Supervisory personnel can attend training sessions and look for deficiencies in the conduct of the program. These deficiencies should be recorded as soon and as specifically as possible. General impressions should be avoided, since suggestions based on such impressions will be of little help to the instructor in improving his techniques. It is important to remember that the true situation may not be easily observed by a supervisor. Most instructor are not at their best when being observed, and some will consciously alter their methods when an observer is present.

In some cases it may be possible to make a tape recording of the training session. Much can be learned in this way, and instructors seldom resent this type of monitoring as long as they have been informed that it will be periodically done.

Analyzing Student Performance Checks

Performance checks can serve as sources of unbiased information on some aspects of training. These records of each student's performance are filled out by the instructors during the flight. Analyses of information obtained from the form employed in administering such checks have proved useful to supervisory personnel in improving the quality of training.

The following are some examples of the types of information which can be obtained from analyzing performance checks:

1. Since, observations recorded on the performance checks serve as the basis for corrective instructions during the critique, a key function of the instructor is to recognize and record the student's errors. If the observations are made completely and correctly, the instructor can inform the students of their faulty procedures and suggest corrective actions. An analysis of the errors recorded by an instructor can give an indication of his teaching ability by providing such information as the average number of errors he records for each of the normal and emergency procedures included in the flight. If an instructor consistently observes few or no faults actually present in procedures, or neglects certain procedures, the soundness of instruction during the critique is questionable and student errors are likely to be repeated.

2. "Command decisions" made by the students regarding flight procedures or equipment breakdowns may make it necessary for the instructor to deviate from the prepared training outline by eliminating one or more of the scheduled procedures. However, it is possible that a poor instructor will eliminate an unjustifably large number of procedures from the training. Such a practice on the part of a poor instructor can seriously reduce the effectiveness of training, since a student may not have a chance to practice all the procedures that have been carefully selected for inclusion in the course. The number of procedures completely omitted from the program by each instructor can be obtained by reviewing the performance checks which he has filled out.

3. Some instructors tend to make their training flights shorter than required by the curriculum. This practice deprives the students of trainer time that has been allocated to them and results in reduced trainer utilization. It also indicates that the instructor is eliminating certain procedures from the flight. The length of each flight, as reported on the performance checks, can be used to obtain the average length of the periods conducted by each instructor.

4. Within certain commands, crew integrity is a requirement for the effective utilization of multiplace flight trainers. Whenever possible, crews who are regularly flying together should report for flight trainer practice together. Crew substitutions after a course has started can be harmful and should be approved only under exceptional circumstances. Information regarding crew integrity can be obtained from the form used with performance checks.

Collecting Opinions and Suggestions From Students

The opinions and suggestions of students have proved to be valuable sources of information for improving programs. This information can be obtained by having the students fill out a questionnaire consisting of a number of well-designed items, or by having supervisory personnel interview the students after they complete training. Of these two methods, the questionnaire has some advantages since it will give a record of a large number of student responses which can be tabulated for report purposes, and it requires less of the supervisor's time. However, the interview will result in more detailed information on student opinions and suggestions. In practice, it is probably best to use a combination of the two methods. The questionnaire can be used with all of the students to obtain an overall appraisal of the program; whereas, the interview can be used occassionally to obtain detailed information and suggestions pertaining to persistent problem areas.

General topics upon which student opinion and suggestions can be obtained are:

1. Differences between the trainer and the aircraft which could possibly have an adverse effect on the student's subsequent performance in the aircraft.
2. Type, amount, and value of instruction given during briefings, critiques, flights, and lectures.
3. Appropriateness of the procedures given during the training periods as well as the relative emphases given to various procedures.
4. Methods of conducting flights with emphases on the realism and the adequacy of the buildup to emergencies.

When personal signatures are required on questionnaires, students tend to try to please the instructor with their answers, no matter how much assurance is given that their criticisms will not be used against them. This tendency can be reduced by not requiring the students to put their names on the questionnaire. Truth, even when it hurts, should be sought with such questionnaires. It must be realized that student opinions are not full substitutes for scientific investigations of the worth of a training device or a training program. When opinions are obtained from a sufficiently large group of students, they can be a useful and readily available source of information. However, they may be misleading if they are not properly interpreted.

Gathering Information From Outside Sources

Some of the information needed to keep a training program up to date must be obtained from sources outside the training unit. Supervisory and instructor personnel should have the most recent information available on current procedures and the operation of the aircraft. The following are some of the publications which are helpful:

1. The Pilot's Handbook for the aircraft simulated.
2. Aircraft manufacturers' publications.
3. Pertinent Bureau instructions.
4. Naval Aviation News.
5. Publications of the U.S. Naval Aviation Safety Center, NAS, Norfolk, Viriginia.
6. Federal Aviation Agency publications such as the Flight Information Manual and ANC Procedures for the Control of Air Traffic.

METHODS FOR IMPROVING TRAINING QUALITY

Accurate and well-defined information in the areas mentioned in the preceding paragraphs serves as the basis for initiating continuing and realistic administrative actions for improving the training program. In fact, many of the methods of collecting information, by their mere use, tend to improve the quality of training. Methods which have proved successful in effecting improvement in synthetic device programs are discussed below.

Staff Meetings

Staff meetings are one of the most useful and efficient methods for making improvements in a program. During these meetings, the division officer, leading chief, and/or the petty officer in charge of instructors can discuss existing deficiencies in the program and can initiate corrective measures. Most of the meetings will require only the presence of the instructors, but for certain topics, it may be advisable to have maintenance personnel also present so that they can gain an understanding of how good trainer maintenance can help solve the problems involved. Listed in the below paragraphs are some suggested topics for staff meetings.

STAFF RECOMMENDATIONS.—Supervisors should encourage instructor and maintenance personnel to make any recommendations they have for improving the program. These recommendations should be freely discussed and a decision made by the supervisor on whether or not to incorporate them into the program.

INSTRUCTOR DEFICIENCIES.—Procedures that are being incorrectly taught should be called to the attention of the instructors. In a staff meeting, this must be done in such a way that even the poorest instructor will not feel he is being ridiculed. Criticism should always be constructive. Telling a group of men that they need to improve does little good unless they are also given some suggestions on how to improve. Whenever possible, instructors should be complimented on above-average performance. Instructors whose performance is poor should be individually interviewed so that their specific deficiencies may be pointed out to them and suggestions for improvement given.

PROCEDURE REVIEWS.—Reviews of the procedures taught in the trainer should be held periodically to insure that everyone is teaching these procedures correctly. Whenever revisions are made, they should be discussed thoroughly and immediately incorporated into the program. Supervisors should be certain that they make definite decisions on controversial topics discussed at staff meetings. If this is not done, or if these decisions are not emphasized, considerable confusion may result.

On-The-Job Training

Good on-the-job training for instructors and maintenance men is essential. Suggestions for training maintenance personnel were given earlier in this chapter. Training for instructors should include flying the trainer through each procedure they will be required to instruct, observing an experienced instructor, and finally, instructing under the supervision of an experienced instructor. When possible, flight time in the aircraft simulated should also be given.

Obtaining Student, Station and Command Support

To conduct an effective training program, training personnel must actively seek and secure the support of student, station, and command personnel. Without their support, little can be accomplished.

Since new developments are constantly being made in the manufacture of training devices, the officers in charge of the training program at a station or in a squadron may not be fully aware of the capabilities of operational flight trainers. As a training program is being planned, it is often helpful to provide familiarization in the equipment to key personnel. These people should be sold on the nature of the training that can be given, and should be consulted as the syllabus is set up so that the greatest possible coordination between training on the ground and training in the air will be achieved.

CHAPTER 4

ELECTRONIC TEST EQUIPMENT

A Tradevman must be able to test, adjust, and repair equipments containing electronic circuits such as power supplies, voltage and power amplifiers, phase detectors, amplitude modulators, and servomechanisms. He must be capable of testing these circuits for continuity shorts, and grounds; and measuring electrical quantities such as voltage, current, power, frequency, and phase angles. This chapter discusses the application of electronic test equipment as well as some of the equipment circuits.

Many of the general purpose electronic test instruments are described in detail in the Rate Training Manuals Basic Electricity, NavPers 10086-B, Basic Electronics, NavPers 37-B, and Tradevman 3 & 2, NavPers 10376. However, this chapter provides information on the selection of proper test instruments and their operating limitations.

MEASURING INSTRUMENTS

Maintenance shops are equipped with various types of meters. They range in complexity from a simple plug-in ammeter to an electronic volt-ohm ammeter. The repairman must exercise judgement in the selection of the proper test instrument to insure the desired results. He must not only base his selection on the type of meter and its operating ranges, but must also consider the effect the meter will have on the circuit being tested.

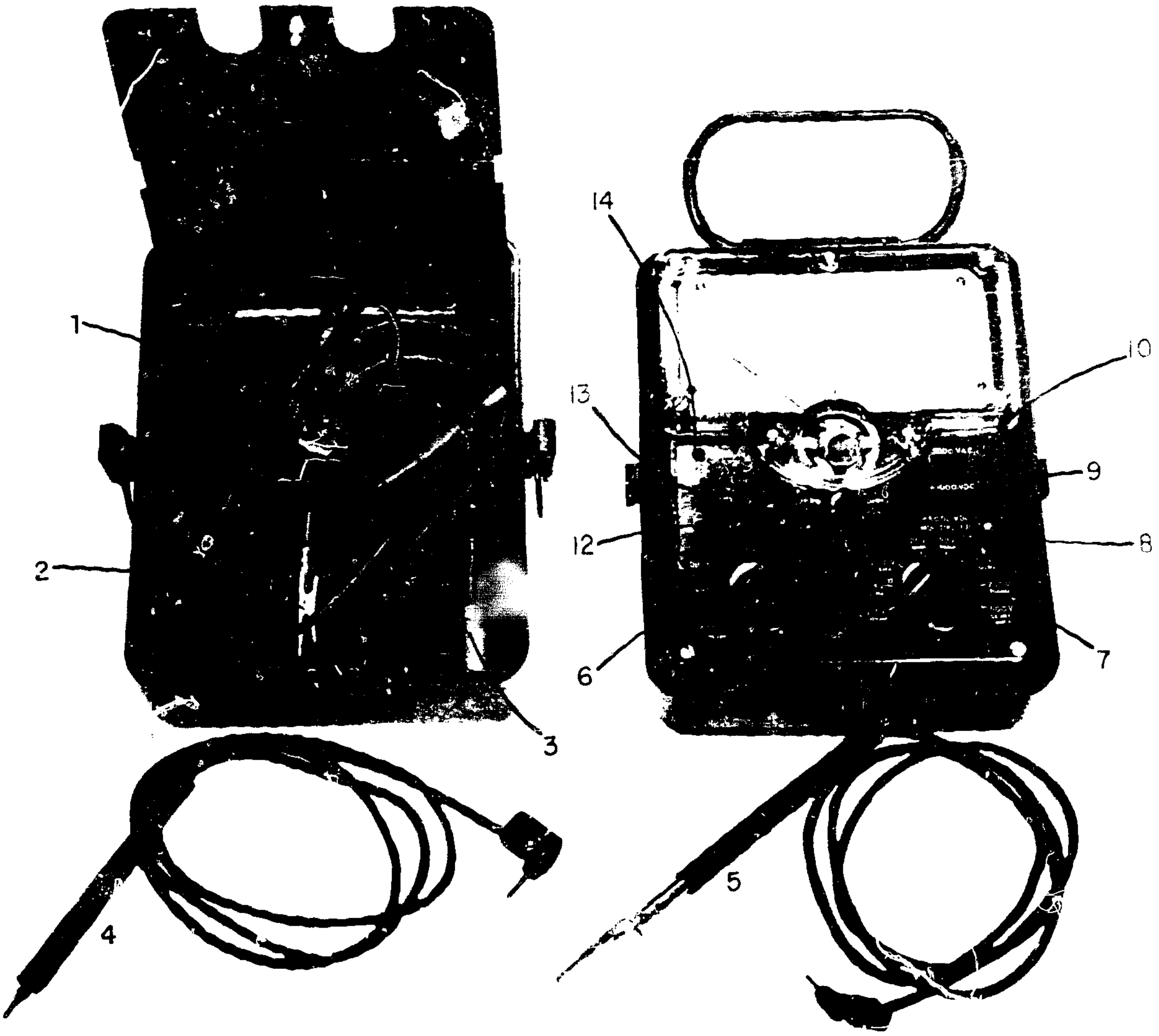
MULTIMETER AN/PSM-4C

The Multimeter AN/PSM-4C (fig. 4-1) is designed to permit the technician to make measurements of voltage, resistance, and current with a completely self-contained portable instrument. It can measure either a-c or d-c voltage, d-c resistance, or direct current in a wide range of values. This capability covers the basic requirements for a portable tester of this type. All leads and accessories are stored in a compartment built into the cover, which remains with the instrument at all times. The cover forms a watertight seal when clamped over the face of the meter. While the instrument is in use, the cover clamps over the back of the meter keeping the accessory compartment convenient to the operator. Batteries used with the meter are: one BA-30 (1.5 volts) and one BA-261/U (22.5 volts.)

In the accessory compartment there is a pair of standard test leads (one red and one black) which are used for most applications of the instrument. These leads have elbow probes on one end to connect the lead into the circuit jacks on the instrument. They have probe tips on the other end, which have threaded shoulders to accept the alligator clips which are screwed on. These parts are used to make all measurements, except d-c voltage over 1,000 volts.

For measuring d-c voltages over 1,000 volts, a special high voltage probe is provided, and is used in conjunction with the standard black lead. One end of the lead has a threaded tip which screws on a post in the face of the meter (labeled 5,000 VDC MULTIPLIER). The other end of the lead has a high voltage multiplier assembly made of red plastic with a clear plastic end and terminates in a crocodile clip at the end of a short piece of flexible wire. The clear plastic end allows the operator to observe the glow of a neon lamp when there is high voltage present. This is a warning to the operator that there is high voltage present at the clip and that he should not touch it. The neon lamp is in series with a 100-megohm resistor within the housing. When a high voltage is being measured, the current passes through the lamp making it glow, through the resistor, and through the armature of the meter.

There are three controls on the face of the meter. One is a 10-positon rotary-switch in the



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1. High voltage probe.
2. Alligator clips.
3. Telephone plug.
4. Standard test lead (red).
5. Standard test lead (black).
6. Function switch.
7. Current and voltage range selector.
8. 5,000 VDC multiplier.
9. +1,000 VDC (red lead).
10. 1,000 VAC (red lead).
11. Zero ohms.
12. +10 amps (red lead).
13. + Volts/MA/ohms (red lead).
14. Common (black lead).

Figure 4-1.—Multimeter AN/PSM-4C.

lower left-hand corner which is used as a function switch. Five of the positions on this switch are used to set up different resistance scales. Two of the positions are for selection of d-c voltage measurement (direct and reverse). The normal position of the switch is in the DIRECT position. If a negative voltage is to be measured, the switch is moved to the REVERSE position. (NOTE: Never switch leads to read a reverse or negative voltage.) One position of the switch is marked ACV; in this position the meter may be used to read a-c voltage. A rectifier in the instrument changes the a-c voltage to an equivalent d-c value which is applied to the meter. One position is marked OUTPUT, in this position the a-c portion of mixed a-c and d-c voltage may be read. The last position of the switch is used when measuring direct current and is marked DC with three ranges (μA, MA, AMPS) indicated to the right of the letters DC. In the lower right-hand corner is an eight-position switch used to select current and voltage ranges.

Near the center of the meter is a control marked ZERO OHMS. This control, which is a continuously variable adjustment, is used to zero the meter thus compensating for battery aging in the ohmmeter circuits. This control is adjusted until the meter indicates full-scale deflection (indicating zero ohms) when the function switch is set at one of the resistance range positions and the meter probes are shorted together. To prevent erroneous readings when switching to a different position, a check of the meter zero indication is always necessary.

The Multimeter AN/PSM-4C is designed to make the following electrical measurements:

1. Measure direct current up to 10 amperes.
2. Measure resistances up to 300 megohms.
3. Measure d-c voltages up to 5,000 volts.
4. Measure a-c voltages up to 1,000 volts.
5. Measure output voltages up to 500 volts.

Input impedance for measuring d-c voltages is 20,000 ohms-per volt and is accurate to within 3 percent of full-scale (4 percent for the 5,000 VDC scale). When measuring a-c voltages, the input impedance is 1,000 ohms-per volt and is accurate to within 5 percent of full scale.

Under normal conditions, no routine service inspection is necessary beyond visual examination at established inspection periods. If the instrument is to be stored for periods of 6 months or longer, the batteries must be removed to prevent corrosion. The periodic inspection should include removal of the battery case cover to facilitate inspection of battery connections. If the instrument is used under extreme temperature conditions, a visual inspection of all parts should be made at least once a month. No periodic maintenance is required except for inspection, test, and replacement of batteries.

MILLIOHMMETER AN/USM-21A

The Navy does not normally supply its maintenance facilities with an instrument consisting solely of an ohmmeter. The ohmmeter is normally incorporated with the voltmeter to form a multimeter. The AN/USM-21A is the exception to this rule and available for special applications.

This ohmmeter is a low range ohmmeter capable of measuring resistances in the range of 10 milliohms or less. Most ohmmeters read zero at such a low value. Several troubleshooting problems can be solved easily with such an instrument. One of the most common and troublesome problems is to find the exact location of a short circuit in a power distribution circuit involving many parallel paths.

In using a milliohmmeter, several problems are encountered. These problems include stray circuit resistances such as contact resistance, test lead resistance, and switching resistance. In using the conventional low range ohmmeters, the primary limitation is the contact resistance at the test probes.

The AN/USM-21A was designed principally to overcome the contact resistance problem. A measured current is passed through the test circuit by means of a heavy set of clips. Using an auxiliary set of test leads which carry very little current, the resulting voltage drop across the test circuit is measured by a sensitive millivoltmeter which senses this voltage.

ELECTRONIC METERS

Electronic meters are used primarily for the same purposes as the nonelectronic meters. Some characteristics of their operation, however, give them definite advantages. In the electronic multimeter, the current and resistance measuring circuits function in a manner identical to the corresponding nonelectronic measuring instruments. The measurement of voltage, however, involves the use of an amplifier which in turn requires the meter be calibrated prior to use.

Proper calibration and use of the instruments vary slightly according to model. Details are included in the Operation Instruction Manual for each model.

The ordinary voltmeter has several disadvantages that make it practically useless for measuring voltages in high impedence circuits. For example, suppose that the plate voltage of a pentode amplifier is to be measured. (See fig. 4-2.) When the meter is connected between the plate and cathode of the electron tube, the meter resistance R_m is placed in parallel with the effective plate resistance R_{eff}, thereby lowering the effective plate resistance.

The effective plate resistance is in series with the plate load resistor R_L, and this series circuit appears across the supply voltage, E_{bb}, as a voltage divider. Since the overall resistance is lowered, current through R_L will increase, the voltage across R_L will also increase, and the voltage across R_{eff} will decrease. The result is an incorrect indication of plate voltage, and is called loading effect.

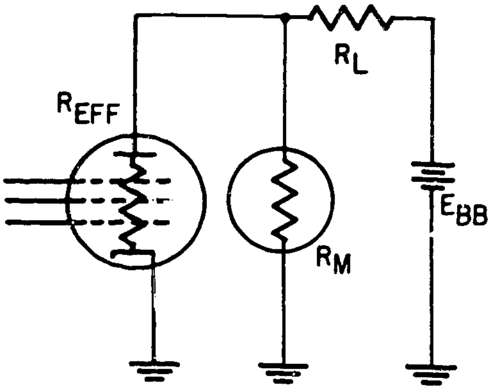

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Figure 4-2.—Loading effect created by meter resistance.

Calculation of Loading Effect

Before the voltmeter is connected, the plate current is determined by the effective resistance of the plate circuit, the plate load resistor, and the plate voltage. If the tube has an effective resistance of 100,000 ohms, a plate load resistance of 100,000 ohms, and the plate power supply is constant at 200 volts, then the plate current is $\frac{200 \text{ v}}{200{,}000\,\Omega}$, or 0.001 ampere. The plate voltage (plate to cathode) is 0.001 x 100,000, or 100 volts.

Assume that the voltmeter used to measure the plate voltage of the tube has a sensitivity of 1,000 ohms per volt and the selected meter range is from 0 to 250 volts. The meter will then have a resistance of 250,000 ohms. This resistance in parallel with the tube resistance of 100,000 ohms produces an effective resistance of 71,400 ohms in series with the plate load resistor. The total resistance across the B supply is therefore 171,400 ohms instead of the 200,000 ohms before the meter was applied, and the current through the load resistor is $\frac{200 \text{ v}}{171{,}400\,\Omega}$, or 0.00117 ampere. Across the plate load resistor the voltage drop is 0.00117 x 100,000, or 117 volts, and the plate-to-cathode voltage on the tube is 200 - 117, or 83 volts when the meter is connected, thus causing an error of 17 volts. The lower the sensitivity of the meter, the greater the error will be; in the example, the error of 17 volts when the reading should be 100 volts is a 17 percent error.

A meter having a sensitivity of 20,000 ohms per volt and a 250-volt maximum scale reading would introduce an error of about 1 percent. However, in circuits where very high impedances are encountered, such as in grid circuits of electron tubes, even a meter of 20,000 ohms per volt sensitivity would impose too much of a load on the circuit.

VTVM Advantages

Another limitation of the alternating current, rectifier type voltmeter is the shunting effect at high frequencies of the relatively large capacitance of the meter's rectifier. This shunting effect may be eliminated by replacing the usual metallic oxide rectifier with a diode electron tube; the output of the rectifier is applied to the grid of an amplifier. The plate circuit of the amplifier contains the d-c meter. Such a device is called an electron tube voltmeter or a vacuum tube voltmeter, usually abbreviated VTVM. Voltages at frequencies up to 500 megahertz and sometimes even higher, can be measured accurately with this type of meter. The frequency limitation is determined by the model of VTVM.

The input impedance of a VTVM is large, and therefore the current drawn from the circuit whose voltage is being measured is small and in most cases negligible. The main reason for using a vacuum tube voltmeter is to overcome the loading effect by taking advantage of the VTVM's extremely high input impedance. A VTVM that is used extensively for electronics maintenance is the TS-505 multimeter, which was discussed in the TRADEVMAN 3 and 2, NavPers 10376-C.

Phase Angle Voltmeters

The overall accuracy of many electronic equipments is determined by measuring phase angles in computing transformers, computing amplifiers, and resolver systems. In the past, one of the most common methods used for measuring phase shift or phase angles between signals was observing patterns on an oscilloscope. With this method, it was hard to determine small angles, and difficult to translate various points into angles and sines of angles. The most limiting factor in using oscilloscope patterns developed when one of the signals contained harmonic distortion or noise.

In any complex waveform containing a fundamental frequency and harmonics, measuring phase shifts presents problems. In most applications, interest lies in the phase relationship of the fundamental frequency, regardless of the phase relationship of any harmonics which may be present. One of the requirements of a phase measuring device is to measure the phase difference between two discrete frequencies, regardless of the phase and amplitude of other components of the waveform.

The basic block diagram of a phase angle voltmeter is shown in figure 4-3. There are two inputs—the signal and the reference. Both channels contain filters which pass only the fundamental frequency. All other frequencies are highly attenuated. Each channel has a variable amplitude control and amplifiers to increase the variety of signals that can be checked.

A calibrated phase shifter is inserted into one channel; that channel signal can be phase shifted to correspond to the other channel. This is detected in the phase dectector and observed on the meter.

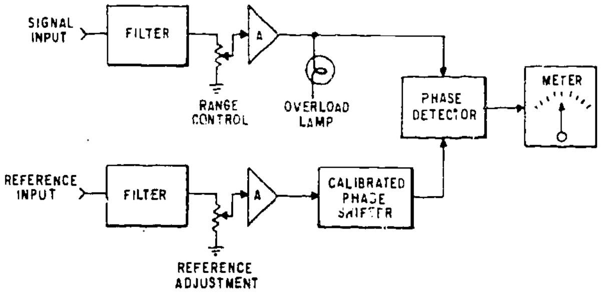

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Figure 4-3.—Phase angle voltmeter, block diagram.

The calibrated phase shifter is made up of a switch (whose position corresponds to the 0°, 90°, 180°, and 270° phase shift) and a potentiometer (whose dial is calibrated from 0° to 90°). The total phase shift is made up of the sum of the two readings.

The phase detector is a balanced diode bridge type demodulator. Its output is proportional to the signal frequency amplitude times the cosine of the angle of phase difference between the signal input and the reference input.

If the reference input is phase shifted until it is in phase or 180° out of phase with the signal input, the output from the phase detector is proportional to the signal input amplitude (the cosine of the angle is unity). If the reference input is phase shifted until it is 90° or 270° from the signal input, the phase detector output is zero (the cosine of the angle is zero).

The point at which the two signals are in phase or 180° out of phase is the point of maximum deflection on the meter. The difference between the in phase and the 180° out of phase points is in the direction in which the needle swings—not the distance it swings. As the point of maximum deflection is approached, the rate of change of the meter reading decreases because the cosine has a small rate of change near 0°. This makes it difficult to read the exact point of maximum deflection.

Because the cosine has a maximum rate of change as it approaches 90° (and thus gives a better indication on the meter), most commercial voltmeters are set to determine the point at which the signals are 90° out of phase—"quadrature." When the voltmeter is set for this point, there must be some way of converting the phase shifter reading so that it shows the correct amount of phase shift rather than 90° more or less than the actual amount. Some confusion exists in this area because different manufacturers have different methods of determining the signal quadrant. Manufacturers also differ on whether the final reading is a leading or a lagging phase shift. This means the technician must be familiar with as many types of phase angle voltmeters as the Navy has in the field. He cannot assume that the method he uses to determine phase angle on one type of meter can be used on another; nor can he assume that, because one meter gives him a leading angle between signal and reference waveforms, another manufacturer's meter also gives leading phase shift.

Differential Voltmeter

The differential voltmeter is a reliable precision item of test equipment. Its general function is to compare an unknown voltage with an internal reference voltage, and to indicate the difference in their values. The differential voltmeter in most common use in Navy applications is the 803D/AD (fig. 4-4).

The 803D/AD is usable as an electronic voltmeter, as a precision potentiometer, and as a megohmmeter. It can also be used to measure the excursions of a voltage about a reference value. Ease of operation, inherent protection from any accidental overload, and high reliabilty of readings are additional advantages of the instrument. It is accurate enough for precision work in calibration laboratories, yet rugged enough for general shop use.

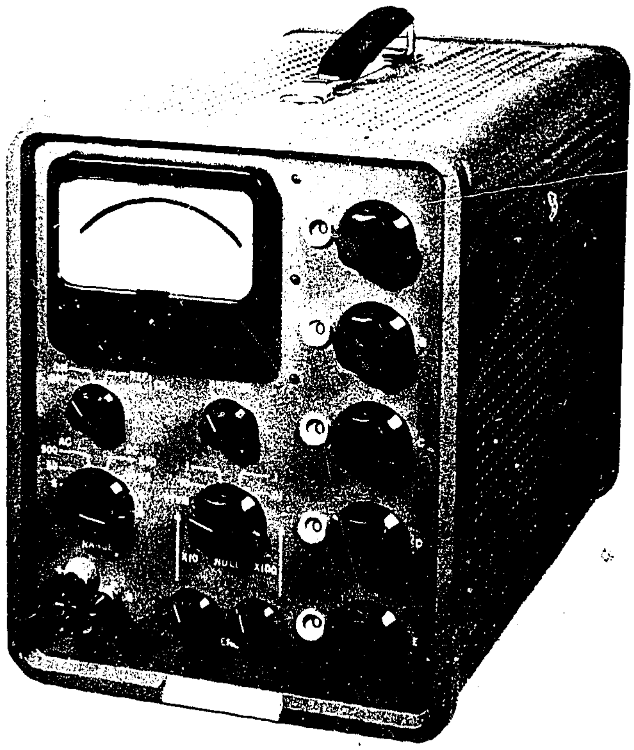

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Figure 4-4.—Differential Voltmeter, Model 803D/AD

The heart of the unit is a precision 500-volt d-c reference power supply. This 500 volts can be precisely divided into increments as small as 10 microvolts by means of 5 voltage dials. Unknown a-c or d-c voltages are matched against the precise internal voltage until no deflection occurs on the panel meter. The unknown voltage is then simply read from the voltage dials. In the highest null sensitivity range, a potential difference between unknown and reference voltage as small as 0.01 volts causes full scale meter deflection.

At null, the differential voltmeter presents an "infinite" input impedance to the voltage under measurement, almost completely eliminating circuit loading.

A functional schematic diagram of the differential voltmeter is shown in figure 4-5. The principal circuit divisions are as follows:

1. A 500-volt d-c reference power supply.
2. Precision voltage divider network.
3. VTVM
4. Chopper-amplifier
5. Converter and converter power supply.

The system circuitry is designed with two separate common returns. One of these, the

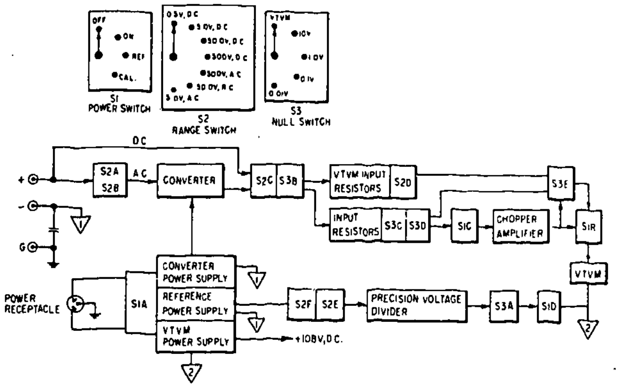

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Figure 4-5.—Differential voltmeter, functional schematic diagram.

return for the converter power supply and reference power supply, provides a safety factor for personnel and a capability for measuring a potential difference between two voltages. The other, which is the common return of the VTVM power supply, is connected to the known reference voltage output from the precision voltage divider network. This arrangement provides a constant d-c voltage of + 108 volts across the differential amplifier regardless of the d-c potential applied to the grid.

D-C REFERENCE POWER SUPPLY.—A full wave rectifier with its associated filter network supplies a d-c voltage of approximately 1,000 volts to a conventional electron controlled voltage regulator. The regulated output is maintained at 500 volts ± 0.01 percent.

In the 500 V DC position, the RANGE switch (S2E) passes this 500 volts directly to the precision voltage divider. In the 50 V DC, 5V DC, and 0.5 V DC positions, range resistors S2F divide the reference voltage to 50, 5, and 0.5 volts d.c., respectively. In all a-c positions of the RANGE switch, only 5 volts of the reference supply is used, due to the fact that the maximum output of the a-c to d-c converter is 5 volts.

PRECISION VOLTAGE DIVIDER.—Each of the four precision voltages available from the reference supply must be made adjustable through a precision divider string so that unknown voltages may be nulled or matched exactly. The five decade resistor strings (fig. 4-6) accomplish this function.

Note that each string, with the exception of the first, parallels two resistors of the string that precedes it. Between the two wipers of S4, there is a total resistance of 40K and a total voltage of 100 volts d.c. with the RANGE switch in the 500 V DC position. Across the wipers of S5, S6, and S7, there are 10, 1, and 0.1 volts d.c., respectively. Switch S8 selects increments of 0.01 volt d.c. from the last decade. These voltages are reduced by a factor of 10 for each successively lower voltage range.

All resistors of each decade are matched and all decades are matched for each instrument, providing an overall divider accuracy of 0.005 percent.

With the NULL switch in any null range, the output of the precision voltage divider appears at the grid of one-half of the VTVM differential amplifier. A one two-hundredths ampere (5 milliampere) fuse protects this output.

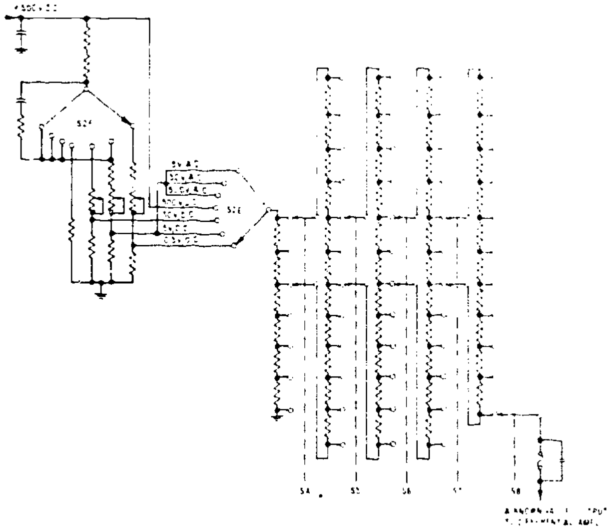

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Figure 4-6.—Precision voltage divider

VACUUM TUBE VOLTMETER.—When operating in the differential mode, output voltage from the precision voltage divider appears on the grid of V4B, one-half of the differential amplifier. (See fig. 4-7.) The unknown voltage appears on the grid of V4A, the other half of the differential amplifier. Any difference between these potentials is indicated by the meter coupled between the cathodes of V4A and V4B. When the output voltage exactly matches the unknown, the meter reads zero and no current is drawn from the source being measured, because the same potential exists on both sides of the input resistances.

When used as a conventional VTVM, the grid of V4B is connected to the 0-volt bus, or negative binding post. With the range switch in the 0.5 V DC position, the unknown voltage appears directly on the grid of V4A and the meter indicates the approximate value of the unknown. Input divider resistors maintain the 0 to 0.5 grid voltage range for all instrument voltage ranges. The input resistance of the instrument in the VTVM position is 10 megohms.

CONVERTER.—All a-c measurements are made by first converting the a-c input to a d-c voltage. The converter provides a maximum d-c output of 5 volts for a maximum a-c input of 5 volts rms. In the 5 V AC position, range switch sections of S2A and S2B couple the converter amplifier input directly to the binding

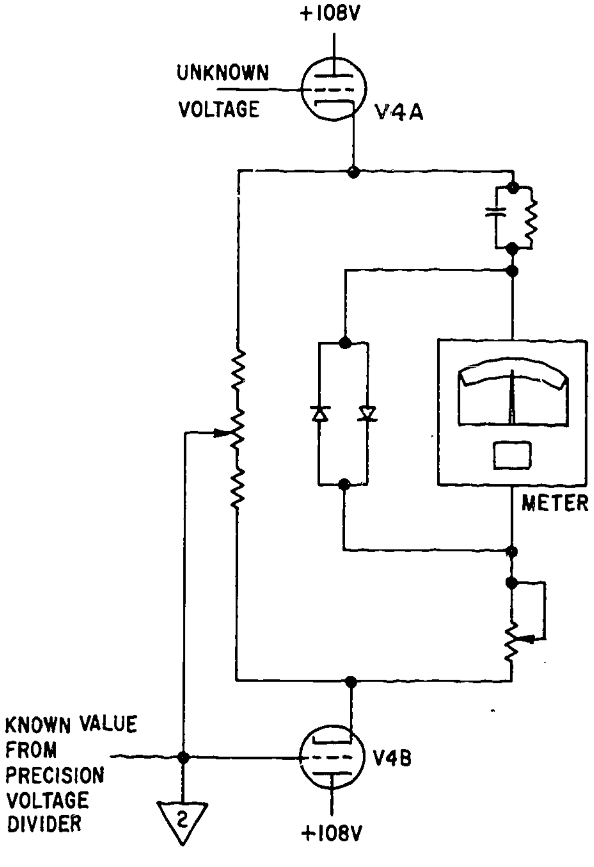

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Figure 4-7.—Differential amplifier.

post. In the 50 V AC and 500 V AC positions, input attenuators reduce the unknown a.c. to provide a maximum of 5 volts a-c input to the first converter amplifier.

The overall frequency response of the converter is essentially flat from 30 Hz to 10 kHz.

POWER MEASUREMENTS

It is often necessary to check the power consumption and the input and output signal power levels of electronic equipment. The determination of d-c power is comparatively simple; the unit of power (the watt) is the product of the potential in volts and the current in amperes. Therefore, a few basic circuit measurements may be taken and the power computed by means of Ohm's law.

To make accurate a-c power measurements, the phase angle of the voltage and current must be considered. The measurement of a-c power is further complicated by the frequency limitations of various power meters. If there is no phase difference, a-c power may be computed in the same manner as d-c power, by determining the average value of the product of the voltage and current.

Electric power at a line frequency of approximately 60 Hz may be measured directly by a dynamometer type wattmeter. This type of meter (discussed in Basic Electricity) indicates the actual power; and therefore, the phase angle of the voltage and current does not have to be determined. Normally, the exact power consumption of equipment is not necessary for maintenance, and a current measurement is sufficient to decide whether the power consumption is within reason.

In the audiofrequency range, power levels have to be determined in the course of routine checks and during corrective maintenance procedures. When working with audiofrequency amplifiers, it is ordinarily easier and more convenient to measure voltage, current, and impedance and then compute the power than it is to measure power directly.

Power measurements for audiofrequency circuits are usually indicated in terms of decibels (db), decibels referenced to 1 milliwatt (dbm), or volume units (vu). The power gain of an amplifier can be expressed in db. The power level of a sinusoidal signal compared to a 1-milliwatt reference is indicated in dbm. The power level of a complex signal, such as voice, music, or multiplexed information, compared to a reference level of 1 milliwatt is indicated in vu.

Many a-c voltmeters have scales calibrated in decibels or volume units. Such meters are useful for making measurements where direct indication in decibels is desired. However, it must be remembered that these are voltmeters, and that power measurements are not meaningful unless the circuit impedance is known. (The topic of decibels is discussed in some detail in Basic Electronics.)

At radiofrequencies below the UHF range, power is usually determined by voltage, current, and impedance measurements. One common method, used to determine the output power of RF oscillators and radio transmitters, consists of connecting a known resistance to the equipment output terminals, measuring the current flow through the resistance, and then calculating the power as the product of I^2R. Since the power is proportional to the current squared, the meter scale can be calibrated to indicate power units directly. A thermocouple ammeter is usually used for measurement of RF current. The resistor used to replace the normal load is usually specially designed to have low reactance, and has the ability to dissipate the required amount of power. Such resistors are commonly called "dummy loads" or "dummy antennas."

In the UHF and SHF portion of the radiofrequency spectrum, it is usually difficult to accurately measure the voltage, current, and impedance. These basic measurements may change greatly at slightly different points in a circuit, and are appreciably affected by small changes in the placement of parts in the vicinity of the tuned circuits. To measure the output of microwave radio or radar transmitters, test instruments which convert RF power to another form of energy such as light or heat, can be used to indirectly measure the power. A method which measures the heating effect of a resistor load on a stream of passing air can be used. Accurate measurement of large magnitude power can be achieved by measuring the temperature change of a water load. The most common type of power meter for use in this frequency rage employs a bolometer. The bolometer is a loading device that undergoes changes of resistance as changes in the power dissipation occur. Resistance is measured before and after RF power is applied, and power can be determined by the change in resistance.

Field Intensity and Noise

The magnitude of the electric field of a radio wave at a given point is known as the "field intensity" or "field strength" of that wave, and is usually measured in terms of millivolts or microvolts per meter. The field strength of a radio wave is determined by measuring the RF voltage induced in a receiving antenna. The unit of field strength is the volt per meter; but since the actual values of induced voltage are quite small, the microvolt per meter is a more convenient unit in practical applications.

Several types of test equipment are available for the measurement of field strength and noise. They are known as "radio test sets," "field strength meters," and "radio noise meters." These instruments can be used to indicate either the relative or the absolute magnitude of the field intensity of the energy radiated by a transmitter antenna. The equipment necessary for a specific test is determined by the frequency of the signal to be measured and the accuracy required. Field strength and noise measurements are required to determine antenna efficiency, directivity characteristics, and signal coverage. This information is valuable for selecting antenna sites and for detecting spurious harmonic radiation. Interference, either radiated or conducted, can be detected and located by the use of radio test sets.

The measurement of relative field strength can be made with rather simple test equipment; sometimes a grid-dip meter will suffice. Other test equipment circuits utilize a pickup antenna and a diode (or crystal) detector in connection with a microammeter. In circuits using this combination, the meter reading indicates the relative strength of the field acting on the pickup antenna, and is not directly proportional to the field intensity because of the nonlinearity of the detector.

More elaborate test equipment, for the measurement of absolute field intensity, compares the voltage induced in a pickup antenna with a voltage generated by a self-contained calibrated oscillator. The antenna is connected to a sensitive receiver, which usually incorporates two calibrated attenuators, one between the antenna and mixer stage, and the other in the first IF amplifier stage. A meter in the test equipment measures the diode current in the second detector and indicates the field intensity, usually in terms of microvolts per meter.

In (A) of figure 4-8, a schematic of a simple type of crystal detector field strength meter is shown. The crystal detector is mounted in the center of a pickup antenna, whose length ideally is one-half wave at the frequency of the received signal. The crystal is coupled to a 0-1 milliammeter through radiofrequency choke coils.

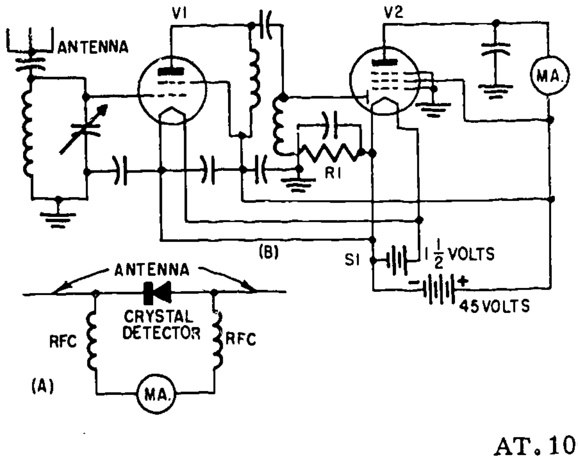

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Figure 4-8.—Field strength meters.

The induced signal is rectified by the crystal, and the resulting current is indicated on the milliammeter. This type of meter is used at distances of four or five wavelengths from the transmitting antenna and for low power transmitter measurements.

In (B) of figure 4-8, a schematic of a considerably more sensitive field strength meter is shown. Tube V1 is an RF amplifier, the output of which is impedance coupled to the diode section of V2, a detector-amplifier. The rectified signal voltage is developed across R1, one end of which is attached to the filament-cathode of the amplifier tube. The voltage developed across R1 controls the plate current of V2 which is read on the milliammeter in the plate lead. The amount of change in the plate current is an indication of the strength of the signal induced in the pickup antenna of the field strength meter.

Tube V2 is a variable mu pentode. In this type of amplifier, large signal voltages are amplified by a relatively small amount, and small signal voltages receive much greater amplification. The e_c-i_b curve of such a tube is essentially a logarithmic curve. As a result of this fact, the meter in vacuum tube field strength circuits of this type can be calibrated directly in decibels, a logarithmic unit of power or voltage level.

When using field strength meters, errors and erractic readings can be caused by the presence of objects or persons near either the radiating source or the test meter, resulting in shadows and reflections in the radiated field.

The antenna of the test meter should always be extended to its full length so as to keep its effect on the tuning circuit constant.

Many types of field strength indicators are intended for use within 25 feet of the equipment being tested when antenna adjustments are made to achieve maximum radiation. The distance which results in the most satisfactory operation of the instrument for this test varies with the type of equipment being tested. Usually it is desirable to select a distance for the measurements which give a meter reading at about half-scale

FREQUENCY MEASUREMENT

Frequency measurements are often an essential part of preventive and corrective maintenance for electronic equipment. Rotation frequencies of some mechanical devices must be determined. The output frequency of electric power generators is checked when the engine is started and during preventive maintenance routines. Equipment which operates in the audio-frequency range must be adjusted to operate at the correct frequencies. Radio transmitters must be accurately tuned to the assigned frequencies to provide reliable communications and avoid interfering with radio circuits operating on other frequencies. Radar sets must be properly tuned to obtain satisfactory performance.

The rotation frequency of rotating machinery such as radar antennas, servomotors, and other types of electric motors can be measured by the use of a stroboscope. Stroboscopic methods compare the rate of one mechanical rotation or vibration with another or with the frequency of a fluctuating source of illumination. Tachometers can be used to measure the rotation frequency of armatures in electric motors, dynamotors, and engine-driven generators.

The electrical output frequency of a-c power generators can be measured directly by vibrating reed, turned circuit, or crossed-coil iron-vane type meters. The vibrating reed device is the simplest type of frequency meter, and has the advantage of being rugged enough to be mounted on generator control panels. It is also used to check the line voltage in the shop to insure that the proper frequency is supplied to the equipment and/or test sets.

Frequency Meters

"Frequency meter" is a term generally applied to denote an item of test equipment which is used to indicate the frequency of an external signal. Although some models of frequency meters generate signals having a basic frequency, they should not be confused with that class of test equipment known as signal generators. (Signal generators are discussed later in this chapter.) The signal generator develops a frequency used to operate an external circuit; the frequency meter measures the frequency of a signal developed in an external circuit.

As mentioned previously, some frequency meters generate a signal frequency; others do not. The group in which no frequency is generated internally in properly called a "wavemeter." Wavemeters are of two basic types—reaction and absorption. Those frequency meters which do generate an internal frequency may use either electronic or mechanical oscillation as the frequency generator.

Measurement Methods

Frequency measurements in the audiofrequency range can be made by the comparison method or by a direct-reading frequency meter. Frequency comparison can be made by the use of a calibrated audiofrequency signal generator in conjunction with either an oscilloscope or a modulator and a zero-beat indicator device. Direct-reading frequency measurements can be made by instruments using series frequency-selective electrical networks, bridge test sets having null indicators, or counting type frequency meters.

Frequency measurements for radio equipment are made during tuning, preventive maintenance, and corrective maintenance procedures. The type of test equipment selected depends on the frequency to be measured and the required accuracy. Signal frequencies of radio transmitters which operate in the low frequency to the VHF range are normally measured by absorption type wavemeters, reaction type wavemeters, heterodyne type frequency meters, or calibrated radio receivers. Where accuracy is not of prime importance, rapid frequency checks may be made by the absorption type wavemeter. Since the wavemeter is relatively insensitive, it is very useful in determining the fundamental frequency in a circuit generating multiple harmonics. Calibration of test equipment to measure signals in this frequency range can be checked by comparison with standard frequency signals broadcast by the National Bureau of Standards.

Heterodyne Type Meters

Heterodyne type frequency meters are available in several varieties. Although they all function in the same general manner, some differences exist in the manner of accomplishing their purpose.

Test instruments of this class generate a signal within the test set. This signal is mixed with a signal from the equipment under test to obtain a beat frequency. The frequency of one signal is then changed to obtain a zero beat. (The beat frequency is the difference frequency which results from heterodyning two signals. A zero beat is obtained when heterodyning two signals of the same frequency.) The frequency of the unit under test may be determined by reading the frequency indicator of the test set.

A heterodyne type frequency meter usually consists of a heterodyne oscillator, an RF harmonic amplifier, a crystal-controlled oscillator, a mixer or detector, a modulator, an AF output amplifier, and a means for indicating frequency. (See fig. 4-9.) Most models are furnished with a set of calibration charts giving the dial readings for the frequencies listed, together with a table of the crystal harmonics; thus, a complete and accurate frequency coverage over the designed range is provided. Some models indicate the frequency directly on dials.

The crystal-controlled oscillator operates at a fixed frequency, but is also capable of emitting various harmonic frequencies of the crystal for use as check frequencies. These checkpoints are then used for adjusting the heterodyne oscillator, thus insuring more accurate operation. Provisions are usually made within the crystal-controlled oscillator for precise adjustment to its assigned fundamental frequency.

The TS-186D/UP test instrument is a general purpose, crystal-controlled, heterodyne type of frequency meter used to measure the frequency of transmitters, oscillators, or signal generators. It provides both visual and aural indications of signal frequency by means of a beat indicating meter, headphones, and a video output jack for observation on an oscilloscope, as desired. A vernier tuning dial and an associated calibration chart are used in making frequency measurement determinations. The instrument is usable for either field or depot level maintenance testing.

The RF input is routed through waveguide and coaxial cable to a detector mixer, where

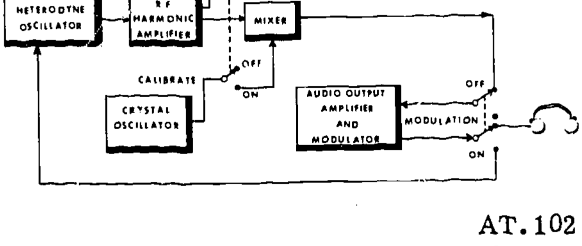

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Figure 4-9.—Crystal-calibrated heterodyne frequency meter, block diagram.

it is mixed with the output of a heterodyne oscillator. From these inputs, the difference signal is then routed through an audio amplifier. A crystal oscillator, when substituted for the input signal, is used to check the frequency calibration of the heterodyne oscillator. This checking is done at specified checkpoints near the frequency at which the frequency measurement is to be made.

A d-c milliammeter is included for the following functions:

1. Help to indicate a zero beat.
2. Measure the grid current of the crystal oscillator when used.
3. Measure the cathode current of the detector mixer.
4. Measure the cathode current of the heterodyne oscillator.
5. Measure the cathode current of the various indicators.

A selector switch determines which value is to be measured. The indicator circuit causes a dip in meter reading near the zero-beat indication. The meter, however, does not respond to frequencies less than 100 Hz; therefore, a pair of headphones is used to provide more accurate indications of zero beat. The video output is obtained through a jack in the output of the detector mixer circuit.

The instrument is usable for CW, MCW, or pulsed signals in the frequency range of 100 to 10,000 MHz, with signal input magnitudes of 500 μ to 1 v. The bandpass of the audio amplifier is 100 Hz to 100 kHz, audio output impedance is 600 ohms. For airborne use, the equipment is usable up to altitudes of 10,000 feet without requiring additional pressurization.

Wavemeters

Wavemeters are calibrated resonant circuits used to measure frequency. Although the accuracy of wavemeters is not as high as that of heterodyne frequency meters, they have the advantage of being comparatively simple and can be easily carried about.

Any type of resonant circuit may be used in wavemeter applications. The exact kind of circuit employed depends on the frequency range for which the meter is intended. Resonant circuits consisting of coils and capacitors are used for low frequency wavemeters. Butterfly circuits, adjustable transmission line sections, and resonant cavities are used in VHF and microwave instruments.

There are three basic kinds of wavemeters—the absorption, the reaction, and the transmission types.

Absorption wavemeters are composed of the basic resonant circuit, a rectifier, and a meter for indicating the amount of current induced into the wavemeter. In use, this type of wavemeter is loosely coupled to the circuit to be measured. The resonant circuit of the wavemeter is then adjusted until the current meter shows a maximum deflection. The frequency of the circuit under test is then determined from the calibrated dial of the wavemeter.

The reaction type of derives its name from the fact that it is adjusted until a marked reaction occurs in the circuit being measured. For example, the wavemeter is loosely coupled to the grid circuit of an oscillator, and the resonant circuit of the meter is adjusted until it is in resonance with the oscillator frequency.

The setting of the wavemeter dial is made by observing the grid current meter in the oscillator. At resonance, the wavemeter circuit takes energy from the oscillator, causing the grid current to dip sharply. The frequency of the oscillator is then determined from the calibrated dial of the wavemeter.

This type is commonly referred to as a "grid-dip" meter, and is discussed in Basic Electronics.

The transmission wavemeter is an adjustable coupling link. When it is inserted between a source of radiofrequency energy and an indicator, energy is transmitted to the indicator only when the wavemeter is tuned to the frequency of the source. Transmission wavemeters are widely used in measuring microwave frefrequencies. Units of this type are included in echo boxes. The additional provisions for echo boxes permit additional testing functions.

SEMICONDUCTOR TESTERS

Since semiconductors have replaced vacuum tubes in many new equipments, the testing of semiconductors has become increasingly vital. Two basic types of equipment are discussed in this section. They are the crystal diode tester and the curve tracing tester.

MIXER CRYSTAL TEST SET

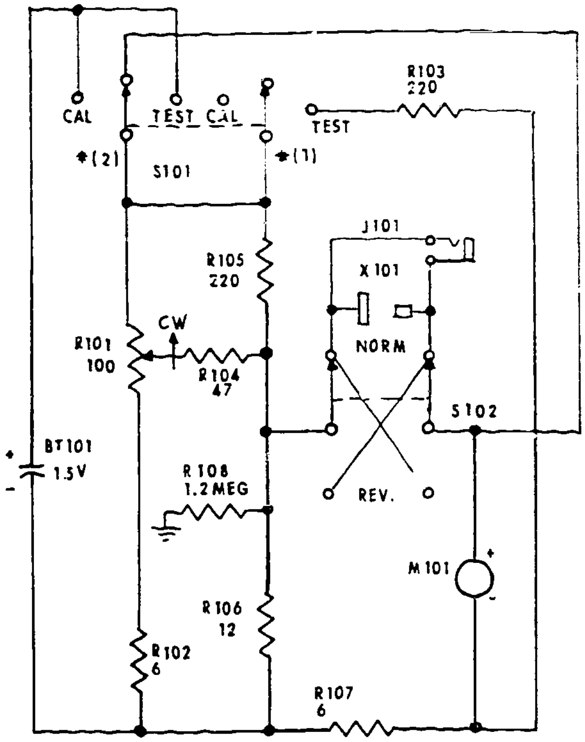
Mixer Crystal Test Set, Type 390, is used to provide an accurate and reliable indication of the quality of mixer crystals. Its accuracy is comparable to that of more elaborate laboratory test setups, but its testing versatility is more limited.

The quality of a mixer crystal can be determined by measurement of its conversion loss and noise temperature. The Type 390 is designed specifically to perform these tests on crystals intended for use at frequencies of 10,000 MHz and lower. For crystals used at frequencies above that figure, the readings are relative—crystals can still be selected in the order of comparative quality.

Conversion loss is defined as the ratio of the power available from the RF signal source to the power available at the IF output of the mixer. Noise temperature is defined as the ratio of the IF noise power available from the crystal to the thermal noise power available from a resistance (equal to the RF resistance of the crystal) at room temperature. The theory of the mixer crystal test set is based on the fact that the minimum conversion loss and noise temperature can be determined from the degree of nonlinearity of the static voltage-current (E -I) curve of a mixer crystal.

The Type 390 measures this nonlinearity by measuring the incremental change in crystal current (Δi) caused by an incremental change in voltage (Δe) applied to the crystal in the "forward" direction. Adjustment is made to the variable resistor R101 with the CAL-TEST switch in the CAL position. (See fig. 4-10.) If the E-I curve of the crystal under test were linear, a midscale reading would be obtained on meter M101 when S101 was switched to the TEST position. If the reading actually obtained is below midscale, the E-I curve of the crystal is nonlinear. The amount by which the reading falls below the midscale point is a measure of the degree of crystal's nonlinearity. The lower the meter reading below midscale, the more nonlinear the E-I curve for that crystal, and the lower its conversion loss and noise temperature.

Figure 4-10 is a schematic diagram of the test set. The initial adjustment of voltage V_i is made using variable resistor R101 with the CAL-TEST switch S101 in the CAL position. (An incorrect adjustment of R101 may apply excessive voltage to M101, causing damage to the pointer. For this reason, R101 should always be set fully clockwise before switching to the CAL position.) (See fig. 4-11.)



* SECTION (1) OF SWITCH S101 MAKES BEFORE SECTION (2)

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Figure 4-10.—Mixer Crystal Test Set, Type 390 schematic diagram.

Fixed resistors R102, R104, R105, and R106 determine the limits to which V_i can be adjusted. The voltage increment (Δe) is established by R103 and R107 when in the TEST position; it has the same value for all crystals.

When a crystal is to be tested, it is placed in crystal holder X101. The crystal should always be handled by the base; while inserting the crystal, any static charge should be removed by touching the base to the grounding spring on the holder. The switch is set to the CAL position, and R101 is adjusted until the meter indication coincides with the calibration scale reading of R101. When S101 is moved to the TEST position, M101 indicates the quality of the crystal. With the aid of a chart supplied with the test set, the reading of M101 can be converted to the actual conversion loss and noise temperature. Block sections on the meter scale help ease the acceptance or rejection of crystals according to the type being tested.

