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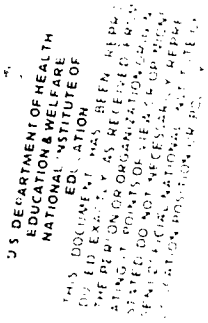
ABSTRACT

One of a series of curriculum guides prepared for the electricity/electronics occupations cluster, this guide identifies the essentials of the appliance repair and radio and television trade as recommended by successful servicemen. An instructional program based upon the implementation of the guide is expected to prepare a student to adequately perform entry level tasks required of servicemen or to enter a post-secondary technical or apprenticeship program in appliance repair and radio and television where additional depth can be realized. Trade tasks or information are listed in chart form in separate content sections for appliance repair and radio and television. Lists in each section are under such subheadings as safety, special tools and materials, warranties and service policies, merchandising and warehousing, basic thermodynamics, test and measuring equipment, and labor and replacement/repair estimating. Space is provided on the charts to record for each item the date completed, teaching methods used, and teaching materials used. Also included are a list of teacher responsibilities, sources of occupational information, recommended tests and references, and a chart depicting the total electricity/electronics occupational curriculum. A typical application for employment and a sample trade and industrial education injury report are appended. (HD)

TRADE AND INDUSTRIAL EDUCATION

TRADE PREPARATORY TRAINING GUIDE



APPLIANCE REPAIR
RADIO AND TELEVISION

NEBRASKA DEPARTMENT OF EDUCATION
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DEFINITIONS USED IN THIS GUIDE

Major Occupational Group

A grouping of similar and related occupational area clusters. These groups include occupations that have been determined to be the most relevant and pertinent for inclusion in vocational education in Nebraska.

Occupational Area Clusters

These clusters are distinguishable in terms of similar work performed, materials used, products produced, and or services rendered. They include a wide variety of common occupational skills and knowledge.

Occupation

The career or employment engaged in by an individual for remuneration. This activity includes technical competencies and related technical information often referred to as one's vocation.

Technical Competency

The specific tasks required for a vocational trade and industrial graduate to perform successfully at the entry level in an occupational area. These technical competencies apply to the psychomotor domain and include elements which emphasize motor skills such as: operate a machine; measure; etc.

Related Technical Information

The information the entry level worker must know in order to make appropriate trade decisions which will allow him to adequately perform the tasks or technical competencies of his occupation. This information applies to the cognitive domain and includes elements which are intellectual outcomes such as: knowledge and understanding.

Related General Information

Information which is desirable and good for the tradesman to know but which is not necessary to do his work properly; information that is nice to know, such as the history and development of his trade.

Related Guidance Information

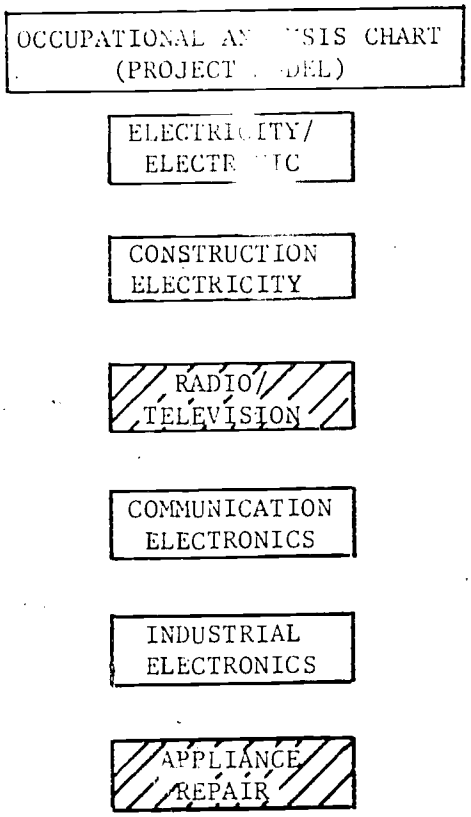
Information that helps the student choose, prepare for, secure, hold, and make progress in an occupation.

Entry Level

The technical competencies and related technical information deemed necessary by industry for obtaining and holding a job in a specific occupational area. This level of employment includes the technical competencies and related technical information that will be utilized by the employee within the first year of employment.

