These materials for a five-unit course were developed to introduce secondary and postsecondary students to the telecommunications process and its impact on society. Units cover the following topics: orientation to telecommunications; telecommunications hardware; telecommunications software; methods of transmission; and applications. The first section is designed to show teachers how to use the materials and includes an explanation of instructional elements, an instructional task analysis for each unit, and a glossary. Twenty-two references, a list of 15 supplementary materials, including computer software, and a resource list also appear. The instructional elements for the units include objectives, suggested activities, information sheets, transparency masters, assignment sheets, handout sheets, tests, and test answers. Some elements, such as the information sheets, include diagrams and line drawings. (CML)

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Introduction to Telecommunications
# INTRODUCTION TO TELECOMMUNICATIONS

## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit I</td>
<td>Orientation</td>
<td>1</td>
</tr>
<tr>
<td>Unit II</td>
<td>Hardware</td>
<td>31</td>
</tr>
<tr>
<td>Unit III</td>
<td>Software</td>
<td>61</td>
</tr>
<tr>
<td>Unit IV</td>
<td>Methods of Transmission</td>
<td>85</td>
</tr>
<tr>
<td>Unit V</td>
<td>Applications</td>
<td>113</td>
</tr>
</tbody>
</table>
FOREWORD

The wide acceptance and use of telecommunications in today's workplace and the resulting need for students to become more aware of these technologies has prompted the Mid-America Vocational Curriculum Consortium to develop *Introduction to Telecommunications*.

Designed to supplement a typical vocational program at either the secondary or postsecondary level, this publication introduces the student to the telecommunication process and its impact on society.

As this material is used, it is hoped that the student will be able to fill a broader role in their chosen occupation. Every effort has been made to make this publication basic, readable, and by all means, usable. Three vital parts of instruction have been intentionally omitted from the publication: motivation, personalization, and localization. These areas are left to the individual instructors who should capitalize on them. Only then will this publication become a vital part of the teaching-learning process.

Harley Schlichting, Chairman
Board of Directors
Mid-America Vocational Curriculum Consortium

Greg Pierce
Executive Director
Mid-America Vocational Curriculum Consortium
ACKNOWLEDGEMENTS

Appreciation is extended to those individuals who contributed their time and talent to the development of Introduction to Telecommunications.

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USE OF THIS PUBLICATION

Instructional Units

Introduction to Telecommunications contains five units of instruction. Each instructional unit includes some or all of the basic components of a unit of instruction; performance objectives, suggested activities for teachers and students, information sheets, assignment sheets, job sheets, visual aids, tests, and answers to the tests. Units are planned for more than one lesson or class period of instruction.

Careful study of each instructional unit by the teacher will help to determine:

A. The amount of material that can be covered in each class period
B. The skills which must be demonstrated
   1. Supplies needed
   2. Equipment needed
   3. Amount of practice needed
   4. Amount of class time needed for demonstrations
C. Supplementary materials such as pamphlets or filmstrips that must be ordered
D. Resource people who must be contacted

Objectives

Each unit of instruction is based on performance objectives. These objectives state the goals of the course, thus providing a sense of direction and accomplishment for the student.

Performance objectives are stated in two forms: unit objectives, stating the subject matter to be covered in a unit of instruction; and specific objectives, stating the student performance necessary to reach the unit objective.

Since the objectives of the unit provide direction for the teaching-learning process, it is important for the teacher and students to have a common understanding of the intent of the objectives. A limited number of performance terms have been used in the objectives for this curriculum to assist in promoting the effectiveness of the communication among all individuals using the materials.

Reading of the objectives by the student should be followed by a class discussion to answer any questions concerning performance requirements for each instructional unit.

Teachers should feel free to add objectives which will fit the material to the needs of the students and community. When teachers add objectives, they should remember to supply the needed information, assignment and/or job sheets, and criterion tests.
Suggested Activities for the Instructor

Each unit of instruction has a suggested activities sheet outlining steps to follow in accomplishing specific objectives. Duties of instructors will vary according to the particular unit; however, for best use of the material they should include the following: provide students with objective sheet, information sheet, assignment sheets, and job sheets; preview filmstrips, make transparencies, and arrange for resource materials and people; discuss unit and specific objectives and information sheet; give test. Teachers are encouraged to use any additional instructional activities and teaching methods to aid students in accomplishing the objectives.

Information Sheets

Information sheets provide content essential for meeting the cognitive (knowledge) objectives in the unit. The teacher will find that the information sheets serve as an excellent guide for presenting the background knowledge necessary to develop the skill specified in the unit objective.

Students should read the information sheets before the information is discussed in class. Students may take additional notes on the information sheets.

Transparency Masters

Transparency masters provide information in a special way. The students may see as well as hear the material being presented, thus reinforcing the learning process. Transparencies may present new information or they may reinforce information presented in the information sheets. They are particularly effective when identification is necessary.

Transparencies should be made and placed in the notebook where they will be immediately available for use. Transparencies direct the class’s attention to the topic of discussion. They should be left on the screen only when topics shown are under discussion.

Assignment Sheets

Assignment sheets give direction to study and furnish practice for paper and pencil activities to develop the knowledge which is a necessary prerequisite to skill development. These may be given to the student for completion in class or used for homework assignments. Answer sheets are provided which may be used by the student and/or teacher for checking student progress.

Job Sheets

Job sheets are an important segment of each unit. The instructor should be able to demonstrate the skills outlined in the job sheets. Procedures outlined in the job sheets give direction to the skill being taught and allow both student and teacher to check student progress toward the accomplishment of the skill. Job sheets provide a ready outline for students to follow if they have missed a demonstration. Job sheets also furnish potential employers with a picture of the skills being taught and the performances which might reasonably be expected from a person who has had this training.
Test and Evaluation

Paper-pencil and performance tests have been constructed to measure student achievement of each objective listed in the unit of instruction. Individual test items may be pulled out and used as a short test to determine student achievement of a particular objective. This kind of testing may be used as a daily quiz and will help the teacher spot difficulties being encountered by students in their efforts to accomplish the unit objective. Test items for objectives added by the teacher should be constructed and added to the test.

Test Answers

Test answers are provided for each unit. These may be used by the teacher and/or student for checking student achievement of the objectives.
INTRODUCTION TO TELECOMMUNICATIONS

INSTRUCTIONAL/TASK ANALYSIS

PRACTICAL APPLICATION: What The Student Should Be Able to Do (Psychomotor)

RELATED INFORMATION: What the Student Should Know (Cognitive)

UNIT I: ORIENTATION

1. Terms and definitions
2. History of telecommunications
3. Applications of telecommunications
4. Questions concerning the impact of telecommunications
5. Research a career in telecommunications
6. Develop a scrapbook of telecommunications items

UNIT II: HARDWARE

1. Terms and definitions
2. Types of telephone hardware
3. Types of computers
4. Types of peripheral devices
5. Types of video equipment
6. Characteristics of networking systems
7. Research a new piece of hardware
8. Prepare a poster showing types of telecommunications hardware
UNIT III: SOFTWARE

1. Terms and definitions
2. Types of computer operating systems software
3. Characteristics of a telephone operating system
4. Types of business software
5. Types of audiovisual software
6. Research software currently being used in business and industry
7. Match types of business software with their applications
8. Determine the types of videotapes available in video stores

UNIT IV: METHODS OF TRANSMISSION

1. Terms and definitions
2. Analog and digital transmission
3. Three modes of transmission
4. Speeds of transmission
5. Transportation systems
6. Survey businesses in your community to determine their use of telecommunications
7. Design a networking system to transmit data within your school
UNIT V: APPLICATIONS

1. Types of data communications
2. Video communications
3. Types of audio communications
4. Graphic communications
5. Develop a message for voice mail
6. Develop an electronic mail message
7. Set up a conference call
INTRODUCTION TO TELECOMMUNICATIONS

GLOSSARY

Analog — A form of transmission over communication channels in a continuous waveform

Bandwidth (also known as grade) — The range or width of the frequencies available for transmission on a given channel

Baud — Unit used to measure transmission speeds

Bus configuration — Each computer plugs into a single bus cable that runs from workstation to workstation

Channel — Path for transmission of signals between two or more points

Central office — Centralized switching site which allows communications between two or more locations

Circuit — The connection which enables the customer to access common user and/or private line telecommunication services

Coaxial cable — Insulated hollow copper cylinder containing a signal wire conductor to transmit data

Communication software — Programs that assist in the transfer of information across communication channels by convincing the computer to act as if the microcomputer was a terminal and a part of the communication system

Computer operating systems — Programs that control the operation of the computer system

Data base management systems — Programs that serve as the interface between the data base and the programmer, operating system, and users

Digital — A form of transmission over communication channels in a series of on/off pulses

Download — To receive a file from another computer

Fiber optics — Tiny threads of glass used to transmit light pulses

Fully distributed network configuration — One in which every set of nodes in the network can communicate directly with every other set of nodes through a single communication link

Hardware — Physical components which make up a system

Hierarchical configuration — Network design for multiple CPU’s, in which an organization’s needs are divided into multiple levels that receive different levels of computer support

Impact printer — Printer that forms characters by physically striking a ribbon against paper

Integrated software — Two or more application programs which work together to allow easy movement of data between the applications
Links — The transmission channels which connect the nodes such as telephone lines and coaxial cables

Local-area networks — Operate within a well-defined and generally self-enclosed area

Modem — A device used to translate signals from analog to digital or digital to analog

Node — Refers to the entry/exit points of a network and consists of CPUs, printers, terminals, and/or other physical devices

Non-impact printer — The use of heat, laser technology, or photographic techniques to print output

PBX — Local telephone switch which serves stations within a company and accesses the public network

Remote networks — Cover large, geographically dispersed areas and are used mostly by large volume users due to cost

Ring configuration — Network design in which a number of computers are connected by a single transmission line in a circle

Software — Program or programs used to direct a system

Spreadsheet — Programs that create a table of data and allow any piece(s) of data to be defined mathematically in terms of any other data within the table

Star configuration — Network design in which all transactions must go through a central computer prior to being routed to the appropriate network computer

Telecommunication — Transmission of voice, data, and video through electronic means

Transponder — Receiver/transmitter combination that retransmits a received signal greatly amplified

Twisted pair — Two insulated copper wires twisted into pairs, used to transmit signals

Upload — To send a file from one computer to another

Word processor — Programs that perform text-editing functions
INTRODUCTION TO TELECOMMUNICATIONS

REFERENCES

(NOTE: An alphabetical list of references used in developing this text, a list of suggested supplemental materials, and a resource list may be found in Unit I, Suggested Activities.)
ORIENTATION
UNIT I

UNIT OBJECTIVE

After completion of this unit, the student should be able to define telecommunications, list applications of telecommunications, and describe the impact of telecommunications on society. Competencies will be demonstrated by completing the assignment sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to telecommunications with their correct definitions.
2. Match dates related to the history of telecommunications with their correct events.
3. List applications of telecommunications.
4. List questions concerning the impact of telecommunications.
5. Research a career in telecommunications. (Assignment Sheet #1)
6. Develop a scrapbook of telecommunication items. (Assignment Sheet #2)
ORIENTATION

UNIT I

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to supplement/reinforce information provided in this unit of instruction.