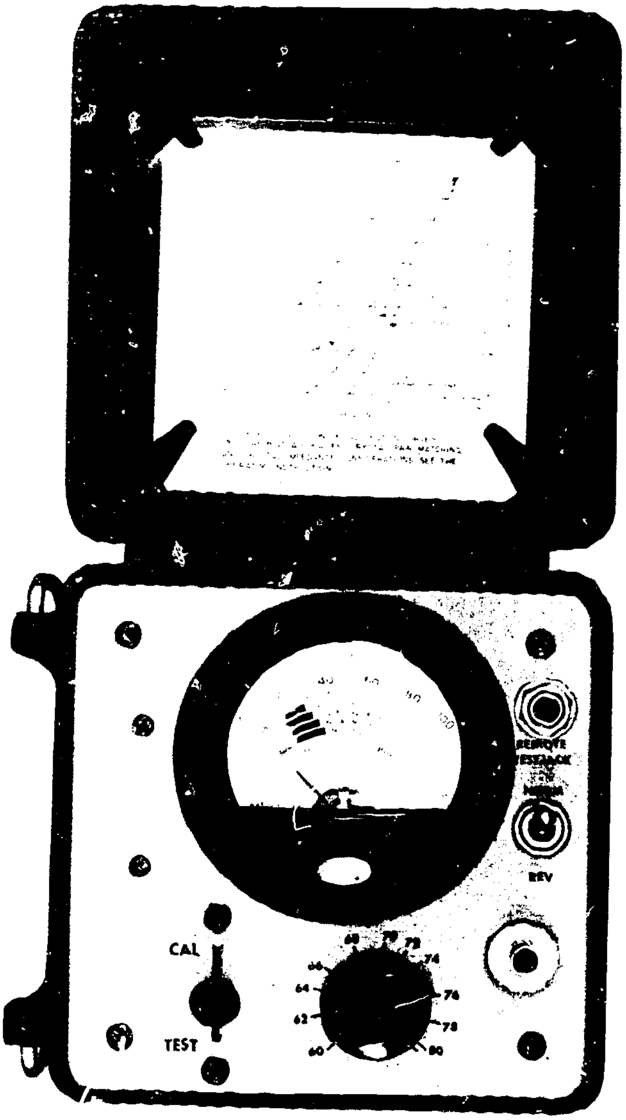

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Figure 4-11.—Type 390 crystal test set.

TRANSISTOR CURVE TRACER (TEKTRONIX 575)

The Transistor Curve Tracer 575 is employed to plot or trace characteristic curves of transistors and other semiconductor devices. There are two different methods for plotting the characteristic curves of a transistor. One is to apply d-c voltages and take measurements point by point. The other method is to use changing voltages and display the curve on an oscilloscope.

The 575 displays the curves by the use of the oscilloscope. There are several advantages in the use of the second method. To begin with, it is faster and more accurate than the point-by-point method. The point-by-point method may allow small irregularities in the characteristics to go undetected. Since heat is a major factor in transistor operation, errors caused by heat are reduced because the periods of applied power are shorter. Another definite advantage is that permanent records of the curves traced out on the oscilloscope may be easily produced at a reasonable cost by the use of photographic equipment.

This equipment is also provided with a self-calibration test. The operator can quickly reassure himself of the accuracy of the test set by the use of this built-in calibration check, in case a displayed curve deviates from the published nominal characteristic curve. The following paragraphs describe briefly how the 575 works and outlines a method for determining dial settings for transistors found in the fleet.

An illustration of the front panel of the equipment is shown in figure 4-12. As can be seen the controls are grouped into five blocks, with a test connector panel at the base of the test set. In addition to the block arrangement the panel is also color coded to simplify the operation. The collector currents and voltages are referenced by the sections of the panel etched in red; the sections etched in blue refer to the base currents and voltages. An exception to this color code is when a common base transistor configuration is being tested, at that time the blue is in reference to the emitter.

In the description of the five functional divisions that follows, refer to figure 4-12 for the item numbers listed; a functional block diagram is also given in figure 4-13.

The collector sweep circuit supplies the transistor under test with a collector voltage which is the output of a full-wave rectifier without any filtering. The 60-Hz line voltage is supplied to the full-wave rectifier and the output of the rectifier is 120-Hz pulses. The output waveform varies from zero volts to some peak value which can be controlled from the front panel (item 2 and 4). The peak voltage can be varied in two ranges, from 0 to 20 volts and from 0 to 200 volts. The polarity of the sweep voltage can be reversed in order to check both PNP- and NPN-type transistors (item 3). A variable amount of resistance can be placed between the collector sweep supply and the transistor under test in order to limit the maximum amount of collector dissipation (item 1).

Base Step Generator

The step generator develops currents and voltages which change value in stairstep fashion in synchronization with the collector sweep voltage (items 12, 16, 17, and 18). The output of the generator can be reversed in polarity and can be connected to either the base or the emitter of the transistor under test (item 13). The number of steps can be varied from 4 to 12 according to the type of display desired (item 14).

Display Function

The display function includes the three major functional blocks remaining; the vertical and horizontal amplifiers, and the cathode-ray tube. (A description of the operation of a cathode-ray tube is given in Basic Electronics; an oscilloscope was discussed earlier in this chapter.)

The horizontal and vertical amplifiers of the cathode-ray tube display can be driven by several different inputs, depending upon what characteristics are of interest (item 9). The horizontal amplifier can select any four inputs and display one of them on the horizontal axis. The four inputs are base volts, collector volts, base current or base-source volts, and external. In the base volts position, the horizontal amplifier is connected to the base of the transistor under test. In the collector volts position, the horizontal amplifier is connected to the collector of the transistor under test. Both of these inputs have several positions so that the scaling factor can be changed. The base-current or base-source volts position connects the output of the base step generator into the horizontal amplifier. The external position connects the horizontal amplifier to two coax connectors on the rear of the instrument.

The vertical amplifier can also select from four different inputs: collector MA, base volts, base current or base-source volts, and external. Base volts, base current or base-source volts, and external positions are the same as described for the horizontal amplifier, but in the collector MA position, the vertical axis will give a plot of collector current.

INTERPRETING THE DISPLAY.—As the collector voltage changes from zero to some peak value and back to zero again, the step generator output remains at some specific level and then changes to some new level for the next collector voltage cycle. The collector voltage is swept at a rate of 120 Hz and the step generator changes steps or level after every cycle (in the 240 steps per second, the step generator changes both the zero point of the collector sweep and at the maximum point). Figure 4-14 is a plot of collector sweep voltage and base step generator current. It should be noted that the collector sweep makes a complete excursion, while the base is at some steady value. As the next collector sweep starts, the base current is changed to the next value of current selected by the dials on the front of the instrument, and again the base current will remain steady while the collector voltage is varied.

As previously mentioned, the waveforms of figure 4-14 can be reversed by switches on the front panel in order to check either PNP or NPN.

Figure 4-15 is a plot of collector voltage and collector current for given values of base current for an NPN transistor. For this type of transistor, it is a convention to have the lower left-hand corner represent zero collector voltage and current. In this graph, it was arbitrarily decided that each division to the right of the lower left-hand corner of the horizontal axis would represent a collector voltage change of one more volt positive. This would indicate a collector voltage swing of zero to 10 volts positive. The vertical axis is a plot of collector current varying from zero milliamperes in the lower left-hand corner to 10 milliamperes at the top of the graph in 1 milliampere steps. The different lines on the graph represent different values of base current; in this case, each line represents a change of 0.01 milliampere. If this graph had been for a PNP rather than for an NPN, the upper right-hand corner would have represented zero collector voltage and zero collector current. The divisions to the left would have represented ngative collector voltage and the divisions downward from the top would have indicated the amount of negative current. This would have made the family of curves to appear as shown in figure 4-16.

These curves are known as the static collector chracteristics for a common emitter configuration or output characteristics curve.

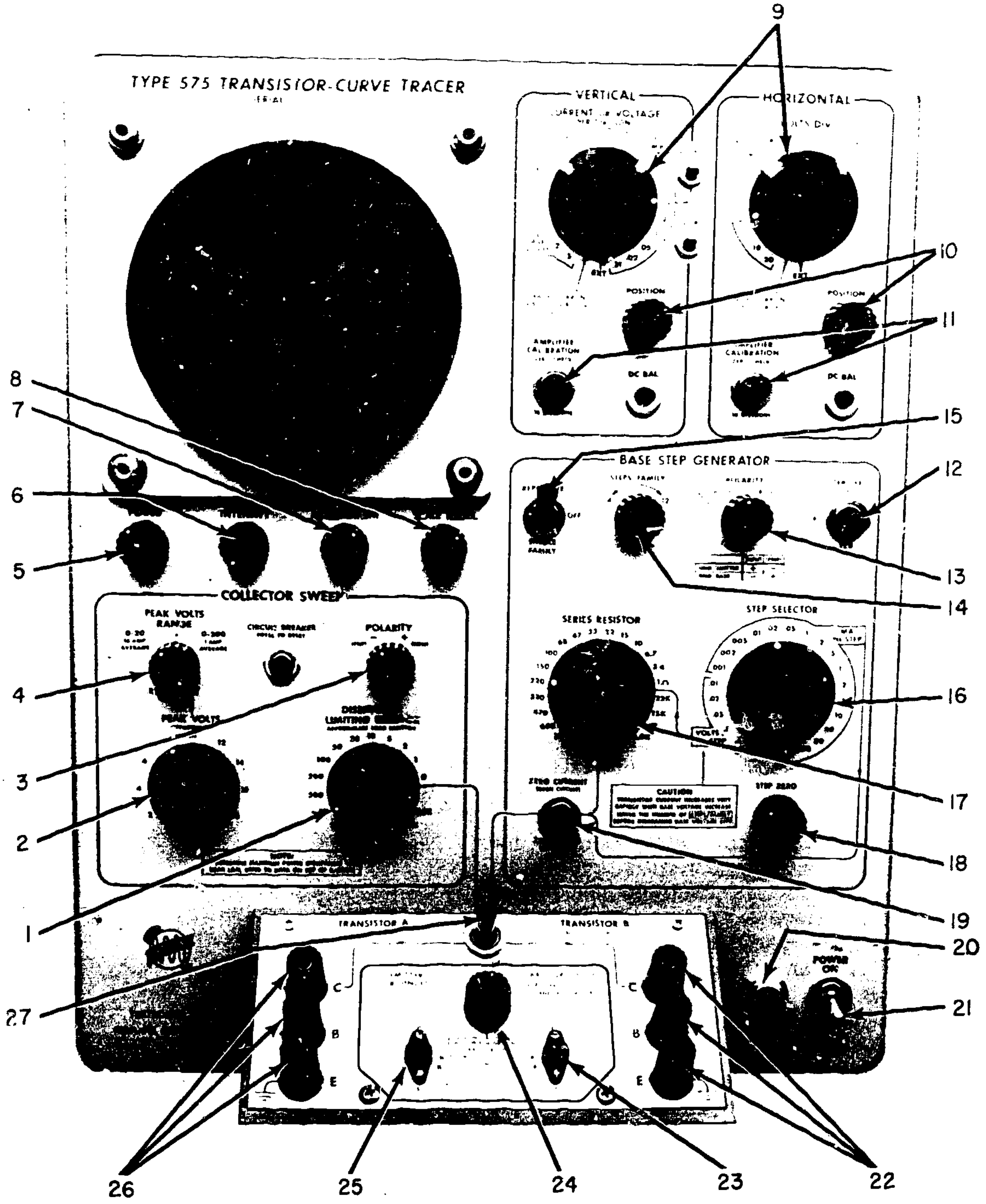

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Figure 4-12.—Transistor curve tracer (Tektronix 575).

Two identical test probes are supplied as standard oscilloscope equipment. Isolation networks are built into the probes to reduce the input loading effect of the oscilloscope. The nomial scope input of 1 megohm shunted by 30 pf is changed to 10 megohms shunted by 10 pf at the probe tip. This results in a voltage drop of 10 to 1 in the probe.

DESCRIPTION OF CONTROLS AND CONNECTORS.—The controls and connectors of the oscilloscope which are normally used by the operator are shown in figure 4-28 and are described in table 4-1. The numbers in figure 4-28 relate each control to the descriptive text in table 4-1, and do not indicate a preferred order of operation.

SINGLE-SWEEP OPERATION.—Single-sweep operation is intended for viewing transients and other signals which cannot be viewed using normal recurrent-sweep operation. In single-sweep operation, the sweep generator is disabled at the end of each sweep and must be triggered before it can generate another horizontal sweep trace. The sweep generator can be triggered automatically with an external signal or manually with the SWEEP MODE control. Detailed instructions for single-sweep operation are given in the Maintenance Instructions Manual.

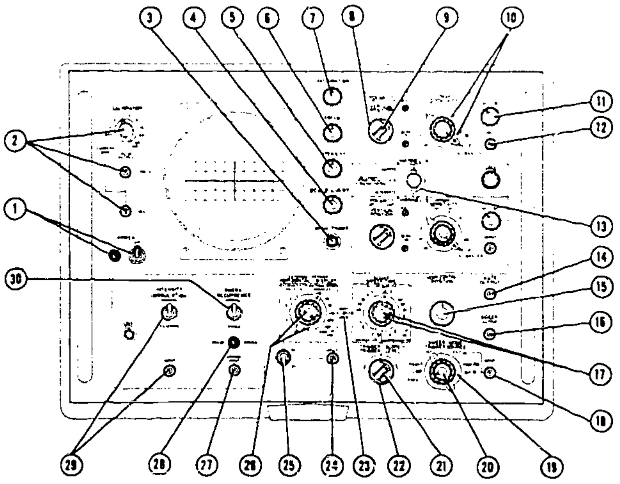

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Figure 4-28.—Oscilloscope front panel.

Table 4-1.—Description of front panel controls and connectors (index numbers refer to fig. 4-28).

Item	Description and Function
1	POWER Switch. In ON position, turns on all power to the oscilloscope; in OFF position, removes all power from oscilloscope. The adjacent indicator lamp is illuminated when the oscilloscope is turned on.
2	CALIBRATOR Switch and VOLTS-MV Connectors. A 1-kc square wave calibration signal is provided at the VOLTS and MV connectors, with a peak-to-peak amplitude (in volts or millivolts depending on the connector used) corresponding to the CALIBRATOR switch position. With the CALIBRATOR switch set at CURRENT, a 1-kc square wave with 5 ma peak current (with source impedance of 200K) is provided at the VOLTS connector.
3	BEAM FINDER Pushbutton. Used to locate off-screen traces when the oscilloscope beam has been driven off-screen. When this button is pressed, the beam is confined to the screen, brightened and defocused. Then the beam can be centered on the screen by adjusting the HORIZONTAL POSITION and VERTICAL POSITION controls while holding the BEAM FINDER pushbutton depressed. Release of the pushbutton returns the oscilloscope to normal functioning.
4	SCALE Control. Adjusts the brightness of the graticule illumination.
5	INTENSITY Control. Adjusts the brightness of the oscilloscope trace.

Table 4-1.—Description of front panel controls and connectors (index numbers refer to fig. 4-28)--Continued.

Item	Description and Function
6	FOCUS Control. Adjusts the sharpness of the trace in conjunction with the ASTIGMATISM control.
7	ASTIGMATISM Control. Adjusts the sharpness of the trace in conjunction with the FOCUS control.
8	VERTICAL POSITION Control (black). Adjusts the vertical position of the Channel A presentation (Channel B has an identical control).
9	POLARITY Switch (red). Selects the direction of beam deflection for Channel A presentation; in + UP position, a positive signal deflects the beam upward (Channel B has an identical control).
10	SENSITIVITY Switch (black) and VERNIER Control (red). These controls select the sensitivity of the CHANNEL A input circuit. Each step of the switch is calibrated in VOLTS/Cm of vertical deflection. With the VERNIER control in the CALIBRATED position, sensitivity exactly corresponding to the switch setting is provided. Turning the VERNIER control counterclockwise from the CALIBRATED position reduces the height of the displayed waveform and provides continuous adjustment of sensitivity between steps. (Channel B has identical controls.)
11	AC-DC Switch. Selects capacitive (AC) or direct (DC) coupling for the vertical input signal. Set to DC for viewing pulses longer than about .01 second or when the DC component of the signal is desired. Set to AC to avoid beam displacement due to DC voltage on signal (Channel B has an identical control).
12	INPUT Connector (type BNC). Receives the input signal to Channel A (Channel B has an identical connector).
13	Vertical Presentation Selector Switch. Selects mode of CRT presentation of trace(s) from the dual-channel preamplifier: CHANNEL A only; CHANNEL B only; A-B (difference between Channel A and Channel B); ALTERNATE (Channel A and Channel B in sequence on alternate sweeps); CHOPPED (Channel A and Channel B on alternate 1-μsec segments of each sweep).
14	GATE OUTPUT Connector (type BNC). Provides a +50-volt unblanking pulse during horizontal sweep time of trace. Connected to ground during retrace.
15	HORIZONTAL POSITION Control. Adjusts the horizontal position of the presentation.
16	SWEEP OUTPUT Connector (type BNC). Provides a ramp voltage (approximately -50 to +50 volts) which coincides with the internal horizontal sweep.
17	SWEEP TIME Switch (black) and VERNIER Control (red). These controls select the horizontal sweep rate. The switch is calibrated in 1-2-5 steps, in MICROSECONDS/CM, MILLISECONDS/CM, and SECONDS/CM. With the VERNIER control in the CAL (calibrated) position, the sweep rate corresponds exactly to the switch setting. Turning the VERNIER control counterclockwise from the CAL position slows the sweep and provides continuous adjustment of sweep rate between steps.

Table 4-1.—Description of front panel controls and connectors (index numbers refer to fig. 4-28)--Continued.

Item	Description and Function
18	INPUT Connector (type BNC). Accepts an external sweep triggering signal.
19	TRIGGER SOURCE Switch (black). Selects source of the sweep triggering signal (power LINE, INTernal, EXTernal AC, or EXTernal DC).
20	SWEEP MODE Control (red). Provides a variable adjustment of the sensitivity of the sweep circuit to the trigger signal. Allows selection of either triggered or free running sweep by rotating the control pointer to either the left-hand (TRIGGER) or right-hand (FREE-RUN) sector. When turned fully counterclockwise to the PRESET position, provides greatest sensitivity and permits stable triggering with nearly all signals.
21	TRIGGER SLOPE Switch (red). Selects the portion of the triggering waveform which triggers the sweep: + (positive-going slope) or - (negative-going slope).
22	TRIGGER LEVEL Control (black). Selects the amplitude point on the input signal waveform at which the sweep will be triggered (range is ± 30 volts from the center 0 position).
23	SWEEP UNCAL Indicator. Is illuminated when the combined settings of the SWEEP TIME and HORIZONTAL DISPLAY switches place the sweep at an uncalibrated speed.
24	INPUT Connector (type BNC). Accepts an externally applied horizontal input signal.
25	AC-DC Switch. Selects capacitive coupling (AC) or direct coupling (DC) for the external horizontal input signal. Set to DC for externally-driven sweep times longer than 1 millisecond or when the DC component of the signal is desired. Set to AC to avoid beam displacement due to DC voltage on signal.
26	HORIZONTAL DISPLAY Switch (black) and EXTERNAL VERNIER Control (red). Within its EXT SENSITIVITY sector, the switch selects the sensitivity of the horizontal input circuit to an external signal, in VOLTS/CM of horizontal deflection. With the EXTERNAL VERNIER control in the CAL position, sensitivity exactly corresponding to the switch setting is provided. Turning the EXTERNAL VERNIER control counterclockwise from the CAL position reduces the width of the displayed waveform and provides continuous adjustment to sensitivity between steps. Within its INTERNAL SWEEP MAGNIFIER sector, the HORIZONTAL DISPLAY switch in the X1 position selects the internal sweep as established by the SWEEP TIME switch. In the X2 through X100 positions, the HORIZONTAL DISPLAY switch expands the waveform presentation horizontally by a factor corresponding to its setting, by increasing the sweep speed a corresponding amount over that selected by the SWEEP TIME switch.
27	ARMING INPUT Connector (type BNC). Accepts the external signal which arms the internal sweep circuit to allow triggering of one sweep when the SWEEP OCCURENCE switch is set to SINGLE. (The arming signal must be a pulse of + 15 to + 25 volts with a duration of 1 to 200 microseconds.)
28	SWEEP ARMED Indicator. Indicates that the sweep circuit is ready to be triggered by an external or internal pulse for a single sweep. Lamp extinguishes after sweep starts.

Table 4-1.—Description of front panel controls and connectors (index numbers refer to fig. 4-28)--Continued.

Item	Description and Function
29	INTENSITY MODULATION Switch and INPUT Connector (type BNC). Selects NORMAL mode (no intensity modulation) or EXTERNAL modulation of trace intensity. INPUT connector is for the external intensity modulating signal; + 20 volts will provide complete blanking of a trace of normal intensity.
30	SWEEP OCCURRENCE. Selects either NORMAL- or SINGLE-sweep operation.

DUAL-TRACE OPERATION.—Dual-trace operation is used to compare two different input signals, such as the input and output signals of an amplifier or network.

The vertical plug-in provides two types of dual-trace operation as selected by the Vertical Presentation Selector Switch (item 13, fig. 4-28) ALTERNATE and CHOPPED. On ALTERNATE operation, the output of one channel is shown on the CRT during one sweep and the output of the other channel during the next sweep. On chopped operation channels are switched at a 1-MHz rate, so both signals appear in alternate 1-μsec segments during each sweep.

Alternate operation is for comparing two signals which require use of high sweep speeds. However, for the most accurate time comparisons, the sweeps must be triggered by an external signal that is synchronized with both vertical signals. In many cases, one of the vertical signals can be used as the trigger signal (by making appropriate external connections). Internal triggering on the vertical signal cannot be used because of the instability that might be produced by the dual-channel display switching. When signal frequency permits, greater accuracy can be obtained by comparing the two signals during a single sweep, as made possible by the chopped operation.

Chopped operation is for comparing two signals while using sweep speeds below about 5 μsec per cm (which are low compared to the 1-MHz switching rate). This type operation permits precise time comparisons because both signals are displayed during the same sweep. In general, external triggering is required. If internal triggering is attempted, the 1-MHz switching signal may trigger the sweep and cause an unstable presentation.

OPERATOR'S MAINTENANCE.—Maintenance of the oscilloscope by operating personnel is limited to checking and adjusting vertical sensitivity and balance, cleaning the air filter in the cooling air inlet, and replacing fuses. In many cases a calibration adjustment is required when replacing tubes and semiconductors Therefore, only qualified technicians should attempt replacement of such parts. Operating personnel other than those qualified to make calibration adjustments should refrain from repair of this type except in an emergency.

The useful life of an oscilloscope can be materially extended by using normal care in handling and operating. When in use, the area behind the cooling air inlet must be kept clear to allow free flow of the cooling air through the ventilating door. This oscilloscope is provided with a thermal switch to protect from overheating. If the instrument goes off during use, removal of the dual trace preamplifier plug-in unit will allow the operator to view a neon type indicator lamp. If the lamp is lit, the oscilloscope is overheated. Turn off the power and investigate the cause of overheating.

CAUTION: This instrument contains voltages as high as 8,600 volts, which can be fatal. Turn the instrument off before touching any internal part.

SYNCHROSCOPE

The synchroscope, which is widely used in radar testing, is an adaptation of the oscilloscope. A trace is produced only when it is initiated by an input trigger, as contrasted with the continuous sawtooth sweep provided by the oscilloscope. Synchroscope circuits are similar to oscilloscope circuits except for the signal channel and the sweep channel. These circuits are shown in block diagram form in figure 4-29.

The signal channel of a typical synchroscope includes an input circuit, which is usually in the form of a 72-ohm adjustable-step attenuator. Various degrees of attenuation are available, and the dial is calibrated to indicate how much attenuation is present. This attenuator insures that all signals, regardless of amplitude, produce about the same input level to the amplifier section. Following the attenuator is an artificial delay line, which is a low pass filter with a cutoff frequency higher than the highest frequency to be passed, and which has an impedance of 72 ohms. The delay line is terminated with a 72-ohm gain control. One purpose of the delay line is to delay presentation of the signal to be observed until the sweep trace has been initiated by an undelayed portion of the input signal. If the delay line were not used, the initial portion of the waveform would not appear on the trace, because a certain amount of time is required for the input signal voltage to rise to the level needed to trigger the sweep circuit. With the delay line in use, the signal does not reach the amplifier until one-half microsecond after the trace starts; as a result, the entire pulse is seen. A secondary purpose of the delay line is to provide, by means of reflection, a series of accurately spaced pulses suitable for calibration of short time intervals.

To accomplish the secondary purpose, a switch is provided to cause a mismatch in the termination of the delay line. When a sharp pulse is fed into the line, a series of reflections occurs similar to those shown in figure 4-30. Since the time required for a pulse to travel down the line and back is 1 microsecond, a series of pulses occurring 1 microsecond apart is produced. Each successive pulse is smaller because of the losses in the delay line, but enough pulses are visible for most high speed calibration purposes.

The gain control feeds a wideband or video amplifier, which is connected to the vertical deflection plates. In addition, an external connection is provided to the vertical plates.

The horizontal circuit consists of a sync switch for either internal or external sync, a sync amplifier with a gain control, and a start-stop sweep generator, which will not develop a sweep voltage until a pulse of sufficient amplitude is supplied. The duration of the sweep, or sweep speed, is made adjustable from a very

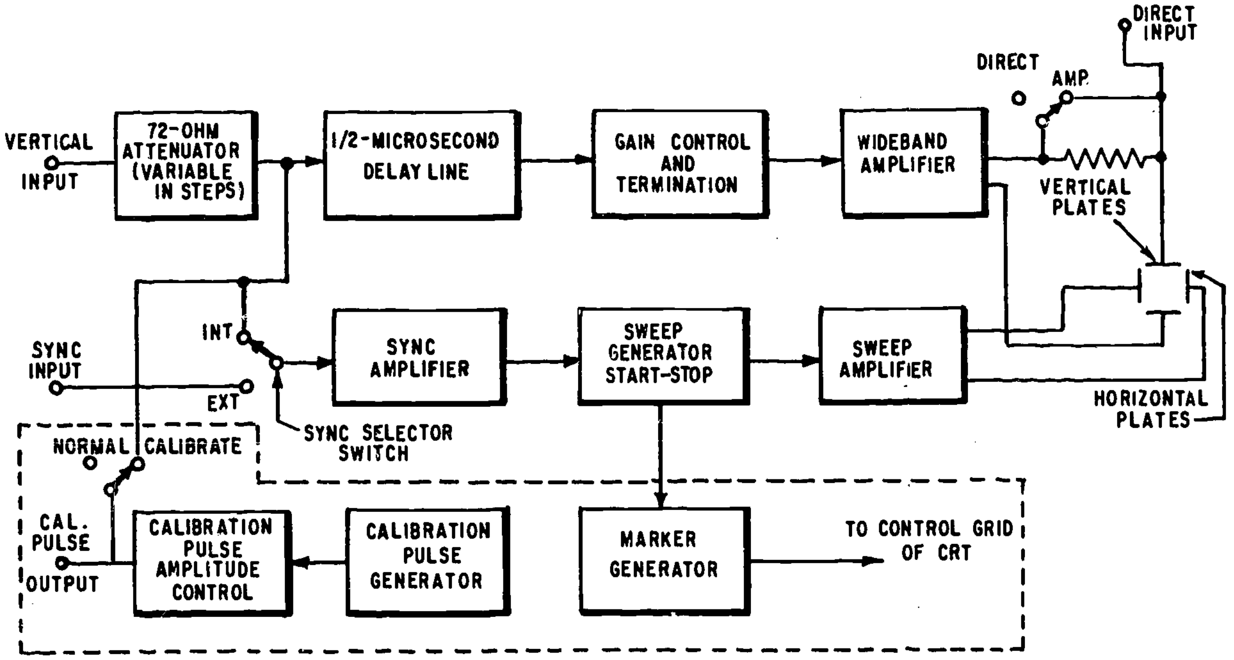

Figure 4-29.—Typical synchroscope, block diagram

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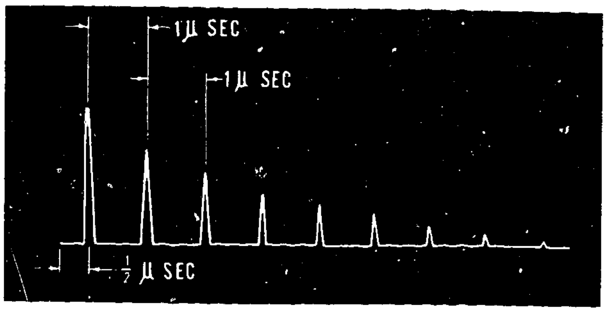
few microseconds to about 250 microseconds. The sweep generator is followed by a conventional horizontal amplifier. Since the trace is triggered by the input signal, the synchroscope may be used to observe nonperiodic pulses, such as those occurring in a radar system with an unstable PRF generator.

In later designs, it is common to find provisions for calibration of input voltages and sweep time. Voltage calibration is made by comparing the unknown voltage with a variable-voltage pulse of known value, generated internally. The calibrating pulse is adjusted to be equal in amplitude to the unknown voltage; the value is then read from the dial that controls the calibrating pulse. Sweep time calibration is made with the aid of marker pulses produced by accurately adjusted tuned circuits. The marker pulses appear on the trace as a series of bright dots spaced at intervals chosen by the operator. In a typical synchroscope, marker intervals of 0.2, 1, 10, 100, and 500 microseconds may be selected in accordance with time duration of the pulse under test; for greater accuracy, interpolation may be used.



AT.132
Figure 4-30.—Pulse reflection on on a mismatched line.

WAVE ANALYZER

The wave analyzer is used to measure amplitude and frequency of the components of a steady state complex electrical waveform. These include the components of harmonic distortion, intermodulation distortion, hum, and noise.

Specific uses of the wave analyzer include the measurements of distortion components in AF equipments; radio receivers and transmitters; oscillators, amplifiers, and vacuum tube circuits in general; harmonic studies of electrical power system and electrical machinery, hum measurement in a-c operated communication equipment; and noise analysis. As a sharply tuned voltmeter, it is useful in the measurement of the transmission of characteristics of electric wave filters and as a null detector for impedance bridges. The unit may be used as a detector for intermodulation distortion measurements when a two-signal audio generator is used as a source.

The wave analyzer discussed in the following paragraphs is a heterodyne type vacuum tube voltmeter. The IF amplifier includes a selective filter using three quartz crystals. The use of a heterodyne method makes it possible to vary the frequency response while using a fixed frequency filter.

The output of the local oscillator and the whole of the complex waveform to be examined are fed to a balanced modulator where their combination produces both sum and difference frequencies, or sidebands in the output. The original of the complex waveform is not passed by the modulator intermediate frequency output transformer and the local oscillator carrier frequency is suppressed in the output because of the two-tube, balanced modulator employed.

The 50-kHz component of the upper sideband, proportional to the voltage of that frequency present in the original wave to which the main dial is set, is selected and amplified by the intermediate stages. The step attenuators provide for measurement of a wide range of voltages.

The equipment is mounted in a shielded oak cabinet, and all critical parts are hermetically sealed.

A detailed discussion of wave analyzers is beyond the scope of this training manual, but the foregoing discussion should serve to familiarize the TD with some of the basic principles used in the design of a wave analyzer.

CHAPTER 5

PRINCIPLES OF AIR CONDITIONING

The term "air conditioning" is often erroneously construed to mean the cooling of a given mass of air. When correctly defined, it is the process of treating air so as to control its temperature, humidity, cleanliness, and distribution to meet the requirements of the conditioned space. It can be stated that true air conditioning requires mechanical ventilation, addition of heat, removal of heat, control of humidity conditions, and filtering.

The construction and operation of most electronic equipment require controlled temperature and humidity conditions. To obtain the desired atmospheric control from air-conditioning equipment requires space, a source of power, and routine maintenance. Training devices, because of their limited space, usually utilize compact units. This normally increases the maintenance requirements of the equipment. The most widely accepted configuration for training devices is the self-contained air-conditioning unit; that is, complete air handling, cooling, heating, humidifying, and dehumidifying equipment are designed to fit into one compact package.

This chapter and the following chapter are intended to provide the TD with a general knowledge of air conditioning and types of air-conditioning systems used in training and training devices. Subjects discussed include air-conditioning requirements, theory of operation, and maintenance. Air-conditioning equipments will vary from trainer to trainer, but the general theory remains the same.

REFRIGERANTS

The system which provides mechanical cooling is commonly referred to as the refrigeration system. The refrigeration system, whether it is a part of an air conditioner, a refrigerator, water cooler, or numerous commercial installations, operates on the same general principle using a refrigerant.

Mechanical refrigeration systems use as the primary refrigerant some liquid that has a boiling point lower than water but, in changing from liquid to vapor at low pressures and temperatures, absorbs a lesser quantity of heat. Most refrigerants commonly used today require close-to-atmospheric pressures in the system, and thus leaking tendencies and overwork of compressors are reduced to a minimum.

FREON-12

Dichlorodiflouromethane is known as Freon-12, Genetron 12, or Isotron 12. In some texts, you will find it referred to as Refrigerant-12, or R-12. In training courses it is generally called Freon-12. It has a boiling point of minus 21.7° F, and would immediately boil if exposed to ordinary room temperature and atmospheric pressure. It must therefore be kept under pressure if it is to be maintained in a liquid state; and this pressure will vary according to the ambient temperature. Its freezing point (minus 247° F) is a temperature not likely to be encountered in operating conditions.

Freon-12 has now replaced to a great extent such refrigerants as ammonia, sulfur dioxide, or methyl chloride, which because of their toxic and explosive character have caused many fatalities.

The chief advantages of this refrigerant are as follows:

1. It is odorless and tasteless in concentrations of less than 20 percent by volume in air.
2. It is nontoxic; but by reducing the oxygen content in a working space, it can cause suffocation.
3. It is nonexplosive and nonflammable; although it decomposes in the presence of an

open flame, forming irritating and toxic gases, it will not ignite.

4. It is noncorrosive in contact with the metals that are commonly employed in refrigeration units; it will, however, corrode magnesium and aluminum alloys that contain magnesium.

5. It is chemically stable up to at least 1,000° F; above that temperature, it decomposes, forming corrosive and poisonous products.

6. It acts as a solvent, loosening and removing particles of dirt, scale, or oil within the system. However, it will eat away natural rubber gaskets; therefore, neoprene or some other synthetic rubber must be used.

7. It mixes readily with oil, and thus simplifies the lubrication of the plant by acting as a carrier of oil to moving parts and as an aid in returning the oil from the evaporator. This last characteristic is important, since an excess of oil in the evaporator will form an insulating film between the refrigerant and the inside surface of the evaporator.

The disadvantages of Freon-12, from an operating standpoint are as follows:

1. It has a low latent heat; and as a result, absorbs only about 51 Btu for every pound of refrigerant that boils off in the evaporator at 5° F, when condensing temperature is 86° F. This low latent heat necessitates the circulation of a large volume of refrigerant per ton of refrigeration.

2. In concentrations of 20 percent or more, Freon-12 produces a phosgene gas if exposed to an open flame.

3. In its liquid form, Freon-12 can cause severe frostbite (extra care must be taken to avoid this). Since the refrigerant has no noticeable odor, leaks may escape notice.

The disadvantages of the low latent heat (51 Btu per pound of refrigerant) can be emphasized by comparing it with the refrigeration ton (12,000 Btu per hour). Thus, a 1-ton unit would have to boil off a minimum of approximately 235 pounds of refrigerant per hour to maintain the cooling capacity of 12,000 Btu per hour.

Because of the capacity of Freon-12 to absorb water, utmost caution is necessary to prevent the entrance of water (or water-laden air) into the system. Any excessive moisture in the system can cause freezeups at the expansion valve. This characteristic is one that Freon -12 shares with all refrigerants whose boiling point is below 32° F.

REFRIGERATION CYCLE

OPERATION

As the refrigerant flows through the primary (or basic) refrigeration components, it assumes four different and distinct states of character. These four states of refrigerant (fig. 5-1) are as follows:

1. Low-pressure gas (input side of the compressor).
2. High-pressure gas (output side of the compressor).
3. High-pressure liquid (output side of the condenser coil and liquid receiver).
4. Low-pressure liquid (output side of the expansion valve).

After passing through the evaporator coil, the refrigerant returns to a low-pressure gas, and the cycle is repeated until the unit is shut off. The following sequence of operation traces the flow of refrigerant through its cycle and explains where the changes take place.

When the compressor starts, it draws refrigerant gas from the low-pressure (suction) side of the refrigeration system. Mechanical action of the compressor changes the refrigerant into a high-pressure gas. This gas is normally cold when it enters the compressor, but it becomes hot during compression.

The hot high-pressure gas leaves the compressor's high-pressure (discharge) side and flows directly to the condenser coil. The heat, produced when the gas was compressed and which was removed from the conditioned space, is dissipated with a finned coil by the airstream drawn through this coil by the condenser fan. This cooling effect gradually changes the high-pressure gas into a high-pressure liquid.

From the condenser coil, the refrigerant flows to the receiver which acts as a reservoir for storing the liquid refrigerant. After leaving the receiver, the high-pressure liquid flows through the thermostatic expansion valve. Here the refrigerant is changed into a low-pressure liquid and is metered into the evaporator coil.

Upon entering the evaporator coil, the low-pressure liquid changes (boils) to a low-pressure gas. This change, from liquid to gas, produces a cooling effect within the evaporator coil and the coil becomes cold. A stream of air is directed over the cold coil. The air is cooled and then directed to the space to be cooled.

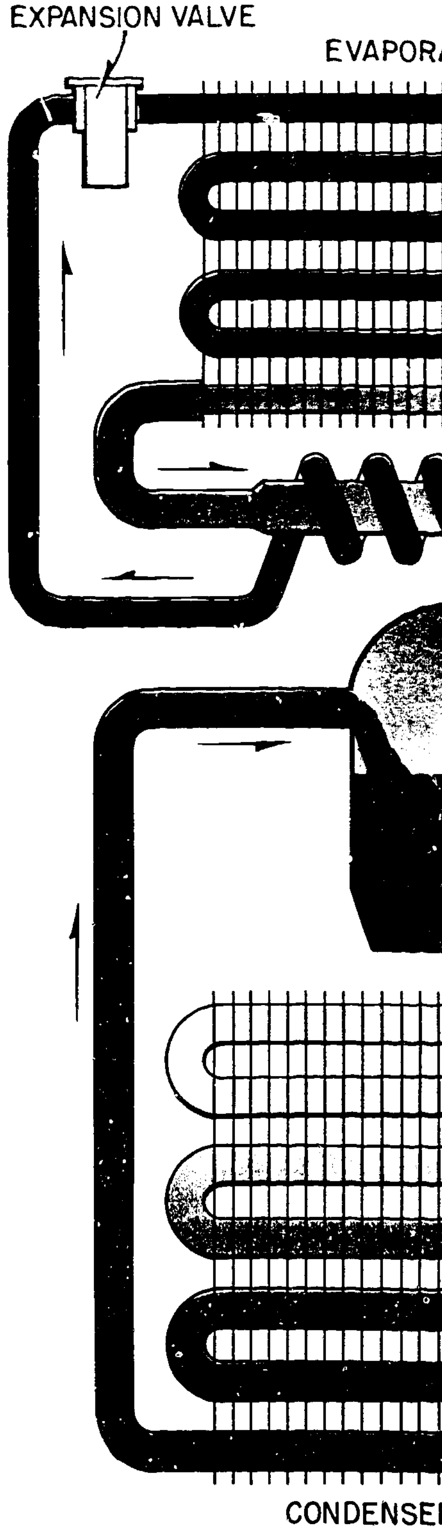
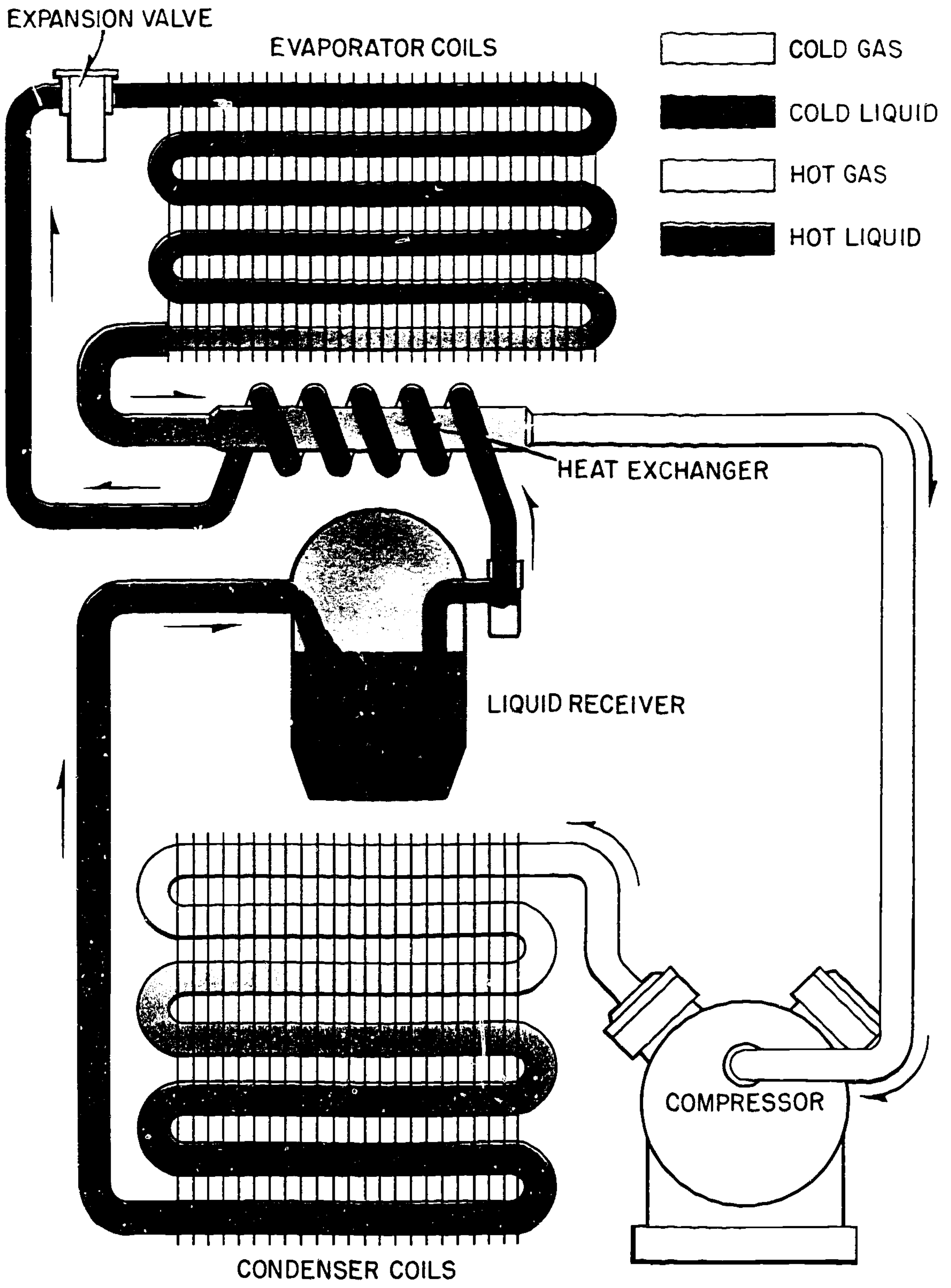


Figure 5-1.—F



TD.397

Figure 5-1.—Fundamental refrigerant cycle.

After leaving the evaporator coil, the refrigerant returns to the low-pressure (suction) side of the compressor.

The foregoing cycle is repeated as long as the compressor is operating. As can be seen from the above, the flow of refrigerant is from the compressor to the condenser coil, then to the receiver, to the expansion valve, to the evaporator coil, and back to the compressor.

MAJOR COMPONENTS

Compressor

The compressor is used to remove (draw) gas from the evaporator and increase the pressure of the gas sufficiently for operation of the remainder of the system. Thus, by increasing the pressure of the gas, the temperature is raised above that of the medium (air or water) surrounding the condenser, permitting heat to flow to the medium.

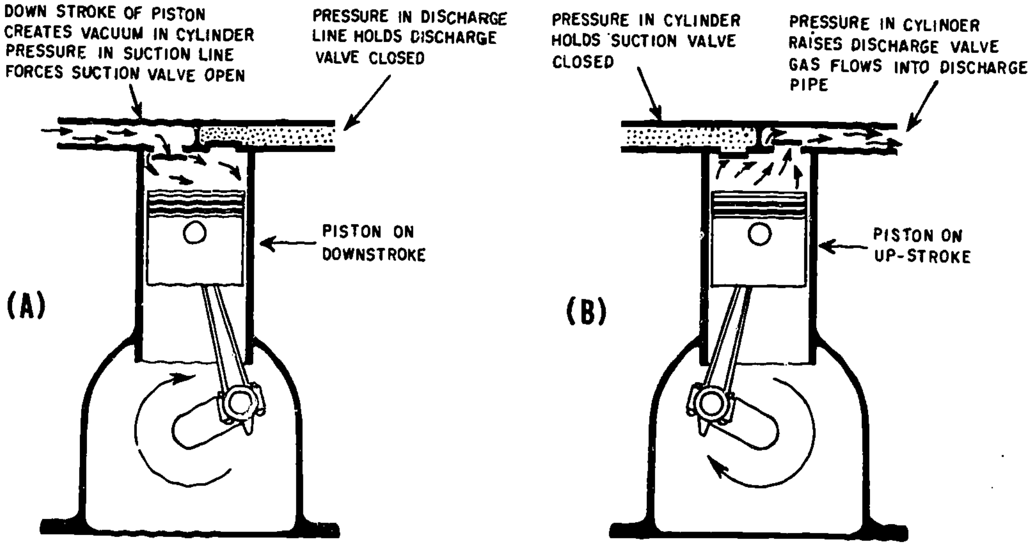
The size and the type of compressor vary according to the installation and the requirements of the air-conditioning system. Compressors may be divided into three general groups—reciprocating, rotary, and centrifugal. A second classification, as to type of compressor, is the open, semihermetic, and full-hermetic type. The function of the compressor is the same in all three types, but the mechanical means for accomplishing this task differs considerably.

OPEN RECIPROCATING TYPE.—This type of compressor is driven by an external means. which is normally belt-driven or direct-driven through coupling. One of the simplest ways of achieving high gas pressures is to draw a large quantity of gas into a cylinder through an intake or suction valve (fig. 5-2) by means of the partial vacuum produced by the downward movement of a piston. The piston is actuated by a crank arm or connecting rod attached to a crankshaft, which is rotated by the external driving force.

As the piston is moving down toward its lowest position, the cylinder is completely filled with low-pressure gas. As indicated in figure 5-2 (A), the suction (intake) valve opens when the pressure inside the cylinder is less than the pressure in the suction line leading to the cylinder. A common pressure at the suction valve is about 37 psig (pounds per square inch gage).

When the piston has reached the lowest point of its travel, it begins to move upward (fig. 5-2 (B)), and the intake (suction) valve closes. The intake valve closes when the pressure inside the cylinder becomes greater than that in the suction line.

The gas that has been compressed is delivered to the high-pressure (discharge) line through the discharge valve. As the piston moves upward, the valve opens when it senses that the pressure inside the cylinder is higher than that in the high-pressure line. A common



TD.398

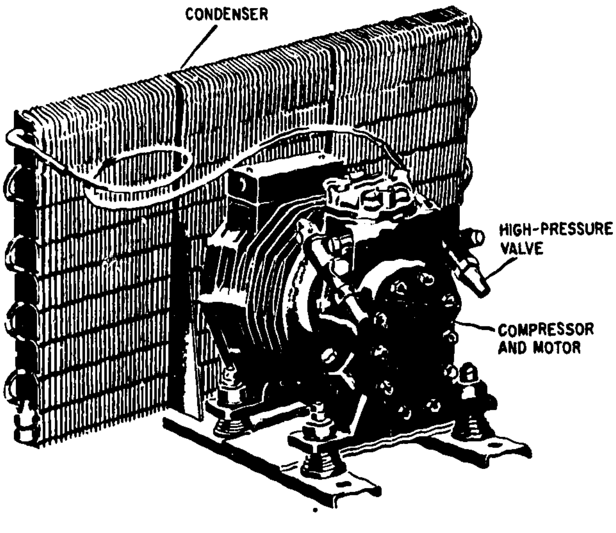
Figure 5-2.—Operating cycle of a reciprocating compressor.

pressure at the discharge valve would be about 126 psig. The valves, therefore, serve as one-way traffic-flow controllers; they permit the gas to flow in one direction only, and only when the pressures are of the correct amount.

The open type compressor has the advantage of supporting large systems. Also the power source can be any prime mover. The fact that the compressor is driven by an external source of power through a shaft creates operating disadvantages. Sealing around the shaft must be maintained to prevent gas on the inside of the compressor body from leaking outward into the atmosphere. The exposed belt drive or rotating couplings may prove dangerous to operating personnel. This type of compressor system requires considerable space for operating.

SEMIHERMETIC RECIPROCATING TYPE.—This type compressor has the compressor and direct drive motor housed within one casing or casting (fig. 5-3). The operation of the compressor is the same as the open type compressor. Both units are housed in a common enclosure which eliminates some of the disadvantages of the open type unit. The weight and space consumed are much less than that required by the open type compressor.

FULL - HERMETIC RECIPROCATING TYPE.—The full-hermetic unit (fig. 5-4) is a completely closed motor and compressor welded into a pressed steel casing. This prevents any type of field maintenance, and requires that servicing be performed at very specialized compressor overhaul centers, normally the compressor manufacturer's plant. This type compressor has all the advantages of semihermetic compressors plus additional weight saving because of the much lighter pressed steel casing.

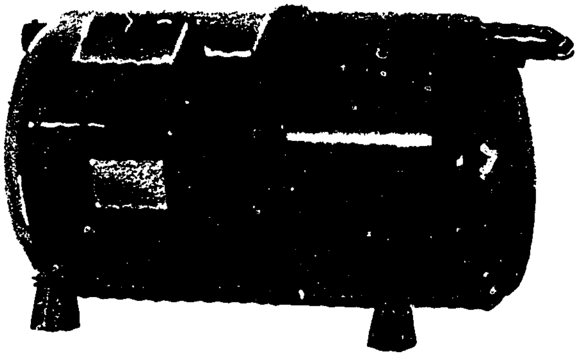


TD.399

Figure 5-3.—Bolted type semihermetic compressor motor assembly.

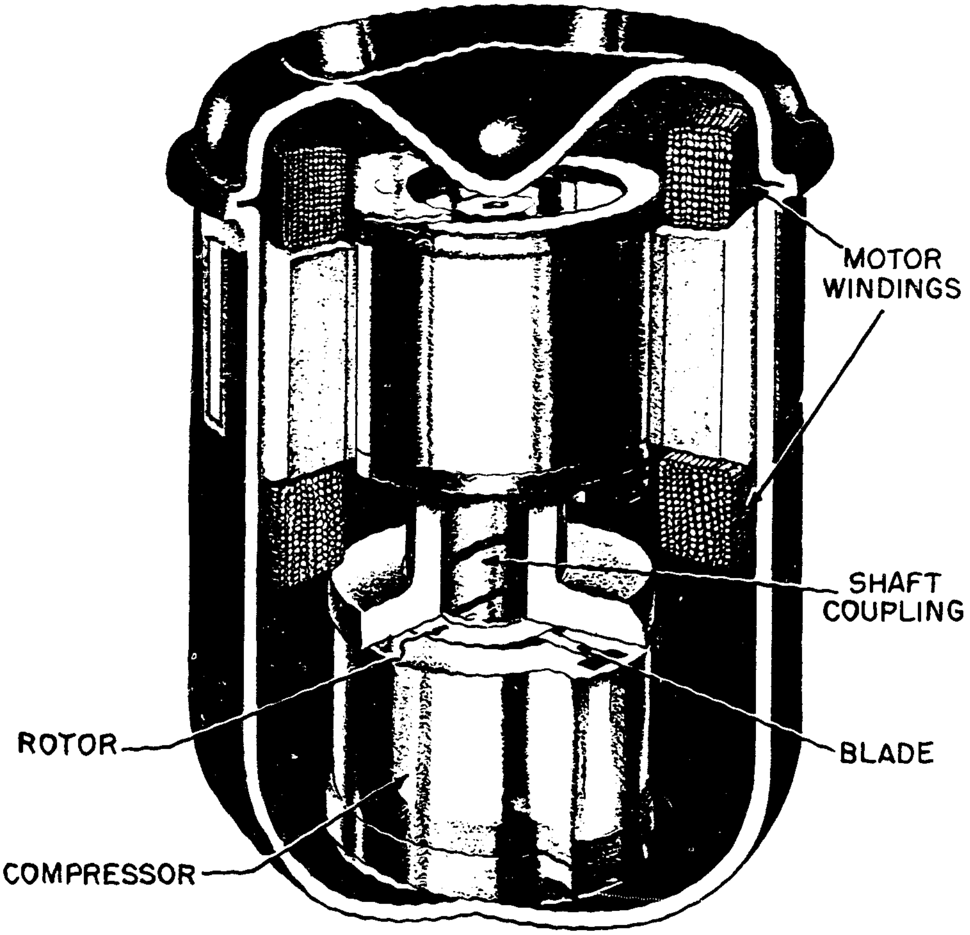
ROTARY.—Another common type of compressor is the rotary type. This has some distinct advantages as far as vibration and moving parts are concerned. The materials used in construction are very similar to those of the reciprocating pump, but its operation is different. The major difference is that the pumping effect is produced by a rotary motion rather than a reciprocating motion. Figure 5-5 illustrates an internal view of the assembly where the motor and compressor are mounted in the same shell.

The operation of the stationary blade compressor is illustrated in figure 5-6. The shaft rotates in a chamber so that the eccentric or offcentered disk rubs constantly against the outer wall of the chamber. Referring to figure 5-6, the sequence of operation can be followed. With the chamber filled with gas (A), the eccentric starts to rotate. As the eccentric roates (B), gas imprisoned ahead of the eccentric is compressed and the void behind the eccentric sucks low-pressure gas into the chamber in preparation for the following cycle. As rotation continues ((C), (D), and (E)), the imprisoned gas is compressed into a smaller space, building up the pressure and temperature, and finally forcing the gas



TD.400

Figure 5-4.—Full-hermetically sealed compressor motor assembly.



TD.401

Figure 5-5.—Hermetic rotary compressor.

into the high-pressure side (or discharge side) of the system.