OCCUPATIONAL ANALYSIS CHART

The chart on this page shows Appliance Repair and Radio and Television as it relates to other occupations within the Electricity/Electronics occupations cluster. This guide is concerned with Appliance Repair and Radio and Television only. Other guides have been prepared for each of the occupations found in this chart and are available through the Nebraska State Department of Education.



INTRODUCTION

This curriculum guide has been prepared with the help of competent craftsmen in the electricity/electronics trades. The funds that made this guide a reality were provided through a federal research grant in cooperation with the Nebraska State Board for Vocational Education and sponsored by the Nebraska Research Coordinating Unit.

Curriculum guides have been prepared for several trade and industrial occupational clusters from which high school teachers can develop appropriate occupational related experiences for their students. The major occupational groups, occupational area clusters, and occupations are shown in graphic form on pages of this guide.

Selection of trades within four major occupational groups have been made based on a three year survey by the Nebraska Research Coordinating Unit on needs of Nebraska business and industry. This study has identified the occupations with the greatest need for employees. A related set of curriculum guides have been prepared for these occupations.

Guidance Information

The U. S. Department of Labor has developed an extremely helpful book entitled, "Occupational Outlook Handbook". This annual publication provides a very complete description of the activities of the persons employed in the occupations represented in the Nebraska trade and industrial curriculum guides. Information concerning current and future opportunities is a major portion of this publication. Inexpensive reprints in booklet form that describe individual occupations are available through the Department of Labor. These booklets should be used by trade and industrial teachers and school guidance counselors for the most up-to-date guidance information about a particular occupation.

A listing of these reprints from the "Occupational Outlook Handbook", the order number, and price per copy is listed below for those occupations in the occupational area cluster of "Electricity/Electronics Occupations".

Number	Title	Price
1700-85	Appliance Servicemen	.10
1700-95	Television & Radio Service Technicians	.10
1700-91	Maintenance Electricians Industrial Machinery Repairmen, Millwrights	.15
1700-130	Electric Power Industry Power Plant Occupations, Transmissions and Distribution Occupations, Customer Service Occupation	.15
1700-134	Telephone Industry, Central Office Craftsmen, Central Office Equipment Installers, Linemen & Cable Splicers, Telephone & PBX Installers, and Repairmen	.15

The Appliance Repair and Radio and Television Guide

This guide uses the title Appliance Repair and Radio and Television as the most logical descriptive term for identifying a particular related group of workers. Identification of specific job titles within this group should be determined by referring to the "Dictionary of Occupational Titles" The USOE classification system for coding instructional programs has assigned 637.281, 723.381, and 827.281 to the instructional program, Appliance Repair. The USOE classification system for coding instructional programs has assigned 720.281 to the instructional program, Radio and Television.

The information within this guide identifies the essentials of the appliance repair and radio and television trade as recommended by the successful servicemen. An instructional program based upon the implementation of this guide will prepare a student to adequately perform entry level tasks required of servicemen or to enter a post-secondary technical or apprenticeship program in appliance repair and radio and television where additional depth can be realized.

The tasks and/or competencies identified within these covers are those agreed upon by a jury of reputable Nebraska servicemen. A separate group of persons directly employed within this trade in Nebraska have further verified these tasks and/or competencies. Jury members, tradesmen, and educators who contributed toward the development of content for this guide are listed in the front.

Course offerings in trade and industrial education in Nebraska are to be organized within two period blocks of time each day, five days a week. Time is to be set aside for classroom instruction directly related to manipulative laboratory instruction. The remainder of the student's school day is to be utilized for general education subjects.

USE OF THIS GUIDE

The use of curriculum guides for trade and industrial education in Nebraska secondary schools may vary greatly, depending upon the depth and breadth of each school district's vocational program. Large school districts, for example, may utilize one particular curriculum guide to develop a course in a trade area such as appliance repair and radio and television. A small school district may, on the other hand, incorporate several curriculum guides to develop a course in the electricity/electronics occupational cluster.

The manipulative content identified in this guide is deemed necessary for inclusion in a course that is designed to prepare entry level appliance servicemen. While not all secondary school facilities in Nebraska are equipped to expose students to all of this content through hands-on experience, it is assumed that this content will through some media become related technical information. This will insure inclusion of all content and provide at least discussion level understanding.

