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ABSTRACT

This guide is intended for use in teaching a course in electronic communications systems. Class activities during the course examine the processes of creating electronic signals and transmitting various coded messages to other locations. Methods of changing the form of electric current are emphasized, and the latest techniques in data processing are covered. The first two sections discuss the guide's development within the framework of North Carolina's efforts to improve technological literacy and the guide's place as part of an instructional system. A list of the course's major objectives and a course outline are provided next. The remainder of the guide consists of learning modules on the following topics: electronic communications systems, fundamentals of electronic media, message design in electronic communications, preparation for and actual production of electronic messages, transmission of telecommunications media, and information processing and computers. Each module includes information about the length of time needed to complete the module, an introduction to the instructional content to be covered in class, performance objectives, a day-by-day outline of student learning activities, and lists of suggested textbooks and references. (MN)

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ACKNOWLEDGEMENTS

The North Carolina Technology Education Curriculum is the product of a curriculum redirection process begun in the early seventies. As in any change process, many individuals have contributed their time and energies to provide North Carolina students with a curriculum designed to meet their needs to be technologically literate adult citizens. The following are recognized for their vision and leadership in setting the direction for Technology Education in North Carolina schools.

Members of the N.C. Curriculum Study Taskforce who charted the course for technology education in North Carolina schools. Their study report and recommendations provided the direction for a change in the identity of the discipline and a total redirection of the curriculum.

Members of the N.C. Curriculum Committee who validated the Technology Education Curriculum Guide as appropriate study for assisting students in understanding technological systems impacting on their lives. Further, industry representatives of the committee verified the appropriateness of suggested activities reflective of practices in construction, communications, manufacturing, and transportation.

N.C. Technology Education Association who provided a forum for redirection of the discipline. It was the association that led the profession in changing identity to technology education. The association also provided opportunities for professionals to develop competence in the classroom delivery of technology education through the sponsorship of in-service programs.

Individual technology education professionals who gave leadership to other professionals in the curriculum change process. These professional leaders piloted many technology education activities in their classrooms and served as role models for other professionals.

Members of the N.C. Council of Technology Teacher Educators who provided insite and support throughout the curriculum redirection process.

Indiana curriculum developers who provided curriculum materials adopted and adapted for North Carolina Technology Education programs.

INTRODUCTION

The North Carolina Technology Education Curriculum is a program to meet every citizen's need to be technologically literate. Some basic assumptions underlie the program, and these can be divided into content assumptions, and learner assumptions.

The curriculum was developed using the belief that the appropriate content for the field is technology, and its impact on individuals and society. It was further assumed that the content is best organized around human productive systems that have been used, are now being used, and will, most likely, continue to be used. These universal systems are communication, construction, manufacturing, and transportation. Finally, it was assumed that this content can best be addressed from a systems approach with its inputs, processes, outputs, feedback, and goals/restraints.

The curriculum was further based on the assumption that education should meet the needs of individuals and the human requirements of society. It was assumed that each person living in a technological society should have a basic understanding of and the ability to assimilate the knowledge about technology. People it was assumed, should be able to interact with the technological nature of society and help impact the type of future new technologies can provide. Additionally people should be able to be contributors to a society in their several roles, including citizen, voter. investor, consumer, worker, and leader.

These assumptions caused the curriculum to be developed in such a way as to:

1. Provide an overview of technology first, allow for more indepth study in specific technological areas, and culminate with synthesis activities.

2. Be more teacher-directed, content-centered in early courses, and highly, student-directed, process centered in advanced courses.

3. Involve problem-solving and group activities of all courses.

4. Stress the how and why of technology and its relationship to our quality of life.

5. Be activity-centered learning, with the content being used to determine the appropriateness of each activity selected.

6. Be equally important to young women and young men, both of which must function in a technological society.

Finally, the curriculum was developed to be descriptive rather than prescriptive. The materials describe what to teach and suggest ways of teaching the content. At no time are daily activities prescribed in such a way to preclude individualizing the presentations to meet local conditions.

THE CURRICULUM GUIDE IN AN INSTRUCTIONAL SYSTEM

Each course in the North Carolina Technology Education Curriculum is seen as a dynamic activity involving a complete instruction system. This system generally includes seven components: the teacher, the students, a textbook when available, the curriculum guide, laboratory sheets, apparatus, and a reference library.

THE TEACHER

The teacher plays the primary role in the system. This role entails being a curriculum developer. The teacher chooses the points to emphasize and to evaluate. Care should be taken to insure that the coverage of the subject is comprehensive. You should resist "picking and choosing" only modules and activities that are the most interesting, most familiar, or the easiest to implement. All modules and activities should be included. However, you are encouraged to redesign or replace activities with your own activities that contain equivalent content.

As a technical expert, the teacher gives presentations, demonstrations, and asks questions about the subject matter. Safety information, and the demonstration of teaching/learining activities, are the responsibility of the teacher.

The teacher is an instruction manager. Managers plan, schedule, direct, and control activities. The teacher, perhaps in cooperation with students, plan the instruction by identifying the instructional goals. The activities to reach these goals are scheduled. Through presentations and application activities students are directed through the construction activities. Finally, the student's work and the teacher's management is controlled through various forms of evaluation. Since evaluation instruments should be designed to measure success in reaching the goals, these instruments should be prepared by the teacher.

The teacher is the creator of the teaching/learning environment. It is highly recommended that you create a "role playing" environment. In addition to having students do tasks that simulate construction, have them play the role of workers, managers, and owners. For example, refer to a group of students as a "work crew" or "survey party" with job titles, rather than as students who carry out assigned tasks. Help them visualize themselves in their roles. The teacher can become a job superintendent, owner, or government officer, who approves the "work crew's" job.

THE STUDENT

The target population is made up of middle-junior high or high school students. The students will often work in groups of from three to five. Their responsibilities include reading the textbook assignments, doing the worksheets as homework, and completing the activities.

THE TEXBOOK

A textbook should be selected for the course and each student should have one. A textbook contains the body of knowledge about industrial technology. It should be selected to meet the appropriate reading level, and be written in an interesting way with numerous illustrations.

THE CURRICULUM GUIDE

The curriculum guide is to be used to help plan your instruction. The introduction consists of a structure for the content and a description of an instructional system with suggestions on how to use it.

The remainder of the curriculum guide briefly describes the modules. Each module consists of an introduction, objective(s), and a description of the activities. The description of the activities includes a schedule, presentation titles, application activities, and presentation titles, references, and safety guidelines. Suggestions for getting prepared and carrying out the activity are found in the teacher activity sections.

Suggestions for a variety of optional activities may also be found throughout the curriculum guide.

THE APPARATUS

Often the course guide contains plans for specialized apparatus useful in teaching the course. Drawings will be placed with the activity in which they are used. You can use the drawings to construct the apparatus.

THE REFERENCE LIBRARY

Some courses require student reference books. The titles of these are included in the reference library and copies should be purchased for laboratory use.

DAILY LESSON PLANS AND EVALUATION

The planning of daily activities and an on going evaluation system are the teacher's responsibility and rightfully so. Each student should adapt activities and presentations to insure they help students develop the identified concepts within local conditions. The curriculum guide was designed to help you, the local professional, present a relevant, exciting course. Good luck!

ELECTRONIC COMMUNICATION SYSTEMS

Of all the wonders of our modern civilization, perhaps the most significant is the latest advances in electronic communication technology. Common examples surround us—digital telephones, stereo laser-disc players, electronic banking, computer networks, satellite and cable television, electronic photocopy services, laser-prints, and numerous other technologies. These devices and systems were not a part of our grandparent's generation, but now seem vital to our everyday affairs.

Electronic communication technology includes all those technical systems which use electricity (in many forms) to exchange messages with others. Electric current can easily be altered to create different kinds of signals. Typically, electronic signals are in the form of radio waves, acoustical signals, beams of visible light, or pulses of electrical current. Electronic devices then amplify, code and decode, and transmit these signals over varying distances. We refer to the exchange of messages between remote locations as telecommunications.

In this country, the mass media is a familiar type of electronic communication system. Popular television and radio broadcasts are sent to our homes as electronic signals for our enjoyment. News and educational programming keep us constantly updated concerning important local and global events. These communication channels connect us with nearly every spot on the face of the earth.

An understanding of electronic systems is essential to preparing the citizen of tomorrow. So much of their daily lives will be influenced by this technology; it will alter how they work and play. Therefore, this course is important in preparing students for life in the electronics age. Class activities in this course examine the processes of creating electronic signals and transmitting various coded messages to other locations. Methods of changing the form of electric current are emphasized. In addition, the latest techniques in data processing are covered.

COURSE OUTLINE

Module Number	Title and Content	Time (Days)
1	Electronic communication systems A. Modern electronic media B. Classifications of electronic systems C. Means of exchanging signals/messages D. Wired vs. non-wired systems E. Accoustical/audible systems F. Light based systems	7
2	Fundamentals of electronic media A. Electron theory B. Electromagnetic spectrum C. Waves, frequencies, wave lengths, and wave motion D. Frequency allocation E. Generating electronic signals F. Amplification of electronic signals G. Operation of transmitters and receivers Manipulation of electronic signals	23
3	Message design in electronic communication A. Creation of electronic messages B. Assessment of mass media audiences C. Preparing broadcasting scripts (copy)	8
4	Preparing to produce electronic messages A. Preproduction activities B. Scheduling production activities C. Casting, staging, props, etc.	5
5	Production of electronic messages A. Designing production studio B. Testing recording equipment C. Recording audio messages (radio) D. Recording audio video messages (television)	7
6	Transmission of telecommunications media A. Means of transmitting messages B. Evaluating electronic messages	4
7	Information processing/computers A. Information processing equipment B. Processing, storing, and retrieving data C. Computer languages D. Data and word processing applications E. Graphics and spreadsheet applications	26

INTRODUCTION TO ELECTRONIC COMMUNICATIONS

I. Introduction to Electronic Communication Systems
   - A. Define electronic communication
     1. Electronic technology
     2. Communication systems
     3. Modern electronic media
   - B. Communication process
     1. Sender
     2. Channel
     3. Receiver
     4. Feedback
     5. Storage/retrieval
     6. Interference
   - C. Classifications
     1. Telecommunications
        a. Radio
        b. Microwave
        c. Satellite relay
        d. Other
     2. Hard-wired
        a. Telegraph
        b. Telephone
        c. Cable
        d. VCR's
        e. P.A. system
        f. Other
     3. Light
        a. Laser
        b. Fiber optics
        c. Visible signals
     4. Acoustic
        a. Audible sounds
        b. Radar
        c. Sonar
        d. Stereo/phonographs
        e. Other
     5. Information processing
        a. Computers
        b. Facsimile
        c. Teletext/videotext

II. Electron Theory and the Electromagnetic Spectrum
   - A. Electrical energies
     1. Wavelengths
     2. Frequency

B. Electromagnetic spectrum
   1. Audible sound
   2. Radio Waves
      a. AM/FM
      b. Side band
      c. FSK
      d. Pulse
      e. Other
   3. Visible light
C. Electronic communication signals
   1. Generating sources
   2. Amplification
   3. Oscillators
   4. Switching
   5. Power supplies

III. Creation and Generation of Electronic Messages
A. Designing the message
   1. Text
   2. Script
   3. Music
   4. Programming
B. Preparing for production
   1. Practice
   2. Rehearse
   3. Debug
C. Production of electronic messages
   1. Recording
      a. Audio
      b. Video
   2. Broadcasting
      a. TV
      b. Radio (AM/FM)
      c. Other radio
   3. Other
      a. Ultrasonic
      b. Light waves
      c. Microwave
      d. Computer

IV. Transmission of Electronic Messages
A. Program distribution
   1. Channels
      a. Radio waves
      b. Audible sounds
      c. Other

2. Feedback
3. Interference

B. Program reception
1. Recording
2. Storage/retrieval

V. Data Processing/Computers
A. Introduction to computers and data processing
B. Hardware
1. Input devices
a. Keyboards
b. Modems
c. Light pen
d. Mouse/graphics pad
2. Processor (CPU)
a. ROM
b. RAM
3. Output
a. Screen
b. Printer
c. Computer card
4. Storage units
a. Disks
b. Tape
c. Bubble memory

C. Software
1. Programming
2. Application
3. Utilities
4. Auxiliary functions

D. Applications
1. Word processing
2. Spreadsheet
3. Calculating/accounting
4. Games
5. Simulation

MODULE: 1 : Electronic Communication Systems

LENGTH: 7 DAYS Communication CLUSTER

Electronic devices are an integral part of the complicated electronic systems involved in contemporary lives. They are a part of our television sets, radios, stereo sets, communication satellites, nuclear power plants, and even our modern day automobiles. Understanding these devices, knowing how they are used, and knowing what they do becomes important to everyone's understanding of technology.

Electronic communication comes in all sizes and shapes and the characteristics of each system are developed to meet a specific human or sociological need. We will define electronic communications as "communication by wire and wireless methods, in a one or two way system." Wired systems have a physical connection occurring between the transmitting element and the receiving element. As examples of these, we find audio systems, fiberoptic systems, and some telephone systems. Hardware systems have as their advantage an immunity to noise and a greater security than non-wired systems, but usually have a prohibitive cost and maintenance.

Non-wired systems are connected not by physical objects, such as wire or cable, but by invisible electromagnetic radiation. Examples of non-wired systems are television, radio, satellite relays, and radar systems.

Hybrids also occur between wired and non-wired systems as in the case of the phone system. A phone call may leave your house and go to the central switching station by wire, but then be transferred to a satellite link or a microwave tower for long distance travel. At the end of the call, the non-wired transmission is transferred back to wired transmission for reception in the caller's home.

The next general breakdown of electronic communication systems is by the frequency of transmission. Frequency is a topic that will be discussed in the following unit, but for now it can be considered as the vehicle for transmission. Signals can be transferred by sound energy, radio waves, microwaves, or light energy. Each of these systems has its inherent limitations and attributes and the study of these systems will take place throughout the course.

The main goal of this module is the introduction of classification systems to the students and the demonstration of units within each system.

OBJECTIVES

At the end of this learning module, students should be able to:

1. Describe the nature of messages and information signals.
2. Describe and define sending messages in the communications processes.
3. Discuss the common techniques in transmission of messages.
4. Define and describe electronic communication systems.
5. Define and describe the two classifications of electronic communications systems.
6. Produce a simple system and send a message.
7. Discuss the impacts of the different classifications of electronic communication systems on individuals, communities, and the environment.

CALENDAR

DAY	ACTIVITY
1	Complete administrative tasks and introduce the course goals and objectives.
2	Present a lecture/discussion of "What is the electronic communication process." Show a video or film emphasizing our modern electronic media.
3	Discuss the classification of electronic communication systems. Students brainstorm and classify communication devices. Assign show and tell activity for day 4.
4	Discuss the different ways signals or messages can be exchanged. Students will show their communication device and define it in terms of mode and frequency.
5–6	Students produce a simple nonelectric system for coding and sending a message to illustrate the communication process.
7	Students list businesses, industries, and major government installations that use communications as a major activity.