   (NOTE: This activity should be completed prior to the teaching of this unit.)

B. Provide students with objective sheet.

C. Discuss unit and specific objectives.

D. Provide students with information and assignment sheets.

E. Discuss information and assignment sheets.

F. Integrate the following activities throughout the teaching of this unit:

   1. Locate a film on the history of telecommunications. Contact your local telephone company or your local chapter of The Telephone Pioneers of America.

   2. Ask a representative from the telecommunications industry (telephone, computer, satellite, cable TV) to discuss the history of telecommunications, current trends, and careers in telecommunications.

   3. Ask a panel of business people using telecommunications in their business to share uses of telecommunications with your class.

   4. Discuss how telecommunications shock affects workers, i.e. fear of being replaced by a machine.

   5. Discuss past, present, and future changes as a result of telecommunication technology. Have students visit with individuals over 60 who can tell them about the changes they have seen as a result of new technology.

   6. Discuss how telecommunication affects and impacts on current events.

      EXAMPLES:  Election results — Reporting over the years
                  World disasters — Shuttle disaster in U.S., Chernobyl in Soviet Union; how quickly events are reported to world

   7. Have students compile a list of careers in telecommunications, including job titles, descriptions, requirements, qualifications, skills, salaries, etc.

      (NOTE: Refer to Occupational Outlook Handbook or Bulletin Board of Careers.)

   8. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

G. Give test.

H. Evaluate test.

I. Reteach if necessary.
REFERENCES USED IN DEVELOPING UNITS OF INSTRUCTION

(NOTE: The following references were used in developing the five units of instruction which are included in Introduction to Telecommunications. Refer to this list when selecting supplemental materials for your students.)


REFERENCES USED IN DEVELOPING UNITS OF INSTRUCTION


SUGGESTED SUPPLEMENTAL MATERIALS

Telecommunication Simulators

(Note: Telecommunications simulators are now available for educators from the elementary level through the post-secondary level. The list below provides descriptions of current products on the market.)

A. THE ELECTRONIC VILLAGE is a site-licensed simulation and tutorial introduction to telecommunications and bulletin board systems. Also comes with materials in telecommunications ethics. Exsym, 2728 23rd Street, Greeley, CO 80631; (303) 330-8021.

B. THE ELECTRONIC MAILBAG is an electronic mail simulator with a complete curriculum. Multi-boot permission is granted for up to three computers. Exsym (see above address).

C. WINDOW ON TELECOMMUNICATIONS is a unique site-licensed telecommunications vocabulary simulator. Exsym.

D. GBBS “PRO” is actually one of the most sophisticated Apple-based bulletin board software packages on the market. One of its many features uses what is called a “local driver” or “modemless” driver. The driver allows GBBS “PRO” to function without a modem, enabling it to act as a live simulator or functional classroom message center. Later, the system can be hooked up to a modem and phone line, and students can actually go online. Micro Data Products, 537 Olathe Street, Unit G, Aurora, CO 80011; (303) 360-6200.

E. INFORMATION CONNECTION is a package which simulates an on-line information search using a limited version of the Grolier online encyclopedia currently available on CompuServe. Grolier Electronic Publishing, Sherman Turnpike, Danbury, CT 06816, (203) 797-3756 or (800) 858-8858.
SUGGESTED SUPPLEMENTAL MATERIALS

Educational Software Packages with Telecommunications Capabilities

A. The Other Side — Tom Snyder Productions
   123 Mt. Auburn St.
   Cambridge, MA 02138
   (617) 876-5841

B. NEWSROOM — Springboard
   7808 Creekridge Circle
   Minneapolis, MN 55435
   (612) 944-3912

C. WRITE AWAY — Peregrine Software
   1160 Appleseed Lane
   St. Louis, MO 63132
   (314) 997-2369

D. Word Juggler — Quark
   2525 W. Evans, Suite 220
   Denver, CO 80219
   (303) 934-2211

E. Pro-COM-A — Prometheus
   4545 Cushing Parkway
   Fremont, CA 94538
   (415) 490-2370

Bulletin Board Software — Public Domain

A. RBBS (IBM and compatibles)

B. WAPBBS (Apple)

C. MACE (Atari)

Beginning Books


RESOURCE LIST

Periodicals

(NOTE: The following is an alphabetical list of publications which may be beneficial as supplemental teaching aids and reference materials and can be obtained by writing to the addresses below.)

Administrative Management
The Automated Office, Ltd.
P.O. Box 7524
Teaneck, NJ 07666

Apple Orchard
908 George Street
Santa Clara, CA 95050
9 issues/year. Apple users only. News, software tips included.

Byte
70 Main Street
Peterborough, NH 03458
Monthly technical magazine. Detailed descriptions of hardware, construction articles, in-depth reviews.

Call A.P.P.L.E.
304 Main Street, Suite 300
Renton, WA 98055
7 issues/year. Apple users only. News, hardware tips, programs.

Classroom Computer News
P.O. Box 266
Cambridge, MA 02138

Computel
P.O. Box 5406
Greensboro, NC 27403
Monthly. For Atari, Commodore, or Apple users only. Good tutorial approach, many programs, software tips.

Computer Decisions
Hayden Publishing Co., Inc.
10 Mulholland Drive
Hasbrouck Heights, NJ 07604

Computers & Electronics
One Park Avenue
New York, NY 10016

Computerworld
International Data Corporation
60 Austin Street
Newton, MA 02160

The Computing Teacher
International Council for Computers in Education
C/o Department of Computer and Information Science
University of Oregon
Eugene, OR 97403

Computronics
50 North Pascack Road
Spring Valley, NY 10977

Creative Computing
39 E. Hanover Ave.
Morris Plains, NJ 07950
Monthly. For Apple, Atari, Radio Shack, IBM, and Commodore users. Evaluations and applications for home and school.

Creative Computing Buyer's Guides
39 E. Hanover Ave.
Morris Plains, NJ 07950

Desktop Computing
P.O. Box 997
Farmingdale, NY 11737

EC & TJ (Educational and Technology Journal)
Association for Education Communications and Technology
1126 16th Street, NW
Washington, D.C. 20036

Educational Computer Magazine
P.O. Box 535
Cupertino, CA 95015
Bi-monthly. Success stories, how-to classroom applications, reviews.
RESOURCE LIST

Educom Bulletin
Interuniversity Communications Council
Box 364, Rosedale Road
Princeton, NJ 08540

Electronic Classroom
TEC
150 West Carob Street
Compton, CA 90220

Electronic Learning
902 Sylvan Avenue
Englewood Cliffs, NJ 07632
8 issues/year. Published by Scholastic. Lots of teacher contributions and reviews.

Infoworld: The Newsweekly for Microcomputer Users
530 Lytton
Palo Alto, CA 94301

Instructional Innovator
1126 16th Street N.W.
Washington, D.C. 20036
Monthly. Covers audio visual, computers, and other related technology for schools.

Interface Age
16734 Marquardt Ave.
Cerritos, CA 90701
Monthly. Has moved toward primarily a business orientation. Good comparison charts of hardware and software.

Journal of Computer-Based Instruction
Association for Development of Computer-Based Instructional Systems
8120 Perm Avenue, South
Bloomington, MN 55431

Journal of Computers in Mathematics and Science Teaching
P.O. Box 4455
Austin, TX 73765

Journal of Data Education
Society of Data Educators
516 Mark Avenue
Truth or Consequences, NM 87901

Media & Methods
1511 Walnut Street
Philadelphia, PA 19102
9 issues/year. Aimed at elementary/secondary schools; covers audio/video as well as computers.

Microcomputer Index
2464 El Camino Real #247
Santa Clara, CA 95051
Quarterly. One-line descriptions of all articles, reviews, and programs in 39 magazines.

Microcomputing
80 Pine Street
Peterborough, NH 03458

Microcomputer Applications
International Society for Mini and Microcomputers
Acta Press
Box 2481
Anaheim, CA 92804

MicroDiscovery
P.O. Box 7500
Bergenfield, NJ 07621

MicroSIFT News
Northwest Regional Educational Laboratory
300 S.W. Sixth Avenue
Portland, OR 97204

Modern Office Technology
P.O. Box 91368
Cleveland, OH 44101

PC
39 East Hanover Avenue
Morris Plains, NJ 07950
Monthly. IBM Personal computer and clones. Huge magazine with articles, reviews of peripherals and software.
RESOURCE LIST

PC World
555 DeHaro Street
San Francisco, CA 94107
Monthly. IBM personal computer only. Articles, stories, reviews about IBM PC and lookalikes.

Personal Computing
50 Essex Street
Rochelle Park, NJ 07662

Personal Software
Hayden Publishing Co., Inc.
50 Essex Street
Rochelle Park, NJ 07662

Popular Computing
70 Main Street
Peterborough, NH 03458

School Microwave Reviews
R.O. Box 246
Dresden, ME 04342
3 issues/year. Collection of software reviews for elementary/secondary level. Best of its kind. Publishes directory also.

Softside
6 South Street
Milford, NH 03055
Monthly. Program listings for TRS-80, Apple, and Atari. Somewhat inner directed with little outside advertising.

Softalk
11021 Magnolia Blvd.
North Hollywood, CA 91601
Monthly. Apple only. Cram full of articles, stories, reviews, programs, tutorials, hints.

Softalk for IBM Personal Computer
11021 Magnolia Blvd.
North Hollywood, CA 91601
Monthly. Programs, industry gossip, new product information.

Software Digest
EDP Services, Inc.
7620 Turtle Turnpike
Annadale, VA 22003

Software Review
Microform Review, Inc.
520 Riverside Drive
Westport, CT 06880

Softwarenews
Datapro Research Corp.
1805 Underwood Blvd.
Delran, NJ 08075

Today's Office
Hearst Business Publication
P.O. Box 11716
Philadelphia, PA 19101

80 Micro
80 Pine Street
Peterborough, NH 03458
Monthly. TRS-80 only. The bible for Radio Shack owners. Programs, tutorials, hardware hints, stories.

80-U.S. Journal
3838 South Warner Street
Tacoma, WA 98409
Monthly. TRS-80 only. Technical information, programs, reviews.

99'er
P.O. Box 5537
Eugene, OR 97405
Monthly. Texas Instruments only. Hints, programs, news, reviews.
RESOURCE LIST

Microcomputer and Educational Organizations

(NOTE: The following is an alphabetical list of organizations related to microcomputers and education which may be beneficial in obtaining reference materials.)

