The Apple Computer Clubs Activities Handbook

The Official Apple Computer Clubs Series

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Dick Casabonne, series editor

A Spectrum Book

Samuel Miller *Mike Caley*

The Apple Computer Clubs' Activities Handbook

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—R.J. Casabonne

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Foreword

The Official Apple Computer Clubs' Book Series

Launched in the fall of 1983, the Apple Computer Clubs' program was designed to recognize the expertise and enthusiasm of students, teachers and parents involved in educational computing. This book series is designed to serve as a resource for those club members. Each book focuses on a particular area of interest.

Computer Publishing Services, Inc., the organization responsible for the management of the Apple Computer Clubs' program, hopes that these books offer you the information you require. They provide the insignt to reappraise your club's direction and allow you to customize it and make it more pertinent to your needs. Additionally, they provide each individual computer user with practical suggestions for personal growth and encouragement and stimulation to extract that excellence which is part of us all.

The first three books in the series are:

The Apple Computer Clubs' Activities Handbook by Samuel Miller and Michael Caley is a resource for every student, advisor, and adult who works with young people. The authors have divided their book into specific areas of interest and challenge to the Apple user. The chapters are devoted to Apple graphics, Logo, Using the Computer to Generate Music, and other stimulating subjects. Within each chapter, Notes to the Advisor, Suggested Activities, and References to other resources are included. This book is valuable for the beginner or the continuing user of Apple computers.

Merle Marsh's book, *Apple Computer Clubs' Parent's Guide,* is unique from a number of perspectives. It was written by a woman who is a parent, a teacher, a curriculum director, and an advisor to an Apple Computer Club. In her role as advisor, Merle entered Competition '84 and was selected as the winner of the Elementary Advisor's division. Her interest in computers, and more important, her interest in the way

computers are used by others, and the way she communicates that concern is an exciting element in her book.

Merle Marsh addresses those issues which all parents will face as an inevitable part of the twentieth century. She covers concerns about use patterns, futuristic trends, legalities of certain issues, selection of equipment, and the software to use on it in a way that is understood and enjoyed by those who might not themselves be computer literate when they start reading the book. Merle's sincere and straightforward approach is sure to win over many adults who are beginning to embark on the road toward computer literacy not only for their children, but for themselves as well.

The Winning Programs by Louise Appell is a retelling of the excitement of Apple Computer Clubs' Competition '84. It is the story of the decisions of the winning clubs to compete in the first annual Apple Computer Clubs' Competition, the process of the planning, and the implementation of the programs that were to become the winners. Most important, it is the story of Apple Computer Clubs' members, both students and advisors, in their own search for excellence within themselves that eventually brought them to Washington, D.C., for a week of learning, sharing, and recognition.

The book also looks at those semifinalists who were winners. Almost l00 clubs and individuals from around the country, although they did not make it to Washington, were recognized for their efforts.

Finally, the book asks the questions, "Will you be there next year?" "What will your project be?" Each member of the Clubs' program throughout the world is encouraged to begin planning and executing of new projects for Competition '85.

Dick Casabonne, series editor, is president of Computer Publishing Services, Inc., which manages the Apple Computer Clubs' programs. He works closely with TALMIS, a leading market research firm in educational computing. He also publishes TEENAGE, a student-researched and -written general-purpose magazine. A former teacher and librarian, Mr. Casabonne has worked with children and computers since 1967. He earned his undergraduate degree from Brown University and his Masters in Education degree in Instructional Technology from Boston University.

The Apple Computer Clubs' Activities Handbook is written by Sam Miller and Mike Caley.

Sam Miller, a curriculum specialist in Eugene, Oregon, has been an elementary and middle school teacher, a curriculum developer, university instructor, and teacher inservice specialist since 1974. He is the co-author of *Getting Started with Logo* and the author of *Evaluating and Implementing Educational Software.*

Mike Caley, a former computer programmer in the U.S. Airforce, has been an elementary and middle school teacher, a curriculum developer, and a teacher inservice specialist since 1974. He currently teaches computer classes at the middle school level in Eugene, Oregon.

Preface

This book is addressed to individuals who are involved with an Apple Computer Club. It has been developed as a handbook to serve three needs. First, this book provides Apple Computer Club advisors with reference materials that can serve as the focus for club activities and projects. Second, a large portion of this book is intended to introduce students to a number of computer literacy topics. Finally, the book is designed to be used as an information and activity handbook for any Apple computer user.

We have attempted to write about computers in non-technical terms under the assumption that some readers have no prior knowledge of computing. The activities in the book should challenge beginners and experts alike. Although the activities are brief they represent many powerful ideas relevant to the use of computers.

An excellent supplement to this book is the Apple Computer Clubs Advisor's Organizing Kit. This kit contains a number of ideas and materials that can be used to organize and run an Apple Computer Club. This kit is available by writing to the address listed below.

Apple Computer Clubs
P.O. Box 948
Lowell, MA 01853

We have attempted to write about computers in nontechnical terms under the assumption that some readers have no prior knowledge of computing.

1

What Are These Things Called Computers?

Notes to the Club Advisor

Chapter Overview

This chapter introduces general information about the development of computers. The chapter also presents information about basic computer components and their operation.

Things to Consider

Since the purpose of this chapter is to strengthen what club members may already know about computers, the club advisor must make an effort to avoid duplicating information that club members may have already been introduced to at school. This can be accomplished by surveying the club members' interests in pursuing the information presented in this chapter. Don't be surprised to discover that most club members prefer to spend their time working with computers instead of talking about them.

Ideas for presenting the information in this chapter are described below.

1 Encourage club members to read the chapter material at home or while they are waiting to use computer equipment in club meetings. Explain to them that a person who is truly computer literate knows a number of things about computers besides computer programming and operation.

2 Whenever possible provide club members with concrete examples of the computer components discussed in this chapter. This means that you might take the club on field trips to sites where the equipment is being used. Club members may also enjoy hearing expert speakers in the field of computing.

■

3 If club members are inclined, they might be interested in pursuing some of the projects described below.

- Prepare a report on one or more of the following people. Each has made a significant contribution to computer technology.
  John V. Atanasoff
  Clifford Berry
  Ted Hoff
  Gerald Weinburg
  Captain Grace Murray Hopper
  Lady Augusta Ada Byron, Countess of Lovelace
- Prepare a chart that compares the various types of computer memory that are available (acoustic, bubble, film, and so on).
- Conduct a debate about the value of knowing how to use the touch method of typing in the year 2000.
- Arrange for club members to visit the local Apple Computer dealership for a demonstration of the family of Apple products.

As you read this book, you will learn about how computers work, computer history, computers in everyday life, and how you can use computers.

Introduction

Computers are everywhere! They can be found in banks, television sets, microwave ovens, and even in some automobiles. The time you are living in has come to be called the "Computer Age." It's an exciting time to live, because computers have the potential to change and improve our lives. This book is about some of the changes that have already occurred and some that may occur in the future. It is a book for students, teachers, parents, and anyone else with an interest in learning about computers and how to use them. This book is especially written for use by an Apple Computer Club.

As you read this book, you will learn about how computers work, computer history, computers in everyday life, and how you can use computers. This book won't teach you everything there is to know about computers, but it will help get you started.

Throughout this book there are notes for club advisors. These notes are only suggestions since every Apple Computer Club will have members with different skills and different interests. The best way to use this book is as a stepping stone to activities that the club members want to learn more about.

Computers of the Past and Present

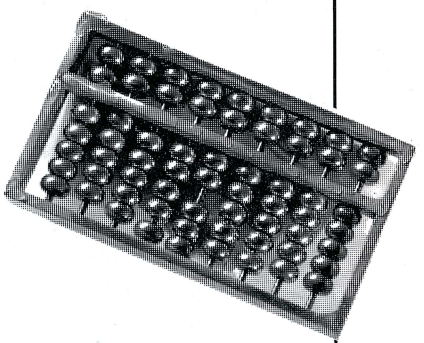
Are computers really a new idea? Not really. People in ancient civilizations didn't have computers, but they still needed to keep track of numbers. They didn't use modern computers, but they did have ways to keep track of the seasons, the movement of the planets, and other important things in their daily life. For example:

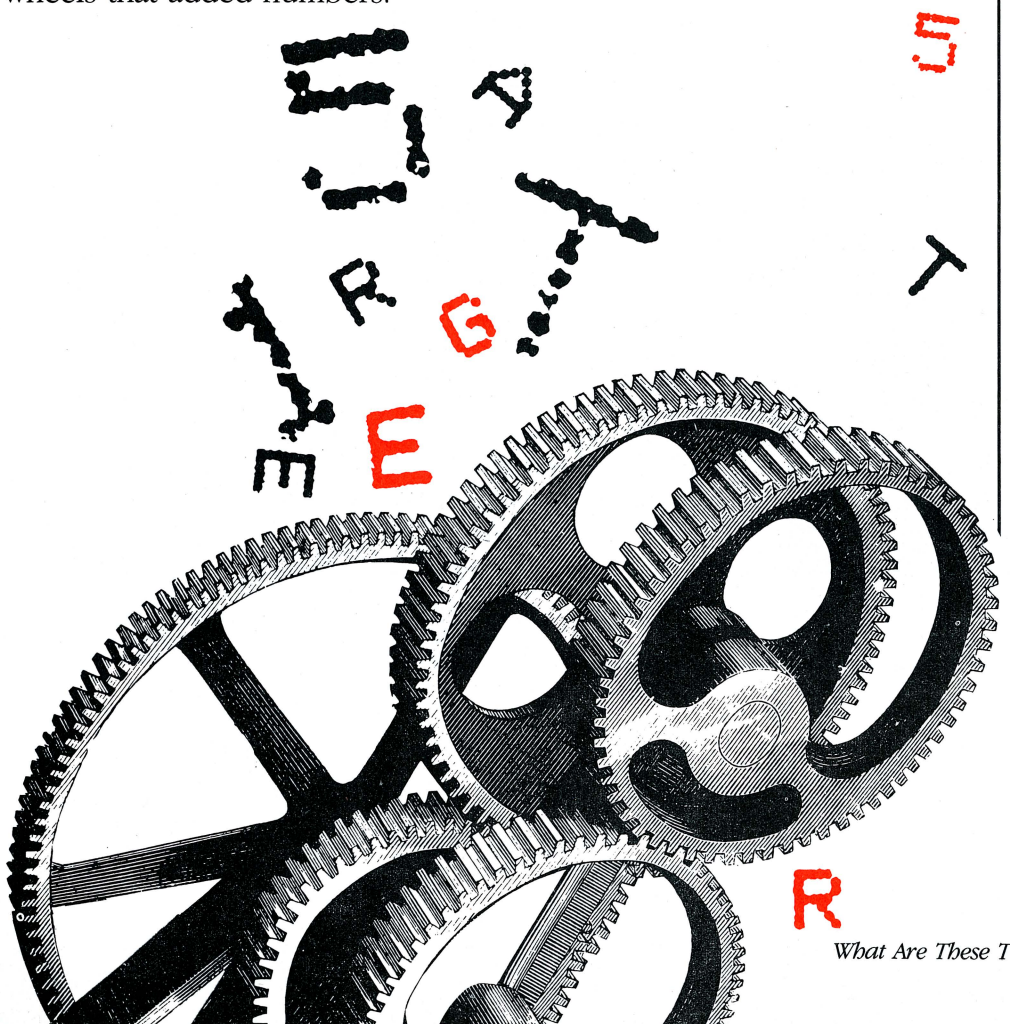
Ancient "computers" were crude devices, such as knots tied in rope or string, piles of pebbles, or notches cut into sticks.

The earliest known mechanical device used for computation is the *abacus.* The abacus was developed in China nearly 5,000 years ago and is still used today in some Asian countries. An abacus is a frame with rods that have strings of beads on them. The beads represent numbers and are moved along the rods to perform rapid calculations.

The first person to actually develop a model of an adding machine that worked was Blaise Pascal. Pascal was a French philosopher and mathematician who lived in the 1600s. He invented the Machine Arithmetique in 1647. Pascal's machine was similar in design to the odometer on modern automobiles. It had a series of gear-driven counting wheels that added numbers.

The earliest known mechanical device used for computation is the *abacus.* The abacus was developed in China nearly 5,000 years ago and is still used today in some Asian countries.



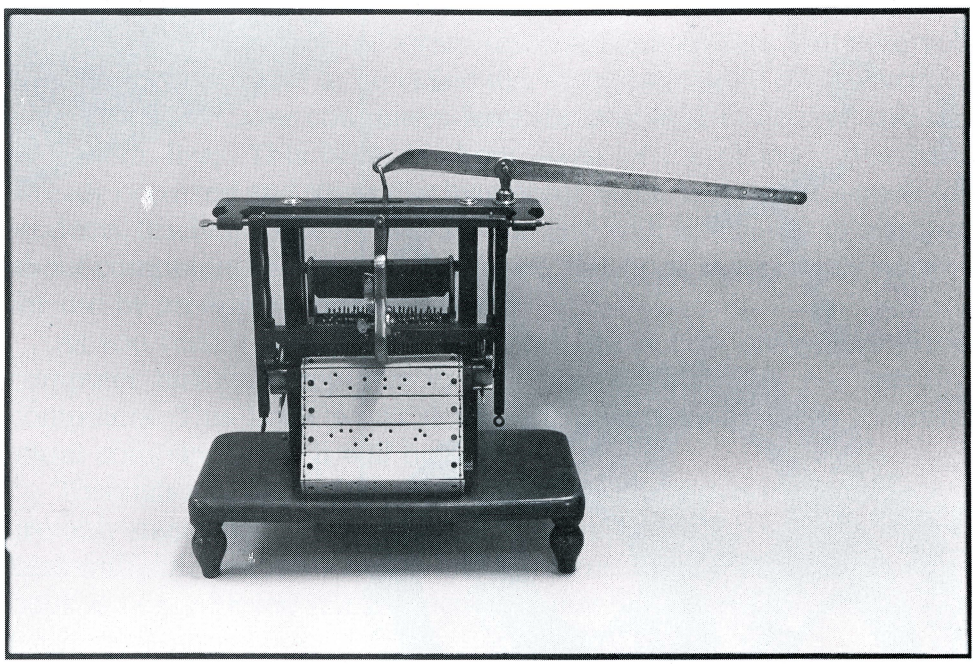


Another Frenchman, Joseph Marie Jacquard, developed an automatic weaving loom in 1804. His loom was operated by a series of cards with holes punched in them. The holes represented weaving instructions that were frequently repeated. Jacquard's system of using punched cards to automate a weaving loom represents a simple programming system. Looms of similar design are still in use today.

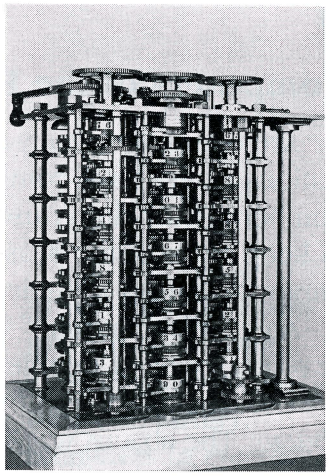
Charles Babbage, a British engineer, attempted to build the first general purpose computer in the mid-1800s. This machine, which he called the "difference engine," was to be powered by steam. Babbage wanted his machine to include:

- An input device to enter information into the machine.
- A processor or number calculator to perform rapid calculations.
- A control unit to control the flow of data.
- A storage device to hold information for later use.
- An output device to transfer information from the machine to the world.

The difference engine was never completed; however, Babbage's ideas are used in all modern computers.



The Computer Museum, Boston MA



The MIT Museum, Cambridge MA

Charles Babbage wanted his difference engine to calculate numbers rapidly. Photo courtesy of MIT Museum, Cambridge, Massachusetts.

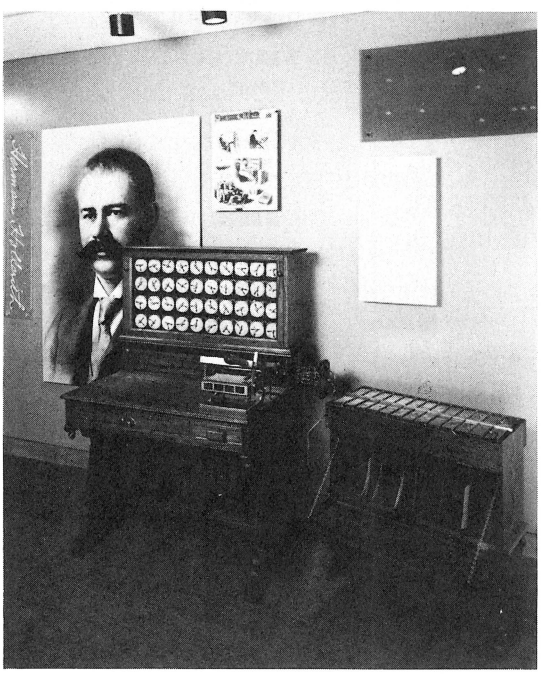
Pictured is a rare salesman's model of a Jacquard loom from 1810 displayed at The Computer Museum, Boston, Massachusetts.

Lady Augusta Ada Byron, a daughter of the famous English poet Byron, developed ideas for giving instruction to Babbage's machine. She is considered the world's first computer programmer. The U. S. military has named a programming language, Ada, in her honor.

How would you try to count all of the people in the United States? This is a problem that the United States Census Bureau has faced every ten years since 1790. The 1880 census took seven and a half years to complete because there was no quick way to tabulate all of the information the Census Bureau had collected.

The Census Bureau needed a faster way to count the number of people in the United States, so they invited inventors to develop ideas for taking the 1890 census. Herman Hollerith, a former Census Bureau employee, developed a system for tabulating census information that resulted in the census being completed in two years instead of seven and a half years.

Using Jacquard's ideas for repeating instructions for weaving through the use of punched cards, Hollerith used a combination of



The Computer Museum, Boston MA

A punch-card computing device, the Hollerith was invented by Herman Hollerith to tabulate the 1890 U.S. census. It cut the census calculating time from seven to three years. This exquisite full-scale model of a Hollerith tabulator can be seen in the Computer Musuem, Boston, Massachusetts.

punched cards and electrical wires to create the first tabulating device that used electricity. The use of electricity was important for two reasons: speed and cost. Electric signals are able to travel through wires near the speed of light (186,000 miles per second) and reduce the need for mechanical parts that can frequently fail. Hollerith began a company that eventually became International Business Machines (IBM). Today, IBM is a leader in the computer industry.

The next major development in computing history occurred in 1944 when Howard Aiken of Harvard University invented the MARK I. The MARK I was the first electro-mechanical computer. By current standards, the MARK I was quite slow, requiring several seconds to complete an arithmetic operation. It could multiply two 23-digit numbers in about 5 seconds. It was a massive device, stretching more than 51 feet in length and standing over 8 feet high.

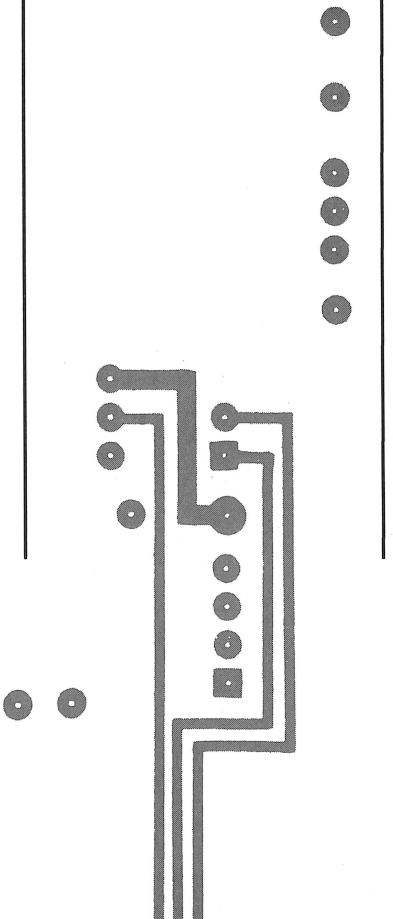
The first electronic computer, ENIAC, was developed by John Mauchly and J. Presper Eckert at the University of Pennsylvania in 1946. ENIAC cost half a million dollars, weighed 30 tons, and required the floor space of an average-sized house. The electrical power it used would supply about 150 homes today. Almost all of the power went into heating the 80,000 vacuum tubes used in the electronic circuits.

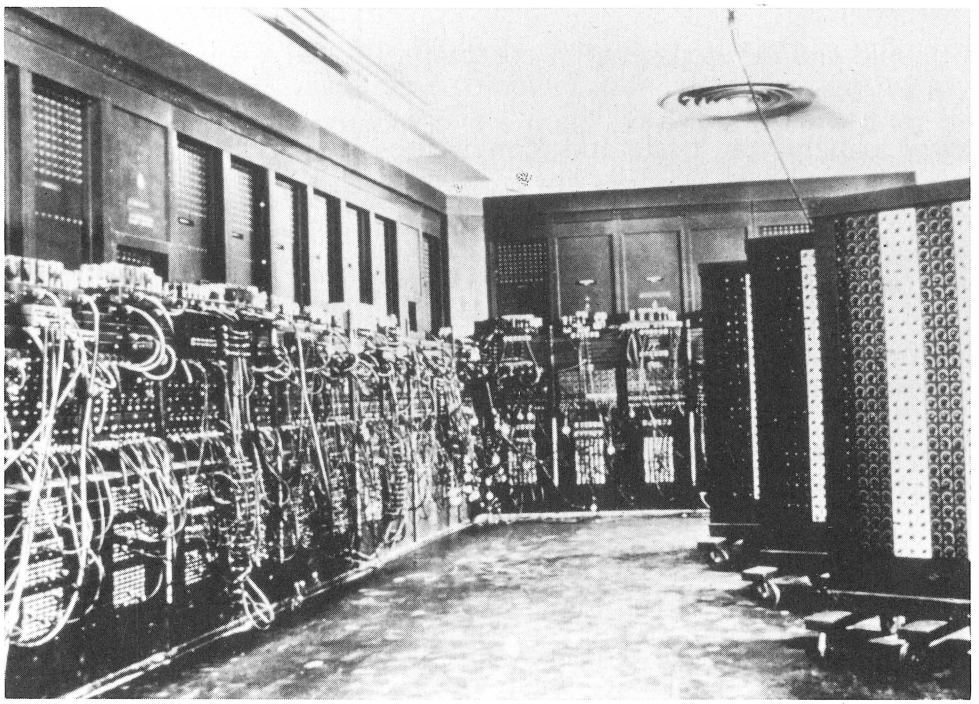
Your Apple computer can store instructions in its memory; ENIAC could not do this. However, ENIAC could be programmed by connecting wires into programming panels. This was a very slow process, sometimes taking many weeks to create a program. Whenever ENIAC was required to perform a new task, the wires had to be rearranged; but this ability to be programmed to perform more than one task is what made ENIAC a true computer.

Although slow by today's standards, ENIAC could perform calculations a thousand times faster than the fastest methods that existed at that time. Today's fastest computers are capable of multiplying or dividing a billion times faster than a person using a pencil and paper. An Apple computer stores in its memory a thousand times what ENIAC could store, processes information a hundred times faster, and uses less power than a light bulb.

ENIAC proved that an electronic computer could work. Computers that used vacuum tubes were refined during the 1950s and replaced during the 1960s by a new generation of computers that used transis-

Q: What did Caesar say to his computer?
A: When in ROM do as the ROMans do.





Moore School of Engineering, University of Pennsylvania

The first electronic computer, ENIAC, was developed by John Mauchly and J. Presper Eckert at the University of Pennsylvania in 1946. ENIAC cost half a million dollars, weighed 30 tons, and required the floor space of an average-sized house.

tors. A transistor is an electronic circuit that is smaller, faster, cheaper to produce, and more reliable than a vacuum tube.

By 1970, it was possible to put the circuits contained in thousands of transistors on a chip of silicon. Patterned in and on a silicon chip is an intricate maze of miniature wires. A flake of silicon that is a quarter of an inch on a side can hold a million electronic components, ten times more than the thirty-ton ENIAC! Computer scientists are now creating microchips that will someday be able to store the text of 200 long novels.

Microchips are reliable (chips fail about once in 33 million hours), are quite small in size, are inexpensive to produce, and use very little power. Because microchips have so many advantages, computers can now be purchased by anyone. Can you imagine owning ENIAC? Probably not, but you can own an Apple computer because two intelligent men, Steven Jobs and Steve Wozniak, created a computer and a company dedicated to the belief that computers belong in every home.

Projects

1 Create a timeline of famous people and developments in computing history. Place the timeline in your club room.

2 Use the Apple *Owner's Manual* to help you locate and identify the following parts of your Apple computer:
- Input device
- Chips used to store and process information in your computer
- Output device(s)

3 Build a model of an abacus. Learn how to use it and teach other members of your club.

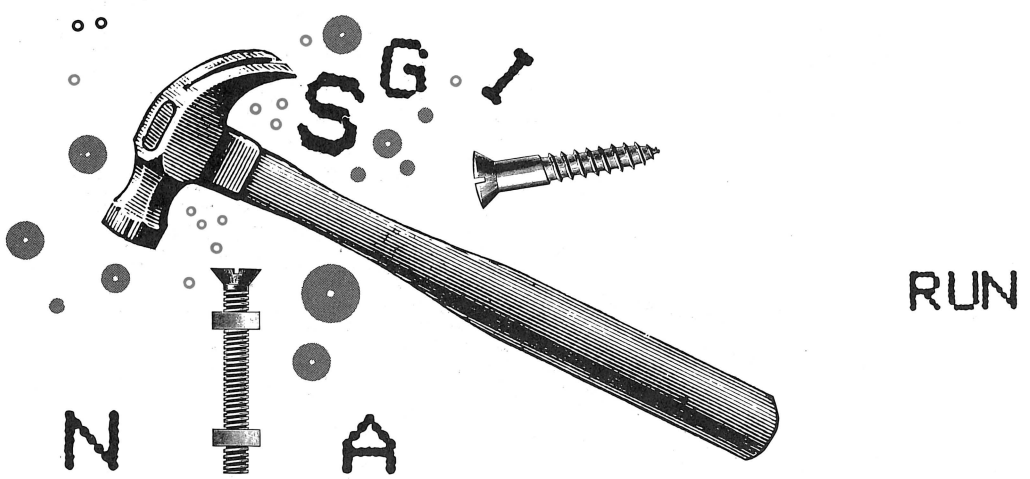
4 Multiply these numbers (642,378 × 436,378) by the following methods and compare the speed of each method:
- By hand
- With an abacus
- With a pocket calculator
- With your Apple computer

5 Invite an expert in the field of computing history to a club meeting to discuss past, present, and future developments in computer technology.

6 Create a display that includes a vacuum tube, a transistor, and a microchip.

7 If there is a science museum or school of computer science nearby, plan a field trip.

8 Build a microcomputer from a kit.



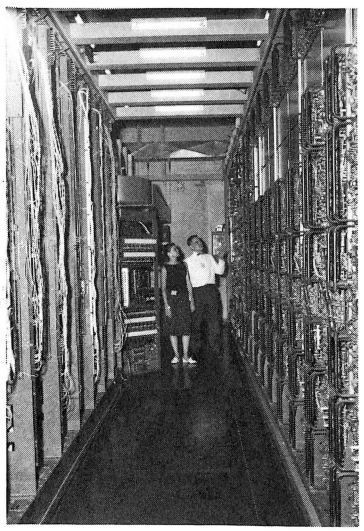
Types of Computers

There are many different kinds of computers. Modern computers come in three sizes: mainframe computer, minicomputer, and microcomputer. Mainframe computers are quite large and occupy a lot of space. They can store enormous amounts of information. They also are quite expensive. Mainframe computers are used by large businesses, government agencies, and universities. For example, the Internal Revenue Service uses a mainframe computer to keep track of the tax records for every citizen and business in the United States.

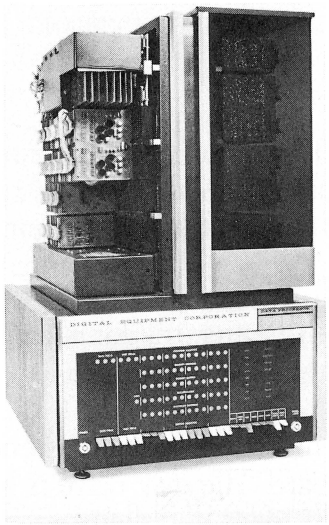
Minicomputers are about the size of a large cabinet, cost from about $10,000 to about $100,000, and store a lot of information. They are often used by businesses and some school systems.

Both mainframe computers and minicomputers can handle more than one job at a time. They do this by having stations called terminals connected to them. Terminals are devices that receive and send information to a computer. A terminal can be in the same room with a computer or be connected with a computer that is thousands of miles away.

Pictured is the Whirlwind mainframe computer which was developed at MIT; a classic PDP-8 which is an example of the first minicomputer; and the Apple Macintosh microcomputer.



The MIT Museum, Cambridge MA



The Computer Museum, Boston MA

Apple Computer, Inc.