PRESENTING THE MODULE

DAY	ACTIVITY
1	Follow standard procedures for admitting new students to your class. Provide an overview of subject material studied and activities experienced by following the course content outline.
2	Present a lecture/discussion of "What is the electronic communication process?" This presentation should set the stage for the entire electronic communications course. Emphasis on the historical aspect may be important, with several examples of modern day classifications, e.g. laser, radar, audio. Demonstrate a simple electronic method man uses to communicate (walkie-talkie, phone). Students participate in the discussion of the communications process. Read textbook assignment. Observe and participate in the demonstration "sending the message." (Text Duvall, Technology of Communications, pp. 1-16.) Show video or film—Our Modern Electronic Media.
3	Discuss with the class the necessity of a categorization model for all the electronic communication devices available. Present the categorization model and describe how different telecommunications systems fit into each branch. Students brainstorm all telecommunication devices and by using gained knowledge and the textbooks classify each system. For homework bring in a telecommunication device (phone, radio, walkie-talkie) for a class presentation and discussion (See Appendix).
4	Present a lecture/discussion of the different ways signals or messages can be exchanged. Students present to the class the device and describe its categorization of operation. Define the intended receiver and transmitter. Listen to the students' presentations and elaborate and clarify any misconceptions or misunderstandings. Hybrid systems that defy or switch categorization will be the most difficult (See Appendix).
5-6	Divide the class with 2-3 students to a group. Provide each group with a list of objectives. Have each group demonstrate communicating a message using a simple nonelectric method for communication.

DAY	ACTIVITY
7	In groups of 3 and 4 participants, list all the businesses, industries, and government installations in your phone where communications is the major activity. Report the findings in class.

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The recommended textbooks are listed below along with chapters and pages which apply to this module:

DuVall, J. B., G. R. Maughan, & E. G. Berger, Getting the Message: The Technology of Communication, Davis Publications, Worcester, MA, 1981.

Seymour, R. D., J. R. Ritz, & F. A. Cloghessy, Exploring Communications, Goodheart-Willcox, Inc., South Holland, IL, 1987, (Section

The more recent college textbocks, reference books, and related materials which cover this area, include:

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Gamble, M. W., & T. K. Gamble, Introducing Mass Communication, McGraw-Hill Book Co., New York, 1986.

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Gross, L. S., Telecommunications: An Introduction to Radio, Television, and the Developing Media, William C. Brown Publishers, Dubuque, IA, 1983.

Long, M., & J. Keating, The World of Satellite Television, The Book Publishing Co., Summerton, TN, 1983.

McGinty, G. D., Videocassette Recorders, McGraw-Hill Book Co., New York, 1979

Pincus, E., Guide to Filmmaking, New American Library, New York, 1972.

Rogers, E. M., Communication Technology: The New Media in Society, The Free Press (MacMillan, Inc.), 1986.

Schrank, J., Understanding Mass Media, National Textbook Co., Lincoln, IL, 1981.

Waite, M., & J. Arca, Word Processing Primer, McGraw-Hill, Peterborough, NH, 1983.

Waite, M., & M. Pardee, Basic Primer, Howard W. Sams, Indianapolis, IN, 1978.

Books available at many commercial bookstores include:

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Rapaport, S. D., How to Make and Sell Your Own Records, The Headlands Press, Tiburon, CA, 1984.

Weinstein, B., Breaking Into Communications, Arco Publishing, New York, 1984.

Williams, F., The Communications Revolution (Rev. Ed.), New American Library (Mentor Books), New York, 1983.

Wright, R. T., Manufacturing (2nd Ed.), Goodheart-Willcox, Inc., South Holland, IL, 1986.

Among the better textbooks and reference materials for this module are:

Cannon, D. L., & G. Luecke, Understanding Communications Systems, Radio Shack (Texas Instruments Learning Center), Ft. Worth, TX, 1980.

Forester, T. (Ed.), The Information Technology Revolution, The MIT Press, Cambridge, MA, 1985.

Forester, T. (Ed.), The Microelectronics Revolution, The MIT Press, Cambridge, MA, 1981.

Marsh, K., The Way the New Technology Works, Fireside Books (Simon & Schuster), New York, 1982.

Stevenson, J., Telecommunications, Silver Burdett Co., Morristown, NJ, 1985.

APPENDIX

INSTRUCTIONAL MATERIALS

1. Teacher produced transparencies, overheads.
2. Samples of communication systems in operation:
   A. Walkie Talkie
   B. AM/FM Radio
   C. Television
   D. Telegraph
   E. Telephone
   F. Microwave antenna
   G. Intercom
   H. Wireless phone
   I. S.S.B. transceiver
   J. C.B. transceiver
   K. Laser/flashlight.

3. Teacher designed sheets which will cause students to:
   A. Realize the impact and scope of electronics on communication.
   B. Note the electronic communication systems in the home environment.
   C. Understand the magnitude of commercial communication systems.
   D. Record, identify telecommunications systems.
   E. Record safety considerations.
   F. Classify communication systems.
   G. Differentiate communications systems.
   H. Observe and note the actions of communications systems.

SHOW AND TELL COMMUNICATION DEVICE

1. Take your communication device to the front of the class.
   a. Phone
   b. Radio receiver
   c. Walkie talkie, etc.

2. Tell students what the device is used for.

3. Describe its mode of connection.
   a. Hard-wired—signal is transmitted to the receiver through a wire.
   b. Non-wired—signal is transmitted to the receiver by electronics. radiation.

4. Describe the frequency of transmission used between the transmitter and receiver.
   a. Acoustic—using sound waves.
   b. Radio waves—using electromagnetic waves off an antenna.
   c. Microwave—special high frequency radio waves used by the telephone company.
   d. Light waves—light energy used in fiber optics calling.

CLASSIFYING COMMUNICATION DEVICES

Brainstorm every type of communication device you can think of. Record the name of each device on your answer sheet. Classify each device as a transmitter or receiver. Identify the mode of connection and the frequency of transmission.

	Communication Device	RX	TX	Mode of Connection	Frequency of Transmission
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

MODULE: 2 : FUNDAMENTALS OF ELECTRONIC MEDIA

LENGTH: 23 DAYS Communication CLUSTER

Contemporary electronic communication systems are based on foundational knowledge of electron theory. Electron theory, starting from its source element, the atom, and culminating in its applicative design of electronic subsystems will provide the student with the knowledge necessary to work with later modules of this series.

Essentially in this module, the teacher/learner will look into:

1. The structure of the atom and electron theory.

2. The characteristics of insulators, conductors, and semiconductors.

3. Measurement scales for electricity.

4. The electromagnetic spectrum.

5. The four basic components of electronic communication systems.
   a. The power supply
   b. The amplifier
   c. Oscillators
   d. Signal switching devices.

The atom and basic electron theory is the fundamental element upon which telecommunication systems operate. A basic understanding of this will aid the student in his/her comprehension. The atom and its parts, magnetism, and the rules underlying electron flow will be delved into.

Following this exploration into basic electron theory, as applied to direct current, the module will introduce the students to alternating current. Stress will be applied to application of alternating current to common communication devices.

Following this experience, the students will explore the application of electron theory by observation and experimentation with insulators and conductors. Semiconductors, the essential component of telecommunication systems, will be introduced.

The next few lessons will deal with the measurement of electricity by meters and oscilloscope and the interrelationship of measurement scales by ohms law. Next, a brief description and demonstration of the differences between direct current and alternating current will take place.

Piggybacking on the fundamentals of D.C. and A.C. theory are the applications of these principles to simple electronic subsystems. These subsystems provide the necessary building blocks for fully developed electronic communication systems.

Specifically, this module will look into four basic components of electronic communications systems; the power supply, the amplifier oscillators, signal switching, and manipulation devices.

Power supplies are essential in that they supply all other circuits and systems with the required voltage and current. All too often, power supplies are subordinated in their importance, but this is a poor view, for the quality of any signal manipulation system is fundamentally dependent on the regulation and accuracy of the power supply.

Amplification systems are an essential part of all communication systems due to the inherent losses and noise of transmission over distances. Amplification networks can be as simple as an audio amplifier in one's stereo set or as complex as a microwave amplifier on a television dish antenna.

Oscillators, too, are important because they permit the uplinking and downlinking of audio signals with higher frequencies so that the signals will be more efficient. Oscillation also provides the heartbeat for computers and timing circuits such as digital wristwatches.

Signal switching and manipulation devices are all those "other" subsystems of electronic communication technology that provide us with the needed signals. These include mixers, transmitters, multiplexers, and a host of others.

Tempering the lessons in this unit should be a black box approach to the components used. For example, we will look at what an amplifier does to process signals and where it is used, but the black box should not be opened to reveal the mass of transistors, diodes, resistors, capacitors, and wires.

OBJECTIVES

Upon completing this learning module, each student should be able to:

1. Describe the structure of the atom.
2. Define electricity, including common units of measure.
3. Demonstrate the measurement of voltage, resistance, and current.
4. Explain the difference between direct and alternating current.
5. Describe the frequency allocations for the electromagnetic spectrum.
6. Describe and measure frequency.
7. Discuss the need and uses for a power supply.
8. Explain the purpose for amplifiers in telecommunication systems.
9. Explain the purpose for the oscillator in telecommunication.
10. Explain the purpose for the detector used in communication equipment.
11. Describe the various gates used to control digital signals.

CALENDAR

DAY	ACTIVITY
1	Discuss the importance of electricity in contemporary life.
2	Students brainstorm and record devices that use and do not use electricity for communications.
3	Discuss electron structure and the conditions necessary in the outer shell for a balanced atom.
4	Demonstrate electromotive force and its ability to become transferred from one place to another.
5	Define electricity.
6	Students measure DC voltage.
7	Discuss the properties of insulators, conductors, and semiconductors.
8	Students measure resistance.
9	Discuss the different uses of direct current.
10	Students measure DC current.
11	Discuss frequency, wave motion, wavelength, and allocating the frequency spectrum.
	Demonstrate AC voltage measurement.
	Students view an AC signal on the oscilloscope and identify its parts.
12	Students measure AC frequency using the oscilloscope.
13-14	Discuss basic elements used in electronic communications.
15-22	Construct an electronic device that will transmit or receive a message.

PRESENTING THE MODULE

DAY	ACTIVITY
1	Explain the importance of electricity in contemporary life and envision a day without electricity. Demonstrate some simple and complex uses of electricity (Jacob's ladder, shortwave set, microcomputer) and explain that all these devices use electricity (plugged into wall sockets).
2	Students brainstorm a list of devices that use electricity and ones that do not. Data will be recorded in a handout (see Appendix). (Emphasize devices that use electronics to communicate information.)
3	Discuss, develop, and show the structure of the atom. Develop a rationale for the individual components (proton, neutron, and electron) and show their interrelationship with a model. Discuss the balance of the atom by showing the excess or depletion of electrons in the outer shell. Students construct a model of the atom and identify its parts. Materials include string, glue, and pieces of colored paper (see Appendix).
4	Participate in lab activity demonstrating electromotive force. In groups, look up the following simple series circuits to show the stored energy or potential force that is available with electricity. 1.5 volt battery to a lamp to a buzzer to a solenoid to a motor. Observe what happens to each. What was the outcome? Describe how energy is transferred from one form to another.
5	Define electricity in terms of negative, positive, voltage, conductor, load, circuit, current. Use the wet cell in the discussion.
6	Students measure DC voltage using a meter (see Appendix).

DAY	ACTIVITY
7	Discuss the differences between insulators and conductors. Introduce the concept of semiconductors—a device that can either conduct electricity or not conduct electricity.
8	Students measure resistance using an ohmmeter (see Appendix).
9	Discuss the different uses for direct current. Include the electromagnet, heating element, incandescent lamp, neon lamp, DC motor, code key, and transistor radio.
10	Students measure DC current using dry cells and different resistor values (see Appendix).
11	Discuss AC frequency, wave motion, wavelength, and allocating the spectrum.
	Demonstrate measuring AC line voltage.
	Students view AC voltage using the oscilloscope.
12	Students measure frequency using oscilloscope (see Appendix).
13-14	Discuss basic electronic communications elements—include amplifiers (RF, IF, power), oscillators, and the detector.
15-22	Students construct an electronic device capable of communicating a message (see Appendix).
23	Students listen to each station on the AM and FM dial, note the station's frequency and its program type.

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Forester, T. (Ed.), The Information Technology Revolution, The MIT Press, Cambridge, MA, 1985.

Forester, T. (Ed.), The Microelectronics Revolution, The MIT Press, Cambridge, MA, 1981.

Marsh, K., The Way the New Technology Works, Fireside Books (Simon & Schuster), New York, 1982.

Stevenson, J., Telecommunications, Silver Burdett Co., Morristown, NJ, 1985.

INSTRUCTIONAL MATERIALS

1. Instructor produced transparencies and overheads presenting the concepts of:
   A. Magnetism and electromagnetism
   B. Electromotive force, ohm law
   C. Electronic measurement
   D. Insulators and conductors
   E. Direct and alternating current
   F. Wavelength and frequency
   G. Constructed sample of crystal radio and AM radio
   H. Instructional material on oscilloscope and signal tracery

2. Teacher designed laboratory projects/experiments which will cause students to:
   A. Gain familiarity with properties of magnets.
   B. Record the potential effects of electromotive force.
   C. Observe the properties of conductors, insulators, and semiconductors.
   D. Note the different characteristics of alternating and direct current.

SPECIAL EQUIPMENT AND SUPPLIES

1. Parts for construction of a crystal radio.
2. Kit or parts for the construction of either an AM or FM radio.
3. Soldering irons, test leads, solder, etc.
4. Oscilloscope and test leads.
5. Signal generator and audio speaker.
6. Volt-ohm meters and test probes.
7. Magnets and iron filings.
8. Power supply—adjustable 0-50 VDC/AC.

Electric and Nonelectric Communication

Brainstorm every type of communication device that uses electricity and all methods of communication that do not use electricity. Record the names of each on your answer sheet and classify them according to their need for electricity.

Classifying Methods of Communication

	Communication Device	Requires Electricity	NO Electricity Required
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Model of the Atom

Atoms represent the smallest part of an element capable of existing alone. The center of the atom is called a nucleus. The nucleus contains two particles—one is called the proton and the other is called the neutron. A third particle, called the electron, is found spinning around the nucleus. Electrons are almost weightless and have a negative charge. The proton is very heavy and has a positive charge. The neutron is also very heavy and has no charge at all.

Procedure

1. Select one picture of an atom.
2. Cut string to equal the shells in your picture.
3. Place dots of glue on the picture where each shell is drawn.
4. Set each string in the glue and let it lay.
5. Press and roll small pieces of white paper into spheres.
6. Set a dot of glue where each proton will exist.
7. Place a white sphere on each spot of glue.
8. Neatly print the word proton next to each white sphere.
9. Press and roll small pieces of green paper into spheres.
10. Carefully glue each green sphere between the white spheres.
11. Neatly print the word neutron next to the green spheres.
12. Press and roll small pieces of blue paper into spheres.
13. Set a dot of glue where each electron will exist.
14. Place a blue sphere on each spot of glue.
15. Neatly print the word electron next to each blue sphere.

Questions

1. What is an atom?

2. The electron has what weight?

3. What is a shell?

4. Where are neutrons and protons located in the atom?

5. Electricity is the study of which atomic particle?

Demonstrate Potential Energy

Discharge a capacitor through an incandescent bulb.
1.
2.

Discharge a capacitor through a neon bulb.
1.
2.

Energize the sonalert and remove power.
1.
2.

Discharge a capacitor through a DC motor.
1.
2.

Discharge a capacitor to produce a loud report.
1.
2.

Crank the AC generator to demonstrate electrical shock.
1.
2.

Operate a Jacob's ladder.
1.
2.

Produce ozone.
1.
2.

Operate a spark gap generator near an AM receiver.
1.
2.

Video—need a 20-30 minute video.

APPENDIX

Measure DC Voltage

The abbreviation DC stands for direct current. The word direct is used to indicate that current flows in one direction only. It is an accepted fact that DC current flows from negative, through the load, to positive. DC voltage is needed to produce direct current flow.