This guide is written with the assumption and expectation that the related technical information necessary to perform technical competencies will be an integral part of instruction. Thus, occupational decisions that must be made by an entry level worker will be developed along with each related manipulative activity.

The instructor who uses this guide is responsible for including the identified related technical information as well as the identified manipulative tasks. He is also responsible for the identification of competencies pertaining to general and guidance information even though this information is not specifically identified for him.

Definitions for various terms used in this guide are presented in the front.

TEACHER RESPONSIBILITIES*

1. Use the American Vocational Association National Safety Council's "National Standards School Shop Safety Inspection Check List" for shop safety inspections. (Available from American Vocational Association, 1510 "H" Street, N.W., Washington, D.C. 20005)

2. Use safety check list to assure safe factors exist.

3. Require students to report ALL accidents to instructor.

4. Keep complete records of ALL accidents on file.

5. Report ALL accidents to the school administrator.

6. Develop safety consciousness in the students through teacher example--always doing things in the safe way.

7. Give shop demonstrations stressing safe use of machines.

8. Give shop demonstrations stressing safe use of hand tools.

9. Provide instruction on what to do in case of an accident.

10. Develop information sheets dealing with the safe use of specific machines.

11. Give demonstrations on the proper use and care of personal protective devices.

*These responsibilities are necessary for inclusion in all trade and industry programs in the State of Nebraska.

12. Develop information sheets dealing with the general safety rules for the trade.

13. Enclose all gears, moving belts, and other power transmission devices with permanent guards.

14. Prohibit students from operating machines when instructor is not present.

15. Prohibit the removal of guards and safety devices, even for a brief period, without the approval of the instructor.

16. Prohibit more than one operator from using a machine at one time.

17. Determine personal-liability factors and liability coverage afforded through your school.

18. Provide for the bulk storage of flammable materials.

19. Mark the location of fire-fighting equipment.

20. Post instructions and inform students of building evacuation procedures.

21. Require the wearing of appropriate eye protection as specified by the State of Nebraska eye safety regulations.

22. Keep tools sharp, clean and in good working condition.

23. All shop personnel should be thoroughly familiar with the location of fire extinguishers and the type fire for which each extinguisher is designed.

APPLIANCE REPAIR CONTENT
(Identified Trade Tasks of Information)

TRADE TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
Recognize safe and unsafe areas-avoid areas of possible danger.			
Recognize safe and unsafe methods or practices-avoid those which may be dangerous.			
Select appropriate clothing and safety apparel.			
Exercise care in handling and using testing/measuring instruments.			
Exercise care in handling and using hand and power tools.			
Correct unsafe conditions of tools and test/measuring instruments.			

Recognize and report unsafe conditions to immediate supervisor.			
Follow federal occupational safety laws relating to appliance repair occupations.			
Exercise competent communication skills with public.			
Exercise proper use of telephone communication.			
Prepare appliance defect/ repair reports.			
Explain basic controls and operations of appliances to customers.			
Write business letters.			
Keep records specified by employer.			

TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
MER AND JOB RELATIONS			
lish and maintain n quality of personal anship.			
ice a pleasant atti- toward customers and v workers.			
concepts of good and grooming.			
nctual.			
vith minimum immediate vision.			
facilities clean and ly.			

fuse puller

soldering aids

de-soldering aids

relay/contact service tools

solder

relay/contact cleaner

soldering flux and paste

soldering irons

soldering guns

soldering pencils

wire stripper

electrical tape

TRADE TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
solderless connectors			
solderless connector crimping tool			
fish tape and wire puller			
GENERAL COMPETENCIES			
Use common hand tools.			
Disassemble-assemble electro-mechanical appliances.			
Cut and strip wire.			
Splice wires.			
Install optional equipment specified by customer or manufacturer.			

Unsolder-solder components within appliances.

Remove-install electro-mechanical appliances.

Operate hand and power drills.

Locate defective components.

Replace defective components.

Repair defective components.

Clean parts and appliances.

TRADE TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
Inspect and install grounding devices on appliances.			
Inspect appliances for wear/malfunctioning.			
Adjust and calibrate appliances.			
Adjust and calibrate test and measuring instruments.			
Analyze test data.			
Follow manufacturer's specifications.			
Apply electrical theory.			