American Association of School Administrators
1801 North Moore Street
Arlington, VA 22209
(703) 528-0700

American Federation of Information Processing Societies, Inc.
1815 North Lynn Street
Arlington, VA 22209

American Society for Information Science
1155 16th Street, N.W.
Washington, D.C. 20036
(202) 659-3644

American Society for Training and Development
P.O. Box 5307
Madison, WI 53705

Apple for the Teacher
c/o Ted Terry
5848 Riddio Street
Citrus Heights, CA 95610

Association for Computer Users (ACU)
P.O. Box 9003
Boulder, CO 80301
(303) 443-3600

Association for Computing Machinery (ACM)
1133 Avenue of the Americas
New York, NY 10036
(212) 265-6309

Association for Educational Communications and Technology (AECT)
1126 16 Street, N.W.
Washington, D.C. 20036
(202) 833-4180

Association for Educational Data Systems (AEDS)
1201 16th Street, N.W.
Washington, D.C. 20036
(202) 833-4100
RESOURCE LIST

Association for the Development of Computer-Based Instructional Systems (ADCIS)
Bond Hall
Western Washington University Computer Center
Bellingham, WA 98225
(206) 676-2860

Association of School Business Officials in the U.S. and Canada
720 Garden Street
Park Ridge, IL 60068

Commission on Software Issues in the Eighties
c/o Daniel T. Brooks, Chairman
6106 Lorcom Court
Springfield, VA
(703) 569-6064

Computer-Based Education Research Laboratory
University of Illinois
Urbana, IL 61801

Computer-Using Educators
c/o W. Don McKell
Independence High School
1776 Educational Park Drive
San Jose, CA 95133

Council for Educational Development and Research
1518 K Street, N.W.
Suite 206
Washington, D.C. 20005

Datapro Research Company
1805 Underwood Blvd.
Delran, NJ 08075
(800) 257-9406

Educational Technology Center
University of California
Irvine, CA 92717
(714) 833-6911

EDUCOM
P.O. Box 364
Princeton, NJ 08540
(609) 734-1915

International Council for Computers in Education (ICCE)
Department of Computer and Information Science
University of Oregon
Eugene, OR 97403
RESOURCE LIST

Laboratory for Personal Computers in Education
State University of New York
Stony Brook, NY 11094
(516) 246-8418

Lawrence Hall of Science
University of California
Berkeley, CA 94720
(415) 642-3167

Michigan Association for Computer Users in Learning (MACUL)
c/o Wayne County Intermediate School District
33500 Van Born Road
Wayne, MI 48184
(313) 326-9300

Micro Co-Op
P.O. Box 432
Wcst Chicago, IL 60185
(312) 231-0912

MicroSIFT
Northwest Regional Educational Laboratory
500 Lindsay Building
710 2nd Avenue, S.W.
Portland, OR 91204
(503) 248-6974

Microcomputer Center
San Mateo Educational Resources Center Library
333 Main Street
Redwood City, CA 94063
(415) 363-5469

Microcomputer Education Applications Network
256 North Washington Street
Falls Church, VA 22046

Microcomputer Resource Center
Teachers College
Columbia University
New York, NY 10027
(212) 678-3740

Minnesota Educational Computing Consortium (MECC)
2520 Broadway Drive
St. Paul, MN 55113
(612) 376-1101
RESOURCE LIST

National Association of Computer Stores
3255 South U.S. 1
Fort Pierce, FL 33450
(305) 465-9450

Northwest Council for Computers in Education
Computer Center
Eastern Oregon State College
La Grande, OR 97850
(503) 963-2171

Society for Applied Learning Technology
50 Culpepper Street
Warrenton, VA 22816
(703) 347-0055

Texas Computer Education Association
7131 Midbury
Dallas, TX 75230
(214) 361-9472
I. Terms and definitions

A. Analog — A form of transmission over communication channels in a continuous waveform
   EXAMPLE: Human voice

B. Coaxial cable — Insulated hollow copper cylinder containing a signal wire conductor to transmit data

C. Digital — A form of transmission over communication channels in a series of on/off pulses
   EXAMPLE: Turning on a light switch

D. Fiber optics — Tiny threads of glass used to transmit light pulses

E. Hardware — Physical components which make up a system
INFORMATION SHEET

F. Modem — A device used to translate signals from analog to digital or digital to analog

G. PBX — Local telephone switch which serves stations within a company and accesses the public network

H. Software — Program or programs used to direct a system

I. Telecommunication — Transmission of voice, data, and video through electronic means

J. Twisted pair — Two insulated copper wires twisted into pairs, used to transmit signals

II. History of telecommunications

A. Communications before 1844
   1. Smoke signals across the sky when there was no rain
   2. Pounding of drums limited to a certain distance
   3. Development of the weaving device which used punched cards to control the loom and patterns in the weave

B. 1844-78
   1. Early telegraph started the communication process via an electrical wire path
INFORMATION SHEET

2. Analytical difference engine developed by Charles Babbage in 1850 which used two sets of punched cards for instructions

3. Invention of the telephone in 1876 by Alexander Graham Bell

C. 1878-1900

1. Vacuum tube was introduced

2. Transmission technological advances improved long distance transmissions through the development of copper twisted pair

3. Hollerith's data processing machine used punched paper and pins to do the 1890 United States Census

D. 1900-1960

1. In the 1920s, electronic experiments led to transmission of pictures

2. Coaxial cable was introduced

3. The impact of the transistor, introduced in 1947, led to the development of systems which were smaller and more powerful

4. World War II led to a great deal of research and development of radio telecommunications systems

   EXAMPLES: AM, FM, UHF, shortwave

5. Voice, data and video transmission over microwave radio relay systems was introduced by Bell System

   EXAMPLES: Television, long distance calling

6. IBM introduced its first computer, the Model 701, and Remington-Rand offered the UNIVAC for commercial sale

   (NOTE: The Model 701 was what is commonly referred to as a mainframe today)

E. 1960-1975

1. Development of the integrated chip in 1960; used in the first computer-controlled PBX

2. New options in software and hardware became available for customer selection

3. Minicomputers came of age during the 1970s

4. Modems were used even though they were slow and expensive
INFORMATION SHEET

F.  1975-85

1. Voice and data transmission improved due to technological changes

2. Microcomputers such as personal computers were introduced and became an important business tool

3. Fiber optics and other enhanced transmission processes were being developed and introduced to improve the transmission of voice, data, and video

4. The breakup of the Bell System in 1984 created a trend toward a multiple-vendor environment causing an explosion of telecommunications technologies

G.  1985 and beyond

1. Local area networks were introduced which met the needs of users wishing to share peripherals, resources, and data

2. New technologies will further lead to the interconnections for voice, data, and video systems through improvements in transmission and switching as well as services

III. Applications of telecommunications

A. Travel industry

1. Reservations for airlines, lodging, and rental cars

2. Automatic ticketing

3. Seat assignments

4. Flight information with access to arrivals, departures, cancellations, and passenger count

B. Banking

1. Automated teller machines

2. Communications between remote branches and main office

3. Home banking for the payment of bills and inquiries regarding accounts

4. Access to information for loan processing such as credit reports
INFORMATION SHEET

C. Broadcasting
   1. Satellites and moveable receivers for news coverage
   2. Linkage to graphics programs for headlines and artwork
   3. Transmission of video to and from remote areas

D. Education
   1. Registration and admission records availability
   2. Interactive video and computer touch-screens for curriculum enhancement
   3. Video broadcasting to multiple student locations across campus or state
   4. Computer terminal access between students and instructors
   5. Recruiting, fundraising, and alumni associations
   6. Class scheduling and grading

E. Health care
   1. Emergency communication to aid patients
   2. Staff training using video or teleconferences
   3. Records and information regarding patients

F. Insurance
   1. Remote agents can be connected with large insurance company files via telecommunications
   2. Access to program applications which will perform policy and risk analysis
   3. Claims processing

G. Manufacturing
   1. Quality control through part production using communications between design equipment and production equipment
   2. Centralized records for billing, shipping, and order processing
H. Retailing
   1. Inventory control and automated reordering
   2. Customer information and orientation with the use of touch screens
   3. Automatic bar code reading, check and charge authorizations, and billing information
   4. Home shopping

I. Cross-industry
   1. Payroll
   2. Order entry
   3. Pricing charges
   4. Inventory control
   5. Electronic order exchange
   6. Human resource management
   7. Business accounting
   8. Benefits management
   9. Electronic mail

IV. Questions concerning the impact of telecommunications
   A. What are the special requirements for business and industry?
   B. What are the implications of a “paperless society”?
   C. Can confidentiality be maintained?
   D. What is the impact on individuals as technological change is forced on them in the workplace?
   E. Will telecommunication eliminate the need to travel to school, work, or to handle any business situations?
ORIENTATION
UNIT I

ASSIGNMENT SHEET #1 — RESEARCH A CAREER IN TELECOMMUNICATIONS

NAME ___________________  SCORE ___________________

Directions: Research a career in telecommunications for an industry of your choice. Write a report to include the following:

2. Include a job description.
3. Determine education needs.
4. List job qualifications (prior experience, skills, etc.)
5. List salary possibilities.
6. State potential career advancement opportunities.
7. Discuss changes which have taken place due to telecommunications (past, present, and future)

(NOTE: Sources of information for your report might include the Occupational Outlook Handbook, Bulletin Board of Careers, want ads, career counselors, and business magazines.)
ORIENTATION
UNIT I

ASSIGNMENT SHEET #2 — DEVELOP A SCRAPBOOK OF TELECOMMUNICATION ITEMS

NAME ___________________________ SCORE _________________________

Directions: Find ten items which are the direct result of telecommunication and mount these items on paper in a scrapbook format. Place one item per page and include a brief description including the following information:

1. The name of the item and its source
2. How the item (its information) was communicated (telephone, computer, facsimile)
3. How the information was handled prior to telecommunication technology

(NOTE: Items in your scrapbook might include an airline ticket or boarding pass, utility bill, bank statement, data base address label, insurance claim, bar code from grocery item, retail price tag, and advertisement on telecommunication equipment.)
1. Match the terms on the right with their correct definitions.