Meter familiarization and care

1. Rubber feet—always keep the meter on its feet.
2. ON * OFF switch—move the switch to the left to ON.
3. Test leads—black plug goes to - and the red plug goes to +.
4. Function switch—set the right hand control to DCV.
5. Range switch—set the left hand control to 10.
6. Readout display—a 0.00 indicates a NO reading.
7. Never lift the meter off the table while using it.

Discussion

1. The difference between a battery and a drycell.
2. Safety when using electricity at work and in the home.
3. To prevent damage follow the teacher's instructions.
4. When in doubt, always ask questions first.

Record DC Voltage Measurements

	Voltage Source to Measure	Voltage Measured
1.	6 VDC lantern battery	_____ DC Volts
2.	1.5 VDC drycell	_____ DC Volts
3.	9 VDC battery	_____ DC Volts
4.	Voltage between fingers	_____ DC Volts

Questions

1. What does the word "direct" mean in the abbreviation DC?

2. Why is it important to rest the meter on its rubber feet?

3. What does the readout display when no voltage is measured?

4. Describe the difference between a drycell and a battery.

5. It is assumed that DC current always flows in what direction?

Measure Resistance

Resistance is used to control the amount of work done by an electric circuit. Examples of work done by electricity are the production of heat, light, sound, and motion. Resistance is located inside the load. The load can be a toaster, a bulb, a speaker, or a motor. "Ohms" is the unit of measure for resistance.

Meter familiarization and care

1. Rubber feet—always rest the meter on its feet.
2. ON * OFF switch—move the switch to the left to ON.
3. Test leads—black plug goes to - and the red plug goes to +.
4. Function switch—set the right hand control to high ohms.
5. Range switch—set the left hand switch to 100.
6. Readout display—flashing 19.99 indicates an infinity reading.

Procedure

1. To prevent damage follow the teacher's instructions.
2. When in doubt, always ask questions first.
3. Never lift meter off table when making measurements.

Record resistance measurements

	Resistor Color Code	Resistance Measured
1.	Brown-Black-Brown	_____ Ohms
2.	Grey-Red-Brown	_____ Ohms
3.	Brown-Black-Yellow	_____ Ohms
4.	Yellow-Violet-Orange	_____ Ohms
5.	Green-Blue-Black	_____ Ohms
6.	Red-Red-Orange	_____ Ohms
7.	Resistance between hands	_____ Ohms

Questions

1. What is the purpose of resistance in electricity?

_____

2. Where is most resistance found?

_____

3. Name three kinds of service provided by the load.

_____

4. What is meant by a flashing readout display?

_____

5. What is the unit of measure for resistance?

_____

APPENDIX

Measure DC Current

1. DC current—electrons moving in one direction only.
2. The unit of measure for current is the Ampere.
3. Resistors are used in this experiment to control how much current will move through the circuit.
4. DC current will be measured using three different sources.
   a. 1.5 volts DC
   b. 6 volts DC
   c. 9 volts DC
5. Students will use four different resistors to control or limit the flow of DC current.
6. Write your names, the date, and class hour in the upper right corner of your answer sheet.

	Source	Resistor A DC current		Resistor B DC current		Resistor C DC current		Resistor D DC current
1.	1.5 VDC Drycell	_____	*	_____	*	_____	*	_____
2.	6 VDC Battery	_____	*	_____	*	_____	*	_____
3.	9 VDC Battery	_____	*	_____	*	_____	*	_____

Questions

1. What is the unit of measure for DC current?

   _____

2. Why are resistors used in the circuit above?

   _____

3. How many directions does DC current flow?

   _____

4. Which voltage caused the greatest current flow?

   _____

5. Which resistor had the least amount of current flow?

   _____

Demonstrate AC voltage measurements

The abbreviation AC means alternating current. The word alternating refers to the voltage used to make current flow. Alternating voltage (AC voltage) has a polarity that is constantly reversing. It is important to remember that AC voltage causes alternating current to flow. Outlet voltage is usually referred to as 110 but this voltage is often a value different from 110 volts AC. Depending on the conditions and the area where it is produced, AC can be as low as 105 volts AC and as high as 130 volts AC.

Measure the following AC voltage values:
1. 8 VAC
2. 16 VAC
3. 24 VAC
4. Hi AC voltage output
5. Lo AC voltage output
6. 110 VAC.

The polarity of connecting the meter wires has no effect on the AC voltage value.

Observe and Identify AC Voltage

Equipment needed
1. Source of 110 VAC
2. Audio frequency generator
3. Coax cable
4. Oscope

Procedure
1. Tune audio generator to 60 HZ. (6 X 10)
2. Connect the coax cable to the sine wave output jack.
3. Adjust the sine wave gain control full clockwise.
4. Connect the coax cable clips to the oscope vertical input jacks.
5. Turn the oscope ON.
6. Adjust the oscope controls for one sine wave.
7. Explain the purpose of each control.

Information to discuss
1. What is one sinewave?
2. What are P-P and P values of AC?
3. What is meant by wavelength?
4. How does wavelength change with frequency?
5. What do 2- 3- and 4-sine waves look like?

APPENDIX

Accurate AC Frequency Measurements

Equipment needed

1. Oscope
2. Audio AC generator
3. Bell transformer + extension cord.
4. Procedure sheet for accurate AC frequency measurements.
5. Test leads.

Procedure

1. Turn the oscilloscope ON and allow it to warm up.
2. Connect test leads from the Horizontal Input to the Known Frequency (Bell Transformer, 8 VAC, 60 Hz).
3. Turn the Course Sweep Control to the Ext(External) position.
4. Adjust the Horizontal Width Control for 6 Centimeters.
5. Keep the Horizontal Width Control in this position at all times from this moment on!!!
6. Temporarily remove the Test Leads from the Horizontal Input Jacks.
7. Connect a second set of Test Leads from the Vertical Input to the Unknown Frequency (Audio Generator, X10, Dial 6, Gain Control at FCW Position).
8. Set the Course Vertical Control to 1.0.
9. Adjust the Vertical Vernier Control for 6 Centimeters.
10. Reconnect the first set of Test Leads to the Horizontal Input Control from the Bell Transformer.
11. Slowly adjust the Audio Frequency Dial (left or right; until the waveform stops moving on the oscope screen.
12. The Unknown Frequency = $\frac{\text{Loops on Horizontal X Known Frequency}}{\text{Loops on Vertical}}$

Example: Loops on the Horizontal = 3

Loops on the Vertical = 1

Unknown Frequency = $\frac{3 \times 60}{1}$

= 180 Hz

Accurate Frequency Measure

Unknown Frequency = $\frac{\text{Loops on Horizontal X Known Frequency}}{\text{Loops on Vertical}}$

	Frequency Dial Setting	H. Loops	V. Loops	Frequency Calculated
1.	____ X10 ____	_____	_____	_____
2.	____ X10 ____	_____	_____	_____
3.	____ X10 ____	_____	_____	_____
4.	____ X10 ____	_____	_____	_____
5.	____ X10 ____	_____	_____	_____
6.	____ X10 ____	_____	_____	_____
7.	____ X10 ____	_____	_____	_____
8.	____ X10 ____	_____	_____	_____
9.	____ X10 ____	_____	_____	_____
10.	____ X10 ____	_____	_____	_____
11.	____ X10 ____	_____	_____	_____
12.	____ X10 ____	_____	_____	_____

1. Place a bar magnet on a table. Suspend over the table a piece of glass, parallel and within one inch of the magnet. Pour iron filings over the glass and record the resultant pattern.

2. Place two magnets, like poles together (N N or S S) under the glass. Hold the magnets 1/2 inch apart. Record the resultant pattern of the iron filings.

3. Repeat step two with opposite magnet poles (i.e., N S).

4. Describe the effects of opposite magnetic poles coming in close proximity of one another.

5. Hold the opposite magnetic poles apart (about 1"). Bring a wire down against the magnetic field and with the magnetic field. Note the induced electricity in the voltmeter attached to the wire.

6. Construct the two pole universal motor (as shown below) and note the use of both electromagnets and induced current.

NOTES

Antenna—2 connected slinkies

Input coil—70 wraps of lacquer-coated wire around a toilet paper roll core.

Preparing the Circuit Board

1. Give each student a schematic of the Siren/Code Oscillator.
   a. Explain what the project will do.
   b. Explain basically how the circuit works.

2. Identify and inventory all circuit parts in the plastic bag.
   a. Use the parts list shown on the handout.

3. Clean the circuit board with soft steel wool.
   a. Nr. 00 or 000.

4. Spread a thin coat of rubber cement on the phenolic board (copper side).

5. Attach a full-size circuit pattern to the circuit board.

6. _____Have the teacher check and sign your work!!

Draw a Schematic on the Copper Board

1. Steel point the schematic at every important location.
   a. Steel point where holes will be drilled (white dots).
   b. Steel point where black circuit changes direction.
   c. Steel point where two black circuits intersect (only 1 point).

2. _____Have your teacher check and sign your work!!

3. Carefully remove and save the paper schematic. (Do NOT tear it!!)

4. Place the paper schematic (right side up) on the table next to the copper clad board (also right side up).

5. Visually identify points on the copper with those on the paper schematic.

6. Locate a ruler or some form of straight edge.

7. Draw a schematic on the copper using a sharp pencil.
   a. All pencil lines are drawn from point to point on the copper.

8. Circle, in pencil, every point to be drilled.

9. AGAIN, steel point every circled point to prevent drill walk-away.

10. Be sure to keep your paper schematic!! Do NOT throw away!!

11. _____Have the teacher check and sign your work.

Varnish Over the Pencil Circuit

1. Drill all holes using an NR. 76 bit.

2. Enlarge (4) holes in the circuit board for transistor Q2.
   a. Drill (2) transistor wire lead holes at E and B using a 1/16" bit.
   b. Drill the (2) bolt holes at C and C using a 3/16" bit.

3. Carefully varnish one short leg of the circuit board.
   a. Open a container of dark walnut varnish.
   b. Locate a wooden pen for drawing straight lines.
   c. Freehand draw varnish over the pencil lined circuit.

4. A GOOD JOB OF VARNISHING WILL PRODUCE (NARROW) LINES WITH A (DARK BROWN) COLOR!!!

5. _____Have your teacher check and sign your work.

6. Continue varnishing over the circuit you drew in pencil.

7. Reinforce all drilled holes with varnish.
   a. Carefully lay extra varnish around both bolt holes.
   b. Draw extra varnish around each wire hole.

8. _____Have your teacher check and sign your work.

9. Allow the varnish to dry until the following day.

NOTE: MISTAKES MUST BE CORRECTED AFTER THE VARNISH HAS DRIED!

Etching the Copper Board

1. Locate the dish used to etch circuit boards.

2. Lay the copper clad board in the dish with the copper side up.
   a. More circuit boards can be etched at one time so long as they are separated from each other in the dish.

3. Pour FERRIC CHLORIDE over the circuit board covering it by 1/8".

4. Allow the board to etch for approximately 30 minutes.
   a. Check at about 15 minutes.

5. Remove the phenolic board when etching is completed.
   a. The copper is dissolved next to the varnish.

6. Wash the board in fresh water until all ferric chloride is removed.

7. Dry the circuit board with paper towels.

8. Remove all varnish and polish the copper with steel wool.

9. _____Have your teacher check and sign your work.

Locate and Identify All Parts and Wires

1. Lay the circuit board on the table (copper side down).

2. Locate the Top View Enlarged picture.

3. Position your circuit board so that the drilled holes and picture look the same.

4. Write all identifications on the circuit board using pencil.
   a. Identifications help you locate all parts on the board.
   b. All polarities (+) and (-) are clearly shown.
   c. Location of wires for external connections are identified.

5. _____Have your teacher check and sign your work!!

Mount and Solder All Parts

1. Mount and solder the speaker wires, one at a time.
   a. Use one color for both wires.
   b. Remove 1/4" of plastic insulation from each end of both wires.

2. _____Have your teacher check and sign your work!!

3. Mount and solder B1 battery wires, one at a time.
   a. You must solder the black wire to (-) and the red wire to (+).
   b. Remove 1/4" of plastic insulation from each end of both wires.

4. _____Have your teacher check and sign your work!!

5. Mount and solder S3 switch wires, one at a time.
   a. Use one color for both wires.
   b. Remove 1/4" of plastic insulation from each end of both wires.

6. _____Have your teacher check and sign your work!!

7. Mount and solder the 100 UF capacitor C1.
   a. Be sure the capacitor (+) wire is soldered to the (+) terminal on the phenolic board.

8. Mount and solder S2 wires, one at a time.
   a. Use one color for both wires.
   b. Remove 1/4" of plastic insulation from each end of both wires.

9. _____Have your teacher check and sign your work!!

10. Mount and solder the 39 Ohm resistor R4.

11. Mount and solder the 100K Ohm resistor R3.

12. Mount and solder the 100 UF capacitor C2.

13. _____Have your teacher sign and check your work!!

14. Mount and solder S1 wires, one at a time.
    a. Use one color for both wires.
    b. Remove 1/4" of plastic insulation from each end of both wires.

15. Solder S1 (switch) to the opposite ends of S1 wires.
    a. Remove 1/4" of plastic insulation from each end of both wires.

16. Mount and solder the 22K Ohm resistor R1.

17. Mount and solder the 66K Ohm resistor R2.

18. Mount and solder the .01 UF capacitor C3

19. _____Have your teacher sign and check your work!!

20. Mount and solder the .05 UF capacitor C4.

21. Mount and solder the transistor socket.
    a. Be sure the socket wires pass through the phenolic board.

22. Identify the E B C for the transistor. (See your teacher.)

23. Carefully plug the transistor into its socket.
    a. C to C
    b. E to E
    c. B to B

24. Mount and bolt transistor Q2. WARNING—Tighten with screwdriver. HOLD BUT DO NOT TURN THE NUT.

25. Solder the two transistor wires C and C on Q2.

26. _____Have your circuit checked and signed by the teacher!!

Operating the Siren/Code Oscillator (SIREN)

1. Clip the circuit board speaker wires to a speaker.

2. Clip the battery wires to the battery clip observing polarity. (Red) to (Red) and (Black) to (Black).

3. Twist S2 wire ends together to select the siren.

4. Twist S3 wires to turn the unit ON.

5. Press and hold switch S1.

MODULE: 3 : Message Design in Electronic Communication

LENGTH: 8 DAYS Communication CLUSTER

The purpose of the next four modules is to introduce the student to the ideation, generation, production, and transmission of messages by electronic means. By electronic communication, we mean that the message, whether human voice, morse code or video signals, passes through an active electronic device during encoding, transmission, and decoding. Common everyday devices that are found under this category can be simple (pocket pager, telegraph, telephone) or very complex (V T recording, satellite communication).

Although for these next four modules provide examples of the curriculum via videotape recording, the equipment availability of the instructor will dictate which electronic communication or device will be used. The thrust is not on the particular electronic instrument, as that only provides concrete evidence of the concepts, but on the idea of message ideation, generation, encoding, transmission, and decoding by electronic means.

Module three deals specifically with the task of designing the message. By this we mean answer the questions: Why is the message produced? To whom will it be sent? What is its purpose? The module will deal with the process of taking an intangible idea and turning it into a tangible product; a script that will be used as a road map for future production.

OBJECTIVES

Upon completing this learning module, each student should be able to:

1. Define the goal of "message design."
2. Discuss the variables involved in message design.
3. Understand some processes of creative message ideation.
4. Produce a given message for a given purpose (entertain, inform, influence).
5. Discuss and deal with language barriers which might be involved.
6. Produce a finite script to be used for production from an idea.
7. Define and exemplify the importance of audience analysis.
8. List the variables involved in the analysis of an audience.