Observe functioning circuit for defects.

Interpret and utilize drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks.

Perform maintenance according to federal, state, local electrical codes.

RADIO AND TELEVISION
(Identified Trade Tasks or Information)

TRADE TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
SAFETY			
Provide adequate ventilation when using solvents.			
Provide appropriate safety precautions to prevent injury to oneself and others as appliances undergo operation, testing, and maintenance.			
Identity fire extinguishers and their use.			
Recognize safe and unsafe methods or practices - avoid those which may be dangerous.			

TRADE TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
Select appropriate clothing and safety apparel.			
Exercise care in handling and using testing/measuring instruments.			
Exercise care in handling and using hand and power tools.			
Recognize and report unsafe conditions to immediate supervisor.			
Correct unsafe conditions of tools and test/measuring instruments.			
COMMUNICATION SKILLS			

Exercise competent communications skills with public.

Exercise proper use of telephone communications.

Prepare appliance defect/repair reports.

Explain basic controls and operations of appliances to customers.

Keep records specified by employer.

CUSTOMER AND JOB RELATIONS

Establish and maintain a high quality of personal workmanship.

Practice a pleasant attitude toward customers and fellow workers.

TRADE TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
Apply concepts of good dress and grooming.			
Be punctual.			
Work with minimum immediate supervision.			
Keep facilities clean and orderly.			
Develop and follow work plans or schedules.			
Understand and follow through on instructions or directions.			
BUSINESS PRINCIPLES AND PRACTICES			

Apply principles and practices of business in economics, accounting, marketing, and salesmanship.

WARRANTIES AND SERVICE POLICIES

Comprehend and explain warranty and service policies to customers.

Maintain an up-to-date records system on warranty and service data.

LABOR AND REPLACEMENT/ REPAIR ESTIMATING

Estimate replacement/ repair costs.

Estimate total cost of a job.

TRADE TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
Explain to customer type of payment due upon completion of job.			
MATHEMATICS			
Solve problems using basic mathematics.			
Apply algebraic functions.			
BASIC ELECTRICITY			
Possess and utilize electrical symbology and terminology.			
Interpret circuit drawings and schematics.			
Apply Ohm's Law.			

Identify and apply DC circuit concepts.

Identify and apply AC circuit concepts.

Possess and utilize laws of magnetism and electro-magnetism.

BASIC THERMODYNAMICS

Analyze effects of temperature.

Analyze effects of mist coolants on circuit components.

MECHANICAL

Apply principles of belt and pulley arrangements.

TRADE TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
Select proper lubricants.			
Apply lubricants.			
ELECTROMECHANICAL			
Possess and apply the theory and structure of appliance mechanisms including:			
motors			
timers			
solenoids			
Know and utilize the theory and operation of appliance controls including:			

motor speed controls

switches

overload protection devices

antenna rotor and control devices

BASIC ELECTRONICS

Possess and utilize the theory and operation of vacuum tube circuits.

Possess and utilize the theory and operation of transistor circuits.

Possess and utilize the theory and operation of semi-conductors.

TRADE TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
TEST AND MEASURING EQUIPMENT			
Use and maintain:			
VOM			
VTVM			
wattmeter			
continuity checker			
capacitance checker			
oscilloscope			
transistor analyzer			
tube tester			
RF signal generator			

audio signal generator

sine/square wave generator

television analyst

sweep/marker alignment generator

CRT tester and rejuvenator

color-bar generator

hi-voltage test probe

signal injector probe

combination audio and RF signal generator

TRADE TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
vectorscope			
power supplies			
SPECIAL TOOLS AND MATERIALS			
Identify and properly use:			
tape head cleaner and lubricants			
tube pin straightener			
tube and parts extractor			
fuse puller			
de-soldering aids			
nut drivers			

soldering aids

TV service mirror

TV degaussing coil

alignment tools

solder

relay and
cleaner

spray circuit and component coolants

circuit board repair
kit

soldering pencils

soldering irons

TRADE TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
soldering guns			
wire stripers			
tape head demagnetizer			
GENERAL COMPETENCIES			
Use common hand tools.			
Disassemble and assemble electro/mechanical equipment.			
Cut and strip wire.			
Splice wires.			
Install optional equipment specified by customer or manufacturer.			

Unsolder-solder components.