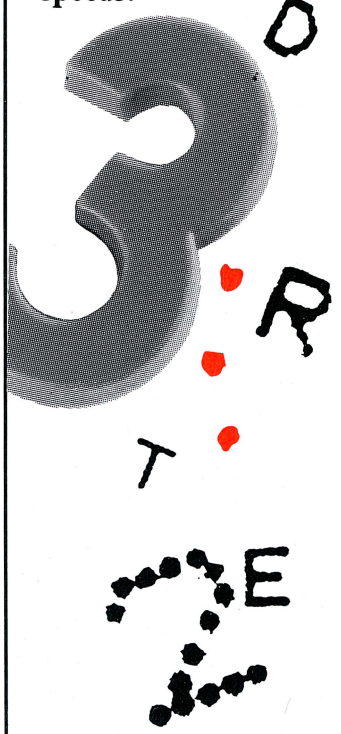
Microcomputers are frequently used by students and their parents. They are about the size of a typewriter and are designed for personal use. Microcomputers are popular because they are affordable and can perform a number of jobs. As you read this book, you will learn about the Apple family of microcomputers.

What Is a Computer?

What is a computer? A computer is a special machine that can work with numbers and words at very high speeds. It can also remember tremendous amounts of information.

Every computer has four parts or units; each does a particular job. These four parts are the input unit, the memory unit, the central processing unit (CPU), and the output unit. The picture below illustrates how the four parts work together. Imagine for a moment that a computer could run a hot-dog stand. The input unit would accept the customer's order. The memory unit would contain the ingredients. The central processing unit would organize the ingredients and fix the hot dog. The output unit would serve the hot dog to the customer.

A computer is a special machine that can work with numbers and words at very high speeds.



What Does a Computer Do?

Computers have three main activities:

1 Input: The computer takes in information.

2 Processing: The computer does something with the information.

3 Output: The computer gives out information.

Input, processing, and output are a lot like listening, thinking, and talking. An Apple computer has several parts that work together as a system to accomplish these activities.

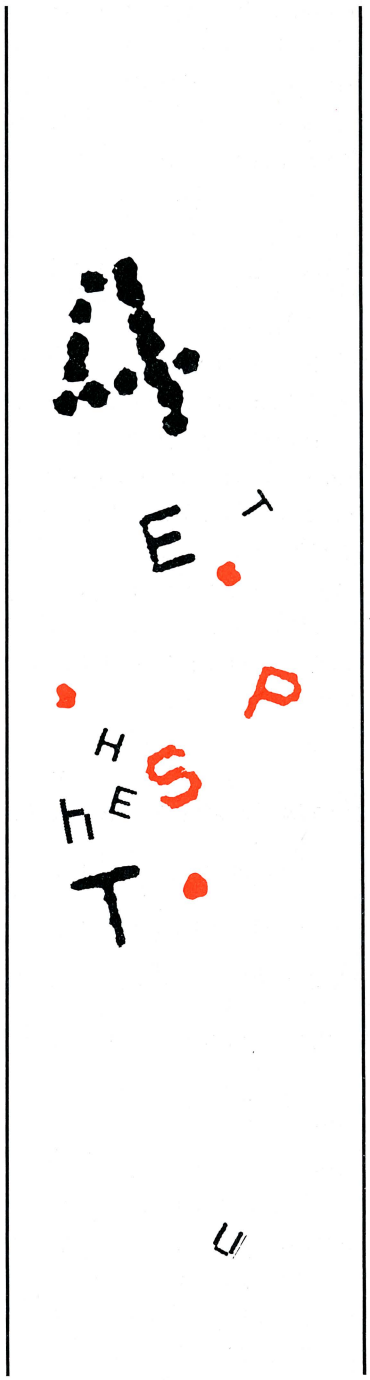
The parts of a typical Apple computer system that allow it to listen (receive input) are the disk drive and the keyboard. The disk drive is a device that can store and transfer information from a diskette to a computer. A diskette is a small, flat piece of plastic that rotates inside the disk drive. Diskettes, sometimes called disks or floppy disks, store

information that is put into a computer (input). Another way to input information into a computer is by using the keyboard.

Inside an Apple computer are a number of electronic components that are the "brains" of the system. These components allow the computer to process the information it receives as input. Examples of processing are adding numbers together and sorting files alphabetically.

The computer then uses a monitor or a printer to output—or display—the processed information. A monitor is a device that looks like a television set; a printer resembles a typewriter. Examples of output are seeing a graphics program on a monitor or printing out a list of friends' addresses.

Let's examine some other ways that a computer can receive input or produce output.



Input: Communicating with a Computer

Input is any information that you put into the computer. When you type on your Apple's keyboard, you are inputting information into the computer. When you load a program from a disk, the program becomes input because it is put into the computer from the disk drive. There are many ways to input information into the computer. Here are some examples:

Punched Cards

A punched card has patterns that represent different letters and numbers that are read by a card reader that is attached to the computer. The card reader reads the pattern of holes punched into the cards and sends the information to the computer.

Punched cards will be used less and less in the years to come as a way to input information into the computer because they are heavy, take up a good deal of storage space, and are slow for the computer to process.

Tape Drives

Some mainframe computers use reel-to-reel tape drives as input devices. Microcomputers can use a cassette tape recorder as an input device.

Magnetic Ink Character Reader

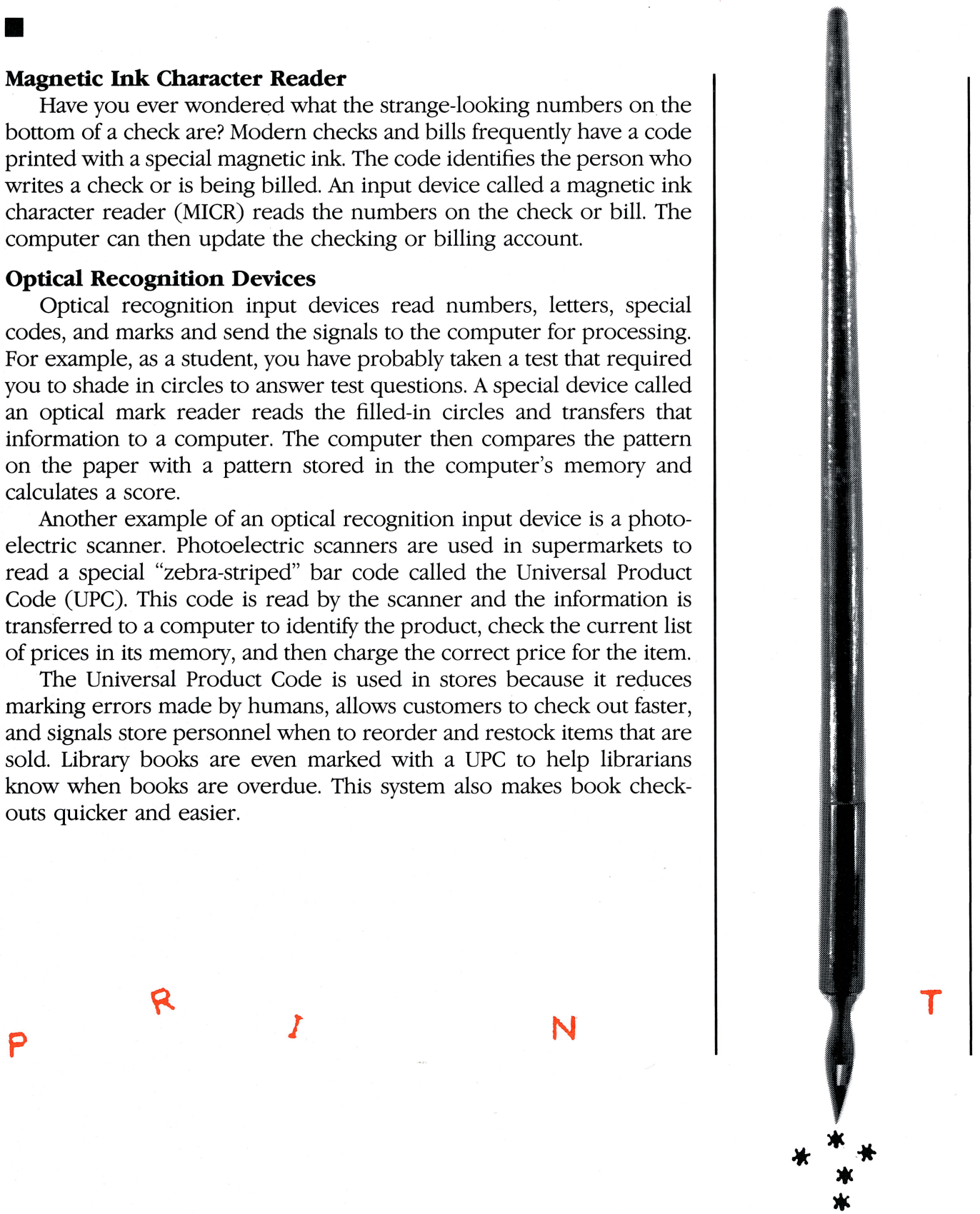
Have you ever wondered what the strange-looking numbers on the bottom of a check are? Modern checks and bills frequently have a code printed with a special magnetic ink. The code identifies the person who writes a check or is being billed. An input device called a magnetic ink character reader (MICR) reads the numbers on the check or bill. The computer can then update the checking or billing account.

Optical Recognition Devices

Optical recognition input devices read numbers, letters, special codes, and marks and send the signals to the computer for processing. For example, as a student, you have probably taken a test that required you to shade in circles to answer test questions. A special device called an optical mark reader reads the filled-in circles and transfers that information to a computer. The computer then compares the pattern on the paper with a pattern stored in the computer's memory and calculates a score.

Another example of an optical recognition input device is a photoelectric scanner. Photoelectric scanners are used in supermarkets to read a special "zebra-striped" bar code called the Universal Product Code (UPC). This code is read by the scanner and the information is transferred to a computer to identify the product, check the current list of prices in its memory, and then charge the correct price for the item.

The Universal Product Code is used in stores because it reduces marking errors made by humans, allows customers to check out faster, and signals store personnel when to reorder and restock items that are sold. Library books are even marked with a UPC to help librarians know when books are overdue. This system also makes book check-outs quicker and easier.

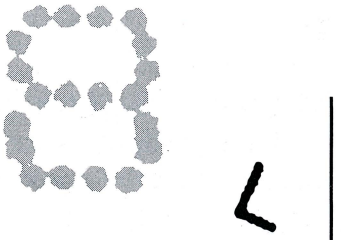


Voice Input Devices

Can you imagine telling your computer, "Please give me the names and addresses of all members in my Apple Computer Club." Scientists and engineers are hard at work creating devices that convert spoken words into digital code that can be understood by the computer. At the present time, some computers can understand a very limited number of spoken words. It is highly possible that by the end of this century, most computers will be able to understand a large spoken vocabulary.

Light Pens

Another type of input device is a light pen. A light pen looks like a pen and is connected to the computer with a cable. The pen senses light on the computer screen and sends information back to the computer. Light pens are frequently used by artists to create computer graphics.

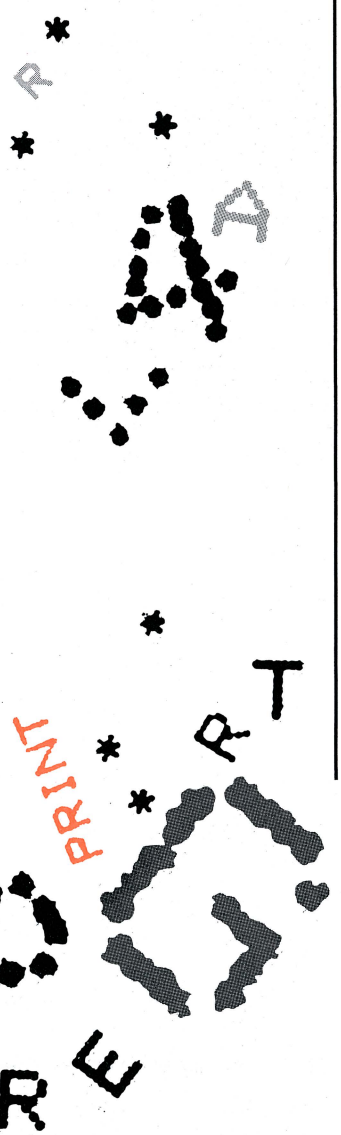


Another type of input device is a light pen. Light pens are frequently used by artists to create computer graphics.

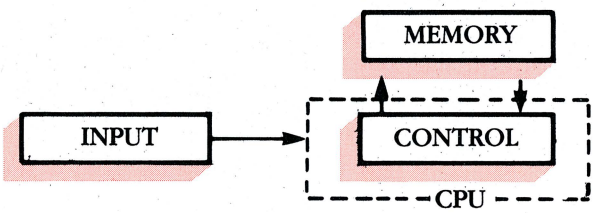
Processing: How the Computer Processes Information

The "brain" of a computer is the *central processing unit* (CPU). The CPU has two major parts, a control unit and an arithmetic-logic unit. The control unit can read and understand an instruction (program step) that is stored in one of the computer's memory spaces called "primary storage." The arithmetic-logic unit adds and compares numbers incredibly fast.

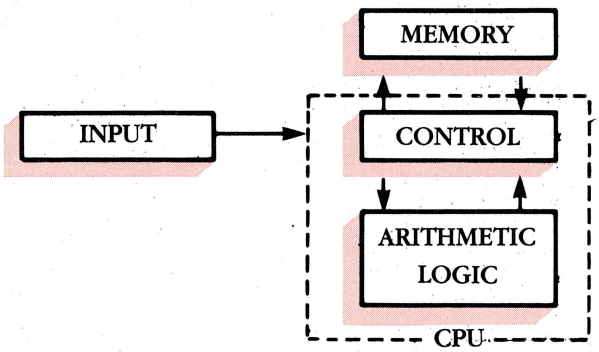
The CPU processes information in two steps. In the first step, when the CPU gets an instruction from primary storage (computer memory), its control unit interprets the meaning of the instruction. In the second step, the computer executes the instruction. An instruction might be an arithmetic operation (+, −, *, /) or a logic operation (comparing two quantities to see if they are equal). To execute an instruction, the computer may have to obtain additional instructions from primary storage. For example, an instruction may indicate that two numbers that have been input into the computer's memory are to be multiplied. During the execution step, the two numbers are brought into the arithmetic-logic unit and multiplied.



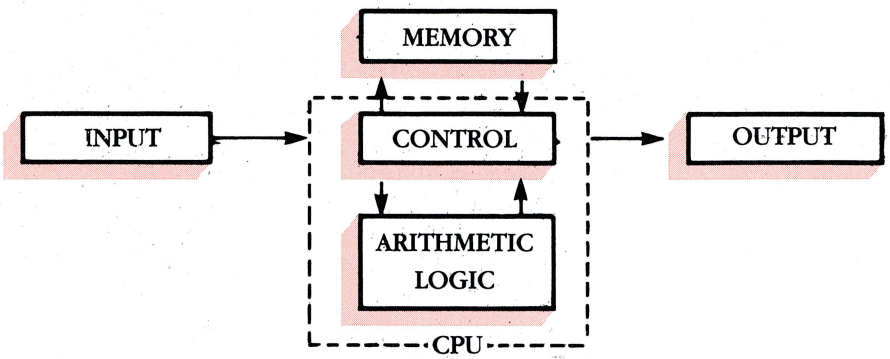
In step one, when information (data) is entered into a computer through an input device, the CPU's control unit directs the flow of that data through the computer.



The CPU sends the data to the memory for storage. Then data to be processed from the memory is brought back into the CPU. The CPU's arithmetic-logic unit calculates and compares the data.



Finally, it sends the processed data to an output device.



The speed at which the CPU works is measured in nanoseconds. A nanosecond is a billionth of a second. It takes about four nanoseconds for a computer to solve a problem like 89,764 × 345,789,908. The super speed of the arithmetic unit makes the computer a very powerful tool. How long do you think it would take you to complete a million arithmetic problems? A computer can solve more arithmetic problems in a minute than a typical person does in a lifetime.

Output: How the Computer Communicates with the Outside World

After a computer has processed data, it sends the processed data to an output device. Output can appear as pictures (graphics) on a screen, printing on paper, electronic signals, and sounds.

Video Output

The most common output device on microcomputers is a video screen or cathode ray tube (CRT). A video screen may be a television or a computer monitor.

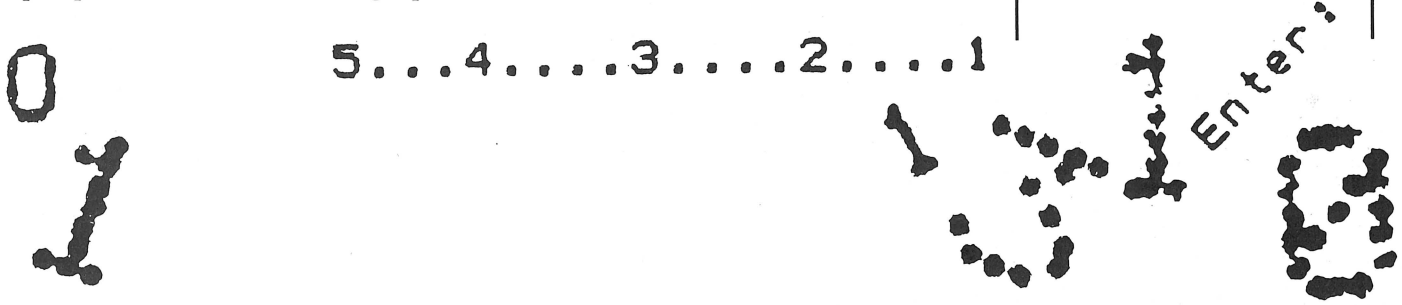
Printed Output

A printer is an output device that produces printed paper output known as "hard copy." There are many different kinds of printers. A dot-matrix printer is one type that is quite popular. A dot-matrix printer prints characters by making marks on paper in a pattern or matrix of tiny dots. The patterns look something like the numbers on an electronic basketball scoreboard. Dot-matrix printers are inexpensive and can print much faster than the fastest typists.

There are a number of other types of printers. Among them are the daisy wheel printer, the ink-jet printer, and the laser printer. Some laser printers are so fast that they can print 21,000 lines per minute!

Plotters

A plotter is a special kind of printer that draws maps, graphs, and charts. Some plotters are able to make multi-colored drawings. Plotters are very useful for mathematicians, engineers, architects, and other people who need to use graphs in their work.



Other Output Devices

Speakers can be used to output sounds created by a computer. Perhaps you own or have used a computer game or toy that speaks. Computerized rock music is a very popular art form today. Another kind of output device is a robot. Robots are used to follow computer instructions to do a number of jobs. Robots have been designed to assemble cars, wash windows, mine coal, and even pluck chickens and shear sheep.

Peripherals

The input and output devices that you have read about so far are usually attached to the outside of a computer. Devices that are attached outside the computer are called *peripherals.* Some peripherals are input *and* output devices (I/O devices). For example, a disk drive or a cassette tape recorder can input data to the computer or receive output.

The Making of a Chip

When you look at a computer, you usually see an attractive plastic case with a keyboard, but what you don't see is the real miracle inside the computer—the microchip! One Apple memory chip can hold 1,500 English words, numbers, or other information. It's a good thing that the microchip (or chip for short) exists, for without this tiny electronic wafer most people would never get to use or own a computer. Today, a single microchip is more powerful than the world's first digital computer, the room-sized ENIAC.

The microchip began in 1969 when a California electronics company, Intel, figured out how to shrink the main parts of a calculator onto four tiny silicon chips.

A computer chip resembles a domino with metal pins coming out of it. The pins make it possible to plug the chip into a computer circuit board. A chip is actually a very thin wafer of silicon that measures about one-eighth of an inch on each side. Silicon is a common element in the earth's surface found in sand, quartz, and granite. If you look closely at a chip, you might see what appears to be scratches, or etchings, on the metal.

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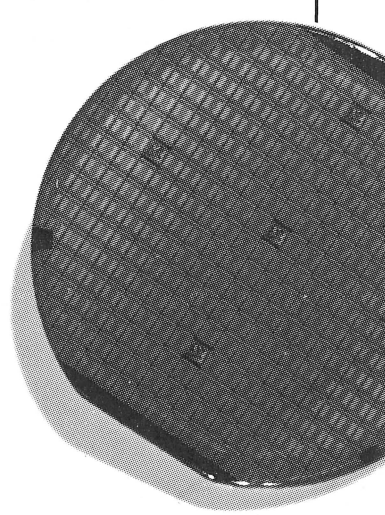


The Computer Museum, Boston MA

If you examined the surface of a chip with a microscope, you would discover that the "etchings" are actually very tiny circuits. A circuit is an electrical pathway. A thousand or more circuits may be on a single chip.

All of the circuits on a chip are connected together—or integrated—with one another. These chips are called integrated circuit chips. The process of placing many circuits on a single chip is called large scale integration (LSI). Here are the main steps in large scale integration:

1. An engineer designs the chip using a computer and prints out the chip's design with a plotter.
2. The printed design is photographed and reduced so that it is more than 500 times smaller.
3. The photograph is then baked in a special oven with temperatures that reach over 1000 degrees. During the baking process, the circuit design on the reduced photograph makes an indentation, or etching, on the silicon chip.
4. The silicon chip is then passed through a magnetic chamber to magnetize the etchings. Because the etchings have been magnetized, they can conduct electricity; they have become electrical circuits.
5. The chip is then placed into a plastic case with pins and tested.

This entire process takes place in specially sealed, dust-free rooms where all workers dress in sterile garments like surgeons. It is necessary to prevent chips from coming into contact with dust because a speck of dust will seem as large as a boulder to the microscopic roadways of a chip.

All chips are not alike. Of course, you probably know this. You wouldn't use a potato chip on a hard dip when you could use a strong corn chip instead.

Special Chips

All chips are not alike. Of course, you probably know this. You wouldn't use a potato chip on a hard dip when you could use a strong corn chip instead. Computers use many different kinds of chips, too. Two of the most important chips in any microcomputer are the memory chips.

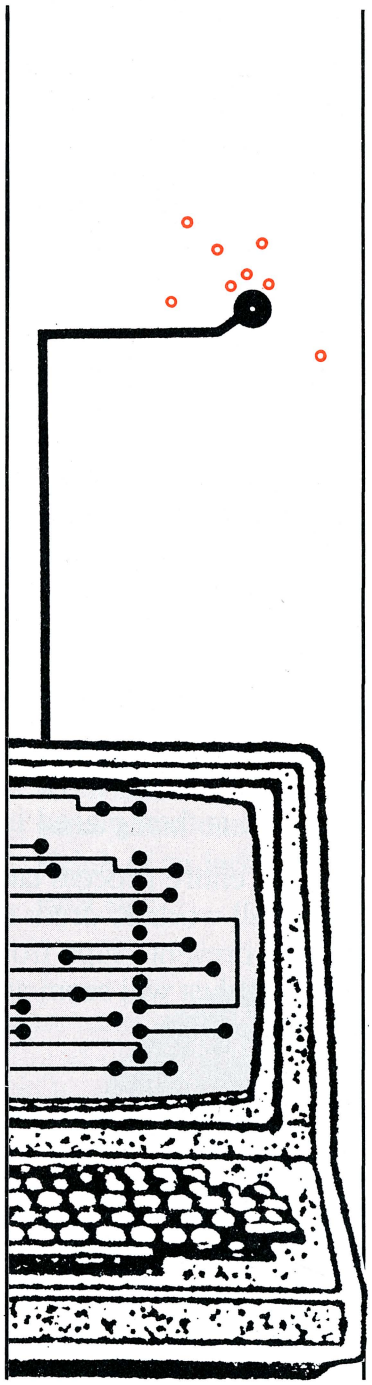
In the Apple computer, and many others, there are two kinds of memory. One kind is called RAM, *Random Access Memory.* The other kind is called ROM, *Read Only Memory.* How are these two types of memory different?

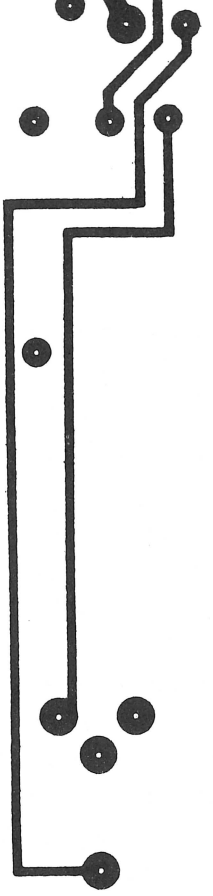
The random access memory, RAM, is a temporary memory. When you are programming or using software, the program instructions are stored in the computer's random access memory. However, all of the information stored in RAM is lost when you turn the computer off. To prove this to yourself, type a short program, turn the computer off and back on, then try to run the program. Your program will no longer exist because it was entered into the RAM, or temporary memory. This is why you need to save your programs on disks.

The ROM, or read only memory, is the computer's other kind of memory. The ROM stores programs and information that are permanently recorded into the computer's memory at the factory. The contents of ROM can be read and used, but they cannot be changed. One thing that your Apple computer has stored in its ROM is the Applesoft BASIC programming language.

Another very important kind of chip in the computer is the central processing unit (CPU) chip. The CPU is the "brain" of the computer and has two parts—the *arithmetic unit* and the *control unit.* The arithmetic unit is sometimes called the logic unit and does the calculations.

The second part of the CPU, called the control unit, contains circuitry that, with electrical signals, directs and coordinates a computer system in carrying out a series of instructions. The control unit does not execute the instructions itself; rather, it directs other parts of the computer system to do so.





Bits and Bytes

People usually think of computers as intelligent machines. But the fact is that computers basically know only two things: "on" and "off." Every circuit on a computer chip can be switched on or off; current either flows through the circuit (on) or doesn't flow through it (off). The computer is told when to switch a circuit on or off using a code called *binary code.*

Binary code is a number system that uses two numbers: 0 for "off" and 1 for "on." The two digits, 0 and 1, are called *bits* (binary digit = *bit*). Every time the computer processes data, it translates the information into a series of bits (1's and 0's). In most microcomputers, a combination of eight bits (1's and 0's) are used to represent letters, numbers, and symbols. When you type the letter A on your computer keyboard, the letter is translated into the following binary code: 01000001. Eight binary digits, or bits, make up a *byte.* For example, suppose you entered this instruction into your Apple computer:

PRINT "HI"

The computer changes each character and symbol in the instruction into an eight-digit byte. The circuits in each byte are turned on or off in different combinations that the computer understands.

BYTE		CIRCUITS							
		1	2	3	4	5	6	7	8
P	0101 0000	off	on	off	on	off	off	off	off
R	0101 0010	off	on	off	on	off	off	on	off
I	0100 1001	off	on	off	off	on	off	off	on
N	0100 1110	off	on	off	off	on	on	on	off
T	0101 0100	off	on	off	on	off	on	off	off
"	0010 0010	off	off	on	off	off	off	on	off
H	0100 1000	off	on	off	off	on	off	off	off
I	0100 1001	off	on	off	off	on	off	off	on
"	0010 0010	off	off	on	off	off	off	on	off

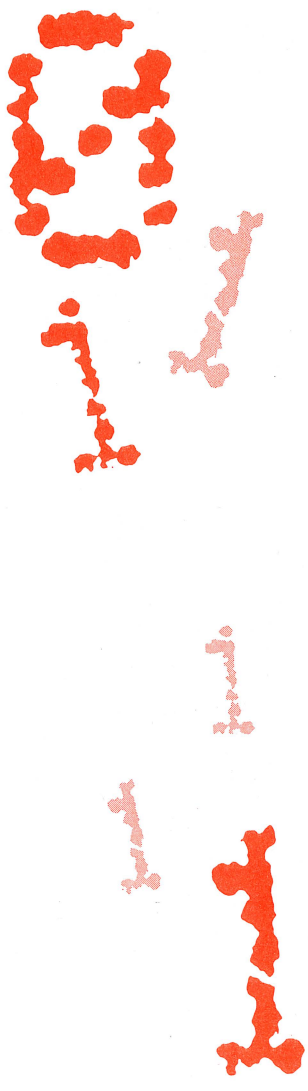
A standard way to describe the size of a computer's memory is to identify how many *kilobytes* it can store. A kilobyte or K equals 1,024 bytes. A digit, letter, or special character can be stored in one byte of memory. An Apple IIe computer usually has 64 kilobytes (64K) of RAM (random access memory). This means that it can temporarily store approximately 64,000 characters or symbols.

Binary Code: Your Computer's Native Language

What your computer actually understands when you program in BASIC or any other programming language is a special language called *machine language*.

Machine language is a code made up of the numbers zero (0) and one (1). You've learned that this code is called *binary code*. There are different binary code alphabets. The binary code alphabet used by the Apple is called the ASCII code. ASCII stands for American Standard Code for Information Interchange. No matter what you type on the keyboard, the computer quickly translates this into binary code. Only then can the computer understand the information that you have given it. For instance, 0100 1000, 0100 0101, 0100 1100, 0100 1100, 0100 1111 means HELLO in binary code.