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CALENDAR

DAY	ACTIVITY
1	Discuss message design and analysis. Show overheads describing the technical parts of a production. Briefly discuss the three parts in a production.
2	Students evaluate prepared scripts or shows.
3	Discuss Osborn's concept of brainstorming. Reserve study rooms for script writing.
4	Discuss the importance of audience assessment. Students assess the audience.
5-7	Students rewrite their script based on information obtained from audience assessment.
8	Students write script into a final form.

DAY	ACTIVITY
1	Discuss message analysis and design. Show overheads emphasizing production concepts such as: locations, flashbacks, scenes, exteriors, interiors, sequences, and translating ideas for scenes into images. Briefly discuss the three basic production processes: (1) scripting, (2) shooting, and (3) editing.
2	Students evaluate six to eight two-page comedy plays or television show (See Appendix.)
3	Complete the script evaluations done by students. Cast students into a play limiting the number of plays to two per class hour. Reserve library study rooms or any room that allows privacy. Discuss Osborn's concept of brainstorming.
4	Discuss the importance of assessing the audience. Students assess the study hall students or whatever student groups available. Students tabulate assessment data.
5-7	Students rewrite their assigned script following information obtained from audience assessment. Students must change title name, character names, and rewrite total content into a new comedy idea.
8	Students prepare a final script ready for production.

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APPENDIX

INSTRUCTIONAL MATERIALS:

1. Teacher produced brainstorming sheets, audience analysis survey, and script sheets.

2. Reference material on audience analysis and information presentation.

3. Sample script sheets and audience analysis results.

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Evaluating Scripts

1. Every student will evaluate eight scripts over the next three days.

2. Each script will be rated
   a. Good
   b. Fair
   c. Poor

3. Scripts rated GOOD means the following:
   a. The student thinks the script is well written and humorous.
   b. The student would like to have an acting part in the play.
   c. The play could be effectively changed into a new play with equal or more humor.

4. Each student will then be assigned a part in one play.

5. Students will work as a group to
   a. Change the script title.
   b. Change each character's name.
   c. Write a totally new script.

6. Be sure to read and carefully rate each play.

APPENDIX

Selecting a Script

You will be given eight scripts to evaluate. Read each and carefully rate them as GOOD, FAIR, or POOR. Jot down thoughts you have concerning each. You will be working with other students to rewrite the total script. Build a simple set and produce it. Your work will be evaluated by several teachers and other students. Be careful in the selection of your script.

1. Slush—The New Breakfast Cereal
   (GOOD) (FAIR) (POOR)
   NOTES: _____

2. All the Doctors of Our Lives
   (GOOD) (FAIR) (POOR)
   NOTES: _____

3. Way Back Then
   (GOOD) (FAIR) (POOR)
   NOTES: _____

4. Scare Theater
   (GOOD) (FAIR) (POOR)
   NOTES: _____

5. Commercial for Stuff
   (GOOD) (FAIR) (POOR)
   NOTES: _____

6. Gun's Fire
   (GOOD) (FAIR) (POOR)
   NOTES: _____

7. Fallen Arches
   (GOOD) (FAIR) (POOR)
   NOTES: _____

8. Mosquito Girl
   (GOOD) (FAIR) (POOR)
   NOTES: _____

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APPENDIX

Audience Assessment

Give each interested student an assessment sheet and reasonable time to fill reasonable time to fill it out.

AUDIENCE ASSESSMENT

Please take the time to complete this survey form which concerns like and dislikes of TV viewers. Your information will assist the class in accurately producing a video. Thank you for your time and cooperation.

1. What is your sex? ____M ____F.

2. What is your age? ____10-12 ____13-14 ____15-20 ____21-40 ____+.

3. What grade are you in? ____7 ____8 ____9 ____10 ____11 ____12.

4. How much expendable income do you have each week? _____.

5. What time of the day do you enjoy watching TV most? _____.

6. What day(s) of the week do you watch TV most?
   _____M _____T _____W _____Th _____F

7. How much TV do you watch per week? ____1-2 hrs. ____3-5 hrs. ____5+ hrs.

8. List your three favorite TV shows, with the most favorite first.
   a. _____
   b. _____
   c. _____

9. What television commercials offend you the most?
   a. _____
   b. _____
   c. _____

10. What television commercials turn you ON the most?
    a. _____
    b. _____
    c. _____

Audience Assessment (Tabulation Sheet)

1. Average age for the audience _____.

2. Number of females in the audience _____.
   Number of males in the audience _____.

3. Average income for the audience _____.

4. The time of day TV is watched most _____.

5. Day(s) of the week TV is watched most _____.

6. Average amount of time per week TV is watched most _____.

List the TV programs by name with the most enjoyable at the top. Indicate how many in the audience voted for the program.

	TV Program Name	Number of Votes
1.		
2.		
3.		
4.		
5.		

List the TV commercials found offensive with the most offensive listed first. Indicate how many in the audience voted against the commercial.

	Commercial Name	Number of Votes
1.		
2.		
3.		
4.		
5.		

List the TV commercials found appealing with the most appealing listed first. Indicate how many in the audience enjoy the commercial.

	Commercial Name	Number of Votes
1.		
2.		
3.		
4.		
5.		

APPENDIX

Script Group Assignment Sheet

1. Slush—The New Breakfast Cereal

Group 1	Group 2	Group 3

2. All the Doctors of Our Lives

Group 1	Group 2	Group 3

3. Way Back Then

Group 1	Group 2	Group 3

4. Scare Theater

Group 1	Group 2	Group 3

5. Commercial for Stuff

Group 1	Group 2	Group 3

6. Gun's Fire

Group 1	Group 2	Group 3

APPENDIX

Student Assignments by Script

1. Title of Play _____
2. Class Hour _____
3. Group Coordinator's Name _____
4. Recorder's Name _____

STUDENT'S NAME

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

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APPENDIX

Creating a New Script

New Title _____

New Actor Names: 1. _____ 5. _____

2. _____ 6. _____

3. _____ 7. _____

4. _____ 8. _____

A-Rise		Performer	New Script
_____	1.	_____	
_____	2.	_____	
_____	3.	_____	
_____	4.	_____	
_____	5.	_____	
_____	6.	_____	
_____	7.	_____	
_____	8.	_____	
_____	9.	_____	
_____	10.	_____	
_____	11.	_____	
_____	12.	_____	

APPENDIX

A-Piece		Performer	New Script
	1.		
	2.		
	3.		
	4.		
	5.		
	6.		
	7.		
	8.		
	9.		
	10.		
	11.		
	12.		
	13.		
	14.		
	15.		
	16.		
	17.		

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APPENDIX

Production Title _____

Scene # _____ Director _____

In the space above describe the specific scene setup.

In the space below list each prop needed and describe its specific nature and location.

Prop #	Description	Distinguishing Characteristics	Location

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APPENDIX

DIRECTIONS FOR BRAINSTORMING

1. Within the group list 20 ideas that could solve the problem. Each group member should call out whatever idea comes to mind. All evaluation of ideas should be deferred until later.

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

2 Review each original idea from step 1 and sort out the best five. The sorting and decisions should be done by the entire group and factors of time and feasibility should be considered.

1. _____
2. _____
3. _____
4. _____
5. _____

3. Review the five ideas selected in step 2 and discuss within the group how each idea could be brought to a final product. From these discussions, select the one best idea and outline the plan for the production.

Objective Idea:

Outline:

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AUDIENCE ASSESSMENT

Please take the time to complete this survey form for the _____ class at _____ High School. This information will be used to better enable the class to target advertisements to meet the needs of people like yourself. Thank you for your time and cooperation.

1. What sex are you? ____male ____female

2. How old are you? ____10-12 ____13-14 ____15-20 ____21-40 ____41+

3. What grade are you in? ____7 ____8 ____9 ____10 ____11 ____12

4. How much expendable income do you have per week?
   ____$0.50 ____$0.51-$1.00 ____$1.00-$5.00 ____$5.00 and up

5. When do you find you have the most free time?
   ____Nights ____Afternoons ____Days

6. What days of the week are you most available?
   ____M ____T ____W ____Th ____F

7. How much TV do you estimate you watch per week?
   ____1-2 hrs. ____3-5 hrs. ____5+ hrs.

8. List your three favorite television shows.
   1. _____
   2. _____
   3. _____

9. List the hours when you watch the most TV. _____

10. What type of television commercials offend you the most?

11. What type of television commercials do you like the most?

APPENDIX

Group # _____ Director _____

Production Length _____

Production Title _____

Scene	Elapsed Time	Total Time	Audio	Video

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MODULE: 4 : Preparing to Produce Electronic Messages

LENGTH: 5 DAYS Communication CLUSTER

Module 4 deals with the process of taking the script as produced in the last module and preparing the broadcast for production. This step is common in the reality of industry as it allows rethinking, production, and allocation of necessary materials which and resources will be used during the actual production.

Steps dealt with in this module should be:

1. Selection of talent.

2. Production or gathering of necessary resources and materials.

3. Rehearsing and evaluation.

4. Adaptation of environment.

5. Debugging of program.

As mentioned previously, we are exemplifying these concepts via video taping. Although a viable approach, equipment limitation may restrict the instructor from employing this device. Regardless of elective media used, all of the preparatory steps are considered and dealt with, although their importance varies with the medium employed.

OBJECTIVES

Upon completing this learning module, each student should be able to:

1. Discuss the criteria used for "talent" selection.
2. Evaluate a given message and determine the necessary materials and props needed for production.
3. Discuss and deal with environmental adaptations necessary for production.
4. Evaluate a rehearsal to determine problematic areas.
5. Rehearse the production and ready it for the production time and place.

CALENDAR

DAY	ACTIVITY
1	Discuss selecting talent. Students participate in their first rehearsal.
2	Discuss the importance of rehearsing with emphasis on the dry-run rehearsal. Students discuss and edit their scripts.
3	Discuss the basic set design that will be constructed. Students discuss and edit their scripts.
4	Student dry-run rehearsal of play. Students discuss and edit their scripts.
5	This is the last day for dry-run rehearsals.

DAY	ACTIVITY
1	Discuss the standards a professional would consider when selecting talent. Show students a sample talent sheet. Give each student a copy of his/her play. Students sit together and participate in their first rehearsal.
2	Discuss the importance of rehearsing and briefly describe the dry-run rehearsal. Students block-in their play during a stand-up rehearsal. Students are given time to discuss and edit their script.
3	Discuss the basic set design that will be used during production. Students alternate rehearsing their individual plays. Students are given time to discuss and edit scripts.
4	Students continue dry-run rehearsals with each group alternating rehearsals during the class period. Encourage students to work without scripts as much as possible. Emphasize the importance of facial expressions and body movement. Students are given time to discuss and edit their script.
5	Remind students that this it the last dry-run rehearsal. Continue to encourage students to rehearse without scripts. Each group alternates rehearsals. Encourage students to develop drama through facial, vocal, and body expressions.

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McQuillin, The Video Production Guide, Howard W. Sams, Indianapolis, IN, 1985.

Stevenson, J., Telecommunications, Silver Burdett Co., Morristown, NJ, 1985.

INSTRUCTIONAL MATERIALS

1. Teacher produced talent sheets and prop sheets.
2. Reference books and material dealing with acting, stage lighting, and scenery design.

SPECIAL EQUIPMENT AND SUPPLIES

1. Video cassette recorder and camera
2. Blank tapes
3. Color television monitor.

APPENDIX

TALENT SHEET

Character Sought _____

Characteristics: Sex _____ Hair color _____

Height _____ Face shape _____

Age _____ Hair style _____

Personality:

Test Script Lines (To be used by candidates for position)

Evaluators Comments and Rating

	Physical	Personality	Script	Total Points
Candidate 1	1 2 3	1 2 3	1 2 3	_____
Candidate 2	1 2 3	1 2 3	1 2 3	_____
Candidate 3	1 2 3	1 2 3	1 2 3	_____
Candidate 4	1 2 3	1 2 3	1 2 3	_____
Candidate 5	1 2 3	1 2 3	1 2 3	_____

ACTIVITY

Construct the set—a simple backdrop.

1. Build four wood frames 4' x 8' using 2 x 2's.
2. Bring the four frames together using take-apart hinges.
3. Cover each frame with 4' wide paper and staple.

Construct the set—a basic facia curtain.

1. stretch bailing wire between wall hooks positioned in front of backdrop.
2. Cut a 20' x 4' strip of paper into two strips, each 20' x 2'.
3. Punch small pencil-size holes in each paper strip6" from one side every 2", the full length.
4. String the paper and ruffle it across the facia wire.

Collect and copy all script pages which the students edited.

MODULE: 5 : Production of Electronic Messages

LENGTH: 7 DAYS Communication CLUSTER

The first module of this unit dealt with the ideation and formation of a script ready for production. In module 4, the script was rehearsed and the necessary equipment and talent selected. This module, Number 5, will deal with the actual recording of the electronic message and the management of the taping.

First, the module will set up a personnel system so that each class participant will have a role to play in the production. Positions like producer, director, camera person, lighting director, etc., all have to be filled. After the personnel are trained and ready, each group will film (with the other group's help) its production as rehearsed and written.

CALENDAR

DAY	ACTIVITY
1-2	Construct a set for all plays.
3	Discuss the production team and assign production positions. Demonstrate the video recorder. Students rehearse and critique their efforts.
4	Discuss the shot sheet. Students continue to rehearse and critique their work. Students consider special effects that might improve their production.
5-6	Students continue rehearsing, critiquing, and improving their play.
7	Final production day.

CALENDAR

DAY	ACTIVITY
1-3	Discuss the production team and assign production positions. Demonstrate the video recorder. Students rehearse and critique their efforts. Instructors should train all necessary staff.
4	Discuss the shot sheet. Students continue to rehearse and critique their work. Students consider special effects that might improve their production.
5-7	Production days for all broadcasts.

DAY	ACTIVITY
5–6	Students continue live rehearsals followed by monitor viewing and critiquing. Continue to encourage drama through special effects and body language.
7	Final production day. Encourage all participants to deliver their greatest efforts into this final production.

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The recommended textbook is listed below, along with chapters and pages which apply to this module:

DuVall, J. B., G. R. Maughan, & E. J. Berger, Getting the Message: The Technology of Communication, Davis Publications, Worcester, MA, 1981.

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Stevenson, J., Telecommunications, Silver Burdett Co., Morristown, NJ, 1985.

APPENDIX

DIRECTOR

Responsible for entire production operation, hiring of personnel, and supervision of equipment. Has two assistants working under this position to carry out tasks.

CAMERAMAN

Responsible for operation, maintenance, and storage of camera equipment and accessory films. Training in camera operation is required.

ASSISTANT CAMERA

Assists cameraman in setup, review, and editing of video tape. Must have knowledge and training with camera equipment.

LIGHTING DIRECTOR

Oversees lighting of set and care of equipment. Position has two assistants under it. Position requires knowledge of lighting equipment and techniques.

PROP PERSONNEL

Responsible for obtaining, setting up, and storage of all props required for production.

CASTING DIRECTOR

Responsible for selection and training of talent for production. Position requires a person with a keen sense of judgment and the ability to recognize and work with talented people.