Operate hand and power drills.

Locate defective components.

Replace defective components.

Repair defective components.

Clean equipment or parts.

Adjust and calibrate test/measuring equipment.

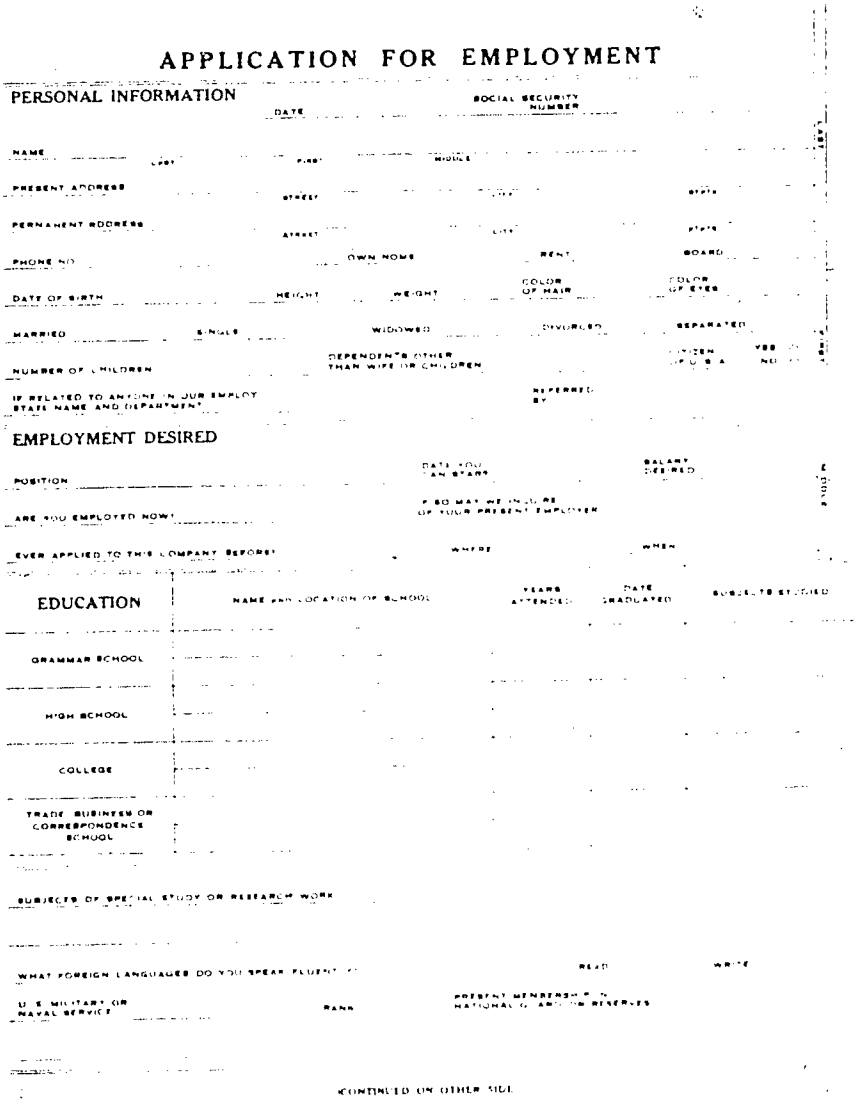
Analyze test data.

Follow manufacturer's specifications.

TRADE TASK OR INFORMATION	DATE COMPLETED	TEACHING METHODS USED	TEACHING MATERIALS USED
Apply electrical theory.			
Apply electron theory.			
Observe functioning equipment for defects.			
Interpret and utilize drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks.			

Appendix A

One of the primary objectives of trade and industrial education is the successful placement of students completing course work in a specific occupation. The following sample application form is included in this guide with the recommendation that the preparation of such forms become a necessary activity for students in all trade and industrial education courses.



APPLICATION FOR EMPLOYMENT

PERSONAL INFORMATION

DATE

SOCIAL SECURITY NUMBER

NAME

LAST

FIRST

MIDDLE

PRESENT ADDRESS

STREET

CITY

STATE

PERMANENT ADDRESS

STREET

CITY

STATE

PHONE NO.