Machine language is a code made up of the numbers zero (0) and one (1). You've learned that this code is called *binary code*.



Binary Code Alphabet

A 0100 0001	J 0100 1010	S 0101 0011
B 0100 0010	K 0100 1011	T 0101 0100
C 0100 0011	L 0100 1100	U 0101 0101
D 0100 0100	M 0100 1101	V 0101 0110
E 0100 0101	N 0100 1110	W 0101 0111
F 0100 0110	O 0100 1111	X 0101 1000
G 0100 0111	P 0101 0000	Y 0101 1001
H 0100 1000	Q 0101 0001	Z 0101 1010
I 0100 1001	R 0101 0010	

Can you use binary code to solve the riddle below?

WHAT DO COMPUTERS DO FOR FUN IN HAWAII?

0101 0100 0100 1000 0100 0101 0101 1001

0101 0010 0100 1001 0100 0100 0100 0101

0100 1011 0100 0101 0101 1001

0100 0010 0100 1111 0100 0001 0101 0010 0100 0100 0101 0011

The First Apple Computer

Years ago when people heard the word "apple," they probably thought of apple pie, candied apples, and apple sauce. In 1977, two young men, Steven Jobs and Steve Wozniak, added a new meaning to the word "apple" by creating what has become the world's most popular personal computer.

Jobs and Wozniak, two college dropouts, met at a club for amateur computer builders in 1975 and realized that their expertise was needed by others. They formed the Apple Computer Company in 1977 after building a computer in their garage by using $1,300 from the sale of an old Volkswagen.

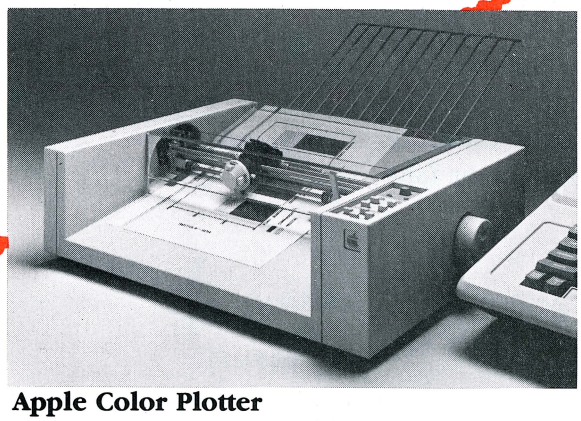
Apple computers were among the first computers with easy-to-use typewriter keyboards. Today, the Apple Computer Corporation in Cupertino, California, is one of the most successful computer companies in the world. There are many different kinds of Apple computers. Your Apple Computer Club might be interested in learning about different Apple computers by visiting your local Apple Computer dealer or having a salesperson attend a club meeting.

Lisa

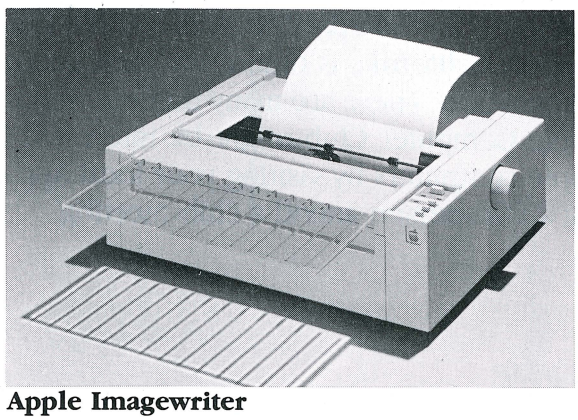
wow!

A Family of Apples

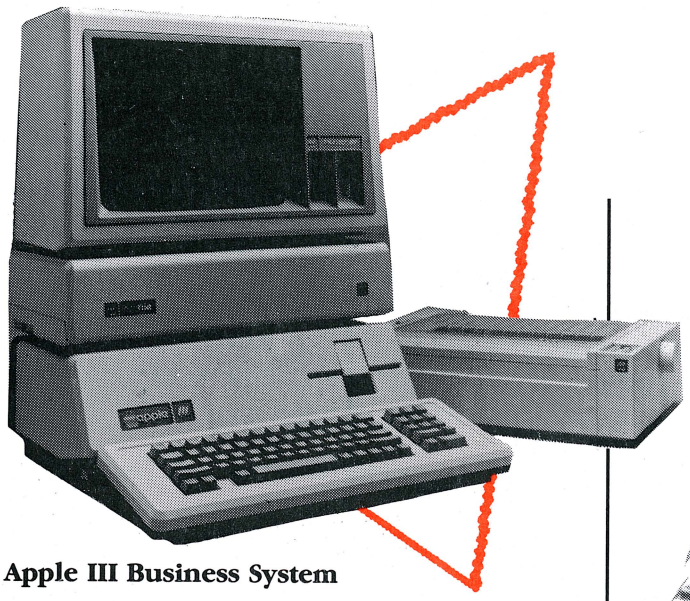
More than 750,000 people own Apple computers; they use them in businesses, classrooms, industries, and homes. Apple can proudly claim to have produced the most popular personal computer in the world—the Apple IIe. But the Apple IIe is only one of the many members of a growing family of Apple computers; each has its own special capabilities and features.



Apple Color Plotter



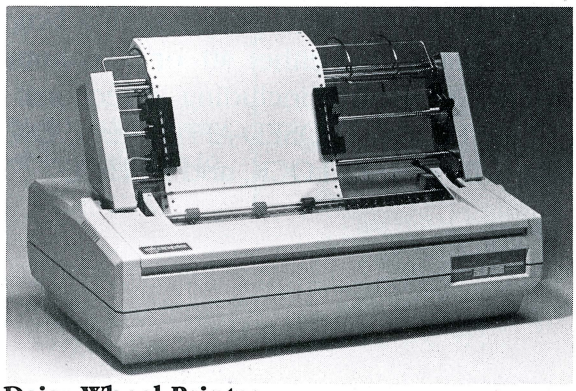
Apple Imagewriter



Apple III Business System

Apple IIc

Apple IIe



Daisy Wheel Printer

The Apple IIe

The Apple IIe is advertised as "the most versatile personal computer in its class." Not only is this computer the most popular of all home use computers but it has become the standard in many schools both in the U.S. and abroad because it is supported by the most extensive collection of educational software available for any computer. This easy-to-use machine has the following standard features:

- A typewriter-style, 63-key keyboard with upper- and lower-case characters and an auto-repeat feature
- Special-function keys: UP, DOWN, RIGHT, and LEFT arrows, TAB, DELETE, CONTROL, ESCAPE, SHIFT, CAPS LOCK, RESET, and programmable OPEN-APPLE and CLOSED-APPLE
- An 8-bit microprocessor
- 64K bytes of RAM
- 16K bytes of ROM, which includes built-in Applesoft BASIC
- Seven I/O expansion slots
- Color graphics and sound capabilities

The IIe's ability to adapt to the expanding needs of the user makes this computer a good choice for both the beginner and the expert.

The Apple IIc

The newest addition to the Apple computer family is the Apple IIc. Because it is small (fits in a brief case), light (7-1/2 pounds), and portable (a battery pack is available), it can go with its owner just about anywhere. Its standard features include:

- 128K RAM
- Built-in disk drive
- Built-in RF modulator, which allows it to be attached to a TV set for video display
- Built-in Applesoft BASIC programming language
- A switch that allows either 40- or 80-column displays
- Complete keyboard including directional keys and programmable OPEN-APPLE and CLOSED-APPLE keys, ESCAPE, TAB, CONTROL, RETURN, SHIFT, CAPS LOCK, and DELETE

- Built-in color graphics
- Sound capability with volume control knob and headphone plug-in jack
- Carrying handle that can be used to prop up the computer at the proper typing angle
- Plug-in connectors for peripherals such as a mouse, joystick, modem, video display units, extra disk drive, printer, and plotter

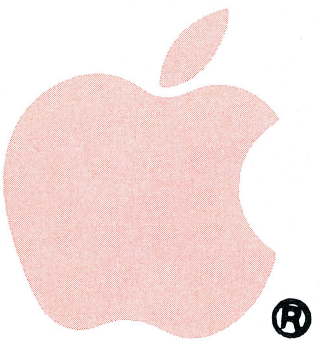
With all the standard features listed above and the ability to run nearly all the software developed for the Apple IIe and earlier Apple II versions, this computer is both powerful and practical for any user.

The Apple III

Designed specifically to meet business computing needs, the Apple III is a valuable tool for the businessperson. It can be used to help handle management tasks such as the creation of budget reports, project scheduling, information communication, software development, and even management training. With several hundred business programs available, the Apple III is a flexible and powerful computer for business use. Its standard features are:

- 256K of RAM
- A built-in disk drive
- High-resolution 16-color graphics
- 80-column, upper-case, and lower-case display
- 61-key, contoured, typewriter-style keyboard with auto-repeat function
- Numeric keypad
- Special keys: UP, DOWN, LEFT, and RIGHT arrows, programmable OPEN-APPLE and CLOSED-APPLE, TAB, SHIFT, ALPHA LOCK, CONTROL, RETURN, ENTER, and ESCAPE
- Quick-connect plugs for I/O devices
- Four expansion slots for interface cards
- High-quality sound capabilities
- Compatibility with ProFile hard-disk systems

With its large built-in memory capacity and ability to accept an impressive number of accessories, the Apple III is a capable assistant in business.

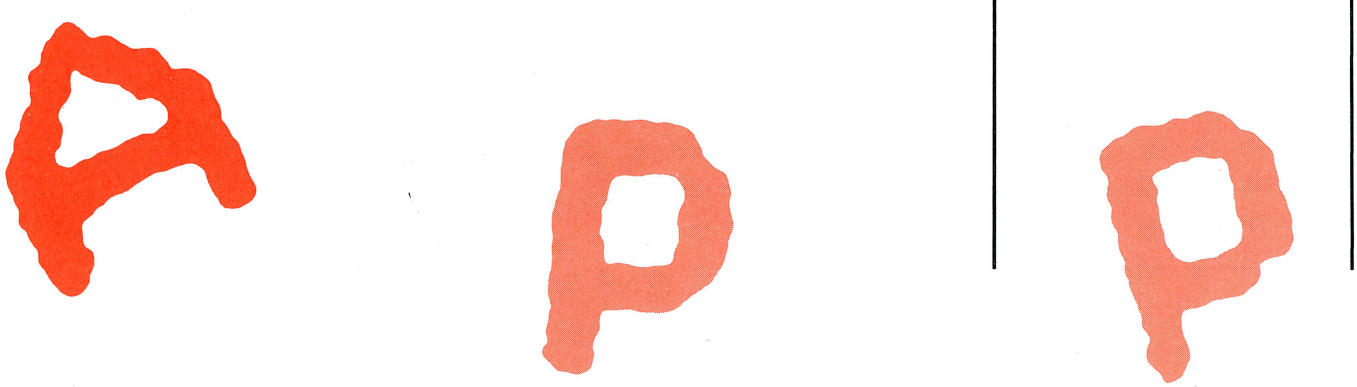


The Lisa

Lisa, the most powerful and sophisticated computer built by Apple, is advertised as the most revolutionary personal computer in the world. It not only has the power and flexibility to handle just about any business processing or management job, it is easy to use as well. Supported by specially designed software packages and controlled by a *mouse* (a small rolling box that fits under your hand and enables the user to control a pointer on the screen) rather than difficult-to-learn control codes, Lisa quickly and easily handles such business management tasks as data communication, budgeting, project management, reporting, correspondence, and high-resolution graphics displays and production. Its standard features are listed below:

- 12-inch high-resolution screen display (364 lines by 720 dots)
- Detached, 77-key, standard typewriter-style keyboard
- Numeric keypad
- Mouse-driven cursor positioning
- Built-in dual 840K disk drives
- 32/16-bit microprocessor
- 16K ROM
- Up to 1 megabyte RAM
- 2 serial ports and 1 parallel port for peripherals such as printers, modems, and hard-disk storage devices
- Built-in speaker for sound capability
- 3 expansion board slots

With Lisa, the first 32-bit member of the Apple computer family, Apple has provided business with one of the most easy-to-use and powerful personal computers available today.

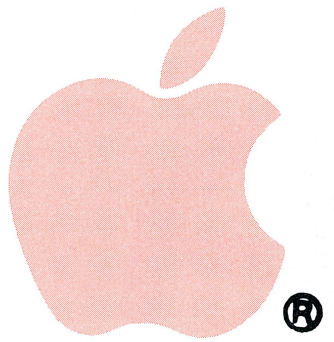


The Macintosh

The Macintosh is the closest relative of the first 32-bit Apple computer, Lisa. Like the Lisa, Macintosh was designed with the user in mind. Using a mouse and some of the most sophisticated software ever developed for a personal computer, The Macintosh makes it possible to go from the computer store to the office or home and get down to serious computer-aided work in almost no time. Its standard features are listed below:

- 32-bit microprocessor
- Built-in disk drive
- 128K of RAM
- 64K of ROM
- 9-inch built-in monochrome monitor
- High-resolution graphics displays (512 by 342 pixels)
- 3-1/2 inch disk drive (400K capacity)
- 58-key detachable keyboard
- Mouse cursor positioning
- Sound generator (four channel)
- Serial ports for modem and printer
- External connector for second disk drive

With added options—such as a numeric keypad, Imagewriter printer, modems, and *MacWrite* (word processing) and *MacPaint* (graphics) packages—Macintosh can easily fill the needs of educational, business, and home users.



Other Family Members

The five computers built by Apple are not the only members of the Apple family. Any computer system is only as good as the peripherals that take care of input and output chores.

Video Display Devices

Apple offers several video monitors for its family of computers: the Apple II monitor, the Apple III monitor, and the Apple IIc monitor. All three monitors have a green-screen, high-resolution display. Unlike the other two, which have 12-inch diagonally measured screens, the IIc monitor has a 9-inch display. The three are interchangeable and, of course, can be replaced by color monitors or televisions when the Apple's color capabilities are desired.

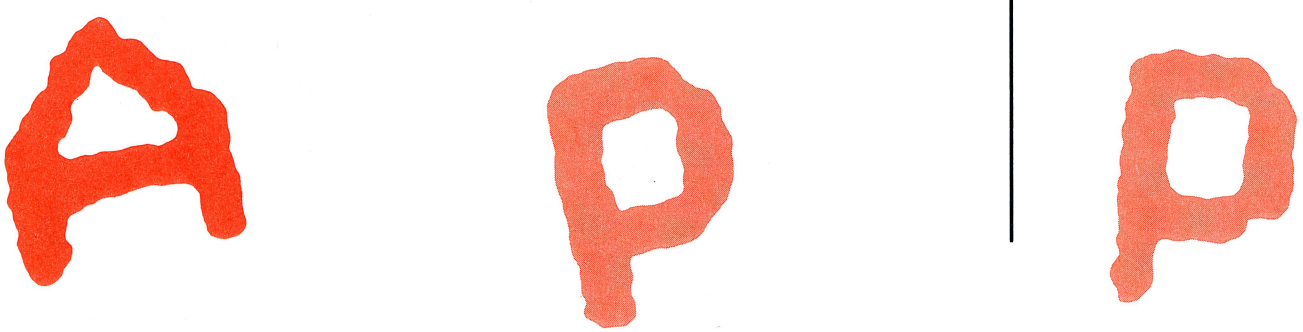
A flat panel display device small enough to fit on top of the Apple IIc can slip inside a briefcase or backpack along with the Apple IIc.

Printers

You will need a printer to produce hard copy of all the work your Apple does for you. Knowing that one kind of printer does not fit the needs of all users, Apple offers two different types of computer printers.

The Apple Imagewriter

Available in standard or wide carriage sizes, the Apple Imagewriter printer features print resolution of 160 × 144 dots per inch. It prints 120 characters per second in text mode and 180 characters per second in graphics mode. It features a number of print pitches, superscript and subscript, adjustable-width tractor and friction feed, exceptionally quiet operation, and can be used with any Apple computer.

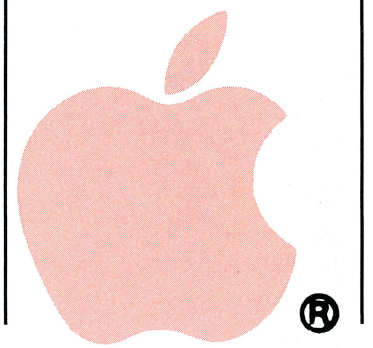


Apple Daisy Wheel Printer

The Apple daisy wheel printer is designed for the professional or home computer user who needs letter-quality printing capabilities. Unlike the Imagewriter or other dot-matrix printers, it is a fully formed character, impact printer. It offers high speed (40 characters per second) plus graphics capability. A wide variety of 130-character print wheels provides the flexibility to match print styles to print needs. The Apple daisy wheel printer can be plugged directly into the serial interface port of the Lisa, Apple III, or Apple IIc. With an Apple IIe system, the printer plugs into the connector of the Apple Super Serial interface card installed in any unused expansion slot.

The Apple Color Plotter

Some computer users need to display graphics and data in an easy-to-read, colorful format. This can be done either on paper or on attention-getting overhead transparencies using the Apple Color Plotter. Using four active pens in eight different colors, this device allows the user to produce labels and other text work to be done at the same time as colorful graphics. The Apple Color Plotter is the tool for creating colorful pie charts, bar charts, line graphs, or drawings.



Buying a Computer

So you've just decided to buy your own computer. Great! But, before you plunk down your money there are a few things you should consider.

The first thing every computer buyer should think about is what he or she wants to do with a computer. Remember, computers are capable of doing many different things. You can use a computer to learn how to program, write letters, study for school, and play games.

Here's a checklist of things to think about before you buy a computer:

- ☐ If you plan to use your computer to play a lot of video games, find out if your favorite game programs are available for the computer you plan to buy.
- ☐ If you plan to write your own programs, you should purchase a computer that has programming capability in more than one programming language. You should also make sure the computer has a large enough RAM memory and a keyboard that's easy for you to use.
- ☐ If you are using a computer at school, you may want to consider buying the same kind of computer for home use. The advantages of doing this are you may be able to borrow your school's software to use at home and you will be able to write programs at home that can also be used at school.
- ☐ If you want to use programs that help you in school subjects such as math, English, or a foreign language, be sure those types of programs are available for the computer you plan to buy.
- ☐ Make sure that the store where you buy your computer will help you set up and get started using your computer, if necessary.
- ☐ Find out if there is a local users' group in your area for the computer you plan to buy. A users' group is a good place to learn about your computer and share ideas.
- ☐ The computer system you plan to buy should allow you to expand the memory or add useful peripherals such as light pens, graphics tablets, joysticks, printers, and music synthesizers.

The first thing every computer buyer should think about is what he or she wants to do with a computer. Remember, computers are capable of doing many different things. You can use a computer to learn how to program, write letters, study for school, and play games.

Projects

1 Try to obtain or borrow different input and output devices to demonstrate at club meetings.

2 Make arrangements to visit a store that uses an optical scanner at their checkout stands. You may even discover that your local supermarket is using an output device that informs the customer about the price of an item. Ask the store manager to explain how computer devices are used to order and price merchandise.

3 Visit a local bank to find out how an automatic-teller system works.

4 Arrange a tour of schools, businesses, or government offices that use mainframe computers or minicomputers.

5 Cut photographs out of computer magazines to make a display about various computers, their peripherals, and various uses.

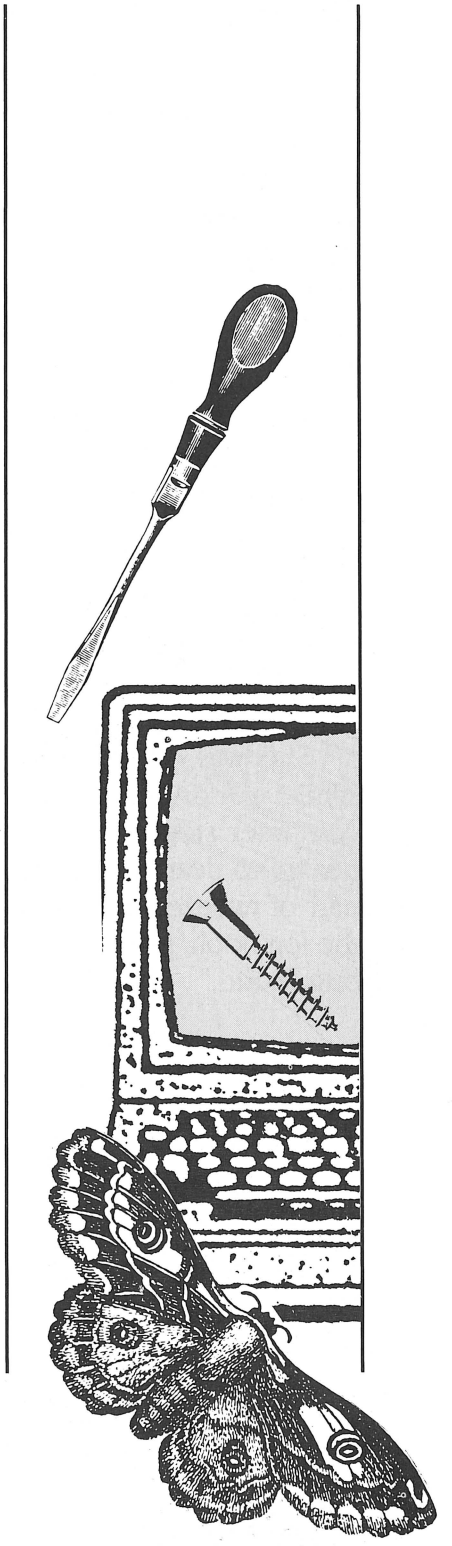
6 Obtain an old microchip and remove the top to expose the actual chip. Examine the surface of the chip with a microscope.

7 Try this: Turn on your Apple computer and enter the command PRINT FRE (0), then press RETURN. A number like −18435 will be displayed on the monitor. This number indicates how much of the computer's RAM has been used.

8 Hold a club scavenger hunt for computer-related parts or products. Start by making a list of items to hunt for: checks, universal product codes, punched cards, or old computer chips. After the members of the club have collected a variety of items, use them to build a club sculpture.

9 Hold a club contest! Ask each club member to guess how many bytes of information are on this page. Find the answer by counting the number of words, numbers, symbols, and spaces between words on this page. Divide the total number by eight. The answer will be the number of bytes on this page.

10 A good way to learn more about how a computer works is to build one. Ask your club advisor to find out where you can obtain a kit to build your own computer.



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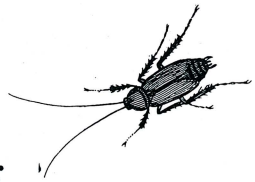
11 Try writing your name in binary code.

12 Make a wall chart that has your club's name and the names of each member written in binary code.



Micro Bits!

The Grand Lady of Computing — Grace Hopper

Seventy-six-year-old Grace Murray Hopper is a very special person. She is a Commodore in the U.S. Naval Reserve and one of the first computer programmers. Commodore Hopper is the oldest naval officer on active duty and spends nearly all of her time traveling around the country and abroad lecturing about computers.

With the outbreak of World War II, she joined the Naval Reserve and was assigned to work at Harvard University on the first computer—the Mark I. Commodore Hopper figured that since it's much easier for most people to write an English statement than it is to use special symbols, programmers should be able to write their programs in English, using the computer to translate them into machine code. Her idea was the beginning of COBOL, one of the first programming languages.

She was present when the computer term "bug" was first used. While working on the Mark II computer in the summer of 1945, the computer stopped! Inside one of the big signal relays of the Mark II, beaten to death by the relay, was a moth. The computer operator got a pair of tweezers and fished the bug out of the relay. He put the bug in the log book, put scotch tape over it, and below it he wrote, "First actual bug found."

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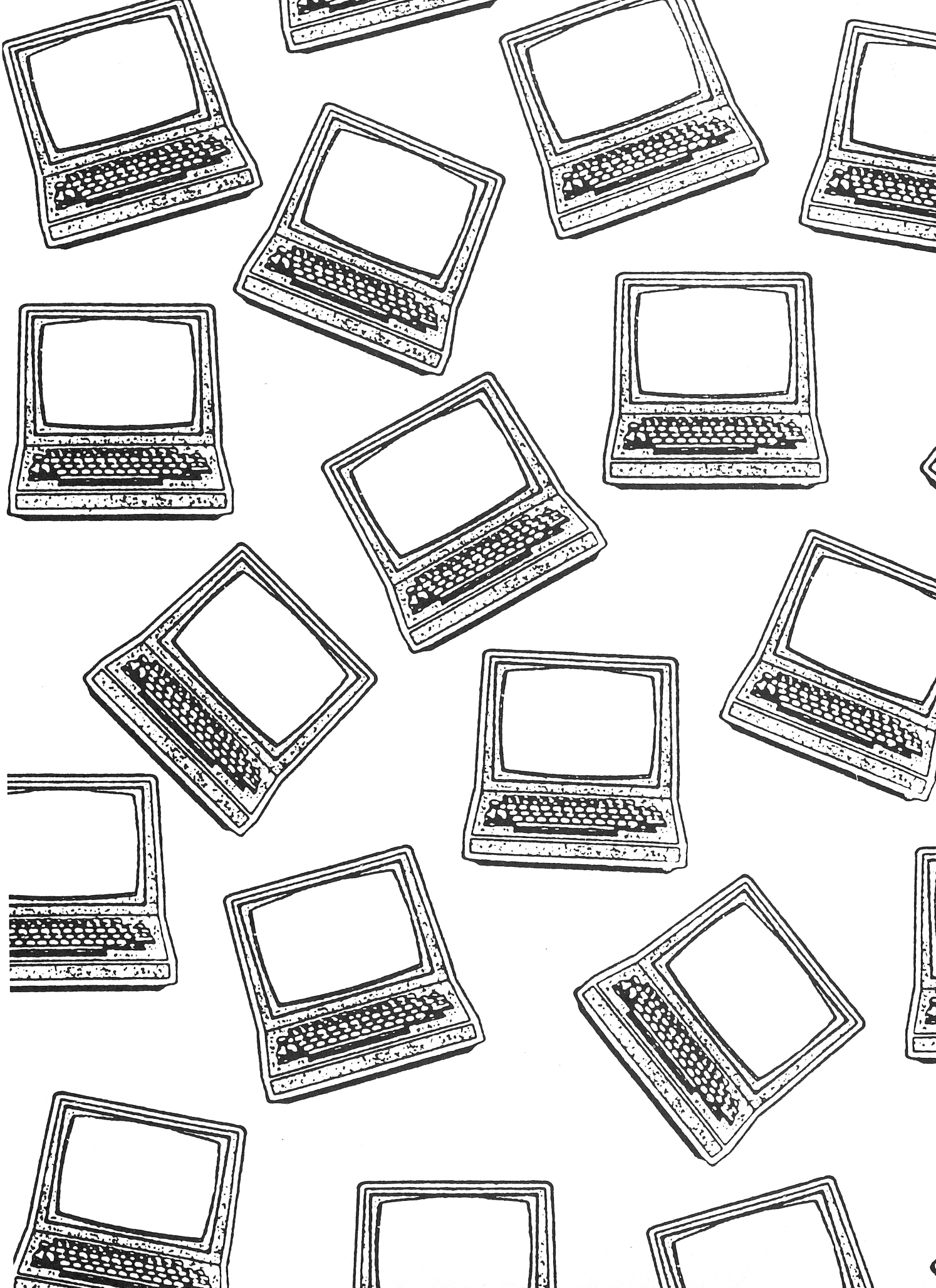


Computers In Your Life

2

Notes to the Club Advisor

Chapter Overview

This chapter introduces club members to some common and uncommon applications of computer technology. Computers in space, medicine, school, sports, and music are just a few of the many topics presented.

Things to Consider

Ideas for presenting the information in this chapter are described below:

1. Create a display of pictures that show people involved in different computer careers.
2. Find out which local universities, colleges, or technical schools offer special computer training or degree programs. Write the schools and request information about admission and graduation requirements.
3. Arrange to have guest speakers who work with computers come to a club meeting and discuss their jobs and training.
4. Have club members prepare a report about the use of computers at their school. Potential survey questions are presented in this chapter.
5. Provide club members with an opportunity to use some of the instructional software recommended in this chapter.
6. Have club members request information from the various computer camps mentioned in this chapter.

7 Arrange field trips to businesses where computers are used.

8 Assist club members in a project that requires them to interface a computer with a video disk player. The Super Pilot authoring language is well suited to this purpose.

9 Have club members make a chart and tape of rock groups that use computers to make music.

Computer Careers

In 1970 there were 100,000 computers in use in the United States. By 1987, it is estimated that there will be between 4 and 5 million personal computers alone! Someone is going to have to keep all of those computers operating. The following sections present just a few examples of careers in computer-related fields.