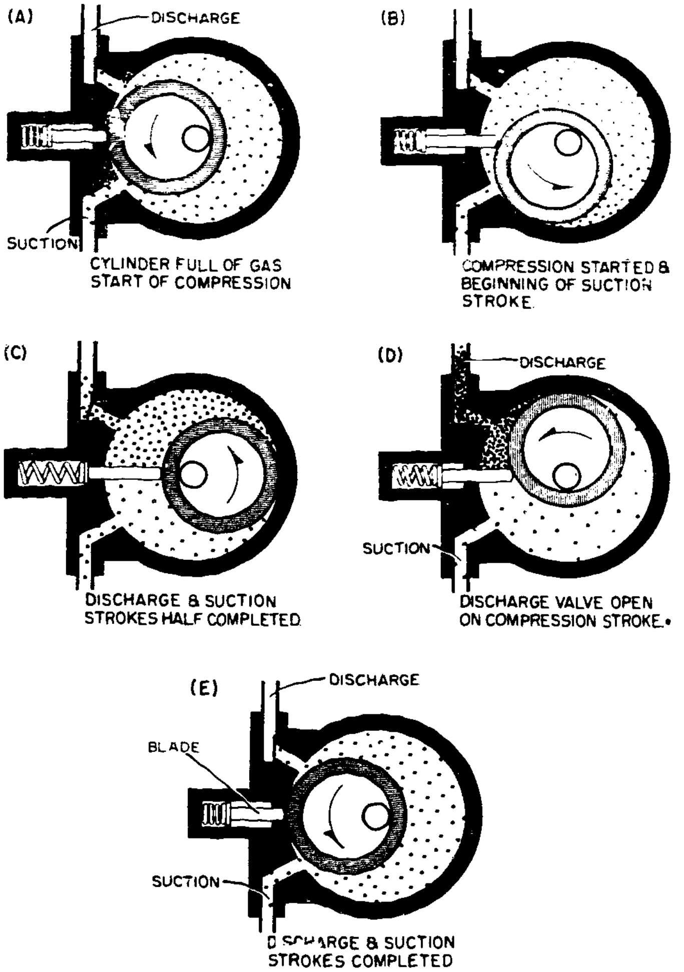
Another version of the rotary type compressor is the rotating blade. It differs from the compressor described above in that one or more pairs of blades are rotated in place of the eccentric. As these blades rotate, they trap low-pressure gas from the suction line and force the gas into smaller and smaller spaces until, at the discharge lines, the gas leaves as a high-pressure, high-temperature gas.

Compressor Motors

The driving mechanism or the source of power for compressor units is usually an electric motor. The type and the size of the motor vary with the requirements of the particular installation. Two general types of motors used are the open and sealed motors. The open type, normally a capacitor motor (fig. 5-7), is a common type motor used in the air-conditioning field.

The capacitor type motor is normally a split-phase motor with a capacitor connected in series or parallel with the windings to aid in the starting or running of the motor. In a capacitor-run motor the capacitor is used to aid the running winding, and is connected in parallel with the running winding. The capacitor-start motor derives its name from the use of a capacitor connected in series with the starting winding and aids the starting torque of the motor. Since the capacitor start is the most common motor used in air-conditioning equipment, it is discussed in greater detail.

In the capacitor-start motor, the capacitor, centrifugal switch, and starting winding are normally connected in series. The capacitor



CYLINDER FULL OF GAS
START OF COMPRESSION

COMPRESSION STARTED &
BEGINNING OF SUCTION
STROKE

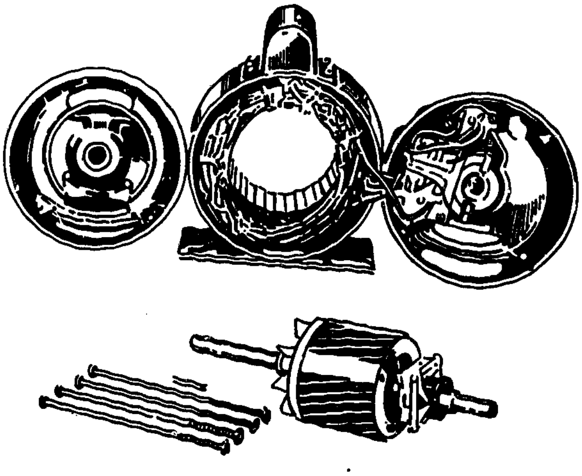
DISCHARGE & SUCTION
STROKES HALF COMPLETED

DISCHARGE VALVE OPEN
ON COMPRESSION STROKE

DISCHARGE & SUCTION
STROKES COMPLETED

TD.402

Figure 5-6.—Stationary blade rotary compressor.



TD.403

Figure 5-7.—Capacitor type motor.

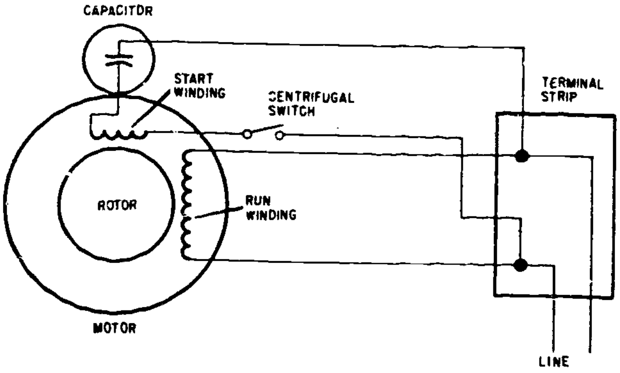
is in the housing mounted on top of the frame; the centrifugal switch is mounted in the rear end bell (right end, fig. 5-7); the starting winding is the smaller diameter wire and is usually placed on top of the running winding.

The centrifugal switch is in the closed position when the motor is not running. When voltage is applied to the motor, the capacitor-start motor acts as a two-phase motor when starting. The starting winding aided by the capacitor causes the rotor to rotate. When the rotor reaches 75 percent of its rated rpm, the centrifugal switch is disconnected, taking the capacitor and starting winding out of the circuit (fig. 5-8). The motor continues to run, but now as a single-phase induction motor. More detailed information on motors may be found in Basic Electricity, NavPers 10086-B.

The troubles encountered in the capacitor type motor are few, and they deal mainly with the mechanical condition of the motor. There is a possibility that the centrifugal switch may become worn. Also, an open or short circuit may occur in the capacitor or in the field windings. The mechanical troubles encountered are common to most types of motors. The most common of these are the following:

1. Worn bearings.
2. Excessive end play.
3. Excessive vibration.
4. Dirty.
5. Worn motor mounts.

Very frequent starting of the motor may result in overheating, which many times will cause the capacitor and/or the windings to fail. If the motor will not start, but simply has the characteristic hum, it is a sign that the capacitor or the centrifugal switch points have failed or the starting winding is open.



TD.404

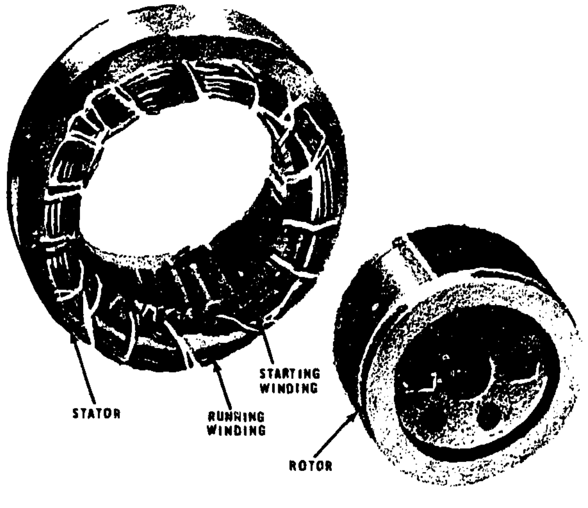
Figure 5-8.—Capacitor type motor schematic.

It is a simple matter to substitute a good capacitor for the questioned one. If the motor still does not start, the trouble is possibly in the centrifugal switch or the starting winding. A continuity check should quickly determine the fault.

The basic operation of the hermetic type motor is essentially the same as the open type. There are some definite differences because of the motor being mounted in a sealed container (fig. 5-4) with the compressor. Brushes and/or open points cannot be used in the hermetic motor because the arcing would gradually disintegrate the refrigerant and the oil in the unit. Therefore, an external means must be used to disconnect and connect the various windings, and all torque must be developed by induction only. The electrical terminals which carry the circuit through the dome (container) must be electrically insulated from the dome; they must also be leakproof.

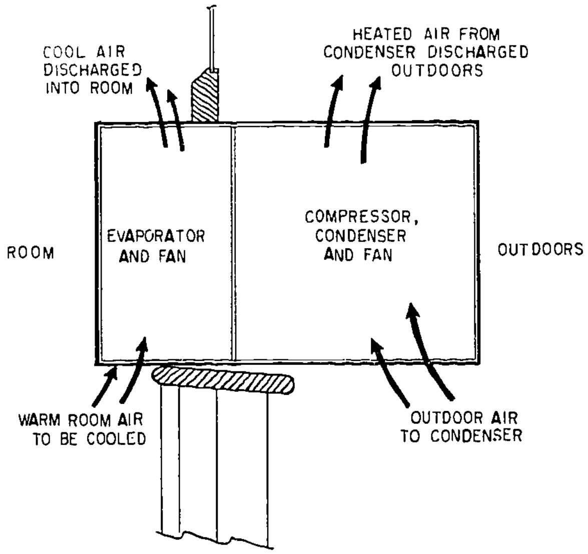
The higher starting torque required for those units which start under load necessitates the use of large conductors in the starting circuit. This required starting torque is usually obtained by using one of several electrical devices. Usually, manufacturers attempt to provide starting power equal to twice the running power. In other words, the attempt is to have a 1/6-horsepower motor produce one-third horsepower during starting. Likewise, various methods are used to disconnect the special starting devices after the motor has approached its full speed.

The two common types of motors used are the split-phase and capacitor-start motor. As in the open type motor described above, the split-phase motor has its starting and running windings mounted within the stator shell (fig. 5-9). In the split-phase motor, these two windings are made into four coils each with the starting winding positioned at an actual 45° around the stator from the running winding. This positioning puts the starting winding 90 electrical degrees from the running windings. Smaller size wire is used in the starting winding. This smaller wire opposes the current and builds up its magnetic field slower than the running winding. This slower buildup causes

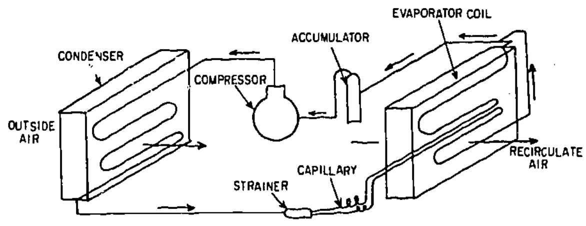


TD.405

Figure 5-9.—A 1/4-horsepower split-phase hermetic motor.



TD.426
Figure 6-2.—Air distribution.



TD.427
Figure 6-3.—Refrigerant cycle components.

The schematic for the circuit operation is illustrated by figure 6-5. A 220-volt single-phase a-c supply from the main circuit breaker panel is supplied to the relay actuated air-conditioning contactor K1 which is controlled by a START switch S1 and a STOP switch S2. When switch S1 is depressed, a circuit is completed to energize relay K1, which closes the contacts. Closing contact C2 holds the relay closed through the STOP switch S2 which is normally closed. Depressing the STOP switch S2 opens the holding ircuit of K1 and power is disconnected from he system. When actuated, the contacts of K1 oute 220 volts a.c. to the motor.

The powerline from fuse F2 connects a common line to one side of the evaporator fan motor, condenser fan motor, and terminal R of the compressor motor terminal box. The other powerline from fuse F1 to the other side of the motors is first routed through selector switch S3 and the thermostat S4 on the control console.

When the master selector switch S3 is placed in the FAN position, the circuit is completed to the condenser and evaporator fan motors. The fans or blowers circulate air in an out of the cockpit area through ducts connected to the air-in and air-out ports of the air-conditioning system. (See fig. 6-4.)

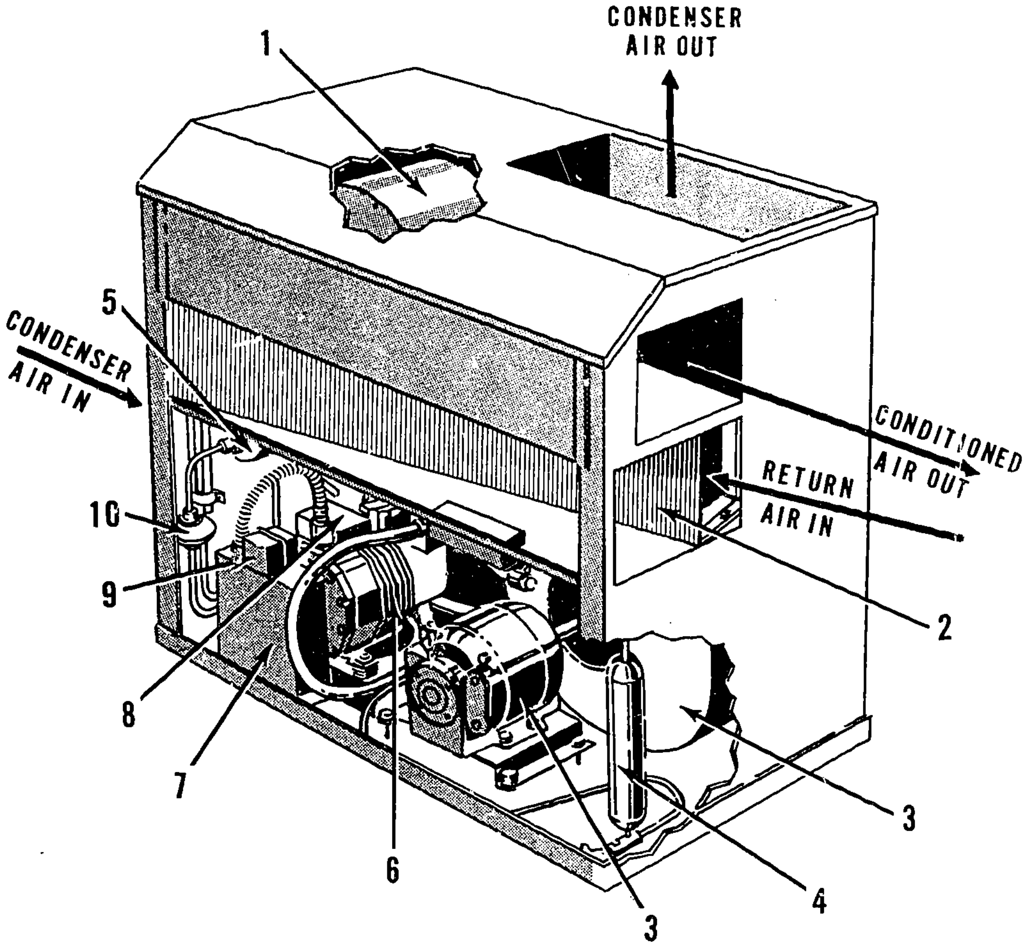
When the master selector switch S3 is placed in the COOL position, the circuit is completed through the thermostat S4 to the compressor motor terminal box (fig. 6-5). The compressor unit uses a capacitor-start, capacitor-run induction motor to drive the 1-hp sealed compressor. In addition to the starting capacitors, a running capacitor is included to reduce the power factor after the starting capacitors are removed from the circuit. The thermal overload switch S5, a part in the compressor motor terminal box, opens the power circuit to the compressor in case of overheating or excessive current drain.

The compressor and associated refrigeration components provide cool air as long as the thermostat contacts (S4) remain closed. When the predetermined temperature is reached, the contacts open, removing power from the compressor motor. The circuit, through the right-hand contacts of the master selector switch, still provides power to the evaporator and condenser fan motors which continue to circulate the air.

MULTIPLE STAGE SYSTEMS

Multiple air-conditioning systems are used where large amounts of conditioned air are required. One example of this type system is used where the trainer is mounted in a truck trailer. Operating equipments and training space are condensed into the limited confines of the truck trailer and require conditioned air for proper operation. (See fig. 6-6.)

A multiple system provides the flexibility necessary to efficiently meet widely varying demands. The multiple air-conditioning system has as many refrigeration systems as it has compressors. The multiple air conditioner in figure 6-7 shows the two separate systems. The refrigeration cycle is the same for both



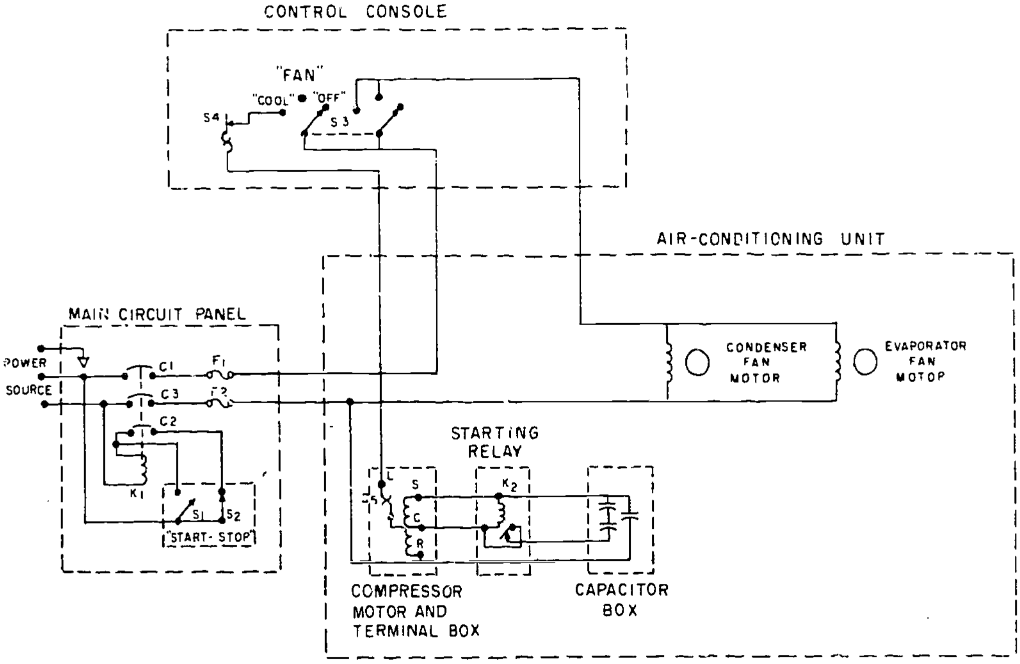
1. Evaporator fan.
2. Conditioned air coil.
3. Condenser fan and motor.
4. Liquid receiver.
5. Expansion valve.
6. Hermetic compressor/motor.
7. Capacitor box.
8. Compressor motor junction box.
9. Relay.
10. Liquid line strainer.

Figure 6-4.—Model 10C air-conditioning unit.

systems. Each system can be operated independently, if necessary. During automatic operation, the number of systems in use at one time depends upon the requirements imposed by the thermostat.

As can be seen by examining figure 6-7, this air conditioner has two compressors, two condenser fans, two heater stages, two evaporators, and one air circulating blower. The control panel provides switches for selecting the mode of operation of the system. The selector switch has five positions as follows: cool, heat, ventilate, off, and service. Also provided on the control panel are six service switches used for maintenance. The electrical connection of the components is illustrated by the schematic diagram in figure 6-8.

The mode of operation of the system (fig. 6-8) is controlled by the master selector switch S1. This selector switch is an 8-wafer, 5-position switch (shown in position C) selecting C (cool), H (heat), V (ventilate), O (off) and S (service). The two stage thermostat (shown in position C) determines from the selected temperature



TD.429

Figure 6-5.—System schematic.

whether the system provides cool or warm air. The humidistat (shown in the humidify position) determines whether moisture is added or removed from the conditioned air. The six service switches (shown in the OFF position) provides the maintenance crew with a means to activate an individual circuit without operating the complete system. The control circuit voltage is brought into the system on line 1 of the power source.

Placing the master selector switch S1 (fig. 6-8) in the V position selects ventilation as the mode of operation. Line 1 voltage (115 v) is applied through terminal E to the center of wafer 1 of switch S1. With the switch in the V position, the circuit is completed through the switch to the circulating fan service switch S7 and then to the control solenoid of the circulating fan. The control solenoid closes and 220 volts is applied to the circulating fan (blower). When S1 is in the V position, the other circuits are not completed, thus only the blower runs.

The system is placed in the cool mode of operation by turning the master selector switch S1 to the C position. The circulating fan also operates with S1 in this position. When the source voltage is supplied to the circulating fan control solenoid, the solenoid is energized and closes contacts C1. The closing of the contacts allows the source voltage to flow through the contacts to the 2nd wafer of the S1 switch. The circuit continues from contact C of S1 to the two W contacts (W1 and W2) of the thermostat and contact C3 of the humidistat. With the thermostat in the position shown in figure 6-8, the circuit is completed from contact W1 to contact C1 of the 1st stage cooling thermostat and then to wafer 5 of S1. The circuit continues through to the No. 1 compressor service switch (S2) applying 115 volts to the time delay relay and the dual pressure cutouts, and then to the control solenoid of the No. 1 compressor. Energizing the control solenoid of the No. 1 compressor starts the compressor and closes contacts C2 which applies voltage to the control solenoid of the condenser fans. Notice that power must be applied to the circulating fan before the compressor can be turned on, and that the condenser fan starts simultaneously with the compressor.

If the No. 1 compressor does not supply sufficient cooling, the second stage cooling

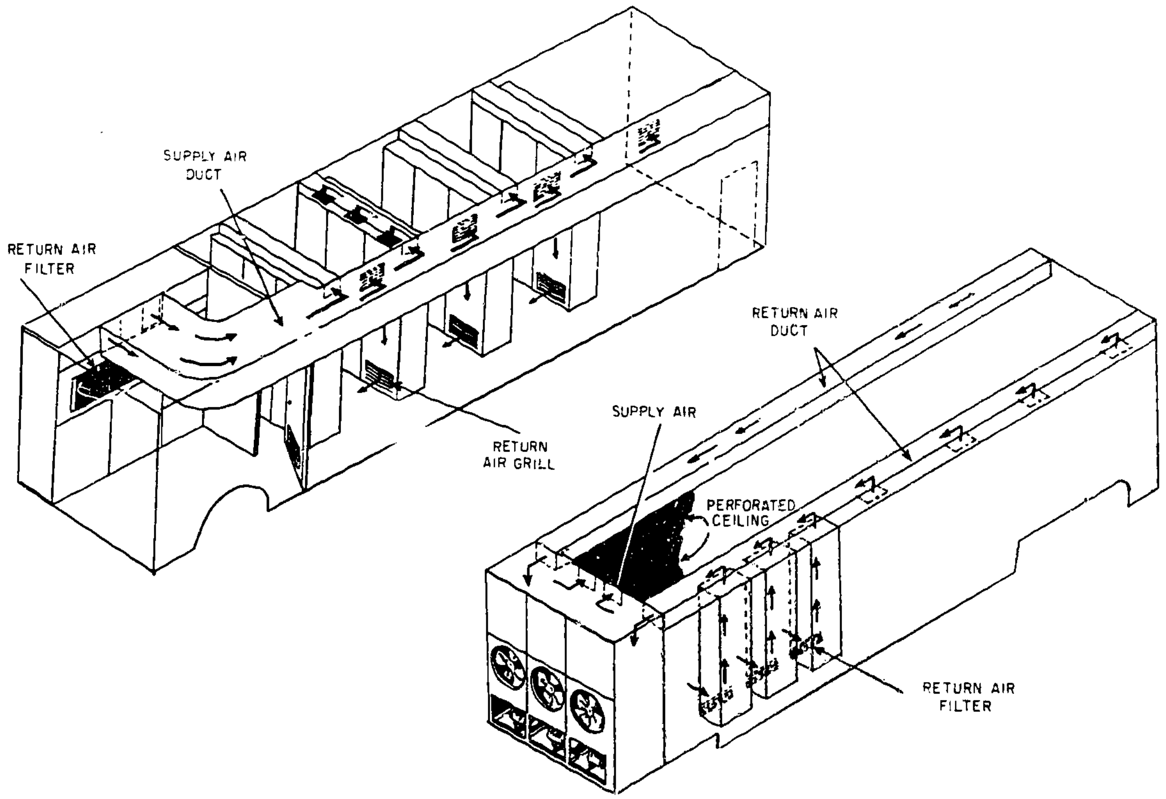


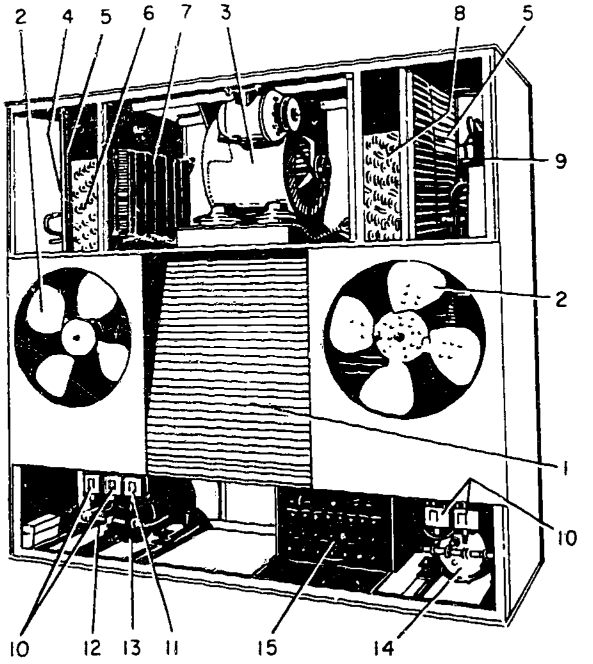
Figure 6-6.—Trailerized air-conditioning system.

TD.430

thermostat closes (W2 and C2) applying 115 volts to the center contact of wafer 7 of S1. (NOTE: A temperature differential exists between the two stages of the two stage thermostat as discussed in chapter 5 of this course.) With the master selector switch in the C position, 115 volts from wafer 7 is routed (through contact C of S1) through the No. 2 compressor service switch (S3) and then to the time delay relay. With the contacts of the delay relay closed, voltage from the No. 2 compressor service switch (S3) continues through to the control solenoid of the No. 2 compressor which applies three-phase power to start the compressor. When the master selector switch is placed in the cool position, the time delay relay will not allow both compressors to start at the same time. The No. 2 compressor lags the No. 1 compressor by about 5 seconds (due to the time delay relay), allowing the No. 1 compressor to start before placing the additional starting load of the No. 2 compressor on the power supply.

Dehumidifying is accomplished by cooling the air below its dewpoint with the No. 1 compressor and reheating the air to the proper temperature with the No. 1 heater. When the relative humidity becomes too high, the humidistat closes contact C3 to H3 routing 115 volts through wafer 4 of S1, through the normally closed contacts of the No. 2 compressor control solenoid C3, to the No. 1 heater solenoid. Thus, the 1st stage heater and the No. 1 compressor both operate when the humidistat calls for dehumidification. However, if the 2nd stage thermostat closes causing the No. 2 compressor to operate, the normally closed contacts of C3 open, and the No. 1 heater becomes inoperative. The reheat cycle of the No. 1 heater cannot be used if both compressors are required to keep the temperature within the requirements of the thermostat.

The humidifier cannot be turned on when the cooling cycle is selected. Voltage to the humidifier is routed through wafer 3 of S1 which is open except when S1 is in the heat position.



1. Condenser coils—1st and 2nd stages.
2. Condenser fans.
3. Air circulation blower.
4. Refrigeration components—1st stage.
5. Air filters.
6. Evaporator—1st stage.
7. Heater coils.
8. Evaporator—2nd stage.
9. Refrigeration components—2nd stage.
10. High- and low-pressure cutouts.
11. Condenser fan switch.
12. Receiver tank —1st stage.
13. Compressor—1st stage.
14. Compressor—2nd stage.
15. Control panel.

Figure 6-7.—Dual air-conditioner system.

When heating is desired, the master selector switch S1 is rotated to the H position. As in the ventilating and cooling position, the circulating blower control solenoid receives voltage from wafer 1 of S1. The control solenoid of the circulating blower energizes, closing contacts C1, routing voltage through wafer 2 of S1 to contacts W (W1 and W2) of the thermostat and C3 of the humidistat. Assuming that the temperature has dropped sufficiently to close contacts W2 and H2 of the 2nd stage thermostat, voltage is routed to wafer 8 of S1 and to the control solenoid of the No. 1 heater. If the temperature falls low enough, contacts W1 and H1 of the 1st stage thermostat closes. Voltage is then routed through wafer 6 of S1 to the control solenoid of the No. 2 heater applying three-phase power to the heater coils. Notice that none of the heaters are energized unless the circulating fan control solenoid has been energized, which closes contacts C1.

Humidification can be accomplished in the heating cycle when required by the humidistat. When the humidistat contacts C3 and H4 close, voltage is routed through wafer 3 of S1 to the humidistat. The humidifier atomizes water into the air supply to bring the relative humidity back up to the comfort zone as selected by the humidistat.

When maintaining the system, the master selector switch S1 is placed in the S position. When S1 is placed in the S position, contacts of wafer 1 route 115 volts to all six of the service switches. This allows the individual components to be turned on and off as required for maintenance. The complete system could be operated manually if training conditions required air conditioning and the automatic control system would not function properly. The circulating fan should always be turned on before turning on either the compressors or the heaters to prevent damage to the equipment.

SYSTEM REFINEMENTS

Some air-conditioning systems utilize an operation referred to as "automatic pump-down." When cooling is no longer required, valves close and the system automatically places itself in a pumped-down condition. This means that practically all of the refrigerant is pumped into the receiver tank. A thermostatically operated solenoid valve is used in the place of the king valve at the output of the receiver tank. When cooling is no longer required, this valve closes allowing no more liquid/gas to return to the compressor. This action continues until the low-pressure cutout interrupts power to the compressor.

Safety controls are incorporated in systems that utilize heater coils. The heater safety circuit is designed to prevent heaters from operating when the circulating fan is off. The safety cutout switch is placed in the vicinity of the heaters and opens the heater circuit when it senses an extremely high temperature.

Most trailerized units have interlock switches which prevent the energizing of the air conditioner when the condenser fan doors are closed.

Sometimes in cold weather the outside air is so cold that the low-pressure cutout does not allow the compressor to start even though the thermostat inside the training space requires that cooling be provided. In this event a "cold start" thermostat applies power to the heater of a time-delay relay. After a given time delay, the low-pressure cutout is bypassed so as to energize the compressor control solenoid. After the system starts operating, the automatic control system reverts to its normal operation.

In many systems condenser fans are on constantly when the compressors are operating. On cold days this would cause a very low head pressure, resulting in abnormal operation of the cutout switches. As head pressure decreases, an automatic condenser fan control cuts off one or more of the condenser fans. On very cold days, it would be possible to operate one compressor with no condenser fans running.

MAINTENANCE

To insure the efficient operation of air-conditioning equipment, a program of preventive and corrective maintenance is very important. The procedures for a particular system, as set forth in the manufacturers maintenance manuals, should be closely followed. These procedures differ from one system to another. The information provided in this section is general in coverage to provide the TD with an overall view of the maintenance problems of air-conditioning systems; it should not be used in place of the manufacturer's maintenance manual.

PREVENTIVE

Preventive maintenance is better than waiting for an adverse condition to develop, and then having to correct it. This helps to prevent loss of training time and costs of materials. The important factors in the maintenance of an air-conditioning system are the same three factors that should be observed in the use of all mechanical equipment: cleanliness, lubrication, and periodic inspection.

NavTraDevCen Instruction 10230.1 sets forth the preventive maintenance program shown in table 6-1.

Table 6-1.—Preventive maintenance checklist.

Description	Interval
1. When a unit is equipped with a humidifier and is being used for heating and humidifying, check the water level in the reservoir and fill if needed.	DAILY
2. Remove air filters and clean (at least one complete set of extra filters should be available for each unit).	WEEKLY or every 100 hours of operation
3. Check air circulating fan belt for tightness. (When "squeezing" the belt between forefinger and thumb, the belt should not move more than 1 inch. If the belt moves more than 1 inch, then slippage will occur, causing inoperation of the unit. Excessive tightness results in bearing or belt failure and may overload the motor.)	WEEKLY
4. Check the refrigerant sight glass of each stage for indication of a low refrigerant charge. If a low charge is indicated, locate and repair the leak and recharge the system. A low charge is indicated by bubbles or a milky appearance in the sight glass.	WEEKLY
5. Inspect the evaporator coils for cleanliness. If dirty, brush with a long bristle brush and remove dirt with a vacuum cleaner.	WEEKLY

Table 6-1.—Preventive maintenance checklist—Continued.

Description	Interval
6. Inspect the condenser coils for cleanliness. If dirty, proceed as in item 5.	MONTHLY
7. When the unit is equipped with a humidifier, check the humidifier for operation and lubricate. Use a light oil.	2 MONTHS
8. With a clean dry cloth, wipe off the drier filter, solenoid valves, sight glasses, heat exchanger, and the thermostatic expansion valve. Check the tightness and general condition of each component as it is cleaned.	2 MONTHS
9. Check the heaters to be sure that wires and heater mounting bolts are tight. Be sure heater fins are clean, not bent, and that no wires are touching the heaters.	2 MONTHS
10. Check the mounting bolts and setscrews for tightness on condenser and air circulating fans, fan shafts, and motor shafts. Check the blower wheel and fan scroll clearances.	2 MONTHS
11. Wipe off the compressor with clean dry cloths; look for and make repairs to the following: a. Loose bolts. b. Loose capillary connections. c. Frayed or broken wires. d. Loose valve caps and gage port plugs. e. Oil leaks beneath compressor and around gaskets.	2 MONTHS
12. MAKE SURE ALL OPEN VALVES ARE BACK SEATED.	
13. Check each stage for refrigerant leaks using a halide torch or other precision leak detector. Check items such as flare nuts, welded connections, bolted connections, all types of fittings, valves, pack nuts, coil manifolds, and return bends. Check any place where oil has been found for refrigerant leaks; repair any leaks found.	2 MONTHS
14. Check the electrical system completely for cleanliness, loose terminals, loose connections, loose mounting bolts or screws, frayed wires, and loose components. Also check contactors for normal opening and closing.	2 MONTHS
15. Check all pressure switches for correct settings and tightness of mounting brackets. Refer to the maintenance manual.	2 MONTHS
16. Check overflow pipes in reservoir and drain pans and clean out any dirt or sediment.	
17. Check all clamps, mounting brackets, and the tightness of all components.	2 MONTHS

Table 6-1.—Preventive maintenance checklist —Continued.

Description	Interval
18. Inspect all air inlet and outlet openings for obstructions.	2 MONTHS
19. On all units where applicable, lubricate circulating fan motors and condenser fan motors and all other parts as required.	2 MONTHS
20. Be sure all access panels and cabinet panels are securely tightened in place to prevent air leaks.	2 MONTHS

NOTE: Item 13 of table 6-1 is very important because all oil leaks found in the area of the compressor denote excessive leakage of the refrigerant. The refrigerant is present with the oil in the crankcase of the compressor and any leakage of this oil is a leakage of the refrigerant.

CAUTION: When there is a very serious refrigerant leak, the concentration of the halogen gas being burned in the acetylene mixture is high, and this results in a deep purple, lazy flame of the leak detector. This lazy purple flame is producing phosgene gas, a deadly poison with the odor of new cut hay. Do not use a torch in a confined area and do not breathe the gas coming off a lazy purple flame of a leak detector. Just as soon as a purple flame occurs, withdraw the test probe. Make certain there is plenty of circulating air to blow this gas out of the confined space. Then use the torch to locate the leak. Repair the leak as necessary.

As stated in table 6-1, cleaning is best accomplished by using a vacuum cleaner or soft hairbrush. The ventilating fins on the condenser and evaporator are made of very thin metal and bend easily. Extreme care should be taken not to bend the fins as bent fins obstruct the passage of air.

Maintenance and overhaul on motors should be performed in accordance with the instructions contained in the manufacturer's maintenance manual.

When placing new equipment into operation, and even when starting up a system that has been out of operation for a period of time, you should give the entire system a checkover. Use a straightedge to insure that the compressor and motor pulleys are in line. Check the belt tension. Remember that if there are two or more V-belts on one drive, they must have identical tension; otherwise, one will carry more than its share of the load, overheat, and wear out. When one V-belt of a multiple set must be replaced, change the whole set, in order to insure uniformity of length and tension.

Refer to the manufacturer's maintenance manual for various setup and inspection procedures.

CORRECTIVE

Faulty operation of any air-conditioning system is indicated by very definite symptoms. The symptoms differ according to air- and water-cooled systems. These symptoms may be caused by one or more incorrect conditions which must be eliminated in a step-by-step process of corrective measures. The trouble symptoms, causes, and corrections, included in tables 6-2 and 6-3, are general in coverage to present examples of possible troubles. However, the manufacturer's maintenance manual generally contains troubles and remedies as applied to the specific system and should be used when maintaining the equipment.

Quiet operation of air-conditioning systems is not only desirable but is very important where training spaces are concerned. To test for excessive noise, operate the system at maximum load. Then listen, both outdoors and indoors, for noisy operation of the equipment.

Locate the noise sources in respect to parts of the equipment, and try to analyze them. A frequent cause of operating noise, for example, is an unbalanced fan. Loose belts, faulty motor bearings, or misalinement of components can result in noisy operation of the unit. The defects, if neglected, may become a major repair problem.

In correcting defects, however, personnel should not tamper with such components as hermetically sealed refrigeration equipment, or factory calibrated automatic controls. Refer to the maintenance manual for the scope of field

Table 6-2.—Trouble diagnosis chart—water-cooled condensers.

Symptom or difficulty	Condition may be due to	Correction
High head pressure	Air or noncondensable gas in system.	Purge air from condenser.
	Inlet water warm or insufficient water flowing through condenser.	Check for obstruction in condenser water supply strainer or partially closed valve.
		Check water regulating valve.
	Too much gas in condenser.	Clean condenser water tubing.
	Condenser clogged or limed.	Draw off refrigerant into service drum.
Low head pressure	Too much water flowing through condenser.	Regulate water inlet valve.
	Water too cold. Hand operated valve is unthrottled.	Reduce quantity of water as above.
	Leaky suction or discharge valves.	Test with gages. If leaking, replace.
	Shortage of refrigerant.	Add refrigerant.
High suction pressure	Overfeeding of expansion valve.	Regulate expansion, check bulb attachment.
	Leaky suction valve.	Remove head, examine valve disks, or rings. Replace if worn.
	Discharge valves leak slightly.	Examine valves, replace if necessary.
Low suction pressure	Restricted liquid line and expansion valve or suction screens.	Pump down, remove, examine, and clean screens.
	Insufficient gas in system.	Check for gas shortage.
	Too much oil circulating in system.	Check for too much oil in circulation. Remove oil.
	Improper adjustment of expansion valves.	Adjust valve to allow more flow.
	Stuck or frozen expansion valve.	Tap or thaw expansion valve as necessary.
Compressor is intermittent during high pressure output	Insufficient water flowing through condenser; clogged condenser.	Determine if water has been turned off. Adjust water regulating valve. Check for limed condenser or obstruction in water strainer.

Table 6-2.—Trouble diagnosis chart—water-cooled condensers —Continued.

Symptom or difficulty	Condition may be due to	Correction
Compressor is intermittent during high pressure output—Continued.	High pressure cutout incorrectly set.	Check setting of high pressure cutout.
	System overcharged with refrigerant.	High pressure cutout may be [illegible] due to insufficient condenser capacity because condenser tubes are submerged. Draw off refrigerant.
	(See high head pressure.)	
Compressor is intermittent during low pressure cutout.	Coils in refrigerators clogged with frost.	Defrost coils.
	Liquid suction or expansion valve screens dirty.	Pump down and clean screens.
	Thermal bulb on expansion valve has lost its charge.	Detach thermal bulb, hold in the palm of one hand, gripping the suction line with the other hand. If flooding through is observed, the bulb has not lost its charge. If not flooding through, replace expansion valve.
	(See low suction pressure, above.)	
Compressor runs continuously.	Improper functioning of the low pressure control switch.	Adjust or replace switch.
	Overloaded compressor.	Start additional compressor if system is arranged for isolating loads carried by more than one unit in operation.
	Shortage of refrigerant (with temperature control).	Test refrigerant; if insufficient, add proper amount necessary. Test for leaks.
	Suction or discharge valves leak badly.	Test valves; if leaking, remove head of compressor and repair or replace.
	Head gasket blown between cylinders.	Replace gasket.
Compressor noisy	Vibration because not bolted to foundation rigidly.	Bolt down rigidly.
	Too much oil in circulation causing hydraulic knock.	Check oil level.

Table 6-2. —Trouble diagnosis chart—water cooled condensers —Continued.

Symptom or difficulty	Condition may be due to	Correction
Compressor noisy —Continued.	Wear of parts such as piston pins, eccentrics, etc.	Determine location of cause. Repair or replace compressor.
Oil leaves crankcase	Leaking piston rings or worn cylinder.	Replace rings or compressor, or rebore and refit.
	On starting, suction pressure drops too rapidly.	Run the compressor intermittently.
Oil does not return to crankcase.	Valve in oil return line closed or stuck shut.	Open.
Compressor will not start.	Overload tripped; fuses blown.	Reset overload, replace fuses and examine for cause or condition.
	No charge of refrigerant in system operated by a low pressure control switch.	Recharge.
	Solenoid valve on liquid line closed.	Replace or repair.
	No voltage or low voltage.	Check for voltage.
Water valve chatters	Water pressure too high.	Reduce water pressure.
Cylinders and crankcase sweating.	Too much oil in circulation.	Examine for conditions of refrigerant and oil charge. Correct the condition.
	Liquid refrigerant in circulation.	
Crankcase frosting	Liquid refrigerant returning to compressor.	Adjust expansion valve.

Table 6-3.—Trouble diagnosis chart—air-cooled condensers.

Symptom or difficulty	Condition may be due to	Correction
High head pressure	Airflow to condenser restricted.	Remove loose articles that would tend to restrict the flow of air.
	Air or noncondensable gas in system.	Purge air from system.
	Overcharge of refrigerant.	Draw off refrigerant into service drum.
Low head pressure	Leaky suction or discharge valve.	Test with gage, if leaking, replace.

Table 6-3.—Trouble diagnosis chart—air-cooled condensers —Continued.

Symptom or difficulty	Condition may be due to	Correction
Low head pressure—Continued.	Shortage of refrigerant.	Add refrigerant.
Low suction pressure	Restricted liquid line, expansion valve screen, or suction screens.	Pump down, remove, examine, and clean screens.
	Insufficient gas in system.	Check for gas shortage.
	Too much oil circulating in system.	Check for too much oil in circulation. Remove oil.
	Improper adjustment of expansion valves.	Adjust valve to allow more flow.
	Stuck or frozen expansion valve.	Tap or thaw expansion valve as necessary.
High suction pressure	Overfeeding of expansion valve.	Regulate expansion valve, check thermal bulb attachment.
	Leaky suction or discharge valves.	Test with gages; if leaking, replace.
Compressor is intermittent during high pressure cutout.	Insufficient air flowing through condenser.	Remove any debris that would block the airflow.
	High pressure cutout incorrectly set.	Check setting of high pressure cutout.
	System overcharged with refrigerant. High pressure cutout tripping due to insufficient condenser capacity.	Draw off refrigerant into service drum.
	Air or noncondensable gases in system.	Purge air from condenser.
Compressor is intermittent during low pressure cutout.	Coils in refrigerators clogged with frost. Suction or expansion valve screens clogged.	Pump down and clean screens.
	Thermal bulb on expansion valve has lost charge.	Detach thermal bulb from suction line and hold in palm of hand, gripping the suction line with the other hand. If flooding through is observed, bulb has not lost its charge. If no flooding through is observed, replace expansion valve.

Table 6-3.—Trouble diagnosis chart—air-cooled condensers —Continued.

Compressor is intermittent during low pressure cutout — Continued.	Condition may be due to	Correction
	(See low suction pressure above.)	(See low suction pressure above.)
Compressor runs continuously.	Shortage of refrigerant.	Test for leaks. Add refrigerant.
	Suction or discharge valves leak badly.	Test valves. If necessary, repair or replace.
	Head gasket blown between cylinders.	Replace gasket.
	Liquid, suction or expansion valve screen clogged. (With temperature control.)	Pump down and clean screens.
	Improper control settings, stuck electrical contacts.	Readjust control settings, clean and adjust contacts.
Compressor noisy,	Vibration; not bolted to foundation rigidly.	Bolt down rigidly.
	Too much oil in circulation causing hydraulic knock.	Check oil level.
	Wear of parts such as piston pins, eccentrics, etc.	Determine location of cause. Repair or replace compressor.
	Excessive high head pressure.	Check reason for high head pressure and correct.
	Lack of lubricating oil.	Check oil level and add as required.
Oil does not return to crankcase.	Valve in oil return line closed or stuck shut.	Open.
Compressor will not start.	Overload tripped, fuses blown.	Reset overload, replace fuses, and examine for cause.
	No charge of refrigerant in system operated by a low pressure control switch.	Recharge.
	Solenoid valve on liquid line closed.	Replace or repair.
	No voltage or low voltage.	Check for voltage.
Oil leaves crankcase	Leaky piston rings or worn cylinders.	Replace rings or compressor, or rebore and refit.

Table 6-3.—Trouble diagnosis chart—air-cooled condensers —Continued.

Symptom or difficulty	Condition may be due to	Correction
Oil leaves crankcase—Continued.	On starting, suction pressure drops too rapidly.	Run the compressor intermittently.
Cylinders and crankcase sweating.	Too much oil in circulation. Liquid refrigerant returning to compressor.	Examine for conditions of refrigerant and correct the condition.
Crankcase frosting	Liquid refrigerant returning to compressor.	Adjust expansion valve.
Head gasket leaks	Head bolts stretched or washers crushed.	Examine gasket, replace if necessary. Tighten head bolts. Replace washers. (NOTE: Head bolts are generally tightened with a torque wrench.)

maintenance. If the repair of the system can not be accomplished by authorized adjustments or repairs, assistance should be requested in accordance with instructions contained in Training Devices Guide, NAVSO P-530-2.

Repair Equipment

Small tools required for repair operations are hammers, hacksaws, tube and wire cutters, piping tools, wrenches, pliers, screwdrivers, files, and hand levels. Also needed is such equipment as a halide torch, gas torch, pressure gages, and a refrigerant charging assembly. (See fig. 6-9.) Many air-conditioning manufacturers furnish a set of special tools for maintaining the specific system of equipments.

Service gages come in the form of a gage manifold with the necessary valves and connections. The pressure gage is on one side, and the compound gage on the other. (See fig. 6-10.) The gages are mounted on a manifold which has three line connections and two shutoff valves that separate the gage openings from the centerline connection. This manifold enables the repairman to connect his gages to the system and allows him to charge and discharge a system, check the pressures, add oil, and any other required operations.

As shown in figure 6-10, the manifold gage (A) is connected by a flexible charging line to the suction side (D) of the compressor. The pressure gage (B) is connected to the discharge side (C) of the compressor. The manipulation of the manifold shutoff valves for the various operations is illustrated in figure 6-11.

To install the gages shown in figure 6-10 proceed as follows:

1. Remove the cap of the compressor suction service valve, and turn the valve stem outward as far as it will go to its back seat. This closes off the service gage port from the compressor crankcase and suction line.
2. Remove the plug from the gage port, and replace it with a flared tube connector fitting.
3. Connect the flared tube fitting with the flexible tube on the 30-inch vacuum, 150-lb compound gage side of the manifold.
4. Move the valve stem of the suction service valve inward, off the back seat, about one-half turn, and tighten the gland nut.
5. Crack the valve on the compound gage side of the manifold, to allow air in the flexible line to escape through the service drum connection.
6. Repeat the same procedures to connect the pressure gage side of the gage manifold to the service port of the DISCHARGE service valve.

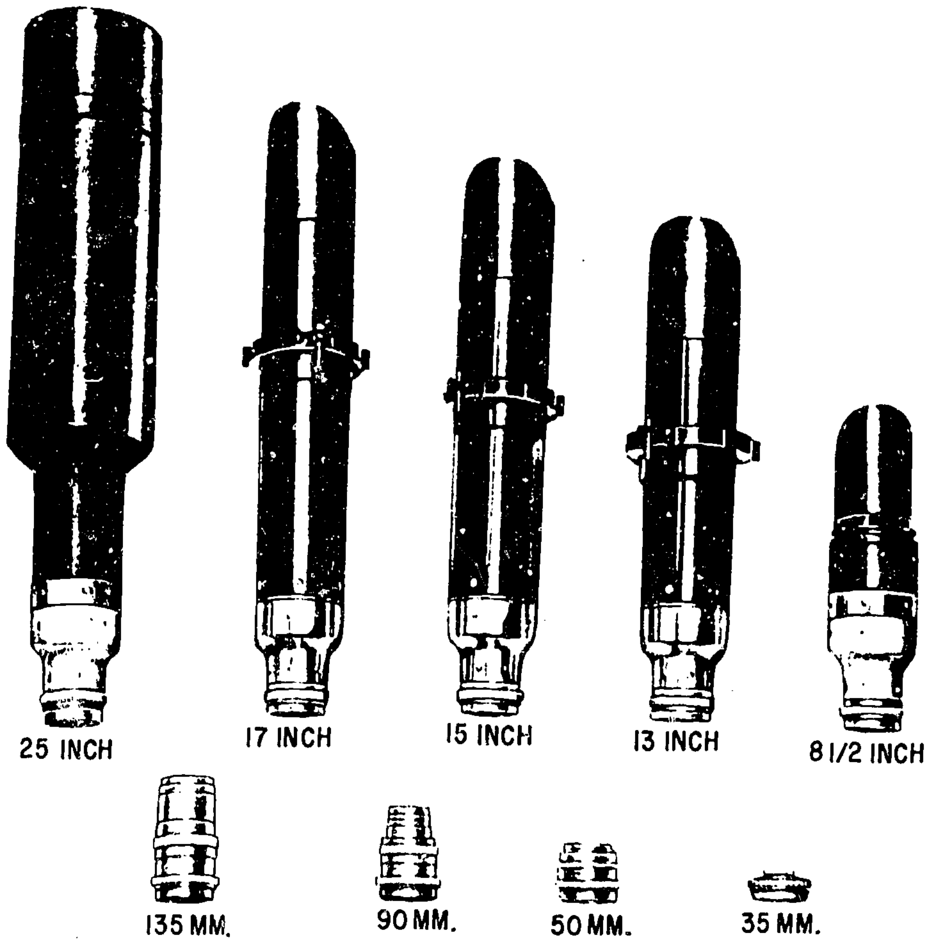


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Figure 7-7. —TV camera lenses.

from small and short to large and long. The purpose of the various lenses vary from the wide-angle lens for large area coverage, to the telephoto lens for narrow coverage at long distances.

A special lens called the "zoom" lens is used for special effects. This lens can be varied from the normal visual coverage to distant closeups. In some installations the lens is manually adjusted, while in other TV cameras it is motor driven. The lens may be adjusted either manually or by an automatic motor-driven device.

FOCUSING

Adjusting or changing the distance between the focal plane and the lens is termed focusing. To aid in accurate focusing, cameras of the view and press type have a focusing screen which is a piece of ground glass placed at the focal plane of the camera on which the subject is focused. This device provides a definite plane upon which the eyes may focus, and insures that the image formed by the lens is focused upon the same plane. The focusing screen should never be confused with the focal plane.

When the distance from the lens to the object focused upon is changed, there must be a corresponding change in the distance from the lens to the focal plane.

When the lens is focused on an object so distant that the light rays reflected from it are essentially parallel, these rays converge, after refraction by the lens, at the point of principal focus. The point of principal focus is on the principal focal plane which is at a distance of one focal length behind the lens. Therefore, the lens is said to be on infinity focus.

If this distant object is moved closer to the lens or the lens is moved closer to the object, the distance between the focal plane and the lens must be increased to keep the image sharp. When the distance between the lens and the focal plane is not extended as the object is moved closer to the lens, the image of the object becomes blurred or out of focus. Hence, as explained earlier, the size of an image formed by a lens is dependent upon two factors; the distance from the lens to the object focused upon, and the focal length of the lens.

In most types of photography it is necessary to have several objects which are at different distances in sharp focus. This means compromise because the lens cannot focus directly on several objects at different distances from the lens. If it is focused directly on a point near the lens, the distant point is not sufficiently sharp. Then again, if it is focused exactly on the far point, the near point is out of focus. The best overall sharpness of both points can be obtained by focusing the lens a little in front of the halfway mark between the near and far points. (See fig. 7-8.)

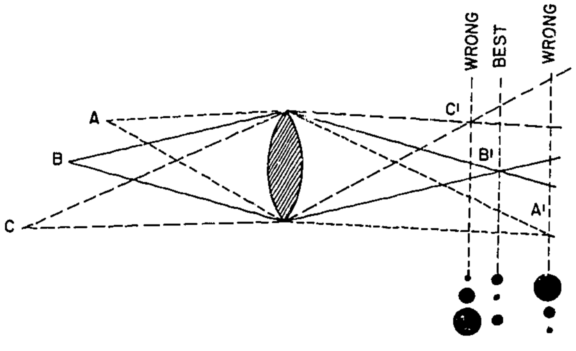

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Figure 7-8. —Focusing in front of the halfway mark.

THE f-VALUE OF A LENS

To use the lens advantageously, the TD must thoroughly understand the relation between the aperture and the brightness of the image produced at the focal plane.

The term relative aperture means the ratio between the effective aperture of the lens and its focal length. The relative aperture of a lens is controlled by two factors: the diameter of the beam of light passed by the lens; and its focal length, which governs the size of the area over which the light is spread. Then,

$$f = \frac{F}{D}$$

Where

F = focal length

D = diameter of the effective aperture

f = f/number, or the relative aperture

EXAMPLE: What is the f/number of a lens that has a focal length of 8 inches and the diameter of the effective aperture is 2 inches? By using the formula,

$$f = \frac{F}{D}$$

$$f = \frac{8}{2}, \text{ or}$$

$$f = 4$$

Therefore, the lens has a relative aperture of f/4.

Simple arithmetic shows that the area of a circle varies as the square of its diameter. Photographically, this means that when the diameter of the opening is made smaller, less light is admitted and the image formed by the beam of light passing through the smaller opening becomes dim. Furthermore, as the size of the opening in the lens is reduced, the ratio,

$$f = \frac{F}{D}$$

between the aperture and the focal length is increased. Then as the f/number becomes larger, the size of the relative aperture is decreased.

The focal length of the lens is the other factor which affects the brightness of the image formed upon the focal plane. Figure 7-9 depicts how this principle of the lens affects image brightness.

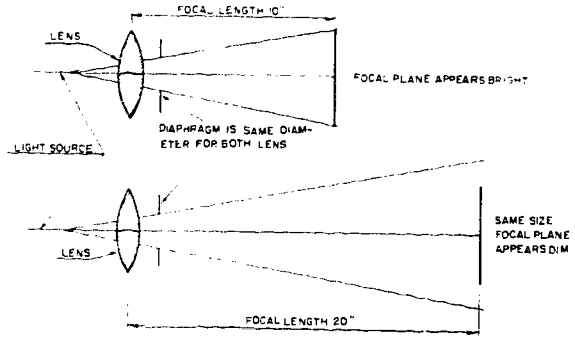

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Figure 7-9.—Image brightness affected by focal length.

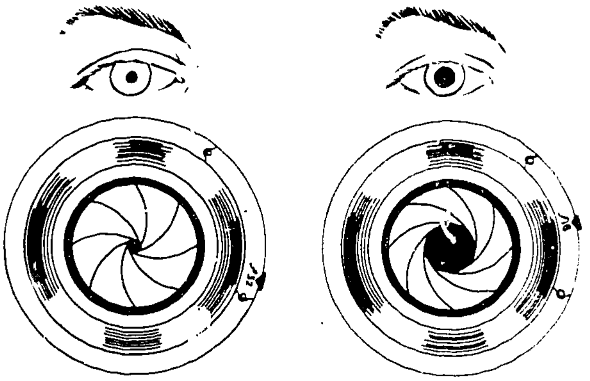

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Figure 7-10.—The iris and iris diaphragm.

The strength or intensity of the light admitted by a lens varies inversely at the focal plane as the square of the distance it must travel (from the lens to the focal plane).

Since the f/number is a ratio of focal length and the lens diameter, all lenses which have the same f/numbers, regardless of focal length should give the same amount of light on the focal plane; that is, if all the other factors that affect image brightness remain constant.

THE DIAPHRAGM

There is placed in every lens assembly some mechanical device for controlling the amount of light which passes through the lens. This mechanism may have a fixed size, or it may be designed to allow a selection among a number of sizes that can be given to the aperture in a lens. This device is a diaphragm (or iris) and is frequently called stops. It is located within the lens to cut off or obstruct the marginal rays while permitting the more central rays to pass. Most lenses have a series of thin metal leaves for this purpose. These leaves are arranged and shaped to provide an approximately circular opening which can be changed in size when desired. This device, which is used to form and control the size of the aperture or opening in the lens, is called an iris diaphragm. (See fig. 7-10.)