OWN HOME

RENT

BOARD

DATE OF BIRTH

HEIGHT

WEIGHT

COLOR OF HAIR

COLOR OF EYES

MARRIED

SINGLE

WIDOWED

DIVORCED

SEPARATED

NUMBER OF CHILDREN

DEPENDENTS OTHER THAN WIFE OR CHILDREN

CITIZEN OF U. S. A.

YES

NO

IF RELATED TO ANYONE IN OUR EMPLOY STATE NAME AND DEPARTMENT

REFERRED BY

EMPLOYMENT DESIRED

POSITION

DATE YOU CAN START

SALARY DESIRED

ARE YOU EMPLOYED NOW?

IF SO MAY WE INQUIRE OF YOUR PRESENT EMPLOYER

EVER APPLIED TO THIS COMPANY BEFORE?

WHERE

WHEN

EDUCATION

NAME AND LOCATION OF SCHOOL

YEARS ATTENDED

DATE GRADUATED

SUBJECTS STUDIED

GRAMMAR SCHOOL

HIGH SCHOOL

COLLEGE

TRADE, BUSINESS OR CORRESPONDENCE SCHOOL

SUBJECTS OF SPECIAL STUDY OR RESEARCH WORK

WHAT FOREIGN LANGUAGES DO YOU SPEAK FLUENTLY?

READ

WRITE

U. S. MILITARY OR NAVAL SERVICE

RANK

PRESENT MEMBERSHIP IN NATIONAL GUARD OR RESERVES

(CONTINUED ON OTHER SIDE)

FORMER EMPLOYERS (LIST BELOW LAST FOUR EMPLOYERS, STARTING WITH LAST ONE FIRST.)

DATE MONTH AND YEAR	NAME AND ADDRESS OF EMPLOYER	SALARY	POSITION	REASON FOR LEAVING
FROM TO				
FROM TO				
FROM TO				
FROM TO				

REFERENCES: GIVE BELOW THE NAMES OF THREE PERSONS NOT RELATED TO YOU, WHOM YOU HAVE KNOWN AT LEAST ONE YEAR.

	NAME	ADDRESS	BUSINESS	YEARS ACQUAINTED
1				
2				
3				

PHYSICAL RECORD:

LIST ANY PHYSICAL DEFECTS

WERE YOU EVER INJURED? GIVE DETAILS

HAVE YOU ANY DEFECTS IN HEARING? IN VISION? IN SPEECH?

IN CASE OF EMERGENCY NOTIFY

NAME ADDRESS PHONE NO

I AUTHORIZE INVESTIGATION OF ALL STATEMENTS CONTAINED IN THIS APPLICATION. I UNDERSTAND THAT MISREPRESENTATION OR OMISSION OF FACTS CALLED FOR IS CAUSE FOR DISMISSAL. FURTHER I UNDERSTAND AND AGREE THAT MY EMPLOYMENT IS FOR NO DEFINITE PERIOD AND MAY, REGARDLESS OF THE DATE OF PAYMENT OF MY WAGES AND SALARY, BE TERMINATED AT ANY TIME WITHOUT ANY PREVIOUS NOTICE.

DATE SIGNATURE

DO NOT WRITE BELOW THIS LINE

INTERVIEWED BY DATE

REMARKS:

NEATNESS		CHARACTER	
PERSONALITY		ABILITY	

HIRED FOR DEPT POSITION WILL REPORT SALARY WAGES

APPROVED: 1 EMPLOYMENT MANAGER 2 DEPT HEAD 3 GENERAL MANAGER

Appendix B

One of the most important parts of any trade and industrial education course is a safety program. The following form is recommended for use in courses of this type.

SAMPLE
TRADE AND INDUSTRIAL EDUCATION
INJURY REPORT* **

Student injured _____ Date _____

Shop in which accident occurred _____ Time _____

Instructor in charge _____

Nature of injury _____

_____

First aid administered _____

_____ By whom? _____

Cause of injury _____

_____

Could injury have been prevented? _____ How? _____

_____

Action taken or recommendations made to prevent recurrence _____

Remarks: _____

_____

_____

Signed _____
(Person making report)

Witnesses: _____

Names _____
and
Addresses _____

*Complete in Duplicate
**File one copy in office

RECOMMENDED TEXTS AND REFERENCES

APPLIANCE REPAIR

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Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20000)

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