Data Entry Operator

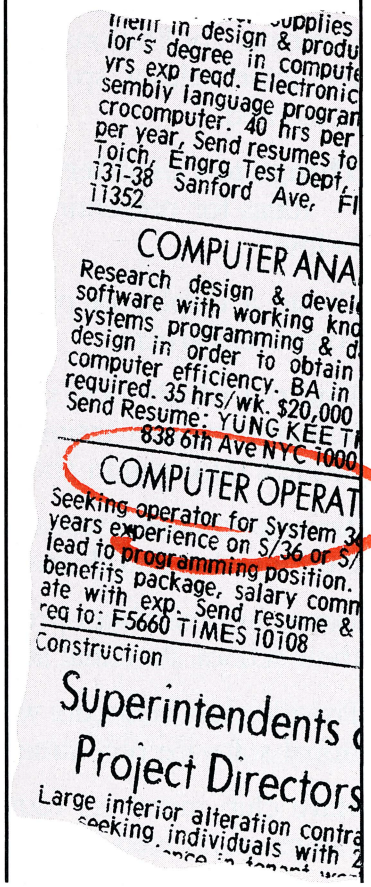
A data entry operator is the person responsible for inputting information into a computer. A keypunch operator uses a keypunch machine with punched cards or a terminal with a keyboard and a CRT to enter information into the computer. For example, large businesses use a mainframe computer to keep track of customers' records and bills. Each time a customer pays a bill, this data is entered into the computer by a keypunch operator. Keypunch operators do not have to know how to program or operate a computer.

Computer Operator

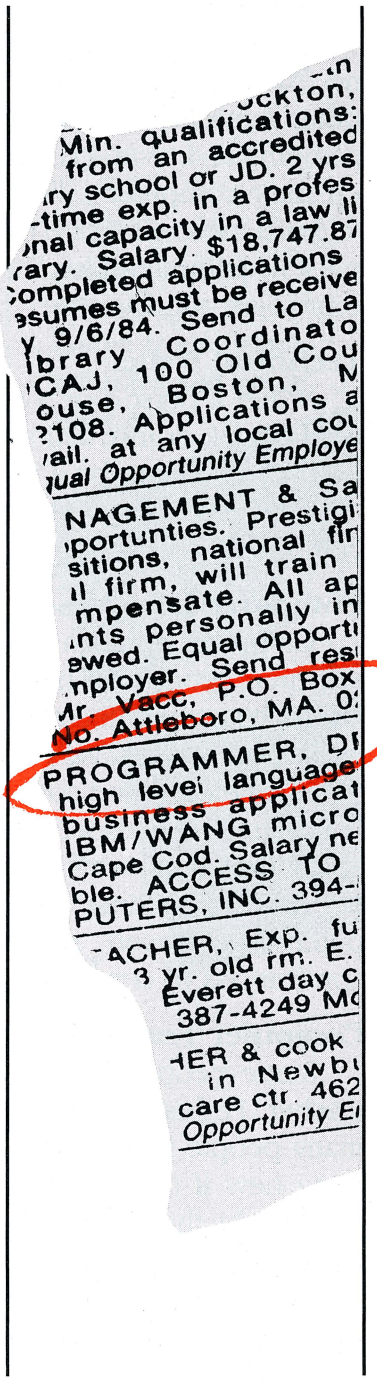
A computer operator is a person who actually works with the computer. The operator prepares equipment to run programs and sometimes fixes programs or hardware. Computer operators work closely with computer programmers and must be knowledgeable about many aspects of data processing. Computer operators are usually not required to have a college degree in computer science. They usually are required, however, to complete some technical training.

Computer Librarian

The duties of a computer librarian include keeping track of thousands of programs and data files kept on disks, tapes, or punched cards.



A computer librarian may work for a business, a school, the government, or any other agency that accumulates a large quantity of computerized information. A high-school education is usually sufficient in order to become a computer librarian. Like all librarians, however, computer librarians have to be good at record-keeping and organizing.



Programmer

A programmer writes the instructions that become the computer program that tells the computer how to process data. Programmers must be able to program in a computer programming language. There are a number of programming languages; most programmers know how to use more than one of them. If you want to become a programmer, you should study business data processing or computer science at a college or university. It is also helpful to have some special knowledge about the subject area for which you would like to write programs. Can you imagine writing a program to control the flight of an airplane without knowing anything about flying?

Systems Analyst

When a company decides to use a computer to keep records or do other jobs, they must first decide whether or not a computer can do the job they want done. The person who helps the company make this decision is the systems analyst. A systems analyst plans what kinds of programs the company should have its programmers develop. He or she must also be able to work with programmers and business managers. If you plan to become a systems analyst, you will need a college degree in computer science. It is also helpful to have a background in business.

Hardware Designer

Someone has to design and build computers. This is the job of a hardware designer. He or she designs computers, input and output devices, chips, and other computer components. To become a hardware designer, you will need to study electronics engineering at a college or university.

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Computer Service Technician

Every machine breaks down from time to time, and computers are no exception. Computer service technicians repair and maintain computer equipment. They also work closely with hardware designers in planning and testing computer equipment. Because companies depend on their computers, they frequently hire their own computer service technicians to take care of equipment problems. Computer technicians must usually attend a technical school for their training for two years or more.

Technical Writer

When a person or a company buys a computer, they usually must read a book or instruction manual to operate it. Computer manuals and books are written by a technical writer. A technical writer is usually a college graduate with good writing skills and a knowledge of computers.

Computer Salesperson

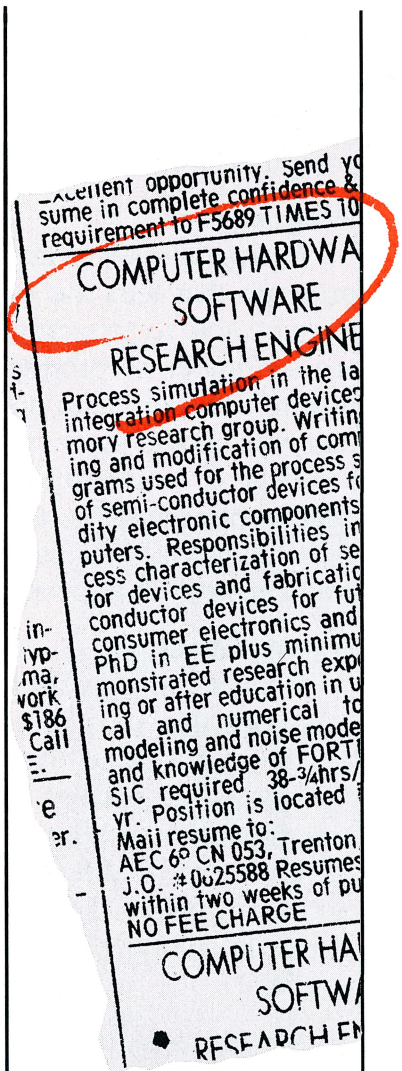
Computer companies and computer stores hire men and women to sell their products. These people not only sell products but assist potential customers in making decisions about which computer to purchase and how to use it in their business or home.

It is helpful for a computer salesperson to be knowledgeable about computers. It is especially important that a computer salesperson be able to get along with people and explain technical details in an understandable way. Since so many customers are business people, a computer salesperson should also have knowledge about business applications of computers and computer software.

Computer Teachers

Some people can sit down and learn about something without a teacher. Perhaps this is how you learned how to use a computer. But many people feel more comfortable about learning how to do something new if they are taught by an experienced teacher. This is one reason why there is a great demand for men and women who can teach other people how to use computers.

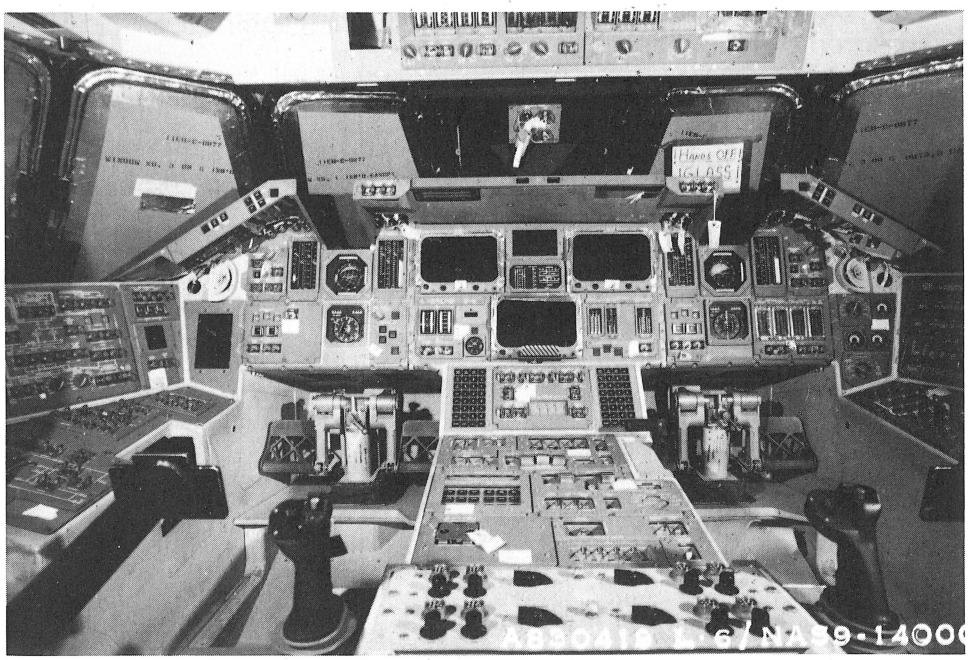
Computers are not easy for everyone to use. In fact, some people are simply afraid of computers. Schools, companies, and computer



stores hire teachers to train people how to use computers. They teach students how to program and use the computer in various ways. To be a computer teacher, a person should be well-informed about computers and capable of presenting information about computers in an organized way. Many computer teachers have degrees in computer science, business, or education.

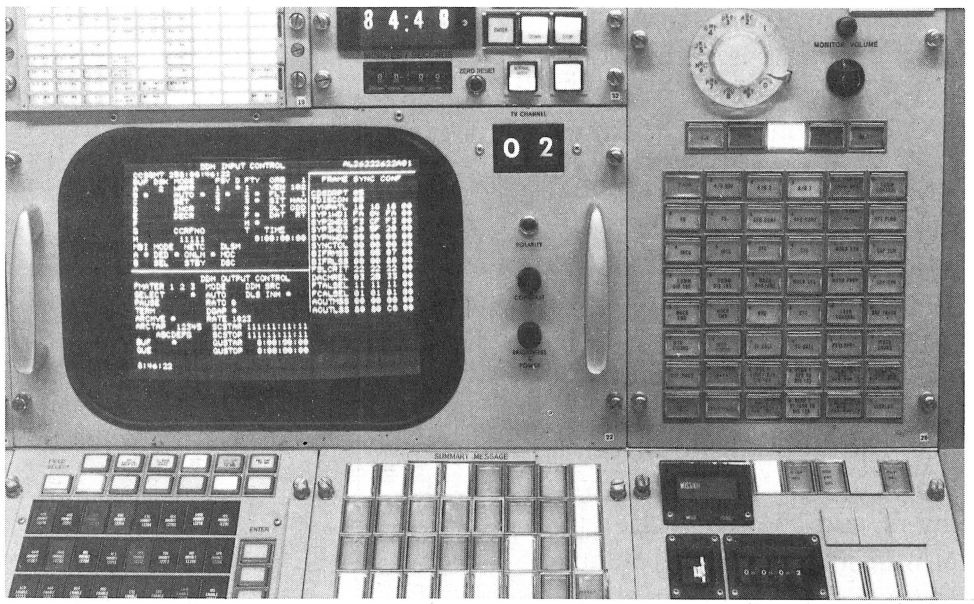
Computers in Space

On April 11, 1970, Mission Control received an emergency message from the Apollo spacecraft heading toward the moon. An explosion had partially disabled the spacecraft. The lives of the three astronauts on board were threatened because their supply of oxygen was dwindling. Scientists, computer programmers, and computer operators at the National Aeronautics and Space Administration (NASA) Manned Spacecraft Center in Houston, Texas, began a feverish effort to solve this life-threatening problem. This problem was solved and the astronauts were returned safely to earth. How?



NASA

NASA also uses computers to interpret photographs transmitted from distant satellites and space vehicles.



NASA

A close-up view of part of a console in the mission control center (MCC) at the Johnson Space Center, Houston, Texas. Photo courtsey of NASA.

Using information gathered from previous space missions, experts at NASA used computers to "simulate" the problem and try out various solutions. The speed and accuracy of computer simulations made it possible to test these solutions and predict their chances of success in a matter of minutes. Using this information, the NASA director was able to make a well-informed decision about which solution to use. Without the computer, three U.S. astronauts might have been lost in space.

Another example of how computers have been used to investigate the mysteries of our solar system is the Viking unmanned space probe that landed on Mars. The Viking mission was an outstanding feat because computers successfully controlled the landing of the spacecraft. Computers on board the Viking also took thousands of photographs, directed numerous scientific experiments, and transmitted important information about Mars back to earth.

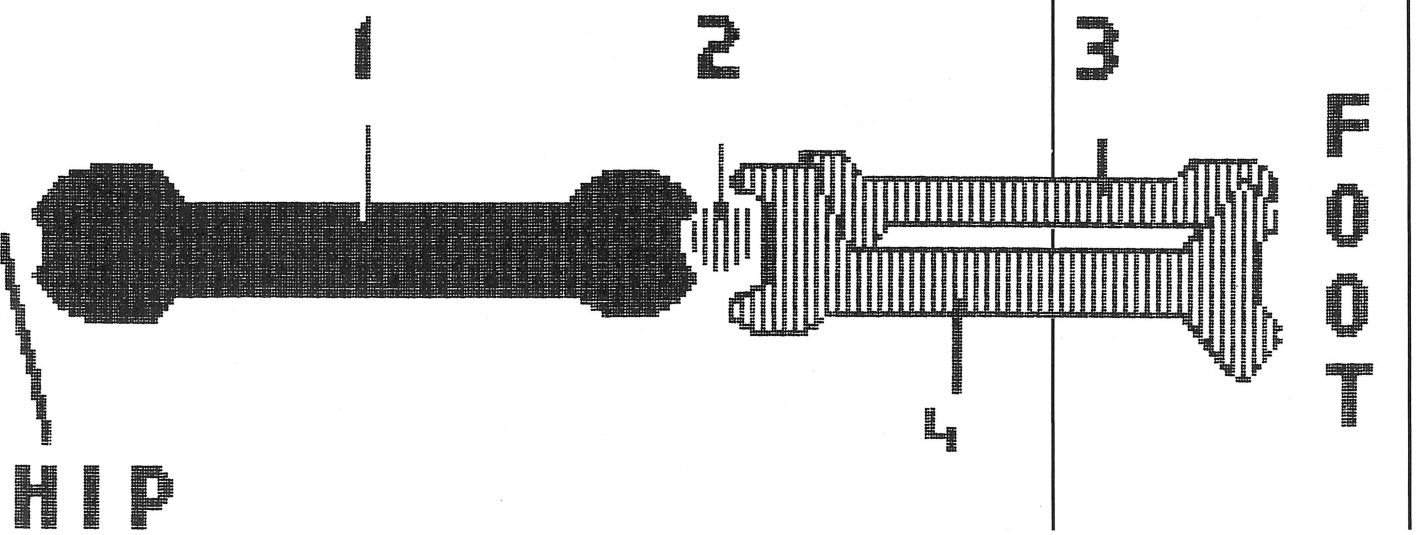
NASA also uses computers to interpret photographs transmitted from distant satellites and space vehicles. Cameras in space take a picture and convert the images into thousands of dots. Each dot has a certain color and intensity that is converted to binary digits and radioed to Earth. The numbers are then reassembled and interpreted by computer, and a color picture is produced.

Computers in Medicine

Maybe you didn't know it, but some of the earliest surgeons were barbers. At one time barbers not only cut hair, but they also cut on people. The tools that early surgeons used were not very sophisticated (and usually not very clean)! Saws, knives, and whatever else was sharp and easy to hold were used by these early medical practitioners.

Medical practice has come a long way since the time when a person might go to the local barber for something more than a shave and haircut! Modern physicians and hospitals are now using better techniques and better tools. Computers are now used to monitor a patient's blood pressure, heart rate, and temperature. If there is a problem with any of these vital signs, the computer is programmed to sound a warning signal that alerts the doctor or nurse. Without the computer, precious minutes might be lost that could mean the difference between life and death for the patient.

Physicians use a computer device called the CAT scanner (Computerized Axial Tomography) to provide pictures of cross-sections of the human body. This technique is something like slicing an apple and photographing each section. These pictures are very detailed and allow doctors to see things that would not show up on ordinary X rays.

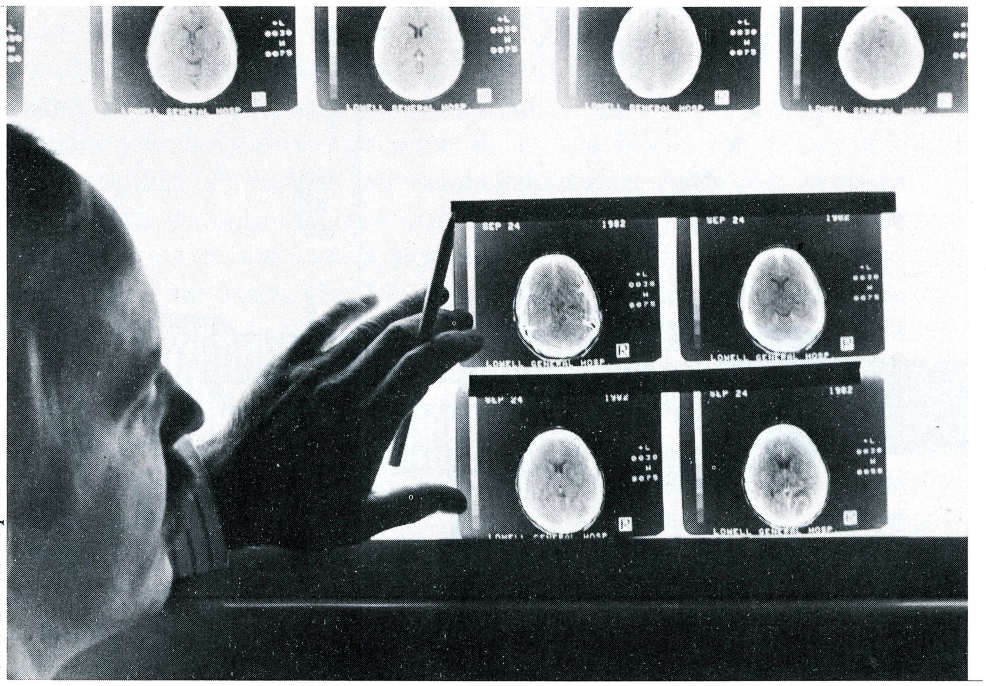


Doctors and computer specialists at the University of Pittsburgh have created a computer program to diagnose diseases. The program is called "Caduceus." The "Caduceus" program contains information about thousands of diseases and can compare and research them hundreds of times faster than a human. A doctor enters information about a patient's condition into the program. The program analyzes the information, asks the doctor questions, and makes a very accurate diagnosis about the patient's problem. In some cases, the computer program is more accurate than the doctor's diagnosis.

Some computer programs are designed for use by patients. For example, some programs question a patient about his or her eating habits and then recommend a diet for that person.

Emory University has even developed a computerized data base that links eye banks across the United States so information about tissues available for cornea transplants can be quickly obtained.

Finally, computer-aided bionic limbs and organs are being developed that can help physically handicapped people do things they could not do several years ago.



Lowell General Hospital

Physicians use a computer device called the CAT scanner (Computerized Axial Tomography) to provide pictures of cross-sections of the human body. This technique is something like slicing an apple and photographing each section.

Computers at School

Where did you first learn how to use a computer? People learn about computers in many different places. One of these places is school. Schools have discovered that students like to learn about computers and like to learn using computers. Here are some of the reasons that teachers and students frequently give for using computers at school:

1 Computers are very patient teachers. You can make a lot of mistakes and a computer will continue to work with you.

2 Computers can make learning fun. Kids love games, and computer games that can teach kids are plentiful.

3 Computers can immediately let you know if you have answered a question correctly or incorrectly.

4 Computers are an important part of everyone's future. You should have many opportunities to work with computers and become familiar with how they operate.

Many people feel that using computers in school may eventually change the way students learn and think. Experts predict that more and more students will be able to stay at home and learn by using instructional software or a modem to communicate with a teacher in another city, state, or country.

Other experts believe that by using computers, students will begin to understand that making mistakes is an important and sometimes necessary part of learning. This is because making mistakes and working with computers go hand-in-hand.

What might a school day be like in the future? Imagine that you are living in the year 2001 and classes are about to begin at your school. You open a case, pull out your portable computer, and attach it to a video display on your desk. The first thing you do is identify yourself to the school's computer system by entering your password. You have a few minutes before class begins so you ask the computer to provide you with a list of your grades in math class. Your grades are displayed, and you decide that you'd better work a bit harder in math.

The next thing you do is ask the computer to check your electronic mailbox because you are expecting a message from one of your friends. Sure enough, your best friend Roscoe has left a message: WHERE'S THE MONEY YOU OWE ME? You decide to ignore the message because class has started and you're broke.

Your geography teacher verbally says hello to the class and directs your attention to a wall-size video screen at the front of the class. (Blackboards are no longer in use.) The screen displays a picture of downtown Peking, China. You recognize the picture from yesterday's class because it was part of a self-guided computer video tour that you took. So far this year your geography class has used computers linked to a video disk to tour countries in all parts of the world.

In the left corner of the screen is the assignment the teacher has prepared for the class. The assignment is to find out what foods are produced by the Chinese. You know this will be an easy assignment because you have used the computer's data base about China to answer similar questions.

You'll also play a simulation game in which you must pretend to be a tourist in China. You will have to make decisions about what you want to see and how much you want to spend. You love these games because they let you make more choices about what you want to learn.

The rest of your classes that morning include computer programming, writing with a word processor, and computer music. In the afternoon you will use a computer in art to draw a portrait and in science to monitor your experiments. Your last class is study hall where you will use a computer to select a subject from a menu displayed on the screen.

You can also select any of these menu items to work on at home. By the time you go to sleep, you've put in a full day. But it is certainly a day different from what you are used to now.

Does this school of the future seem like a science-fiction story to you? It really isn't because everything that's been discussed is possible using today's computer technology.