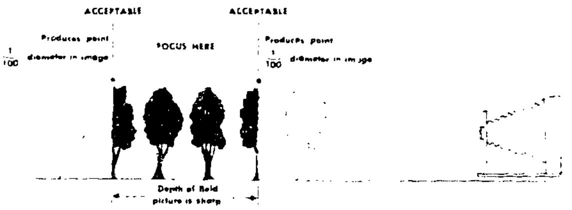
The diaphragm or iris is controlled by a ring or a lever by which its aperture size can be changed. By using this ring or lever, an index mark can be brought into line with the numbers that indicate the measured f-value of the aperture. As these index numbers increase in size, the opening decreases in size. Furthermore, these numbers are so chosen that by moving the index pointer to the next larger number, the amount of light admitted is cut in half; it should be recalled here that the first or lowest number in the series is usually an exception. All these numbers may not fall exactly within this ratio, but they are sufficiently close for practical purposes. However, the TD will find that the exact variation in all of these values is in proportion to the squares of their numbers. For example, f/4 admits four times more light than f/8 because the square of f/4 is contained in the square of f/8 exactly four times.

DEPTH OF FIELD

The hyperfocal distance of the lens is defined as the distance from the optical center of the lens to the nearest point in acceptable sharp focus when the camera is focused on infinity at any given f/number.

Depth of field is the range of distances on the near and far side of the plane focused upon within which all objects are in acceptably sharp focus. When a lens is focused at infinity, the hyperfocal distance of that lens is defined as the near limit of the depth of field, while infinity is the far distance. When the lens is focused on the hyperfocal distance, the depth of field would be from exactly half that distance to infinity. Figure 7-11 shows a typical depth of field of a lens.

The depth of field of a lens is controlled by, and all computations are based upon, the distance focused upon and the hyperfocal distance.



TD. 448

Figure 7-11. —Depth of field.

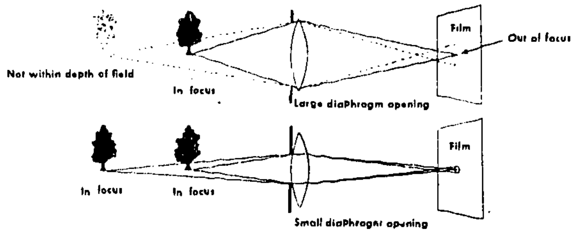
In addition, it should be recalled that the hyperfocal distance of a lens is affected by the focal length and the f/number of the lens. Consequently, the following factors control the depth of field:

1. Focal length of the lens.
2. f/number used (the size of the diaphragm opening).
3. Distance from the lens to the object being focused.

A short focal length lens has a greater depth of field than a long focal length. Hence, the shorter the focal length of the lens used, the greater the depth of field.

Depth of field increases as the lens opening (aperture) is decreased because the size of the cones of light decreases in proportion to the aperture as shown in figure 7-12.

Physical limitations in the design of lenses, discovered in the laws of geometry, make it impossible to manufacture a lens of uniform quality and performance from its center to its edges. Therefore, to obtain the best quality with most lenses, many manufacturers recommend eliminating the use of the lens edge by decreasing the diaphragm opening about two stops from the largest aperture. This recommended stop, about two full stops below the maximum aperture for moderately fast lenses, is termed the critical aperture, or the optimum aperture. The critical aperture for a particular lens refers to the stop where the lens renders the best definition. The critical aperture for any lens may be found in the manufacturer's information pamphlet accompanying the lens or from the manufacturer.



TD. 449

Figure 7-12. —Effect of diaghragm on depth of field.

LENS CARE

The lens is one of the most important parts of the camera unit. It is certainly an important item, since the remainder of the equipment is of little value without a lens. For this reason the lens should be given considerate and careful treatment. Severe damage to a lens can result from careless handling or improper stowage. By caring for and handling lenses as outlined in the following paragraphs, any lens should normally outlast the camera unit on which it is mounted.

The glass used in lens construction is much softer than ordinary glass. Therefore, it cannot be treated like any other piece of glass. The lens must be protected from shocks, force, and compression, since any one of these will produce great differences in the internal structure of the glass.

The lens barrel should not be forced into a mount nor compressed in any other manner, because force and compression will produce changes in the internal structure of the glass.

The perspiration and natural oils from the fingers cause deterioration of the lens surface polish and dim the image. Keep the lens cap on when not using the lens. This not only protects the surface, but it also requires less cleaning of the lens.

The lens should not be subjected to chemical fumes, steam, salt spray, excessive heat, or moisture. If the lens is necessarily exposed to any one of the above, it should be given a thorough cleaning before storing.

Lenses should never be stored in spaces which are excessively warm or damp. They will remain in good condition if stored in air of average humidity at about 70° F. Furthermore, each lens should be mounted ready for use, and the storage shelves arranged to hold each lens mount vertically. As a result, each lens is supported by its own lens rings at the point where the least strain is placed on the cells.

In areas where the temperature and humidity are high, the lenses should be stored in a dry locker. Each time they are removed for use, they should be cleaned and polished before being returned to the locker. They should also be inspected at regular intervals as a precaution against fungus growths.

Cleaning the Lens

Cover a table with a clean blotter or paper to prevent the possibility of damage to the lens surfaces if they should come in contact with the table. First dust the outer surfaces of the lens with a camel's-hair brush to remove the larger particles which may scratch the surface. Then spray the surface with a recommended lens cleaning fluid and wipe gently with lens tissue, using a circular motion and light pressure.

Treat the outer surface of the other cell in the same manner, and examine the assembly by looking through it. Further cleaning should not be needed.

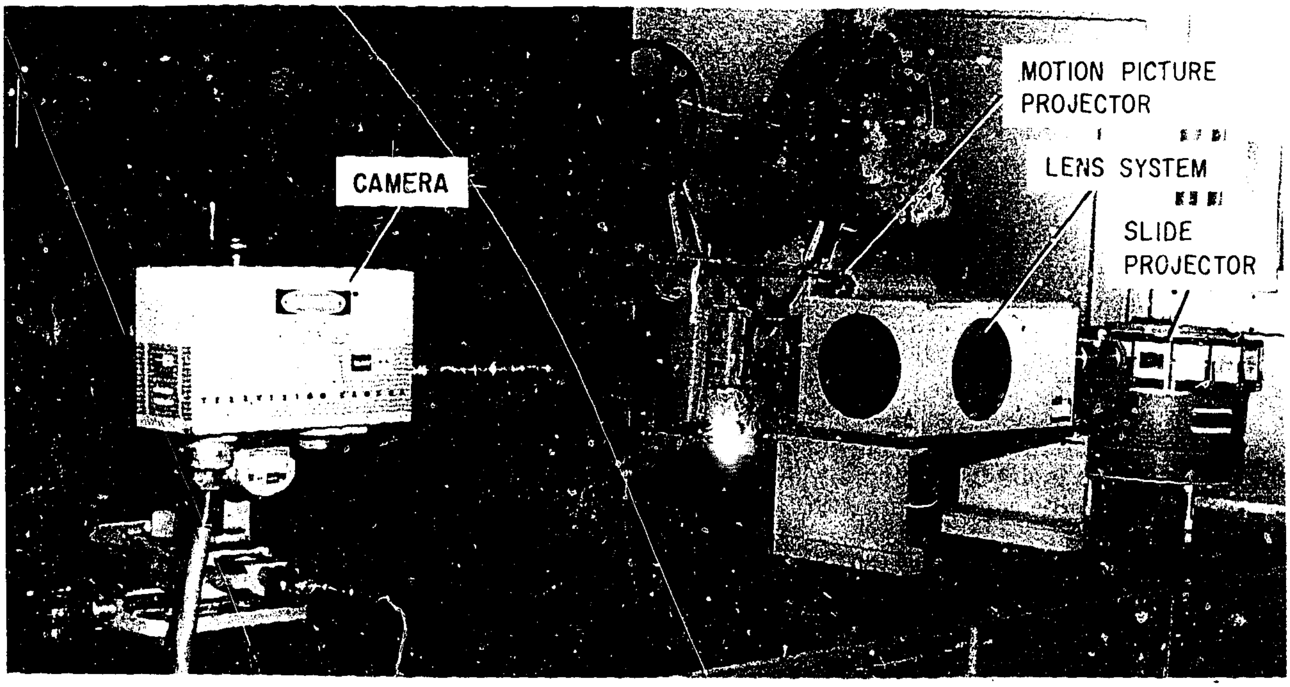
MULTIPLEXER

To televise motion picture film, slides, or any prepared visual material, a specially constructed unit called an optical multiplexer (fig. 7-13) is used. One or more motion picture projectors are mounted on a base unit. A drum type slide projector is also provided. These projectors are aimed at a box containing a system of semimirrors (a reflective surface through which light will also pass). The pickup camera is aimed at the semimirrors, allowing the camera to pick up and transmit pictures from any one projector or any combination of the projectors.

A local control unit is mounted on the base unit for the operator's control of the projectors. Control of the multiplexer can be reassigned to a remote station.

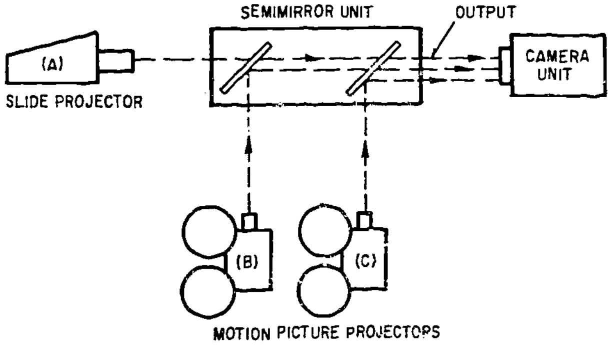
The projection of the pictures from the projectors to the camera is illustrated in figure 7-14. The light rays from the slide projector (fig. 7-14 (A)) pass straight through the semimirrow. The projection from the motion picture projectors (fig. 7-14 (B) and (C)) is reflected from the semimirrors to the camera.

Variac transformers, located in the base unit, control the illuminating voltage for each projector. Varying the projector lamp illumination is necessary for good reproduction.



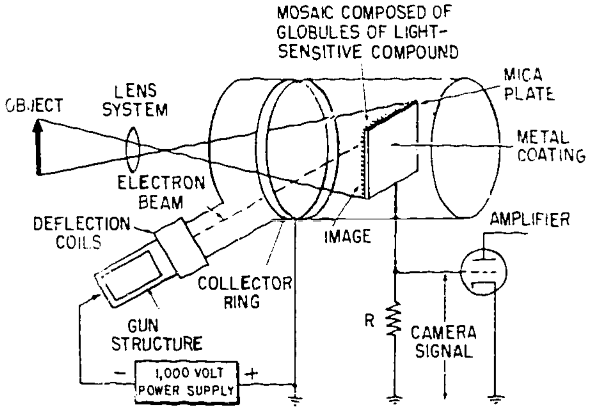
TD. 450

Figure 7-13.—Optical multiplexer.



TD. 451

Figure 7-14.—Block diagram of a multiplexer.



TD. 452

Figure 7-15.—Structure of an iconoscope

PICKUP TUBES

The type of pickup tube used in various camera units is determined by the intended use of the camera. The amount of illumination available for the pickup tube is also a determining factor. The amount of light required by the pickup tube is rated in foot-candles (ft-c). The least number of ft-c required by the pickup tube indicates the sensitivity of the tube.

The following pickup tubes represent typical types and their uses. Other types are in use and many be encountered as one becomes familiar with the various TV systems.

ICONOSCOPE

One of the first pickup tubes developed was the iconoscope. Its present use is relatively limited to high illumination installations (multiplexer). However, its principle of operation affords a fundamental example of a pickup tube.

Figure 7-15 shows the structure of the iconoscope type of picture tube. The image of the object is formed on the mosaic by the lens system. The mosaic is composed of many thousands of tiny isolated elements, thus allowing the picture to be analyzed into a fineness of detail that is limited only by the size of the individual "islands" and by the size of the scanning electron stream.

The islands, or globules, are deposited on a sheet of mica, the back surface of which has a continuous metallic coating. Thus, each globule is capacitively coupled to the continuous metallic coating which serves as the signal electrode. When a scene is focused on the mosaic, the globules emit photoelectrons and become electrically charged by an amount proportional to the brightness of the picture elements. As the line scanning electron stream comes along, the electrons, having a velocity generated by approximately 1,000 volts, strike these globules and discharge them to an equilibrium voltage. The basis of operation is due to secondary emitted electrons caused by bombardment of the mosaic by the high velocity electron beam. The collector ring collects the secondary electrons (the number is determined by the relative charges on the mosaic) and provides a path through the developing resistor to the metallic plate. The electron flow through R is indicative of the light intensity variations focused on the mosaic.

The amount of discharge is proportional to the accumulated charge stored up since the previous electron scan. The discharge of the globules is capacitively coupled to the continuous metallic backplate. In this way the scanning beam produces a series of electrical signals from the globules in the mosaic, and one collecting electrode furnishes a connecting point for the lead to the video amplifier.

The signal from the collecting electrode is about 1 millivolt, and its frequency components may vary from 30 Hz to as high as several MHz.

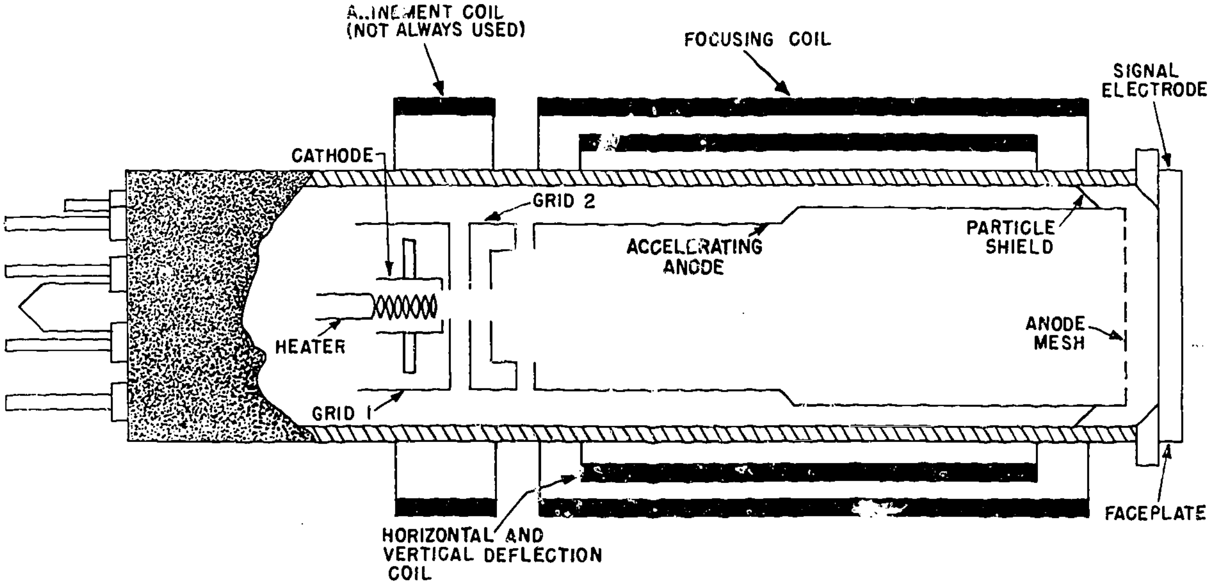
The iconoscope picture tube requires 800 ft-c of light and is now mostly limited to motion picture pickup work found in multiplexer equipment. In this tube, both the scene to be transmitted and the electron stream are projected onto the same side of the photosensitive surface. Because the electron stream has an accelerating voltage of approximately 1,000 volts, considerable energy is present in the beam and much of the performance of the iconoscope depends upon secondary emission in charging and discharging the globules on the mosaic.

VIDICON TUBE

The Vidicon camera pickup tube (fig. 7-16) has a transparent conductive coating, called the signal electrode, on the inner surface of the faceplate; a layer of photoconductive material deposited on the signal electrode; an accelerating electrode; a focusing electrode; and a cathode emitter for producing a beam of electrons.

The beam of electrons is directed toward the layer of photoconductive material (on the cathode side of the signal electrode) at a medium velocity because of the relatively low accelerating potential between the cathode and the accelerating electrode. A sharp beam is formed by the electrostatic field of the focus electrode and the axial magnetic field of the focus coil surrounding the tube. The electron beam is deflected by the deflection coil in such a way as to scan the photoconductive layer. When no light is permitted to reach this layer, its resistivity is extremely high. One side of the layer is maintained at cathode potential through contact with the scanning beam, and the other side is maintained at a small positive potential of 0 to 70 volts by direct contact with the signal electrode.

When light from the scene being televised passes through the faceplate and is focused onto the photoconductive layer, the resistivity of this material (which had been extremely high) is reduced in proportion to the amount of light reaching it. Because the potential gradient between adjacent elements of the photoconductive layer is much less than the potential grandient between opposite sides of the layer, electrons from the beam side of the layer leak by conduction to the other side between scans of the electron beam. Consequently, the potential of each element on the beam side approaches the potential of the signal electrode side and reaches a value that varies with the amount of light falling on the element. On the next scan, the electron stream replaces a number of electrons on each element just sufficient to return it to the potential of the cathode. Because each element is effectively



TD.453

Figure 7-16. —Structure of Vidicon tube.

a small capacitor, a capacitive current is produced in the signal-electrode circuit that corresponds to the electrons deposited as the element is scanned. When these electrons flow through the load resistor in the signal-electrode circuit, a voltage, which becomes the video signal, is produced.

Associated with the Vidicon tube are the alinement coil, the focus coil, and the deflection coils. The alinement coil produces a magnetic field that is variable in both magnitude and direction and is used to adjust the direction of the electron beam so that it is parallel to the field of the focus coil. Control of the alinement coil current is accomplished in the control unit.

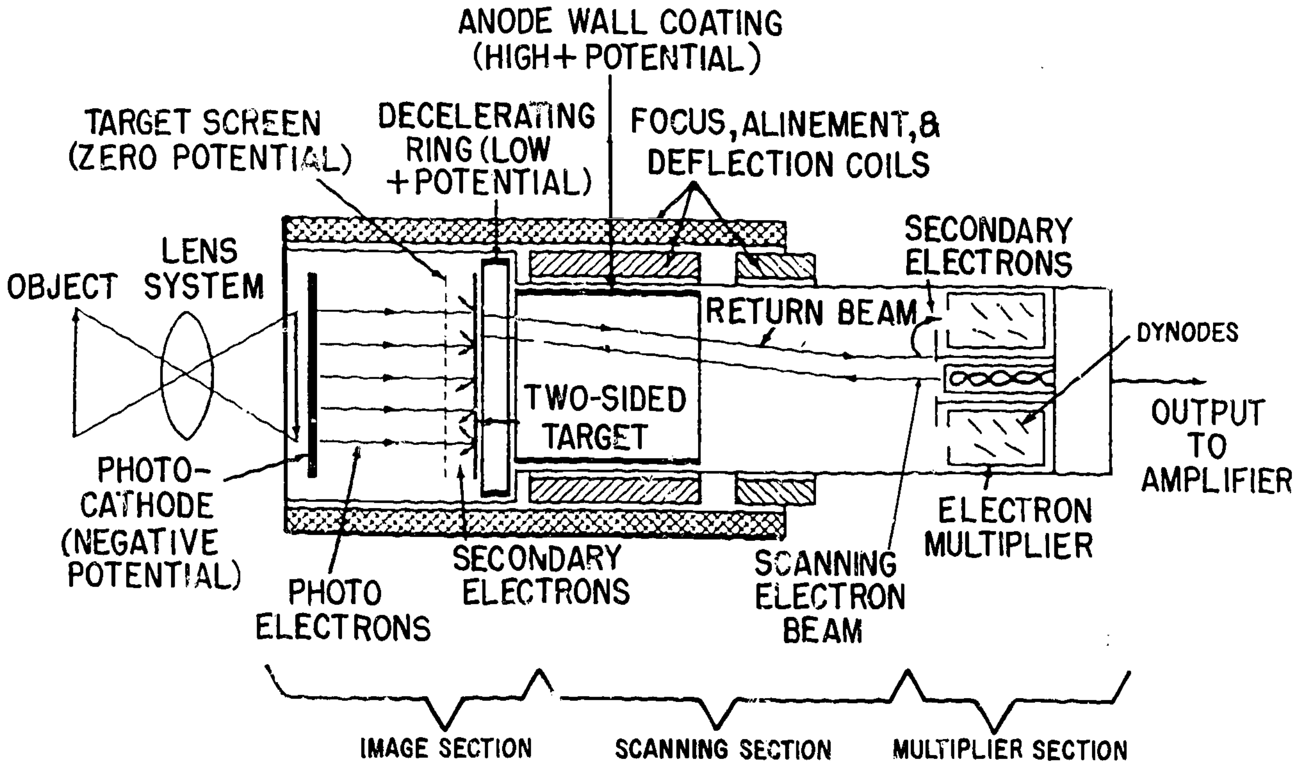
The focus coil surrounds the Vidicon tube and establishes a magnetic field along the axis of the tube. It is connected between the +300-volt and the +150-volt power supplies through a resistor that is located in the rotatable section of the base unit.

The vertical and horizontal deflection coils are excited by linear sawtooth currents from the control unit. These currents produce the field that causes the beam to scan the photosensitive layer.

IMAGE ORTHICON

The image orthicon (fig. 7-17) is an ultrasensitive television camera pickup tube. The tube requires only 8 to 40 ft-c of light and is used in modern conventional and closed circuit television systems. When this tube is used, a light image from the subject (arrow at extreme left) is picked up by the camera lens and focused on the light-sensitive face of the tube, releasing electrons from each of the thousands of tiny globules in proportion to the intensity of the light striking it.

These electrons are directed on parallel courses from the back of the tube face to the target, from which each striking electron liberates several more electrons, leaving a pattern of proportionate positive charges on the front of the target. When the back of the target is



TD. 454

Figure 7-17. —Structure of image orthicon.

scanned by the beam from the electron gun in the base of the tube, enough electrons are deposited at each point to neutralize the positive charges, the rest of the beam returning as shown in figure 7-17, to a series of electron multiplier stages or dynodes, surrounding the gun.

Each dynode is a metallic disk with openings similar to a pinwheel and operates at a positive potential of 200 to 300 volts greater than the preceding dynode. Multiplication occurs through secondary emission at each dynode. If five dynode stages are employed, each with a gain of 4, them (4 x 4 x 4 x 4 x 4) a gain of approximately 1,000 is realized in the multiplier section. Considering the gain of 5 in the image section, the overall gain of the image orthicon is 5,000 which allows this particular pickup tube to operate with relatively less light than the iconoscope or vidicon. The electrons from the last dynode are routed through a signal developing resistor to an extremely high B plus voltage. The output signal is then coupled to the first stage of video amplification.

OTHER CAMERA TUBES

The "image dissector" is another type of television camera tube in common use. In such a tube, the scene is focused upon a continuous photosensitive surface (such as a film), and the resulting photoemission is focused as a pattern by suitable focusing fields and accelerated toward a small collecting aperture. The whole photoelectric pattern of streaming electrons is then deflected in a scanning process, so that individual areas of the picture are successively brought to impinge upon the small aperture. The electron stream collected in this manner is amplified by several stages of electron multipliers used secondary emission. The output of the multipliers is then fed to a video amplifier.

Another type of scene scanning (camera) tube is called a "flying spot" scanner. This scanner is used to project slides or still pictures.

The complete scanner (fig. 7-18) requires the following units:

1. A standard sync generator.

2. A sweep unit for deflecting the electronic beam of a cathode-ray tube with a short persistence phosphor (ordinary picture tube).

3. Optical means for imaging the raster (the illumination of the picture tube) on variable density or opaque subject matter.

4. A multiplier type photocell to collect either the transmitted or reflected light and represent the variable density or variable reflection as an instantaneous voltage variation with time.

5. Suitable mixing circuits to provide composite video output. The raster traced out on the short persistence screen results in a moving light source which is the basis of the whole operation.

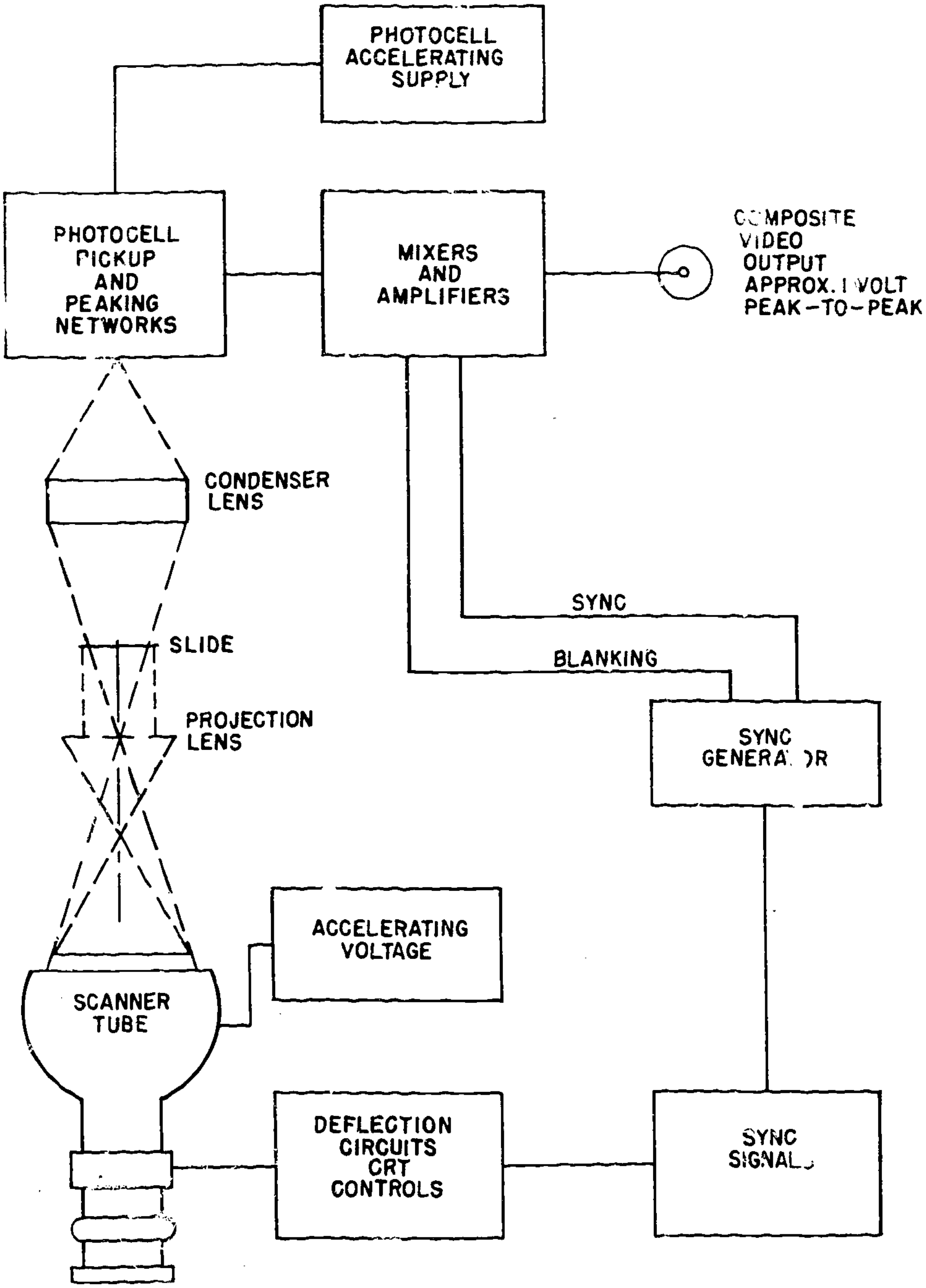
Because the decay time of the moving point source of light is relatively long compared to the period of the highest frequency components desired in the video signal, special peaking circuits (to be described later) must be used. The multiplier type photocell produces a high level output signal with good signal-to-noise ratio. In order to get high resolution (good detail) in the video output signal, the low frequency components in the output must be attenuated considerably to bring up the high frequency components. This may be accomplished with selective amplifiers, with RC networks, or with RL networks.

When a slide is to be transmitted, the raster traced out on the cathode-ray tube is imaged optically on the side to be reproduced. Condenser lenses are used past this focal plane to collect the maximum light energy passing through the slide, and to converge this energy to the aperture dimensions of the multiplier photocell.

BASIC CAMERA CIRCUITS

The purpose of camera amplifier circuits is to amplify the extremely low output signal from the pickup tube. The video signals must be increased in amplitude to overcome tube and circuit noises. Random circuit noise and hum will impose itself into the video output.

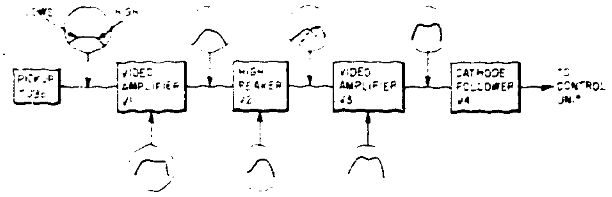
The camera circuits are carefully designed to amplify the high and low frequencies equally. The output of the pickup tube (fig. 7-19) must be as large as possible. The output circuit contains high resistance which gives good gain to low frequencies, but low gain to high frequencies. Because video signals contain both frequencies, stages of amplification are designed to amplify one frequency more than other frequencies.



TD. 455

Figure 7-18.—Slide scanner using flying spot scanner.

The video amplifier (V1) amplifies the video signal from the pickup tube. The low frequencies are amplified more than the high frequencies. (Note wave forms showing frequency response of each block.) V2 is part of a "peaker" circuit whose function is to amplify the high frequencies, while the video amplifier (V3) amplifies all frequencies. The video signal, having been amplified, is routed through a cathode-follower amplifier (V4). V4 is used to match the impedances of the camera unit to the control unit via coaxial cables.



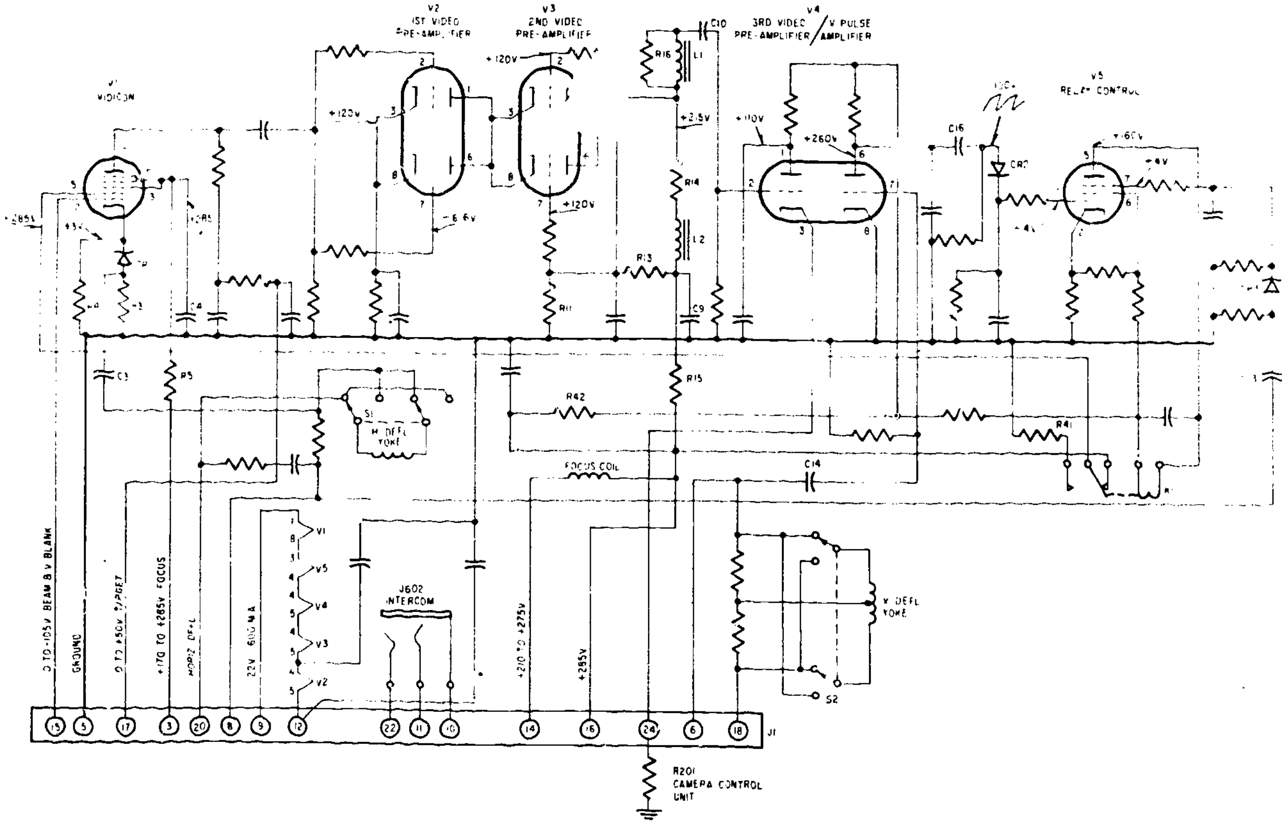
TD. 456

Figure 7-19. —Camera unit block diagram.

The camera unit (fig. 7-20) of the X8F1 CCTV system provides an example of camera unit circuits. The detailed descriptions of individual circuits are contained in Basic Electronics, NavPers 10087-B.

V1 is the schematic presentation of the Vidicon pickup tube. Like the common schematic presentation of electronic tubes, the tube elements of V1 are electronically the same; however, the terminology employed differs somewhat. The filaments of the tube require filament voltage and current. The control grid is referred to as the beam control, while the plate is called the target control.

The video signal leaves the pickup tube (V1) on pin C of the tube. A variable d-c focusing voltage is applied to pin 6 of V1 via the decoupling network R5 and C4. A fixed positive accelerating voltage is applied to pin 5 of V1 through the contacts of K1, from pin 16 of J1. K1 is normally closed when operating. A variable beam control bias and vertical banking pulses are applied to pin 2 of V1 from pin 15 of J1. A pulse derived from the horizontal deflection yoke through S1 (shown in normal position) is differentiated by C3 and R3, clipped by CR1 and R4, and applied to the cathode of V1 as a sharp positive horizontal blanking pulse.



TD. 457

Figure 7-20. —Camera unit, device X8F1.

The synchronized video output, taken from pin C of V1, is fed to V2 and V3, which are connected as cascode amplifiers (a grounded-cathode input stage feeding a grounded-grid second stage). The input signal appears at the control grids of V2. The voltage divider network for the output tube V3 is R11, R13, R14, and R15. The output signal from the plates of V3 is developed across the shunt peaking network R14 and L2 with decoupling by R15 and C9. The signal is coupled through the series peaking network R16, L1, and C10 to the control grid of V4.

V4A is a cathode-follower circuit with the cathode resistor (R201) for the circuit located in the camera control unit. The cathode resistor develops the video signal in the camera control unit from the camera unit. Location of the cathode resistor in the camera control unit reduces signal loss normally associated with long connecting cables. Switches S1 and S2 reverse the connections to the horizontal and vertical deflection yokes, changing the picture from left to right and upside down, respectively. This allows the operator to check the centering of the deflection circuits.

Relay K1 is a protective switch for the pickup tube. If either the horizontal or the vertical deflection signals fail, V5 will not conduct, allowing K1 to open. Thus, the acceleration voltage is removed from pin 5 of V1. A portion of the vertical deflection signal is routed through C14 to the control grid of V4B. The amplified signal coupled through C16 is rectified by CR2 and applied as positive bias to the control grid of V5. Similarly, a pulse from pin 8 of J1 passes through C13, is rectified by CR3, and is applied as positive bias to the suppressor grid of V5. K1 is in the plate circuit of V5; and as long as plate current flows, the relay stays energized. If the bias voltage on either pin 1 or pin 7 of V5 is removed, the tube will stop conducting, causing K1 to deenergize. When K1 is deenergized, voltage is removed from pin 5 of V1, and the grid is grounded through R41. This circuit protects the target screen from burning due to the scanning electron beam stopping.

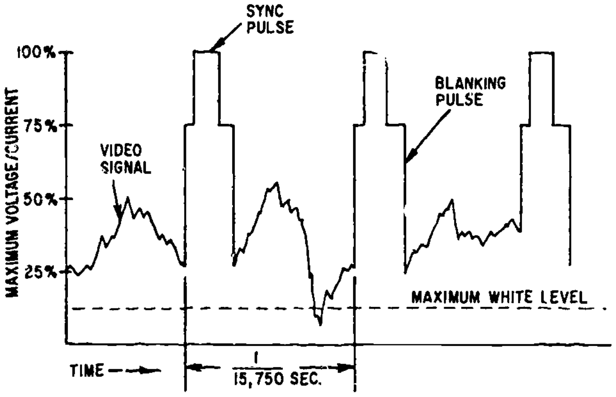
COMPOSITE VIDEO

The composite video signal contains all the information needed to reproduce the picutre. Included is the video from the camera unit, synchronizing pulses to synchronize the transmitter signal with the receiver/monitor, and blanking pulses to obliterate the retrace signals from the picture tube. The video signal is combined with the blanking pulse (fig. 7-21): the sync pulse is placed on top of the blanking pulse.

In the composite video signal, successive values of voltage and current amplitudes are shown against values of time during the scanning of three horizontal lines. During the time when blanking and sync pulses are being transmitted, no video is appearing. The overall signal amplitude is divided into two parts: the lower 75 percent is for the video, and the upper 25 percent is devoted to synchronizing pulses. Standardization is necessary to insure that the transmitted signal is suitable for all receivers/monitors.

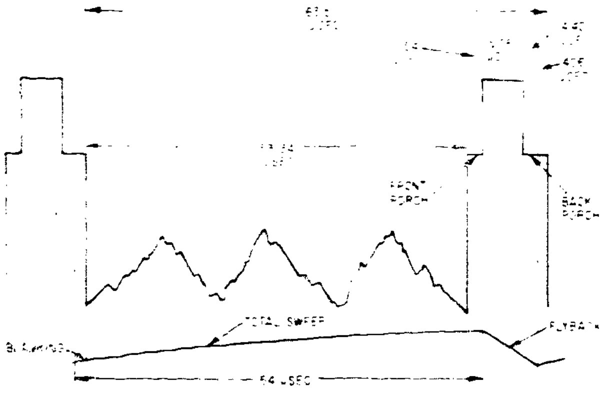
The lowest amplitudes correspond to the whitest parts of the picture. The picture becomes blacker as amplitude increases toward 75 percent. This standard of transmission is called "negative transmission," which is defined as decreasing signal amplitude for decreasing light intensities. As the level reaches 75 percent, the grid cuts off the picture tube and the absence of light establishes the blackest level, which is the case when the blanking level occurs.

Details of the horizontal blanking and sync pulse are shown in figure 7-22. The interval of the complete scan is 63.5 microseconds since horizontal frequency is 15,750 Hz. The



TD.458

Figure 7-21. —Composite video signal.



TD. 459

Figure 7-22. —Composite video time allocations.

horizontal blanking pulse is 10.16 microseconds, or about 16 percent of total sweep. The sync pulse, superimposed on the pedestal, occupies 5.08 microseconds or one-half the blanking time.

The part of the pedestal just before the sync pulse (0.254 microsecond) is called the "front porch"; the portion following the sync pulse (4.826 microseconds) is called the "back porch." The front porch blanks the right side of the picture screen just before the sync pulse begins. Flyback occurs with the leading edge of the sync pulse and continues for 4.42 microseconds of the back porch. The next sweep starts, but the left side of the screen is blanked for 0.406 microsecond of the starting sweep. This action strives to maintain a straight left edge.

The vertical blanking pulse blanks the picture during retrace time when the electron beam has completed one field and is returned to the top ready to start the next field. Immediately following the last active line, the video signal is brought up to the black level by the vertical retrace.

So far in the discussion little has been said about the special form of the combined synchronizing pulses. The form and the timing of the synchronizing pulses are such that the horizontal and vertical oscillators are triggered at exactly the right instant to keep the sweep in the camera tube and the sweep in the picture tube locked in step. Because the horizontal oscillator must be triggered during the vertical sync pulse (to prevent the horizontal oscillator from drifting out of control), the vertical pulse is serrated, as shown in figure 7-23; that is, the vertical pulse is chopped into six pieces. The fluctuations resulting from serrations do not affect the operation of the vertical oscillator, but serve only to keep the horizontal oscillator properly triggered.

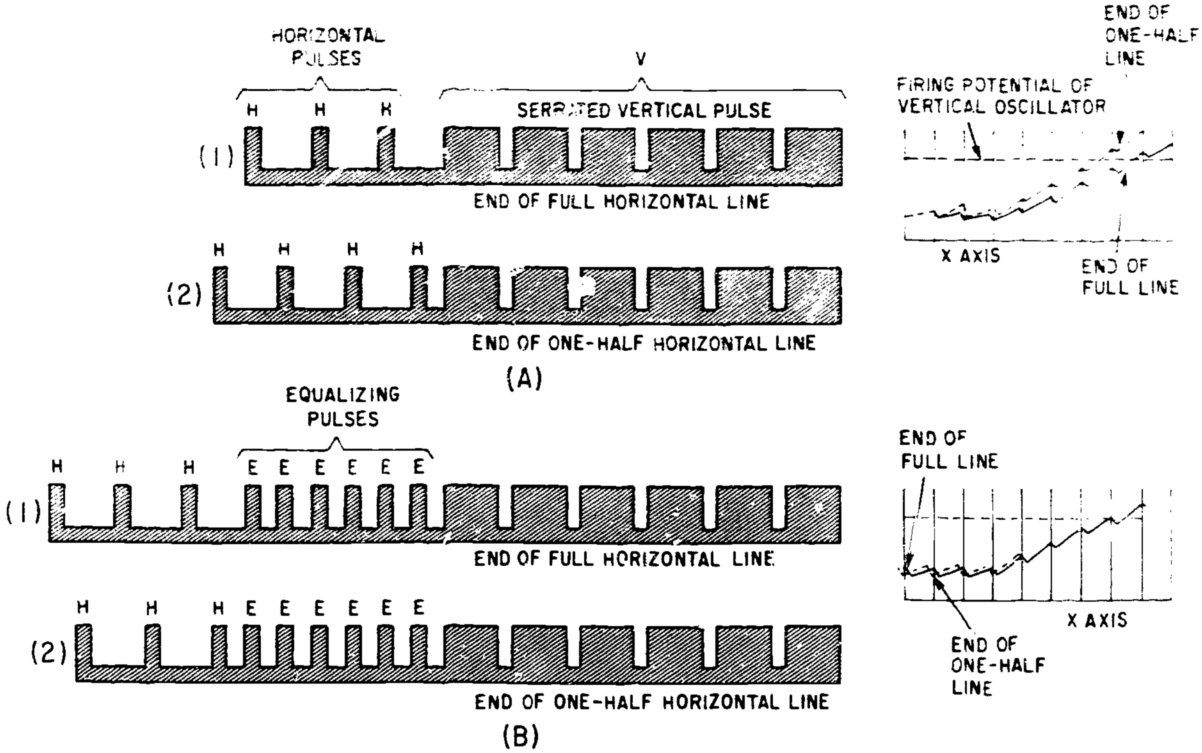
In addition to the serrations in the vertical pulse, equalizing pulses are necessary before and after each vertical pulse. The necessity for the equalizing pulses, labeled E in figure 7-23 (B), may be explained as follows:

First, it is assumed that no equalizing pulses are used, as in figure 7-23 (A). If the vertical pulse is inserted at the end of the field, which occurs simultaneously with the end of a full horizontal line (part (1)), the firing potential of the vertical oscillator is reached at the correct time to produce the desired interlaced scan.

If the vertical pulse is inserted at the end of a field, which occurs simultaneously with the end of a half horizontal line (part (2)), the firing potential of the vertical oscillator is reached too early. This results from the fact that the slight charge on the capacitor in the triggering circuit of the vertical oscillator (due to each horizontal pulse) does not have time to leak off before the vertical pulse arrives. The resisdual voltage across this capacitor, plus the voltage due to the vertical pulse, causes the vertical oscillator to fire too soon.

Second, the situation is corrected, as shown in figure 7-23 (B), by the use of equalizing pulses. The buldup of the vertical pulse across the capacitor now begins at the same point regardless of whether the vertical pulse arrives at the end of a full line or at the end of a half line. In other words, the equalizing pulses cause the potential on the capacitor to be at the same level (at the same time the vertical pulse arrives) regardless of whether the vertical pulse occurs at the end of a half line or at the end of a full line. Although not shown in the figure, equalizing pulses are also used after the vertical pulses.

A better idea of the form of sync pulses may be obtained from a study of figure 7-24. It may be seen that a number of horizontal scans are lost during the vertical flyback time.



TD. 460

Figure 7-23.—Synchronizing pulse forms. (A) Without equalizing pulses; (B) with equalizing pulses.

CONTROL UNIT

The sync pulse generator is located in the control unit of the CCTV system, device X8F1 (fig. 7-25). The purpose of the master oscillator (sync pulse generator) is to generate the basic oscillating signal which provides the vertical and horizontal blanking pulses and the sync pulses.

The output of the master oscillator sends a 31.5 kHz signal to the phantastron counter circuit where the vertical frequency of 60 Hz is developed. 0 Hz output is also sent to the horizont unter and sweep circuits.

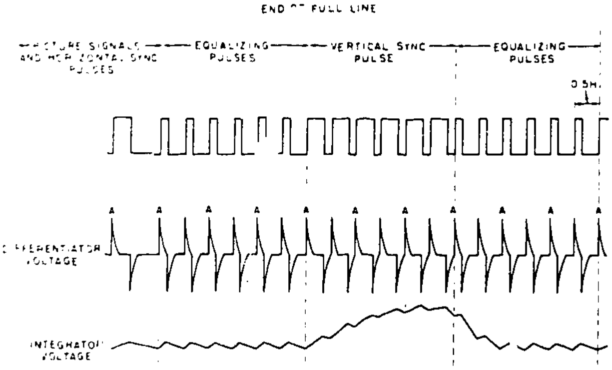
Outputs from the horizontal and vertical sweep circuits are sent to the camera unit for synchronizing the pickup tube. Both vertical and horizontal pulses are routed to the blanking mixer circuit where the combined pulses are sent to the composite video mixer. Video from the camera unit and the sync pulses are mixed and leave the control unit as the composite video signal.

A schematic diagram is included for each block contained in figure 7-25. When studying the individual circuit diagrams, refer to figure 7-25 to maintain overall continuity of the system.

SYNC GENERATORS

The master oscillator circuits (fig. 7-26) develop the timing signals for the entire CCTV system.

V401A and its associated components compose a single swing blocking oscillator. The oscillating frequency of 31.5 kHz (fundamental frequency) is determined by the RC time of C418, R450, and R447. At the same time the tank circuit consisting of C416 and L401 oscillates at 94.5 kHz. With these two circuits oscillating at the same time, the fundamental frequency (with the stabilizing signal superimposed on it at 94.5 kHz) appears on the control grid of V401A. The output signal from the cathode of V401A is fed to TP405, a test point where the output of the oscillator can be checked.



TD. 461

Figure 7-24. —Form of sync pulses the output integrator and differentiator voltages.

From TP405 the signal has two paths to follow: First, one through C420 to the grid of V402A; and second, one through C419 to the grid of V401B. V401B is a buffer amplifier used to separate oscillating stages. The output (31.5 kHz pulses) leaving the plate of V401B goes to the phantastron counter circuits. (See fig. 7-25.)

The other signal from TP405 (coupled through C420) goes to the grid of the multivibrator V402A (fig. 7-26). The time constant of the circuitry components is designed to trigger on every other pulse received from V401A. Thus with a 31.5-kHz input, the output is 15,750 Hz. Assuming that V402A is cut off, V402B is conducting. A positive spike from V401A brings V402A out of cutoff. Increasing the plate current of V402A causes an increase in voltage drop across R460, which is reflected on the cathode of V402B. The rise in cathode potential causes an increased bias on V402B which decreases conduction. This decrease is amplified by the discharge of C421 through R462, driving the grid further negative. This action continues until V402B goes to cutoff.

V402A continues conducting with V402B cut off until C420 discharges at an exponential rate to allow V402B to start conduction again. V402A conducts five times as long as V402B and results in a pulse output which is horizontal blanking.

The plate output of V402B is a square wave varying around a positive potential. The signal is coupled through C422 and applied to the grid of V403A and CR401. CR401 is a clamper, limiting the positive square wave and clamping the negative pulses at zero.

The output of the cathode follower (V403A) is a negative-going waveform which is routed to pin 3 of J102 which in turn is connected to the horizontal sweep circuits. (See fig. 7-25.)

COUNTER CIRCUITS

The vertical countdown circuits (fig. 7-27) consist of a series of counter circuits which divide the frequency of the resulting pulses by 5, 7, 5, and 3 to produce ultimately the 60-Hz vertical drive pulse.

The 31.5-kHz signal from V401, the master oscillator, comes into the circuit through C402 to the cathode of V404A. The phantastron tube (V405) is designed so that the control grid controls tube current and the suppressor grid controls plate current only.

By reviewing the static voltages indicated on V404A and V405, the static condition of V405 can be determined. Plate current is cut off by the suppressor grid of V405. Screen grid current is maximum, causing 35 volts to be present at the cathode. The control grid is also at a potential of 35 volts. With no plate current flowing, the voltage at pin 5 (V405) and pin 2 (V404A) is approximately 175 volts. The voltage divider formed by R409 and R410 places 170 volts on the cathode of V404A. At this time V404A is conducting and plate current at V405 is at cutoff. However, screen grid current of V405 is at maximum.

A negative pulse appears on the cathode of V404A and drives the cathode negative in respect to the plate. V404A conducts harder, sending the effect of the spike through C401 to the control grid (pin 1) of V405. The negative-going control grid of V405 reduces screen grid current and cathode voltage. As the cathode voltage goes below 19 volts, the suppressor grid allows plate current to flow, reducing the plate voltage below 170 volts. As the plate voltage decreases toward 20 volts (see waveform at pin 5 of V405), C401 cannot change instantaneously. C401 discharges at its reactance rate through R402, R401, the power supply, R406, and V405.

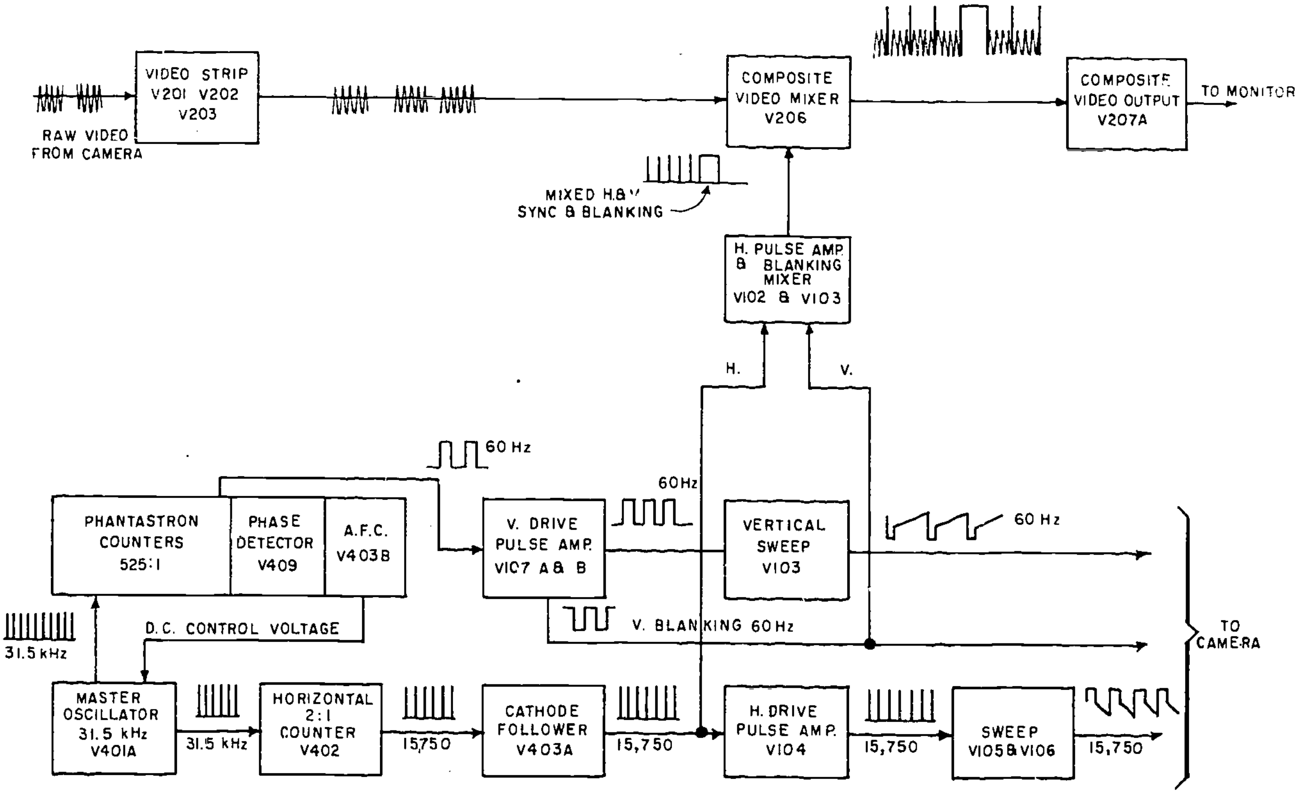


Figure 7-25.—Control unit, device X8F1.

This discharge path forms an extremely long RC time constant. As this discharge time is occurring the control grid voltage slowly rises. The cathode voltage also rises, increasing the bias between the cathode and suppressor grid. The bias continues to increase until plate current ceases and screen grid current again takes control.

During the discharge time of C401, four more pulses appear at the cathode of V404A, but have no effect on V405. Thus, the cathode of V405 will react to one input pulse for five incoming pulses. The output frequency has changed from an incoming frequency of 31.5 kHz to 6.3 kHz, a division of five. Notice that the waveform at TP401 shows a decreased pulse every fifth position, indicating that one pulse out of five is affected by the sequencing of the phantastron V405.

The output from the cathode of V405 is coupled through C403 to the cathode of V404B. V404B operates the same as V404A by shuttling the 6.3-kHz pulse signal to the control grid of V406, the seven-to-one phantastron. The size of C404 is such that V406 pulses once for every seven input pulses. The frequency changes from 6300 Hz to 900 Hz, a division of seven.

The cathode output of V406 is coupled via C405 to the cathode of V404C. V404C and V407 comprise a five-to-one phantastron and produce an output of 180 Hz.

The cathode output from V407 is differentiated by C407 and R432, and is coupled to the grid of V408A by C408. V408 is a cathode-coupled multivibrator. It is timed to cycle on every third input pulse which produces an output frequency of 60 Hz. The output signal from the plate of V408B is routed via R437 through C410 to J401. This supplies the vertical frequency for the vertical blanking and sweep circuits.