APPENDIX

Training objectives for position of Head Camera Person:

1. **Operational controls—camera**
   Describe location and function of:
   - Zoom lens _____
   - Focus _____
   - Zoom range _____
   - White balance _____
   - Power/STBY _____
   - Color adj. _____
   - Light adj. _____
   - Microphone _____
   - Monitor _____
   - A C C _____
   - Lens cap _____
   - Timer function _____
   - Timer control _____

2. **Set up procedure**
   - Attach camera to VCR _____
   - Power up units _____
   - Insert tape _____
   - Record & set memory _____
   - Attach camera to tripod _____
   - Set up titles _____
   - Set up subtitles _____
   - Set up timer _____
   - Remove/Attach microphone _____
   - Set up Aux. microphone _____

3. **Operational procedures**
   - Panning _____
   - Zooming _____
   - Dollying _____
   - Focusing _____
   - Tilting _____
   - Expos. Comp. _____
   - Title insert _____
   - Memory function _____

4. **Maintenance procedures**
   - Secure tape _____
   - Change batteries _____
   - Secure equipment _____

5. **Supervisor responsibility**
   - Direction from script _____
   - Control of assistants _____
   - Reports to director _____

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INSTRUCTIONAL MATERIALS

1. Reference books dealing with production and lighting.
2. Teacher produced or selected training materials for all equipment.
3. Sample tapes showing correct lighting technique.
4. Teacher produced handouts presenting job positions, job descriptions and job training.
5. Teacher produced overheads for personnel layout and training schedules.

SPECIAL EQUIPMENT AND SUPPLIES

1. Video/cassette recorder and camera
2. Blank tapes
3. Lighting equipment—two studio floods and one studio spotlight
4. Light stands, barn doors, diffusers
5. Microphones—two
6. Camera tripod
7. Color monitor

MODULE: 6 : Transmission of Telecommunication Media

LENGTH: 4 DAYS Communication CLUSTER

Following the production of an electronically communicated message, the show is usually transmitted to a wider audience. This module will introduce to the students possible transmission mediums available to the students and will allow for transmission, if at all possible. Local cable TV operators usually provide a station or time for public service announcements and would be glad to broadcast the tape if the subject matter and quality were warranted.

Evaluation of production is another concern of the postproduction phase. Shows must always be evaluated for the effectiveness of reaching the goal. For example, if the purpose of the show were to persuade students to buy a yearbook, what was the increase in sales? How many students heard the announcement and want to buy a yearbook? Effectiveness of the message is the final evaluation and is usually done by empirical evidence, but sometimes by internal pre-broadcast review. This module will allow for review and critique of the program by an internal and limited external review of the production.

OBJECTIVES

Upon completing this learning module, each student should be able to:

1. Describe why evaluation and transmission of the message are necessary.

2. Explain various ways to evaluate a message.

3. Explain various ways to increase the viewing audienc by transmission of message.

4. Critique their own group's and other group's productions noting limitations and attributes of the shows.

DAY	ACTIVITY
1	Discuss the importance of evaluation as an assessment of the effectiveness of the production. Describe how effectiveness is measured by television surveys or response to commercials. Internally review the video tapes. Students view all the groups' tapes and evaluate them on critique sheets.
2	Provide for an external evaluation of the groups' video tapes by showing them to another class, a group of teachers, or an outside group. Students compare internal and external evaluation. Critique the group's own work.
3–4	Provide instruction and demonstration of various ways the message can be transmitted to large populations. Transmission mediums of air waves, cable TV, satellite transmission, telephone, and auditorium presentation should be covered. Students present critique, noting attributes, limitations, effectiveness, and mistakes of each group's presentation.

DAY	ACTIVITY
1	Highlight the importance of evaluation of the message to judge effectiveness of the problem. Describe how television shows and commercials are rated by surveys and consumer response. Provide for internal review of the productions or instructor developed critique sheets. Students view all the groups' tapes and evaluate them on the critique sheets provided by the instructor.
2	Solicit a group, outside of the class production groups, that will provide an unbiased external review of the shows. The group can be of older students, faculty, or parents. Allow the production groups to act as hosts for the showing. Students host the external group's evaluation of the shows. Compare and contrast the internal and external evaluations. Explain the various ways of transmitting the production to a larger audience. Discuss methods of: airwave transmission, cable TV, satellite transmission, telephone transmission, and/or an auditorium presentation. Highlight the legal restrictions with each medium. If possible, select the medium and broadcast the show. Many local cable TV operators allow air time for public forums and will be glad to oblige educational services.
3-4	Each student group should make a presentation to the class noting the limitations, effectiveness, attributes, and mistakes of his/her group.

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APPENDIX

INTERNAL CRITIQUE SHEET

Name of Production _____
Name of Cameramen _____
Date of Evaluation _____ Class Hour _____

TECHNIQUE	Best	O.K.	Lacking
Camera Handling			
a. Proper focus	1 2	3	4 5
b. Satisfactory framing	1 2	3	4 5
c. Logical movements	1 2	3	4 5
d. Movement was smooth	1 2	3	4 5
Exposure			
a. Lighting prevented shadows	1 2	3	4 5
b. Color tones were sharp and vivid	1 2	3	4 5
Actors' speech was clear	1 2	3	4 5
Actors' speech could be heard	1 2	3	4 5
Special visual effects used	1 2	3	4 5
Special audio effects used	1 2	3	4 5
SCRIPT			
Script length developed the idea	1 2	3	4 5
Language was tasteful (not obnoxious)	1 2	3	4 5
Script was clearly written	1 2	3	4 5
FINAL PRODUCT			
Message was transmitted effectively	1 2	3	4 5
Message created the desired response	1 2	3	4 5
Production was visually pleasing	1 2	3	4 5

IMPORTANT FINAL THOUGHTS

1. _____
2. _____
3. _____

APPENDIX

External Critique Sheet

Name of Production _____
Name of Student Coordinator _____
Date of Evaluation _____ Class Hour _____

TECHNIQUE	Best	O.K.	Lacking
Camera handling	1 2	3	4 5
Exposure	1 2	3	4 5
Visual techniques	1 2	3	4 5
Script	1 2	3	4 5
Final product	1 2	3	4 5

IMPORTANT FINAL THOUGHTS

1. _____
2. _____
3. _____
4. _____
5. _____

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APPENDIX

INTERNAL CRITIQUE SHEET

Name of Production _____

Group Personnel _____

Date _____ Class _____

TECHNIQUE	Best	O.K.	Lacking
Camera handling	1 2	3	4 5
Exposure	1 2	3	4 5
Visual Techniques	1 2	3	4 5
Lighting	1 2	3	4 5
THEME			
Length	1 2	3	4 5
Appropriateness to media	1 2	3	4 5
Appropriate attack	1 2	3	4 5
FINAL PRODUCT			
*Appropriate for audience	1 2	3	4 5
Sex	1 2	3	4 5
Age	1 2	3	4 5
S/E class	1 2	3	4 5
*Persuasive characteristics	1 2	3	4 5

*Comments _____

APPENDIX

INSTRUCTIONAL MATERIAL:

1. Teacher made transparencies/handouts presenting the basics of message transmission and reception.
2. Representative devices capable of receiving various wavelengths of messages.
3. Teacher designed critique sheets.
4. Viewing audience for external critique.

SPECIAL EQUIPMENT AND SUPPLIES:

1. Transmission medium for student production:
   a. In-school random-access showing.
   b. In-school formal showing.
   c. Local cable television.
   d. Intra-district educational television.
2. Color monitor

MODULE: 7 : Data Processing/Computers

LENGTH: 26 DAYS Communication CLUSTER

Increasingly so, microcomputer technology and computers are becoming a part of our everyday life. Adaptation and increased awareness and understanding on the part of the users and producers, is becoming necessary in order to provide a smooth influx of microcomputers into the social fabric. Acceptance and proper use is dependent on an increased awareness of the general public.

This module will look into the typical computer hardware and its configurations, as observed in contemporary applications. Hardware, as used within, refers to the physical structure; the tangible parts of a computer system.

To the untrained eye a computer system, with its unlimited configurations, brands and structures, is merely a mass of confusion. To the trained eye a computer is merely an information manipulator. One of the tasks of this module is to develop a keen understanding, in the students, of the essential subsystems and parts of any computer system. In so doing, the identification of input devices, output devices, storage and retrieval devices, and central processing will be discussed in this unit.

It is expected that the instructor has sufficient a number of microcomputers or terminals available. Although the discussion of computers will attempt to be non-machine specific, it is realized that the hands-on experience with computer hardware will be done via the available resource.

With all the essential hardware equipment—CPU, printer, interface, etc.—the computer is still a useless conglomeration of electronic devices. Without direction, the computer is a useless device. What it takes to provide the computer direction is called the software, rather than the hardware it is directing. Software is the remaining essential element of a computer system, as it informs the equipment what to read, what to do with data, where to store things, and what to print. Software is the language the computer understands.

Computers are usually bilingual. They understand a universal language (assembler) and usually a high line language (Basic). Knowing the language permits one to communicate directly or indirectly with a computer. In fact, the computer can also be taught other languages.

This module will look into software, its primary purpose, its uses, and its structure. Various computer languages will be introduced, with an emphasis placed on their specific application and not their structure.

The students will be given an opportunity to work into a little programming in the language of the instructor's choice. Simple programming techniques will be introduced and the students will be given an opportunity to explore their logic and operation.

Terminating this module will be student experimentation with word processing, simulation, graphics, and spreadsheet programs. By allowing student exploration of "canned" programs, a fundamental understanding of computer application will be obtained.

OBJECTIVES

Upon completing this learning module, each student should be able to:

1. List several historical antecedents of the computer and explain their significance.
2. Note the differences between hardware and software.
3. Explain the differences between computer configurations.
4. Draw a schematic form and explain the basic elements of all computer systems.
5. Explain the differences between digital and binary logic.
6. Demonstrate an understanding of binary logic principles.
7. List various types of computer memory devices.
8. List and explain the purpose of various storage and retrieval systems.
9. List various computer input devices and be able to explain the limitations and deficiencies of each.
10. List various computer output devices and be able to explain the limitations and deficiencies of each.
11. Explain the differences of and purposes for computer hardware and computer software.
12. Name various computer programming languages and explain the specific purpose for their development and use.
13. Develop a simple computer program in the instructor's choice of language and effectively use various simple programming techniques.
14. Explain four simple programming techniques and discuss their use.
15. Gain a familiarity with word processing programs and develop sufficient proficiency with one to enter, manipulate, save, recall, and print a file.
16. Gain a familiarity with graphics programs and develop sufficient proficiency with one to create, manipulate, store, recall, and print a drawing.
17. Gain a familiarity with simulation and spreadsheet software programs and understand their purposes and use.

CALENDAR

DAY	ACTIVITY
1	Discuss the historical lineage of the computer.
2	Students perform an activity involving input/output devices.
3	Discuss the basic difference between computer hardware and software. Discuss where computers are used.
4	Student activity day for input/output devices.
5	Discuss similar elements of computer systems.
6	Student activity day for input/output devices.
7	Discuss the two conditions necessary for logic information to exist. Discuss the basic elements used in digital logic.
8	Student activity day for input/output devices.
9	Discuss how binary systems are used to encode numbers.
10	Student activity day for input/output devices.
11	Discuss programming a digital computer.
12	Students perform an activity involving the use of a computer.
13-14	Discuss various computer languages. Student activity day for using the computer.
15-16	Discuss word processing software. Student activity day for using the computer.
17-18	Discuss database management software. Student activity day for using the computer.
19-20	Discuss accounting and bookkeeping software. Student activity day for using the computer.
21-22	Discuss communication software and electronic mail. Student activity day for using the computer.
23-24	Discuss graphics software. Student activity day for using the computer.
25-26	Discuss how to locate software. Student activity day for using the computer.

DAY	ACTIVITY
1	Discuss the historical lineage of the computer. Include major advances in computer development and comment on computers of the future.
2	Students perform an activity involving input/output devices. Allow two but never more than three students to work on any one activity at a time (see Appendix).
3	Discuss basic differences between computer hardware and software. Give examples for each. Discuss the different configurations and capabilities of computer systems. Emphasize the number of users, memory capacity, and calculating speed. Discuss where computers are used. Give examples in business, government, military, engineering, the sciences, and fine arts, education, and the home.
4	Students perform an activity involving input/output devices. Students must select a new activity. This is not a time for make-up.
5	Discuss similar elements of computer systems. Emphasize the basic building block for all computers. Discuss the CPU and input/output sections.
6	Students select a new activity to work on.
7	Discuss the two conditions necessary for logic to exist. Emphasize Logic 1 and Logic 0 and what the expressions bit, bite, and word mean. Discuss the three basic digital logic elements: and gate or gate including the inverter. Explain how each controls the passage of digital information.
8	Students select a new activity to work on.
9	Discuss how binary systems are used to encode numbers. Explain why the 4-bit code is also called the 8421 code. Give examples of how simple numbers are encoded. Give examples of adding and subtracting binary numbers.

DAY	ACTIVITY
10	Students select a new activity to work on.
11	Discuss computer memory. Begin with how the basic digital computer works. Explain the two methods used by the computer for storing data. Finish the discussion with explanations of RAM, ROM, PROM, and EPROM memory chips. Discuss programming the digital computer. Explain why programming is needed and where program software is produced. Give examples of software and include the important job each performs.
12	Students perform an activity involving the use of a computer. Allow two but never more than three students to work on any one activity at a time (see Appendix).
13	Discuss various computer languages. Explain why a computer language is needed. List each of the many computer languages and explain how each has a special application.
14	Students select a new activity. This is not a time for make-up.
15	Discuss word processing software. Explain how word processing software may be used. Give several examples of highly regarded word processing programs.
16	Students select a new activity to work on.
17	Discuss database management software. Discuss the kinds of work where database software is used. Give several examples of highly regarded database software.
18	Students select a new activity to work on.
19	Discuss accounting and bookkeeping software. Describe the kinds of work where accounting and bookkeeping software are used. Give several examples of highly regarded accounting and bookkeeping software.
20	Students select a new activity to work on.
21	Discuss communication software. Describe the kinds of work where communication software is used. Give several examples of highly regarded communication software.

DAY	ACTIVITY
22	Students select a new activity to work on.
23	Discuss graphics software. Describe the kinds of work where graphics software is used. Give several examples of highly regarded graphics software.
24	Students select a new activity to work on.
25	Discuss how to locate software. Emphasize software stores, computer stores, software directories and services, and mail order. Explain the computer consultant's job. Finally, explain what user-supported software/shareware, public domain software, and custom software mean.
26	Students select a new activity or complete unfinished work for credit.

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APPENDIX

INSTRUCTIONAL MATERIALS:

1. Teacher made transparencies/handouts presenting the operation of a computer and its peripheral devices (i.e., printer, plotter).
2. Samples of output or input for each peripheral device.
3. Arranged field trip or guest speaker.
4. Teacher designed task sheets that will cause the student to gain familiarity with each computer peripheral device by solving or working with a given problem.

SPECIAL EQUIPMENT AND SUPPLIES:

1. Home or personal computer
2. CRT output screen
3. Pen plotter
4. Voice synthesizer.
5. Printer and interface
6. Modem and telephone
7. Storage and retrieval system (disk or tape).

ACTIVITIES

INPUT/OUTPUT DEVICES

Computer Activity	Software Used
1. Keyboarding	1. Apple Presents the IIe--an introduction.
2. Modem--transcript of grades.	2. None
3. Digitizer	3. AUTO CAD EXE AUTO CAD OVL
4. Mouse	4. AUTO CAD EXE AUTO CAD OVL
5. Joystick	5. Rescue on Fractalus
6. Plotter	6. AUTO CAD EXE AUTO CAD OVL

APPENDIX

KEYBOARDING

The keyboard is an input device with an array of keys that are mounted on a panel. The keys are connected to a set of pulse code sources inside the computer. When a letter, punctuation, or command key is pressed the pulse code sources convert them into binary codes. Each key has its own separate code.