   ____a.  A form of transmission over communication channels in a continuous waveform
   1.   Analog

   ____b.  Insulated hollow, copper cylinder containing a signal wire conductor to transmit data
   2.   Coaxial cable

   ____c.  Transmission of voice, data, and video through electronic means
   3.   Digital

   ____d.  Physical components which make up a computer system
   4.   Fiber optics

   ____e.  A form of transmission over communication channels in a series of on/off pulses
   5.   Hardware

   ____f.  Program or programs used to direct a system
   6.   Modem

   ____g.  Local telephone switch which serves stations within a company and accesses the public network
   7.   PBX

   ____h.  A device used to translate signals from analog to digital or digital to analog
   8.   Software

   ____i.   Tiny threads of glass used to transmit light pulses
   9.   Telecommunication

   ____j.   Two insulated copper wires twisted into pairs, used to transmit signals
   10.  Twisted pair
TEST

2. Match dates related to the history of telecommunications on the right with their correct events.

_____a. Transmission technological advances improved long distance transmissions through the development of copper twisted pair 1. Before 1844

_____b. Development of the integrated chip which was used in the first computer-controlled PBX 2. 1844-1878

_____c. Coaxial cable was introduced 3. 1878-1900

_____d. Local area networks were introduced which met the needs of users wishing to share peripherals, resources, and data 4. 1900-1960

_____e. IBM introduced its first computer, the Model 701, and Remington-Rand offered the UNIVAC for commercial sale 5. 1960-1975


_____g. Fiber optics and other enhanced transmission processes were being developed and introduced to improve the transmission of voice, data, and video 7. 1985 and beyond

_____h. Early telegraph started the communication process via an electrical wire path

3. List one of the applications of telecommunications for each of the following areas:

a. Travel industry

__________________________________________________________________________

__________________________________________________________________________

b. Banking

__________________________________________________________________________

__________________________________________________________________________
c. Broadcasting


d. Education


e. Health care


f. Insurance


g. Manufacturing


h. Retailing


i. Cross-industry


40
TEST

4. List three questions concerning the impact of telecommunications.
   a. 
   b. 
   c. 

   (NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

5. Research a career in telecommunications. (Assignment Sheet #1)

6. Develop a scrapbook of telecommunication items. (Assignment Sheet #2)
ORIENTATION
UNIT I

ANSWERS TO TEST

1. a. 1  f. 8
   b. 2  g. 7
   c. 9  h. 6
   d. 5  i. 4
   e. 3  j. 10

2. a. 3  e. 4
   b. 5  f. 5
   c. 4  g. 6
   d. 7  h. 2

3. May select any one for each of the following areas:
   a. Travel industry
      1) Reservations for airlines, lodging, and rental cars
      2) Automatic ticketing
      3) Seat assignments
      4) Flight information with access to arrivals, departures, cancellations, and passenger count
   b. Banking
      1) Automated teller machines
      2) Communications between remote branches and main office
      3) Home banking for the payment of bills and inquiries regarding accounts
      4) Access to information for loan processing such as credit reports
   c. Broadcasting
      1) Satellites and moveable receivers for news coverage
      2) Linkage to graphics programs for headlines and artwork
      3) Transmission of video to and from remote areas
   d. Education
      1) Registration and admission records availability
      2) Interactive video and computer touch-screens for curriculum enhancement
      3) Video broadcasting to multiple student location across campus or state
      4) Computer terminal access between students and instructors
      5) Recruiting, fundraising, and alumni associations
      6) Class scheduling and grading
   e. Health care
      1) Emergency communication to aid patients
      2) Staff training using video or teleconferences
      3) Records and information regarding patients
ANSWERS TO TEST

f. Insurance
   1) Remote agents can be connected with large insurance company files via telecommunications
   2) Access to program applications which will perform policy and risk analysis
   3) Claims processing

g. Manufacturing
   1) Quality control through part production using communications between design equipment and production equipment
   2) Centralized records for billing, shipping, and order processing

h. Retailing
   1) Inventory control and automated reordering
   2) Customer information and orientation with the use of touch screens
   3) Automatic bar code reading, check and charge authorizations, and billing information
   4) Home shopping

i. Cross-industry
   1) Payroll
   2) Order entry
   3) Pricing changes
   4) Inventory control
   5) Electronic order exchange
   6) Human resource management
   7) Business accounting
   8) Benefits management
   9) Electronic mail

4. Any three of the following:
   a. What are the special requirements for business and industry?
   b. What are the implications of a “paperless society”?
   c. Can confidentiality be maintained?
   d. What is the impact on individuals as technological change is forced on them in the workplace?
   e. Will telecommunication eliminate the need to travel to school, work, or to handle any business situations?

5.-6. Evaluated to the satisfaction of the instructor
UNIT OBJECTIVE

After completion of this unit, the student should be able to describe the hardware and equipment needed for the telecommunication process. Competencies will be demonstrated by completing the assignment sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to hardware with their correct definitions.
2. Match types of telephone hardware with their descriptions.
3. Match major types of computers with their characteristics.
4. Complete statements concerning types of peripheral devices.
5. Describe four types of video equipment.
6. Select true statements concerning characteristics of networking systems.
7. Research a new piece of hardware. (Assignment Sheet #1)
8. Prepare a poster showing types of telecommunication hardware. (Assignment Sheet #2)
HARDWARE
UNIT II

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit. Suggested supplemental materials are listed in Unit I.)

B. Make transparencies from the transparency masters included with this unit.

C. Provide students with objective sheet.

D. Discuss unit and specific objectives.

E. Provide students with information and assignment sheets.

F. Discuss information and assignment sheets.

(NOTE: Use the transparencies to enhance the information as needed.)

G. Integrate the following activities throughout the teaching of this unit:

1. Take students on a field trip to view hardware being used on-the-job.

2. Have a school official discuss/explain the data processing network which is used at school.

3. Hold a class discussion for students to share the information obtained in completing Assignment Sheets #1 and #2.

4. Hold a poster contest in conjunction with Assignment Sheet #2 to provide students with an added incentive to be creative.

5. Ask hardware vendors in your area to demonstrate hardware to students if you do not have equipment.

6. Compile a list of nationally known computer companies such as E.ltre, Computerland, Radio Shack, Computer Craft, Businessland, etc. and have students identify those companies found locally.

7. Have students use equipment if it is available.

8. Schedule the viewing of a teleconference for students to see process in action.

9. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

H. Give test.

I. Evaluate test.

J. Reteach if necessary.
HARDWARE
UNIT II

INFORMATION SHEET

I. Terms and definitions

A. Bus configuration — Each computer plugs into a single bus cable that runs from workstation to workstation

B. Download — To receive a file from another computer

C. Fully distributed network configuration — One in which every set of nodes in the network can communicate directly with every other set of nodes through a single communication link

D. Hardware — Physical components which make up a system

E. Hierarchical configuration — Network design for multiple CPU's, in which an organization's needs are divided into multiple levels that receive different levels of computer support

F. Impact printer — Printer that forms characters by physically striking a ribbon against paper

G. Links — The transmission channels which connect the nodes such as telephone lines and coaxial cables

H. Modem — Device used to translate signals from analog to digital and digital to analog

I. Node — Refers to the entry/exit points of a network and consists of CPU's, printers, terminals, and/or other physical devices

J. Non-impact printer — The use of heat, laser technology, or photographic techniques to print output

K. Remote networks — Cover large, geographically dispersed areas and are used mostly by large volume users due to cost

L. Ring configuration — Network design in which a number of computers are connected by a single transmission line in a circle

M. Star configuration — Network design in which all transactions must go through a central computer prior to being routed to the appropriate network computer

N. Upload — To send a file from one computer to another
II. Types of telephone hardware

A. Single line set — Plain old telephone set (POTS)

B. Multi-line set — The ability to access one or more lines

C. Key systems
   1. Offers flexibility and a wide variety of uses
   2. Features of the system include pickup, hold, intercom, visual and audible line signals, cutoff, exclusion, and manual signaling

D. Private Branch Exchange (PBX)
   1. Local telephone switch which serves stations within a company and accesses the public network
   2. Typically have to dial “9” from an internal station to access a group of outside lines

E. Centrex system — Central office based leased service provided by the local exchange company

(NOTE: Some features include: incoming calls can be received without going through a central switchboard, each extension has its own seven-digit number, and calls can go through the switchboard if number is not known.

F. Hybrid key system — Key telephone system which resembles PBX in that it shares line-access characteristics of both standard key and PBX systems

G. Automatic call distributor — System designed to distribute a large volume of incoming calls to a number of agents

H. Cellular
   1. Technology employing low-power radio transmission as an alternative to local loops for accessing the switched telephone network
   2. Users may be stationary or mobile
   3. Calls are passed under control of a central site from one cell's transmitter to an adjoining one with minimal switchover delay

I. Bridge — Connection which permits multiple stations to access one line

EXAMPLE: Telephone teleconference
III. Major types of computers

(NOTE: Some characteristics/functions of computers may apply to more than one type.)

A. Microcomputers
   1. Main computing component is located on one integrated circuit or chip
   2. Smallest of all computers
   3. Usually the least expensive
   4. Also known as a personal computer
   5. May allow user to download information from mainframe or minicomputer and then upload the information back to the other computer

B. Minicomputer
   1. Also called medium-sized computers
   2. Can perform many of the tasks on a reduced scale that mainframes can
   3. Less expensive, slower and smaller than a mainframe but larger, faster, and more expensive than a microcomputer

C. Mainframe computer
   1. Able to support multiple operating systems
   2. Peripherals will run at higher speeds
   3. Able to handle the processing needs of large organizations
   4. Requires special power and environmental control requirements
   5. Usually housed in a special room

D. Super computer
   1. Most expensive; largest and fastest of the major types of computers
   2. Used for scientific applications
IV. Types of peripheral devices (Transparency 1)

A. Modem (Transparency 2)
   1. **MOdulator/DEModulator**
   2. Transforms the bit patterns (digital signal) from the terminal into an analog signal that can be sent along standard communication lines
   3. Receives the analog signal and converts it back to the original digital signal
   4. Acoustic connect is designed to use a regular telephone receiver with two cups in which the earpiece and mouthpiece are placed
   5. Direct connect permits modem to be connected directly into the telephone jack

B. Monitor
   1. Television-like device for viewing computer information
   2. Monochrome or single color displays may be black and white, green, amber, or almost any color, and most monochrome video displays are high resolution displays
   3. Also called video display terminal or screen
   (NOTE: Light pens or touch screens can also serve as input devices with a monitor)

C. Keyboard
   (NOTE: When the monitor and keyboard are manufactured as one unit, this is called a terminal)
   1. Used to input data into the system
   2. May have standard keys, numeric keys, control keys, alternate keys, function keys, reset key, and an escape key

D. Printer
   1. Computer output device that produces printed copy
   2. Must be compatible with the microcomputer
   3. Quality of print and speed of printer should be considered when selecting the type of printer
   4. There are two types of printers — impact and non-impact
   EXAMPLES: Impact — Dot-matrix, daisy-wheel, chain
              Non-Impact — Inkjet, laser

E. Other peripheral devices related to telecommunications — Bar code reader, mouse, page scanner, light pens, touch screens
V. Types of video equipment (Transparency 3)

A. Monitor
1. Does the job of either a TV monitor or a TV receiver
2. Accepts either radio frequency from which it derives picture and sound, or it accepts video and audio separately and displays them
3. May look exactly like a home TV set except for one switch and socket on the side or back
4. Switch changes the TV from a monitor to a receiver

B. Camera
1. Consists of a lens, a box of electronics with built-in automatic controls to give you a good picture, an electric cord for power, and a socket called VIDEO OUT
2. Needs a cable to connect the VIDEO OUT to the VIDEO IN of either a monitor or a videotape recorder

C. Videocassette recorder (VCR)
(NOTE: This may also be referred to as a videotape recorder [VTR].)
1. Can record a videocassette or play it back
2. Format can vary
   a. Cassette, cartridge, reel-to-reel
   b. VHS, BETA, 8mm, Umatic
   c. Size of tape (1/2", 3/4", and 8mm)

D. Microphone
1. Used to transmit and record audio sounds
2. Can be a separate unit or part of the camera or recorder
3. Can be used to project sound in a large group for a conference

VI. Characteristics of networking systems (Transparency 4)

A. Networking is the linking together of CPU's and terminals via a communication system which allows users at different locations to share files, devices, and programs.