A positive-going 60-Hz pulse is coupled from the cathodes of V408 to coupling capacitor

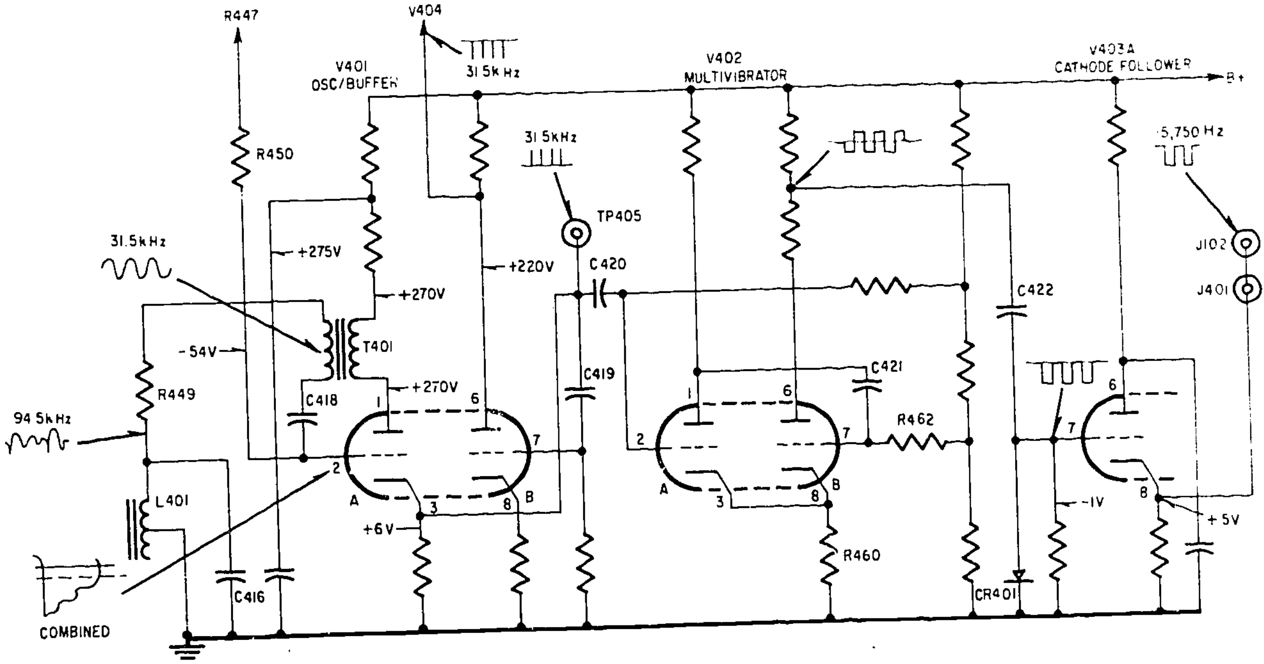


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Figure 7-26. —Oscillator circuit, device X8F1.

C409. A negative-going 60-Hz pulse is coupled from the plate of V408B to coupling capacitor C412. V409 is a phase detector used to synchronize the master oscillator with a 60-Hz line frequency to eliminate "line crawl" as a result of 60-Hz pickup in the various circuits. It also maintains a fixed ratio between the 60-Hz vertical signal and the 15,750 Hz generated by the master oscillator. This action results in a good stable interlaced scanning raster. With a positive signal at the bottom of R442 and a negative signal at the top of R441, a 60-Hz sine wave is injected through R443 to the center point of R442 and R441.

With the AFC (automatic frequency control) switch, S201, in the "lock" position, frequency stabilization is maintained. If the phase of the positive pulse tends to lag behind the 60-Hz sine wave, the conduction of the diode V409B increases. If the negative pulse applied to the cathode of V409A tends to lead, conduction of V409A also increases. A positive d-c voltage is present at the output of the phase detector if the pulse tends to lag. A negative d-c voltage is present if the pulse tends to lead. In either case, the voltage is directly imposed at the grid of V403B, controlling plate current. The conduction of V403B is through R447 whose wiper arm is connected to the control grid of the 31.5-kHz master oscillator. Thus, if the control grid of V401 (master oscillator) is made less positive, C418 (fig. 7-26) now has a new discharge reference. Cutoff time of V401 increases, therefore, the output frequency decreases in proportion to the amount of d-c voltage feedback from V403B. The opposite would occur for an increase in positive voltage at the grid of V401.

Switch S201 is placed in the "unlock" position when adjustments are to be made to the phantastron counting circuits. When S201 is "unlocked," a ground is placed at the tie point of R441 and R442. This allows the shifting of the counter circuits for frequency adjustments.

Counter circuits may take various configurations. The use of blanking oscillators or binary scalers may be employed in place of phantastron counters. Binary scalers are an arrangement of bistable multivibrators (flip-flops) in cascade to perform countdown by 7, 5, 5, and 3 to produce a 60-Hz output from the master oscillator frequency of 31.5 kHz.

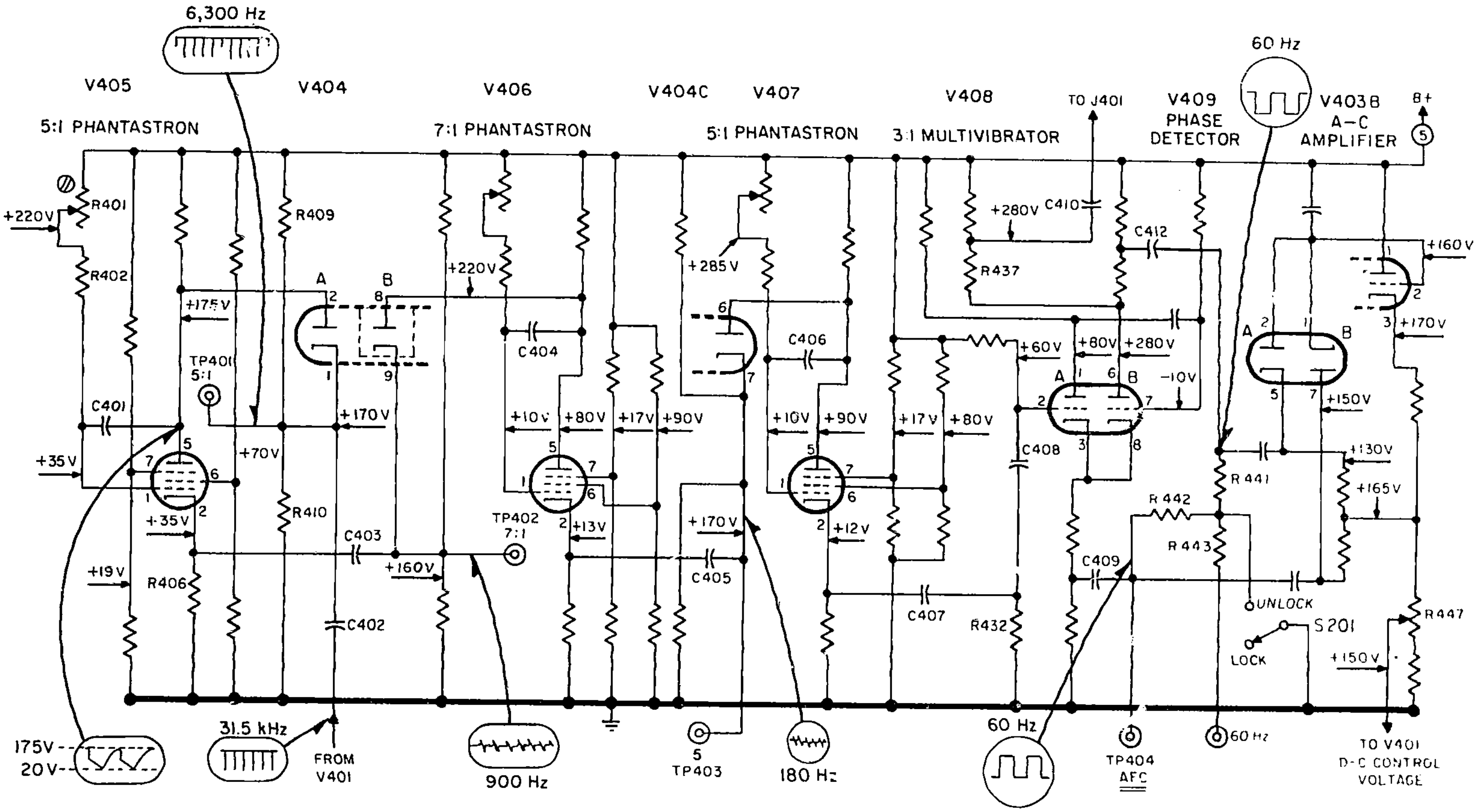

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Figure 7-27. —Vertical countdown circuits.

Each flip-flop will divide the input by a factor of 2. Arranged in cascade, a block of 3 flip-flops with feedback from the last one to the first one will provide a countdown of 7:1. The purpose of the feedback pulse is to allow each 7th pulse at the input to affect the 7:1 counter. A basic typical block diagram is illustrated in figure 7-28.

SWEEP AND BLANKING GENERATORS

The sweep and blanking generators along with the blanking mixer (fig. 7-25) develop the timing signals for the scanning of the pickup tube and the blanking pulses to blank the receiver/monitor picture screen.

In the device X8F1, sync pulses for the receiver/monitor are clipped and separated from the blanking pulses (25 percent of the blanking pulses are employed for synchronization). Some systems have sync pulses (shorter duration) riding on top of the blanking pulses; all systems require some form of synchronization pulses for retrace action.

The circuits of the vertical and horizontal sweep and blanking generators are shown in figure 7-29.

The vertical negative pulses enter the circuit at pin 4 of J102 and are coupled through C128 to the grid of V107A. V107A amplifies and inverts the signal which is coupled from the plate of V107A through C133 to the grid of V108A. Here the pulse is formed into a trapezoidal pulse for a constant rise in current which is necessary in the inductive output circuit. The pulse is again shaped by C135 and R153 and coupled through C134 to the vertical output amplifier (V108B). The positive voltage towards which C135 charges can be varied by the "vertical size" control R148. This varies the amplitude of the trapezoidal pulse. The operating point and the sawtooth current are coupled from the plate of V108B through the top lead of T102 to the "centering" control R141. From R141 the sawtooth is routed to pin 18 of J402 via pin 7 of J102. From T102 the other lead (bottom) goes to pin 6 of J102 and then to pin 6 of J402.

The driven horizontal circuit receives a 15,750 Hz negative square pulse from the sync generators. This pulse is applied to pin 3 of J102, and is coupled through C116 to the control grid of V104A. The pulse is amplified by V104A and V105A and used to discharge C120, which in conjunction with R133 forms the horizontal trapezoidal pulse. The pulse is further amplified by V105B and V106. Pulse amplitude is adjusted by R128, pulse shape is controlled by R129, and centering is determined by R140. The output transformer T101 couples the sweep pulse through pins 1 and 2 of J102 to pins 20 and 8 of junction block J402.

The negative horizontal drive pulse, present at pin 3 of J102, is routed to the control grid of V101A via C102. In V101A the pulse is amplified and coupled as a positive pulse through

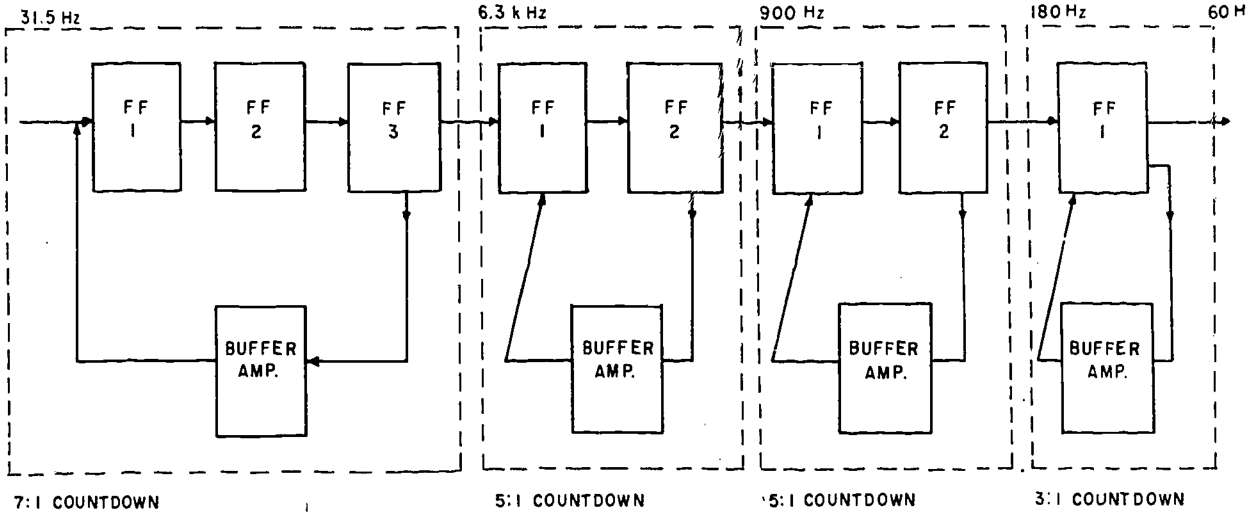

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Figure 7-28.—Block diagram of typical binary countdown circuit.

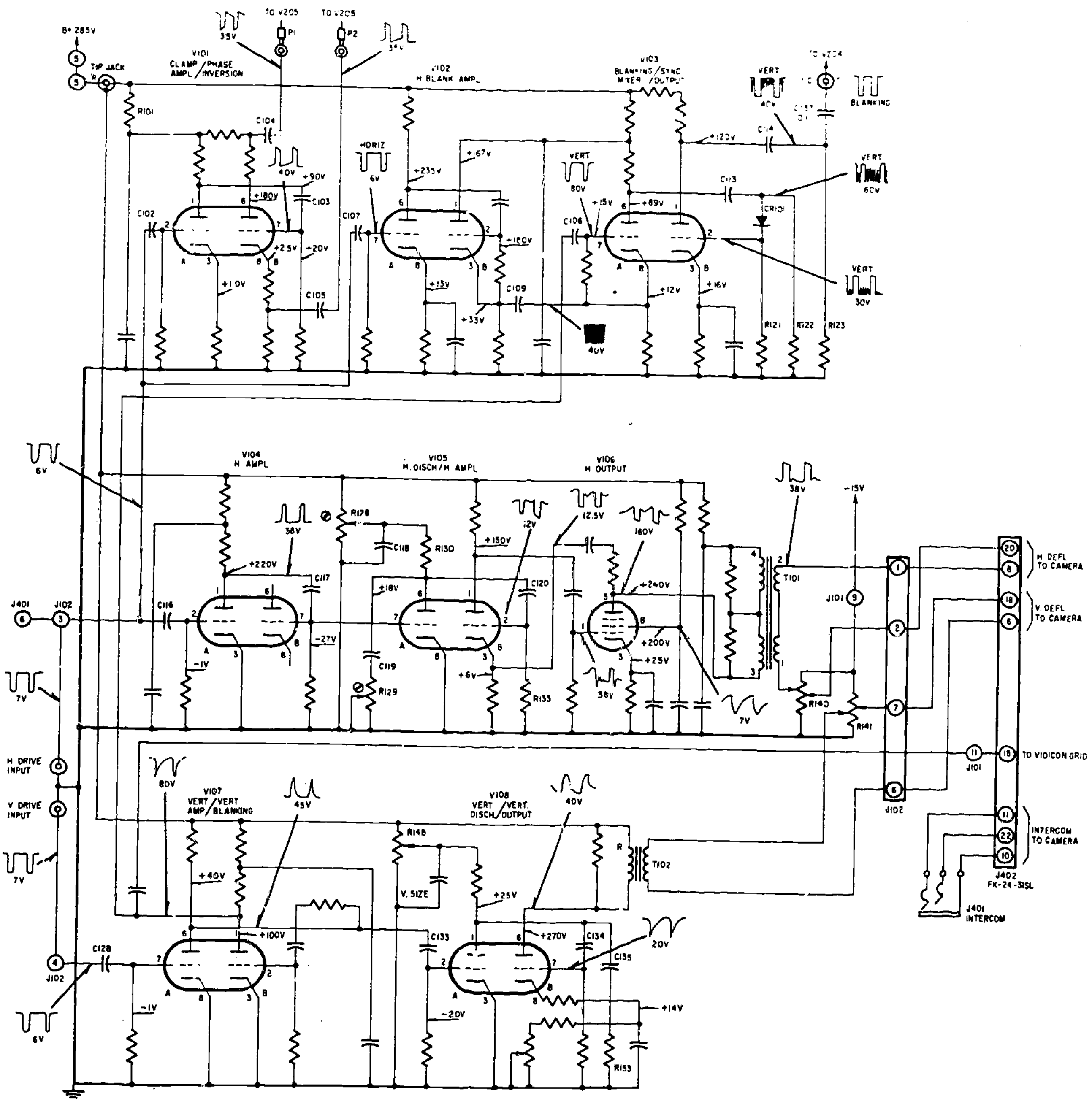

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Figure 7-29.—Sweep and blanking generators.

C103 to the grid of V101B. V101B, a paraphase amplifier, produces two pulses of opposite polarity through the coupling capacitors C104 and C105 to connector pins P1 and P2. These pulses are used in the video amplifier to establish a reference level for the video signals.

The horizontal drive pulse applied to pin 3 of J102 is also routed to the grid of V102A via C107. V102 is the horizontal blanking amplifier which amplifies the pulse and applies it as a positive pulse to the cathode of V103A via C109. The negative vertical pulse at the plate of V107B is coupled to the control grid of V103A via C106.

The horizontal and vertical pulses are combined and amplified by V103A and applied to the grid of V103B via C113 and CR101. R121, R122, and CR101 form a wave shaping network which straightens the leading edges of the pulses. The output of the sync amplifier (V103B) is shaped by C114 and R123 and coupled to pin 7 of J101 by C137. The blanking output is routed to the video amplifier where it is combined with the raw video from the camera circuit and produces composite video.

VIDEO TRANSMISSION CIRCUITS

The video amplifier (fig. 7-30) contains the circuits for amplifying the raw video from the camera unit and inserting the blanking and clamping pulses. (See the block diagram, fig. 7-25.)

The raw video from the camera unit is connected to the video input jack (fig. 7-30) and is coupled through C201 to the grid of V201A. The amplitude, or gain, of the video is varied by R1406 which varies the bias of V201. V201A and V201B are connected as a cascode amplifier (a circuit having the gain of a pentode and the low noise level of a triode).

The plate output of V201B goes through L201 and is coupled by C202 to the grid of V202A. V202 is another cascode amplifier with adjustable peaking by C208.

The output from the plate of V202B goes through L202 and C211 to the grid of V203. Aperture distortion results when the electron beam in the pickup tube is too large to individually sweep each particle of the photosensitive plate. The splashing effect results in a very small amount of loss in resolution. The loss occurs in the high frequencies of the video. V203, operating as an aperture corrector, attempts to exaggerate the amplification of the high frequencies while at the same time amplifying the low frequencies. The amplified video from the plate of V203A goes through R223 and L203 (shifts signal phase to lead the lagging effect of C214) to the junction of C203 and C214. C214 offers a low impedance return to the cathode of V203A for high frequencies. They are again amplified. All frequencies are coupled through C203 to pin 2 of V203B. The output from V203B is developed across R225, peaked by L204, and is coupled through C222 to the grid of V206A.

The blanking pulse from the blanking mixer circuit (fig 7-25) comes into the circuit (fig. 7-30) through pin 6 of J201 to the control grid of V204A. V204A amplifies the pulse and the output from the plate goes to the grid of V204B. CR201 and CR202 clamp the voltage at a positive 2 volts d.c. The pulse is amplified at V204B and the signal goes from pin 3 of V204B to pin 3 V206.

The negative and positive pulses at P1 and P2 are coming from the clamper V101 (fig. 7-29). These pulses are routed to the cathodes of V205A and V205B (fig. 7-30). V205 is called a "keyed clamper." The "keyed clamper" restores the d-c reference level of the video to insure the constant reference to the "black level." The reference level is adjusted by R156.

The pulses on the cathodes of V205 are equal in amplitude and 180° out of phase. When the video, which is coupled through C222, appears at the plates of V205, the conduction of either or both diodes maintains the video at a constant reference point. R156 is adjusted so that the reference voltage is a positive 2 volts.

The blanking pulse from the cathode of V204B also appears on the cathode of V206A. The control grid of V206A receives the raw video from C222. If sync pulses were needed, they would also be inserted at this point. The combined signals are amplified in V206A and coupled to the cathode of V206B. The relatively large blanking pulse is amplified along with the weak raw video. The output waveform at the plates of V206 which appears to be exaggerated is limited, or clipped, by CR203 which brings the ratio of the blanking pulse down as compared with the video. (See the waveforms on each side of CR203.) The purpose of the pedestal clipper, CR203, is to clip the upper portion of the sync (if included) and blanking pulses to produce a clean square pedestal. The composite video signal from CR203 goes to the grid of V207A via L205 and C227.

The purpose of V205C is to prevent the inverse voltage rating of CR203 from being exceeded and also to assist CR203 in its clipping action. The plate is normally negative with respect to the cathode. If the inverse voltage attempts to increase, the diode will conduct, lowering the cathode voltage of CR203.

The purpose of the "white clipper," R486, is to reduce the amplitude of the excessive

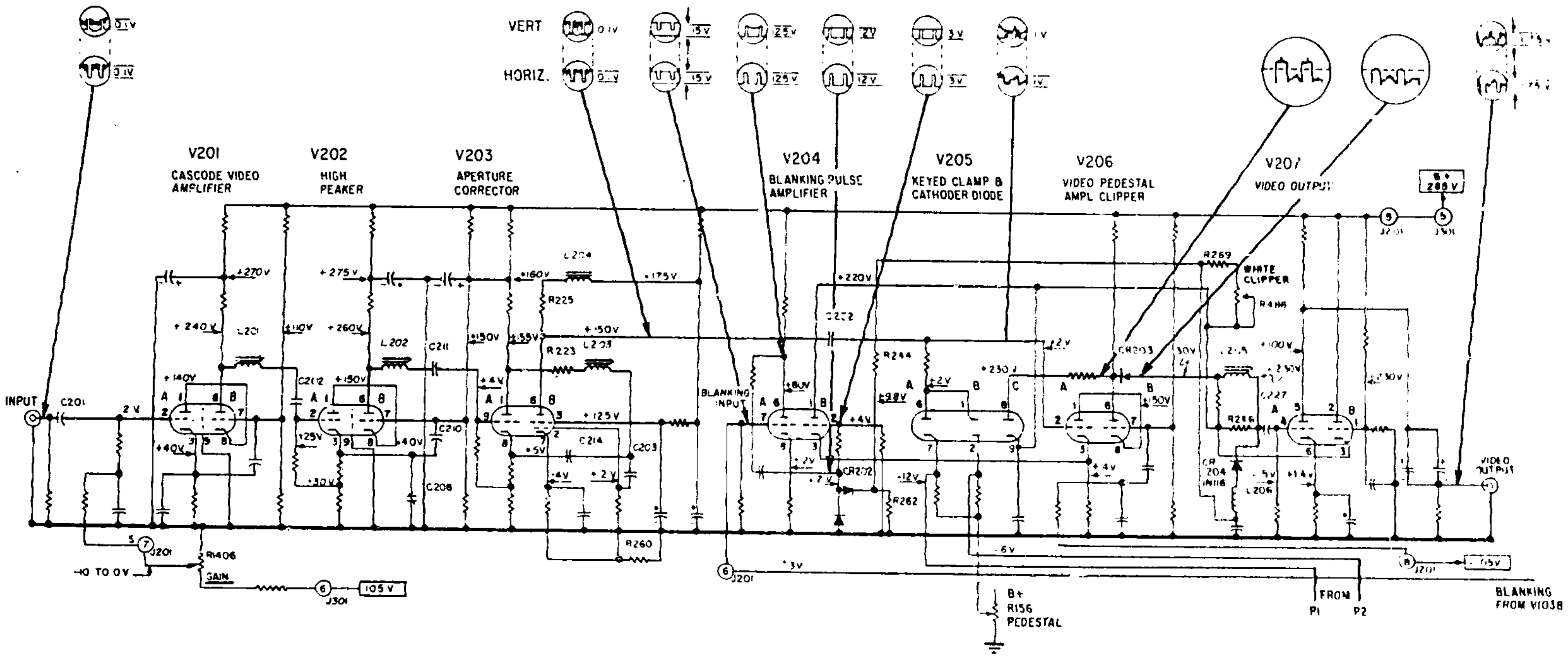

Figure 7-30. —Video amplifier, device X8F1.

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video white signals in order that the lower level background information is not destroyed. V207B, R486, R269, R244, and R262 form a voltage divider from B+ to ground. The potential at the wiper of R486 is applied through R246 to the cathode of CR204. The potential existing between R269 and R244 is applied through L206 to the anode of CR204. The potential across CR204 is therefore controlled by the position of R486. It is adjusted for 1 volt reverse bias on CR204.

The video signal appears at the tie point of CR204 and C227. If the white video signals go negative enough to overcome the reverse bias of 1 volt, CR204 will conduct. This limits the negative-going swing of the video.

The output composite video from the plate of V207A is coupled through C230 to the video output jack. A cable from the output jack connects the control amplifier video system to the video system in the receiver/monitor (fig. 7-31).

The composite video supplied the monitor video circuit is coupled through C101 to the control grid of the video amplifier (V101). Low frequency compensation is achieved by C102, while L1 serves as a shunt peaking coil for high frequency compensation. The contrast control (R117), which is connected to the cathode of V101 through R102 and J1, varies the gain of the video amplifier.

The output of V101 is coupled through C104 to the control grid of the video amplifier (V102). L2 is a shunt peaking coil, and L3 is a series peaking coil. C105 is a variable adjustment for low frequency compensation.

L3 and C106 couple the output of V102 to V103B and to the control grid of the picture tube (V104). V103B is called a d-c restorer which establishes a stable reference level for the fluctuating signal ready to be placed on the picture tube. The circuit evaluates the incoming signals and establishes the average of all the pulses as a reference. The large negative pulses cause V103B to conduct heavily, and its conduction path allows a short discharge time for C106. The short discharging path through R111 and V103B causes R111 to develop a small negative voltage. When C106 starts to charge, its only path is through R112 and R111 and therefore appears as a long RC time in relation to the path for a negative-going signal.

All incoming signals are referenced in respect to the potential across R111 to ground. The action maintains a stable video signal for the picture tube.

The high voltages at pin 10 and the cap of V104 are supplied from the deflection and high voltage power supply, described later in this chapter.

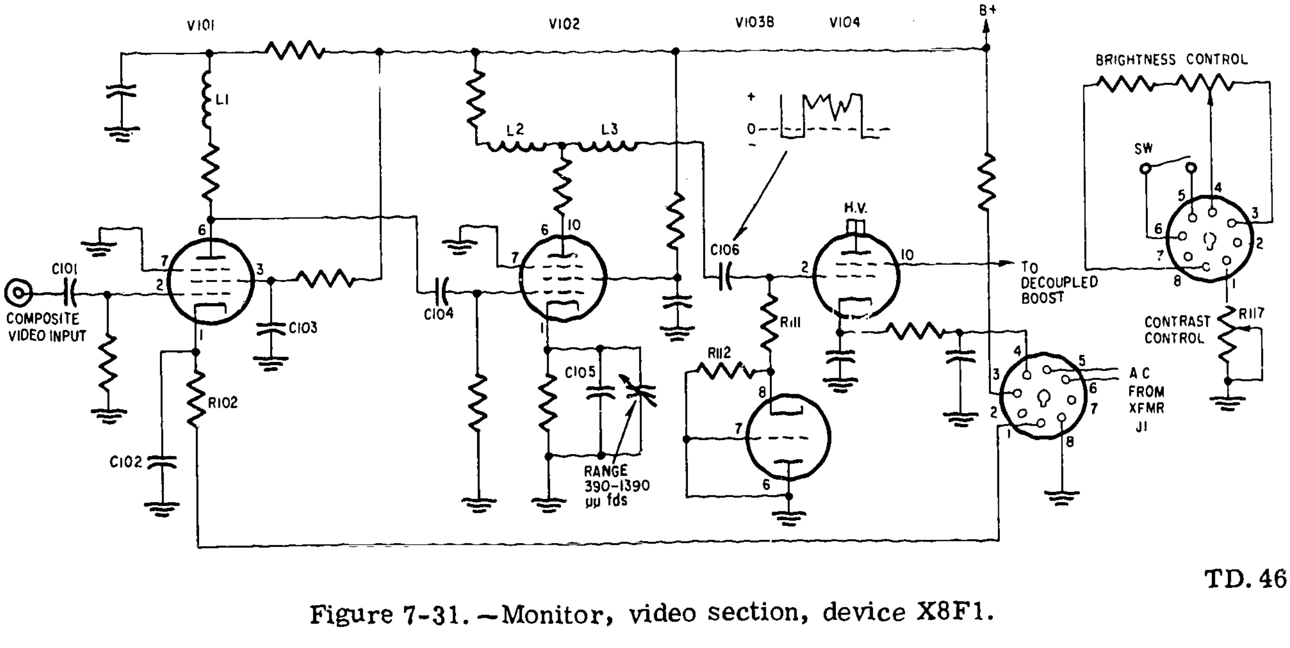

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Figure 7-31.—Monitor, video section, device X8F1.

POWER SUPPLY

The power supply for the control unit also supplies the operating voltages for the camera unit. The power supply is a standard heavy-duty, full-wave rectifier system with electronic regulation.

LINE AMPLIFIER

When the camera unit or the receiver/monitor unit is located at a distant point from the control unit, a booster called a line amplifier is used. When additional receiver/monitor units are desired, the line amplifier provides additional signal levels.

Input composite video signals are connected to the video input jacks J1 and J2 (fig. 7-32). When only one input cable is to be used, a 75-ohm resistor is connected from the other input jack to ground, providing the power impedance termination for the cable in use. The input cable, from the control unit connected to J1, can be continued to another line amplifier by connecting another cable to J2 and on to another line amplifier or monitor.

The input signal is coupled through C1 to the contro grid of V1. Fixed negative bias is placed on V1 by BT1. BT1 contains two mercury bias cells producing 2.7 volts d.c. The fixed bias is used to increase the low frequency response by allowing the cathode of V1 to be grounded. The screen grid of V1 is connected to B+ via R3 and R5. The output from the plate of V1 is routed through L1 and R2, and is developed across shunt peaker L2. The coupling capacitor C3 routes the signal through R7 to the control grid of V2, and through R8 to the control grid of V3.

Resistor R6 serves as the grid leak resistance for both V2 and V3. Resistors R7 and R8 are grid limiting resistors to prevent the control grids from drawing current. Gain controls R18 and R20 vary the outputs of V2 and V3, respectively. Parallel outputs are coupled across C4 and C5 with high frequency peaking by L3 and R22 to output jacks J3 and J4.

The power supply provides the filament and B+ voltages required by the amplifier circuits. The circuit is a full-wave rectifier with electronic regulation.

The regulator tube maintains a fixed potential on the plate of V7, across R34 and R35, and on pins 3 and 4 of V5. The regulated B+ voltage is present at the top of R36. If the B+ voltage should decrease, the decrease would be present along the line at the top of R36. Since R31, R30, and R33 form a voltage divider network, a proportional part of the decreased voltage is present at the connecting point of R31 and R33. This point is also connected to the cathode of V5B. This decreasing voltage at the cathode of V5B causes its plate current to increase. The increased plate current causes the plate voltage to drop, which is reflected (direct coupled) on the grid of V5A. The lower grid voltage causes an increase in the plate voltage of V5A which also controls the grid voltage of both V6A and V6B. This change in control grid voltage causes an increas in plate current of V6. The increased plate current flows through R33, R30, R31, R26 and R27. Increased current through R30 and R31 places of higher voltage at the top of the resistors. An increasing voltage at this point brings the B+ voltage back to its proper value.

SYNCHRONIZING CIRCUITS

The previous discussion on closed circuit TV was focused primarily on delivering the video signal to the picture tube. Equally important, from the point of view of overall receiver operation, is the system by which the various circuits are synchronized with those at the transmitter and made to function together to produce the desired picture. As had been stated before, the blanking pulses and the horizontal and vertical synchronizing (sync) pulses are amplified in the various stages along with the video information.

The detected composite video signal (contains synchronization pulses, blanking pulses, and video) is applied to the control grid or cathode (depending on phase) of the picture tube. The video information intensity modulates the scanning electron beam producing varying degrees of black through white information on the screen. The blanking pulses cut the picture tube off to prevent a visual indication of retrace. The sync pulses are present but have no effect since they are present during the time the picture tube is cut off and only drive the tube beyond cutoff.

After detection the composite video signal is also fed to a sync separation or clipper stage. The vertical and horizontal sync signals are removed from the composite video signal and filtered. Following this, the pulses are amplified and reshaped according to the needs of the synchronization and sweep systems. A block diagram of the synchronization circuits

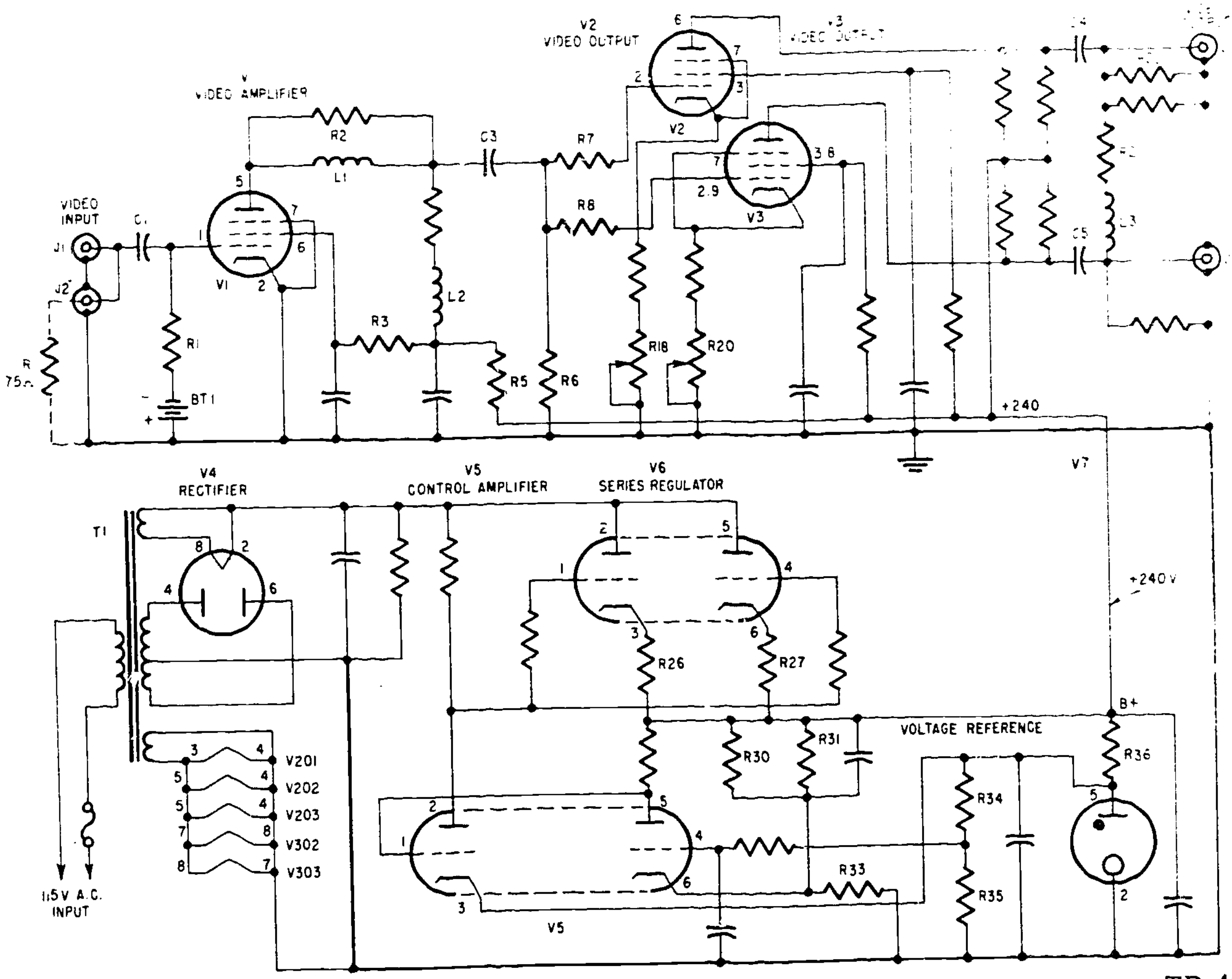

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Figure 7-32.—Line amplifier, device X8F1.

is shown in figure 7-33 with the associated pulse waveforms.

The horizontal sync signal fires the horizontal oscillator at exactly the right instant to maintain the proper synchronization between the horizontal sweep in the receiver picture tube and the horizontal sweep in the transmitter camera tube. The output of the horizontal oscillator is formed into a sawtooth waveform; it is then amplified and applied to the horizontal deflection coils.

The vertical sync signal fires the vertical oscillator at the right instant to maintain the proper synchronization between the vertical sweep in the receiver picture tube and the vertical sweep in the transmitter camera tube. As in the case of the horizontal oscillator output, the vertical oscillator output is formed into a sawtooth were (modified into a trapezoidal form); it is then amplified and applied to the vertical deflection coil.

SYNC SEPARATORS

Sync separation, or sync clipping, may be accomplished by the use of circuits employing diodes, triodes, or pentodes. A simplified circuit of a diode sync separator is shown in figure 7-34. During the time the sync voltage is applied to the input, the diode plate is positive

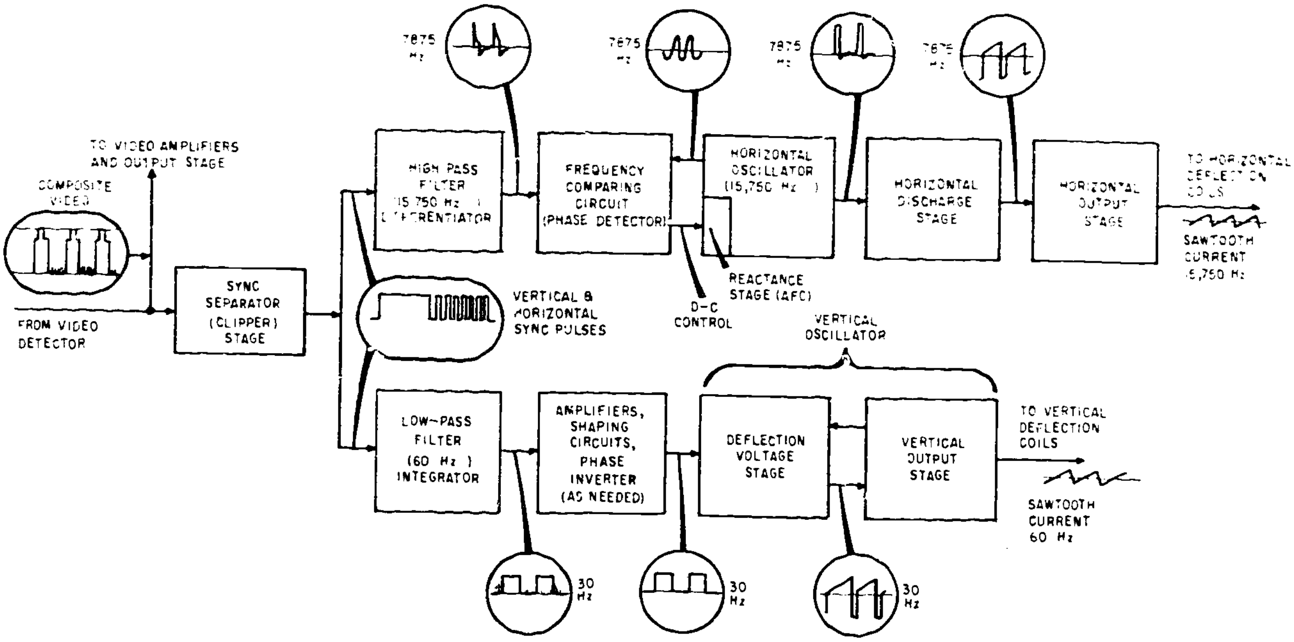

Figure 7-33. —Block diagram of synchronizing circuits.

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with respect to the cathode, and capacitor C is charged through the low resistance of the conducting diode. Between pulses, capacitor C discharges through R and thus maintains a negative bias between plate and ground; this cuts off all signals up to the blanking level. The bias is maintained at approximately the blanking level, and only the sync signal causes pulses of current to flow through RL, across which the output is taken.

The output pulses consist of the horizontal sync pulses, the equalizing pulses, and the serrated vertical sync pulses. These pulses are fed to filter circuits that separate the vertical sync pulses from the horizontal sync pulses.

The problems involved in removing (sync clipping) the sync signals from the composite signal, and in amplifying, separating, and utilizing those signals to control the horizontal and vertical oscillators are treated only in a general way in this section. There are many methods of solving these problems, and therefore a detailed treatment of each method is not possible in this training manual.

Separation of Vertical and Horizontal Sync Pulses

Because the repetition rate of the vertical sync pulses is 60 pulses per second and that of the horizontal sync pulses is 15,750 pulses per second, they can be separated by filters.

One filter, the high-pass filter, is used to pass and shape the trigger voltages for the horizontal oscillator (a multivibrator or blocking oscillator) as shown in figure 7-35. The circuit in this figure has a short time constant with respect to the period (width) of the horizontal pulse. The output signal is developed across R.

The leading edge of the square-wave input pulses causes a rapid charge of C through R. The trailing edge causes an equally rapid discharge of C through R. The flow of charge and discharge currents through R causes the sharp spikes of output voltage, as shown in figure 7-35. Only one spike in each pair (for example, the positive spike) is needed to trigger the horizontal oscillator. The other spike of the pair occurs at a time when the oscillator is insensitive to triggering pulses.

The low-pass filter used to pass and shape the trigger voltages for the vertical oscillator (a multivibrator or blocking oscillator) is shown

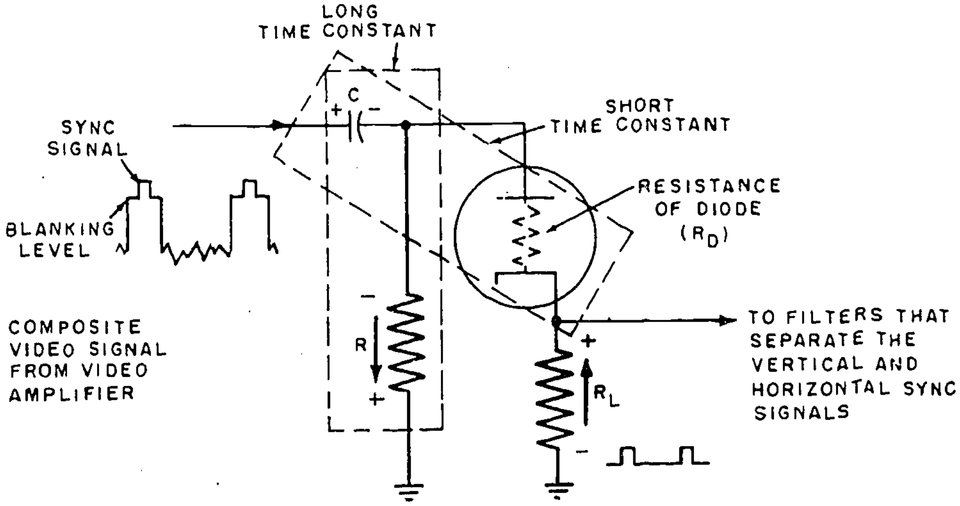

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Figure 7-34. —Diode sync separator.

in figure 7-36. The RC time constant is long with respect to the width of each serration in the vertical pulse. Because of the long time constant in the integrator circuit, C does not have time to discharge during the interval between serrations. However, the RC time constant is short compared to the period of the combined vertical serrated pulses. Thus, C charges up to the peak value during the time

figure 7-37. The composite video signal with negative blanking appears at the video input jack. R118 is the sync clip level (gain) potentiometer from which the desired amplitude of signal is coupled through C109 to the control grid of V105.

C112 and R123 form a grid leak bias network for V106A. With grid leak bias and low plate

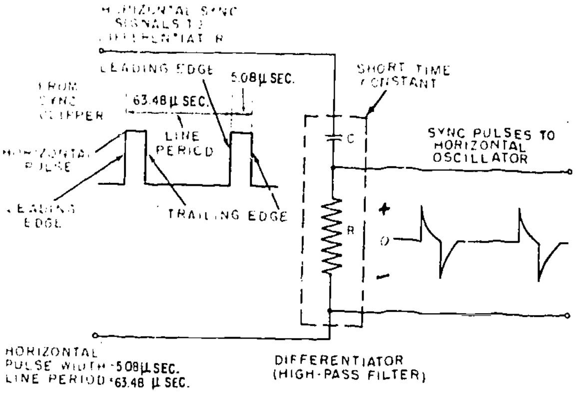

Figure 7-35. —High-pass filter for horizontal sync.

Both vertical and horizontal pulses present at the plate of V106B are routed to the differentiator network consisting of C125 and R147. This network permits the horizontal pulses to pass and are coupled by C126 to the frequency comparing network.

SWEEP CIRCUITS

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version of a blocking oscillator is shown in figure 7-38 (A). When plate and filament voltages are applied to the tube, plate current begins to flow. A voltage is induced in the grid circuit (via transformer T) that makes the grid positive with respect to ground, and the plate current is thereby increased rapidly to saturation. Capacitor C2 charges rapidly during the time that grid current flows. At saturation the plate current and field about T stop increasing. The voltage induced in the secondary of T drops to zero, and therefore the induced positive grid voltage drops to zero. Capacitor C2 begins to discharge through R2 and the plate current falls; the field of T collapses. The voltage induced in the secondary of T is now of a polarity that aids the discharge of C2. The grid, therefore, becomes more negative with respect to ground, and plate current falls rapidly to zero. When the plate current is cut off, T's primary field reverses, causing the voltage at the plate of V1 to be higher than B+.

Capacitor C2 continues to discharge relatively slowly through R2. This action maintains a negative charge on the grid for an appreciable length of time. The time (equal to the period between the pulses produced by the oscillator)

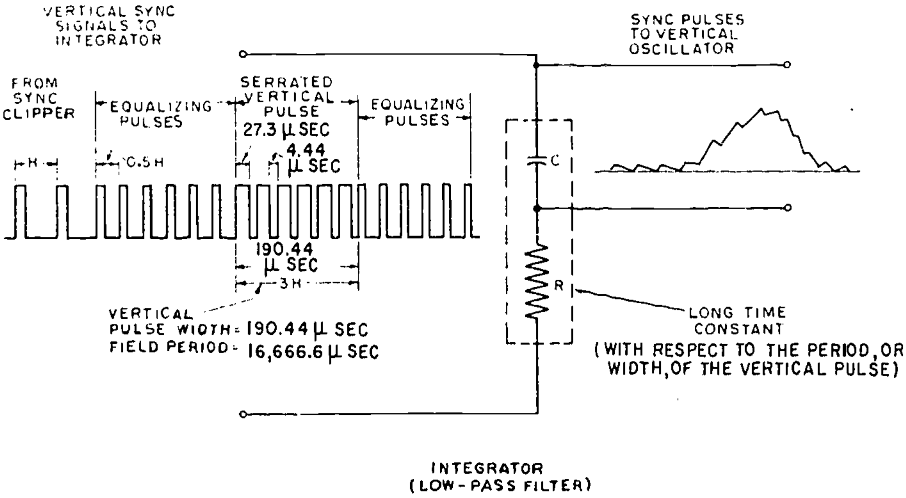

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Figure 7-36.—Low-pass filter for vertical sync pulses.

MULTIVIBRATOR

A synchronized multivibrator circuit, which produces a sawtooth output, is shown in figure 7-38 (B). The sync pulses can control the firing of the multivibrator if the frequency of the multivibrator is slightly less than the frequency of the sync pulses.

VERTICAL SWEEP

vertical linearity control (R145) varies the bias of V109, thereby controlling the gain of V109. Both of these controls (R143 and R145) will vary the amplitude of the vertical sweep signal. Transformer T101 is used to couple the vertical sweep to the deflection coils on the picture tube through J2.

The development of the required trapezoidal

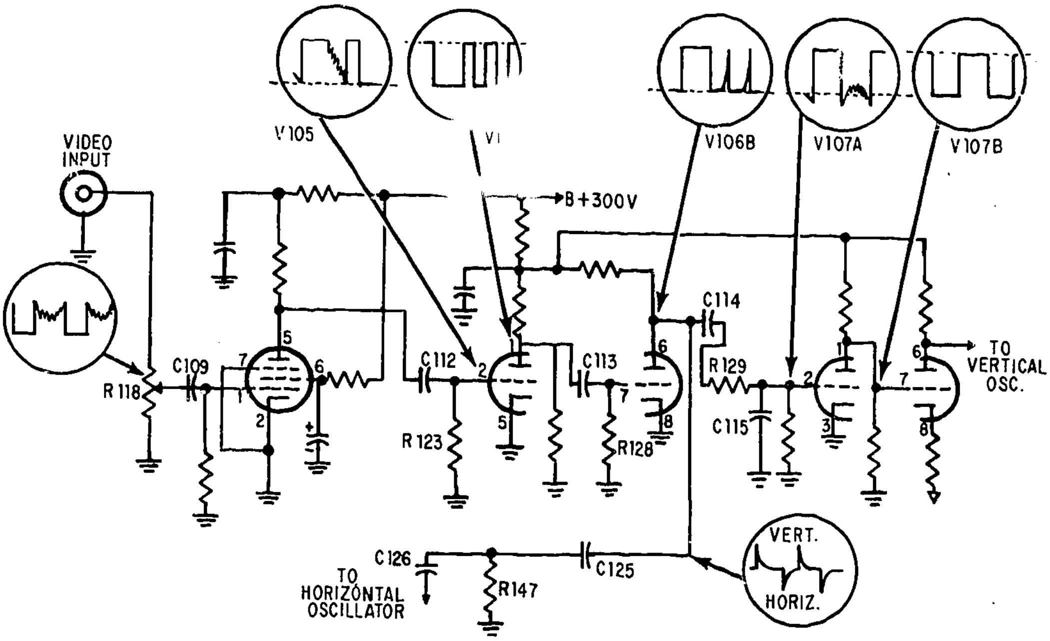

Figure 7-37.—Sync separation circuit.

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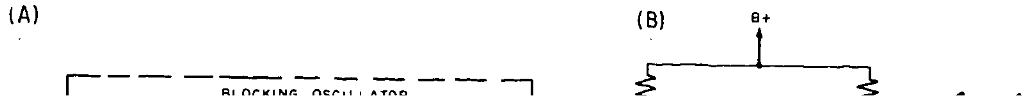

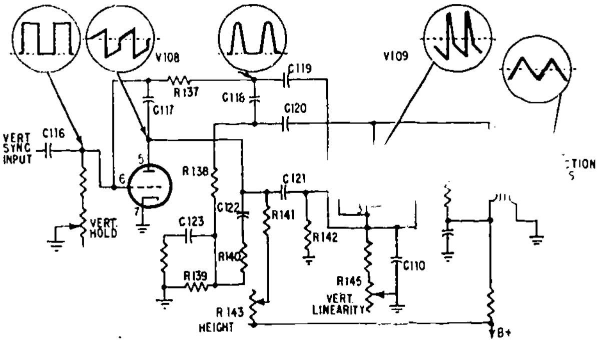

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Figure 7-39.—Vertical sweep circuit device X8F1.

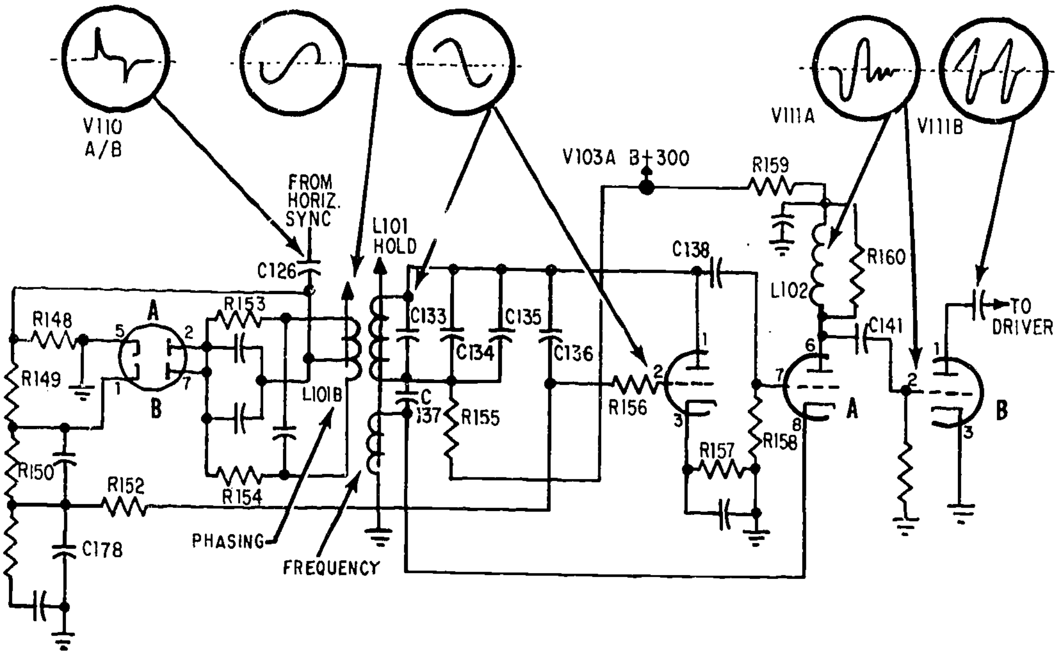
circuit (fig. 7-41). The horizontal oscillator V111A is a (free running) modified Armstrong type oscillator. The grid tank consists of L101A (upper half), C133, C134, C135, C136 (capacitive current coupler) and V103A, a capacitive reactance tube. C133, C134, and C135 are connected in parallel to provide stability in the event of tolerance fluctuations of any one capacitor. The tickler coil is in the cathode circuit of V111A and is shown as the lower half of L101A; C137 places the bottom of the oscillator tank circuit at a-c ground. C138 couples the tank

signal is developed across R158 the grid resistor. The plate circuit of V111A consists of a ringing coil (70 kHz to 90 kHz) L102 that is dampened by R160. R159 limits current to provide the proper plate potential for the oscillator.

The frequency of the oscillator is determined by the size of R158 and the grid tank circuit. With the oscillating sine wave from the oscillator driving the discharge tube (V111B), the sawtooth developed at the plate of V111B is less than the necessary 53.34 microseconds (sweep time) and the decay time much longer than 10.16 microseconds (blanking time). L102 is placed in the plate circuit of V111A to compensate for the incorrect waveform and to cause V111B to generate a sawtooth of the desired rise and decay time (note waveform at L102). L102 is a ringing coil placed in the circuit to generate the large signal pulsing at 15,750 Hz. The coil has an internal resonant frequency from 70 to 150 kHz. R160 is placed in parallel with L102 as an oscillation damping resistor (swamping). The output of V111B is sent to the horizontal deflection and high voltage circuits.

AUTOMATIC FREQUENCY CONTROL (AFC)

In the sweep circuits discussed thus far, the



TD.478

Figure 7-41.--Horizontal sweep circuit, device X8F1.

the filter directly to the horizontal and vertical sweep oscillators. This simple, direct system would be satisfactory if it were not for the pres-

permits the passage of short bursts of noise energy. Consequently, it is necessary to employ

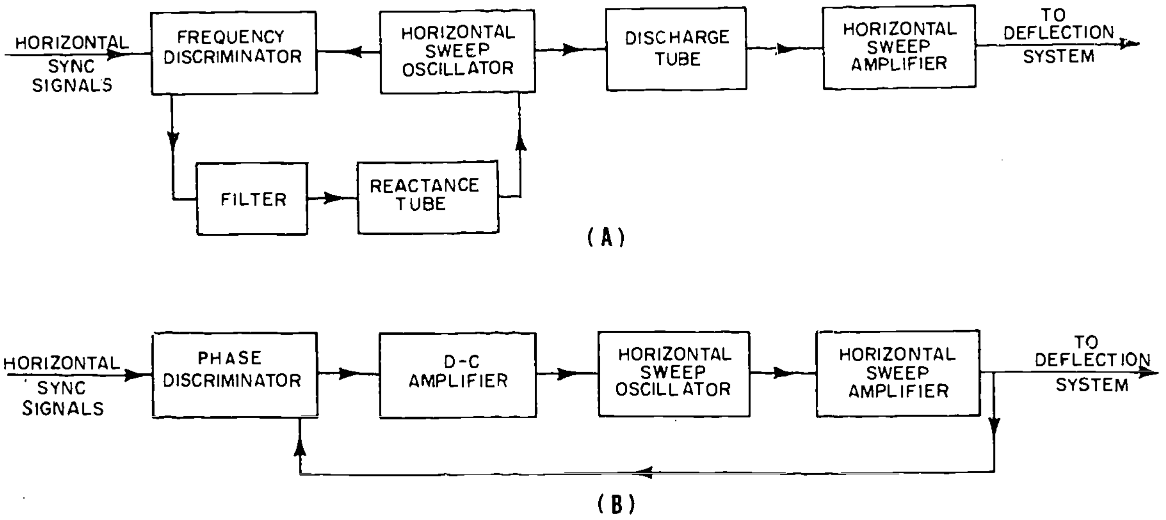


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Figure 7-42.--Systems of horizontal sync control.