How are computers being used in your school right now? What plans are being made for using computers at your school in the future? You or your fellow club members may find it interesting to obtain the

```
                STUDY MENU

  1.  GEOGRAPHY
  2.  KEYBOARDING PRACTICE
  3.  INFORMATION RETRIEVAL
  4.  READING
  5.  SCIENCE
  6.  ART
  7.  MUSIC
  8.  COMPUTER SCIENCE
  9.  SPELLING
 10.  WRITING
PLEASE TYPE A NUMBER THEN PRESS RETURN.
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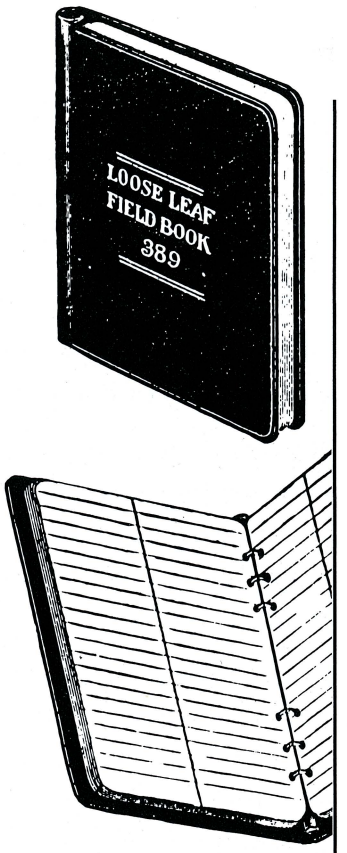


answers to these questions. You may discover some ways that you can help your school in using computers. A suggested list of questions is provided below.

School Computer Survey

1 How many computers does your school own and what brands are they? Find out why your school purchased the brands of computers they did.

2 Does your school have money in its budget for computers and software? If so, how much?

3 What is the main use of computers at your school?

Programming	Instructional programs
Office work	Word processing
Games	Other

4 How many hours a week do students at your school use a computer? Are students allowed to use the computer before and after school and during breaks?

5 How many students at your school have a computer at home? Find out what brands of computers they own and how they use them.

6 How many teachers at your school own their own computer? Find out what brands of computers they own and how they use them.

7 How many teachers at your school use a computer in their classroom? How do they use the computer?

8 How do the students at your school feel about computers? Are there differences between the way males and females feel about computers? If the answer is yes, how would you explain the difference?

9 How do the teachers and administrators at your school feel about computers? Find out if they think computers are a good way to improve education.

10 Ask the teachers, administrators, students, and parents of students at your school how your school's computer curriculum can be improved.

SoftwareSoftwareSoftwareSoftware

There are thousands of educational programs for use with the Apple computer. Listed below are a few programs that you or your club might want to consider using.

Facemaker (Memory Game: Elementary)
In Search Of The Most Amazing Things (Soc. Studies Simulation: Elementary–Jr. High)
Snooper Troops I, II (Problem Solving: Elementary–Adult)
Story Machine (Language Arts: Elementary)
Spinnaker Software Corp.
215 First Street
Cambridge, MA 02142

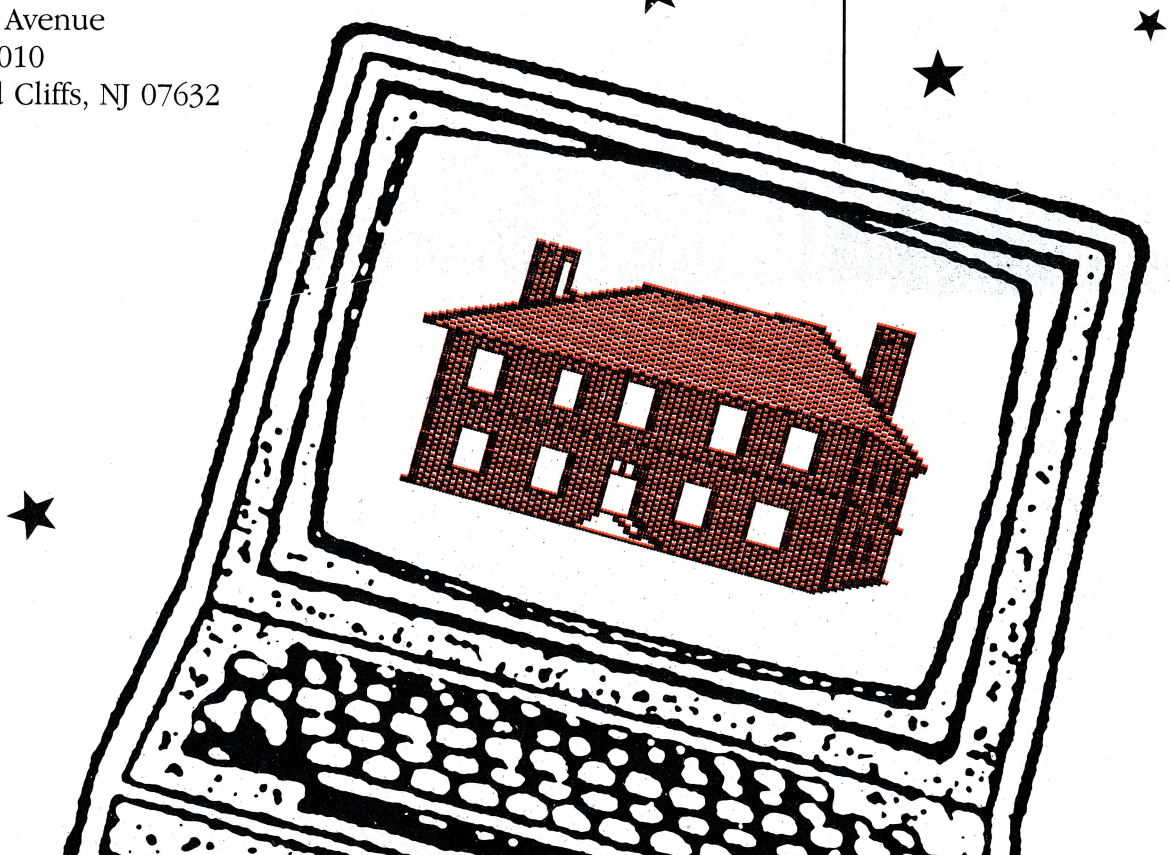
Moptown Hotel (Problem Solving: Elementary)
Rocky's Boots (Problem Solving: Elementary–Adult)
The Learning Company
545 Middlefield Road
Menlo Park, CA 94025

The Factory (Problem Solving: Elementary–Jr. High)
Memory Castle (Problem Solving: Elementary)
Semcalc (Mathematics: Elementary–Adult)
Sunburst Communications
39 Washington Avenue
Pleasantville, NY 10570

Star Search (Science Simulation: Jr. High–Adult)
Volcanoes (Science Simulation: Jr. High–Adult)
Earthware Computer Services
Box 30039
Eugene, OR 97403

Robot War (Computer Programming: High School–Adult)
Muse Software
330 North Charles Street
Baltimore, MD 21201

Microzine (Various Programs: Elementary–Adult)
Scholastic, Inc.
906 Sylvan Avenue
P.O. Box 2010
Englewood Cliffs, NJ 07632



Computers in Sports

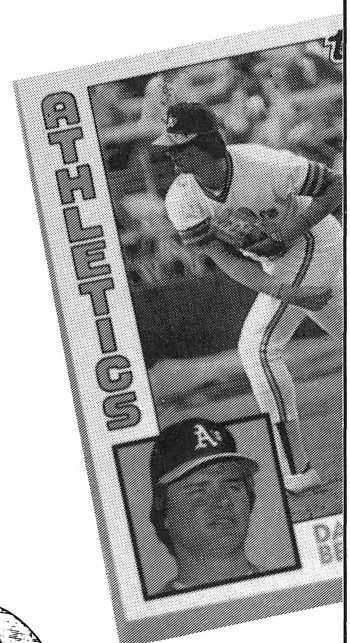
Computers are being used by a number of athletic teams today. Some teams consider the computer their extra "player." For example, the Oakland Athletics baseball team uses an Apple computer to record and print data about the A's and other teams. The computer can show where an opposing player tends to hit the ball, and this information can be used by the manager and coaches to position the players in the field.

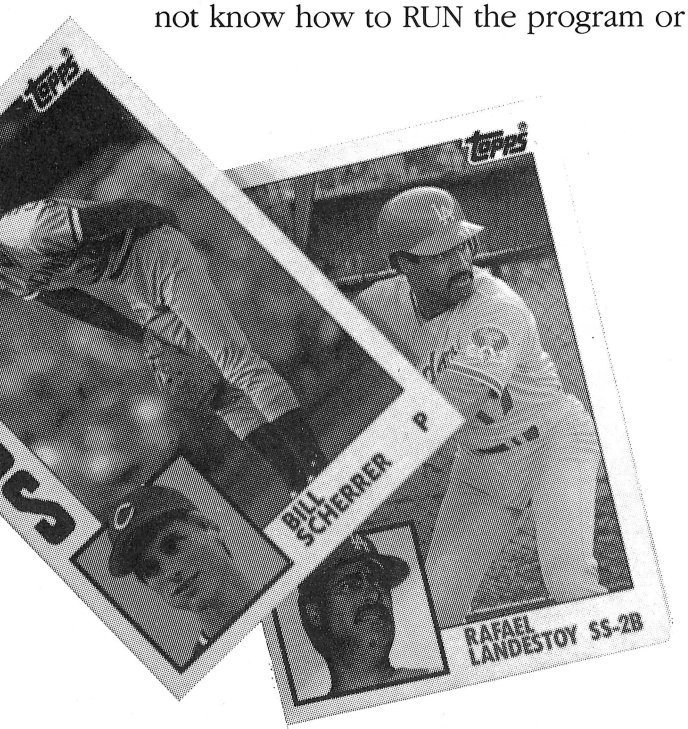
Major league baseball teams also use computers to get up-to-date information on "hot" pro prospects. At the present time, sixteen major league teams receive information about potential major leaguers online by modem from the Major League Scouting Bureau.

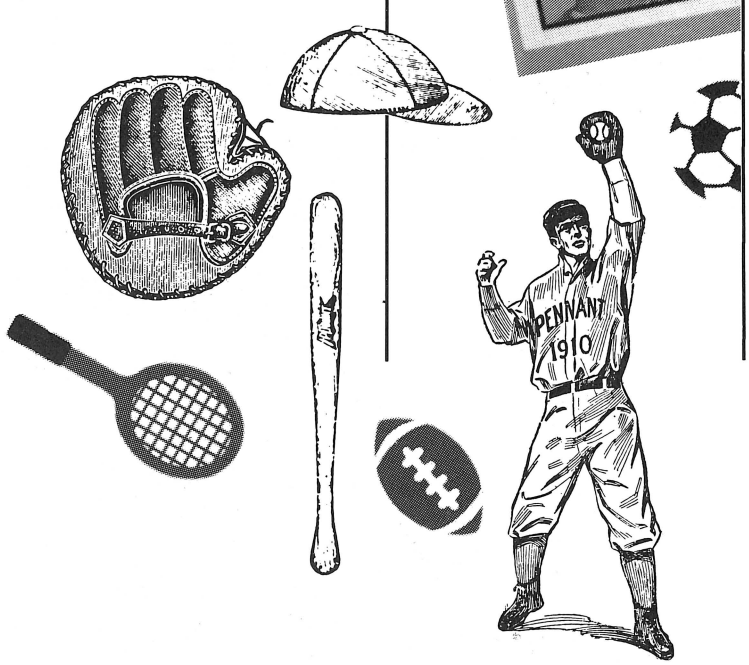
Baseball isn't the only sport in which computers are being used. More than fifteen National Football League (NFL) teams are using computers to help them mash the opposition. The Denver Broncos were among the first NFL teams to keep computerized files on more than a thousand promising college players. Denver, like many other NFL teams, also receives information about pro prospects by subscribing to United Scouting Combine (USC). The USC service distributes information about potential NFL players on computer diskettes to subscribing teams.

The Dallas Cowboys use computers to analyze everything from pass patterns to their training program. Some football experts believe that quarterbacks may eventually consult with a computer about which plays to run. Of course this could be confusing if the quarterback does not know how to RUN the program or input the correct PASSword!

The Oakland Athletics baseball team uses an Apple computer to record and print data about the A's and other teams.







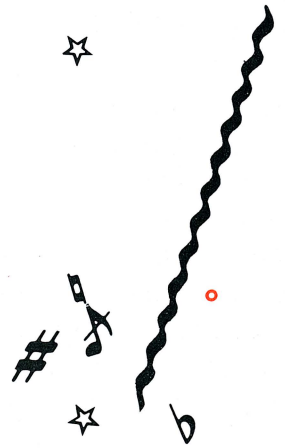
Computers and Music

What do Styx, Duran Duran, and Stevie Wonder all have in common? They all make music with a computer or, more specifically, a synthesizer. A synthesizer is an electronic machine that creates sound and looks like a piano. Musicians who use a synthesizer must turn control knobs and experiment with settings on the keyboard to produce the sounds they want.

Because all sounds are made up of sound waves, and sound waves begin as electric signals, a synthesizer makes sound by changing the shape of these waves. There is no limit to the kind of sounds that a synthesizer can produce. Not all synthesizers use computers. For example, analog synthesizers create sounds and change them without the use of computers. Another noncomputer synthesizer, the drum machine, generates a beat or rhythm pattern similar to that of a live drummer.

Digital synthesizers do use computers and work by converting the shapes of sound waves into numbers, assigning zeros and ones to parts of the wave. Because a computer can store a list of zeros and ones that describe a sound, the synthesizer can recreate each sound whenever the musician desires.

There are a number of programs available for use with the Apple computer for playing music. Although the Apple has a small speaker, it is possible to connect an external speaker that will allow you to produce a wide range of sounds. Software listed on the next page will give you some idea about music programs for the Apple.



The Korg Poly-800 is one brand of synthesizer which can recreate the sounds of several types of instruments including strings and brass.

Music Software and Related Products

Below are some music programs and related products for the Apple computer.

Early Games Music
Counterpoint Software, Inc.
4005 W. 65th Street
Suite 218
Minneapolis, MN 55435

Elements of Music
Electronic Courseware Systems, Inc.
309 Windsor Road
Champaign, IL 61820

Find The Key
Edutek Corporation
415 Cambridge, #4
Palo Alto, CA 94306

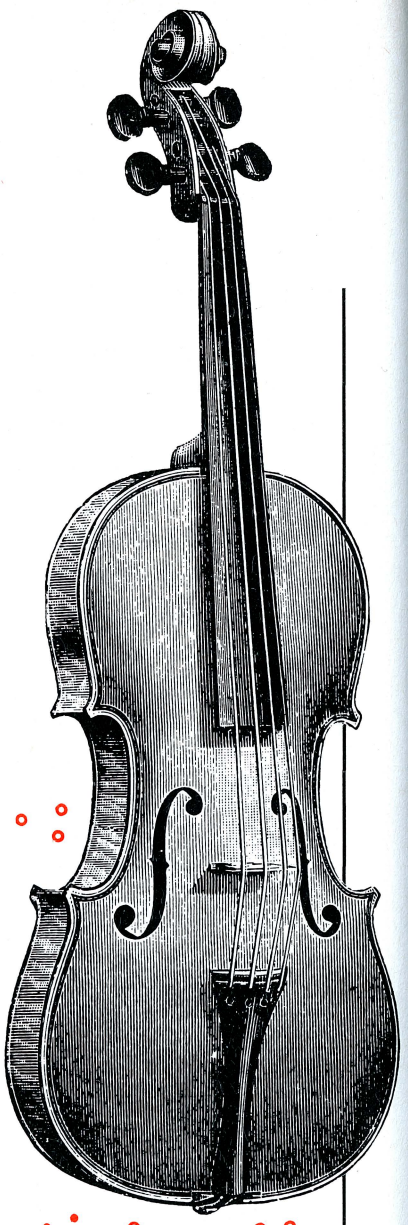
MECC Music Programs
MECC
2520 Broadway Drive
St. Paul, MN 55113

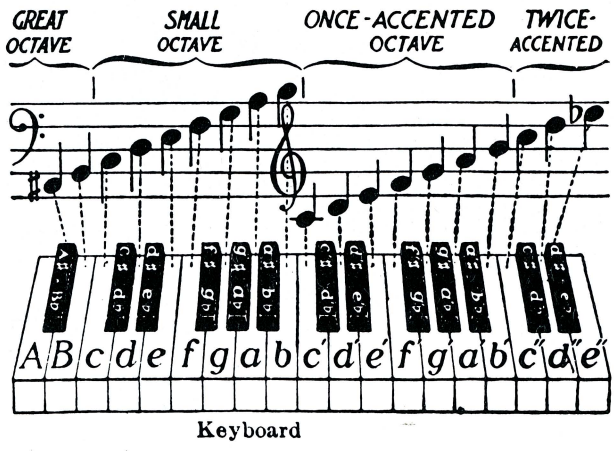
Music Construction Set
Electronic Arts
2755 Campus Drive
San Mateo, CA 94403

Notes
Merry Bee Communications
815 Crest Drive-Papillion
Omaha, NE 68046

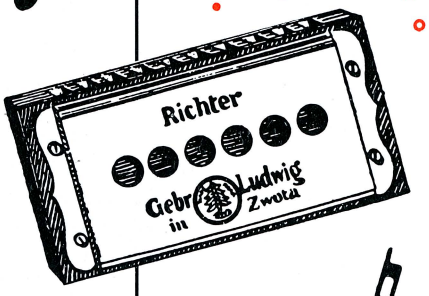
Sebastian
Temporal Acuity Products
1535 121st Avenue, S.E.
Bellevue, WA 98005

Songwriter
Scarborough Systems
25 N. Broadway
Tarrytown, NY 10591





Keyboard



Video Disks

Video disks—some people believe they represent the next revolution in computer technology. What are they? Video disks resemble silver record albums. But there is a big difference between the two. With a video disk and a video disk player you get both sound and pictures on your TV screen.

The video disk is a thin slice of metal sandwiched between two pieces of plastic. Information is recorded onto a video disk by a laser that burns tiny pits into the metal. The pits actually represent the pictures and sounds that are recorded onto the disk. A video disk player uses a laser and a microprocessor to retrieve information from the disk. About 54,000 images, the equivalent of a 30-minute program, can be recorded on a video disk.

The video disk is a thin slice of metal sandwiched between two pieces of plastic. Information is recorded onto a video disk by a laser that burns tiny pits into the metal.

The quality of the picture and sound from a video disk is excellent. Scenes can be replayed in slow-motion, in reverse, or even in different order. It is even possible to locate one frame of information on a disk in a matter of seconds.

Video disks have been primarily used for home entertainment. Thousands of video disk players have been purchased by consumers who want to watch movies and rock concerts at home. Video disks have also become popular at arcades. *Dragon's Lair* and *Space Ace* are popular video disk games created by Don Bluth. Bluth, a former artist for Walt Disney Studios, believes that there are no limits to what can be done with video disk games.

Another popular video disk game is *The MysteryDisc Series* from VidMax. "Murder, Anyone?" and "Many Roads to Murder" are two laser disk mysteries that allow the user to direct the investigation of private eye Stew Cavanaugh as he investigates a crime.

Video disks are also being used in other interesting ways. For instance, video disks are used to teach adults and children a variety of subjects. Some popular educational disks are *NFL Football*, a disk that allows the viewer to analyze the intricate strategies of pro football; *Master Cooking Course*, a disk that allows the viewer to participate in the preparation of four meals using over 100 cooking techniques; and *The Puzzle of the Tacoma Bridge Collapse*, a disk that depicts the 1940

collapse of a bridge in Tacoma, Washington, and involves the viewer in a series of experiments that demonstrate why the tragedy occurred.

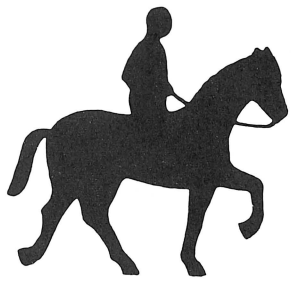
Disks similar to video disks called *optical disks*, for use with microcomputers, are now being considered as an alternative to 5-1/4 inch floppy disks. One estimate projects the price of a 100-megabyte optical disk for storing microcomputer data at $60. The same amount of magnetic storage would require as many as 300 5-1/4 inch floppy disks and would cost 20 times as much—about $1200!

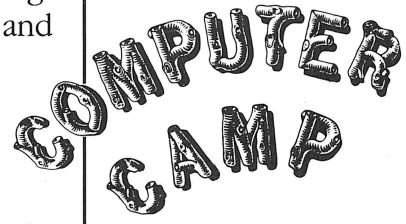
Computer Camps

School's out! For some students, the end of school means going to summer camp. For thousands of American students, summer camp has a new meaning. There are a growing number of camps that not only provide traditional activities such as swimming, hiking, and horseback riding but also computer instruction. These new computer camps allow students to continue to learn about computers during their summer vacation.

You should know that all computer camps are not the same. Some camps may offer instruction in only one programming language while other camps may teach several languages as well as allowing campers to use a variety of software. Which camp is best for you? Before you pick a computer camp to attend, you might want to:

1. Decide if you want to go to a camp that offers other recreation in addition to computing or a camp that emphasizes only computer instruction.
2. Narrow down your choice of camps to those that you can afford to attend, are close to home, or are in a geographic location that you would like to visit.
3. Contact the camps you select and ask them questions about the staff, curriculum, facilities, and other activities. If possible try to talk to someone who has attended the camp.
4. Whenever possible, visit the camp.





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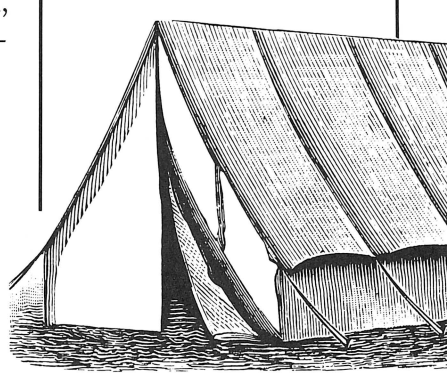

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5 If you're having difficulty making the decision about which camp to attend, contact a professional camp consulting firm for advice. Two of the most active are:

Student Camps and Trips Advisors
244 Bonad Road
Chestnut Hill, MA 02107
(617) 469-0681

Camp Advisory Services
18 E. 41st Street
New York, NY 10017
(212) 696-0499

Camping Anybody?

There are a number of computer camps across the U.S. A few of them are listed below.

Club Med Computer Workshops
Club Med
40 W. 57th Street
New York, NY 10019
(212) 977-2100

The Original Computer Camp, Inc.
559 San Ysidro Road
Santa Barbara, CA 93108
(800) 235-6965 (outside CA)
(800) 824-3349 (in CA)

Midwest Computer Camp, Inc.
9392 Lafayette Road
Indianapolis, IN 46278
(317) 297-2700

Camp Talbot, Camp McCallister
Greater New York YMCA, YWCA
Huguenot, NY 12746
(212) 564-1300 ext. 312, 313

Champlain College Computer Camp
Champlain College
163 S. Willard Street
Burlington, VT 05402
(802) 659-0800

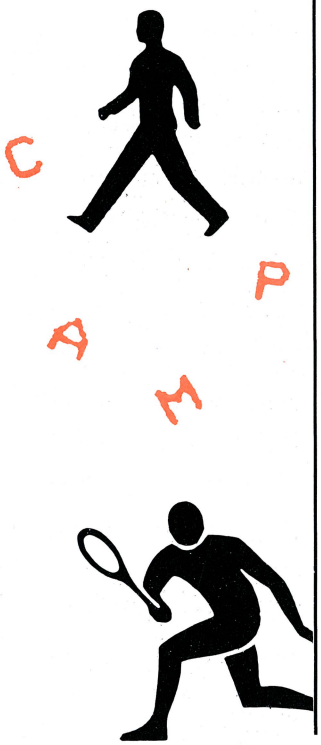
COMPU TAR
Main Office
Old Hardwick Road
Barre, MA 01005
(617) 355-2164

National Computer Camps
P.O. Box 585
Orange, CT 06477
(203) 795-9667

Sun Valley Computer Camp
P.O. Box 1450
Hailey, ID 83333
(208) 788-2164

The TIC Computer Camps
c/o Dr. Karen J. Rosenbaum
Mt. Vernon College
Washington, D.C. 20007
(703) 241-5542

YMCA of the Bronx
2244 Westchester Avenue
Bronx, NY 10462
(212) 931-2500



Micro Bits!

Culinary Computing

A microwave oven is one example of using a computer in the kitchen. Computers are also being used in other ways to help prepare food. Anthony's Pier 4 in Boston and The American Cafe in Washington, D.C., use a computer system called the *Expediter* to speed up the delivery of food to their customers.

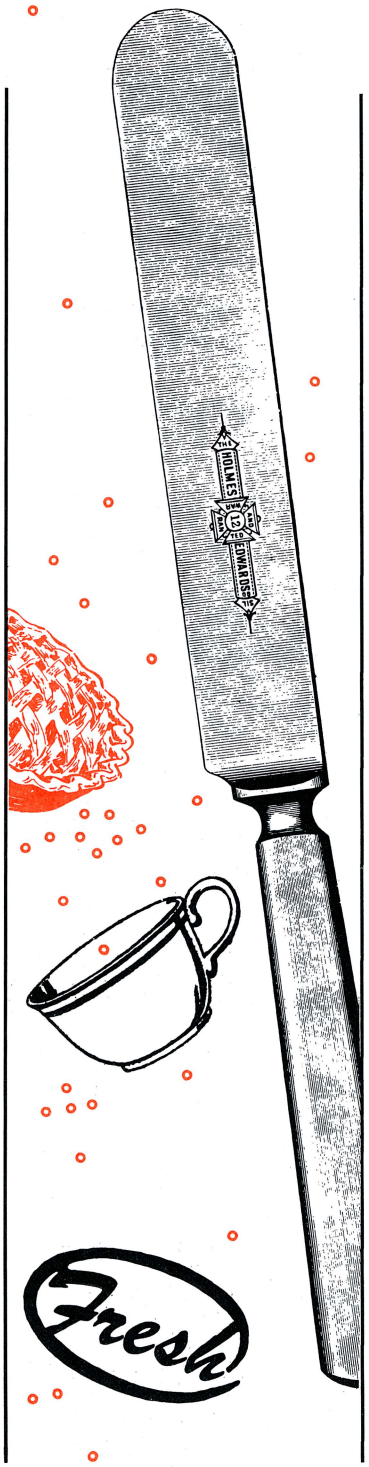
The waiter or waitress enters an order into the computer, which displays the information on a monitor for the cook to see in the kitchen. When the meal is prepared, the cook types in "READY" next to the order and the waiter or waitress can tell at a glance that the order is ready for pick-up.

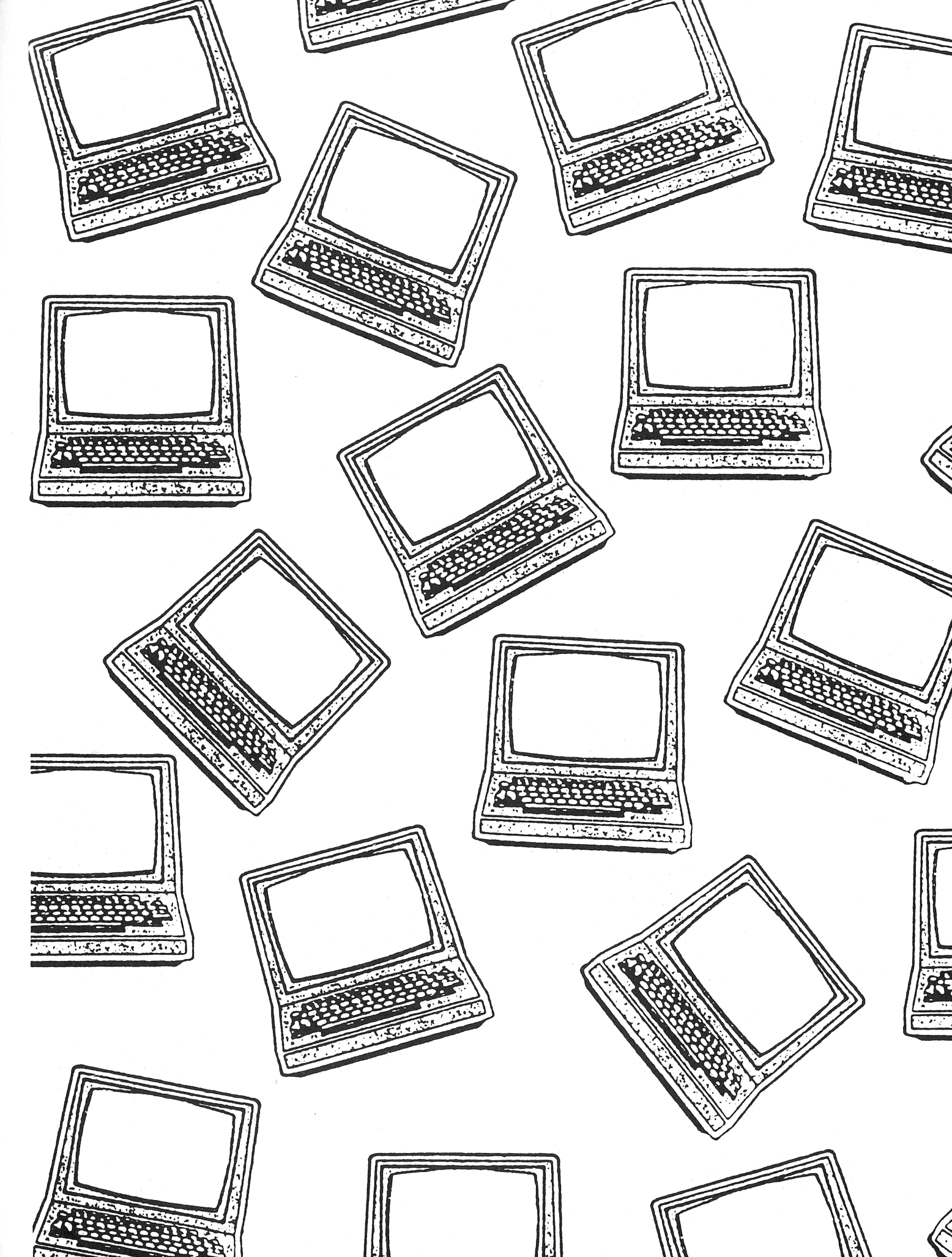
Thick Crust or Thin?

Researchers at the University of Missouri-Columbia are using a computer to monitor the production of pizza. Information about how the pizza is baking in a pizza processing plant is relayed to a computer by use of a special television-like camera. The computer then adjusts the cooking temperature and baking time of the ovens at the processing plant. Researchers are hopeful that the computer will help produce a more nutritious pizza.

Good Taste In Computing

Who's planning dinner at your house tonight? At the home of Yale University's computer-science student Kristian Hammond, it may be the computer. Hammond is the programmer of the first computerized chef. His program *WOK* (*Well Organized Knowledge*), doesn't just store recipes. *WOK* programs the computer to understand differences in taste, flavor, spices, and texture. According to Hammond, *WOK* uses this information to create new recipes.





3

Computers: Things to Think About

Notes to the Club Advisor

Chapter Overview

This chapter introduces club members to serious and light-hearted topics related to computer technology. Artificial intelligence, robotics, and software piracy are just a few of the many topics presented.

Things to Consider

Ideas for presenting information in this chapter are described below.

1. Assign club members to present information at a club meeting about the Turing Test of Artificial Intelligence.
2. Assign club members to present information at a club meeting about the origin and meaning of the term "silicon-based life."
3. Rent one of the movie classics about robots presented in this chapter for viewing at a club meeting.
4. Discuss the issue of software piracy, then encourage club members to develop a policy about the illegal duplication of software.
5. Create a bulletin-board display of computer humor. Include cartoons and jokes from various publications. A humorous book on the topic is *The Unofficial I Hate Computers Book* by Rich Tennant and John Barry, published by Hayden Book Company, Inc., 1984. Encourage club members to create and share their own humor about computer technology.
6. Start a club library. Try to acquire the publications listed in this chapter.
7. Rent one of the following science-fiction movies that portray intelligent computers and show it at a club meeting:

   2001: A Space Odyssey
   War Games

Artificial Intelligence

Some people think that computers are more than just machines. They believe that it is possible for a computer to think, to learn from experience, to speak in a natural sounding voice, and to make decisions in ways similar to a human. This belief is actually a field of study called "artificial intelligence." Experts in artificial intelligence, or AI, are interested in exploring how computers can be used for tasks that require intelligence, imagination, and intuition. In fact, some experts believe that it will be possible to program a computer to at least act as if it had emotions—being sad, happy, or loving.

One of the earliest examples of AI in action was ELIZA, an interactive computer program developed by Joseph Weizenbaum at Massachusetts Institute of Technology (M.I.T.) in the mid-1960s. ELIZA asks the user a series of questions and responds with answers that make it seem as though the computer really understands the user's feelings. A typical conversation with ELIZA might go something like this:

Eliza: HELLO, MY NAME IS ELIZA. WHAT'S YOURS?
Human: HAL.
Eliza: I'M PLEASED TO MEET YOU, HAL. WHAT WOULD YOU LIKE TO TALK ABOUT TODAY?
Hal: MY FRIENDS.
Eliza: TELL ME MORE ABOUT YOUR FRIENDS, HAL.
Hal: I DON'T HAVE ANY.
Eliza: THAT'S INTERESTING; TELL ME MORE, HAL.

The ELIZA program makes it seem as though the computer is thinking for itself. However, it's important to recognize that no AI programs come close to reproducing human intelligence.

Another popular use of AI has been to develop programs that will play games with people. Computers have been programmed to play chess as well as human players. In August, 1978, David Levy, the international chess master, played a demonstration chess match against Northwestern University's computer chess champion, Chess 4.7. After the match, Levy said that he found it hard to believe that he was not playing against an outstanding human opponent. This is not surprising when you consider that a computer can compare thousands of different

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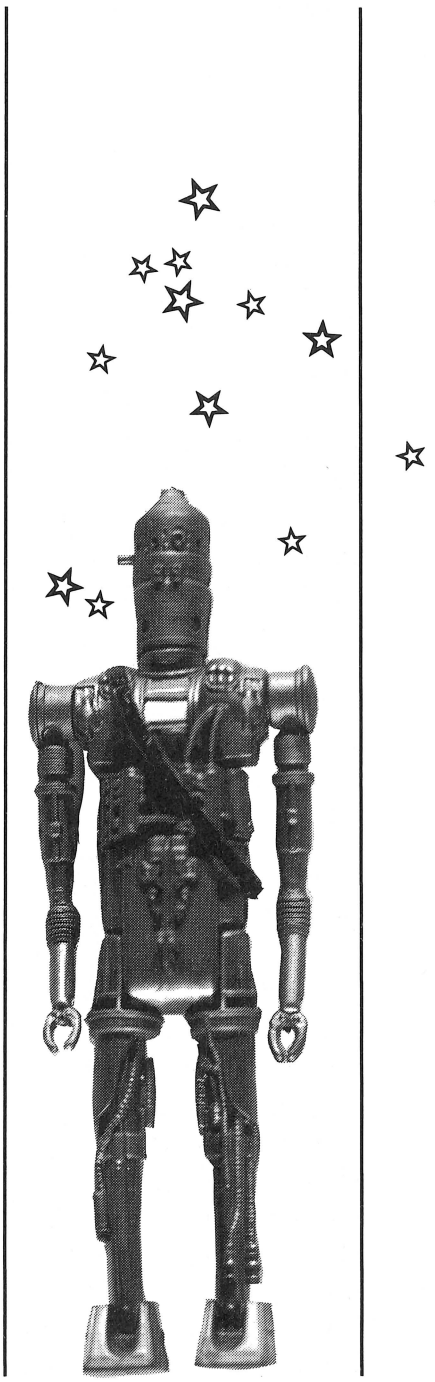
game strategies, board conditions, and possible moves in a matter of minutes.

There are several programs called "expert systems" that are designed to solve problems in areas of specialized knowledge. Using a program called *Prospector*, geologists have been advised where to drill for oil. In many cases, the program has successfully pinpointed oil deposits. Another expert system, *Internist*, diagnoses certain diseases.

Do any of these applications of AI really represent "intelligence"? This is not an easy question to answer because of the problems in defining human intelligence. Until we can answer that question, anything is possible—even computers that can "think."



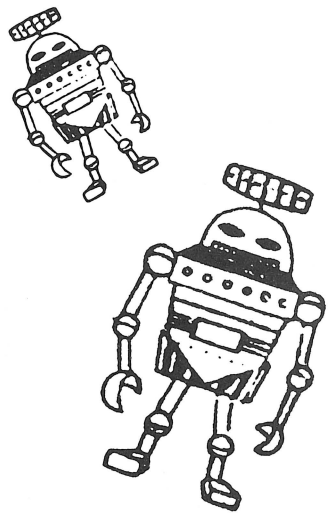
Robots: The Past

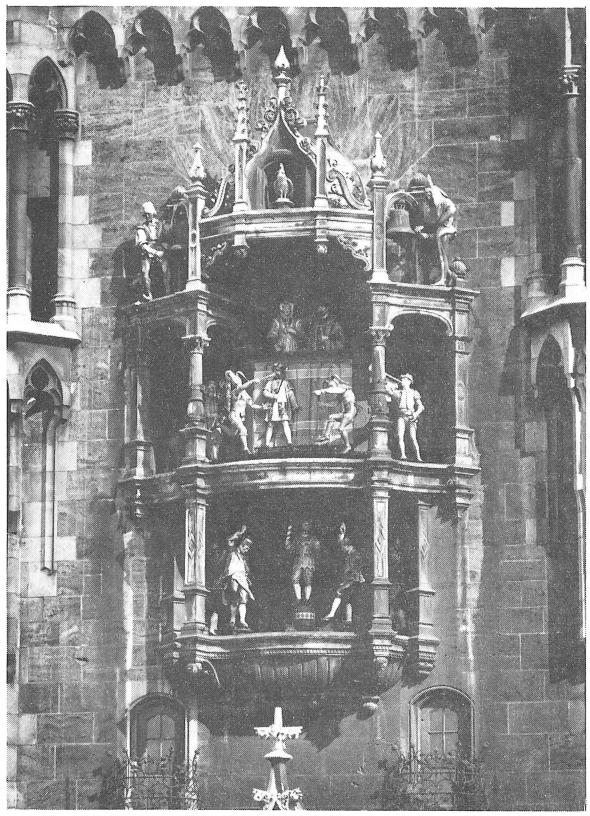
Many people believe that robots are a modern invention. However, the idea of creating artificial creatures that act like people is thousands of years old. Around 2000 B.C., the Egyptians built figures of a dog and a baker to place in the tombs of the Pharoahs. These figures had working parts that were controlled with levers. For example, when a lever on the belly of a dog was pushed, the dog's mouth would open.

The ancient Greeks were also intrigued with the idea of mechanical figures. In Greek mythology, a bronze mechanical man was said to have guarded the island of Crete for King Minos. Hero, a Greek inventor in the first century B.C., constructed a robotic device for opening and closing temple doors.

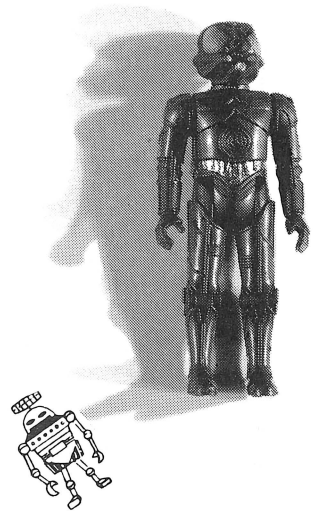
During the Middle Ages, automatons, machines designed to follow a predetermined sequence of operations, were quite popular. Two examples of automatons that still exist are the rooster on top of the Cathedral of Strasbourg, France, which flaps its wings, sticks out its tongue, and crows at noon, and the Glockenspiel at Frauenkirche in Nuremberg, which features a band of figures that walk, play instruments, and sound out the time with bells.

The Industrial Revolution created new tools, machines, and sources of power that made it possible to produce mechanisms that could control completed sequences of motions. Jacques deVaucanson, a French inventor, built a duck that flapped its wings, quacked, drank, walked, and appeared to eat.





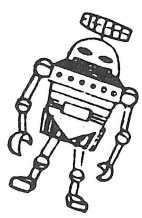
Glockenspiel mechanical clock in Munich. Photo courtesy of the German Information Center, New York, N.Y.



Pierre Jacquet-Droz built a clock-work-driven figure that dipped its pen into an inkwell and wrote whatever message the operator selected. A female automaton built in Turkey had a trumpet attached to her lips and could say simple French words such as *oui* (yes) and *non* (no) when air was forced through her.

A Canadian automaton known as the Steam Man was constructed from metal and wood and powered by steam created by a boiler within the life-size figure's chest. When in operation, the Steam Man's mechanical legs propelled the figure forward.

Although these early "robots" were not as sophisticated as modern robots, their inventors made significant contributions to the development of modern robotics. For example, in developing early manipulator arms for industrial robots, modern engineers closely examined the designs of these early automatons.



Modern Robots

Today's modern robots are far more sophisticated than the automatons of the past and are rapidly approaching the capabilities featured in robots in science-fiction stories and movies. What are robots, how are they used, and where are they made?

Robots are constructed for one purpose: to perform the work of human beings automatically and efficiently. The intelligence control system in today's robots is, of course, a computer—or, as robotics engineers refer to it, the control unit. Computerized robots perform a number of jobs. The most common robot, the industrial robot, can be programmed to tirelessly work on automobile factory assembly lines.

Robots not only work on assembly lines, but they also handle dangerous materials like toxic chemicals or radioactive substances at a distance. A special kind of robot named Mobot (manipulated robot) was first developed by the Hughes Aircraft Company to work at atomic research centers. Mobots are not controlled by computers but by human operators who monitor their movements via closed-circuit television that is remote from a danger area. The operator controls the mobot from his or her console by radio signals.

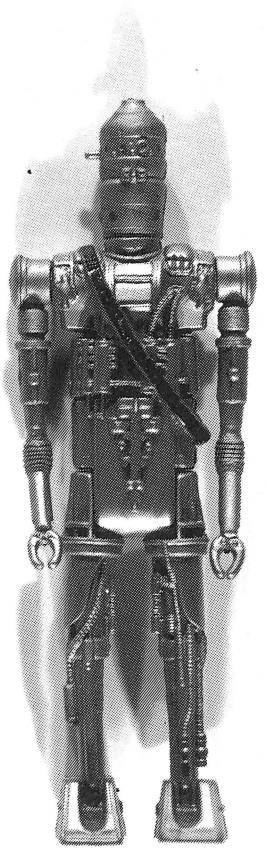
Robots are used in offices in many ways, too. For example, robots are used to operate elevators in large buildings and to switch on sprinklers in office ceilings in case of fire.

Some interesting uses of robots in other fields include a mobot diver that drills oil wells on the ocean floor and a robot whose "perfect" swing has been in use for several years in the testing of golf balls and golf clubs.

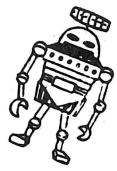
The most complex robots ever constructed were the Viking I and Viking II landers placed on Mars by the United States. Because no human being accompanied the landers, they had the important job of collecting soil samples from the Martian surface. Using manipulator arms activated from earth by radio signals, the landers gathered important information about the surface of Mars.

Some experts are convinced that it will be only a few years before robots are used commonly in the home. Vacuuming and mowing the lawn are just two of the many jobs that a robot might do around the house.

Robots are constructed for one purpose: to perform the work of human beings automatically and efficiently.



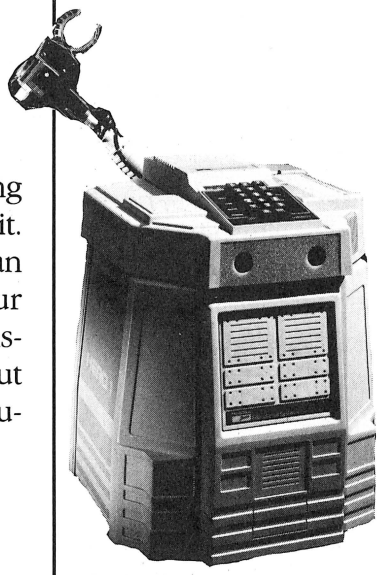
Where will many of the new developments for robotics in the future come from? There is a good chance that these ideas will come from centers for the study of robotics. One such center, the Robotics Institute at Carnegie-Mellon University, in Pittsburgh, Pennsylvania, is the world's leading center for the study of robots. The institute, established in 1979, has attracted over sixty students and eighty scientists who work on multimillion dollar projects to invent new, advanced computers and robots.



Robot Resources

You or your fellow club members may be interested in learning more about robots. A good way to do this is to assemble a robot kit. What kinds of things can you learn by working with robots? You can learn more about programming by using a robot to carry out your instructions, about physics by using a robot's movable parts and sensing devices to measure and illustrate physical phenomena, and about electronic systems by making the robot move. Some of the more popular, affordable robots are described below.

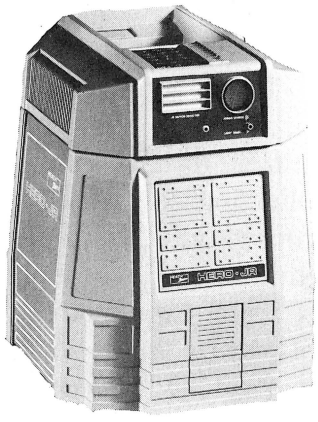
Hero 1
Heathkit/Zenith Educational Systems
Benton Harbor, MI 49022
(616) 982-3200



Hero 1

The Hero 1 is a squatty-looking robot that can be programmed through a keypad on top of its 20-inch body or through a "teaching-pendant," a device that works like a joystick. You can direct Hero 1 to move around a room, turn on command, move its arms, and even speak.

Topo, F.R.E.D., and B.O.B.
Andobot, Inc.
1287 Lawrence Station Road
Sunnyvale, CA 94086
(408) 262-8676



Hero Jr.

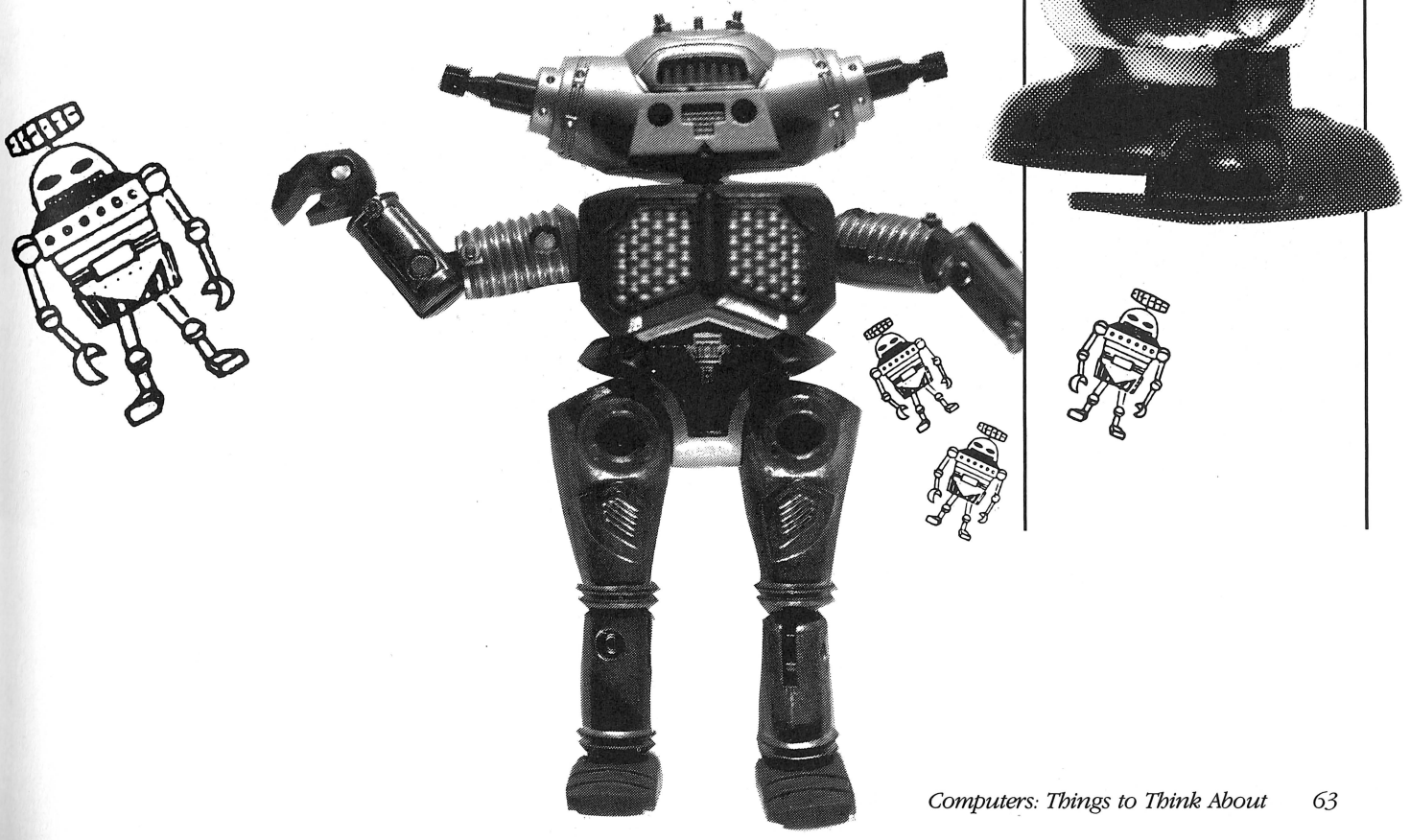
Topo the robot must be linked to a computer that serves as its brain. When programmed, Topo can talk and memorize the layout of a house to travel around without bumping into things. Topo is equipped with sensors to make sure he doesn't fall down stairs or off tables, and he can carry up to 20 pounds.

F.R.E.D. (Friendly Robotic Entertainment Device), a one-foot mini-robot, can be programmed to move around and carry small payloads. F.R.E.D. can also draw patterns on a piece of paper when directed by a computer. Both F.R.E.D. and Topo can be programmed in Logo.

B.O.B. (Brains On Board) is as intelligent as a computer, has a large amount of memory, and can even alert you if someone tries to break into your home. B.O.B. can be expanded to perform a number of jobs. For example, B.O.B. could become a walking refrigerator filled with your favorite soft drinks.

Tasman Turtle and Turtle Tot
Harvard Associates, Inc.
260 Beacon Street
Somerville, MA 02143
(617) 492-0660

Both robots have touch sensors and are programmable in BASIC and Logo via a cable link.



Robots in Fiction

People have been fascinated for ages by mechanical gadgets that acted like living things. Robots are computers with moving parts. People program robots to do work. The word *robota* means dull work in Czechoslovakian, and that's exactly what robots do—dull work!

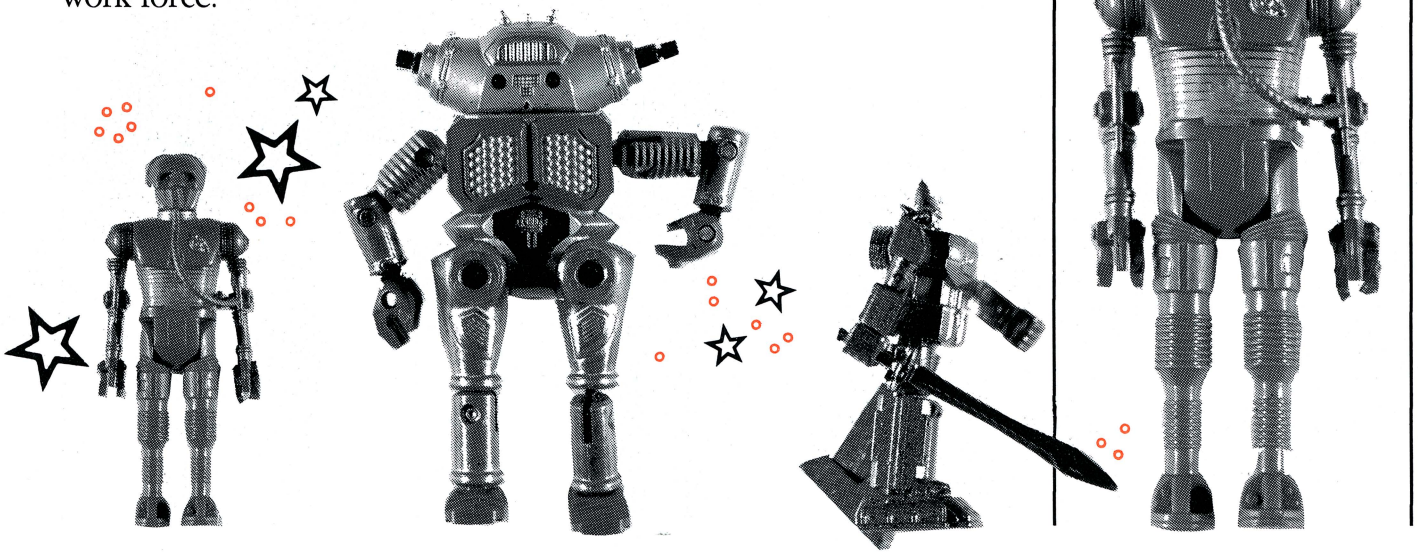
The word "robot" was first used by the Czechoslovakian playwright Karel Capek, in his 1921 play, *R.U.R.* Capek used the term "robot" to describe the metal people in his play. During the 1920s, 30s, and 40s, many science-fiction stories and movies featured robots that turned against their masters. Then in the late 1940s, the science-fiction writer, Isaac Asimov, wrote the classic story *I Robot*. In this story, Asimov introduced the idea that robots could be taught rules that would prevent them from being evil. Asimov's "three laws of robotics" are:

Rule 1: A robot must never hurt a human or, through its actions, allow any human being to come to harm.

Rule 2: Robots must obey human orders, unless they conflict with Rule 1.

Rule 3: Robots must never hurt themselves, unless doing so conflicts with Rules 1 and 2.

The first real robot, called "Unimate," went to work at an automobile factory in 1961. Today, there are more than 15,000 robots in the work force.



Robots supplied by Jon McIntosh

Calling All Robots! Have You Seen These Robot Classics?

1951 Commando Cody and his robot Pal saved the Earth from aliens in the movie, *Satan's Satellites*.

1951 Gort, a robot in the movie *The Day the Earth Stood Still*, warned Earthlings that he would destroy the planet if they did not stop making war.

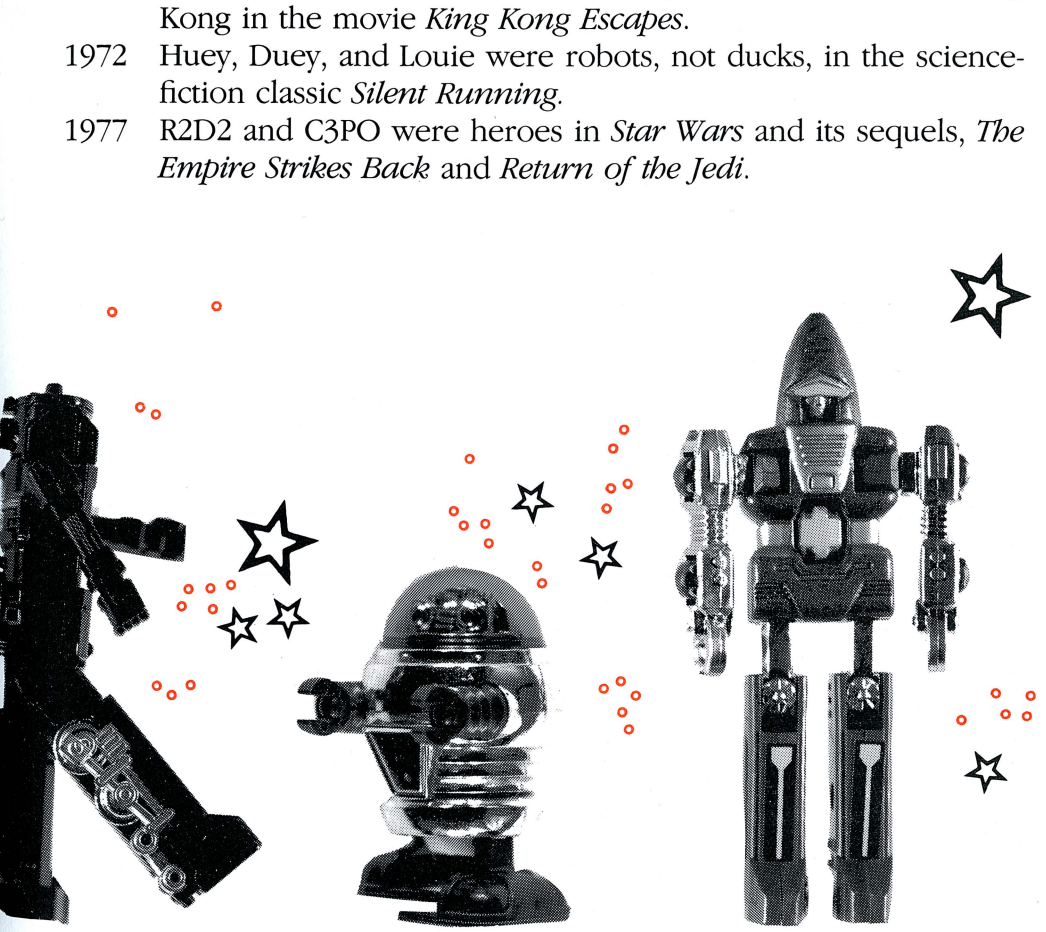
1954 In the movie *Gog*, Gog the robot did household chores for a while—but then began mowing down Earthlings.

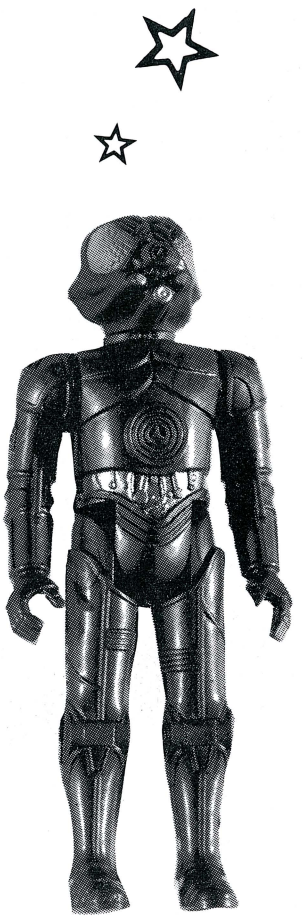
1956 Robbie the Robot was a friendly robot in the movie *Forbidden Planet*.

1968 The evil Dr. Who built Mechani-Kong to duke it out with King Kong in the movie *King Kong Escapes*.

1972 Huey, Duey, and Louie were robots, not ducks, in the science-fiction classic *Silent Running*.

1977 R2D2 and C3PO were heroes in *Star Wars* and its sequels, *The Empire Strikes Back* and *Return of the Jedi*.





Software Thieves

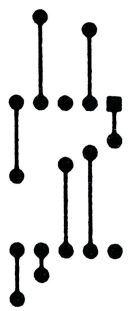
You may have heard the term, "software pirate." A software pirate is a person who illegally copies computer software. The word "pirate" may make you think of a daring and adventurous person. What you should know is that a software pirate who illegally copies software for personal use or for friends is actually stealing!

It takes hundreds and sometimes thousands of hours for a computer program to be planned and written. Every time a person copies a program without paying for it, the company that created the program loses money. How does this affect you and your computer-using friends? To make up for their lost income, some software companies raise their prices. This means that everyone has to pay more because computer pirates are stealing profits from the software companies.

When is it legal to copy a software program? That's not an easy question to answer. However, if you follow the rules listed below, you will most likely be within your rights and avoid the possibility of legal action:

1. Avoid copying software that is copy-protected.
2. Check the printed information that comes with any software you buy to find out if it's legal for you to make a back-up copy.
3. When in doubt about rules 1 and 2, don't copy a program.

There are a number of programs that you can copy legally. These programs are called "public domain" software and may be duplicated and changed by the user with no violation of law. The only restriction on the use of public domain software is that the user may not sell it for profit.



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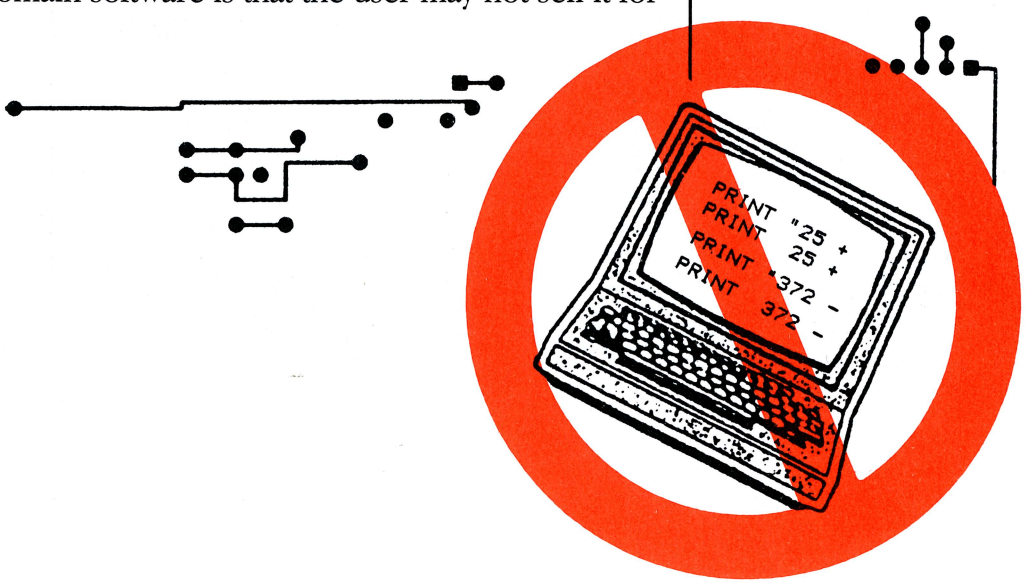


If you want to acquire software for your Apple Computer Club or for yourself, there are many sources of free or inexpensive software. You can begin by contacting your local Apple Users' Group or writing to one of the organizations below that distributes free and inexpensive software.

SOFTSWAP
P.O. Box 18547
San Jose, CA 95158

APPLE-SWAP
607 Sycamore
Starkville, MS 39759

Young Peoples' Logo Association
Software Exchange
1208 Hillsdale Drive
Richardson, TX 75081

International Apple Core, Inc.
908 George Street
Santa Clara, CA 95050

Books for Club Members

Sometimes it's a good idea to take a break from working with your computer and read a good book—about what else? Computers! The books listed below are some of the best books about computing available for kids. Read on!

Books for Club Members in the Elementary Grades

Chip Mitchell: The Case of the Stolen Computer Brains by Fred D'Ignazio. Watts, 1983.
Brainy Chip solves ten mysteries involving computer functions and programming.

Computers by Neil Ardley. Watts, 1983.
This illustrated text provides considerable detail about what computers can do and how they do it.

The Computer That Said Steal Me by Elizabeth Levy. Four Winds, 1983.
A boy named Adam wants a computer chess set so badly that he is tempted to steal one.

Books for Club Members in the Middle Grades

The Computer Caper by Milton Dank and Gloria Dank. Delacorte, 1983.
In this mystery, five members of the Galaxy Gang crack a corporate computer code and expose computer crime.

The Creative Kids Guide to Home Computers by Fred D'Ignazio. Doubleday, 1981.
Project ideas for computer programmers with some experience.

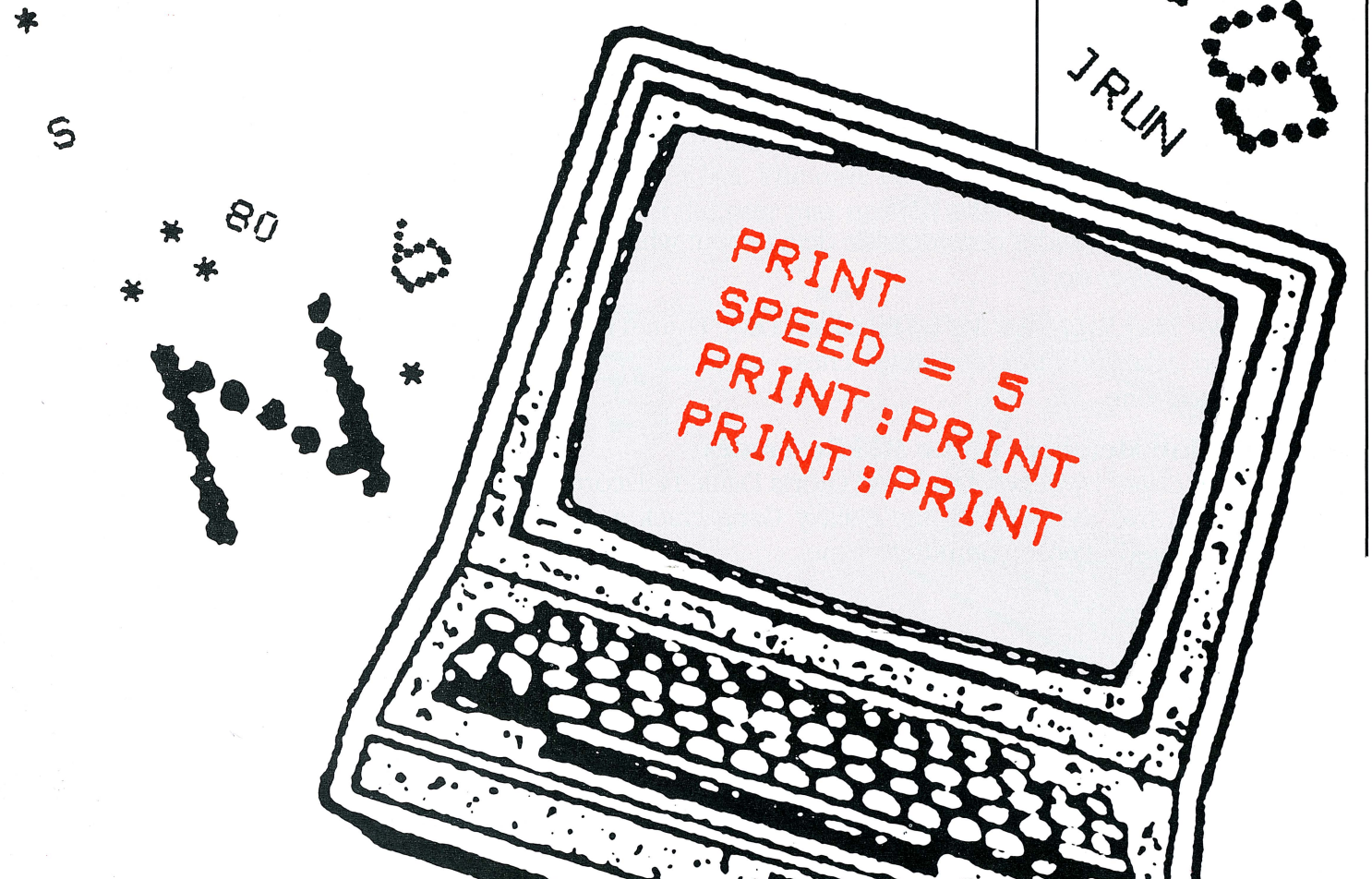
Messner's Introduction to the Computer by Fred D'Ignazio. Messner, 1983.
This historical overview of the development of computers includes biographical sketches of influential people in the field of computing.

Books for Club Members in the Upper Grades

From Baker Street To Binary: An Introduction To Computers and Computer Programming With Sherlock Holmes by H. Ledgard, E. P. McQuaid, and A. Singer. McGraw-Hill, 1983.
Sherlock Holmes's Dr. Watson recounts the development of computers with a blend of fact and fiction.

Inside Your Computer by I. R. Sinclair. Wayne Green, 1983.
This book provides nontechnical explanations of how a computer works.

Programmed For Love by Judith Enderle. Berkley, 1983.
A high-school dance where dates are matched by computer is the subject of this light romance.



Useful Reference Materials

The materials listed below are just a few of the available resources that can be used to enhance club meetings and help club members learn more about computers.

Audiovisual Aids

MECC Computer Parts Kit
A collection of components from three generations of computers. Enough material is provided to lead club members in a variety of activities and investigations suggested by the accompanying teacher's guide.

MECC
2520 Broadway Drive
St. Paul, MN 55113

This Business of Numbers
This film, which is available on free loan to schools, describes the development of numbers from the caveman to modern data processing.

Sperry-Univac
Karol Media
625 From Road
Paramus, NJ 07652

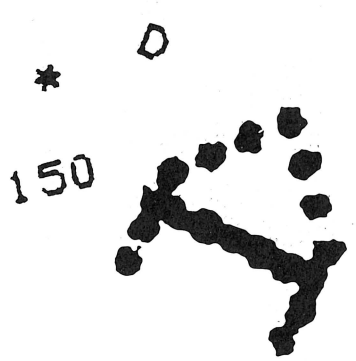
Education Periodicals

Classroom Computer Learning
Pitman Learning, Inc.
19 Davis Drive
Belmont, CA 94002

Electronic Education
Electronic Communications, Inc.
1311 Executive Center Drive
Suite 220
Tallahassee, FL 32301

Electronic Learning
Teaching and Computers
Scholastic, Inc.
730 Broadway
New York, NY 10003

The Computing Teacher
ICCE
University of Oregon
1787 Agate Street
Eugene, OR 97403



General Computing Periodicals

Creative Computing
Ahl Computing, Inc.
39 E. Hanover Avenue
Morris Plains, NJ 07950

InfoWorld
InfoWorld
375 Cochituate Road
Box 837
Framingham, MA 01701

Popular Computing
Byte Publications
1221 Avenue of the Americas
New York, NY 10020

Apple Periodicals

A+
Ziff-Davis Publishing Company
One Park Avenue
New York, NY 10016

Call A.P.P.L.E.
Suite 300
304 Main Avenue South
Renton, WA 98055

inCider
Wayne Green, Inc.
P.O. Box 911
Farmingdale, NY 11737

nibble
Micro-SPARC, Inc.
10 Lewis Street
Lincoln, MA 01773

Student Periodicals

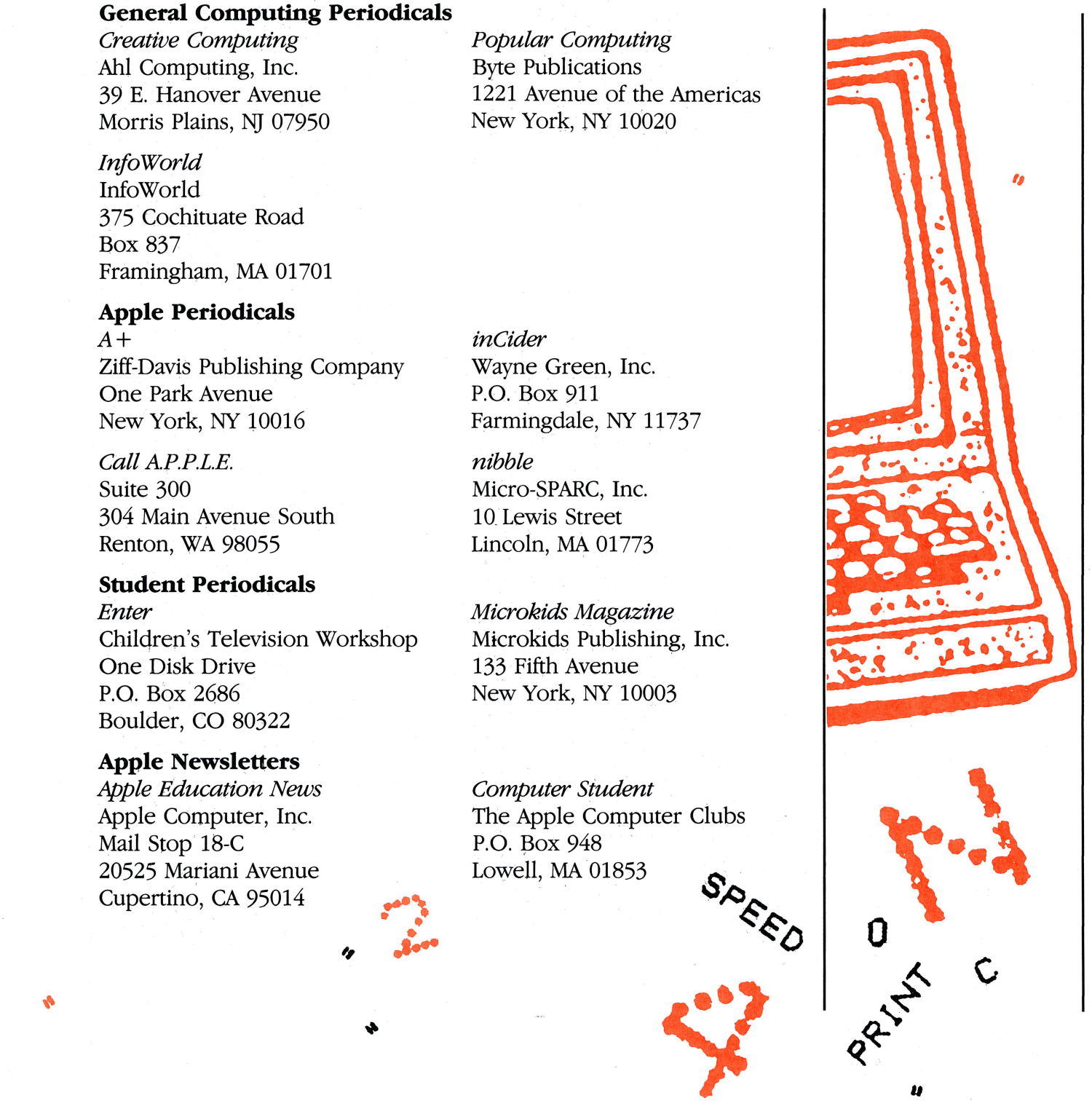
Enter
Children's Television Workshop
One Disk Drive
P.O. Box 2686
Boulder, CO 80322

Microkids Magazine
Microkids Publishing, Inc.
133 Fifth Avenue
New York, NY 10003

Apple Newsletters

Apple Education News
Apple Computer, Inc.
Mail Stop 18-C
20525 Mariani Avenue
Cupertino, CA 95014

Computer Student
The Apple Computer Clubs
P.O. Box 948
Lowell, MA 01853



Computer Dictionaries

Computer Dictionary
Scholastic, Inc.
730 Broadway
New York, NY 10003

A Dictionary of Computer Words
Del Banbury Publishing Co.
37 West Avenue
Wayne, PA 19087

Resource Books for Club Advisors

Clearinghouse For Free Computer Materials
National Association For Educational Computing
Ryan Library
Iona College
New Rochelle, NY 10801

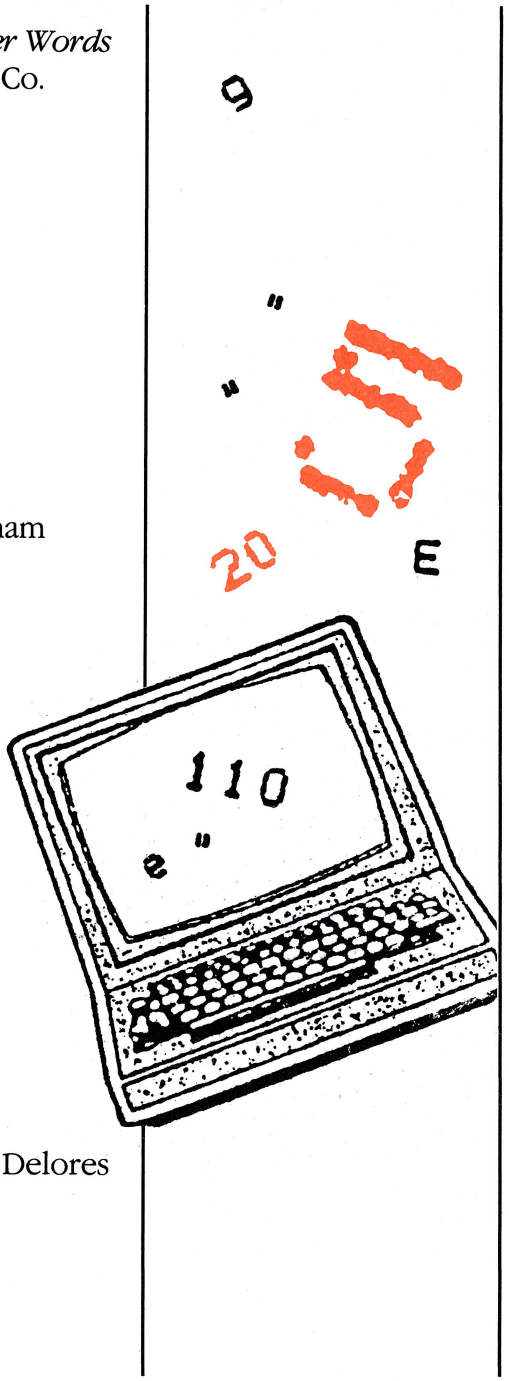
Computer Literacy Survival Kit by A. Leuhrmann and H. Peckham
McGraw-Hill Book Company
1221 Avenue of the Americas
New York, NY 10020

Computers, Education, and Special Needs by E. Goldenberg
Addison-Wesley Publishing Company, Inc.
Reading, MA 01867

Guide To Free Computer Materials
Educators Progress Service, Inc.
Department C
Randolph, WI 53956

Handbook On Finding Free Software
Enrich/Ohaus
2325 Paragon Drive
San Jose, CA 95131

Microcomputer Resource Book For Special Education by Delores Hagen and *My Students Use Computers* by Beverly Hunter
Reston Publishing Company
Reston, VA 22090



Micro Bits!

Junkyard Computing

What if the local junkyard doesn't have a fender for your 1954 DeSoto? Norm Horton Jr., an auto parts dealer in St. Paul, Minnesota, may have the solution. Norm has created the "Data Parts Locating Network." This network uses a computer to check with other junkyards around the country for hard-to-find parts.

E.T., Phone Home

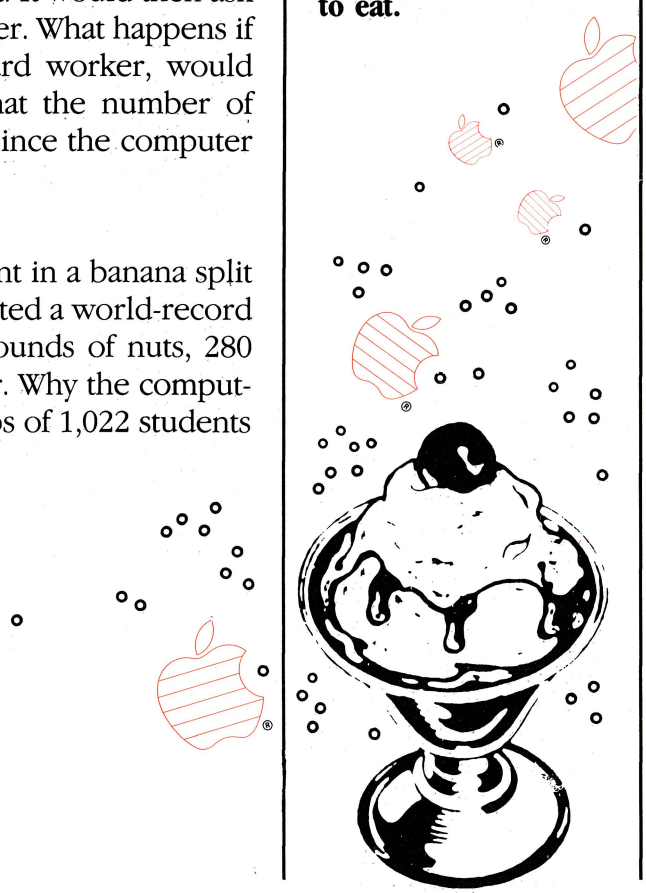
In some schools it's getting harder to play hooky. Schools like West Hill High School in Stamford, Connecticut, have begun to use computers to catch students who are absent without an excuse.

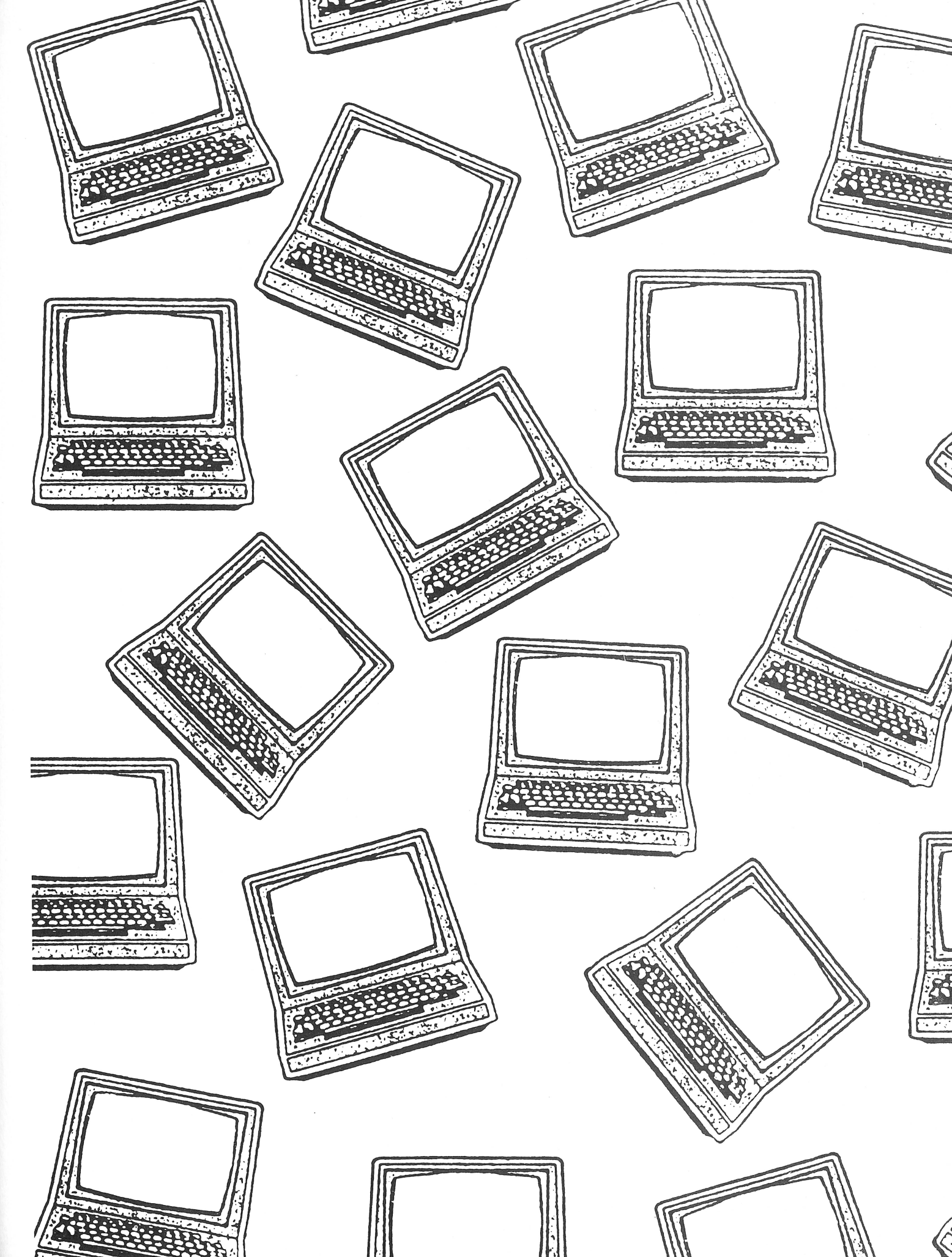
If you went to West Hill High and cut school for the day, West Hill's computer would call your parents at home that night. It would then ask why you were absent and record your parent's answer. What happens if no one answers? The computer, a patient and hard worker, would simply call back later. It comes as no surprise that the number of absences has been down at West Hill High School since the computer enrolled.

Important Ingredient

Does an Apple computer sound like an ingredient in a banana split to you? In 1983, the junior class at a high school created a world-record banana split using 8,000 pints of ice cream, 280 pounds of nuts, 280 gallons of chocolate syrup, and one Apple computer. Why the computer? The computer was added to keep track of the jobs of 1,022 students who worked on the record-setting dessert!

Q: What was a bug doing in the computer?
A: Looking for a "byte" to eat.





Getting Ready to Program

4

Notes to the Club Advisor

Chapter Overview

This chapter introduces members to useful information pertinent to operating an Apple computer. Formatting a blank disk, file handling, and flowcharting are just a few of the many topics presented.

Things to Consider

Ideas for presenting information in this chapter are described below.

1 Teach several club members how to format a blank disk. These members can teach others how to prepare their own disks. It would be helpful if each club member had his or her own disk for use during various club acitvities.

2 Make a large chart of common flowcharting symbols for use by club members.

3 Assign club members to create flowcharts for sequencing the operation for activities such as driving a car, washing the dishes, and building a dog-house.

4 Create a bulletin board display, using pictures from computer magazines, about various types of disks and disk drives.

5 Make the booklet "The Secrets of Perfect Memory" available for club members to read. The booklet provides useful information about disks—how they are made, their care and use, and other interesting details. This booklet, published in 1983, is available from Leading Edge Products, Inc.

How Smart Is a Computer?

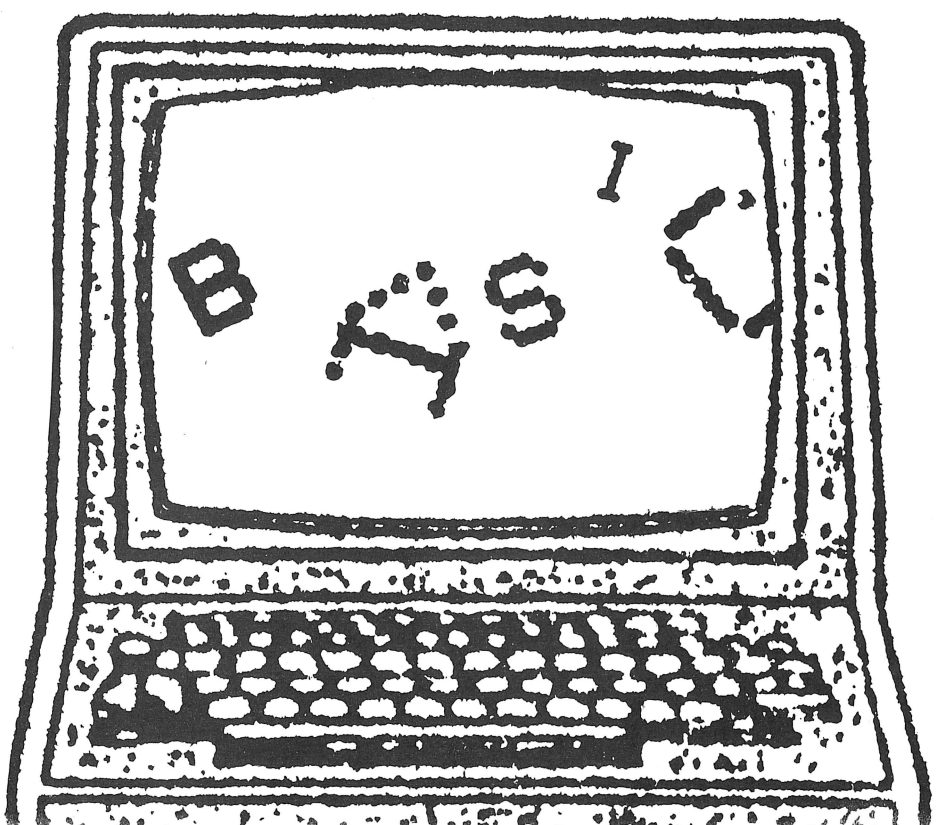
Are computers smart? Not really, because there is no knowledge in any computer except the knowledge entered by a human being. Computers are fast and accurate, but they aren't intelligent as you are. Computers can do only what they are told to do. A computer program is a list of instructions that tells the computer what to do. Without a program, a computer can do nothing.

All computer programs are written in a *programming language,* which contains a set of instructions. When you switch on your Apple computer, it is automatically ready to receive programming instructions in a language called Applesoft BASIC. Here is an example of a program written in Applesoft BASIC:

```
10   HOME
20   PRINT "I AM A MICRO-MANIAC."
30   END
```

Did you notice that the program had a number at the beginning of each line? The numbers are called line numbers and are followed by instructions that command the computer to do different things. Your computer understands about 100 commands in the BASIC programming language. BASIC (Beginner's All-purpose Symbolic Instruction Code) is one of the many programming languages that can be used to communicate with your Apple computer.

Q: What did the computer say to the programmer?
A: Don't bug me.



Ways to Talk to Your Apple

Programming languages are made up of words and abbreviations designed to be easy to use. The Apple computer can understand many different programming languages besides Applesoft BASIC. Once you learn one computer language, learning others is less difficult. Some of the languages that are available for your Apple are:

BASIC	A general purpose programming language.
LOGO	A programming language designed for students.
FORTRAN	A programming language designed for scientists.
COBOL	A programming language designed for business people.
PASCAL	A programming language popular at the high-school and college level.
PILOT	A programming language designed for teachers.

Projects

1 Create a chart of as many programming languages as you can learn about.

2 Organize a club library of books about how to program in different programming languages.

3 Make a chart that compares the commands that different programming languages use to clear the screen.

Getting Ready to Use an Apple Computer

1 Open the door to the disk drive and insert a disk carefully.
IMPORTANT: Never remove or insert a disk while the red light is on. You might damage a disk or the disk drive.

2 Close the door to the disk drive.

3 Turn the monitor on.

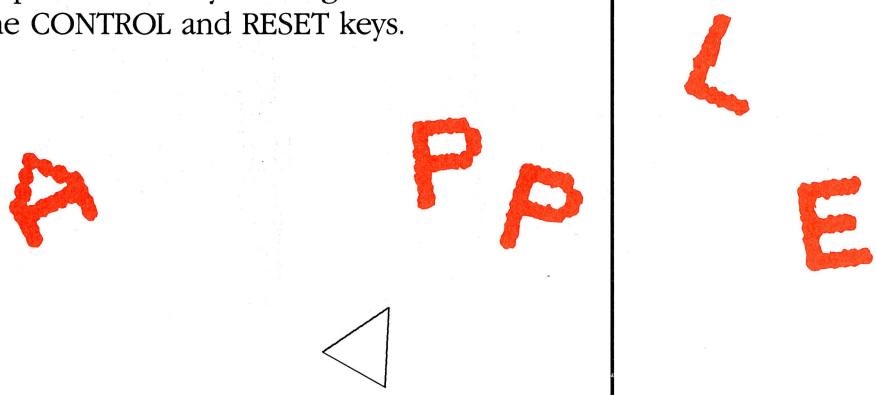
4 Turn the computer on by pressing the power switch in back of the Apple.

5 Wait for a message to appear on the monitor.

Ask your club leader for a disk so you can practice loading the disk drive and starting the computer. Once you are sure you can start the computer without any trouble using this method, learn how to restart the system without turning the computer off. This will save wear and tear on the computer's power switch.

If You Have an Apple II+
If the computer is on and the red light on the disk drive is off, you can load a disk by typing PR#6 and pressing RETURN.

If You Have an Apple IIe
Restart the system when the power is on by holding down the OPEN-APPLE key while pressing the CONTROL and RESET keys.



Information About Disks

All club members should learn how to take care of disks. Disks can be damaged in many ways. Follow these simple rules to keep your own and your club's disks in good condition for a long time.

1 Don't touch the shiny parts of a disk. Even clean hands can leave an oil slick 30 microns deep on a disk. This will destroy data instantly.

2 Use only a felt tipped marking pen to label a disk directly. Writing directly on a disk with a pencil or ball point pen can damage the disk.

3 Store disks in containers that will prevent them from bending and protect them from heat and dust. They should always be put in their envelopes when not in use.

4 Keep them away from anything magnetic such as TV monitors or stereo speakers.

5 Never bend or force a disk into or out of a disk drive.

Some Amazing Facts About Disks

- A disk is covered with microscopic crystals of iron oxide about 1/1000 of an inch thick. These crystals hold positive and negative magnetic charges that are translated into information that the computer understands.
- A disk has no grooves but has invisible concentric circles or tracks. The tracks contain information that is transferred by a read/write head on the disk drive to the computer. Most floppy disks have 48 or 96 tracks per inch.
- A typical single-sided, double density, 5-1/4 inch disk holds the equivalent of 55 pages of double-spaced, typed information.
- When you slide a disk into a disk drive, close the door, and activate the disk drive, the disk immediately begins to spin at 300 revolutions per minute—that's five times a second.
- Disks come in three sizes: 8 inch, 5-1/4 inch, and 3-1/4 inch. Do you know what size disk your computer uses?

Preparing a Disk for Use with Your Apple

There will be times when you will want to use a disk to save the work you did at the computer. Before you can save your work on a disk, you must first prepare your disk so that it can receive information. This is called *formatting* or *initializing*. The reason you have to do this is that blank disks can be used with many different kinds of computers, so you must prepare your disk for use with an Apple computer.

Follow these instructions to prepare your disk. If you need help, ask your club leader.

1. Put the DOS 3.3 SYSTEM MASTER disk into drive 1 and turn on the computer.
2. Be sure the CAPS LOCK key is down. (This isn't necessary if you are using an Apple II+.)
3. Type the following program to place your name on the disk and automatically catalog its contents.