B. Networks may be remote or local.

C. All networks are comprised of two basic components: nodes and links.

D. A network's architecture can be a star, ring, hierarchical, bus, or fully distributed configuration.
Types of Peripheral Devices

Modem

Monitor

Keyboard

Printer
How a Modem Works

Sending Digital Modem Analog Signals

Analog Modem Digital Signals Receiving Computer
Video Equipment

Monitor

Camera

Videocassette Recorder (VCR)
Networking Systems

Star Configuration

Ring Configuration

Hierarchical Configuration
Networking Systems
(Continued)

Fully Distributed Configuration  Bus Configuration
ASSIGNMENT SHEET #1 — RESEARCH A NEW PIECE OF HARDWARE

NAME ___________________________  SCORE ___________________________

Directions: Research a new piece of hardware using computer magazines and brochures from vendors. Then, write a two-page report.

Some specific items which you will need to include are the following:

A. Type of hardware
B. Application(s)
C. Businesses where hardware may be found
D. Training time needed to use hardware
E. Features advertised
F. How new hardware compares to previous models
HARDWARE
UNIT II

ASSIGNMENT SHEET #2 — PREPARE A POSTER SHOWING TYPES OF TELECOMMUNICATIONS HARDWARE

NAME ___________________________  SCORE ___________________________

Directions: Using computer or business magazines and vendor brochures, prepare a poster showing at least eight types of telecommunications hardware. Include a description of each type and list the applications.

(NOTE: Colored board may be used and poster should be large enough to present picture and information in a pleasing manner. Be creative.)

EXAMPLES: Telephone hardware, computer systems, peripheral devices, video equipment
1. Match the terms on the right with their correct definitions.

____a. Network design in which a number of computers are connected by a single transmission line in a circle

____b. The transmission channels which connect the nodes such as telephone lines and coaxial cables

____c. One in which every set of nodes in the network can communicate directly with every other set of nodes through a single communication link

____d. Physical components which make up a system

____e. Each computer plugs into a single bus cable that runs from workstation to workstation

____f. Refers to the entry/exit points of a network and consists of CPUs, printers, terminals, and/or other physical devices

____g. To send a file from one computer to another

____h. Network design for multiple CPU's, in which an organization's needs are divided into multiple levels that receive different levels of computer support

____i. The use of heat, laser technology, or photographic techniques to print output

____j. Cover large, geographically dispersed areas and are used mostly by large volume users due to cost

____k. Device used to translate signals from analog to digital and digital to analog
Network design in which all transactions must go through a central computer prior to being routed to the appropriate network computer.

To receive a file from another computer.

Printer that forms characters by physically striking a ribbon against paper.

2. Match types of telephone hardware on the right with their descriptions.

- System designed to distribute a large volume of incoming calls to a number of agents
- Leased service provided by the local exchange company
- Connection which permits multiple stations to access one line
- Calls are passed under control of a central site from one cell's transmitter to an adjoining one with minimal switchover delay
- Plain old telephone set
- Features of the system include pickup, hold, intercom, visual and audible line signals, cutoff, exclusion, and manual signaling
- Local telephone switch which serves stations within a company and accesses the public network
- The ability to access one or more lines
- Key telephone system which resembles PBX
3. Match the major types of computers on the right with their characteristics.

   (NOTE: Answers may be used more than once.)

   a. Supports a large number of individual terminals
   b. Most expensive; largest and fastest of the major types of computers
   c. Requires special power and environmental control requirements
   d. Also called medium-sized computers
   e. Smallest of all computers
   f. Able to support multiple operating systems
   g. Usually the least expensive
   h. Used for scientific applications

4. Complete the following statements concerning types of peripheral devices by inserting the word(s) that best complete(s) each statement.

   a. The modem receives the __________ signal and converts it back to the original __________ signal.

   b. The monitor is a television-like device for viewing computer information; it is also called a __________ __________ __________ or screen.

   c. The keyboard is used to __________ __________ into the system.

   d. The __________ of print and __________ of printer should be considered when selecting type of printer.

   e. Other peripheral devices related to telecommunications are bar code reader, __________, page scanner, light pens, and touch screens.
TEST

5. Describe the four types of video equipment listed below.
   a. Monitor —
   b. Camera —
   c. Videocassette recorder —
   d. Microphone —

6. Select true statements concerning the characteristics of networking systems by placing an "X" in the blanks preceding the true statements.
   a. Networking is the linking together of CPU's and terminals via a communication system which allows users at different locations to share files, devices, and programs.
   b. Networks may be remote or local.
   c. All networks are comprised of two basic components: nodes and links.
   d. A network's architecture can be a star, ring, hierarchical, bus, or fully distributed configuration.

(NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

7. Research a new piece of hardware. (Assignment Sheet #1)

8. Prepare a poster showing types of telecommunication hardware. (Assignment Sheet #2)
HARDWARE  
UNIT II  

ANSWERS TO TEST

1.  a. 12  f. 9  k. 8  
b. 7  g. 14  l. 13  
c. 3  h. 5  m. 2  
d. 4  i. 10  n. 6  
e. 1  j. 11

2.  a. 7  f. 3  
b. 5  g. 4  
c. 9  h. 2  
d. 8  i. 6  
e. 1

3.  a. 3  d. 2  g. 1  
b. 4  e. 1  h. 4  
c. 3  f. 3

4.  a. Analog, digital  
b. Video display terminal  
c. Input data  
d. Quality, speed  
e. Mouse

5.  Answer should include a basic description of the following:
   
a. Monitor
   1) Does the job of either a TV monitor or a TV receiver  
   2) Accepts either radio frequency from which it derives picture and sound, or it accepts video and audio separately and displays them  
   3) May look exactly like a home TV set except for one switch and socket on the side or back  
   4) Switch changes the TV from a monitor to a receiver  

b. Camera
   1) Consists of a lens, a box of electronics with built-in automatic controls to give you a good picture, an electric cord for power, and a socket called VIDEO OUT  
   2) Needs a cable to connect the VIDEO OUT to the VIDEO IN of either a monitor or a videotape recorder
ANSWERS TO TEST

c. Videocassette recorder (VCR)
   1) Can record a videocassette or play it back
   2) Format can vary
      a) Cassette, cartridge, reel-to-reel
      b) VHS, BETA, 8mm, Umatic
      c) Size of tape (\(\frac{1}{2}\), \(\frac{3}{4}\), and 8mm)

d. Microphone
   1) Used to transmit and record audio sounds
   2) Can be a separate unit or part of the camera or recorder
   3) Can be used to project sound in a large group for a conference

6. All are true

7-8. Evaluated to the satisfaction of the instructor
SOFTWARE
UNIT III

UNIT OBJECTIVE

After completion of this unit, the student should be able to distinguish among the types of software currently being used in business and industry. Competencies will be demonstrated by completing the assignment sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to software with their correct definitions.
2. Match types of computer operating systems software with their characteristics.
3. Select characteristics of a telephone operating system.
4. Match types of business software with their examples.
5. List examples for each type of audiovisual software.
6. Research software currently being used in business and industry. (Assignment Sheet #1)
7. Match types of business software with their applications. (Assignment Sheet #2)
8. Determine the types of videotapes available in video stores. (Assignment Sheet #3)
SOFTWARE
UNIT III

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit. Suggested supplemental materials are listed in Unit I.)

B. Provide students with objective sheet.

C. Discuss unit and specific objectives.

D. Provide students with information and assignment sheets.

E. Discuss information and assignment sheets.

F. Integrate the following activities throughout the teaching of this unit:
   1. Write to software vendors to request demonstration copies of programs.
   2. Demonstrate software to students if equipment and software are available.
   3. Have students learn software packages if equipment and software are available. This knowledge will be useful for possible projects in other units.
   4. Take students on a field trip to view hardware and software being used in local businesses.
   5. Show examples of audiovisual software to students.
   6. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

G. Give test.

H. Evaluate test.

I. Reteach if necessary.
SOFTWARE
UNIT III

INFORMATION SHEET

I. Terms and definitions

A. Communication software — Programs that assist in the transfer of information across communication channels by convincing the computer to act as if the microcomputer was a terminal and a part of the communication system

B. Computer operating systems — Programs that control the operation of the computer system

C. Data base management systems — Programs that serve as the interface between the data base and the programmer, operating system, and users

D. Integrated software — Two or more application programs which work together to allow easy movement of data between the applications

E. Local-area networks — Operate within a well-defined and generally self-enclosed area

F. Software — Program or programs used to direct a system

G. Spreadsheet — Programs that create a table of data and allow any piece(s) of data to be defined mathematically in terms of any other data within the table

H. Word processor — Programs that perform text-editing functions

II. Types of computer operating systems software and their characteristics

A. UNIX
   1. Developed by Bell Laboratories
   2. One of the most powerful operating systems on the market and allows performance of more than one task at a time by multiple users
   3. Can be used on all types of computer systems

B. XENIX
   1. Is called the UNIX work-alike operating system
   2. Developed by Microsoft
   3. Can work on more than one program at a time
INFORMATION SHEET

C. MS-DOS
   1. Developed by Microsoft
   2. Used on many IBM compatible microcomputers

D. PC-DOS
   1. Developed by International Business Machines Corporation (IBM)
   2. Used on IBM personal computers

E. Apple DOS
   1. Developed by Apple Computer, Inc.
   2. Used on Apple microcomputers

F. TRS-DOS
   1. Developed by Radio Shack Division of Tandy Corporation
   2. Used on Radio Shack microcomputers

G. Office System II — Developed by IBM to replace PC-DOS

III. Characteristics of a telephone operating system
   A. Will allow the user to perform a variety of operations
   B. Varies with the hardware depending upon the vendor and equipment choice
   C. Is internal within an organization
   D. May include the following features:
      (NOTE: There are more than 100 features available.)
      1. Speed dialing
      2. Automatic redial
      3. Call waiting
      4. Call queuing
      5. Call forwarding
      6. Conference calling
      7. Call pickup
      8. Message center
IV. Types of business software and their examples