The second method of isolating the horizontal sweep oscillator from noise bursts is shown in figure 7-42 (B). As in the previous system, a frequency (or phase) discriminator is used. It compares the sync-signal input from the filter or sync amplifier with the input feedback from the horizontal sweep amplifier and produces a d-c output that is proportional to

L101A induces a voltage in L101B which is 180° out of phase with the oscillator voltage. This voltage is then applied to the plates of V110. Sync pulses coupled from the sync separator by C126 are also placed on the plates of V110. The phase of the sync pulse is the same on both plates.

The purpose of the discriminator is to com-oscillator frequency back into phase with the sync.

If the horizontal synchronization is lost temporarily, the horizontal frequency slug (hold control L101A) can be adjusted to lock the picture in sync. The automatic frequency control circuit generally holds the picture in sync through one-half rotation of the hold control. The range through which the oscillator can be varied manually by the hold control and still hold the picture in sync is called the hold-in-range or lock-in-range. The range of frequencies through which the AFC circuut will react and can lock-in the oscillator after sync has been lost is called the pull-in-range. The pull-in-range is always less than the hold-in-range.

The horizontal hold control should be set at the middle of its hold-in-range so that the oscillator can be pulled into sync easily when changing channels.

Blanking of the picture screen has the timing of the sync and blanking pulses in the transmitted signal, but the flyback is determined by deflection circuits in the receiver/monitor. The position where the black blanking bars appear on the picture screen depends upon the phase of the scanning in the receiver/monitor deflection circuit with respect to the blanking pulses in the received video signal. If the receiver/monitor's horizontal system shifts

Associated with the high voltage power supply is the "boosted B+" power supply. This voltage is derived from the conduction of a diode, which conducts during a portion of the horizontal sweep. The voltage is filtered and applied to special circuits within the receiver/monitor

The voltages in the deflection and high voltage section range up to 30,000 volts and present a constant hazard to maintenance personnel. Safety precautions referred to in this training manual and manufacturer's maintenance manuals should be carefully observed.

FLYBACK METHOD

The three tubes used in the high voltage system are specially constructed to supply the required voltages and currents. The horizontal output (driver) tube V1 is a pentode designed for high currents and voltage. V3 is the high voltage diode which rectifies the voltage for the picture tube. The damper tube (V2) is a diode which aids V3 in developing the extremely high voltage and in supplying the boosted B+ voltage.

A sawtooth voltage (approximately 70 v) from the horizontal oscillator is coupled by C2 and R1 to the control grid of V1. V1 will normally use grid leak bias. Cathode bias is developed by C3 and R2. This is a protective bias to limit plate current in the event that the causing the oscillation to decay to zero. The damped current in the deflection coils again starts the beam moving from left to right.

The oscillating action of the output circuit is approximately 70 k Hz—7 microseconds for one-half pulse, the time of the horizontal retrace.

Boosted B+ Voltage

Current flowing through V2 (fig. 7-43) charges the boost capacitor (C5) to the regular 300 v B+. The a-c deflection voltage across L2 makes the plate voltage of V2 100 volts more positive during horizontal trace time. This causes C5 to charge to 400 volts, the boosted B+ value. C4 and L6 form a filter network for the voltage.

High Voltage

The pulse produced in the horizontal output circuit (fig. 7-43) during the first half-cycle of oscillation for the flyback is used to develop the high voltage for the picture tube. This is accomplished by stepping up the a-c flyback voltage and supplying it to the plate of the high voltage rectifier (V3).

During retrace, a negative pulse of 1,000 to 2,000 volts is produced in the output circuit and is impressed into the flyback secondary. is from 3,000 to 6,000 volts due to the step-up action from L2. L3 provides a step-up pulse that is from 9,000 to 20,000 volts for the plate of the high voltage rectifier (V3). When the pulse appears on the plate of V3, the tube conducts and charges C8. Since the frequency is 15,750 Hz, the charging of C8 is sufficient to provide filtering.

The drive control (C1) varies the amount of sawtooth voltage present at the grid of V1 by acting like a voltage divider. The width control (L5) is in parallel with part of the secondary winding L2. Varying L5 varies the inductance which will widen the raster.

The amount of boosted B+ voltage varies as C5 charges and discharges. The operation of the output tube (V1) can be controlled by shifting the phase of the boosted B+ and the sawtooth grid voltage. Adjusting the linearity control (L6) will affect the stretching of the center portion of the screen.

The adjusting of the horizontal controls has three effects: drive affects the left side, linearity affects the center, and width affects the right side of the screen.

AUTOTRANSFORMER METHOD

In the autotransformer-coupled horizontal output circuit (fig. 7-44), the primary and

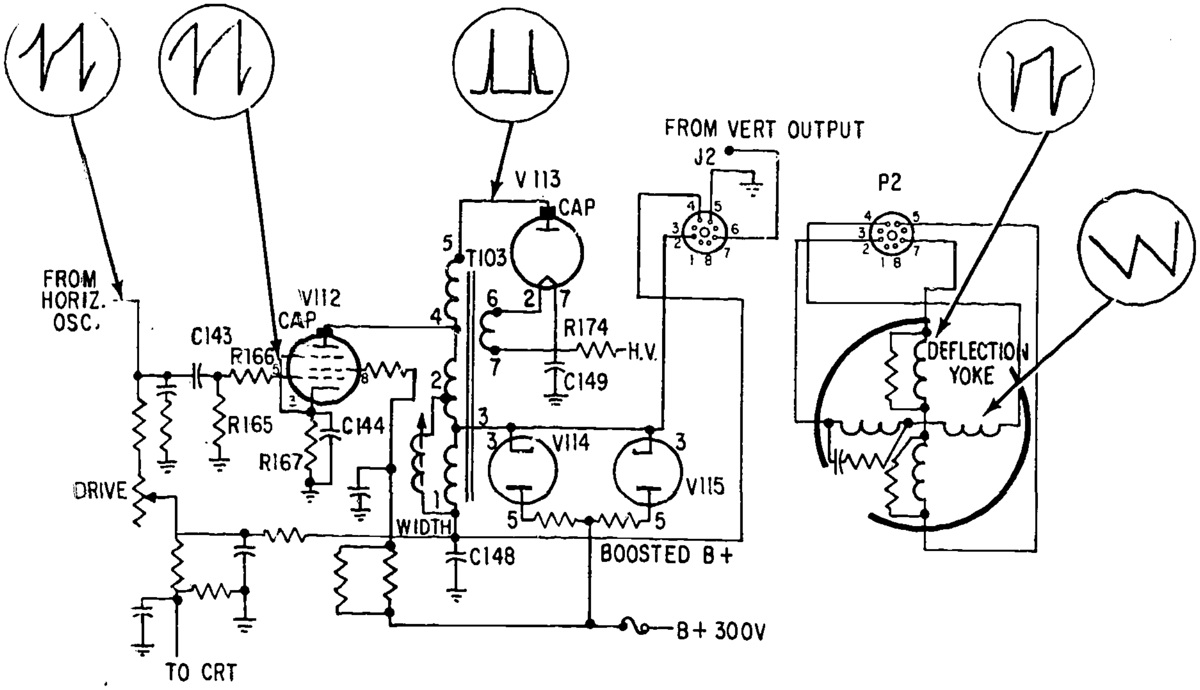

Figure 7-44. —High voltage and deflection circuit, device X8F1.

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The filament power supply is obtained from a secondary winding composed of one or two turns of wire.

In this type of circuit, failure of the low voltage supply automatically removes the high voltage. This is an advantageous arrangement because if the horizontal sweep were removed, without removing the high voltage at the same time, the screen might be damaged at the point where the electron beam strikes it.

CHAPTER 8

CLOSED CIRCUIT TV MAINTENANCE AND APPLICATION

REMOTE OUTPUT

The method of transmitting the amplitude-modulated television picture signal is similar to the familiar system of sound transmission in the standard AM radio broadcast system. In both systems the amplitude of an RF carrier is caused to vary.

In TV broadcasting the composite video signal modulates a high frequency carrier wave. The modulated picture carrier is the composite video signal containing all the information needed for picture reproduction. At the receiver the picture signal is detected to recover the composite video signal which is then used to reproduce the picture.

In CCTV the transmitter is a low powered system which radiates the signal over a selected coverage. Conventional TV receivers receive

mission is called "vestigial sideband." The video occupies 4.5 MHz, leaving the remaining 1.5 MHz for the sound portion and channel separation. In installations that require sound, a separate FM transmitter is employed. FM transmitters are discussed in Basic Electronics, NavPers 10087-B.

The CCTV transmitting system employs a relatively simple circuit (fig. 8-1). The raw video from the camera unit connects to the circuit at the control grid of V1A. V1A, V1B, and V2A are conventional video amplifiers utilizing shunt peaking. V2B is a pentode video amplifier. CR1 in the grid circuit of V2B acts as a d-c restorer which maintains the black level of the video at a constant voltage. The video signal on the control grid and the sync pulses coupled on the cathode are combined in V2B to produce the composite video signal. The

V3B is an electron-coupled oscillator. The oscillating tank consists of L6, C13, and C14. Adjusting C14 varies the frequency from 54 to 88 MHz (channels 2 through 6). The output of the oscillator is coupled from the plate of V3B through C11 to the cathode of V3A.

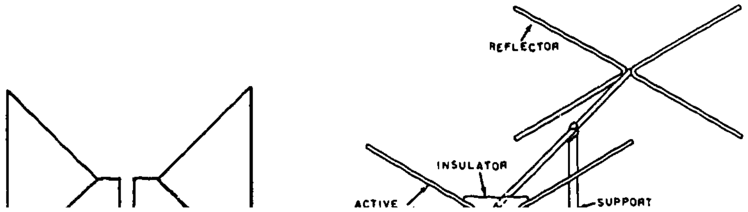
V3A is the modulator output tube. The composite video is applied to the control grid at an established value by the d-c restorer (CR2). CR2 conducts on the positive peaks, thereby clamping the composite video at a negative value. The RF oscillator sine wave is applied to the cathode of V3A. Amplitude-modulated output is coupled through C9 to the RF output terminals. An antenna system can be connected for radiation of the signal, or the output connected to power amplifiers for long range transmission.

REMOTE RECEPTION

In common with other electronic receiving equipments, the TV transmission line functions to convey (with minimum distortion and minimum loss) the signal from the antenna to the receiver. To satisfy these requirements, the line should be balanced to ground (that is, each of the conductors should have the same capacitance with respect to ground); and the primary of the input circuit should be centertapped. Undesired signals induced in the line are thus balanced out and do not affect the operation of the receiver. To reduce losses, the transmission line should have low effective resistance, and the characteristic impedance should be the required value to match the antenna and the receiver input for maximum power transfer.

A number of transmission lines may be used with television receivers; for example, the twisted pair, the shielded pair, the coaxial line, or the twin line.

The type of antenna used will vary with the particular installation. The antennas shown in figure 8-2 are some of the simpler types. The



primary purpose of all TV antennas is to intercept the maximum amount of desired signal energy and to make it available at the input of the transmission line.

Several factors, such as economy, flexibility, low loss, and impedance match, have led to widespread use of the 300-ohm twin line. The conductors, spaced at a distance of about 3/8 inch, are embedded in a plastic ribbon. Although this type of line has several good features, it should be pointed out that weathering will change its characteristic impedance; and, because of a lack of shielding, its use may not be advantageous in areas where there is a large amount of electrical disturbances. Most shipboard and aircraft installations utilize shielded transmission lines, as they have for other VHF and UHF installations, and for the same purposes.

TELEVISION TUNERS

Television tuners, like those of communications receivers, consist essentially of three parts: the RF amplifier, the oscillator, and the mixer. The function of the front end (composed of the RF amplifier, the oscillator, and the mixer) is to amplify the relatively weak input signal of the desired frequency, to produce a locally generated RF signal of the correct frequency, and to mix these two frequencies in such a way as to produce the chosen audio and video

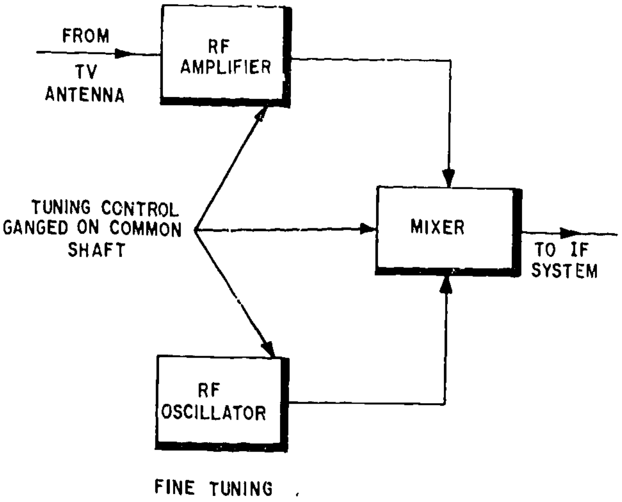


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Figure 8-3. —Block diagram of TV front end.

a popular tuner in which the inductance is varied over the tuning range while the capacitance remains constant.

RF AMPLIFIERS

Because the television signal available at the input of the television receiver is weak, it is

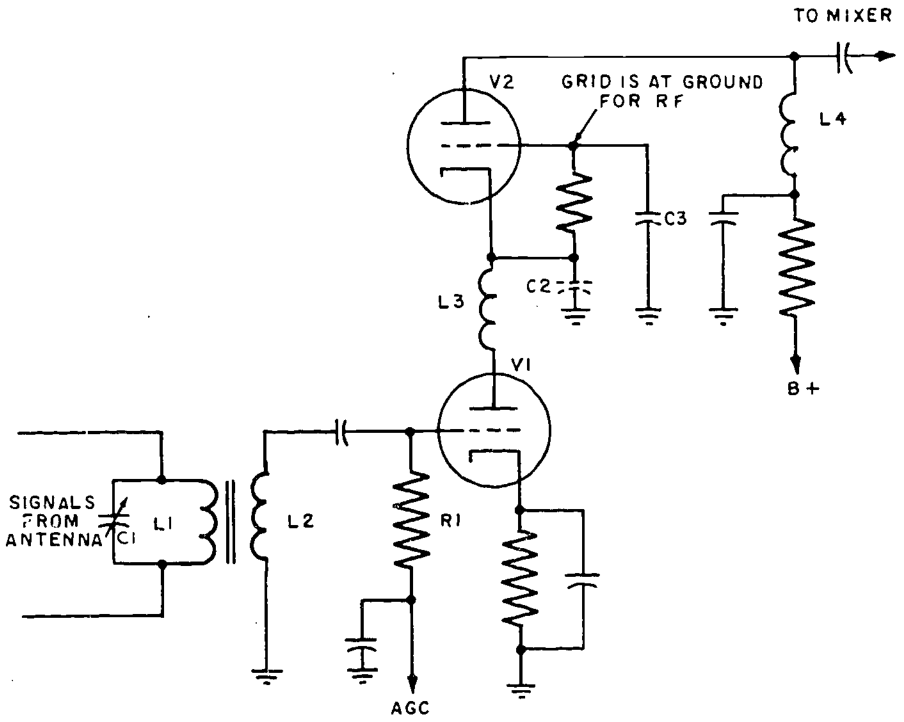

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Figure 8-4.—Tuner RF amplifer.

Neutralization is not necessary for operation on the low band because of the compact arrangement of the circuit and the tube connections. Likewise, neutralization is unnecessary for operation on the high band because L3 and C2 (the distributed capacitance to ground) form a series-resonant circuit (resonant at the center of the high band) from the plate of V1 to ground. The signal voltage across L3 varies the potential of the cathode of V2 with respect to ground; and, because the grid is grounded, the signal is applied effectively between the cathode and the grid of V2. This arrangement, in effect, nullifies the shunting distributed capacitance insofar as injecting undesired noise or degeneration into the grid circuit of V1 and V2.

OSCILLATORS

Although many radio receivers employ a common tube for the oscillator and mixer, it is usually more satisfactory for frequencies used in commercial TV, to use a separate oscillator tube. Triodes are generally used in one of a number of possible circuit arrangements.

The ultra-audion oscillator, similar in many respects to the Colpitts oscillator, is often employed. In other receivers, the Hartley circuit, the Colpitts circuit, or some form of push-pull arrangement is used. Oscillators are discussed in Basic Electronics, NavPers 10087-B.

The fine tuning control is included in the oscillator circuit.

MIXERS

The mixer tubes commonly used in TV receivers are triodes or pentodes. As in the case of RF amplifiers, triode mixers are less noisy than pentodes. However, they lack the gain of pentodes. Diodes introduce little or no noise, but they do not add gain. Energy is coupled from the oscillator into the mixer by capacitive or inductive means. Mixers are also discussed in Basic Electronics.

VIDEO CIRCUITS

Video IF amplifiers perform essentially the same functions that are performed by the IF amplifiers in superheterodyne radio receivers. However, bandpass considerations, vestigial sideband transmission, the necessity for trapping unwanted sound and video beat frequencies, and other factors make the design of video IF amplifiers somewhat difficult. A detailed discussion of the various types of video IF amplifiers is beyond the scope of this training manual. However, the overall problems and some of the methods used to solve them are given.

Perhaps the best approach is to list the various problems inherent in the video IF section of a television receiver and to indicate one or more methods of solving each of the problems.

FIRST: For RF spectrum economy, the lower video sideband is greatly suppressed, and the video information is contained largely in the unsuppressed upper sideband. The remaining portion of the lower sideband is the vestigial sideband. The general form of the television RF spectrum is shown in figure 8-5.

Because it is impracticable to remove all of the lower sideband, the response curve of the video IF stage must have a special form. In general, the response curve is similar to that shown in figure 8-6. It may be seen that the video IF has a higher frequency than the sound IF. This results from the fact that the local oscillator operates at a higher frequency than that of the incoming signal.

That portion of the sidebands extending 1.25 MHz on both sides of the video carrier contains more energy than the sidebands beyond 1.25 MHz (fig 8-5). This results from the fact that both upper and lower sidebands exist in the 1.25 MHz bandwidth in the immediate vicinity of the video carrier; whereas, beyond 1.25 MHz only the upper sideband is present. If the IF amplifiers were flat over the video band, the frequencies between 0 and 1.25 MHz on each side of the video carrier would be overemphasized at the second detector. In other words, the amplitude of these signal frequencies would be greater than that of the remaining frequencies in the upper sideband of the video signal because of the increased energy associated with the frequencies between 0 and 1.25 MHz on each side of the video carrier.

In order to achieve uniformity in the magnitude of the output video signal for all frequency components, the IF stages are adjusted so that the video IF carrier falls about halfway down on the upper slope of the response curve. The lows are therefore amplified less than the highs, and a more uniform response is achieved. For example, a receiver tuned to channel 3 having a video carrier of 61.25 MHz may have

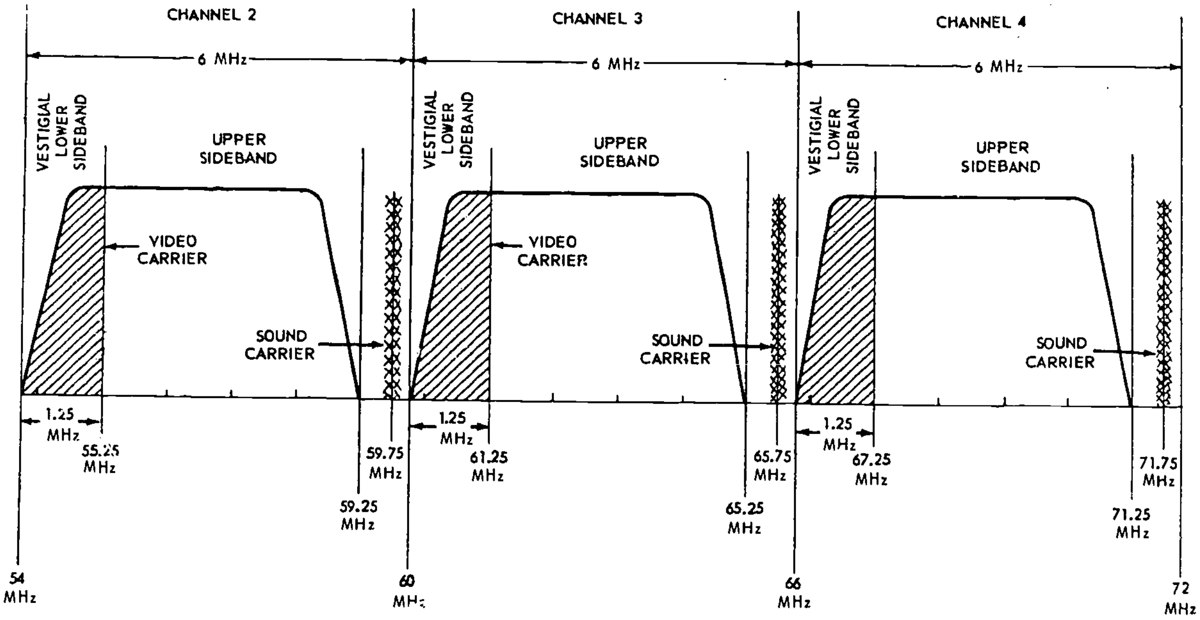

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Figure 8-5.—RF spectrum of TV channels 2, 3, and 4.

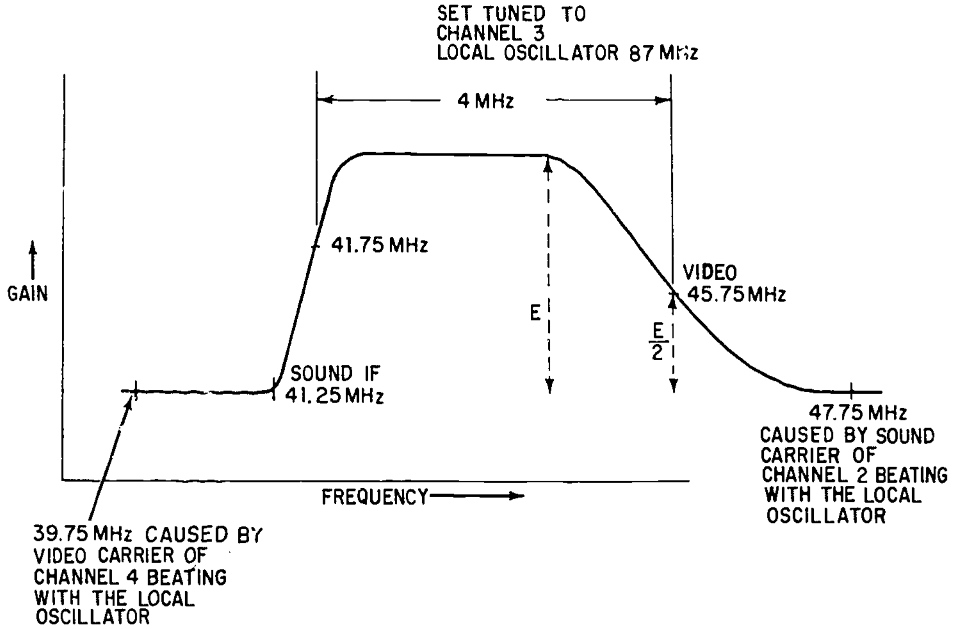

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Figure 8-6.—Video IF response curve.

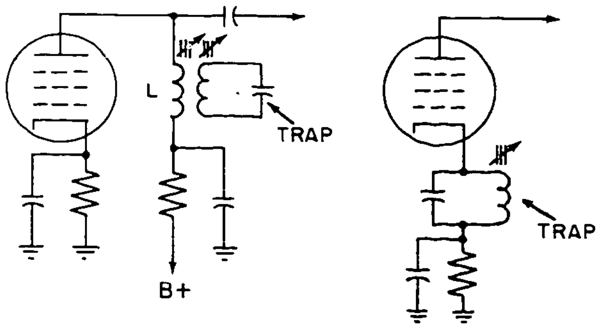
a local oscillator frequency of 107 MHz. The IF bandwidth will then extend from 107-61.25 = 45.75 to 107-65.25 = 41.75, or a total of 45.75-41.75 = 4 MHz. In the alinement of video IF stages, this adjustment is very important.

SECOND: Because the response characteristic of the RF and converter stages is intentionally broadened to pass the desired range of frequencies (6 MHz), the sides of the response curve taper off gradually. This means that undersirable frequencies may be passed through to the video IF system, which may cause horizontal bars to appear on the picture. For example, it is assumed that a television receiver employing a split-sound system is tuned to channel 3. (In a split-sound system the audio is taken off before the detector stage; whereas, in intercarrier-sound systems the audio is taken off after the detector stage.) The frequencies (39.75 MHz, 41.25 MHz, and 47.75 MHz) that may cause trouble on the television screen are indicated in figure 8-6. The 39.75 MHz beat note, caused by the combining of the video carrier (67.25 MHz) of channel 4 with the local oscillator frequency (107 MHz), is close enough to the desired frequencies to be passed through to the video IF system. Likewise, the 47.75 MHz beat note, caused by the combining of the sound carrier (59.75 MHz) of channel 2 with the local oscillator frequency (107 MHz), is close enough to be passed also. Of course, the sound IF (41.25 MHz) of channel 3 is the signal most likely to get through and must be trapped out. In intercarrier systems this frequency, which beats with the video IF to produce the 4.5 MHz sound IF, must not be removed until after the sound IF (4.5 MHz) has been fed to the audio channels.

Some representative trap circuits are shown in figure 8-7. An absorption trap is shown in part (A). The trap is tuned to the undesired frequency, and the output voltage (at the undesired frequency) developed across L is greatly reduced. It is therefore effectively removed from the input to the next stage.

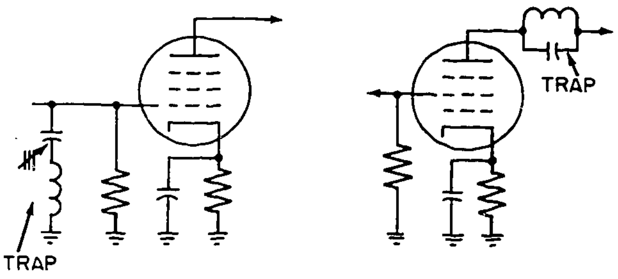
A degenerative trap is shown in figure 8-7 (B). At its resonant frequency (the undesired frequency) the trap offers a high impedance and this causes degeneration and reduced gain at that frequency.

A series-resonant trap is shown in figure 8-7 (C). The trap is tuned to the undesired frequency and thus shunts these frequencies around the input of the stage.



(A) ABSORPTION TRAP

(B) DEGENERATIVE TRAP



(C) SERIES-RESONANT TRAP

(D) PARALLEL-RESONANT TRAP

TD.488

Figure 8-7.—Trap circuits.

The parallel-resonant trap, shown in figure 8-7 (D), offers a high impedance to the undesired frequency. Thus, the offending voltage is dropped across the trap circuit and is not available at the input of the next stage.

Although trap circuits are commonly employed in the video IF stages, they are sometimes also included in the video amplifier of television receivers.

THIRD: In order to pass the necessary wide band of frequencies, most television receivers employ a stagger-tuned IF system. Each stage is tuned to a slightly different frequency to broaden the overall response curve. As an example, it may be assumed that a quality television receiver, employing split sound and stagger tuning, is tuned to channel 3. It may be assumed also that the local oscillator operates at 107 MHz.

The video IF is

107 MHz — 61.25 MHz = 45.75 MHz

and the sound IF is

107 MHz — 65.75 MHz = 41.25 MHz

The various tuned circuits in the IF section (together with the traps) are shown in figure 8-8 (A). The various frequencies in the vicinity of the video IF are so chosen that the overall response curve is similar to that shown in (B).

VIDEO DETECTORS

The video detector in a television receiver performs essentially the same function as the second detector in a superheterodyne amplitude-modulated radio receiver. It rectifies the signal (video and sync pulses) fed to it by the video IF system, removes the IF components, and feeds the remaining signal and sync information to the video amplifier. Various circuit arrangements, employing either diode electron tubes or crystals, are used by the manufacturers of television receivers.

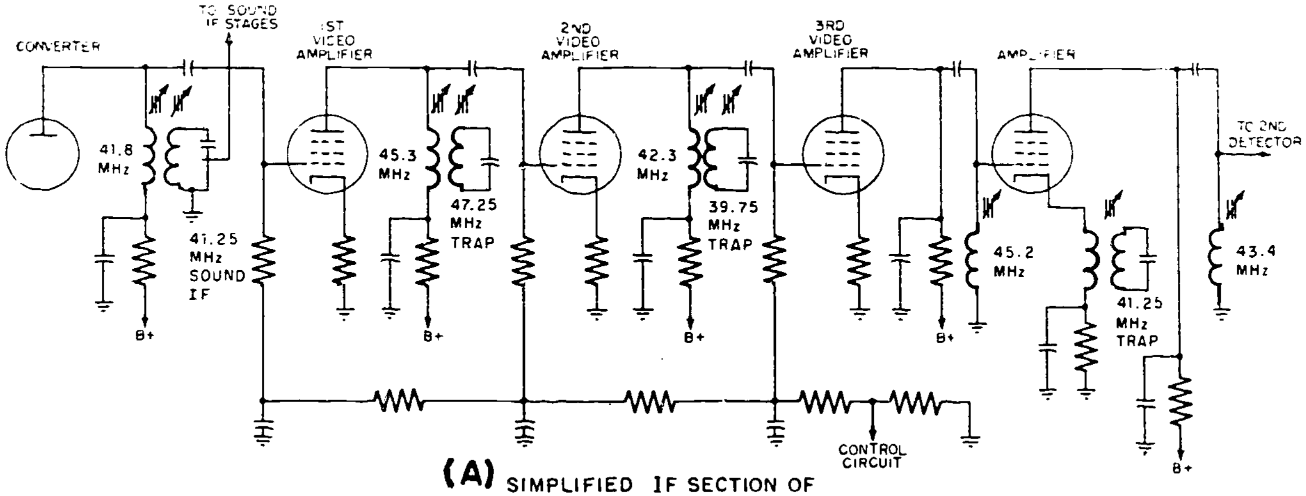
One type of diode detector is shown in figure 8-9 (A). Two methods of connecting the detector are shown. The output of V1 has a negative picture phase, and V2 has a positive picture phase.

In figure 8-9 (A), the low amplitude positive-going picture signals correspond to the brighter portions of the picture and higher amplitudes correspond to progressively darker portions of the picture. This corresponds to the negative picture phase.

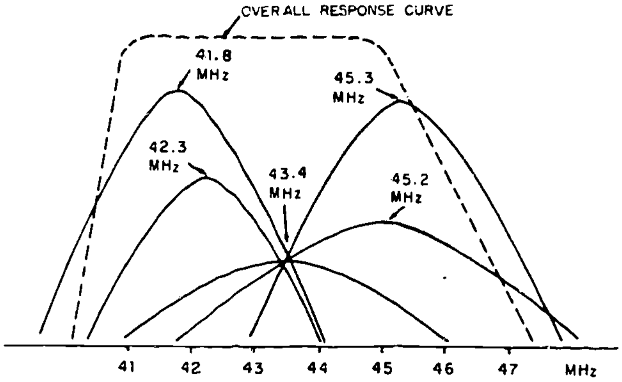
The low amplitude negative-going picture signals of V2 correspond to the brighter portions of the picture and higher amplitudes correspond to progressively darker portions of the picture. This corresponds to the positive picture phase.

The concept of negative picture phase may be made clearer from the following considerations. A video signal having a negative picture phase causes the cathode of the picture tube to be driven in a positive direction beyond cutoff during the blanking pulses. During the darker portions of the picture, the cathode is biased in the positive direction, but not to cutoff. Consequently, few electrons reach the picture tube screen, and the screen is relatively dark. During the brighter portions of the picture the cathode is driven only slightly in the positive direction, and many electrons reach the picture tube screen. The screen is therefore relatively bright.

The concept of positive picture phase may be made clearer from the following considerations. A video signal having a positive picture phase causes the grid of the picture tube to be driven negative below cutoff during the blanking pulses.



(A) SIMPLIFIED IF SECTION OF TV RECEIVER EMPLOYING SPLIT SOUND



(B) APPROXIMATE IF RESPONSE CURVES

TD.489

Figure 8-8.—IF section response curve.

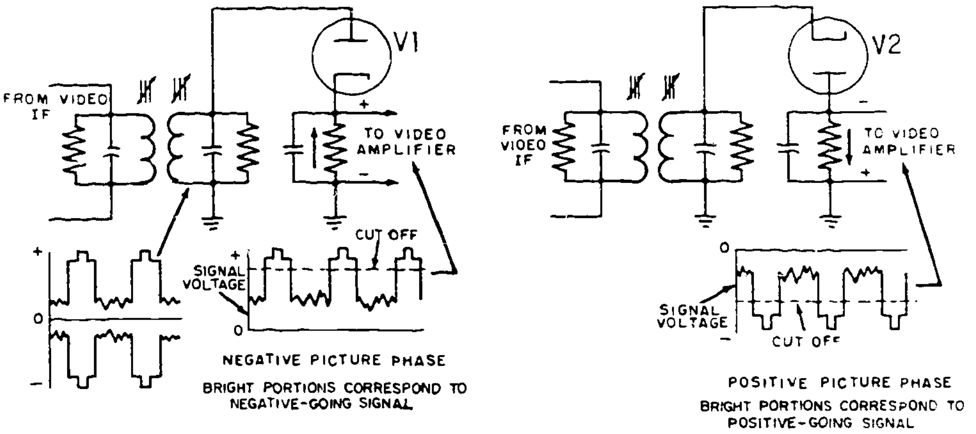
During the darker portions of the picture the grid is driven considerably negative, but not to cutoff. Consequently, fewer electrons reach the picture tube screen, and the screen is relatively dark. During the brighter portions of the picture, the grid is driven only slightly negative, and many electrons reach the picture tube screen. The screen is therefore relatively bright.

In the United States, negative transmission is used; that is, the television signal is transmitted with the negative picture phase. In certain other countries, positive picture transmission is used.

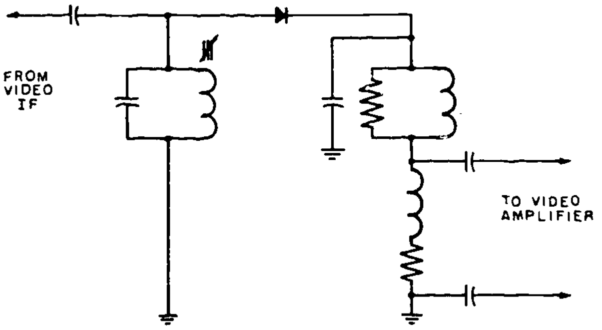
The output of the detector in the receiver may have a positive or a negative picture phase as indicated in figure 8-9 (A), irrespective of the type of transmission used. In either case, the video amplifiers must supply a signal having a positive picture phase to the grid of the picture tube. If the signal is applied to the cathode of the picture tube, it must have a negative phase.

The strength of the signal at the output of the detector is not sufficient to drive the picture tube, and therefore one or more stages of video amplification are necessary.

The circuit arrangement of a video crystal detector is shown in figure 8-9 (B). The crystal performs essentially the same function as the diodes.



(A) VIDEO DIODE DETECTORS



(B) VIDEO CRYSTAL DETECTOR

TD.490

Figure 8-9.—Video detectors.

VIDEO AMPLIFIERS AND D-C RESTORERS

Video Amplifier Design Problems

After the video signal (containing the video information and the blanking and sync pulses) has been rectified in the second detector, it must be amplified in one or more video amplifiers before it is applied to the picture tube. Because a wide band of frequencies must be passed without discrimination by the video amplifiers, they must be carefully designed. Special high and low frequency compensating circuits must be used to extend the approximate range of frequencies passed from 30 hertz to 4 MHz. In other words, frequency distortion must be eliminated as much as possible.

The low frequency video components include the low frequency a-c variations (represented on the picture screen as portions of the image that do not contain fine detail), the blanking pulses, and the sync pulses (vertical and horizontal). The high frequency video components are the high frequency a-c variations that produce the fine detail on the picture screen. In addition to the low frequency and the high frequency components in the transmitted signal, there is a zero frequency, or d-c, component present.

If all of the frequency components are not properly amplified in the video amplifier section, a distorted image is produced. The distortion may appear as a lack of fine detail, a lack of image sharpness in the larger objects, or a lack of contrast.

In addition to frequency distortion, phase distortion must also be eliminated as much as possible. In effect, phase distortion means that certain components (frequencies) that make up complex waveforms are not passed by the amplifier in the same length of time that other frequencies are passed. For example, in resistance-coupled amplifiers the coupling capacitor and the grid resistor, acting together, cause a phase shift that varies with the frequency.

Phase distortion may alter the background of the picture shown on the television screen; portions that should be white may be gray or even black. At the lower frequencies, excessive phase shift may cause larger objects to be blurred on the screen. At the higher frequencies, excessive phase shift causes the fine detail to be blurred.

Methods of Eliminating Frequency and Phase Distortion

Video frequency amplifiers are discussed in Basic Electronics. It is pointed out that the average resistance-coupled amplifier has a flat response of only a few thousand hertz and is therefore not suitable for amplifying video frequencies.

In order to amplify the higher frequencies as much as the middle range of frequencies, it is necessary to use some form of high frequency compensation. This type of compensation commonly takes the form of shunt compensation or series compensation or a combination of both.

In a resistance-coupled amplifier the output capacitance of the first amplifier stage, the distributed capacitance of the wiring, and the input capacitance of the second amplifier stage tend to shunt the high frequencies of the first stage to ground, thereby leaving less output voltage at these frequencies available to the second stage. The high frequencies are therefore not amplified as much as the middle range of frequencies.

This shunting effect may be compensated for (or the frequency range extended) by the use of a small inductor inserted in series with the plate load. The value of this inductor is so chosen that it will neutralize the distributed (output and input) capacitance of the circuit. That is, this inductor together with the distributed capacitance, forms a parallel-resonant circuit that is resonant at a frequency where the response curve begins to fall appreciably. The frequency range is thereby extended. This type of compensation is called shunt compensation, and the coils are called peaking coils.

Series compensation may also be used. In this case, a small inductor is added in series with the coupling capacitor and forms a series-resonant circuit (resonant at a frequency where the response curve begins to drop) with the distributed capacitances. At resonance, increased current flows through these capacitances, and larger voltages are available at the input of the amplifier tube. To prevent a sharp peak in the response curve, a resistor is shunted across the series inductor.

In order to amplify the lower frequencies as much as the middle or high range of frequencies, it is necessary to use some form of low frequency compensation. At low frequencies, the reactance of the coupling capacitor is large and much of the signal voltage is dropped there and is not available at the grid input. A large coupling capacitor could be used; but if this were done, the stray capacitance and leakage current would be increased. Of course, a coupling capacitor introduces some phase shift at low frequencies.

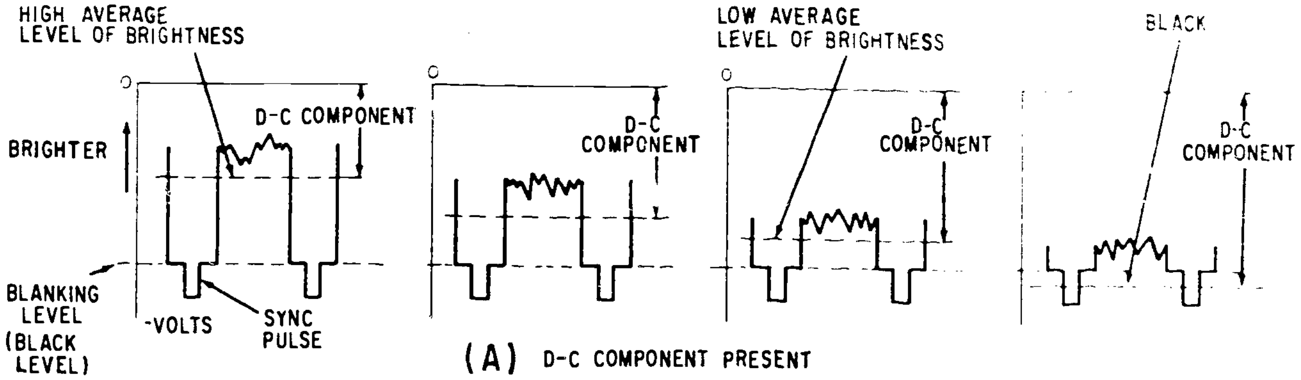
Both the loss in gain and the increase in phase shift at the lower frequencies may be compensated for in part by dividing the load resistor into two parts and bypassing one part with a capacitor. At the lower frequencies the plate load includes both resistors, and therefore the output voltage is higher. At the higher frequencies a portion of the load is effectively bypassed by the capacitor, and the output is proportionately lower.

D-C Restorers

The d-c restorer (or clamper) restores the d-c component of a pulse waveform after this component has been removed by the passage of the waveform through the coupling capacitor in the video amplifier stage. It is necessary to reinsert the correct d-c component at the input of the television picture tube if the correct level of background illumination is to be maintained. Also, if the correct d-c component is not reinserted, the blanking level will vary (instead of remaining constant, as it should), and retrace lines will appear on the screen during the time the blanking voltage is insufficient to cut off the picture tube during retrace.

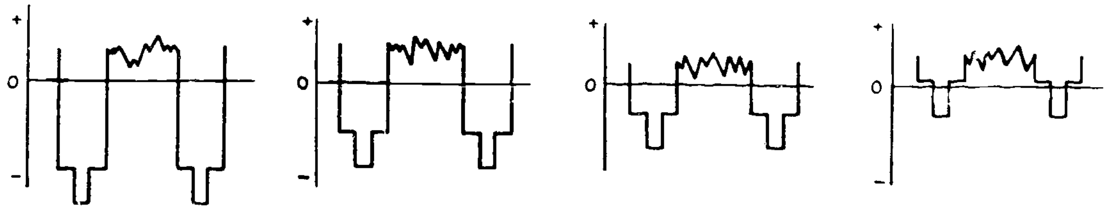
The average brightness of one scanned line may differ widely from the average brightness of another scanned line, as indicated in figure 8-10 (A).

The average d-c component depends on the average brightness of a scanned line. A low d-c



(A) D-C COMPONENT PRESENT

WHEN THE VIDEO SIGNAL PASSES THROUGH A COUPLING CAPACITOR, THE D-C COMPONENT IS REMOVED, LEAVING AN A-C SIGNAL THAT VARIES ABOUT THE ZERO LINE



(B) D-C COMPONENT REMOVED

TD.491

Figure 8-10.—Function of the d-c component in the video signal

component in the negative direction means that there exists a high level of brightness during that line; a high d-c component in the negative direction means that there exists a low level of brightness during that line. The average d-c component therefore establishes the blanking level.

Figure 8-10 (B) illustrates what happens when the d-c component is removed by the passage of the video signal through a coupling capacitor. Although the picture tube may be biased so that it is not driven in a positive direction beyond a certain value, nevertheless the blanking level varies and the retrace is often visible. The background brightness level also differs from that at the transmitter.

Simplified circuits of two types of d-c restorers are shown in figure 8-11. The function in each case is to restore the d-c component that was lost when the video signal passed through the coupling capacitor of the video amplifier. D-c restoration is accomplished by adding to the instantaneous a-c signal enough d-c voltage to bring the blanking voltage to the cutoff point.

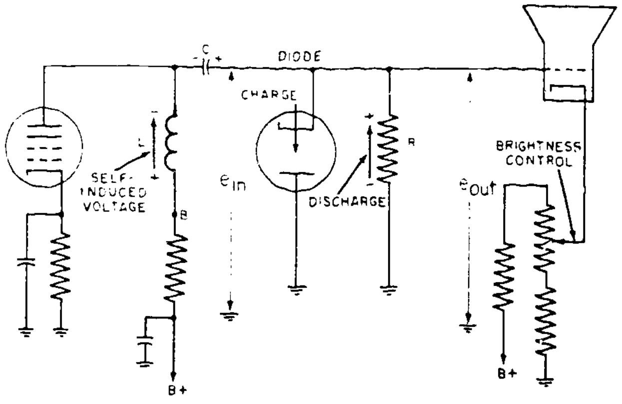
The action of the d-c diode restorer may be explained in the following manner: Without the diode the input signal voltage has the appearance of that shown in figure 8-10 (B). During the negative portion of the cycle (when the blanking and synchronizing pulses are active) the diode (fig 8-11 (A)) conducts because its cathode is negative and its plate is positive. This action occurs because the self-induced voltage across L opposes the B supply voltage and exceeds the value between point B and ground. Capacitor C charges rapidly through the diode and has the polarity indicated. The amount of the charge (voltage across C) depends on the strength of the input signal.

During the positive portion of the signal, shown above the 0 line in figure 8-10 (B), the diode cannot conduct, and C (fig. 8-11 (A)) discharges relatively slowly through R. A positive potential, which reduces the bias on the picture tube, is thus applied between grid and cathode during the scan interval between the blanking pulses. During this interval the diode is effectively an open circuit, and the video signal appears across R in series with the d-c voltage supplied by C. The greater the input voltage, the less the net bias remaining on the grid of the picture tube and the higher the average brightness. Thus the condition existing in figure 8-10 (A), is reestablished.

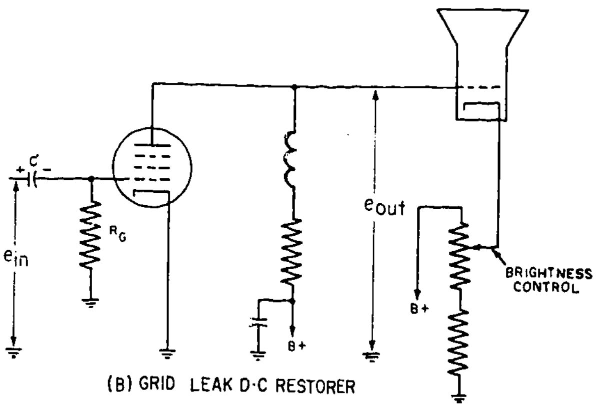
A grid leak d-c restorer circuit is shown in figure 8-11 (B). The incoming video signal has a negative picture phase, and the d-c component is missing; the output video signal has a positive picture phase, and the d-c component is restored, or reinserted.

The action of the grid leak may be explained simply. There is no fixed bias on the tube, and the grid goes positive whenever a positive pulse is applied. Grid current flows, and C charges rapidly through the conducting grid circuit. If a large pulse is applied, a large amount of grid current flows and a large bias is developed. If a small pulse is applied, a small amount of grid current flows and a small bias is developed. These two actions tend to stabilize the plate current at the same level during the pulses of current; that is, the blanking pulses are lined up at the same level as they were before the d-c component was removed. During the interval between blanking pulses, C discharges slowly through R_G.

It should be emphasized that the bias remains essentially constant (because of the long time constant of C and R_G) during the interval between blanking pulses. If this were not true, the d-c component would be lost.



(A) DIODE D-C RESTORER



(B) GRID LEAK D-C RESTORER

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Figure 8-11.—Simplified circuits

TELEVISION SOUND SYSTEMS

The sound system of a television receiver is essentially the same as that of an FM receiver. Because FM receivers are described in Basic Electronics, it is unnecessary to describe them in detail in this chapter. An important difference, however is the system used for IF amplification. There are two systems in use: the split-sound system and the intercarrier-sound system.

SPLIT-SOUND SYSTEM

A simplified version of a split-sound system is shown in figure 8-12. Although a large number of the newer television receivers use intercarrier sound, some sets still employ the split-sound system. In the split-sound system the sound IF is removed at the output of the converter (or from the first video IF) and amplified in a series of sound IF amplifiers.

INTERCARRIER-SOUND SYSTEM

A simplified version of an intercarrier system is shown in figure 8-13. This system is now used in most commercial sets. Its obvious advantage is that the sound is amplified along with the video, which means fewer audio stages are necessary.

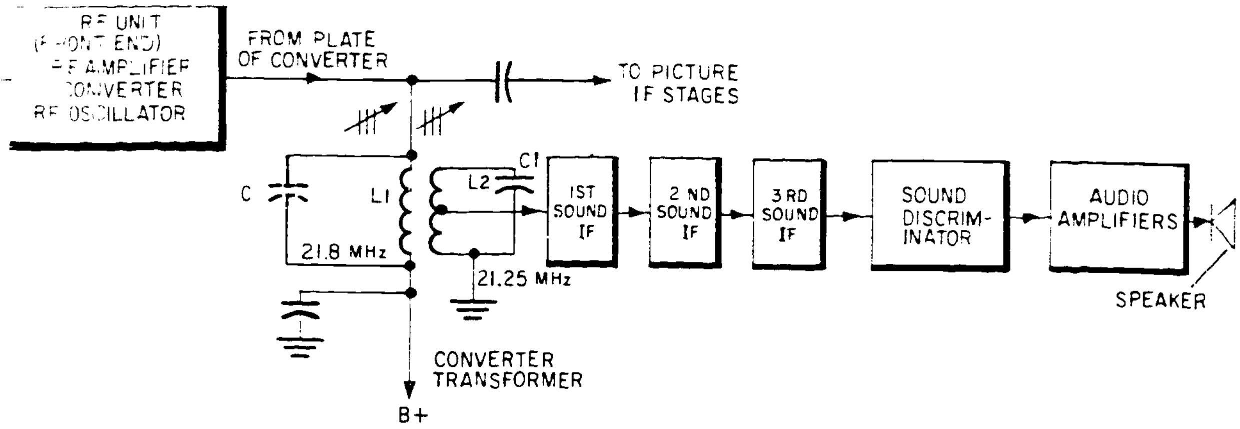

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Figure 8-12.—Split-carrier sound system.

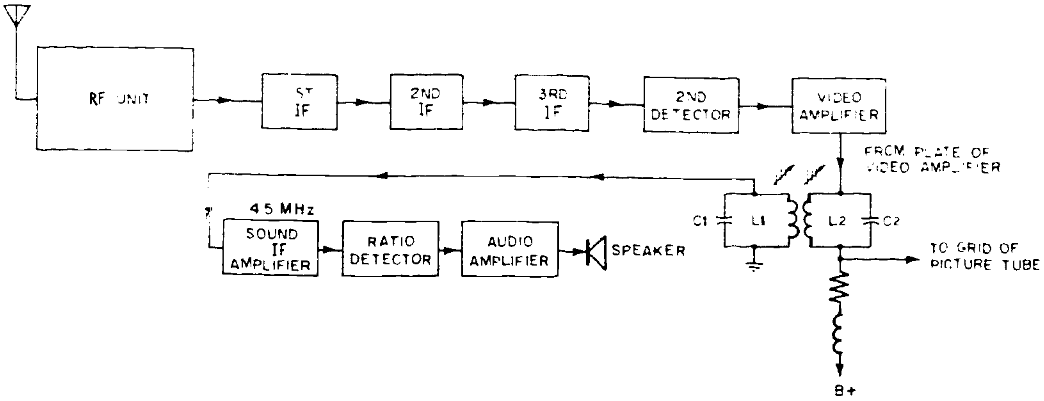

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Figure 8-13.—Intercarrier-sound system.

The carrier IF in the output of the RF unit is the same as those in the output of the RF unit in the split-sound system. Because the IF stages in the intercarrier system must pass both the picture and the sound IF carrier, the bandpass must be wide enough to pass both of these frequencies.

Although both video and sound IF carrier frequencies (with their sidebands) are amplified in the IF stages the sound IF is not amplified as much as the picture IF. By keeping the sound IF level much lower than the picture IF level, a 4.5 MHz beat note, containing only the modulation of the original RF sound carrier, is obtained at the second detector. This beat note is the difference in frequency between the sound carrier IF and the picture IF and, in fact, is the sound IF signal after it has passed the second detector. The difference between the video and sound carrier frequencies forms the basis of the sound IF and is always 4.5 MHz.

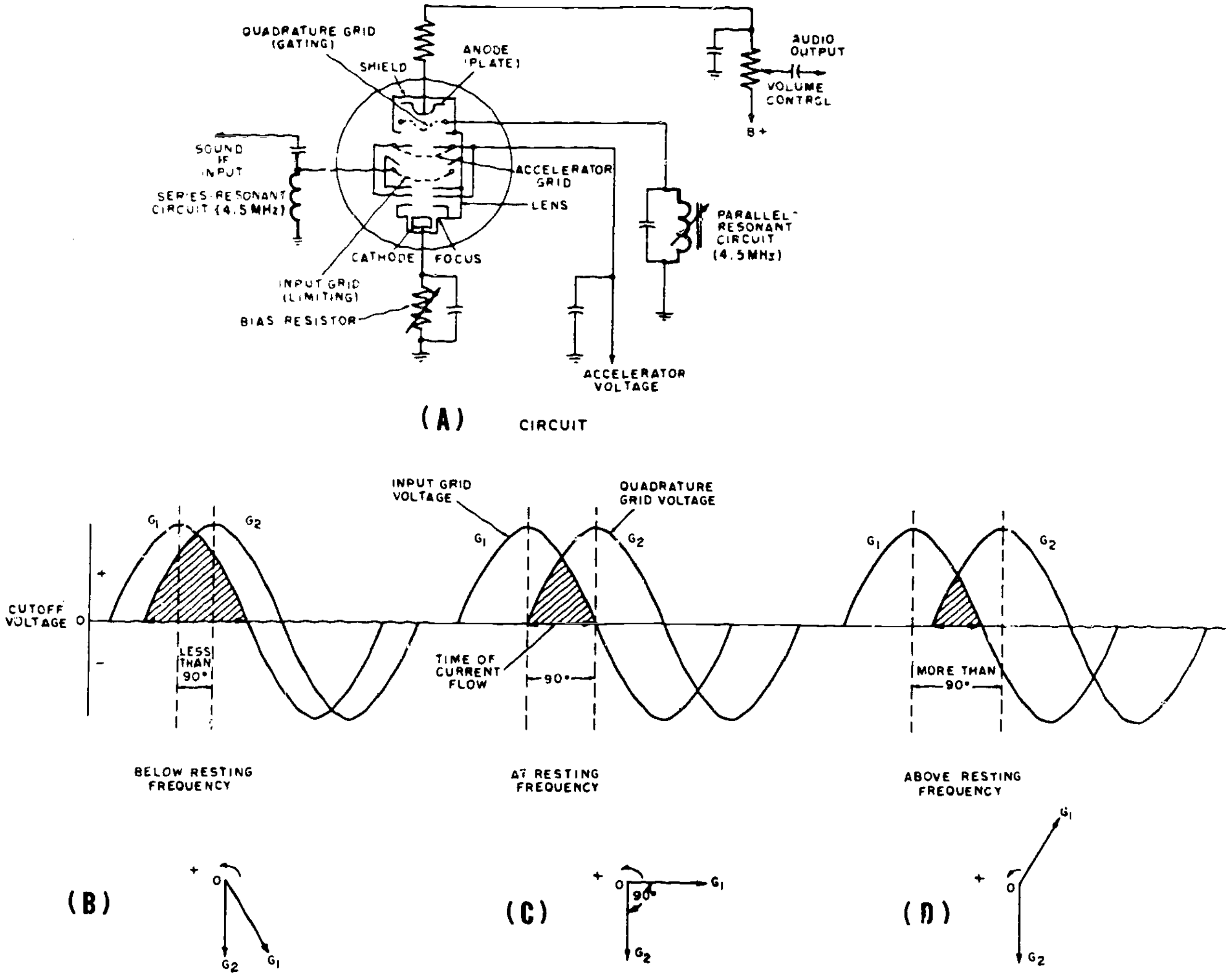
The 4.5 MHz sound is extracted, as shown in figure 8-13 from the video amplifier by a 4.5 MHz trap. The sound IF then passes through a sound IF amplifier, which also serves as a limiter. The signal is then passed to a ratio detector and to an audio amplifier and speaker.