```
10 REM HELLO
20 REM GREETING PROGRAM FOR
30 HOME: PRINT
40 PRINT "your name'S DISK"
50 PRINT CHR$(4); "CATALOG"
60 NEW
```

4. Remove the DOS 3.3 SYSTEM MASTER disk from disk drive 1 and insert your blank disk.
5. Type: INIT HELLO and press RETURN key.
6. When the light on the disk drive goes off, your disk will be prepared for use. You will now be able to save your work.

Using the Disk Drive

There are a number of jobs related to saving your work on a disk that are performed by the disk drive. The sections below describe the steps you should follow to perform each job.

Saving a Program

You may want to save some of the programs you write. To save a program on a disk you should:

1 Obtain an initialized disk. The previous page explains how to initialize a disk.

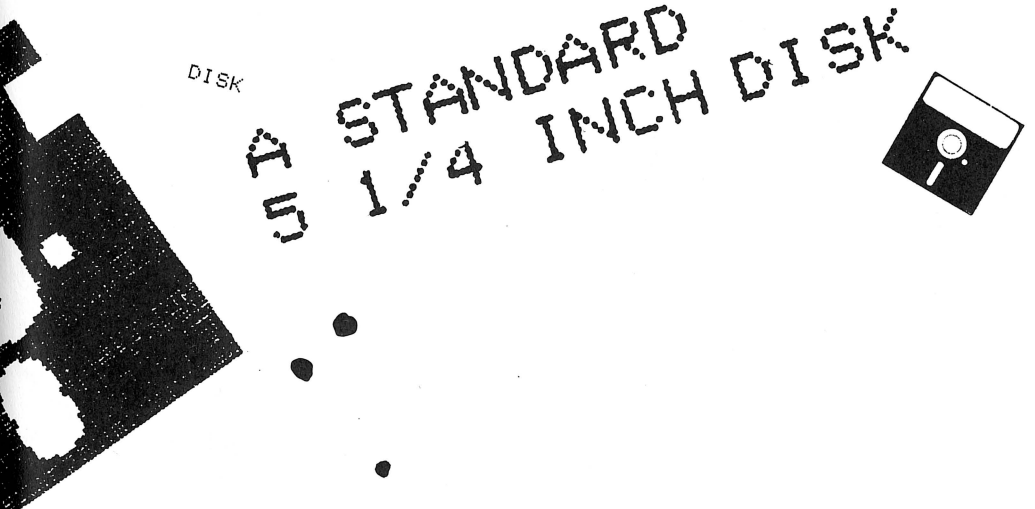
2 Enter and then RUN your program to make sure it works.

3 Insert the disk in the disk drive, close the door to the drive, enter SAVE *(enter the name of your program here),* and press RETURN.

4 The disk drive will whir as the program is being saved. When the red light goes off and the whirring stops, your program is saved on the disk.

5 Enter CATALOG and press RETURN. If the saving process worked properly, you should see the name of your program listed on the screen. The name you have assigned to your program is called a "file" name. Think of a disk as being a file cabinet that contains a number of folders or files that hold information.

6 When you CATALOG your disk several pieces of information are displayed. For example, A 005 HOMEWORK. The "A" means the file contains a program written in Applesoft BASIC. The 005 stands for the amount of space in sectors that the program occupies on a disk. HOMEWORK is the name of the file.



Locking a File

Sometimes you will have programs that you will want to protect from being accidentally erased from the disk. To lock or protect a file you should:

1 Insert the disk with the program you want to lock into the disk drive, enter LOCK *(enter the name of your program here),* and press RETURN.

2 The disk drive will whir and automatically lock your program.

3 Enter CATALOG and press RETURN.

An asterisk * will appear in front of the letter A to indicate that the file has been locked. For example, * A 005 HOMEWORK.

Naming and Renaming Files

There are a few rules you must follow when you name your program. To name a program you:

1 Must begin the name of your file with a letter.

2 Must limit the length of the file name to a total of 30 characters and spaces.

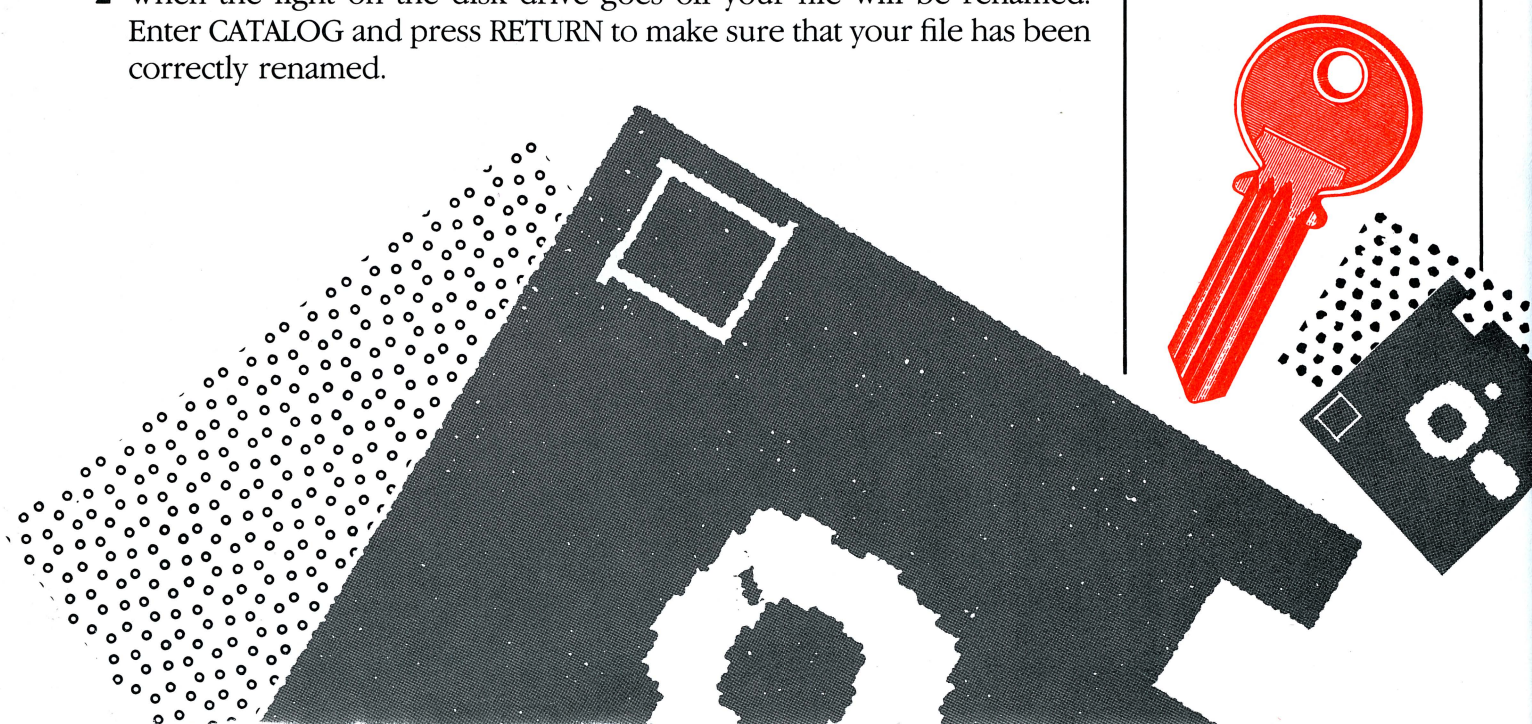
3 Cannot use a comma in a file name.

To rename a file saved on a disk follow these steps:

1 Insert the disk with the program you wish to rename into the disk drive, enter RENAME *(enter the name of your program here),* and *(enter the new name you wish to use),* and press RETURN.

2 When the light on the disk drive goes off your file will be renamed. Enter CATALOG and press RETURN to make sure that your file has been correctly renamed.

Q: What did the program say to the computer?
A: Sorry, but I've gotta RUN.



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Erasing a Program

To erase a program from a disk follow these steps:

1 Insert the disk with the program you want to erase into the disk drive, enter DELETE *(enter the name of your program here),* and press RETURN.

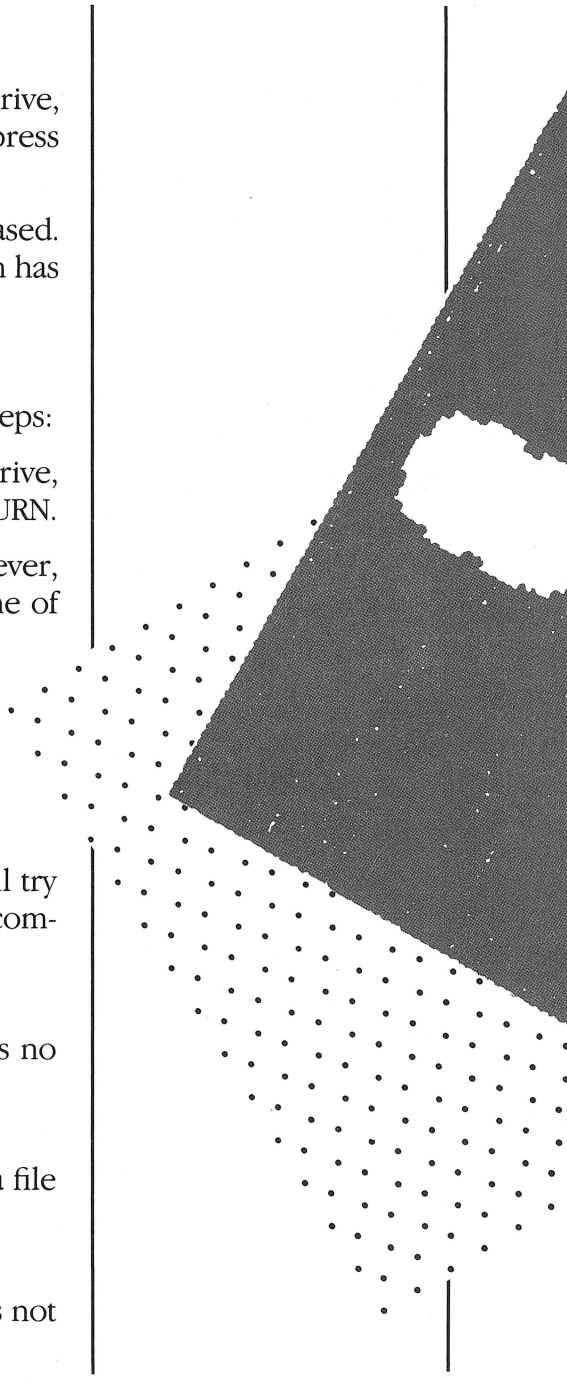
2 When the light on the disk drive goes off your program will be erased. Enter CATALOG and press RETURN to make sure that your program has been erased from the disk.

Loading a Program

To load a program that has been saved on a disk follow these steps:

1 Insert the disk with the program you want to load into the disk drive, enter LOAD *(enter the name of your program here),* and press RETURN.

2 LOAD will place your program into the computer's memory; however, to run the program you must still enter RUN followed by the name of the program.



Common "Disk Operating System" (DOS) Error Messages

If you make a mistake in using the disk drive the computer will try to help you by printing an error message. Listed below are some common DOS error messages.

1 DISK FULL
This message will appear if you try to save a file on a disk that has no room left on it.

2 FILE LOCKED
This message will appear if you try to SAVE, DELETE, or RENAME a file that is locked.

3 FILE NOT FOUND
This message will appear if you try to LOAD or RUN a file that does not exist on the disk.

4 I/O ERROR (INPUT/OUTPUT)
This message will appear if you try to SAVE, LOAD, or RUN a program from a disk that is not working properly for some reason. This error message is often displayed if the door to the disk drive is left open when loading a disk or if a disk is defective.

5 LANGUAGE NOT AVAILABLE
This message will appear if you try to LOAD or RUN a program written in a programming language that is not in the computer's memory.

6 WRITE PROTECTED
This message will appear if you try to SAVE or DELETE a program from a disk that has been write protected. Disks with a tab covering the write slot are write protected. To write to a write-protected disk you must first remove the tab.

Planning A Program

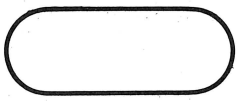
People who program computers have different styles of programming. Some programmers sit down and try to program their ideas without a lot of advance planning. A programmer who uses this method of programming is called a "hacker." It's tempting to be a hacker, and some programmers can actually program quite well this way. However, studies show that programmers who carefully plan their programs in advance are far more successful than hackers at handling complex problems.

When you write a program for your Apple you are giving the computer a set of step-by-step instructions for doing a job. If you don't plan your steps carefully, the computer will not understand what to do. Writing a flowchart can help you arrange the steps your program will follow before you write a single line of programming code. A flowchart is a diagram of the steps you want the computer to follow when it runs a program. It's also a useful tool for debugging (correcting) your work.

The symbols shown on the next page are frequently used in flowcharting. Study the meaning of each symbol and then examine the sample flowchart.

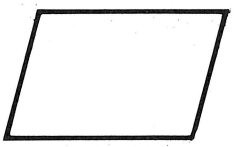
Flowcharting Glossary

START OR STOP

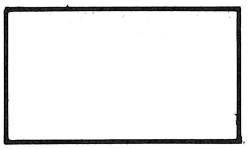


INDICATES PATH PROGRAM WILL FOLLOW

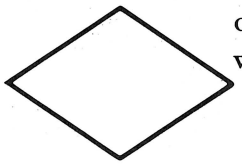
INPUT OR OUTPUT



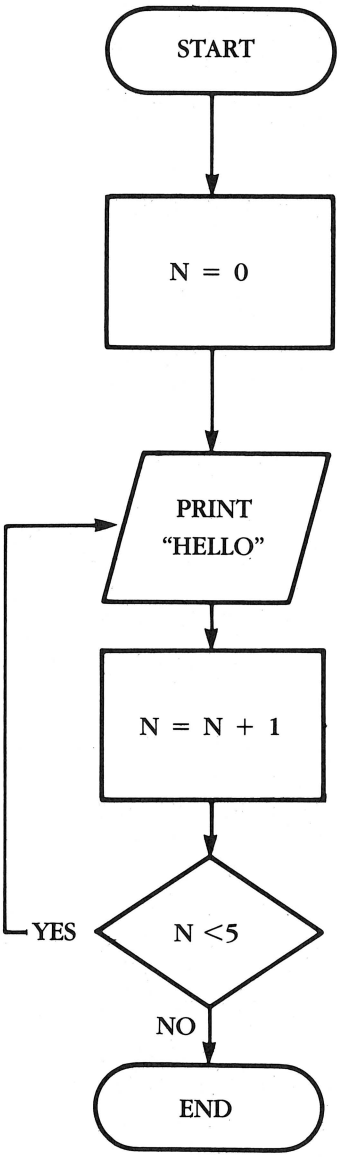
SINGLE STEP



DECISION BOX — Either a question or a comparison — with two exit points



Sample Flowchart

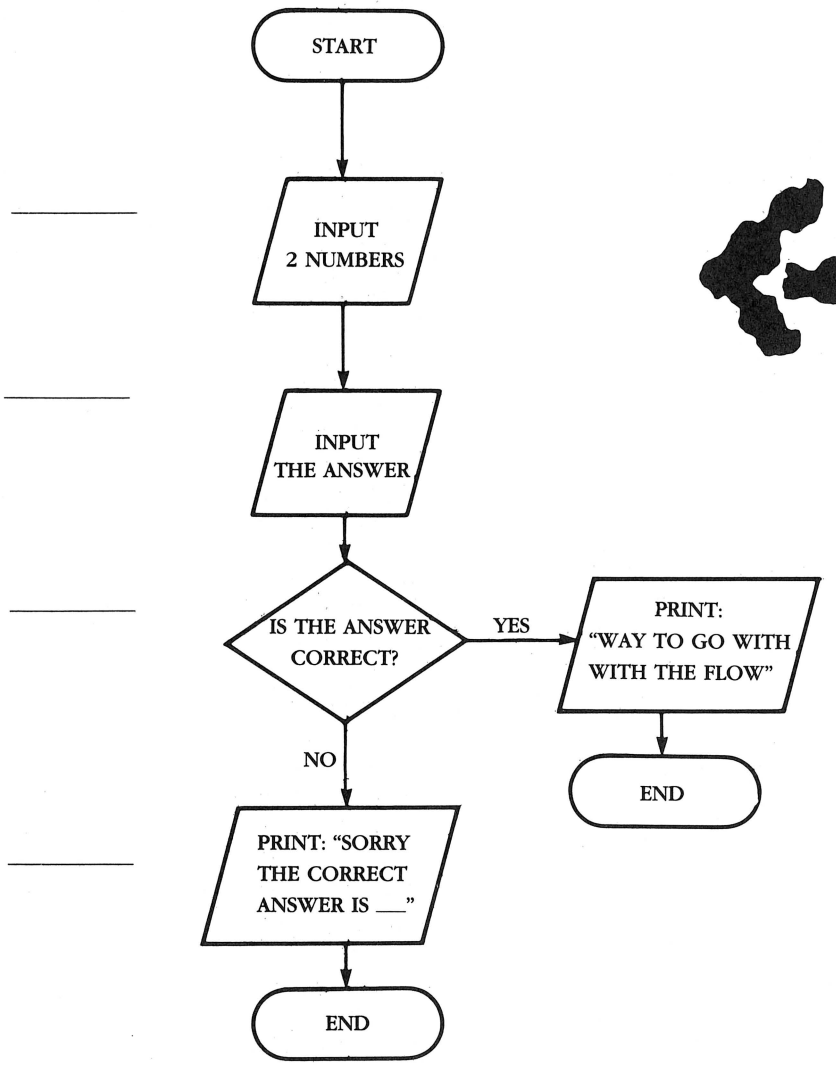


Program

Your Turn to Flowchart

Next to each symbol in the flowchart, place the number of the line or lines of the program that the symbols represent.