A. Integrated software
   1. Apple Works
   2. Symphony
   3. Enable
   4. Write Power II
   5. Smart System
   6. DeskMate

B. Data base management system
   1. dBASE III Plus
   2. Double Helix 1.0
   3. Omnis 3 plus 3.24
   4. Paradox 1.1
   5. Powerbase 2.3
   6. R:BASE System W
   7. Reflex for the Macintosh 1.01
   8. Universal base SIX 6.6

C. Spreadsheet
   1. Excel
   2. Lotus 1-2-3
   3. SuperCalc 4
   4. Trapeze
INFORMATION SHEET

D. Word processing/desktop publishing
   1. Displaywrite 4
   2. Multimate
   3. Pagemaker
   4. Ventura Publisher
   5. Word Perfect
   7. WriteNow 1.0
   8. MindWrite 1.0
   9. Microsoft Word

E. Communication
   1. ASCII Pro 1.3
   2. Blast-II 8.0
   3. Crosstalk XVI 3.61
   4. Flash 1.12
   5. HyperACCESS 3.20
   6. MicroPhone 1.0
   7. Microsoft Access 1.01
   8. ProComm 2.4.2
   9. Fred Ryder 9.4
   10. Re:ay Gold 2.0
   11. Smartcom ll 2.1
   12. Telescope 1.0
   13. Kermit
   15. Pro Comm A
INFORMATION SHEET

V. Types of audiovisual software

A. Audio tapes
   1. Reel-to-reel
   2. Cassette

B. Video tapes
   (NOTE: Size can vary depending upon equipment.)
   1. Beta
   2. VHS
   3. 8mm
   4. Umatic
SOFTWARE
UNIT III

ASSIGNMENT SHEET #1 — RESEARCH SOFTWARE CURRENTLY BEING USED IN BUSINESS AND INDUSTRY

NAME ___________________________   SCORE ___________________________

Directions. Using magazines and vendor brochures, research the types of software currently being used in business and industry in one of the following areas:

Data base management
Spreadsheet
Word processing/desktop publishing
Communications
Integrated software

Write a short report on the software package you have chosen. The following questions should be answered.

A. What are the features of the software package?
B. How much does it cost?
C. What computer systems will it run on?
D. What are the business applications?
E. Who developed the software?
F. What are the advantages of the software?
G. What are the disadvantages of the software?
H. What is the availability of the software?
## ASSIGNMENT SHEET #2 — MATCH TYPES OF BUSINESS SOFTWARE WITH THEIR APPLICATIONS

<table>
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Directions: Match the types of software listed on the right with their applications. Answers may be used more than once.

1. **Typing a letter**
2. **Combining data files into a report**
3. **Organizing sales figures**
4. **Text editing**
5. **File handler**
6. **Financial calculations**
7. **Sharing data between computers**
8. **Varies type styles for publishing**
9. **Financial reports and graphs**
10. **Two or more packages for processing data**

- 1. Integrated software
- 2. Data base management system
- 3. Spreadsheet
- 4. Word processing/desktop publishing
- 5. Communication
SOFTWARE
UNIT III

ASSIGNMENT SHEET #3 — DETERMINE THE TYPES OF VIDEOTAPES AVAILABLE IN VIDEO STORES

NAME ___________________  SCORE ___________________

Directions. Visit your local video stores to determine the various types of videotapes which are available. List two examples in each category.

A. Educational
   1. __________________________
   2. __________________________

B. Business
   1. __________________________
   2. __________________________

C. Entertainment
   1. __________________________
   2. __________________________

D. Health and Fitness
   1. __________________________
   2. __________________________

E. Personal Improvement
   1. __________________________
   2. __________________________
SOFTWARE
UNIT III

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1 — Evaluated to the satisfaction of the instructor

Assignment Sheet #2

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Assignment Sheet #3 — Evaluated to the satisfaction of the instructor
SOFTWARE
UNIT III

TEST

NAME ___________________________    SCORE ___________________________

1. Match the terms on the right with their correct definitions.

   _____a. Operate within a well-defined and generally self-enclosed area
   1. Communication software

   _____b. Programs that perform text-editing functions
   2. Computer operating systems

   _____c. Programs that assist in the transfer of information across communication channels by convincing the computer to act as if the microcomputer was a terminal and a part of the communication system
   3. Data base management systems

   _____d. Programs that control the operation of the computer system
   4. Integrated software

   _____e. Programs that serve as the interface between the data base and the programmer, operating system, and users
   5. Local-area networks

   _____f. Program or programs used to direct a system
   6. Software

   _____g. Programs that create a table of data and allow any piece(s) of data to be defined mathematically in terms of any other data within the table
   7. Spreadsheet

   _____h. Two or more application programs which work together to allow easy movement of data between the applications
   8. Word processor
TEST

2. Match the types of computer operating systems on the right with their correct characteristics.

   _____a. Used on the Radio Shack microcomputer
   _____b. Developed by IBM to replace PC-DOS
   _____c. Used on IBM personal computers
   _____d. Developed by Apple Computer, Inc.
   _____e. Developed by Bell Laboratories
   _____f. Is called the UNIX work-alike operating system
   _____g. Developed by Microsoft

   1. UNIX
   2. XENIX
   3. MS-DOS
   4. PC-DOS
   5. Apple DOS
   6. TRS-DOS
   7. Office System II

3. Select characteristics of a telephone operating system by placing an “X” in the blanks preceding the correct characteristics.

   _____a. Limits the user to only two or three operations
   _____b. Is internal within an organization
   _____c. Speed dialing, automatic redial, and conference calling are a few of the features
   _____d. Varies with the hardware depending upon the vendor and equipment choice
4. Match types of business software on the right with their correct examples.

_____a.  
1) Multimate
2) Pagemaker
3) Word Perfect

1. Integrated software
2. Data base management system

_____b.  
1) Crosstalk XVI 3.61
2) Flash 1.12
3) Pro Comm 2.4.2

3. Spreadsheet
4. Word processing/
desktop publishing

_____c.  
1) Excel
2) Lotus 1-2-3
3) Trapeze

5. Communication

_____d.  
1) Paradox 1.1
2) Powerbase 2.3
3) Omnis 3 plus 3.24

_____e.  
1) Smart System
2) Symphony
3) Enable

5. List two examples for each type of audiovisual software.

a. Audiotapes
   1) __________________________
   2) __________________________

b. Video tapes
   1) __________________________
   2) __________________________

(Note: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

6. Research software currently being used in business and industry. (Assignment Sheet #1)

7. Match types of business software with their applications. (Assignment Sheet #2)

8. Determine the types of videotapes available in video stores. (Assignment Sheet #3)
SOFTWARE
UNIT III

ANSWERS TO TEST

1. a. 5  e. 3
    b. 8  f. 6
    c. 1  g. 7
    d. 2  h. 4

2. a. 6  e. 3
    b. 7  f. 2
    c. 4  g. 2 or 3
    d. 5

3. b, c, d

4. a. 4
    b. 5
    c. 3
    d. 2
    e. 1

5. a. 1) Reel-to-reel
       2) Cassette
   b. Any two of the following:
       1) Beta
       2) Vi+S
       3) 8mm
       4) Umatic

6-8. Evaluated to the satisfaction of the instructor
UNIT OBJECTIVE

After completion of this unit, the student should be able to describe the methods of transmission including the speed, mods, grades, and transportation systems used in the telecommunication process. Competencies will be demonstrated by completing the assignment sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to methods of transmission with their correct definitions.
2. Distinguish between analog and digital transmission.
3. Define the three modes of transmission.
4. Match the speeds of transmission with their correct uses.
5. Match transportation systems with their correct descriptions.
6. Survey businesses in your community to determine their use of telecommunications. (Assignment Sheet #1)
7. Design a networking system to transmit data within your school. (Assignment Sheet #2)
METHODS OF TRANSMISSION
UNIT IV

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to supplement or reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit. Suggested supplemental materials are listed in Unit I.)

B. Make transparencies from the transparency masters included with this unit.

C. Provide students with objective sheet.

D. Discuss unit and specific objectives.

E. Provide students with information and assignment sheets.

F. Discuss information and assignment sheets.

(NOTE: Use the transparencies to enhance the information as needed.)

G. Integrate the following activities throughout the teaching of this unit:

1. Invite a technical expert to your class to discuss methods of transmission with students.

2. Demonstrate methods of transmission if equipment and software are available.

3. Locate and show films which discuss methods of transmission. Your local telephone company may be an excellent source.

4. Have students collect examples of components used to make telecommunications work.

5. Explain the input/output process and how components work.

6. Ask a member of a computer user group to speak to class.

7. Compile a list of businesses in your community which use hardware and software to communicate. Explain how the equipment is used.

   EXAMPLES: Telephone company, bank, cooperative, utility company, insurance, library, government offices

8. Set up an oscilloscope to a telephone and have students view modulation/demodulation waveforms.
SUGGESTED ACTIVITIES

9. Have students make a collage of transportation modes and systems to depict methods of transmission.

10. Have students share their information collected in Assignment Sheet #1 with the rest of the class.

11. Have students establish a true communications link between two devices. Refer to Handout #1.

12. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

H. Give test.

I. Evaluate test.

J. Reteach if necessary.
METHODS OF TRANSMISSION
UNIT IV

INFORMATION SHEET

I. Terms and definitions

A. Bandwidth (also known as grade) — The range or width of the frequencies available for transmission on a given channel

B. Baud — Unit used to measure transmission speeds

C. Central office — Centralized switching site which allows communications between two or more locations

D. Channel — Path for transmission of signals between two or more points

E. Circuit — The connection which enables the customer to access common user and/or private line telecommunication services

F. Transponder — Receiver/transmitter combination that retransmits a received signal greatly amplified

EXAMPLE: Satellites usually contain several transponders

II. Analog and digital transmission (Transparency #1)

A. Analog — A form of transmission over communication channels in a continuous waveform

B. Digital — A form of transmission over communication channels in a series of on/off pulses

III. Modes of transmission

A. Simplex transmission — Transmits data in only one direction; can either send or receive data but it cannot do both

B. Half-duplex transmission — Transmits data in two directions but only one way at a time

C. Full-duplex transmission — Transmits data in both directions simultaneously

(NOTE: This is a very versatile type of transmission.)
IV. Speeds of transmission

(NOTE: Baud rate is the speed of the transmission. Synchronization requires computers on each end of a data transmission to work together so data that are sent can be properly interpreted.)