A. Check the disk drive and remove any disk inadvertently left inside.
B. Turn off the power at the box.
C. Insert the Apple Presents the Apple IIe program into the disk drive door.
D. Turn the monitor brightness control to full intensity.
E. Wait for the program to stop loading.
F. Read and follow all instructions carefully.
G. Take out a clean sheet of paper and write your name, the date, and class hour in the upper right corner.
H. Number and answer the following questions:

1. Under what two conditions should you press the return key?
2. Draw a picture of the cursor and explain what it looks like.
3. What kind of computer are you using?
4. What happens when you press and hold a letter key down?
5. What key is used to correct mistakes?
6. Name the fruit that was incorrectly spelled.
7. Name the toy every child likes to play with.
8. When are the arrow keys (left and right) used?
9. What does the left arrow key do?
10. In what country does it rain?
11. Who was buried in a tomb?
12. Whose heart was worth yearning for?
13. Who discovered the laws of gravity?
14. What first name did you use?
15. What meal did you choose?
16. Select menu No. 4.
17. The long bar has what name?
18. What last name did you use?
19. The keyboard has how many shift keys?
20. What is the shift key used for?
21. What symbol did you type when using the shift key?
22. Name the different ways you can make a capital letter.
23. What letter did you capitalize?
24. How can you tell when the caps lock key is being used?
25. What will happen when a command is typed in lower case?
26. Will caps lock give you punctuation or symbols when pressed?
27. What do astronauts say?
28. Select menu No. 5.
29. What type of screen is used in your monitor?
30. 40 letters across the screen is also called what?

Keyboarding—Continued

31. The apple computer will display how many columns?
32. What is a monitor?
33. Select menu No. 6.
34. Never confuse the letter O with what other symbol?
35. Never confuse the letter L with what other symbol?
36. The computer asked you to add what two numbers?
37. Select menu No. 7.
38. What key, already learned by you, does nothing by itself when pressed?
39. What happens when you press control and the letter G?
40. Where is open apple located on the keyboard?
41. Where is solid apple located on the keyboard?
42. How did you use the open and solid apple keys?
43. How do you get help when using open apple?
44. Select menu No. 8.
45. Name the 4 ways, in proper order, to exit a program.
46. Select menu No. 9.
47. What is a friendly program?
48. What is an unfriendly program?
49. Name the 4 important steps to follow.
50. Select menu No. 10.
51. What is the spice of life?
52. Name 3 things you have learned with the blinking-bar cursor.
53. Describe the other cursors that might be used.
54. What does the blinking square cursor mark?
55. What does the solid square cursor do when moved over a letter?
56. Select menu No. 11.
57. What keys allow the cursor to be moved up or down?
58. To what did you provide aid?
59. Select menu No. 12.
60. You are now considered what kind of genius?

Modem (Transcript)

The modem is an input/output device that converts data from a form which is compatible with data processing equipment (computers) to a form which is compatible with analog transmission over telephone lines and vice-versa. Modem is an acronym for modular demodulator unit. When you print code information on the keyboard and press the ENTER key, the modem functions as an input device. Code information is changed by the modem from a binary form into an analog form so that it can travel over the telephone lines. A modem at the school's administration building changes the analog coded information back to binary so that their mainframe computer can understand what the data means. In a way, the modem changes one language (English) into another language (French) and then back to English again.

Definitions

Input function--data printed on the keyboard for personal transcript information—S05,Q,Students I.D. Number.
Student name—last name, first name, and middle initial printed on the transcript used to identify ownership.
Student identification number—a six digit number that follows the students middle initial used to identify ownership.
School name—the name of the school which the student is presently attending.
School number—a number following the school name used for school identification.
Grade—a number used to identify the student's grade level.
Homeroom—the letters HR followed by a three digit number used to identify the student's homeroom.
Rank—a seven digit number; the last three digits represent the highest rank possible and the first three digits show the student's actual rank.
Grade point average—the letters GPA followed by a four digit number representing the students average for total grade points.
Total credits attempted—the letters ATTP followed by a four digit number represents the total credits attempted by the student.
Total credits earned—the letters EARN followed by a four digit number represents the actual credits earned.
Total accumulated points--the letters PTS followed by a five digit number represents total educational points accumulated.
Grade point average (GPA) = PTS divided by total credits attempted.

Answer the Following Questions

1. Write your name, the date, and class hour in the upper right corner of a clean sheet of paper.

2. Write each question on your answer sheet and place the correct answer below.

3. What input function data did you enter at the keyboard for personal transcript information?

4. What student name was printed on the transcript?

5. What six digit number is used for a student identification number?

6. What school name is printed on the transcript?

7. What number is used to identify the student's school?

8. What number is used to identify the student's grade level?

9. What numbers follow the letters HR that are used to identify your homeroom?

10. What three digit number represents the highest possible rank for the student and what three numbers represent actual student rank?

11. What four digit number follows the letters GPA and is used to identify the students average for total grade points accumulated?

12. What four digit number follows the letters ATTP that are used to represent the total credits attempted by the student?

13. What four digit number follows the letters EARN that are used to represent the actual credits earned by the student?

14. What five digit number follows the letters PTS that are used to represent the total educational points accumulated?

15. Calculate your GPA as shown in information M. Show all math.

Digitizer

Digitizing means to convert an analog measurement of a physical variable into a numerical value that expresses the value in a digital form. The digitizer is the mechanical-electrical device that converts the analog measurement into its digital form.

Preliminary Setup

1. Locate the Auto Cad EXE program diskette and insert it in slot A of the disk drive (upper).
2. Locate the Auto Cad OVL program diskette and insert it in slot B of the disk drive (lower).

NOTE: IF YOU NEED HELP CALL YOUR INSTRUCTOR!

3. Turn the CAD unit ON—power button is under the bench.
4. MS-DOS will be displayed on the screen.
5. Press the return key two times.
6. A> will be displayed on the screen.
7. Print acad on the keyboard and press return (wait 60 seconds).
8. Print b: on the keyboard and press return (wait 30 seconds).
9. Print one on the keyboard and press return.
10. Remove the Auto Cad EXE program from the disk drive slot A.
11. Insert the Digitizer Data Disk in the disk drive slot A.
12. Print your drawing name on the keyboard using less than eight letters.
13. Press return and wait for a colored screen to be displayed.
14. Turn the digitizer power ON (Black box—Digi Pad Power Supply).
15. The Root Menu will be displayed on the monitor screen.
16. Hold the digitizer in your right hand.
17. Slide the digitizer to the right side of the Digi Pad.
18. Move the yellow bar cursor (seen in the monitor) to stop over DRAW.
19. Press button No. 5 on the digitizer.
20. The Drawing Menu will appear in the monitor.

Drawing a Simple Automobile

1. Move digitizer over the word Circle in the Drawing Menu.
2. Press button No. 5 on the digitizer.
3. Move over CEN, RAD and press button NR.5.
4. Move the digitizer into the drawing screen.

NOTE: LOOK AT PICTURE ON PAGE 2.

5. Continue moving the digitizer to the approximate location of a wheel center for the automobile.
6. Press button No. 5 and see the center point + appear on the monitor.
7. Move the digitizer away from the center point.
8. A circle will be drawn any time you move the digitizer.
9. When the desired circle size is drawn press button No. 5.
10. Again, move the digitizer over CEN, RAD and press button No. 5.

11. Move the digitizer into the drawing screen.
12. Move the digitizer to the approximate location of wheel two.
13. Press button No. 5 and see the center point + appear.
14. Move the digitizer away from the center point and draw the circle.
15. Press button No. 5 to retain the desired circle.
16. Move the digitizer over Last Menu.
17. Press No. 5 and see the Drawing Menu appear.
18. Move the yellow bar cursor over LINE and press button No. 5.
19. Move the digitizer to start the line at point 0 (look at drawing).
20. Press button No. 5.
21. Move digitizer to point 1 and press button No. 5.
22. Move digitizer to point 2 and press button No. 5.
23. Move digitizer to point 3 and press button No. 5.
24. Move digitizer to point 4 and press button No. 5.
25. Move digitizer to point 5 and press button No. 5.
26. Press return.
27. Move digitizer over Last Menu and press button No. 5.
28. Move yellow bar cursor over ARC and press button No. 5.
29. The ARC Menu will be displayed.
30. Move yellow bar cursor over 3-POINT and press button No. 5.
31. Move digitizer back to point five and press button No. 5.
32. Move digitizer to the highest point on your arc.
33. Press button No. 5.
34. Move the digitizer to point 0 and press button No. 5.
35. The drawing is now completed.
36. Remove drawing points + by pressing button No. 2.
37. Type the word end on the keyboard and press return.
38. Your drawing is now loaded into the E.C. Auto Cad Data Disk.
39. Call your teacher for evaluation and credit.

Mouse

Preliminary Setup

1. Locate the Auto Cad EXE Program diskette and insert it in slot A of the disk drive (upper).
2. Locate the Auto Cad OVL Program diskette and insert it in slot B of the disk drive (lower).

NOTE: IF YOU NEED HELP CALL THE INSTRUCTOR!

3. Turn the CAD unit ON—power button is under the bench to right.
4. MS-DOS will be displayed on the screen.
5. Press the return key two times.
6. A> will be displayed on the screen.
7. Print acad on the keyboard and press return (wait 60 seconds).
8. Print b: on the keyboard and press return (wait 30 seconds).
9. Print one on the keyboard and press return.
10. Remove the Auto Cad Data EXE program from the disk drive slot A.
11. Insert the Mouse Data Disk in the disk drive slot A.
12. Print your drawing name on the keyboard using less than eight letters.
13. Press return and wait for a colored screen to be displayed and red disk drive light to go off.
14. The Root Menu will be displayed on the monitor screen.
15. Hold the mouse in your right hand.
16. Slide the mouse to the right side of the light reflecting pad.
17. Move the yellow bar cursor (seen in monitor) to stop over DRAW.
18. Press button No. 1 on the mouse (left side of mouse).
19. The drawing menu will appear on the monitor screen.

Draw a Simple House

1. Move the mouse over the word LINE in the drawing menu and press button No. 1.
2. Move the mouse into the drawing screen.

NOTE: LOOK AT PICTURE ON PAGE 2.

3. Continue moving the mouse to the approximate location of point 0.
4. Press button No. 1 and see the center point + appear on the monitor.
5. Move the mouse to the approximate location of point one and press button No. 1.
6. Move the mouse to the approximate location of point two and press button No. 1.
7. Move the mouse to the approximate location of point three and press button No. 1.
8. Press return.
9. Move the mouse over the words LAST MENU and press button No. 1.

10. Move the mouse over the word SOLID and press button No. 1.
11. Move the mouse into the drawing screen to point four and press button No. 1.
12. Move the mouse over to point five and press button No. 1.
13. Move the mouse to the approximate peak or point six and press button No. 1.
14. Press return two times and see the upper house become solid.
15. Move the mouse to Last Menu and press button No. 1
16. Move the mouse to LINE and press button No. 1.
17. Move the mouse to point seven and press button No. 1.
18. Move the mouse to point eight and press button No. 1.
19. Move the mouse to point nine and press button No. 1.
20. Move the mouse to point 10 and press button No. 1.
21. Press return.
22. Move the mouse to RECTANG: and press button No. 1.
23. Move the lower left corner of the rectangle (seen in monitor) with the mouse to point 11 and press button No. 1.
24. Move the mouse to locate the upper right corner of the window to point 12 and press button No. 1.
25. Press return.
26. Move the mouse to LINE and press button No. 1.
27. Move to point 13 and press button No. 1.
28. Move to point 14 and press button No. 1.
29. Move to point 15 and press button No. 1.
30. Move to point 16 and press button No. 1.
31. Press return.
32. The drawing is now completed.
33. Remove the drawing points + by pressing button No. 3.
34. Type the word "end" on the keyboard and press return.
35. Your drawing is now loaded into the E.C. Auto Cad Data Disk.
36. Call your teacher for evaluation and credit.

RESCUE ON FRACTALUS

Overview

1. The Jaggies, a scummy bunch, have dug in on Fractalus.
2. Fractalus is the most inhospitable planet this side of the Kalamar system.
3. The cyanitric atmosphere will dissolve a spacesuit in minutes.
4. Don't worry about being taken prisoner. The Jaggies will kill you first and worry about it later.
5. There are Jaggie gun emplacements on the ground and war saucers in the sky.
6. Many Ethercorps pilots have been downed and are desperately in need of rescue. (Life inside a damaged ship is limited.)
7. You have a mothership that can refuel you and take rescued pilots.
8. Here are your mission priorities:
   a. Defend yourself against the enemy at all cost!!!
   b. Rescue Ethercorps pilots at every opportunity and return them to the mothership!!!
   c. Destroy the Scum Jaggies whenever and wherever possible!!!

FLIGHT CONTROLS

1. Start game—PRESS SPACEBAR
2. Fly aircraft—MOVE JOYSTICK
3. To launch AMB torpedo—PRESS JOYSTICK BUTTON
4. To land on Fractalus—PRESS L
5. To shut off and restart engines and deflector shields—PRESS S
6. To open airlock—PRESS A
7. To get airborn again—PRESS (RIGHT ARROW) KEY
8. To return to mothership—PRESS B

Plotter Abstracts

1. Locate the AUTO CAD EXE program diskette and insert it in slot A of the disk drive (upper).
2. Locate the AUTO CAD OVL program diskette and insert it in slot B of the disk drive (lower).

NOTE: IF YOU NEED HELP CALL YOUR INSTRUCTOR!!!

3. Turn the CAD unit ON—power button is under the bench.
4. MS-DOS will be displayed on the screen.
5. Press the return key 2 times.
6. A> will be displayed on the screen.
7. Type acad on the keyboard and press return (wait 60 seconds).
8. Type b: on the keyboard and press return (wait 30 seconds).
9. Type 2 on the keyboard and press return.
10. Remove the Auto Cad EXE program from the disk drive slot A.
11. Insert the Plotter Abstracts program in slot A of the disk drive.
12. Type ABY1 on the keyboard and press return.
13. Drawing ABY1 will be displayed on the monitor.
14. Type plot on the keyboard and press return.
15. CALL YOUR TEACHER AND PREPARE THE PLOTTER!!!
16. Be sure the plotter is plugged in to the back of the computer.
17. Turn the plotter ON with toggle switch in back of plotter unit.
18. Wait until the noise and the activity stops.
19. On the plotter keying card, press enter (red light comes on).
20. Press (the up arrow)—red light goes OFF.
21. Press small.
22. Wait until the noise and activity stops.
23. Position a sheet of paper on the plotter (line up the front edge and second silver line).
24. Set levers of paper grippers down.
25. Insert the plotter pen into its holder (slides in horizontally).
26. Press return two times (wait for the plotter action to stop).
27. Press return two times to start plotting activity.
28. When plotting is finished, lift the paper grip levers.
29. Remove the plotted abstract.
30. Do not shut off the equipment.
31. Go to the next page for more abstract plotting.
32. Type end and press return (delay in activity).
33. The main menu will be displayed.
34. Type 2 and press return.
35. Type ABY2 and press return.
36. The next drawing will be displayed on the monitor.
37. On the plotter keying card, press enter (red light comes ON).
38. Press (the up arrow)—red light goes OFF.
39. Press small.
40. Wait until the noise and activity stops.