AUDIO DETECTOR

When the ratio detector is used in the sound system of a television receiver, three or more tubes are required for the sound. Even more tubes are required when the discriminator is employed.

For additional economy of tubes, the gated-beam tube is sometimes used as the FM detector in television receivers. (It is also used in FM receivers.) Only one additional tube (output tube) is required in the audio portion of the intercarrier-sound system employing the gated-beam tube because this tube amplifies and detects the signal. A simplified version of the gated-beam tube and the associated circuits is shown in figure 8-14.

The sound IF signal is applied to the grid of the tube by the series-resonant input circuit. This provides some voltage step-up. If a given potential is applied to either the input grid or the quadrature grid, the plate current will not exceed a certain value even if the other grid is made much more positive. On the other hand, if the potential on either of the grids is negative enough, plate current cutoff will occur no matter what potential is applied to the other grid. In any case, plate current does not flow unless the potentials on both grids are above the cutoff value. The



TD.495

Figure 8-14.—Gated-beam tube and circuit.

amount that an incoming signal is permitted to change the plate current is thus limited.

A parallel-resonant circuit, tuned to the center frequency of the sound IF, is connected between the quadrature grid and ground. This high-Q circuit is actually the heart of the FM detector.

Assume that an unmodulated signal is applied to the sound IF input circuit. A voltage, the net value of which depends on the strength of the signal and the setting of the bias resistor, is applied between the input grid and cathode. Electrons approaching the quadrature grid induce a current in the parallel-resonant circuit. The resultant voltage between the quadrature grid and ground is 90° out of phase with the voltage between the input grid and ground (fig. 8-14 (C)). Therefore, the tube can conduct only when both voltages are above the cutoff voltage.

Now assume that a frequency-modulated signal is applied to the input grid. When the input signal is below the resting frequency, the parallel-resonant circuit becomes inductive. The quadrature grid voltage is less than 90° out of phase with the input grid voltage, as shown in figure 8-14.

When the input signal is above the resting frequency, the parallel-resonant circuit becomes capacitive. The quadrature grid voltage is then more than 90° out of phase with the input grid voltage, as shown in figure 8-14 (D).

Because plate current flows only when there is a positive potential on the quadrature and the input grid, the relative time durations of current flow are as indicated in figure 8-14. The volume control and the capacitor in the plate circuit, in effect, smooth out the current pulses and develop the audio signal voltage across the volume control.

SYSTEM ANALYSIS

The key to effective maintenance is the ability to analyze the complete system in operation, determining how each section affects the other. In troubleshooting a television system, symptoms can be obtained by viewing the picture tube and listening to the sound system. A summary of the overall system operation is the first step in analyzing troubles.

SUMMARY

The objective in television is to convert light reflections from an object into equivalent electrical impulses so that with the help of control and scan circuits the image of the object may be reproduced at the receiver.

The complete details of a picture or object cannot be transmitted (with the system currently being used) simultaneously. They must be sent bit by bit in rapid sequence so that with the aid of persistence of vision the picture may be seen as a whole. This method of transmitting a picture in parts, or bit by bit, is called scanning. (See fig. 7-2) In the United States, scanning (both in the camera tube and in the picture tube) is from left to right and from top to bottom. In order to avoid objectionable flicker without increasing the horizontal scanning speed, and without increasing the bandpass requirements of the composite TV signal, each of the thirty complete frames that are scanned out each second is divided into two fields. That is, during the first field every other line is scanned, and during the second field the lines missed during the first field are covered. This system of scanning is called interlaced scanning. (See fig. 7-3) Essentially the same net effect, as far as the viewer is concerned, is obtained by the shutter action in moving-picture projectors.

In one type of camera tube the electron beam, under the influence of the deflection coils, scans across the mosaic, which is composed of minute globules of a light-sensitive compound. The individual globules have charges that are proportional to light incident on them. The electron beam neutralizes the charges, and the resultant instantaneous electron flow from the common backplate of the mosaic through a resistor develops an instantaneous signal voltage. The succession of signal voltages is amplified, and along with the blanking and synchronizing voltages, is used to modulate the video carrier wave.

Blanking voltages are used to blank out the electron beam in both the camera and the picture tubes during the horizontal and vertical retrace times. Synchronizing voltages are injected during the blanking periods to synchronize the horizontal sweeps and the vertical sweeps at the transmitter and the receiver.

Because an image may contain a vast amount of detail, a wide range of frequencies must be transmitted for satisfactory viewing. Therefore, the transmitter and receiver circuits must be capable of passing, without distortion, a wide range (about 4.5 MHz) of frequencies.

Although the audio signals are transmitted along with the video signals, the audio and the video systems are essentially separate systems.

The video carrier is amplitude modulated and the sound carrier is frequency modulated.

Because the television signals present at the receiving antenna are often very weak, it is necessary to use a high-gain antenna. (See fig. 8-2.) Out-of-phase signals may arrive (after reflection) at the rear of the antenna, and may make the use of a highly directional antenna desirable. Various types of commercial antennas are available for both the VHF and UHF bands. The UHF antennas are smaller, and therefore elaborate arrays that would be too cumbersome at lower frequencies are sometimes used.

Television "front ends" (tuners) have much in common with radio front ends. However, bandpass considerations, wide tuning range, high frequency operation, and reception in fringe areas have introduced design problems. Front ends are composed of an RF amplifier, a local oscillator, and a mixer. (See fig. 8-3.) The cascode amplifier is a popular television RF amplifier. It produces fairly high gain and introduces very little noise. The oscillator and the mixer sections of TV receivers are generally included in separate tube envelopes in order to achieve maximum frequency stability.

A number of tuning methods are used in TV front ends. Rotary switches that connect the correct inductors and capacitors for the desired channel are often employed. In some systems the "tuned line" is used, and in other the turret tuner is used. The Inductuner, one of the few continuous tuners, tunes over the entire tuning range.

Bandpass requirements, vestigial sideband transmission, and the necessity for trapping out undesired frequencies have introduced problems in the design of video IF amplifiers. Stagger tuning is employed to obtain the desired bandpass. In order to avoid overemphasizing the frequencies adjacent to the video carrier, the video IF stages are adjusted so that the video IF falls approximately halfway down on the slope of the video IF bandpass. Resonant trap circuits are used to absorb and dissipate the energy contained in the undesired frequencies.

The video detectors commonly employed are electron tubes or crystal diodes. (See fig. 8-9.) The output of the detector may have positive or negative picture phase, depending on the way the diode and elements of the picture tube are connected.

After the video signal has been rectified in the video detector, it is amplified in one or more amplifiers before it is applied to the picture tube. Because a wide band of frequencies must be passed without discrimination by the video amplifiers, they must be carefully designed. Special high and low frequency compensating circuits must be used to extend the approximate range of frequencies passed from 30 Hz to 4 MHz. In other words, frequency distortion must be eliminated as much as possible. In order to pass the required wide band of frequencies, some form of shunt compensation or series compensation or a combination of both is used. Likewise, phase distortion must be eliminated as much as possible. Phase distortion is reduced by the proper design of the coupling circuits.

The d-c component of a pulse waveform must be restored after it has been removed by the passage of the waveform through the coupling capacitor in the video amplifier stage. It is the function of the d-c restorer to reinsert the correct d-c component at the input of the television picture tube so that the correct level of background illumination is maintained. Diode or grid leak restorers are the types often used.

Synchronizing circuits are exceedingly important in TV receivers. These circuits separate the sync pulses from the composite video signal, and in turn separate the horizontal from the vertical sync pulses.

The horizontal sync pulses are used to trigger the horizontal oscillator (a multivibrator or a blocking oscillator) at the correct instant to keep the horizontal sweep of the receiver in step with the horizontal sweep of the transmitter. If the horizontal oscillator does not lock-in properly, the picture gives the appearance of tearing.

The output of the horizontal oscillator is fed to a circuit (for example, a discharge tube), which gives the voltage pulse the proper trapezoidal sawtooth form. The pulse is then amplified and fed to the deflection yoke. It is common practice to utilize the inductive kick due to the horizontal flyback in the output transformer to produce the high voltage for the picture tube. The output transformer has an autotransformer arrangement, which effectively adds the necessary additional inductance. Included in this stage is the damper tube which dampens oscillations and provides boosted B+.

The vertical sync pulses are used to trigger the vertical oscillator (a multivibrator or a blocking oscillator) at the correct instant to keep the vertical sweep of the receiver in step with the vertical sweep of the transmitter. If the vertical oscillator does not lock-in properly, the picture will "roll" downward or "jump" upward.

The pulse from the vertical oscillator is properly shaped, amplified, and fed to the yoke as sawtooth current.

In the intercarrier system, the sound and the video signals are amplified in the same IF system of amplifiers. At the video detector, or in a circuit following the video detector, the sound IF is removed and fed to the sound IF amplifier, which also acts as a limiter. A ratio detector or a discriminator may be used as the FM detector. A gated-beam tube is sometimes used as the FM detector. When this tube is used, the sound IF stage may be omitted. After the FM sound signal has been detected, it is fed to the audio amplifier and the speaker.

UNIT ISOLATION

When troubleshooting a system the first step is to isolate the probable trouble to one major unit. Figure 8-15, which illustrates the major units of the system, shows that the video signal starts at the camera and goes to the control unit. From the control unit the signals are sent to the monitors by way of a cable and then to the receivers via air transmission.

If one video monitor/receiver develops trouble, the first check to make is to observe the other monitors. For example, if the other monitors/receivers are working normally, it can be assumed that the camera unit and control unit are functioning properly. The trouble must be either in the video monitor/receiver or in the connecting cables.

When all monitors/receivers have the same trouble, the trouble must be in some unit that is common to them. In this case the control unit or the camera unit may be the source of trouble. Checking the input to the control unit with an oscilloscope will determine the operation of the camera unit. Correct video signals appearing at the video input jack eliminates the camera unit. This isolates the trouble to the control unit. Procedures contained in the manufacturer's maintenance manual will aid the TD in finding the faulty component.

CIRCUIT ISOLATION

Observing the picture on the receiver/monitor furnishes the TD with valuable symptoms of trouble. The sound system operation is heard through the speaker. The operating condition of practically all other circuits (fig. 8-16) is displayed on the picture tube.

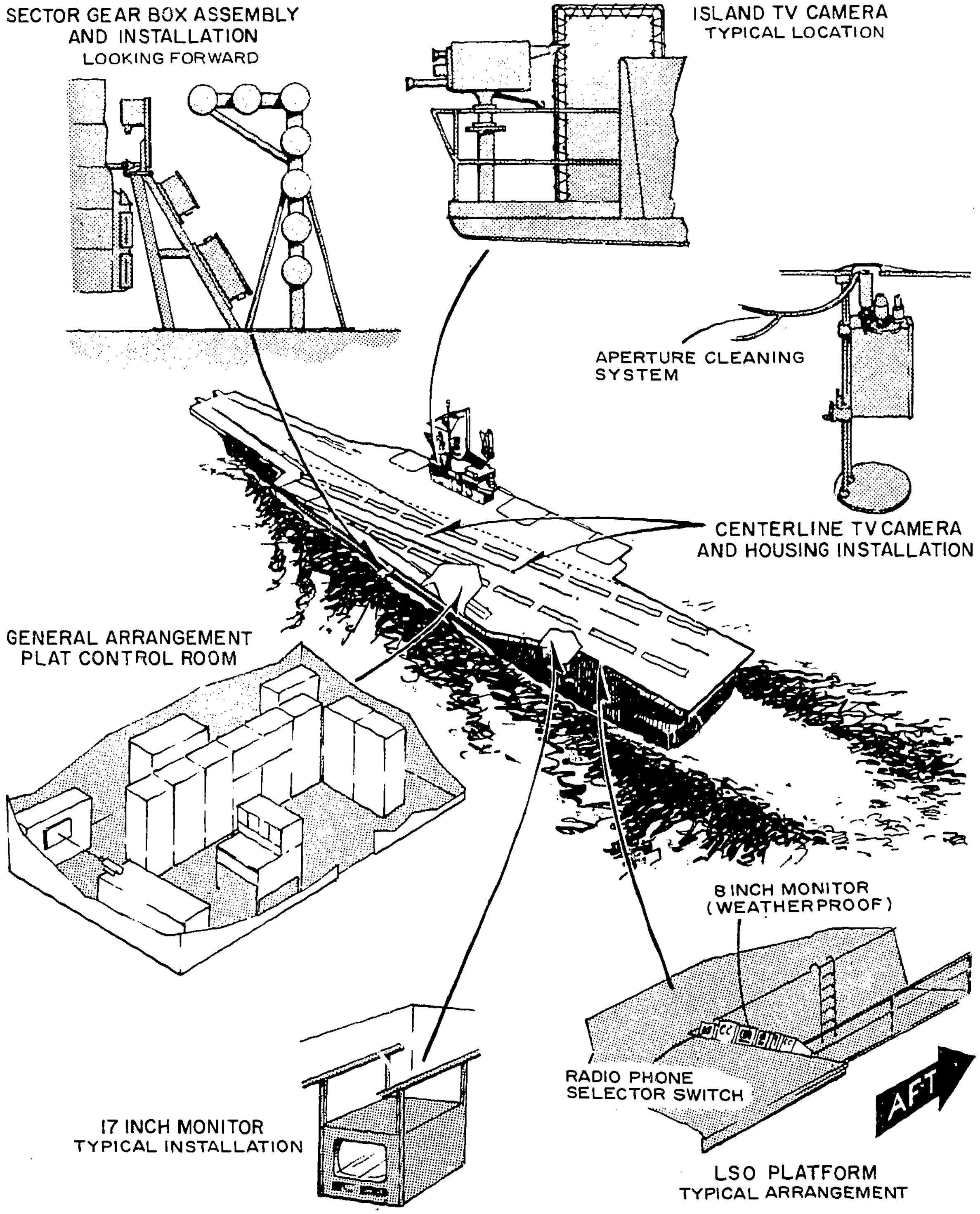
Reviewing the block diagram (fig. 8-16) will show how the operation of the individual circuits is related to the other circuits. The low voltage power supply furnishes voltages for the whole receiver. Trouble in this circuit affects both the video and sound. The received video and sound must pass through the tuner section; trouble in this circuit results in both video and sound trouble. The high voltage supply furnishes the voltages to the picture tube for the picture raster. Trouble in this circuit would affect the brightness of the raster only, while video and sound could be normal. However, in this case the video is present but cannot be seen because the picture tube is not illuminated.

The sweep systems are free running and not dependent upon received signals to start their operation. When the horizontal sweep system starts oscillating, energy is supplied to the high voltage supply circuit and the picture tube is illuminated. If the raster is present, the sweep circuits are operating. If no video (picture) is present, the trouble circuit is one that affects the picture only. Referring to figure 8-16, it can be seen that the video received at the input (antenna) passes through the tuner and then through the video section to the picture tube. If sound is heard, it can be assumed that the tuner is normal. This further isolates the trouble to the video amplifiers.

While it is beyond the scope of this training manual to describe all the possible troubles encountered, the examples in table 8-1 illustrate the technique used to isolate a trouble in a complex system into a simple circuit problem. Table 8-1 is based on a typical receiver circuit using intercarrier sound with the sound takeoff circuit in the video system, shown as a broken line in figure 8-16.

COLOR TV

The contents of chapter 7 and this chapter have been concerned with the pickup, control, transmission, and reception of black and white pictures. This achievement in itself is indicative of modern technology. The addition of color TV has made training aids more realistic in that the trainees see the actual colors of the scene.



TD.507

Figure 8-26.—PLAT system, general arrangement.

speed, and waveoff signal. This camera output is displayed simultaneously with the output of either the centerline cameras or the island camera.

A manned camera, located on the island structure approximately 40 feet above the flight deck, picks up the aircraft as it passes over the centerline cameras, "zooms in" for a closeup, and follows the arresting wire back to its battery position to determine which of the four wires was engaged. If the aircraft bolters, the cameraman follows it as it departs the ship. The island camera is also used to pick up launches, providing the ship's combat information center with immediate takeoff information and permitting all ready rooms to keep direct contact with deck operations.

The video tape recorder, located in the PLAT control room, records one video signal and two audio signals on a standard 90-minute reel of video tape 2 inches wide. As the tape requires no processing, the recording can be played back immediately. Later it can be erased and the tape used again to capture the next landing operation. One of the two audio channels records conversation between landing operation personnel and the pilot. The second is a "cue" track which can be used for additional commentary during pilots' debriefing or for accident analysis.

An integrated system of picture monitors (TV sets) keeps carrier control and information centers in constant touch with each step of landing or takeoff. A monitor in the combat information center, for example, lets below deck technicians actually see aircraft approach as well as read it on a conventional radar screen. Landing operation personnel cross-check the "physical" landing with the monitor picture while movement of the arrested aircraft to forward areas can also be plotted from the same screen. Readyroom monitors allow personnel not involved in the operation to evaluate a pilot's general performance or reaction to specific emergencies.

After a mission is completed, pilots and landing operation personnel can watch a minute-by-minute playback of the entire landing operation. Errors in judgment or procedure can be pointed out while the operation is still fresh. Details impossible to remember are re-created in their entirety on tape to lend authoritative reference to the hasty and often cryptic notes made during the operation. Later the same tape can be used to help train new pilots long before their first carrier landing is ever attempted. These tapes can also be invaluable for training new personnel who have never seen aircraft making actual carrier arrestments.

CHAPTER 9

ANALOG COMPUTERS

GENERAL PRINCIPLES OF COMPUTERS

Computers can add, subtract, multiply, and divide, or do calculus problems at speeds far beyond the capacity of the human brain. They produce correct answers in numerical form for use by statisticians, or in physical form for the control of machinery, military equipment such as gun directors, and synthetic training devices such as operational trainers.

Computers are often called mechanical brains because many of them operate on principles similar to those of the human brain. Unlike the human brain, however, properly operated and maintained computers have no unaccountable inconsistencies. They behave in a fixed pattern; and any man who understands this pattern can control and repair the machines. Computers operate according to basic mathematical rules, and contain only such simple elements as vacuum tubes, capacitors, variable resistors, motors, gears, relays, and synchros. All the operator or repairman needs is a sound knowledge of computer principles and operation, plus the ability to understand the function and capabilities of the machines he may be called upon to operate and repair.

All computers take input information, give meaning to it in a prescribed manner, and produce output information. In a slide rule, for example, a strip is moved to indicate one input. The operator scans the strip to locate the second input, opposite which the output is indicated. Because the strip is graduated according to the logarithms of numbers, the output will be the multiplication of the inputs. The sum of the logarithms of the two inputs is equal to the logarithm of their product. If a problem requires a series of calculations, the operator merely transfers the answers from one step of the problem to the next, repeating the process as often as necessary.

Modern computers carry out all steps automatically once the operator has provided the input information. These inputs are measurable quantities which represent simple numbers or physical units such as temperature, speed, or pounds. Computing elements give purpose to the information by operating according to mathematical laws to perform the processes of adding, multiplying, integrating, etc. Outputs are numerical or physical quantities corresponding to the inputs and the mathematical operation performed.

COMPUTER TYPES

In their present stage of development, computers operate on one of two basic principles and, as a result, can be classified into two major systems: digital and analog. (NOTE: Basic Electronics, NavPers 10087-B, contains a discussion of both analog and digital principles. The Tradevman should be familiar with the contents of this course before studying the material that follows.) Although this chapter is concerned primarily with analog computer principles and chapter 10 with digital computer principles, a brief comparison of the two systems follows.

In the typical digital computer, quantities are handled by counters which register increases or decreases in discrete (separate) steps. All mathematical processes are reduced to a series of additions or subtractions. For example, in the digital method of operation, 2 x 3 is handled as 2 + 2 + 2. In all cases, the sequences of the additions (or subtractions) are controlled so that they conform to the statement of an equation to be solved or to the necessary steps of an arithmetical computation to be carried out.

When digital computers are employed, complicated mathematical operations must be reduced to arithmetical operations before the problems can be solved. The digits representing the input information are fed into the computer and stored or "memorized." The digits are then added or subtracted according to instructions provided to the machine. Outputs representing the results of the computations are recorded on magnetic devices (tapes, drums, etc.), on graphs, on punched cards, or in some cases, converted into typewritten answers.

Analog computers differ in several fundamental ways from digital machines. These differences include the manner in which the inputs are presented, the number of basic operations involved, and in the degree of accuracy of the computations.

In typical analog computers, the input data are represented by physical quantities, such as voltages, shaft rotations, or mechanical displacements. Unlike digital inputs, these quantities are continuously variable rather than varying in steps. Operating in response to the inputs, the analog computer provides a continuous solution which is correct at every instant, whereas the digital system must go through a certain sequence of steps before arriving at an answer.

Analog components perform a number of different kinds of operations including addition, subtraction, multiplication, integration, and differentiation, as well as other basic mathematical processes. The components are interconnected and vary in complexity with the number of processes for which the computer is designed.

In general, analog computers are not as accurate as comparable digital machines since analog accuracy is limited by the accuracy with which physical quantities can be measured. If accuracy in the order of 0.1 to 5 percent is satisfactory, analog equipment will give adequate performance with the advantage of relatively low cost. Operational trainers are examples of devices which employ analog computer principles; another familiar example is the simple slide rule, which is widely used by engineers and technicians.

COMPUTER CLASSIFICATION

Computers may be further classified, based on their construction, as follows:

1. Mechanical.
2. Electronic.
3. Electromechanical.

Mechanical computers utilize mechanical quantities to represent the input and output values. They normally contain devices that add, subtract, multiply, or divide by means of gear ratios, shaft rotations, etc. Examples of these devices are discussed in chapter 11 of Tradevman 3 & 2, NavPers 10376-C.

Electronic computers utilize electrical units, such as voltage amplitude and phase, resistance, electrical pulses, and other electrical units to represent physical quantities. Computers of this type normally contain electronic and magnetic amplifiers, phase detectors, modulators, and demodulators.

Electromechanical computers represent numbers or variables in both electrical and mechanical units. A typical application may employ both electrical and mechanical inputs to a servomechanism and have a mechanical output.

In actual practice, computers used in training devices will not normally be of any one type, but will contain some features of all types. Their classification is based on the predominant type of computing device found in the equipment.

ANALOG MATHEMATICAL OPERATIONS

There are a number of requirements which an analog computer used in a training device must fulfill. Primarily, it must possess sufficient accuracy to solve a problem within the required limits. It must be constructed in a manner whereby it can withstand the stress of constant use and require a minimum of maintenance. It is also advantageous from the maintenance standpoint for a computer to use as many similar components as practicable, keeping the number of spare parts to a minimum. Therefore, the TD may expect to find equipment that has rearranged simple equations from their simplest form to one that is more complicated mathematically for reasons not readily apparent to the Tradevman. Many of the computers used in training devices have been designed around equation rearrangement.

IMPLICIT PROBLEM SOLVING

The use of computers to solve complex problems does not always afford direct solution to all parts of the problem. Thus, the solution may be based on indirect or implicit methods.

Implicit problem solving may accomplish subtraction by means of addition, division by means of multiplication, the extraction of a square root by means of squaring, and differentiation by means of integration. The following is a comparison of explicit and implicit methods of problem solving:

	EXPLICIT	IMPLICIT
Subtraction	$c = a - b$	$c + b = a$
Square root	$c = \sqrt{a}$	$c^2 = a$
Division	$c = a/b$	$cb = a$

Implicit problem solving assumes that the solution of a problem is already known; i.e., the answer is part of the solution. An example of this would be the equation $\theta = a + b \sin \theta$, where a and b are angular displacements. The answer θ appears on both sides of the equation and is therefore expressed in its implicit form. To express this equation in explicit form, it would contain an infinite series. The first five terms, which may be considered an approximate answer, are as follows: $\theta = a + b \sin a + 0.5b^2 \sin 2a + 0.125b^3 (3 \sin 3a - \sin a) + 0.166b^4 (2 \sin 4a - \sin 2a) + \dots$ The solution of even this approximation by an analog computer would require a large number of circuits. However, if the implicit form is used, only three components need be used, a position servo with a resolver, a summing amplifier, and an inverter. (See fig. 9-1.)

The magnetic resolver has the function b as its input and is controlled by the θ servo. The sine output ($b \sin \theta$) is applied along with function a to the summing amplifier for addition. The output is fed to the inverter and now represents $a + b \sin \theta$, which equals θ. This signal is then fed to the servoamplifier. This closed loop servosystem assures that the implicit relation is made true, even if it is initially incorrect. If θ does not equal $a + b \sin \theta$, then there will be an output from the summing amplifier and thus an input to the servo. This will cause the servo to drive in such a direction and to such a position until the inverting amplifier output is again zero. If either of the two variables change (a or b), then an error signal exists which drives the servo until the error is again zero, stopping the servo at the new value for θ, thus keeping the relation true.

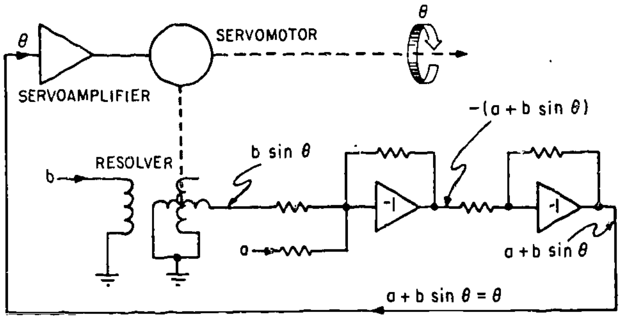
The use of the implicit technique is found frequently in computers. There are numerous computations for which the implicit method may be more accurate or more convenient, based on the information available to the computer. Servomechanisms and amplifiers utilizing negative and positive feedback are well suited for instrumentation of implicit operations.

REPRESENTATION OF QUANTITY

For the purpose of this chapter, representation of quantity may be defined as that physical quantity used by an analog computer to represent a specific input quantity. Thus, for example, in a training device computer, a specific quantity, distance from the station to the flight trainer, may be identified with a d-c voltage fed to the analog computer for solution of the tracking problem.

Table 9-1 indicates the types of representation which may be encountered in analog computers.

Table 9-2 gives some advantages and disadvantages of the two general types of



TD.553

Figure 9-1.—Analog circuit for the implicit formula $\theta = a + b \sin \theta$.

Table 9-1.--Mechanical and electrical representations in computers.

Mechanical	Electrical
Force	Voltage
Pressure	Current
Torque	Charge
Linear displacement	Impedance
Angular rotation	Frequency
Linear velocity	Phase
Angular velocity	
Linear acceleration	
Angular acceleration	

Table 9-2.--Comparison of mechanical and electrical methods of representation.

Mechanical		Electrical	
Advantages	Disadvantages	Advantages	Disadvantages
Simpler and easier to understand. Few adjustments. Contain no electronic components subject to failure.	Subject to friction and wear. Requires precision components.	Flexibility. Replacements are normally standard parts. Accuracy. Weight Speed of response.	Electronic parts failures. Components may change value causing drift.

representation. Regardless of the apparent advantages some methods of representation may have, all methods are found in training devices.

IDENTITY OPERATIONS

For the purpose of this discussion, an identity operation may be defined as any operation that does not change the mathematical quantity represented. Examples of identity operations are changes in scale factor, voltage level, impedance, and data representation.

Change in Scale Factor

A clear concept of scale factor is necessary in the understanding of computers. Often it is necessary to convert a computing voltage value to the quantity that it represents. An example of this is as follows. The maximum range of a computer is 240,000 yards; the maximum voltage level that the amplifiers are capable of handling is 12 volts. The scale factor is then equal to:

$$\text{scale factor} = \frac{\text{analog units}}{\text{physical units (equation units)}}$$

$$\text{scale factor} = \frac{12 \text{ volts}}{240{,}000 \text{ yards}}$$

$$\text{scale factor} = \frac{1 \text{ volt}}{20{,}000 \text{ yards}}$$

This scale factor states that 1 volt represents 20,000 yards.

If the scale factor and the analog units are known, the physical units (equation units) may be found as follows: (assume an analog voltage of 3 volts).

$$\text{physical units (equation units)} = \frac{\text{analog units}}{\text{scale factor}}$$

$$\text{physical units} = 3 \text{ volts} \div \frac{1 \text{ volt}}{20{,}000 \text{ yards}}$$

$$\text{physical units} = 3 \text{ volts} \times \frac{20{,}000 \text{ yards}}{1}$$

$$= 60{,}000 \text{ yards}$$

If the scale factor and the physical units are known, the analog units may be found as follows:

$$\text{analog units} = \text{physical units} \times \text{scule factor}$$

$$\text{analog units} = 60{,}000 \text{ yards} \times \frac{1 \text{ volt}}{20{,}000 \text{ yards}}$$

$$\text{analog units} = 3 \times 1 \text{ volt} = 3 \text{ volts}$$

Any change in analog units wihtout a corresponding change in equation units will result in a change in scale factor. To illustrate this, consider the following example:

A 10-volt positive d-c signal is selected to represent a range of 1,000 yards.

$$\text{scale factor} = \frac{+10 \text{ volts}}{1{,}000 \text{ yards}}$$

$$= 0.01 \text{ volt per yard}$$

If the 10-volt signal is fed through a d-c amplifier having a voltage gain of 10, the analog unit is now equal to 100 volts. The scale factor is:

$$\text{scale factor} = \frac{+100 \text{ volts}}{1{,}000 \text{ yards}}$$

$$= 0.1 \text{ volt per yard}$$

Thus, the scale factor was changed by the action of the amplifier.

When the multiplier is less than one, simple networks of resistance, capacitance, or inductance may be used. When the constant of multiplication is greater than one, amplifiers whose gain has been accurately calibrated may be used.

Change of Voltage Level

Computers, such as those utilizing addition and subtraction, must frequently change or shift the voltage level or reference to that level usable by subsequent components or units. A possible example of a shift in voltage level is found in direct-coupled amplifiers where the equipment is limited by the output of the d-c supply for the amplifier.

Change of Impedance

A change in output impedance may be required to match the various sections of a computer. This may be accomplished by the use of networks, and in some cases the use of cathode followers or other amplifiers employing feedback.

COMPONENTS OF ANALOG COMPUTERS

The means of performing mathematical operations such as summation, multiplication, division, differentiation, integration, vector resoluation, coordinate conversion, and special function generation are included in most analog computers and are explained later in this chapter. General purpose commercial analog computers usually have specific functional units assigned to perform certain mathematical operations. For example, they may contain a bank of ten summation amplifiers and ten integration amplifiers. Complete solutions are obtained by interconnecting the appropriate units by means of cables.

Special purpose analog computers, such as flight trainers, generally contain apparatus grouped in sections according to equations to be solved rather than in banks of similar circuits. Thus, one chassis might be concerned with angle of attack, another with heading, and a third with altitude. Interconnections between the various chassis are used to cause the trainer as a whole to react realistically to the flight environment and the control movements made by the pilot. Analog computers are usually comprised of the following functional units:

1. Linear computing elements which perform summation (addition and subtraction), phase inversion, multiplication, and division, and are often completely electronic.
2. Nonlinear computing elements which perform mathematical operations involving one variable as a nonlinear function of another. Servomechanisms are used to carry out such processes as logarithmic solutions and special function generation.
3. Scale factor resistors which make analog units proportional to equation units, and also set in coefficients of equation terms.
4. Power supplies which furnish voltages needed by the electronic components.

Single-purpose analog computers produce answers on visual-display indicators and simulate natural reaction forces; for example, readings on turn-and-bank indicators and reactions to the aircraft's control stick.

A TYPICAL ANALOG COMPUTER

This chapter describes a few of the many methods of automatically carrying out computations which are involved in simulating real situations. However, before attempting to understand computer operation, the reader must know the answers to such questions as:

1. What is its purpose?
2. What equations does it solve?
3. In what form are the solutions presented?

What computational techniques are used and how they are applied can then be determined.

Figure 9-2 illustrates the relationship between an actual physical situation and its electromechanical analog. The physical situation is that of an aircraft in flight. The electromechanical analog in this instance is a group of servomechanism computers which solve the equations of flight. In the simulator, motions of the pilot which ordinarily control the aircraft are used to control variables in the equations of

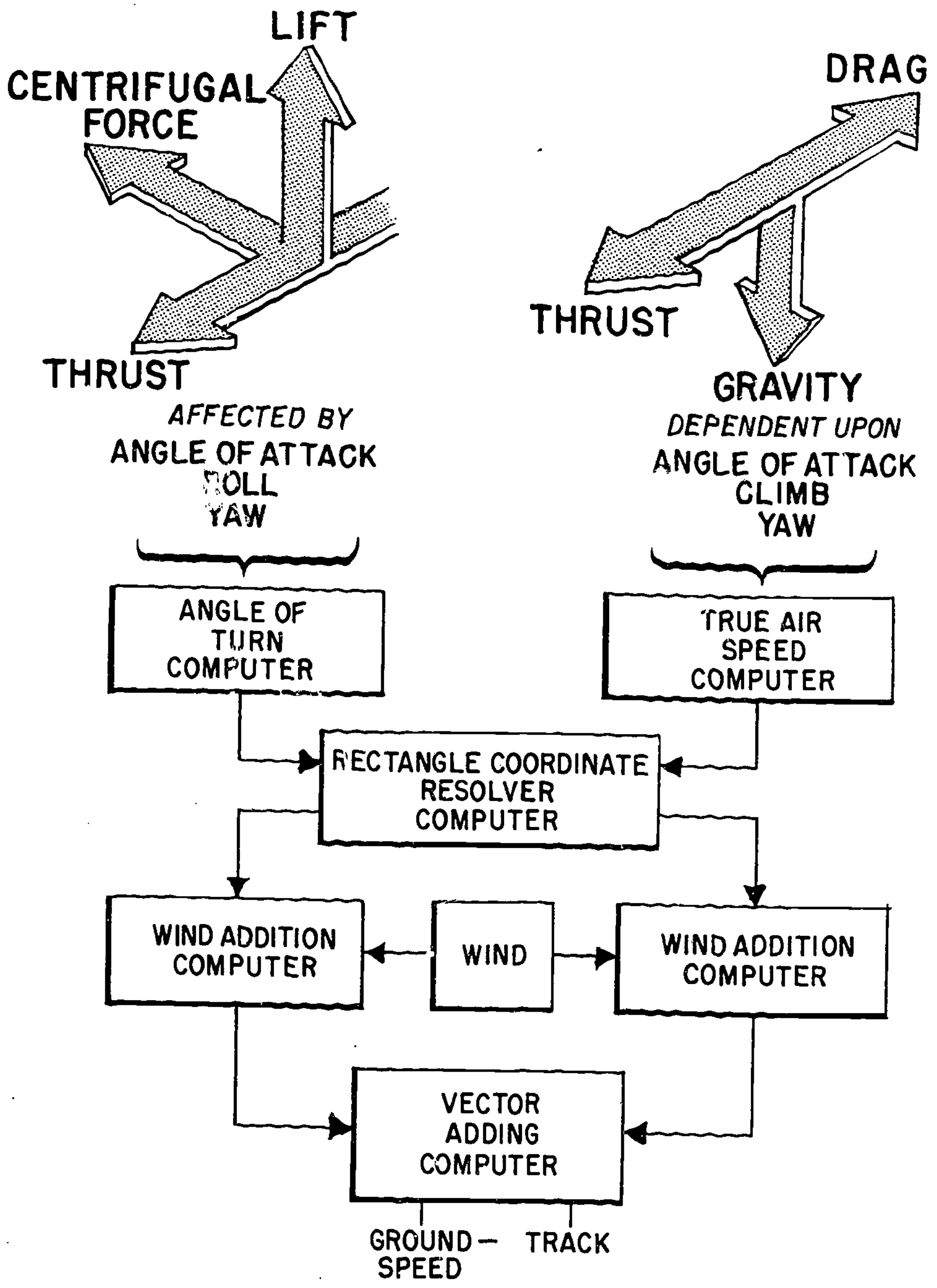


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Figure 9-2.—Functional diagram of a typical analog computer.

flight. The solutions to these equations are in the form of instrument panel indications and stick and rudder reactions to which the pilot responds. For example, if the aircraft is flying straight and level and the pilot wishes to turn to the right, he moves the stick to the right. The movement of the stick is transmitted electrically to computers where it affects the flight equations related to lateral performance. As a result, the turn needle is deflected, the pilot feels the controls respond to the forces generated by the turn, and alters his movement of the controls accordingly. Analog computers solve the equations for the following:

1. Rate of turn.
2. True airspeed.
3. Groundspeed.
4. Track.

Since one of the purposes of the synthetic flight trainer is to solve for track and groundspeed, these solutions are fed to a plotter which makes a record of the flight. The simplified functional diagram (fig. 9-2) shows the inputs of lift, thrust, drag, centrifugal force, and gravity which are combined, and modified by wind, to give an output of groundspeed.

COMPUTER SERVOMECHANISMS

Servomechanisms play an important part in the functioning of an electromechanical analog computer. In such a computer, a servomechanism output in the form of a voltage or shaft position will result from input signals introduced at some remote location. The output reflects the input accurately, because feedback makes its result independent of such factors as load change and line voltage variation. Servomechanisms are power amplifying devices as well as remote control systems. They are used extensively in computers to convert mechanical variables to electrical variables, or vice versa.

The principle on which servomechanisms operate is described in TD 3 & 2 and Basic Electricity, NavPers 10086-B. The two basic types of servomechanisms are position servos, which produce an output position corresponding to an input signal; and velocity servos, which produce an output speed proportional to an input signal.

Power for servos may be electromechanical, pneumatic, or hydraulic. Electromechanical servos are almost universally employed in analog computers because of their characteristics of flexibility, accuracy, and speed. In cases where given loads require considerable power, pneumatic or hydraulic systems may be used.

ELEMENTS OF SERVOMECHANISM

The basic elements of a typical position servosystem are the error detector, controller, motor, and followup loop (sometimes called feedback loop). (See fig. 9-3.) Input and followup signals are subtracted in the error detector, and transducers are used to insure that all the signals are in compatible forms. Any error signal is amplified by the controller and produces torque in the motor. The motor output drives the load.

Input

The input may be in any one of many varied forms—motion, pressure, temperature, etc; but the command signal to the controller must be in a form suited to the capabilities of the controller. In computer servomechanisms the input information is usually in the form of a voltage, shaft position, or velocity. The error signal to an electronic controller must be a voltage.

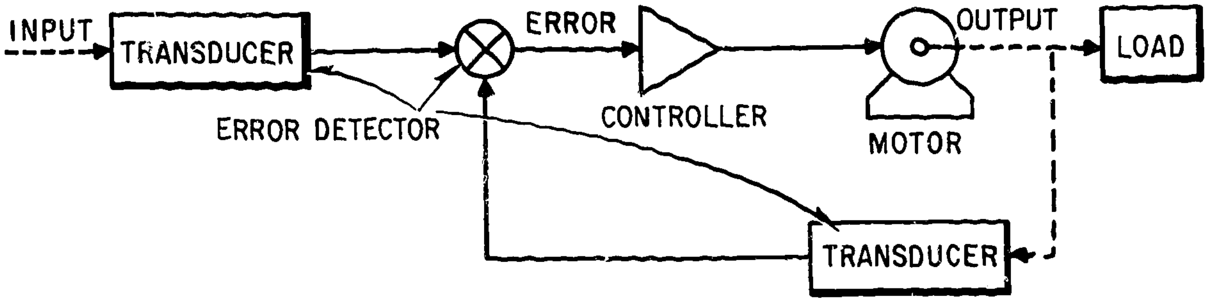

Figure 9-3.—Block diagram of basic servomechanism elements.

The followup may be a voltage or a mechanical quantity. Units such as potentiometers, synchros, and strain gages are used to convert data from one form to another, and are called transducers. In some instances a second transducer may be needed in the followup loop to convert the output into the same form as the command signal, so that subtraction may be made to form the error signal.

Transducers

Where the input or output has limited motion, potentiometers are generally used. (See fig. 9-4.) In single-turn potentiometers the shaft motion may be 350° or less. They may be used with either a.c. or d.c. Potentiometers may also be used to generate nonlinear functions. Potentiometers are subject to limited resolution because there is a voltage drop between the adjacent turns of the wire. There is also wear of wiper and resistance wire.

Synchro transmitters can also be used to transform shaft motion into electrical signals with unlimited resolution and rotation. They may be employed in two-speed combinations to develop extremely high angular accuracy. Differentials and control transformers, which are modifications of synchros, are widely used. The servomotor drives the control transformer rotor until the rotor voltage is canceled, at which time its position corresponds to the position of the rotor of a remote synchro transmitter. Therefore, the servo output follows the input motion of the transmitter. In this case, the control transformer acts as an error detector as well as a transducer. (See fig. 9-5.)

Error Detectors

The error detector or differential or subtracting device, such as a parallel resistor summation network (fig. 9-4), or a control transformer, which produces an error signal voltage equal to the difference between the command and the followup signals: $e = V_{in} - V$ (followup). As the error approaches zero, the value of V_{in} approaches that of V_{out}. However, until the error is nulled, the amplified error signal is sufficient to develop a torque to run the motor.

Controller

The servo controller amplifies the error signal to produce sufficient power to drive the motor. The power output is adequate to meet maximum load requirements of the motor. The gain of the controller is high enough so that small error voltages will affect the output to give good positional (static) accuracy. Too high a gain will produce instability.

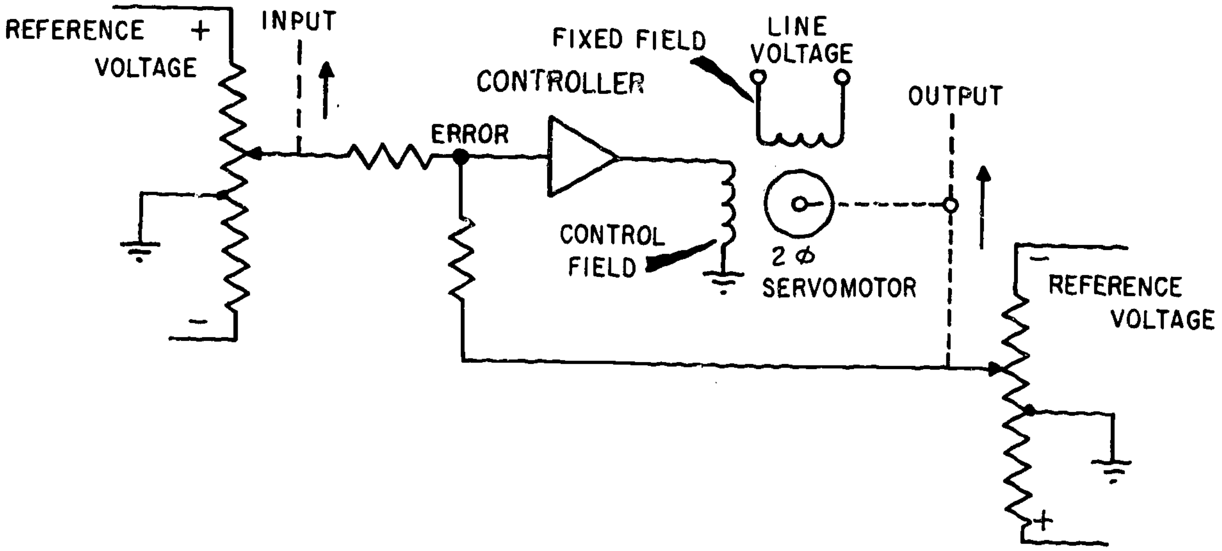

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Figure 9-4.—Typical servosystem utilizing potentiometers as input and followup units.

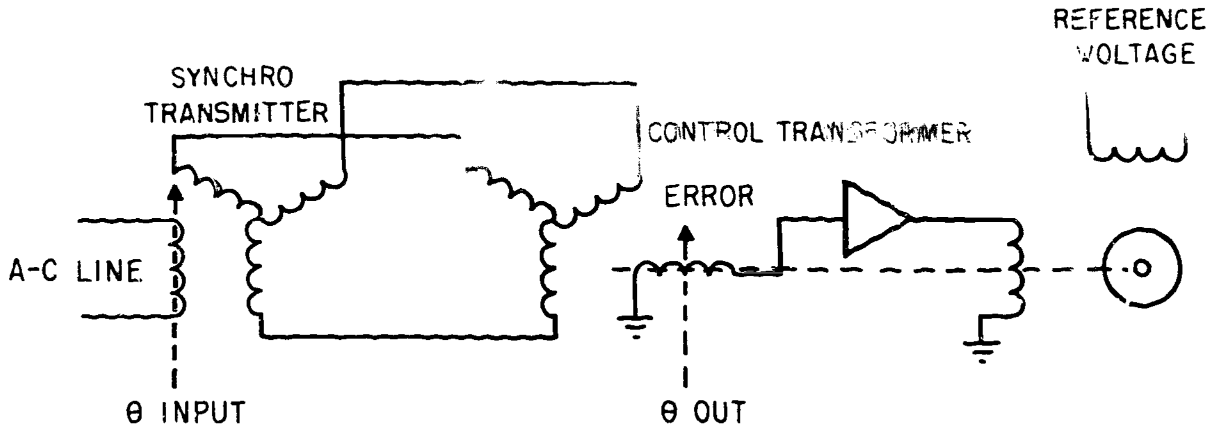

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Figure 9-5.—Control transformer in a servomechanism.

The design of the amplifier circuit of the controller depends upon whether the error is d.c. or a.c., and upon what type of motor is used. Usually a-c amplifiers are used because of their greater simplicity and stability. High gain is easily achieved, and there is no d-c drift problem.

Modulators and phase detectors are necessary to convert signals from d.c. to a.c. and back to d.c.

When d.c. is converted to a.c., both polarity and magnitude of the d-c signal must be contained in the resulting a.c. Modulator circuits that convert d.c. to a.c. contain switching type elements such as diodes, crystal or metallic rectifiers, clamping circuits, and mechanical contactors. The switching elements are operated at a carrier frequency and the resulting a.c. is a series of pulsating voltages in which amplitudes equal the d-c error voltage.

In d-c analog computers a phase detector is required to convert an alternating error voltage to a direct voltage. The amplitude and polarity of the d-c voltage must correspond to the polarity of the error signal. A simple full-wave rectifier circuit produces a d-c voltage irrespective of the half-cycle polarity, but the phase detector switches to produce the proper polarity. Phase detectors operate on the principle of adding the error signal to, and subtracting it from, a reference voltage and then rectifying the resulting a.c.

When using a-c analog computers a phase detector is employed when it is desired to compare an input voltage phase with a reference phase. This is normally done to switch the inputs feeding a certain servosystem.

Motors

An electric motor usually supplies the output. If the output should be translatory (straight-line motion) instead of rotary, solenoids or other devices are used. Servomotors have a linear torque/rpm characteristic over a great range of voltages so that the output speed is proportional to the error. For good acceleration characteristics, the ratio of motor torque to rotor inertia is high.

The 2-phase induction motor is the most widely used a-c servomotor. The reference-phase winding is excited by the fixed line voltage. The control-phase winding is excited by the error voltage from the controller, and is 90° (or 270°) out of phase with the reference voltage. The magnitude of the amplified error voltage determines the motor torque; and the phase angle, with respect to the reference line voltage, determines the direction of rotation.

The d-c servomotor most frequently employed is the shunt motor which is controlled by varying the armature current. Current is controlled by vacuum tubes or thyratrons in the controller. In some small motors the field is a permanent magnet.

Friction or magnetic fluid clutches located between continuously running motors and the load are sometimes used with servomotors and are actuated by the controller. Current to clutch coils can produce any desired amount of coupling so that the output motion follows the input with the required smoothness and accuracy. A detailed description of motors is contained in Basic Electricity.

Output

The output is the controlled quantity which is proportional to the input quantity. In a position servo, the output is the angular displacement of a shaft geared to the motor shaft. This mechanical output may position a potentiometer wiper or a synchro control transformer to produce an electrical output. In a velocity servo, the output is a shaft speed.

Load

The load includes all factors which the servomotor must overcome. These factors include gear train and bearing friction, inertia, and friction of any components driven by the motor. A typical position servo using a 2-phase motor and potentiometers as transducers is shown in figure 9-4.

STABILITY AND ACCURACY OF SERVOS

In position servo operation, a change in the input causes the output motor to drive the followup transducer in a direction determined by the polarity (or phase) of the error signal to cancel or null the input change. If the input signal is larger than the followup, the output moves in the direction to increase followup. When the error is reduced to zero, the controller output drops and does not drive the motor. However, inertia of moving parts causes the motor shaft to continue rotating even when no voltage is supplied to the motor. As the output goes beyond the position which would cancel the input, the followup voltage becomes larger than the input voltage and the error changes polarity. The motor is braked by the reverse signal. If the error voltage caused by followup again drives the motor beyond the null, the process repeats and the system oscillates or hunts. However, the error signals must develop a motor torque sufficient to overcome frictional loads; and if the overshoot is not significant, the error may not be large enough to drive the output further. The range of the error voltage variation which does not overcome frictional loads is called the dead zone. If friction loads are high or the servo gain low, the system may come to rest within the dead zone without hunting.

In most instances, some external damping factor must be added to reduce inertia effects. A servo is said to be underdamped if it overshoots the correct position and has no sustained oscillation. If the servo is overdamped, or loaded excessively for its gain, the null is reached without hunting, but dynamic accuracy suffers since the output does not respond instantaneously and is slow in reaching the null position. (The servo is said to have velocity and acceleration lag.) The servo is critically damped if the output follows the input without delay and does not overshoot the null when it is first reached.

To avoid hunting conditions, the servo must be damped, or some means of anticipating the null must be provided so that the motor can be braked before the desired output position is reached. The latter method is better in that gain and acceleration capabilities are not sacrificed.

A servo generator driven by the servo output produces a voltage proportional to rotor speed which may be used for damping. If this voltage is fed into the controller with a polarity opposite to the error voltage, it creates an apparent null advanced beyond the actual null. When the motor slows down, the generator voltage decreases and becomes zero when the motor stops.

Because the generator voltage is fed back, the error signal required to maintain a given servomotor velocity must be larger than would be necessary without stabilization. This type of stabilization therefore causes a large velocity lag error. Servo generator stabilization, however, has the advantages of being simple to adjust; it is relatively independent of backlash in the gear train; and it has no effect on the static gain of the controller.

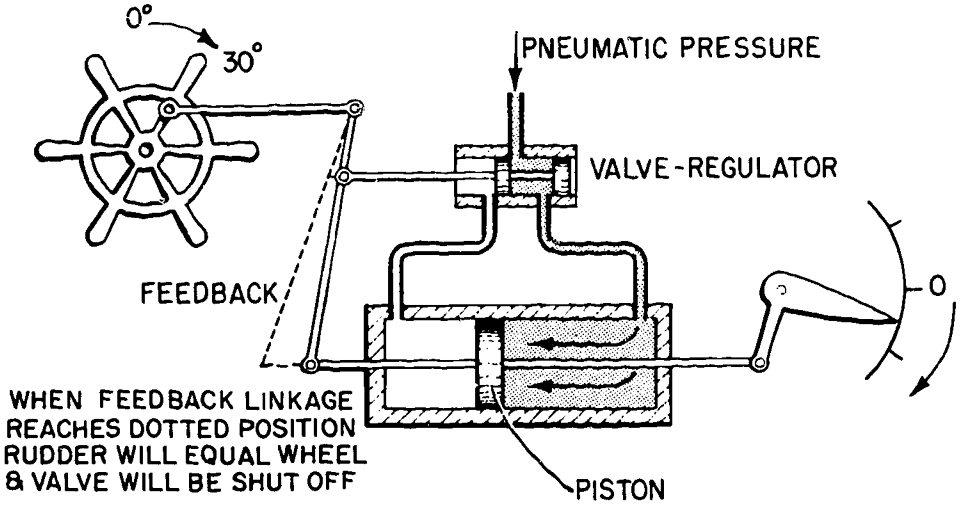
A velocity servo produces a motor velocity corresponding to an input voltage. The total number of revolutions made by the motor shaft is the time integral of the input voltage. An ideal 2-phase induction servomotor would run at the same speed as the rotating flux regardless of the applied voltage if power loss and friction were zero. The torque necessary to overcome these losses is developed as the rotor slows down; but as loads also require torque, in practice, the actual speed is proportional to the torque developed, minus load torque. The motor speed, therefore, is a function of both applied voltage and load.

Velocity servos must compensate for speed changes due to varying loads. In many cases the velocity servo employs a servo generator to produce a feedback voltage which is proportional to the speed at which the generator is driven. The voltage from the controller to the motor is a function of the difference between the input quantity and the velocity of the output shaft. The tendency of the motor speed to decrease with load is overcome by the feedback signal produced by the servo generator. If the feedback signal is less than the input, the resulting error voltage will increase the motor speed until the increasing feedback cancels the input, thereby holding the motor speed proportional to the input. When a load torque is applied to the output shaft, its velocity decreases; but this, in turn, causes an error signal which produces more controller output to supply the torque demand. With a high controller gain, full motor torque can be developed with only a slight velocity error.

POWER SERVOS

The instrument servomechanisms employed in computers are seldom required to develop large power outputs, since in most cases they drive small loads such as low-mass gear trains, synchros, and potentiometers. On the other hand, the servomechanisms which drive radar antennas, direct antiaircraft guns, steer ships, and control guided missiles must produce large amounts of power. For these applications, pneumatic, hydraulic, and specialized electrical servos are used. The heavy equipment must be driven at varying speeds, it must be capable of positioning the load member in both the forward and reverse directions, and it is usually necessary that it be operated by remote control. The basic elements of power servomechanisms are identical in principle with corresponding elements of electromechanical instrument servos. In heavy-duty applications, however, the final stages, or servomotors, are characterized by large output-power capabilities; and in most cases, they require greater amounts of control power than instrument servos.

Figure 9-6 shows a pneumatic servo which is similar to the Servomechanism Demonstrator Device 3K41A discussed in TD 3 & 2. The operation of the system is governed by a regulator valve, which controls the flow of air under high pressure to the piston. The feedback data and the input command signals are applied in the form of shaft displacements, which are applied to a mechanical differential. The latter element combines the applied displacements and produces an error signal for controlling the action of the system. In pneumatic servos (such as those employed in some guided missiles), the



TD.512

Figure 9-6.—Pneumatic servomechanism.

exhaust can be released to the atmosphere after passing through the system only once.

A high-power servomotor operating on electrical principles is illustrated in figure 9-7. The servomotor proper consists of a combination of a d-c generator and a d-c motor. The generator which is of special construction, is called an amplidyne. It is driven by a heavy-duty a-c motor and provides direct energy to the final d-c motor which controls the position of the final load member. The amplidyne gives a high output with less control power than the conventional d-c generator. It contains a short-circuit loop in the armature circuit in addition to the brushes from which the output current is taken. Very little control current is required to produce high current in the short circuit; as a result, this arrangement is equivalent to one stage of amplification. The large flux set up by the short-circuit current induces sufficient voltage to drive an equally large current through the external load, thereby providing effectively a second stage of amplification.

MATHEMATICAL OPERATIONS WITH COMPUTERS

A computer is generally capable of performing numerous types of mathematical operations. This includes the linear type such as addition and subtraction, and also nonlinear processes such as deriving powers and roots. This section of the chapter reviews the circuitry and mechanisms used in performing these operations. The theory of operation of each is also discussed.