A. 110 bits per second — About 10 character per second and is used in tele-types

B. 300 bits per second — About 27 characters per second and is used by many information retrieval services

C. 1200 bits per second — Can send data at approximately four times the rate of a modem with a baud rate of 300

D. 2400 bits per second — Newest kind of modem can transport at this speed

E. 5600 bits per second — USA standard which is being changed to the 6400 standard of the Integrated Service Digital Network (ISDN)

F. 9600 and 19200 bits per second — About 870 and 1750 characters per second and are used for high volume, computer-to-computer communications which do not require human intervention

G. 1.5 megabits per second — Used for high volume applications on private lines to reconfigure data networks; used to offload computers and to derive voice, data, and image channels through multiplexers

EXAMPLE: Skynet 1.5 Satellite Service

V. Transportation systems (Transparency 2)

A. Telephone circuits/channels

1. Telephone lines are transmission facilities within a telephone system; part of a local loop that connects a subscriber to the central office.

2. Packet switching is a data transmission technique in which data messages are divided into blocks or packets of standard length, each of which has address and control information coded into it

B. Twisted pair

1. Two insulated copper wires twisted into pairs

2. Can be used across town or across country

3. Primary path between phones, terminals, and modems to telephone company’s central office
C. Microwave (Transparency 3)
   1. High-frequency transmission signals and equipment that can transmit signals
   2. Usually include line-of-sight or omni-directional, open-air transmission
   3. Easily disturbed
      - Towers or tall buildings with horns or dishes are repeater stations which pick up the signal, amplify it, and pass it to the next tower

D. Fiber optics — A data transmission concept using cables made of tiny threads of glass to transmit light pulses

E. Coaxial cable
   1. Also called COAX
   2. Insulated; hollow copper cylinder containing a signal wire conductor to transmit data

F. Digital carrier
   1. A means to send signals from any sources over a signal physical channel
   2. Can carry voice or data

G. Satellite (Transparency 4)
   1. Transponders on satellites act as relay stations for uplink and downlink earth stations
   2. Uplinks transmit narrow microwave beams to the satellite
   3. Downlinks receive amplified signals from satellite transponders
   4. Satellite's coverage area is called footprint
   5. Works best in one-way transmission; for two-way there is a noticeable delay in response
Analog and Digital Transmission

Analog Data Transmission

Digital Data Transmission
Transportation Systems

Twisted Pair

Microwave

Fiber Optics

Coaxial Cable

Digital Carrier

Satellite Link
Microwave Network

Microwave Tower

- Microwave Tower
- Microwave Tower
- Microwave Tower

Repeater Station

- Repeater Station
- Repeater Station

Sender

Receiver
Satellite Communication System
METHODS OF TRANSMISSION
UNIT IV

HANDOUT #1 — CONNECT 2 PCs TOGETHER VIA THE SERIAL PORT ON PC (ELIMINATING MODEMS) TO ESTABLISH A TRUE COMMUNICATIONS LINK BETWEEN TWO DEVICES

PURPOSE:
To demonstrate an actual telecommunications (or data communications) session within the confines of the classroom, utilizing both hardware and software. Attempts should be made to experiment with different transmission speeds, dissimilar pieces of communications software and associated communications parameters such as parity, data bits and stop bits (the instructor should see that documentation is provided for the various software packages). This experimentation can be done once a path has been established between the two PCs.

EQUIPMENT NEEDED:
2 - IBM or compatible PCs with serial port
1 or more communications software package such as those found in Unit III, Objective IV.
1 ‘NULL MODEM CABLE’ to connect the 2 PCs together via the serial port in the back of the PC.

* NULL MODEM CABLE — A cable (RS232) that incorporates the proper cross-over connections that allow you to connect 2 PCs together via the serial port.

PROCEDURE:
1. Setup the 2 PCs approximately 10ft. apart or the length of the NULL MODEM CABLE you have acquired, as long as they are within 50 ft.
2. Connect the 2 PCs with the NULL MODEM CABLE to the serial port on the back of both PCs (male connector on the PC).
3. Boot your PC with DOS and load your communications software on both PCs.
4. Set the communications parameters on both PCs so they match and establish a session.
5. At this point you should be able to communicate between PCs.
   a) Send messages
   b) Transfer files
6. Experiment with different software and options as stated above.
   (NOTE: Check with your instructor to determine the appropriate experiments to be conducted on other existing software.)
METHODS OF TRANSMISSION
UNIT IV

ASSIGNMENT SHEET #1 — SURVEY A BUSINESS IN YOUR COMMUNITY TO DETERMINE METHODS OF TRANSMISSION

NAME ___________________________   SCORE ___________________________

Directions: Survey a business in your community to determine their use of telecommunications. Write a short report. Be very specific. Use examples and information from previous units to develop the questions below as well as those you might add.

Possible questions:

1. What applications do they use it for?
2. What types of hardware do they have?
3. What software programs are they using?
4. What modes of transmission are available to different businesses?
5. What baud rate is being used?
METHODS OF TRANSMISSION
UNIT IV

ASSIGNMENT SHEET #2 — DESIGN A NETWORKING SYSTEM TO TRANSMIT DATA WITHIN YOUR SCHOOL

NAME ___________________________         SCORE ___________________________

Directions: Design a networking system which will transfer data from the school secretary to the administrator's office.

(NOTE: It is important to use the previous four units to complete this assignment sheet.)

1. Define applications and records which could be transmitted.

2. List hardware which is needed. Be specific as to what vendor and products would be used.

3. List software programs which will be used to transfer data.

4. Discuss methods of transmission.
METHODS OF TRANSMISSION  
UNIT IV

TEST

NAME ____________________  SCORE ____________________

1. Match the terms on the right with their correct definitions.
   ___a. Path for transmission of signals between two or more points
   ___b. Centralized switching site which allows communications between two or more locations
   ___c. The range or width of the frequencies available for transmission on a given channel
   ___d. Unit used to measure transmission speeds
   ___e. Receiver/transmitter combination that retransmits a received signal greatly amplified
   ___f. The connection which enables the customer to access common user and/or private line telecommunication services

   1. Bandwidth
   2. Baud
   3. Central office
   4. Channel
   5. Circuit
   6. Transponder

2. Distinguish between analog and digital transmission by placing an "A" for analog in the blank preceding the correct description.
   ___a. A form of transmission over communication channels in a series of on/off pulses
   ___b. A form of transmission over communication channels in a continuous waveform

3. Define the three modes of transmission.
   a. Simplex transmission — ________________________________
       ________________________________
       ________________________________
   b. Half-duplex transmission — ________________________________
       ________________________________
       ________________________________
   c. Full-duplex transmission — ________________________________
       ________________________________
TEST

4. Match the speeds of transmission on the right with their correct uses.

_____a. Newest kind of modem can transport at this speed

_____b. About 27 characters per second and is used by many information retrieval services

_____c. About 870 and 1750 characters per second and are used for high volume, computer-to-computer communications which do not require human intervention

_____d. About 10 characters per second and is used in teletypes

_____e. Can send data at approximately four times the rate of a modem with a baud rate of 300

_____f. USA standard which is being changed to the 6400 standard of the Integrated Service Digital Network (ISDN)

_____g. Used for high volume applications on private lines to reconfigure data networks; used to offload computers and to derive voice, data, and image channels through multiplexes

5. Match the transportation systems on the right with their correct descriptions.

_____a. 1) Two insulated copper wires twisted into pairs

2) Can be used across town or across country

3) Primary path between phones, terminals, and modems to telephone company's central office

_____b. A data transmission concept using cables made of tiny threads of glass to transmit light pulses

_____c. 1) Also called COAX

2) Insulated hollow copper cylinder containing a signal wire conductor to transmit data
TEST

_____d. 1) High-frequency transmission signals and equipment that can transmit signals

2) Usually include line-of-sight or omni-directional open-air transmission

3) Easily disturbed

4) Towers or tall buildings with horns or dishes are repeater stations which pick up the signal, amplify it, and pass it to the next tower

_____e. 1) A means to send signals from any sources over a signal physical channel

2) Can carry voice or data

_____f. 1) Transponders on satellites act as relay stations for uplink and downlink earth stations

2) Uplinks transmit narrow microwave beams to the satellite

3) Downlinks receive amplified signals from satellite transponders

4) Satellite’s coverage area is called footprint

5) Works best in one-way transmission; for two-way there is a noticeable delay in response

_____g. 1) Telephone lines are transmission facilities within a telephone system; part of a local loop that connects a subscriber to the central office

2) Packet switching is a data transmission technique in which data messages are divided into blocks or packets of standard length, each of which has address and control information coded into it

(NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

6. Survey businesses in your community to determine their use of telecommunications. (Assignment Sheet #1)

7. Design a networking system to transmit data within your school. (Assignment Sheet #2)
METHODS OF TRANSMISSION
UNIT IV

ANSWERS TO TEST

1. a. 4
   b. 3
   c. 1
   d. 2
   e. 6
   f. 5

2. b

3. a. Transmits data in only one direction; can either send or receive data but it cannot do both
   b. Transmits data in two directions but only one way at a time
   c. Transmits data in both directions simultaneously

4. a. 4
   b. 2
   c. 6
   d. 1
   e. 3
   f. 5
   g. 7

5. a. 2   d. 3   g. 1
   b. 4   e. 6
   c. 5   f. 7

6.-7. Evaluated to the satisfaction of the instructor
APPLICATIONS
UNIT V

UNIT OBJECTIVE

After completion of this unit, the student should be able to discuss the various types of applications for telecommunications and the equipment needed to accomplish the applications. Competencies will be demonstrated by completing the assignment sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match types of data communications with their correct descriptions.
2. Select true statements concerning video communications.
3. Distinguish between types of audio communications.
4. Select true statements concerning graphic communications.
5. Develop a message for voice mail. (Assignment Sheet #1)
6. Develop an electronic mail message. (Assignment Sheet #2)
7. Set up a conference call. (Assignment Sheet #3)
APPLICATIONS
UNIT V

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit. Suggested supplemental materials are listed in Unit I.)

B. Provide students with objective sheet.

C. Discuss unit and specific objectives.

D. Provide students with information and assignment sheets.

E. Discuss information and assignment sheets.

F. Integrate the following activities throughout the teaching of this unit:

1. If equipment is available, you could do the following:

   (NOTE: Refer to Handouts #1, #2, and #3.)

   a. Set up a bulletin board system.

   b. Upload or download files.

   c. Send and retrieve a message via electronic mail.

   d. Participate in a teleconference.

   e. Conduct a conversation between two remote computers.

   f. Send a message through a facsimile machine.