41. Position a clean sheet of paper on the plotter (line up the front edge and the second silver line).
42. Type plot on the keyboard.
43. Press return five times and wait for plotter activity to begin.
44. When plotting is finished lift the paper grip levers.
45. Remove the plotted abstract.
46. Do not shut off the equipment. The final abstract must be plotted.
47. Type end and press return (delay in activity).
48. The main menu will be displayed.
49. Type 2 and press return.
50. Type ABY3 and press return.
51. The drawing will be displayed on the monitor.
52. On the plotter keying card, press enter (red light comes ON).
53. Press (the up arrow)—red light goes OFF.
54. Press small.
55. Wait until the noise and activity stops.
56. Position the final sheet of clean paper on the plotter (line up the front edge and the second silver line).
57. Type plot on the keyboard.
58. Press return five times and wait for plotter activity to begin.
59. When plotting is finished lift the paper grip levers.
60. Remove the final plotted abstract.
61. Type END on the keyboard and press return (delay in activity).
62. Main menu will be displayed.
63. Type 0 and turn the computer OFF (under the desk!!!)
64. Turn OFF the plotter.
65. Remove the software from the disk drive.
66. Write your name, the date, and class hour on each drawing.
67. Return these items to the teacher for credit.

ACTIVITIES

Computer Uses

Computer Activity	Software Used
1. Synthesized Music	1. Garry Kitchen's Game Maker
2. Word Processing I	2. Apple Writer IIe
3. Word Processing II	3. Apple Writer IIe
4. Educational	4. Shuttle Designer
5. Animation	5. Garry Kitchen's Game Maker
6. Spreadsheet	6. Appleworks—sample files data disk Appleworks—start-up disk Appleworks—program disk
7. Programming I—Your Name's the Game	7. None
8. Programming II—A Greater Challenge	8. None
9. Programming III—A Touch of Graphics	9. None

SYNTHESIZED MUSIC

Selecting the Song

1. Check the disk drive and remove any disk inadvertently left inside.
2. Insert the Garry Kitchen's Game Maker software into the disk drive door with the label side UP.
3. Close the disk drive door and turn the power ON.
4. When the Game Maker Title (Garry Kitchen's Game Maker) appears on the screen, press the space bar.
5. The Game Maker Editor screen will appear with menu listed in the top right screen.
6. Move the pointer to clr shown at the right side of the screen.
7. Press the space bar.
8. Move the pointer to YES and press the space bar.
9. With the pointer at menu, press the space bar.
10. Move the pointer to Music Maker and press the space bar.
11. When the computer finished loading, you will see the Music Maker Screen.
12. Remove the software from the disk drive and turn it over and insert it into the disk drive label side down.
13. Move the pointer to file and press the space bar.
14. When you see the word load press the space bar.
15. The pointer will point to fellow ?
16. Press ↑ the key until you read merry ? and press the space bar.
17. Move the pointer to YES and press the space bar.
18. The pointer now points to play and press the space bar.
19. The "We Wish You a Merry Christmas" song will play.
20. Do NOT erase your work!!! GO TO THE NEXT PAGE...

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To Tie or Untie the Musical Notes

1. Notes can be played to sound together or they can be played to sound separate.
2. To untie or separate the musical notes perform the following steps.
3. Move the pointer to tie and press the space bar.
4. The black background disappears.
5. Move the pointer to play and press the space bar.
6. As you listen, the musical notes sound untied...
7. Move the pointer to tie and press the space bar.
8. The black background will appear.
9. Move the pointer to play and press the space bar.
10. As you listen the musical notes sound tied together.

Tempo

1. Tempo is the speed at which the musical notes are played.
2. To select a tempo of slow, medium, or fast, perform the following steps.
3. Move the pointer to tempo-Med and press the space bar.
4. Press the ↑ or ↓ key until you read fast.
5. Press the space bar.
6. Move the pointer to play and press the space bar.
7. The tempo or speed of the musical notes is much faster.
8. Move the pointer to tempo and press the space bar.
9. Press the ↑ or ↓ key until you read slow and press the space bar.
10. Move the pointer to play and press the space bar.
11. The tempo is much slower.
12. Turn the power OFF and remove the software from the disk drive.
13. Go to the next page...

Composing Synthesized Music

1. Check the disk drive and remove any disk inadvertently left inside.
2. Insert Garry Kitchen's Game Maker software into the disk drive door with the label side UP.
3. Close the disk drive door and turn the power ON.
4. When the Game Maker Title (Garry Kitchen's Gamemaker) appears on the screen, press the space bar.
5. The Game Maker Editor screen will appear with menu listed in the top right screen.
6. Move the pointer to clr shown at the right side of the screen.
7. Press the space bar.
8. Move the pointer to YES and press the space bar.
9. The pointer points to menu , press the space bar.
10. Move the pointer to Music Maker and press the space bar.
11. When the program stops loading, the Music Maker Screen will be displayed.
12. Remove the software from the disk drive, turn it over and insert it into the disk drive label side down.
13. Look at the handout Music Maker Screen to identify its different parts.
14. Notice the staff is divided into 5 lines and 5 spaces.
15. Of the 3 staffs shown, we will use the top staff.
16. Locate the Note Selection Box shown in the Music Maker Screen.
17. Move the pointer to the Note Selection Box and press the space bar.
18. Press the ↑ key until you see ♩ and press the space bar.
19. Press the ← key 1 time to move the note into the Music Sheet.
20. Press the ↑ key to move the ♩ note ON SPACE 1.
21. Press the space bar to hear the note.
22. Press the space to print the note into the staff.

WARNING: YOU MUST WAIT UNTIL AFTER THE NOTE IS HEARD BEFORE PRESSING THE SPACE BAR TO PRINT.

23. Follow steps 20, 21, 22 to hear and print the next 5 staff notes.
24. ♩ on line 1
25. ♩ on line 2
26. ♩ on space 3
27. ♩ on line 3
28. ♩ on line 4
29. We will now select a new note...
30. Move the pointer to the Note Selection Box and press the space bar.
31. Press the ↓ key until you see 𝅗𝅥 and press the space bar.
32. Press the ← key 1 time to move the 𝅗𝅥 note into the music sheet.
33. Press the ↑ key to move the 𝅗𝅥 note on space 5.
34. Press the space bar to hear the note (pause) and press the space bar to print the note into the staff.

35. We will now select a new note.
36. Move the pointer to the Note Selection Box and press the space bar.
37. Press the ↑ key until you see ♩ and press the space bar.
38. Press the ← key one time to move the ♩ note into the music sheet.
39. Press the ↑ key and move the ♩ note on space 5.
40. Press the space bar to hear the note (pause) and press the space bar to print the note into the staff.
41. Follow steps 39 and 40 to hear and print the next 5 staff notes.
42. ♩ on line 4
43. ♩ on line 3
44. ♩ on space 3
45. ♩ on line 2
46. ♩ on line 1
47. We will now select a new note.
48. Move the pointer to the Note Selection Box and press the space bar.
49. Press the ↓ key until you see ♩ and press the space bar.
50. Press the ← key one time to move the ♩ note into the music sheet.
51. Press the ↑ key and move the ♩ note on space 1.
52. Press the space bar to hear the note (pause) and press the space bar to print the note into the staff.
53. We will now select a new note.
54. Move the pointer to the Note Selection Box and press the space bar.
55. Press the ↑ key until you see ♩ and press the space bar.
56. Press the ← key one time to move the ♩ note into the music sheet.
57. Press the ↑ key and move the ♩ note on space 1.
58. Press the space bar to hear the note (pause) and press the space bar to print the note into the staff.
59. Follow steps 57 and 58 to hear and print the next 5 staff notes.
60. ___ on line 1
61. ___ on line 2
62. ___ on space 2
63. ___ on line 3
64. ___ on line 4
65. We will now select a new note.
66. Move the pointer to point to the Note Selection Box and press the space bar.
67. Press ↓ key until you see ♩ and press the space bar.
68. Press the ← key one time to move the ♩ note into the music sheet.
69. Press ↑ key and move the ♩ note on space 5.
70. Press the space bar to hear the note (pause) and press the space bar to print the note into the staff.
71. We will now select a new note.
72. Move the pointer to the Note Selection Box and press the space bar.

73. Press the ↑ key until you see  and press the space bar.
74. Press the ← key one time to move the  note into the music sheet.
75. Press the ↑ key and move the  note on space 5.
76. Press the space bar to hear the note (pause) and press the space bar to print the note into the staff.
77. Follow steps 75 and 76 to hear and print the next 5 staff notes.
78.  on line 4
79.  on line 3
80.  on space 3
81.  on line 2
82.  on line 1
83. We will now select the final new note.
84. Move the pointer to the Note Selection Box and press the space bar.
85. Press the ↓ key until you see  and press the space bar.
86. Press the ← key to move the note into the music sheet.
87. Press the ↑ key and move the  note to line 2.
88. Press the space bar to hear the note (pause) and press the space bar to print the note into the staff.
89. Move the pointer to channel 2.
90. Press the ↑ or ↓ key and turn channel 2 OFF.
91. Move the pointer to Play and press the space bar.
92. Move the pointer to Tie and press the space bar.
93. Press the ↑ or ↓ key to untie the notes and press the space bar.
94. Move the pointer to Play and press the space bar.
95. Move the pointer to Tempo and press the space bar.
96. Press the ↑ or ↓ key to read FAST and press the space bar.
97. Move the pointer to Play and press the space bar.

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Software (Word Processing I)

Below is an article that defines word processing and lists important software used by word processors. Your job is to copy the article using correct word processing procedure.

1. Check the disk drive and remove any disk inadvertently left inside.
2. Insert the Apple Writer IIe software into the disk drive door.
3. Close the disk drive door and turn the power ON.
4. Wait for the program to stop loading and press RETURN.
5. Wait again for the program to stop loading and press RETURN.
6. Type.

   .cj

7. Type the title of this activity, which is Module 10, Activity 5—Software (Word Processing).
8. Type

   .lj

9. Type the information shown below.

WORD PROCESSING

Most home/offices can benefit from word processing software. "Word processing" refers to all software that enables you to use your computer like a first-class typewriter. According to Scientific American, besides allowing work to be done faster, word processing lowers the cost of producing documents to less than one-third the cost of having them typed. Depending on the features of the software you get, you can use word processing and related programs to:

- Enter text
- Edit text
- Move text within a document
- Check spelling and grammar
- Get a word count
- Print out your text and produce multiple originals
- Individualize form letters
- Provide print and typesetting instructions
- Create indexes
- Organize footnotes
- Maintain mailing lists
- Sort mailing lists by name, address, or zip code
- Address envelopes and mailing labels
- Alphabetize lists

10. Turn the printer ON.

11. Hold down CONTROL and type P
12. Type NP and press return.
13. Continue typing the remaining text as shown below.

If your work involves extensive writing, you will want to get a versatile and sophisticated word-processing package and possibly several other packages like spelling and grammar-checking programs. The more sophisticated the software, the more time it may take you to learn, but the more you will be able to do with it.

Sophisticated programs have features that allow you to see what you are typing on your monitor screen exactly as it will appear when printed: produce proportional spacing on documents; find and replace words or phrases throughout a document; delete by word, line, or paragraph at a time; and see two or more parts of a document at once by splitting the screen. These are just a few of the possible features.

Over time, WordStar has been the most popular word processing program and, therefore the standard against which others are judged. Instructional designer Janice Hodgdon chose WordStar because she does long documents and has to do a lot of formatting and complicated editing. "I need a program with a lot of depth. With WordStar I can find a solution to just about every problem I run into. Although I had heard it was hard to use, I didn't have a problem at all. I got a WordStar Reference Card at a software store and set it up on my display where I could see all the commands. If I need to do something special, I look it up in the documentation."

Other highly regarded and popular programs are Multimate, Microsoft Word, and Leading Edge. If you want a less sophisticated word processing program, Bank Street Writer and Homeword are popular favorites. Our favorite spelling checkers are Proofreader and Word Plus. IBM's Word Proof is a spelling program with a fifty thousand-word dictionary, and it includes a simple word processing program, too. With the many word processing programs available to choose from, most people can find one that exactly meets their needs.

Center Justify (Word Processing II)

There is to be a wedding, Kristie Balin has promised to marry Robert Fiore and your job is to prepare a wedding invitation using correct format. Follow all instructions given below in the order they are shown.

1. Check the disk drive and remove any disk inadvertently left inside.
2. Insert the Apple Writer IIe software into the disk drive door.
3. Close the disk drive door and turn the power ON.
4. Wait for the program to stop loading and press RETURN.
5. Wait again for the program to stop loading and press RETURN.
6. Type

.cj

Mr. and Mrs. Theodore Balin

request the honor

of your presence

at

the marriage of their daughter

Kristie Marie

to

Robert Anthony Fiore

Saturday, December tenth

at three o'clock

14 Pringle Terrace

Atwater, Tennessee

7. Turn the printer ON.
8. Hold down CONTROL and type P.
9. Type NP and press return.

Editing (Word Processing II)

Without rhyme or reason Kristie has decided to not marry Robert, her true love apparent. She has now decided to marry Jonathon, due to a flash, a thunderbolt, if you will, of true love. Her parents are not about to throw good invitation effort into the trash. A simple revision should do the trick. It is your job to do the revision.

1. There are four arrow keys used to edit material shown on the screen.
2. Using one arrow key at a time, move the cursor so that it stops to the right side of the word Fiore.
3. Press the deletion key until the words Robert Anthony Fiore are deleted from the screen.
4. Type in the new groom's name—Jonathon L. Larson.
5. Using one arrow key at a time, move the cursor so that it stops to the right side of the word tenth.
6. Press the deletion key until the word tenth is deleted from the screen.
7. Type in the new wedding day 17th.
8. Using one arrow key at a time move the cursor so that it stops to the right side of the word three.
9. Press the deletion key until the word three is deleted from the screen.
10. Type in the new time, which is five.
11. Using one arrow key at a time, move the cursor so that it stops to the right side of the word terrace.
12. Press the deletion key until the words 14 Pringle Terrace are deleted from the screen.
13. Type in the new address which is 16 Belmoral Street.
14. Using one arrow key at a time, move the cursor sot that it stops to the right side of the word Tennessee.
15. Press the deletion key until the words Atwater, Tennessee are deleted from the screen.
16. Type in the new city and state which is Reading, Massachusetts.
17. Turn the printer ON.
18. Hold down Control and type P.
19. Press RETURN.

Shuttle Design (Rockets)—Educational

1. Check the disk drive and remove any disk inadvertently left inside.
2. Insert the Shuttle Designer software into the disk drive door.
3. Close the disk drive door and turn the power ON.
4. Wait for the program to stop loading.
5. Turn the monitor brightness control to full intensity.
6. Take out a clean sheet of paper and write your name, the date, and class hours in the upper right corner.
7. Write a title on the top center line the same as this paper's title.
8. Read all software instruction and information carefully.
9. Number and answer the questions asked below.

Questions

1. What three vehicle designs may be computer-built?
2. What kinds of mathematics might be used in this software?
3. What are the four main rocket categories?
4. What is a HYBRID rocket?
5. What two things do all rockets need to produce high pressure gas?
6. Which of the rockets uses a rubbery type of propellant?
7. Draw a solid rocket motor and identify its parts.
8. What does the solid propellant shape determine?
9. Which type of casting mold is must commonly used?
10. Name two different ways solid rocket motors are guided.
11. Draw the gimbled rocket motor and identify its parts.
12. Where do liquid fuel rockets store their oxidizer and fuel?
13. Why are liquid propellant rockets more desirable than other types?
14. Define the following words: (a) propellants, (b) turbines and (c) pumps.
15. Define the following expressions: (a) rocket motors and (b) gimbled guidance system.
16. Draw the liquid propellant rocket and identify its parts.
17. Why are single stage rockets less desirable?
18. What is meant by the expression "staged away"?
19. Draw the basic multistage rockets and identify its parts.
20. Draw the tandem multistage rocket and identify its parts.
21. How do the TITAN rocket and shuttle operation differ?
22. What makes up the total weight of a launch vehicle?
23. Name four other things the rocket must carry other than fuel.
24. What two payloads are associated with launching a vehicle?
25. What is the primary objective in making a rocket larger?
26. What percentage of a rocket's weight is devoted to propellant?
27. What is the purpose of the shuttle's external tank?
28. Why is today's space shuttle design unattractive for future use?
29. What length should the shuttle or booster be?
30. How is the size of the rocket determined?
31. Draw a cylinder, identify its parts, and write the equation for calculating its volume.
32. What is placed on the ends of the tank to reduce weight and insure maximum strength?