It should be remembered that the major objective of the analog computer as used in training devices is the computation of variable factors, such as velocities, angles, and rates, and their interrelation to each other in the overall picture. In a typical process—squaring, for example—the computer may be dealing with a formula for the distance traveled by a falling body:

$$d = \frac{gt^2}{2} + V_o t$$

where the t factor (time) is squared. The computer might very well represent time as a voltage which, when processed through a squaring circuit, produces a result which is proportional to t^2. The proportional answer can be converted to a true answer through the use of a scale factor.

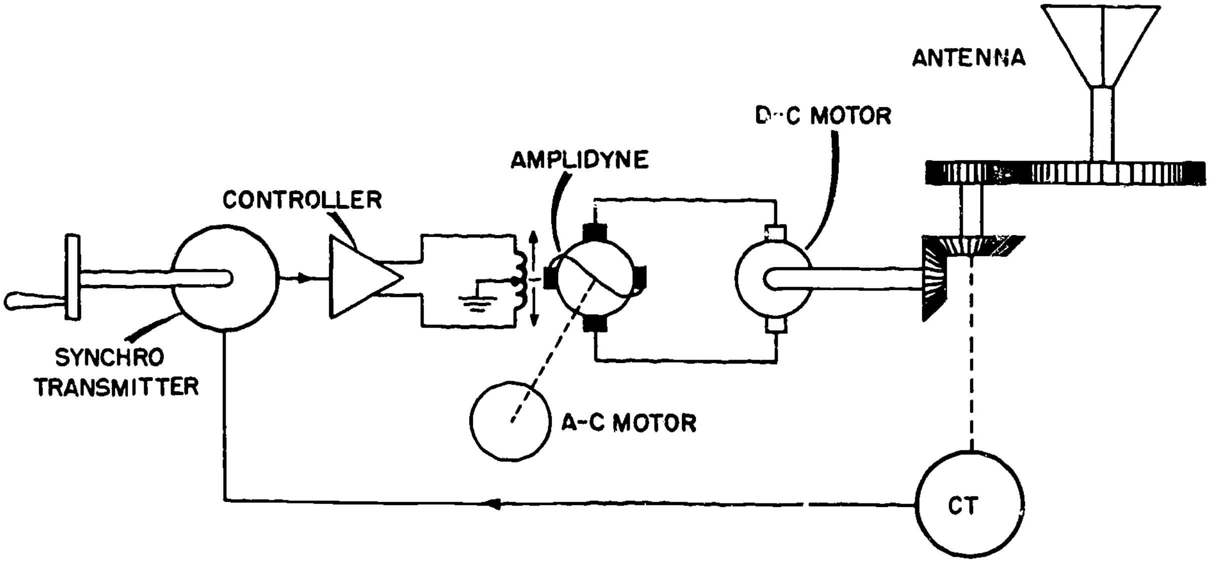


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Figure 9-7.—Simplified diagram of an amplidyne servo.

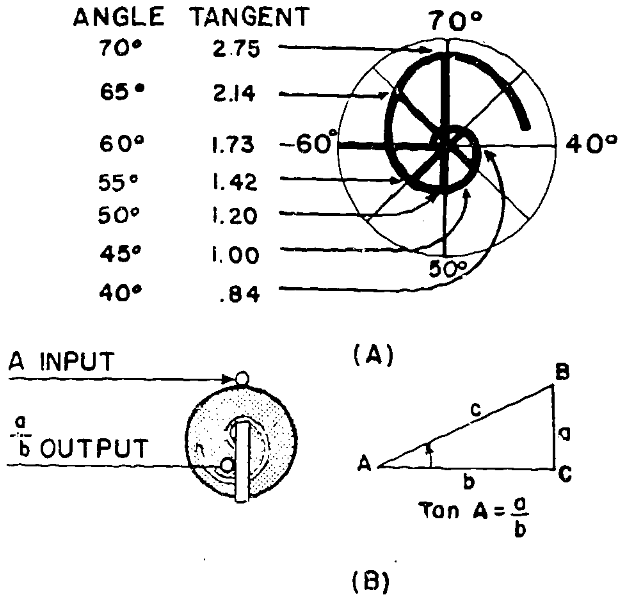

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Figure 9-32.—Tangent cam.

The scotch yoke mechanism is a mechanical device used to produce motions proportional to the sine or cosine of the input angles. (See fig. 33.) As the crank rotates, the slide is displaced vertically within the channel of the output shaft. As the output shaft moves from side to side, its linear horizontal displacement is proportional to the sine of θ. Parts must be held to extremely close tolerances to avoid inaccuracies caused by clearance between the slide and channel.

NONLINEAR FUNCTIONS

Logarithmic-Response Networks

In some computing operations, it is more feasible to work with signals that are proportional to the logarithms of the significant factors rather than with signals which vary in direct proportion with the significant factors. This is especially true when the factors in question are large in amplitude. In this case logarithmic networks are employed in which the output is an approximate logarithmic function of the applied input. An example is shown in figure 9-34. As indicated by the response curve, the input is a current; the output is a voltage. The slope of the response curve becomes increasingly flat as the input current increases, thereby providing the essential characteristic of logarithmic response.

When the input is applied (fig. 9-34), current flows through R1, producing an output voltage proportional to the current (E = IR). As the current increases, the voltage drop across R1 also increases until it becomes great enough to bring CR1 (a crystal diode) into conduction. In this condition, R3 is effectively placed in parallel with R1 because of the low internal resistance of CR1 when in the conducting state. The effect is to lower the total resistance and to produce less voltage drop across the output resistor for a given increase in input current. (This accounts for the bend in the response curve at point a.) The slope of the curve is progressively reduced as additional rectifiers come into conduction. It should be noted that by increasing the number of rectifiers, a more perfect logarithmic curve is obtained.

Nonlinear Circuit Elements

Often the relationship between two variables cannot be expressed by any of the mathematical operations described in the preceding sections. In these cases, circuit elements of special design are employed to produce the desired output. These elements include cams, noncircular gears, and functional potentiometers. When it is necessary that the output vary with two inputs, three-dimensional cams are often used to derive the required output. In addition to the nonelectronic elements mentioned above, there are various electronic devices designed for generating nonlinear functions. However, in electromechanical computers functional potentiometers are generally employed.

There are several methods of designing potentiometers with nonlinear outputs—by use of shaped cards, spaced windings, tapped windings with shunts, tapped windings connected to multiple voltages, and by use of cams. These methods are based on three different basic approaches: by making the winding nonlinear; by adding taps to a linear winding and introducing the nonlinear function externally; and by making the wiper motion nonlinear. These methods are discussed in detail in another section of the chapter.

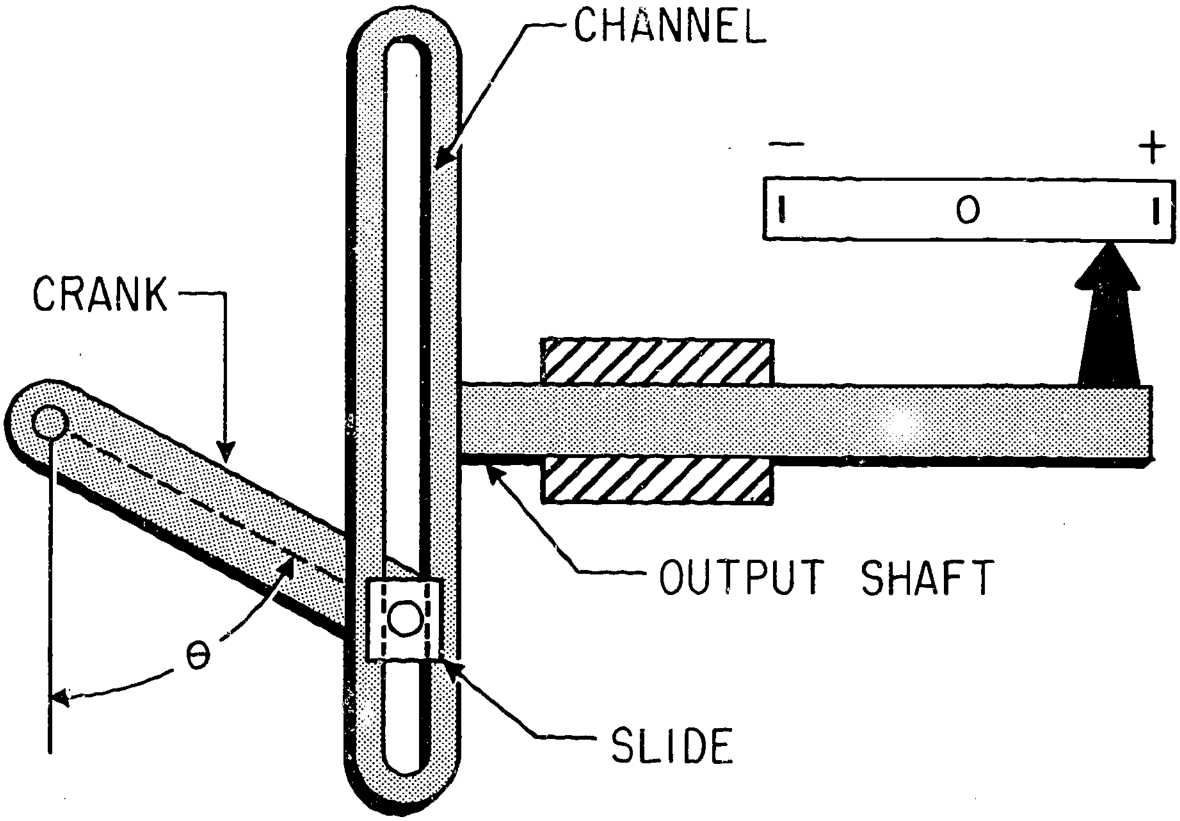

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Figure 9-33.—Scotch yoke mechanism.

DIFFERENTIATION

Differentiation and integration are mathematical operations involving rates. The process of determining the rate of charge of one variable with respect to another is called differentiation; the process of determining the sum of many minute quantities is referred to as integration (generally interpreted broadly as finding the area under a curve).

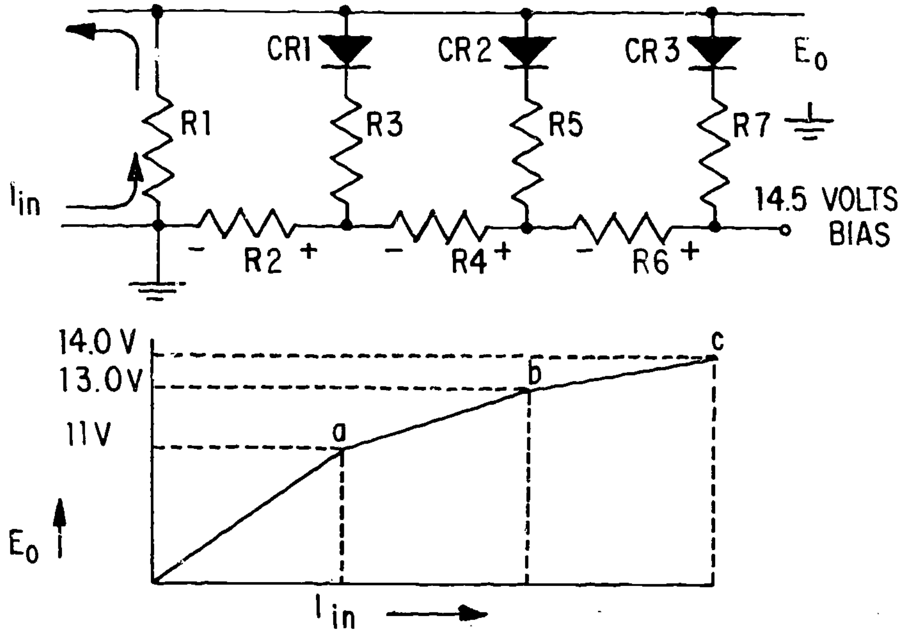
Electronic Differentiation

The rate at which an input voltage is changing can be obtained from a simple series-connected resistor and capacitor combination. A means of differentiation superior to the common RC circuit is shown in figure 9-35. The circuit shown is a feedback-amplifier differentiator which attains its superiority by deriving an output voltage from the input in a shorter time period and with greater accuracy. (Prior to an explanation of this circuit, the reader is requested to review the principles of feedback amplifiers as discussed in Basic Electronics.)

In this particular application (fig. 9-35), the following conditions are established:

1. The amplifier is biased to operate near the center of its linear range and draw no grid current in any part of the operating cycle.
2. The grid voltage is near ground potential and varies only slightly with input voltage due to feedback action.
3. With the grid voltage held almost constant, any change in plate voltage due to input variation appears across both the plate load and the feedback resistor and causes a corresponding change in current through both.

Since almost identifical waveforms appear across both resistors (fig. 9-35), the output voltage can be conveniently expressed in terms



TD.540

Figure 9-34.—Typical logarithmic output network.

of the feedback resistance and the change in current through it. Thus:

$E_o = - \Delta i R_{fb}$ (The negative sign indicates a polarity reversal.)

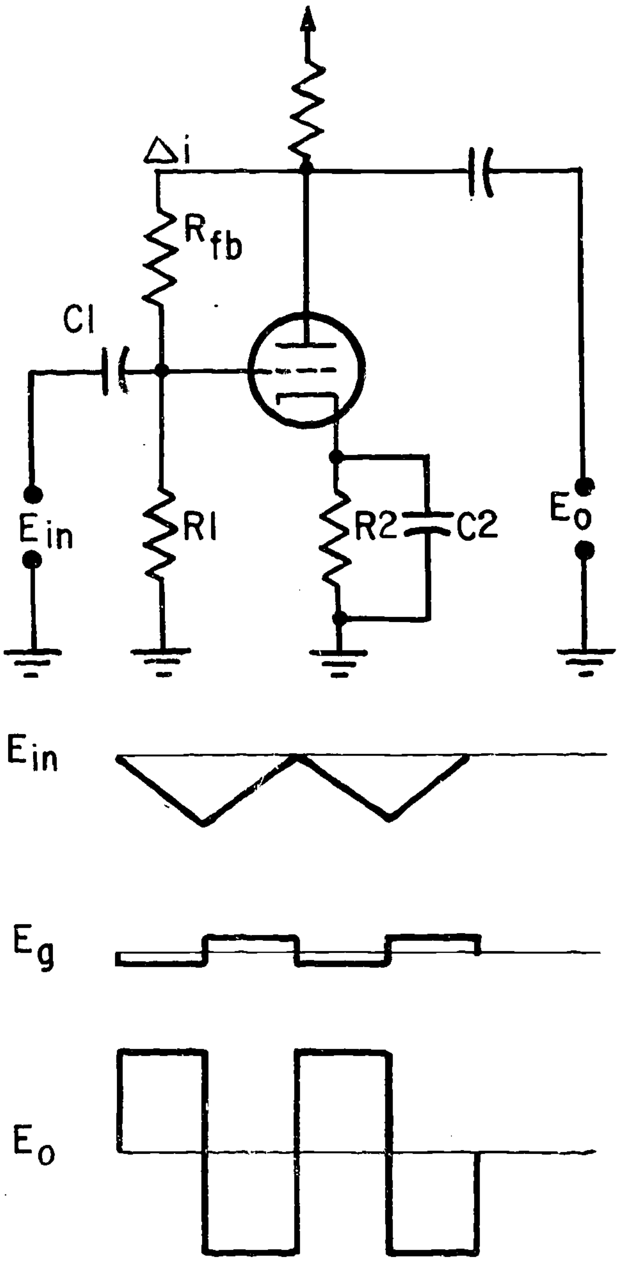
Consider the action of the circuit with a constantly changing input applied. For simplicity, a back-to-back sawtooth, starting downward from its apex, is used. As the negative going signal starts downward, electrons from the grid side of C1 (fig. 9-35) start to flow through R_{fb} causing a drop in the grid voltage. This action reduces the plate current, thereby increasing plate voltage. A portion of the latter is fed back to the grid, causing it to rise. But, since the feedback is only a small portion of the plate signal, the grid does not regain its initial value. The grid and plate reach a state of equilibrium almost instantaneously and remain so as long as the current through R_{fb} is constant, or for the duration of the linear downward slope of the input.

When the input direction is reversed, the plate voltage decreases due to the attempt of the grid voltage to rise. The feedback is then opposite to its previous polarity and tends to hold the grid again at its new voltage. As long as the linear rise continues, the decreased plate voltage remains constant as does the increased grid voltage. The output waveform, taken off either the plate load or the feedback resistor, is consequently a square wave.

Mechanical Differentiation

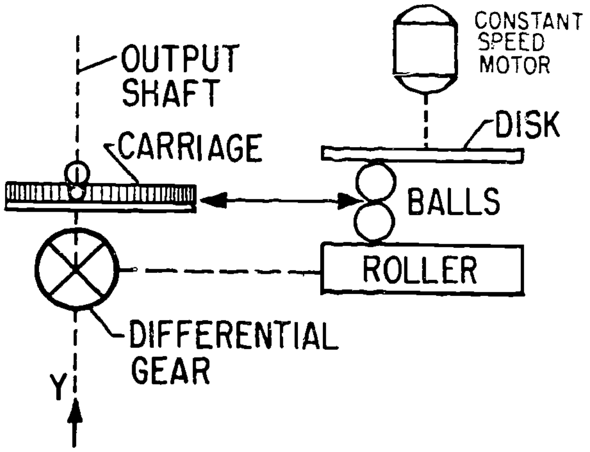
The derivative of a shaft rotation can be obtained by the mechanical ball-disk differentiator illustrated in figure 9-36. The device differentiates the quantity in respect to (time) and produces an output proportional to the rate of rotation.

Basically, the unit consists of a flat rotating disk, driven by a constant-speed motor; a ball and carriage assembly; a roller; and a differential gear assembly. In the illustration, the input (y) feeds the differential gear which receives a simultaneous input from the roller. The constant-speed motor drives the disk which, in turn, drives the balls which rotate the roller. The output of the differential gear is in the form of a shaft rotation which positions the carriage in the direction necessary to shift the position of the balls to increase or decrease the speed of the roller as needed. The ultimate output is taken from the carriage and positions the shaft to indicate the rate of rotation of the input shaft.



TD.541
Figure 9-35.—Differentiating feedback amplifier.

In practice, the unit (fig. 9-36) may be calibrated by injecting zero y input and setting the output indicator on zero. The balls should then be directly under the center of the rotating disk, causing the roller to remain still and resulting in zero input to the differential assembly. As a y input is injected, the differential gear goes into action and imparts motion to the carriage, which moves the balls out from the center of the disk. The resultant roller motion is applied to the differential gear. This motion, when combined with the input, acts as a feedback which zeros the output of the differential. Consequently, the output shaft stops at a position indicative of the rate of rotation of the input.

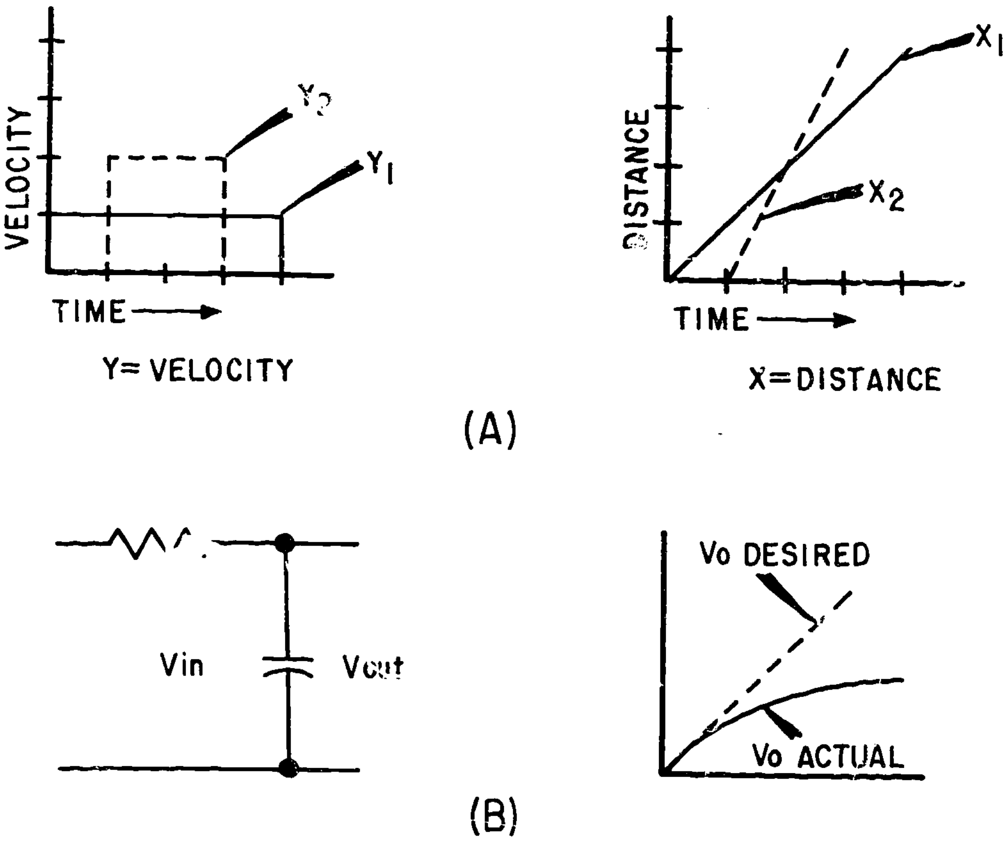


TD.542
Figure 9-36.—Ball-disk differentiator.

INTEGRATION

As previously noted, integration is the process of summing up an infinite number of minute quantities. In most practical applications, integration is the process of summing certain quantities in respect to time. For example, taking the integral of velocity between certain time limits results in the distance traveled. Thus, in an automobile, the speedometer is a differentiator, while the odometer is an integrator.

The summing of many minute quantities is analogous to finding the area under a curve. In the case of a step function, the input wave may be considered as a rectangle having one side variable with time. In figure 9-37 (A), this may be seen to be the solid line, Y1, plotted on a graph of velocity versus time. The distance traveled is equal to the velocity multiplied by the time. In the diagram, this is shown by the numerical value of the area under the curve (which in this case is a rectangle). The area of the



TD.543

Figure 9-37.—Integration of area.

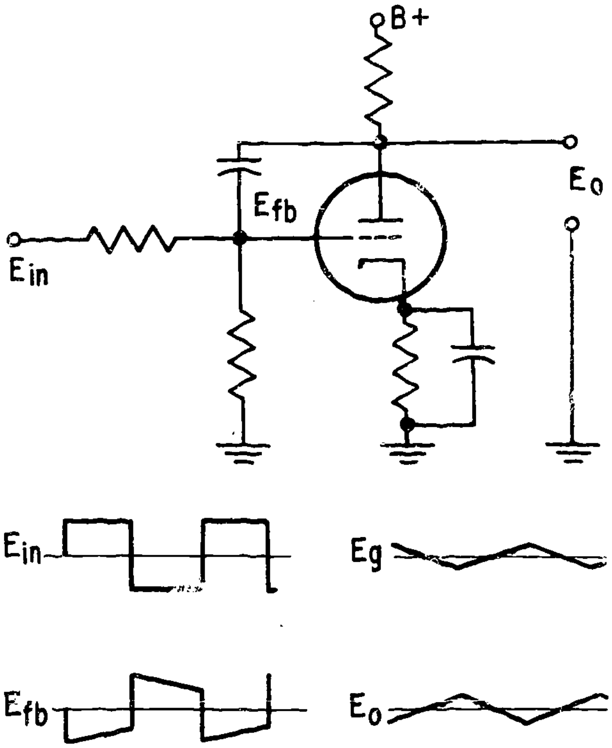
rectangle is equal to the height times the length and thus the area is proportional to the distance, which is the product of time and velocity. On the time-distance diagram of the figure, the sloping line (X1) shows the distance traveled at any instant of time. The larger the amplitude of the step input, the steeper the slope of the line. This is shown by the larger step input (Y2) on the time-distance chart.

Electronic Integrators

Although the distance traveled must continue to increase as long as there is a positive value of velocity, in electronic integrators when the input is a voltage of x value, the circuit components limit the maximum value of the output. Thus, in figure 9-37 (B) where the input is V_{in} the actual output (V_0) differs considerably from the desired output because of the R and C values used in the circuit shown.

An integrator circuit utilizing a feedback amplifier is shown in figure 9-38. While bearing certain similarities to the differentiating amplifier, the significant exceptions are the input and feedback components. Note that in this case, the feedback element is a capacitor and the input is a large value resistor. These two components (the resistor and capacitor) perform the integrating function while the amplifier operates to improve the response and linearity. The use of a large input resistor (compared to the grid-to-ground resistance) allows the grid to be maintained at an almost constant potential when an input signal is applied.

The output is based on the rate of charge or discharge of the feedback capacitor. The amplifier functions to maintain the charge, or discharge, of the integrating capacitor in the linear portion of the RC curve. The net effect is that the capacitor voltage does not oppose the input voltage and the capacitor charging



TD.544

Figure 9-38.—Integrating amplifier.

current depends directly upon the input signal voltage. Waveforms applicable to the circuit are shown below the circuit diagram (fig. 9-38.).

OPERATION OF A TYPICAL ANALOG COMPUTER

As explained in the preceding pages, an analog computer usually solves mathematical equations by employing physical inputs such as voltages of the proper magnitude and phase to represent the quantities involved. By adding, subtracting, multiplying, or dividing these voltages, a resultant voltage is obtained whose magnitude and phase represent the solution of the equation. The following paragraphs are typical examples of analog computers of the position and velocity servo types.

POSITION SERVO

A position servo produces an output position (shaft position) corresponding to an input signal. An indicated airspeed (V_i) computer of a flight [illegible] is a typical example of a position ser[illegible] principles of position servos are basically the same regardless of the equipment they are used in.

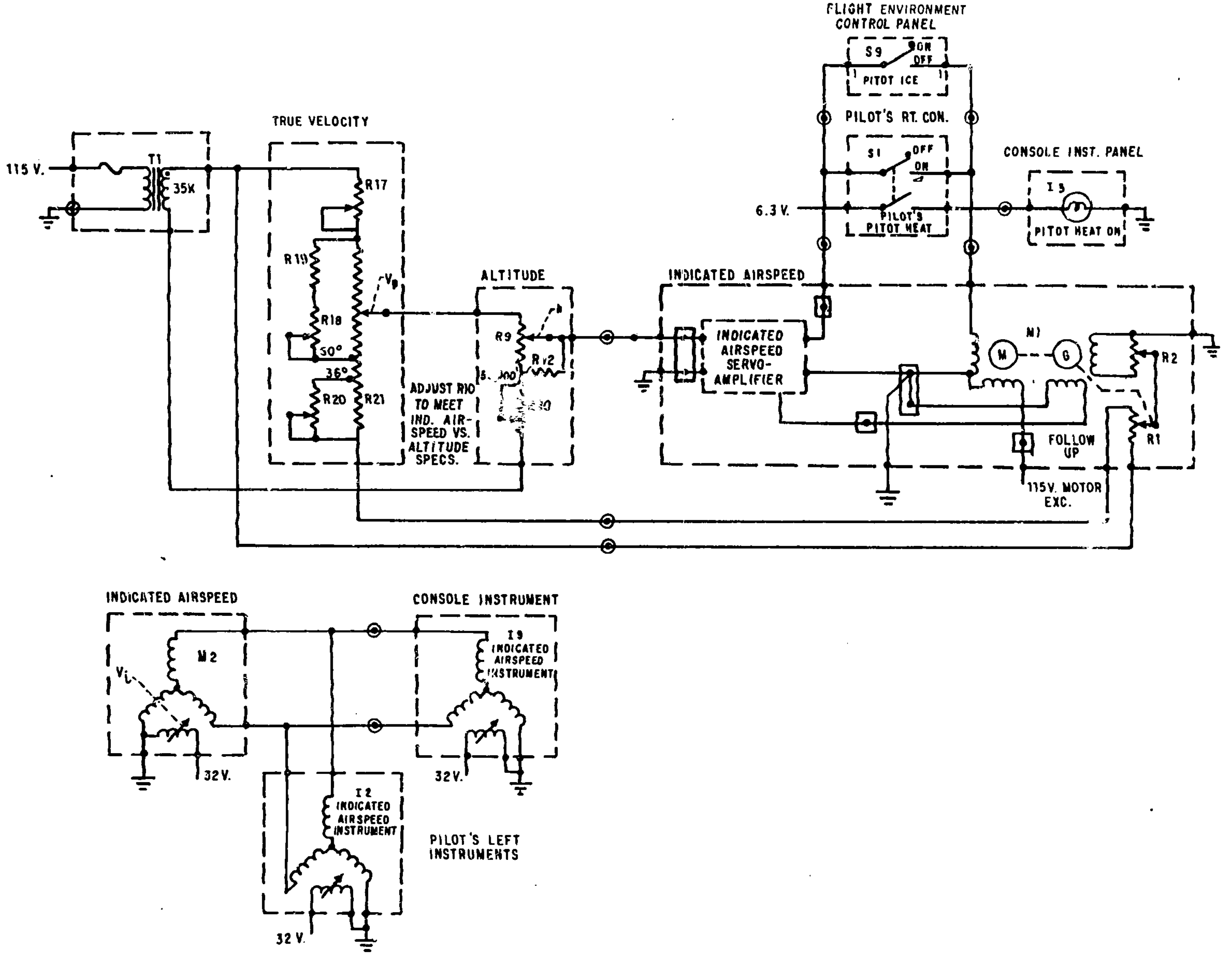
An airspeed indicator in an aircraft measures the difference between static and impact pressure of the air through which the aircraft is moving. The indicated airspeed position servo must simulate all conditions present in the aircraft and convert an electrical quantity into a mechanical position analogous to the aircraft's indicated airspeed.

Altitude (h) has a definite effect on the difference between static and impact pressure. When the aircraft flies in air more dense than standard density, true airspeed is less than indicated airspeed; when the air is less dense than standard density, true airspeed is greater than indicated airspeed. The indicated airspeed position servo must solve an equation with true airspeed (impact pressure) as a primary input and modify it by altitude (static pressure) to meet the previous conditions. The solution of the equation causes the servomotor to position an indicator which provides a visual indication of indicated airspeed.

Indicated Airspeed Computer

Indicated airspeed is directly proportional to true airspeed and varies with altitude due to change in air density. The effect of pitot tube icing, which would cause indicated airspeed to remain constant at the value at which icing occurred, is simulated by switch S9 (fig. 9-39). The effect of pitot icing occurs instantaneously and pitot heating simulates immediate recovery when switch S1 is turned to the on position.

The primary input to the indicated airspeed computer originates from R21 (fig. 9-39). The arm of R21 is positioned as a function of true velocity (V_p). Constant excitation for R1 is derived from transformer T1. R17 is connected in series with R21. R18, R19, and R20 are connected in parallel with R21 and is used to make adjustments to compensate for the nonlinearity of the calibrated dial on the airspeed indicator. Voltage on the arm of R21 is directly proportional to true velocity and is applied as excitation to series connected R9 and R10. R10 is adjusted to proper indicated airspeed at high altitudes. The arm of R9 is positioned as a function of altitude. The voltage taken from the arm of R9 is proportional to true velocity



TD.545

Figure 9-39.—Indicated airspeed computer.

modified by altitude and is indicative of indicated airspeed. The voltage is applied to the indicated airspeed servoamplifier. Under normal conditions (no pitot ice), the servosystem drives the indicated airspeed transmitter (M2) and the followup potentiometer (R1) in response to the computed input. The instruments on the instructor's console and pilot's instrument panel will follow M2 and seek a position proportional to the computed input.

VELOCITY SERVO

The velocity servo performs the process of integration with respect to time. Speed of the servomotor is directly proportional to the input voltage. The total number of revolutions (or total angle) through which the motor rotates at constant speed in a given time is equal to rpm of the motor (proportional to the input voltage) multiplied by the duration of the time interval. The total number of revolutions by the motor during a definite period of time is proportional to the summation of instantaneous voltage inputs multiplied by the time during which these voltages were applied. It is evident that the servo performs a continuous summation; resultant total angular position is identified as the time integral of the voltage. If the voltage input to the integrating servo represents a velocity, the motor rotation will sum up instantaneous velocities multiplied by instantaneous time intervals during which the velocity existed. Therefore, it will represent total instantaneous traveled distance.

If the phase of the voltage input (representing velocity) is reversed, the servomotor will change its direction of rotation. The output of the generator, driven by the servomotor, is added in series with the voltage input to the velocity servo. The generator voltage is proportional to its rpm and its phase is opposite to input voltage, tending to maintain linear relationship between input voltage and servomotor rotation. The velocity servo discussed in this chapter is an altitude computer of a flight trainer. The principles of operation would be the same regardless of where the velocity servo is used.

Altitude Computer

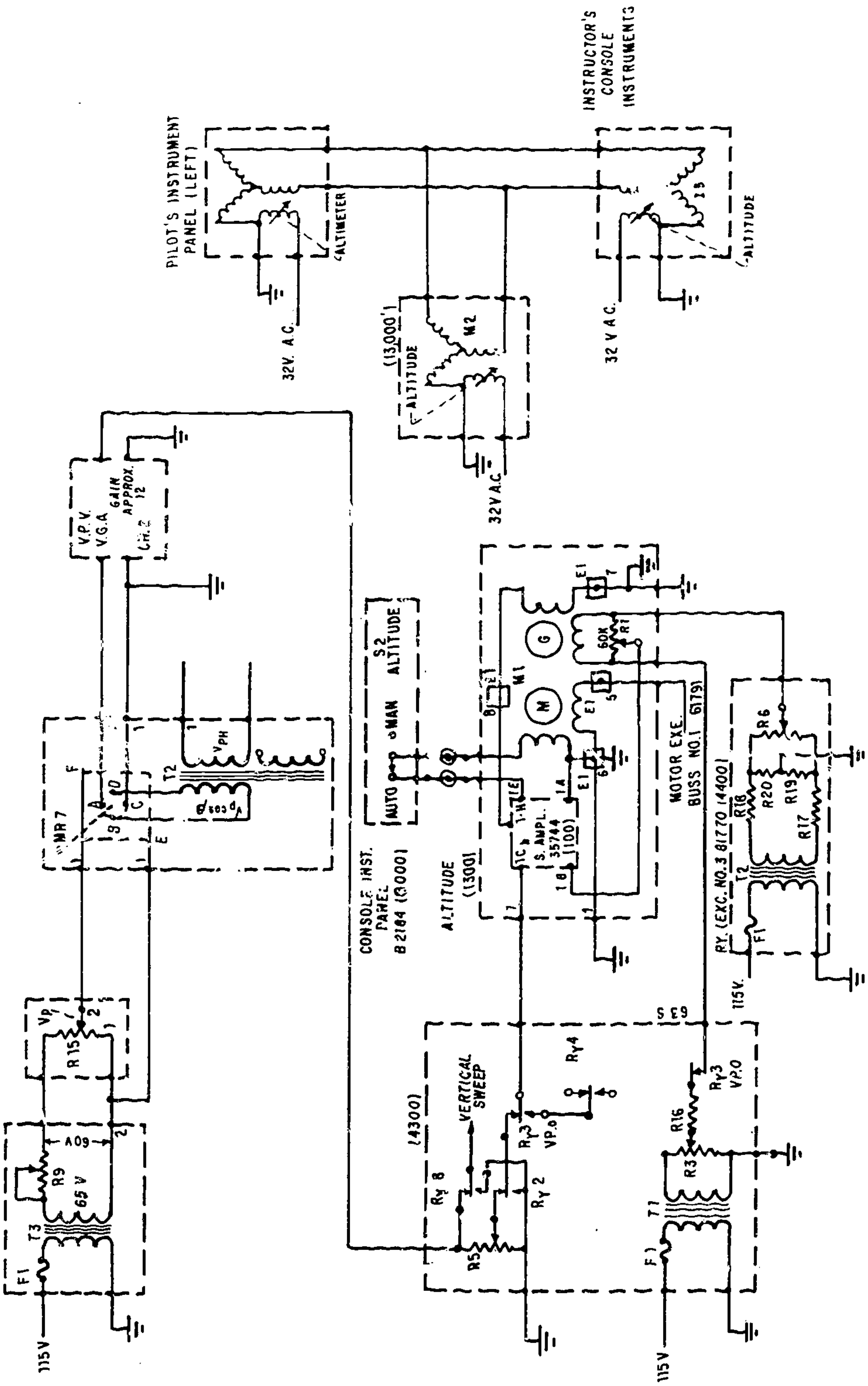
The altitude system computes simulated altitude by integrating the vertical speed component of true velocity (V_{pv}) with respect to time. A servomotor whose speed and direction of rotation are proportional to the amplitude and phase of the vertical speed voltage, gives a shaft position representative of the vertical speed component. The servomotor shaft drives various potentiometers and transmitters which provide inputs to other systems utilizing functions of altitude in their computations. A switching system on the console instrument panel is incorporated to enable the instructor to set in the required altitude at the beginning of the problem.

Potentiometer R15 receives constant excitation from transformer T3 (fig. 9-40). The arm of R15 is positioned as a function of true velocity, and the voltage derived is proportional to true velocity. This voltage is applied to potentiometer resolver MR7, the arm of which is positioned as a function of flight-path elevation angle (β). Two outputs are taken from MR7. One output, proportional to the horizontal component of true velocity (V_{ph}), is routed through transformer T2 to the position computer.

The second output, proportional to the vertical component of true velocity, is routed to the vertical speed variable gain amplifier, amplified and applied to resistor R.5 Full voltage developed across R5 is applied through contacts of altitude relay RY8 to the vertical speed servoamplifier, and is the determinant factor in the operation of the vertical speed system when aircraft altitude is greater than field elevation. A tap on R5 allows a portion of the developed voltage to be applied through contacts of the altitude relay RY2 and true velocity relay RY3 to the altitude servoamplifier which drives the altitude servomotor. The altitude servo functions as a velocity servo, the direction of rotation of the servomotor being determined by the phase of the vertical speed voltage, this voltage is dependent upon the position of the arm of flightpath elevation angle resolver MR7. The servomotor drives altitude teletorque M2 and the altimeters on the instructor's console and the pilot's panel follow M2. This allows the speed of change of the altimeters to be proportional to the servoamplifier input voltage.

ANALOG COMPUTER COMPONENTS

Some of the general characteristics of analog computer components are summarized in the following pages. Although details peculiar to



TD.546

Figure 9-40.—Altitude computer.

certain manufacturers' products are not included, the essential factors affecting accuracy and reliability are discussed, since these are the items of principal interest for the TD who is responsible for making replacements or for evaluating operational equipment.

GENERATORS

A-C Generators

To develop an a-c voltage of line frequency having an amplitude proportional to the velocity of a shaft, a drag-cup induction generator (tachometer) can be employed (fig. 9-41). (This is the source of the generator feedback voltage used to stabilize the operation of the analog computer servo discussed earlier in this chapter.) The induction generator contains two windings which are physically displaced 90° from each other. One is energized from the line, while the other acts as the secondary of a transformer whose coupling is proportional to speed. Flux from the primary winding generates eddy currents in the cylindrical cup located in the airgap. There is a time phase difference between the eddy current flux and the flux from the primary winding. Therefore, when the cup is rotated at a constant velocity, a space phase shift of the generated flux results, proportional to velocity. Any eddy current flux that is not parallel to the primary flux induces a voltage in the secondary winding since this winding is physically 90° from the primary.

D-C Generators

D-c generators used as tachometers in computers are of the permanent magnet type in which Alnico magnet materials replace the field winding. These generators have good linearity and low ripple characteristics. To prevent voltage variation with brush wear, a hinged type brush is often used to maintain a fixed brush axis.

TRANSDUCERS

The operation of synchros and differential synchros is described in detail in Basic Electricity. Resolvers are discussed in this chapter in the section on mathematical operations with computers. Other basic types of transducers are considered in the present discussion, which begins with information on variable autotransformers.

Variable Autotransformers

Variable autotransformers are commonly substituted for linear potentiometers to obtain

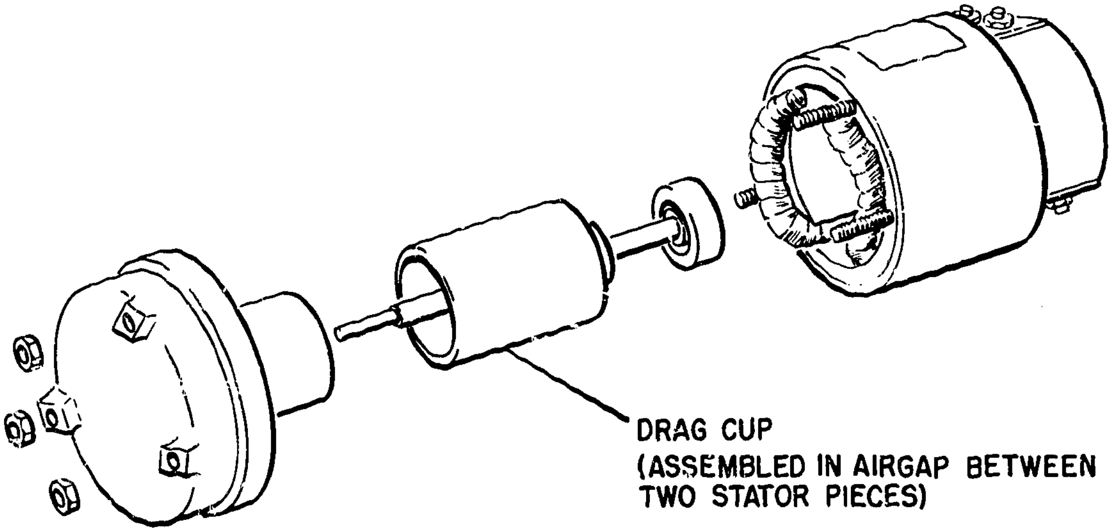


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Figure 9-41.—Exploded drawing of drag-cup generator.

better load regulation. Their operation is identical with that of a transformer having a large number of secondary taps; input power must only supply the excitation current and output load, and so very little power goes into heat. The IR drop in the secondary windings is extremely low because relatively large copper wire is used for the windings. This makes it possible to draw considerable power from the secondary without materially reducing its voltage—a feature useful in cascaded circuits where the load regulation of a potentiometer materially affects its accuracy. A carbon brush must be used to avoid a dead short between turns; otherwise, overheating and appreciable phase shift will occur. The use of a carbon brush also increases the autotransformer's effectiveness. This is true because of the following reasons:

1. A constant contact pressure can be maintained.
2. The contact area of the brush is such that it always contacts at least two coil windings.

POTENTIOMETERS

Wire-wound potentiometers are perhaps the most common type of transducer, because of their relatively low cost and freedom from residual noise. Their resolution is limited by the size and number of wire turns obtainable within the limits of angular travel. There is also a practical limit to the minimum resistance between the end terminals and the wiper at the maximum rotation position. This is known as end resistance and generally equals 0.025 percent to 0.1 percent of the total resistance, depending on the type of potentiometer used.

The linearity of a potentiometer is usually defined in terms of the ratio of maximum error at any point to the total travel expressed in voltage, resistance, or degrees. If the unit is adjusted so that there is no error at the winding extremities, the accuracy is defined as zero-based linearity. When the potentiometer must develop a certain function over a definite angle, accuracy may be defined by the linearity over this angle, with the unit phased to produce no error at the starting point. If the application so requires, linearity may also be expressed as the ratio of maximum error at any point to the voltage, resistance, or degrees corresponding to that point. However, this would allow no tolerance near the zero position, so the accuracy is more precisely expressed as a shaft error plus a percentage of wiper position.

Although there is no appreciable amount of residual static noise in a wire-wound potentiometer, there may often be a dynamic noise generated by the wiper contact moving over the wire. This is a primary function of contact pressure but is also dependent upon load current and impedance. The total resistance of a potentiometer usually has very little effect on system accuracy, and hence is subject to greater tolerance limits than many other computer components.

Precision potentiometers which contain a special form of carbon element that provides infinite resolution are available. The element has the disadvantage, however, of being adversely affected by humidity and temperature changes. These potentiometers should not be confused with ordinary, nonprecision units used as volume controls in many types of radio equipment.

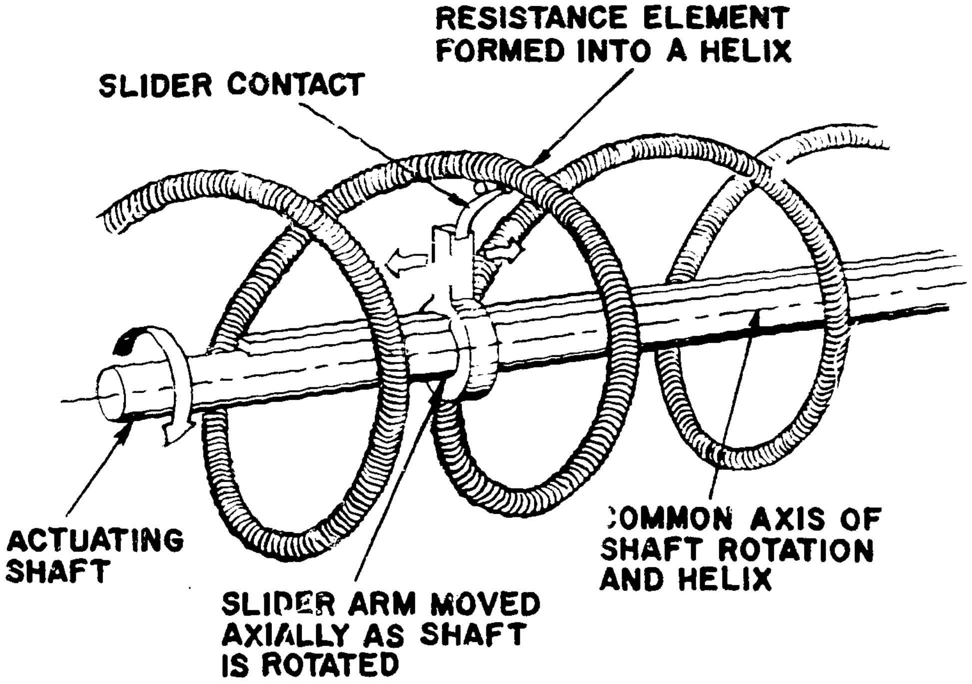
When permitted in the application, the use of multiple-turn potentiometers or helipots (fig. 9-42) is generally desirable from the standpoint of resolution and accuracy compared to that obtainable in a single-turn potentiometer. For example, the total length of a resistance element may be at least eight times that of a single-turn potentiometer of equivalent diameter. However, a proportional increase in resolution is not necessarily obtained with the same overall resistance, unless a higher conductivity alloy is used. The effect of mechanical inaccuracy is greatly reduced in multiple-turn units if errors are referred to the same scale factor as used in single-turn potentiometers.

Potentiometer type transducers are more flexible than the inductive type in that nonlinear functions may be incorporated by one of several methods, which fall into four categories:

1. Shaped winding.
2. Variable-spaced winding.
3. The use of external variables.
4. Nonlinear wiper motion.

Shaped Winding

If the resistance wire is wound on a flat card whose width varies in proportion to the derivative of the function desired and with minimum spacing between adjacent wires, the wiper output will follow the function curve. This occurs



TD.548

Figure 9-42.—Multiple- precision potentiometer.

because successive turns contain different lengths of wire, and the resistance per turn changes accordingly. Therefore, the voltage drop varies from turn to turn, although the mechanical spacing is constant over the entire range. The electrical resolution, then, is merely a function of card width variation. Because of practical limitations in card width, there is a limit to the maximum slope of the curve which is to be reproduced. This can be increased by changing wire size at various points as indicated in the typical card shown in figure 9-43. Although the card width in this case has sharp discontinuities, the resistance per turn follows a smooth variation resulting in an integrated output which is also a smooth curve.

Variable-Spaced Winding

Another method of obtaining nonlinear functions employs a card of constant width and varied spacing between turns. Wires are wound very close together where the slope of the function is a maximum. The maximum space between individual turns is limited by the size of the wiper, which must always touch the resistance wire. It, therefore, may be necessary to change wire sizes at regular intervals in order to extend the slope range of the function. It is generally difficult to attain the same rate of change with this method as with a shaped card without a considerable sacrifice in resolution. However, the spaced winding method may be applied to multiple-turn units, which offsets some of its limitations.

External Variables

A third method of obtaining a desired output function employs a linear winding tapped at various points, with fixed resistors bridging the taps. It is thus possible to reduce the effective resistance of certain sections of the winding, to produce a series of straight-line approximations to the desired output function. If a sufficient number of taps are used, the resulting curve will lie within the allowable tolerance band as shown in figure 9-44. This method may be applied to both single- and multiple-turn units and avoids some of the winding complications inherent in the methods previously described.

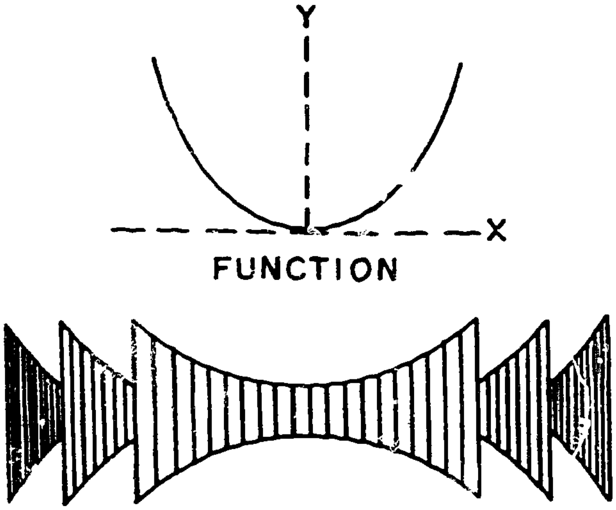


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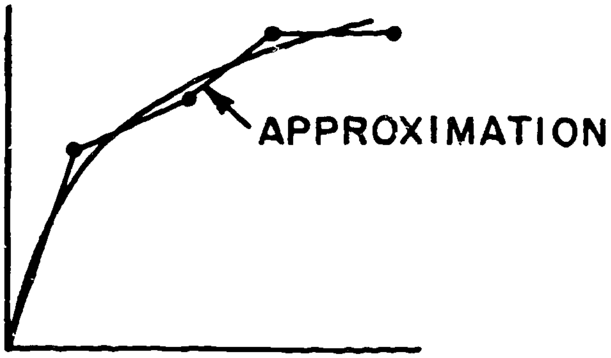
Figure 9-43.—Shaped-card potentiometer.



TD.550

Figure 9-44.—Approximation of a curve through the use of external resistance.

A similar method is to connect each fixed tap of a linear potentiometer to a specific voltage. If the voltages applied to the taps are preselected to correspond with the specific output function, the potentiometer wiper output will again be a series of straight-line approximations to the desired function. (See fig. 9-44.)

Nonlinear Wiper Motion

Linear potentiometer windings may be used to develop nonlinear functions if the motion of the wiper is made to follow a similar function. One such type of winding employs a wire which acts as a wiper arm and is attached to the circumference of a drum forming a curve which corresponds to the desired output shape (fig. 9-45). This wiper contacts a linear resistance element lying parallel and adjacent to the drum which is driven by the input. As the drum rotates, contact is made between the wiper and resistance element in accordance with the position of the contact wire relative to angular position of the drum.

RELAYS

Relays used for switching functions in computer systems may have either a-c or d-c coils with contacts of sufficient size and pressure to handle the required load adequately. D-c relays are generally used whenever a suitable power source is available, because of their greater efficiency, faster action, and smaller size. In the plate circuit of a vacuum tube, the coil is generally wound with a large number of turns in order to provide the best impedance matching and sensitivity. Relays which have critical control applications are generally constructed with a relatively large airgap so that the ratio of release current to operate current is high.

By adding a permanent magnet in the magnetic circuit, the relay will respond to current of only one polarity. A differentially polarized relay employs an E-shaped circuit with a permanent magnet in the center leg, and a coil wound on each arm, with the armature pivoted about the center. Contacts are located at each end of the armature, one being actuated by coil current of one polarity and the other by the reverse polarity (fig. 9-46).

GYROS

The principles of the gyroscope are discussed in Chapter 5, "Instrument Flight," in TD 3 & 2. The gyroscopic properties of stability and precession are utilized in the construction of certain aircraft instruments, stability being utilized in the directional gyro and gyro horizon, while precession is utilized in the turn needle. In these applications, a mechanical linkage is employed to give a visual indication on the pilot's instrument panel.

In computer applications, it may become necessary to measure rates and position with

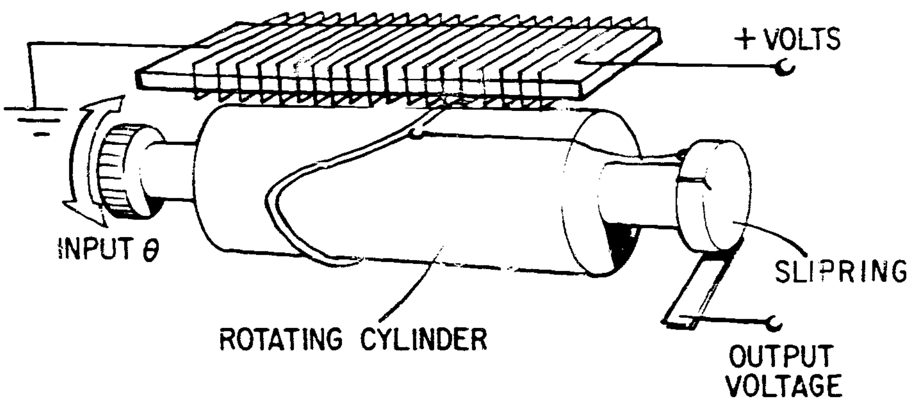


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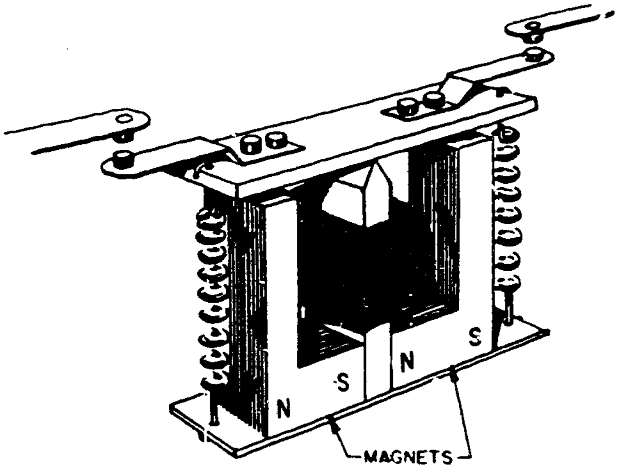
Figure 9-45.—Nonlinear function.



TD.552

Figure 9-46.—Differential relay.

respect to inertial space. This can be accomplished by making use of the properties of the gyroscope; but instead of employing a mechanical linkage to give a visual indication, the linkage drive [illegible] inductive or resistive pickoff to give a [illegible]age output. This output may then be employed to drive a servomechanism.

Gyros which operate on the principle of precession are sometimes called rate gyros, since the magnitude of the output depends upon the rate of rotation about the sensitive axis. The accuracy of this type of gyro is affected by variations in wheel speed, changes which affect the characteristics of the spring against which the rotor precesses, bearing friction, and pickoff errors.

Gyroscopes operating on the principle of stability may be called position gyros because the rotor axis maintains a fixed attitude after being alined with some vector direction from which indications of deviations are desired. In a position gyro, variations in wheel speed affect sensitivity but not accuracy. Friction and imperfect balancing of the rotor also induce errors and result in drift of the gyro. This makes it necessary to reset the gyro periodically to reestablish orientation in the original direction.

COUNTING CIRCUITS

Counting circuits are defined as those circuits which receive input pulses representing units to be counted and produce output voltages proportional to the applied pulse rates. The input waveforms must be uniform in amplitude and in time duration if accurate counting is to result; and for this reason, counters are usually preceded by shaping and limiting circuits to insure the required uniformity.

Frequent application of the counter is made in frequency dividing circuits. These contain blocking oscillators or multivibrators as the final stages, which are controlled by counting circuits and develop output waves at submultiple frequencies of the input signals.