2. Take students on a field trip to view a ...simile and see the transmission process.

3. Invite guest speakers to discuss applications in their business.

4. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

G. Give test.

H. Evaluate test.

I. Reteach if necessary.
APPLICATIONS  
UNIT V  
INFORMATION SHEET  

I. Data communications  
A. Electronic mail  
1. Transmits and stores messages electronically  
2. Speed is a very important asset  
3. Can solve time zone differences between the sender and receiver  
B. Bulletin board service (BBS)  
(NOTE: This service usually requires a password and account number.)  
1. Is a computer information service which is accessible over various transmission systems  
2. Serves microcomputer users  
3. Allows users to post messages and ask for technical help and information  
4. Must dial bulletin board service number, make connection, and then the bulletin board information is available  
C. Real-time processing  
1. Processes transactions as they occur  
   EXAMPLE: Electronic funds transfer  
2. Requires information to be readily available  
   EXAMPLE: Seat assignment for a ticketed passenger on an airline flight  
D. Teleconferencing  
1. Allows group of people to meet without coming to the same location  
2. Teleconferencing has three levels  
   a. Public conference which is available to everyone  
   b. Closed conference open only to those who know the correct password  
   c. Read-only conference which allows anyone to receive it but only participants to make comments  
3. Eliminates travel costs
INFORMATION SHEET

E. Bibliographic services
   1. Are libraries
   2. Are available most any time of the day or night
   3. Allow users to use key words as part of their search to help get only useful information
   4. Various services are available
      a. BRS and BRS/After Dark aimed primarily at large users
      b. Dialog is one of the largest and oldest services
      c. Dow Jones News/Retrieval is business-oriented
      d. The Source and Compu Serve are the most popular among small computer users

F. Full text
   1. Presents exactly what was published
   2. Is not just summaries and abstracts
   3. Provides instant delivery
   4. Is a newsletter in electronic form

G. File transfer
   1. Allows various users to access material
   2. May require an access code or password for security
   3. Provides branch offices and main office with immediate information

II. Video communications
   A. Allows the participants to see and hear what is happening
   B. Requires special equipment which is costly
   C. Satellite technology helps companies with offices around the world communicate through teleconferencing

III. Audio communications
   A. Conference call
      1. Allows user to talk to several people simultaneously at different locations
      2. Call can be scheduled in advance with a conference operator, or can be dialed directly with an alliance bridge (700 number)
INFORMATION SHEET

3. Exact time for the call and all numbers must be given to the operator
4. Participants must be notified in advance

(Note: Refer to Handout #1 for steps to set-up a conference call.)

B. Voice mail
1. Allows caller to leave a message for a person who is unable to answer a telephone call
2. Sends message in analog form, converts it to digital form, and stores it in the computer's memory
3. Allows the computer to generate human-like speech through speech synthesis

IV. Graphic communications

A. Facsimile
1. Is a popular, inexpensive form of electronic mail
2. Can transmit photographic images as well as text
3. Machines on the sending and receiving ends must be compatible
4. Machine scans the page and encodes the information and sends it over the telephone lines
5. Takes very little time
6. Branch offices can have information immediately using a facsimile

B. Electronic blackboard
1. Is a special board where images can be transmitted to a screen or terminal in another location
2. Many have electronic devices which scan the information and print hard copies of the information printed on the board
APPLICATIONS
UNIT V

HANDBOOK #1 — HOW TO SET UP A CONFERENCE CALL

1. Make sure you use an outside line* and:
   - Have a list of conferee telephone numbers
   - Use a touch-tone telephone with a * and a #

2. Call ALLIANCE Service(s)**
   (Audio) 0+700+456-1000
   (Graphics) 0+700+456-2000

3. Enter number of locations—including yourself □ □

4. Dial a telephone number
   Domestic:
   1 + □ □ □ + □ □ □ - □ □ □ □
   International:
   0 1 1 + \[\text{Country Code + City Code + Local number}\]

   When party answers—
   Dial # to continue or * to cancel

5. Dial and add other locations

6. To join conference—dial *

7. To end conference, all hang up

   Courtesy of AT&T
APPLICATIONS
UNIT V

HANDOUT #2 — HOW TO SET UP REMOTE COMMUNICATIONS AND SEND A FILE TO A REMOTE COMPUTER

Read the manual of your communications software about the sending and receiving of files.

1. Make sure you have both computers and modems turned on.

2. For best results on a microcomputer for remote transmission, use the following settings for your communications software. Consult the manual of your communications software for instructions on how to set your software to these settings.

   - 8 data bits
   - No parity
   - 1 stop bit
   - Half duplex

3. Boot your communications software.

4. Make sure one of the remote computers is in terminal mode, ready to answer the phone.

5. Dial the remote number. The remote computer should answer the phone and establish carrier signal.

6. You should be able to type information to and from the remote computer.

   (NOTE: The half duplex setting allows you to see and receive information that you are typing.)
Consult the manual of your communications software for instructions on how to download (receive) a file from a host computer.

In this procedure you will be downloading a software program from a host computer, unpacking the file, and then running the program.

Most files on a bulletin board system are "packed" or "archived" in order to save disk space. These files must be "unpacked" after you download the file. If you are not adept at unpacking files, it is suggested that you contact the systems operator of the bulletin board service or a member of a local computer user group to obtain information on how to unpack files after you have downloaded the file. Some common file extensions that show packed files are:

IBM/IBM Compatibles
Filename.ARC

APPLE
Filename.BNY
XX.filename
Filename.pp

1. Log on to a bulletin board system and read the help file on how to download a file from that system. You may wish to turn on the test buffer and capture this information for viewing off-line.

(Note: You should be sure you have set your communication software to receive files in XMODEM (or other appropriate protocol). Consult your manual for instructions on how to set your download protocol.)

2. From the main menu, locate the command to view the files that the system has in the file directories.

3. While scanning through the file directories, locate the name of a file you wish to download.

4. Use the system's appropriate command to download the file of your choice. Make sure you have a data disk so that the file can be saved to disk.

5. Unpack the file.

6. Run your program.
APPLICATIONS
UNIT V

ASSIGNMENT SHEET #1 — DEVELOP A MESSAGE FOR VOICE MAIL

NAME ____________________________  SCORE ____________________________

Directions: Read the following case study.

Call Ms. Sue Jones and schedule an appointment for Thursday with her to discuss the Brown case. The meeting needs to be at 10 a.m. in your office. When you reach the company where Ms. Jones is employed, the operator puts your call through to her office. She is not available and her voice message asks you to leave a message.

In the space below, write the message you would leave on Ms. Jones’ voice mail system.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

107
APPLICATIONS
UNIT V

ASSIGNMENT SHEET #2 — DEVELOP AN ELECTRONIC MAIL MESSAGE

NAME ___________________ SCORE ___________________

Directions. Develop an electronic mail message which could be sent to branch offices in Dallas, New York, St. Louis, and Omaha requesting the following information:

1. Sales data is needed by the end of month
2. Reports should be developed listing names and total sales
3. Figures should include sales as well as returns
4. Questions should be sent to your attention
# APPLICATIONS
## UNIT V

### ASSIGNMENT SHEET #3 — SET UP A CONFERENCE CALL

<table>
<thead>
<tr>
<th>NAME</th>
<th>SCORE</th>
</tr>
</thead>
</table>

**Directions:** Review Handout #1 in this unit. Then, list the steps necessary to set up a conference call to the following telephone numbers:

- (213) 555-1212
- (817) 555-1212
- (303) 555-1212
- (405) 555-1212

*(NOTE: Be very specific and show the appropriate symbols.)*

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*(Note: Additional space for steps necessary to set up a conference call.)*
APPLICATIONS
UNIT V

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1 — Evaluated to the satisfaction of the instructor

Assignment Sheet #2 — Evaluated to the satisfaction of the instructor

Assignment Sheet #3

1. Dial 0+700+456-1000
2. Enter 05
3. Dial 1-213-555-1212 #
4. Dial 1-817-555-1212 #
5. Dial 1-303-555-1212 #
6. Dial 1-405-555-1212 #
7. Then #
8. To end conference, all hang up.
1. Match the data communications on the right with their correct descriptions.

| a. | 1) Transmits and stores messages electronically | 1. Electronic mail |
|    | 2) Speed is a very important asset | 2. Bulletin board service |
|    | 3) Can solve zone differences between the sender and receiver | 3. Real time processing |
|    | 4) Teleconferencing | 4. Teleconferencing |

| b. | 1) Is a computer information service which is accessible over various transmission systems | 5. Bibliographic services |
|    | 2) Serves microcomputer users | 6. Full text |
|    | 3) Allows users to post messages and ask for technical help and information | 7. File transfer |
|    | 4) Must dial bulletin board service number, make connection, and then the bulletin board information is available | |

| c. | 1) Allows various users to access material | |
|    | 2) May require an access code or password for security | |
|    | 3) Provides branch offices and main office with immediate information | |

| d. | 1) Presents exactly what was published | |
|    | 2) Is not just summaries and abstracts | |
|    | 3) Provides instant delivery | |
|    | 4) Is a newsletter in electronic form | |

| e. | 1) Processes transactions as they occur | |
|    | 2) Requires information to be readily available | |
TEST

1) Allows group of people to meet without coming to the same location

2) Teleconferencing has three levels

3) Eliminates travel costs

4) Various services are available

2. Select true statements concerning video communications by placing an “X” in the blanks preceding the true statements.

   a. Allows the participants to see and hear what is happening

   b. Requires special equipment which is inexpensive

   c. Satellite technology helps companies with offices around the world communicate through teleconferencing

3. Distinguish between audio communications by placing a “C” for conference call next to the correct characteristics.

   a. Participants must be notified in advance

   b. Exact time for the call and all numbers must be given to the operator

   c. Sends message in analog form, converts it to digital form, and stores it in the computer’s memory

   d. Allows user to talk to several people simultaneously at different locations

   e. Call can be scheduled in advance with a conference operator, or can be dialed directly with an alliance bridge (700 number)

   f. Allows caller to leave a message for a person who is unable to answer a telephone call

   g. Allows the computer to generate human-like speech through speech synthesis
TEST

4. Select true statements concerning graphic communications by placing an "X" in the blanks preceding the true statements.

a. Facsimile

_____1. Is a popular, but expensive form of electronic mail
_____2. Can transmit text only
_____3. Machines on the sending and receiving ends must be compatible
_____4. Machine scans the page and encodes the information and sends it over the telephone lines
_____5. Takes very little time
_____6. Branch offices can have information immediately using a facsimile

b. Electronic blackboard

_____1. Is a special board where images can be transmitted to a screen or terminal in another location
_____2. All have electronic devices which scan the information and print hard copies of the information printed on the board

(NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

5. Develop a message for voice mail. (Assignment Sheet #1)

6. Develop an electronic mail message. (Assignment Sheet #2)

7. Set up a conference call. (Assignment Sheet #3)
APPLICATIONS
UNIT V

ANSWERS TO TEST

1.  
   a. 1    e. 3
   b. 2    f. 4
   c. 7    g. 5
   d. 6

2.  a, c

3.  a, b, d, e

4.  
   a. 3, 4, 5, 6
   b. 1

5.-7. Evaluated to the satisfaction of the instructor