Shuttle Designer (Propulsion)—Educational

1. Check the disk drive and remove any disk inadvertently left inside.
2. Insert Shuttle Designer software into the disk drive door.
3. Close the disk drive door and turn the power ON.
4. Wait for the program to stop loading.
5. Turn the monitor brightness control to full intensity.
6. Take out a clean sheet of paper and write your name, the date, and class hours in the upper right corner.
7. Write a title on the top center line the same as this paper's title.
8. Read all software instruction and information carefully.
9. Number and answer the questions asked below.

Questions

1. What two important things will be learned in this lesson?
2. All propulsion systems must develop how much force?
3. Why do rockets burn solids and atomized liquids?
4. Draw the balloon having thrust and explain why it produces thrust while the other balloon does not.
5. The amount of air in a balloon determines what three things?
6. How would the thrust of a balloon be affected by a vacuum.
7. What do we call the amount of thrust produced by each pound of propellant?
8. What two values must be multiplied together to get a total value of thrust developed by a rocket?
9. How does the brick and boat story explain ISP (Specific Impulse)?
10. What three things determine the ISP (Specific Impulse) for a rocket engine?
11. How is the value for ISP affected at sea level compared with outerspace?
12. Which is most desirable: LOW ISP or HIGH ISP?
13. Which fuel oxidizer has the highest SL ISP value?
14. Which fuel oxidizer has the lowest VAC ISP?
15. What must be done to calculate the average value for ISP?
16. How much thrust does the shuttle solid rocket booster provide?
17. What thrust to weight ratio is desirable?
18. Describe the bulk density for fuel.
19. Write the education used to find the volume of a propellant.
20. What percentage is added to calculated values to correct for the rocket engines?
21. What is the bulk density for RP-1/Oxygen.

Select the Scene (Animation)

1. Check the disk drive and remove any disk inadvertently left inside.
2. Insert the Garry Kitchen's Gamemaker software into the disk drive door with the label side UP.
3. Close the disk door and turn the power ON.
4. When the Game Maker title (Garry Kitchen's Gamemaker) appears on the screen, press the space bar.
5. The Game Maker editor screen will appear with menu listed in the top right screen.
6. Move the pointer to clr shown at the right side of the screen.
7. Press the space bar.
8. Move the pointer to YES and press the space bar.
9. Move the pointer until it points to the small TAB at the right corner of the Command Window.
10. Press the space bar and the TAB will start flashing.
11. Press ↓ key until the Command Window opens to show 5 commands. This makes it easier to find needed commands.
12. Press the space bar and the TAB will stop flashing.
13. Move the pointer to point to the small ARROW at the left of the Command Window.
14. Press the space bar. The commands scroll up in the window.
15. Scroll through the commands until you see scene is [ ] then release the space bar to stop scrolling.
16. If you did not find the command scene is [ ] then move the pointer to the small arrow at the top left of the Command Window. Press the space bar to scroll down in the window.
17. Move the pointer until it points to the beginning of the command scene is [ ].
18. Remove the Game Maker program disk from the disk drive and turn it over and insert it in the disk drive, label side down.
19. Press the space bar and read the message Loading Catalog.
20. When the loading is finished, the pointer will be pointing at the name brthdy.
21. Press ↑ key until you read jungl 1.
22. If you missed it, press the ↓ key and carefully look again.
23. When you reach jungl 1 press the space bar to load the program.
24. Move the pointer to point to the run command and press the space bar.
25. You will see a grassy plain with 4 trees.
26. Press the space bar and return to Menu.

Select the Sprite (Animation)

1. Move the pointer to point to the small ARROW at the bottom left of the command window.
2. Press the space bar and scroll until you see the sprite 1 is [ ] command.
3. Move the pointer up with the ↑ key to point to the sprite 1 is [ ] command.
4. Press the space bar 2 times.
5. Press the ↑ key until you read dog.
6. When you read dog press the space bar.

Position the Sprite (Animation)

1. Move the pointer to point to the small ARROW at the bottom left of the Command Window.
2. Press the space bar and scroll until you see the command sprite x position = 000.
3. Move the pointer up with the ↑ key to the sprite x position = 000 command.
4. Press the space bar 2 times.
5. Press the ↑ key until 000 reads 034.
6. Press the space bar.
7. Move the pointer to the small ARROW at the bottom left of the Command Window.
8. Press the space bar and scroll until you see the command sprite Y position = 000.
9. Move the pointer with the ↑ key to the sprite Y position = 000 command.
10. Press the space bar 2 times.
11. Press the ↑ key until you read 130.
12. Press the space bar.

Animate the Scene

1. Move the pointer to point to the small ARROW at the bottom left of the Command Window.
2. Press the space bar and scroll until you see the sprite command sprite animation spd = 000.
3. Move the pointer up with the ↑ key to point to the command sprite animation spd = 000
4. Press the space bar two times.
5. Press the ↑ key until you read 007.
6. Press the space bar.
7. Move the pointer to point to the sprite dir = 000 000 command.
8. Press the space bar two times.
9. Press the ↑ key until you read 064 right.
10. Press the space bar.
11. Move the pointer to point to the sprite movement speed = 000 command.
12. Press the space bar two times.
13. Press the ↑ key until you read 120.
14. Press the space bar.
15. Move the pointer to point to run.
16. Press the space bar.

The Spread Sheet

1. Check the disk drive and remove any disk inadvertently left inside.
2. Insert the AppleWorks Startup disk into the disk drive with the label side UP.
3. Close the disk drive door and turn the power ON.
4. Turn the monitor ON and adjust the brightness control clockwise.
   a. The Copy Right screen appears briefly and then
   b. The title screen appears.
5. Remove the AppleWorks Startup disk from the disk drive and insert the AppleWorks Program disk with the label side UP.
6. Press the Return key.
7. The program will guess at today's date, but for this activity type 9/07/84 as the proper date.
   a. Do you see the unwanted 5 after the date?
   b. Press the space bar 1 time to remove the unwanted 5.
8. Press the Return key and wait for loading to stop.
9. The Main Menu will appear.
10. Select—Add Files to the Desk Top by typing 1 and press Return.
11. Show that disk drive 1 will be used by typing 1 and press Return.
12. Remove the AppleWorks Program disk from the disk drive.
13. Insert the AppleWorks Sample Files Data Disk with label side UP.
14. Close the disk drive door and press Return.
15. The list of Sample Files will be displayed.
16. Select—Organic Growth file with the highlighting key.
17. Press the Return key and wait for the loading to finish.
18. Remove the Sample Files Data Disk from the disk drive.
19. Insert the AppleWorks Program disk into the disk drive with the label side UP.
20. Close the disk drive door and press Return.
21. The spreadsheet—File: Organic Growth File, Mom's Applepie Company: Growth in Organic Pie Sales (projected) will be displayed.

Spread Sheet—Finding a Cell

1. Mom gave you a note asking you to look at the expected sales of Yogurt Yummy pies for the next 6 months.

2. Mom's note also reminds you that the six month sales is located in cell L8.
   a. Row number 8
   b. Column L

3. The present spreadsheet shows
   a. Yogurt Yummy expected sales is in Row 8.
   b. Quarterly (3 month) estimates are in Column G.
   c. Column L (six month figures) is off the edge of the screen.

4. Hold the open apple key down ___ and type F. F stands for find.

5. In the lower left side of the screen you read Find? Repeat Last Coordinates Text.

6. A coordinate includes the column and row information as shown in step 2 above.

7. To enter coordinate data type C

8. Then type the desired coordinates L8

9. Press Return

10. Highlighting shows the 6 month projection to be 3659 Yogurt Yummy Pies.

11. Record on a sheet of paper the 6 month expected sales.

12. Now, locate the NOVEMBER LOW sales for RAGAMUFFINS in cell E11.

13. Hold the open apple key down and type F

14. To enter the coordinate data, type C

15. Now, type the desired coordinate E11.

16. Press Return

17. Record the NOVEMBER LOW on your answer sheet.

Spread Sheet—Changing a Key Value

1. If you change the value in a key cell, the values for all the cells that depend on that cell change, too.

2. Move to cell D16 using the arrow keys.

3. Cell D16 should be highlighted at this time.

4. Change the value in cell D16 by typing the new value 2000. The lower left corner will read VALUE:2000

5. Press return

6. The values in cell D16 are automatically calculated and displayed by the computer.

7. Equations used by the computer to calculate values in cell D16 are different from those used for cells D15 and D14.

8. Calculate the new values for cell D15 by first moving the highlighting cursor to cell D15.

9. Type 200 and press Return

10. Notice that the values in cell D14 were also calculated and displayed along with the values in cell D15. Cells D14 and D15 used the same equations.

11. Change all cells back to their original values.

12. Move the highlighting cursor to cell D16 and type the value 250

13. Press Return

14. Move the highlighting cursor to cell D15 and type the value 200

15. Press Return

16. Check the values in cells D14, D15, and D16 to be sure they agree with the values printed in the spreadsheet handout.

Your Name's the Game (Programming I)

You are going to PROGRAM the computer to follow your own commands. If you should make a mistake type HOME and press RETURN. This will clear the monitor screen. You now may type new data into the keyboard.

1. Any disk in the disk drive must be taken out!
2. Turn the monitor ON.
3. Turn the computer ON.
4. Hold the CONTROL key down and press RESET.
5. Press Caps Lock down.

IMMEDIATE MODE

When we talk directly to the computer, requiring an immediate response, this is called the IMMEDIATE MODE.

1. Type PRINT "HELLO"
2. Press the RETURN key, the computer says HELLO
3. Now type PRINT 2 + 4
4. Press RETURN, and the computer gives you the answer 6
5. Type HOME and RETURN

LOOPS

You are going to create a number of PROGRAMS with the computer. A PROGRAM is a list of instructions, or commands, that tell the computer to do a series of different things.

All programs, in BASIC, begin with LINE NUMBERS. These are the numbers in front of each line in the program.

To create a quotation mark " hold down the SHIFT KEY, and press the " key.

When you see the expression "YOUR NAME" use your own name and be sure to use " marks around it.

1. Type NEW
2. Press RETURN

3. Type 100 PRINT "YOUR NAME"
   110 GOTO 100

4. Type RUN

5. Press RETURN--Your name looks as if it is standing still but in fact it is moving down the screen faster than your eye can see.

6. Press and hold CONTROL then type C

   The program has stopped moving.

7. Type NEW
   100 PRINT "YOUR NAME", (NOTE THE COMMA)
   110 GOTO 100

8. Type RUN

9. Press RETURN

   Your name should be running in two columns down the monitor.

10. Press and hold CONTROL then type C

    The program stops and the computer rings a bell.

11. Type NEW
    100 PRINT "YOUR NAME";
    110 GOTO 100

12. Type RUN

13. Press RETURN

    Your name's across the screen.

14. Press and hold CONTROL then type C

Module 10 Activity 3—A Greater Challenge (Programming II)

This program is more complicated, but will give you an interesting time designing new letters. Let's say your name is JOHN. With the word JOHN, we are going to create a "J". The SPACE BAR, at the bottom of the keyboard, will be used to make necessary spaces. A hint: there are 13 spaces after the " in 10 PRINT "

1. Type

```
NEW

 10 PRINT "             JOHN"
 20 PRINT "             JOHN"
 30 PRINT "             JOHN"
 40 PRINT "             JOHN"
 50 PRINT "             JOHN"
 60 PRINT "             JOHN"
 70 PRINT "             JOHN"
 80 PRINT "             JOHN"
 90 PRINT "JOHN         JOHN"
100 PRINT "JOHN        JOHN"
110 PRINT " JOHN      JOHN"
120 PRINT "  JOHNJOHNJOHN"
130 PRINT "    JOHNJOHN"
140 PRINT "      JOHN"
150 END
```

2. Type RUN

3. Press RETURN

   By typing END at line 150, the program will stop when completed.

4. Type LIST

5. Press RETURN

   List tells the computer to display any program in its memory.

6. Type 150 GOTO 10

   The program has now been made into a LOOP.

7. Type LIST

8. Press RETURN

9. Type RUN

10. Press RETURN

    The "J" repeats itself over and over, in a loop.

11. Press and hold CONTROL then type C

    The loop stops

12. Create your own initial out of your own name.

13. Type NEW

    Follow the above example to guide your work.

Module 10 Activity 4—A Touch of Graphics (Programming III)

Just as you drew initials with the PRINT statement, you can draw pictures the same way. Your introduction to graphics will be a rocket ship in the program shown below.

1. Turn the monitor ON.

2. Turn the computer ON.

3. Hold the CONTROL key down and press RESET.

4. Type

```
NEW
10 REM ROCKET SHIP
20 HOME
30 PRINT :PRINT :PRINT :PRINT
40 PRINT :PRINT :PRINT :PRINT
50 SPEED = 150
100 PRINT "          X"
110 PRINT "         XXX"
120 PRINT "        XXXXX"
130 PRINT "       XXXXXXX"
140 PRINT "       XXXXXXX"
150 PRINT "       XX   XX"
160 PRINT "       XX   XX"
170 PRINT "       XXXXXXX"
180 PRINT "       XXXXXXX"
190 PRINT "       XXXXXXX"
200 PRINT "       XXXXXXX"
210 PRINT "       XXXXXXX"
220 PRINT "      XXXXXXXXX"
230 PRINT "    X          X"
240 PRINT "   X            X"
250 PRINT
260 SPEED = 255
270 FOR I = 1 TO 1000 :NEXT I
280 PRINT "     VVVVVVVVV"
290 PRINT "      VVVVVVV"
300 PRINT "         VVV"
310 PRINT "          V
320 SPEED = 50
330 FOR I = 1 TO 30
340 PRINT
350 NEXT I
360 SPEED = 255
370 END
```

Christmas Tree Graphics (Programming III)

Your next job is to write a program for a Christmas tree with lights blin ing. The program started below is by no means a whole Christmas tree, but it does start the tree with 4 blinking lights. Your job is to continue extending the program so that more tree with at least 2 extra blinking lights is shown.

Type

```
NEW

10  GR
20  COLOR= 4
30  PLOT 20,4
40  HLIN 19,21 AT 5
45  HLIN 19,21 AT 6
50  HLIN 18,22 AT 7
55  HLIN 18,22 AT 8
60  HLIN 17,23 AT 9
65  HLIN 17,23 AT 10
70  HLIN 16,24 AT 11
75  HLIN 16,24 AT 12
80  FOR T = 1 TO 1000: NEXT T
85  FOR I = 1 TO 30
90  COLOR= I3
100  PLOT 19,5: PLOT 21,5
110  PLOT 16,12: PLOT 24,12
112  PLOT 20,8
115  FOR T = 1 TO 1000: NEXT T
120  COLOR= 4
130  PLOT 19,5: PLOT 21,5
140  PLOT 16,12: PLOT 24,12
145  PLOT 20,8
150  NEXT I
160  PRINT "I'M DONE!"
```