```
10  INPUT "YOUR TWO NUMBERS  "; X,Y
20  INPUT "THE ANSWERS ADD UP TO  "; A
30  IF A = X + Y THEN 60
40  PRINT "SORRY, THE CORRECT ANSWER IS  "; A + B
50  END
60  PRINT "WAY TO GO WITH THE FLOW!"
70  END
```



Micro Bits!

Apple Game Wizard—Bill Budge

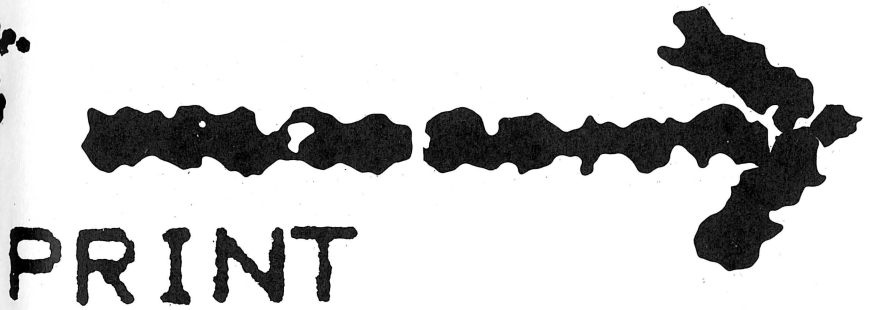
Some people spend a lot of money on computer games to have fun. Bill Budge programs computer games, has fun, and makes a lot of money doing it. Budge, a 30-year-old Californian, has written two top-selling pinball programs, *Raster Blaster* and *Pinball Construction Set.*

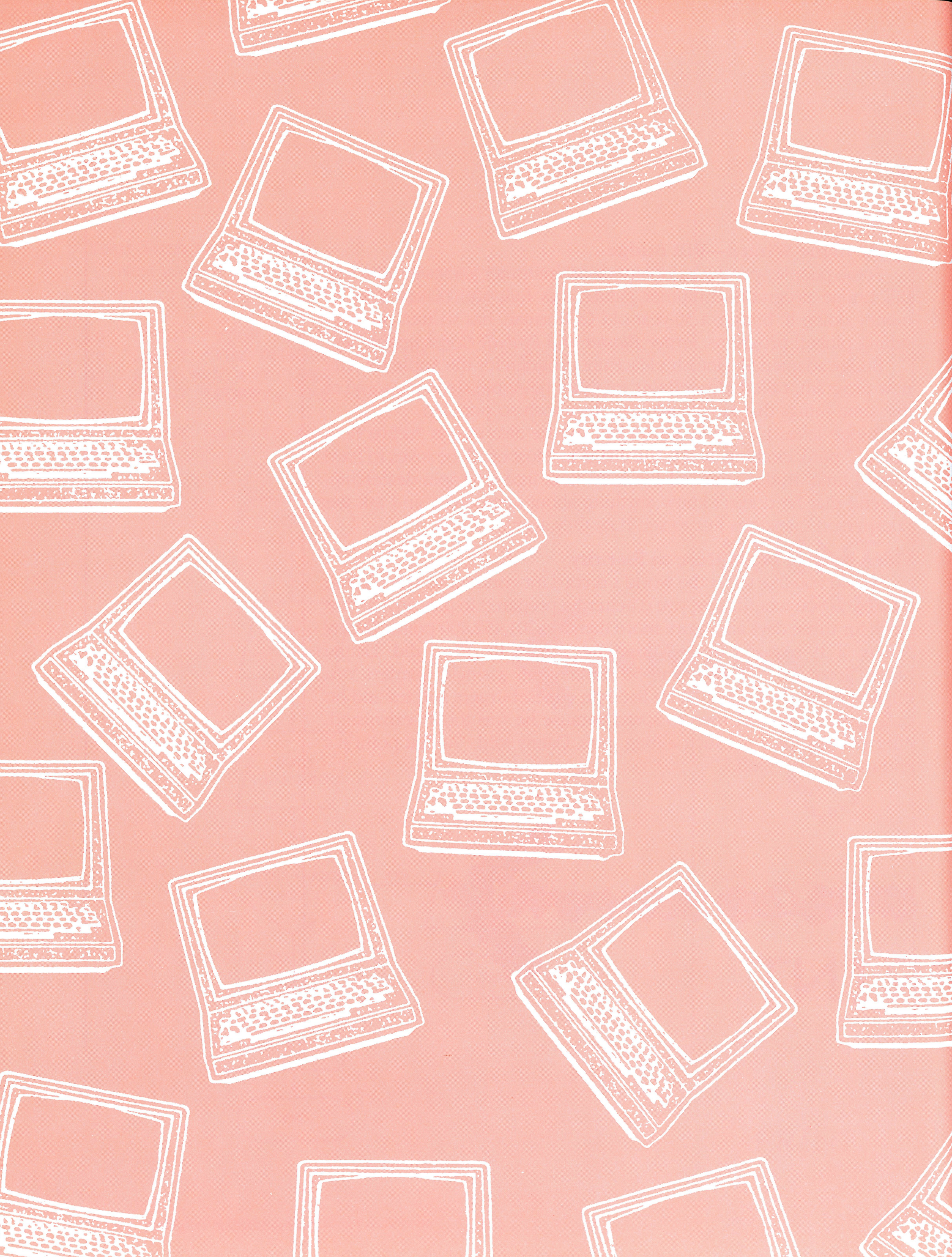
Budge adapted Macintosh's MacPaint program for the Apple IIe. The new program, called *MousePaint,* enables the Apple IIe to do some of the same things that have made the Macintosh so popular.

Budge loves his Apple Macintosh, but he also enjoys "Leave It to Beaver," punk clothing, and science fiction. Most of all, he loves to have a good time. Budge's idea of fun is to walk into an Apple dealership, pretend that he doesn't know anything about computers, and ask the salesperson questions just to see how they answer them.

Video Games: From Here to Eternity

Would you like to set the world's record for continuous video game playing? If you would, then you'd better be prepared to play around the clock for three days and score more than the 201,452,600 points Danny Norris, a 19-year-old from Wilmington, North Carolina, did. Danny played *Joust* for 73 hours and 50 minutes on a single quarter! You might also like to know that he lived on cheeseburgers and tea and he quit playing with 151 men to spare because he was totally exhausted. After playing *Joust* for such a long time, Danny said, "At that point it's endurance—not skill."





Programming in Applesoft BASIC

5

Notes to the Club Advisor

Chapter Overview

This chapter introduces the Applesoft BASIC programming language. The chapter's objective is not to teach club members everything about BASIC but rather to introduce BASIC activities and projects that will be enjoyable. The programs are purposely short so they may be easily understood and completed. The information introduced in the chapter will also help club members complete the chapters on low-resolution and high-resolution graphics.

Minimum Prerequisites

Several things the club advisor can do to help club members learn about programming in BASIC are listed below.

1 Identify which club members are proficient at BASIC programming and ask them to assist less-experienced members.

2 Conduct "mini-lessons" with club members on specific topics related to the projects and activities.

3 Have resource books on hand for club members who may want additional models and information about programming in BASIC. Some suggested texts are listed below.

Applesoft Tutorial
by Meg Beeler
Apple Computers, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

Practicing Programming on the Apple II/IIe
Random House, Inc.
School Division
7307 South Yale, Suite 103
Tulsa, OK 74136

Basic Beginnings and *Basic Fun*
by S. Lipscomb and M. Zuanich
Avon Books
959 Eighth Avenue
New York, NY 10019

Kids and the Apple
by Edward H. Carlson
DATAMOST, Inc.
8943 Fullbright Avenue
Chatsworth, CA 91311–2750

Advance Preparation

The club advisor should become familiar with the activities and projects presented in the chapter. For debugging programs it is useful to have a printer available to list programs.

Applesoft Building Blocks

The next few pages will help you learn how to program in Applesoft BASIC. Type the instructions exactly as they appear. Press return after each instruction. You'll get a chance to use another programming language called LOGO in another section of this book.

If you have a problem, ask your club leader or another club member for help.

If you're working with another club member, be sure to take turns using the computer and help each other out.

Applesoft Commands and Statements for You to Try

HOME	Commands the computer to clear the screen and send the cursor to the upper left corner of the screen.
PRINT	Commands the computer to print output.
SPEED	Controls the speed of the computer's output. (SPEED = 255 is the normal print speed.)
RUN	Commands the computer to "do" the program.
NEW	Commands the computer to erase the program in memory.
LIST	Commands the computer to list all of the commands and statements of a program that is in memory.

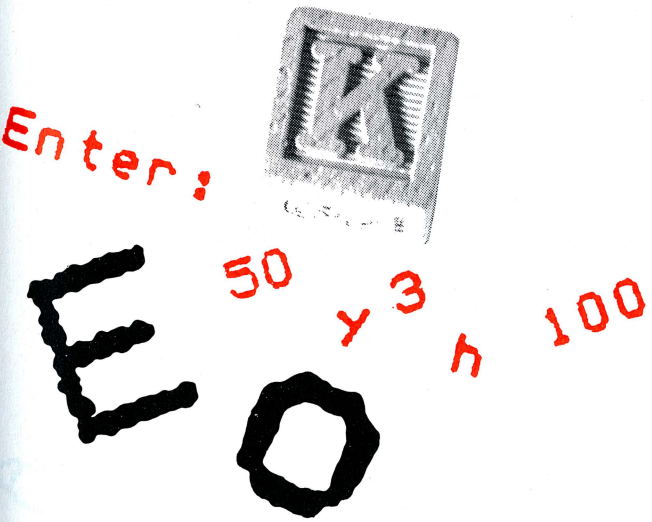
■

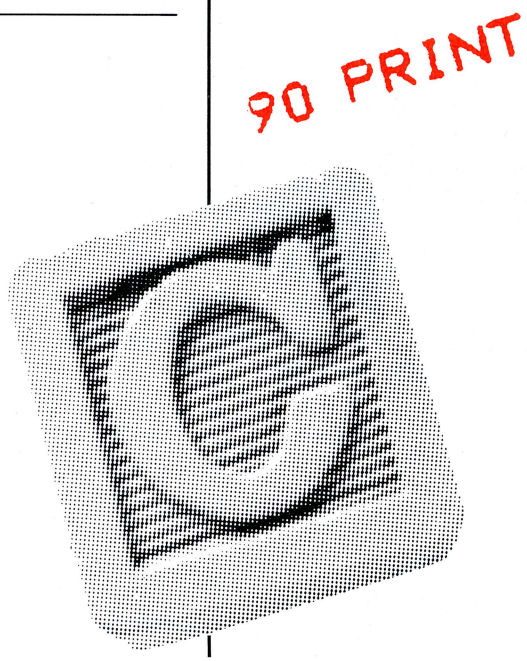
Apple II+ and IIe Keys and Their Functions

RETURN	Signals the computer to carry out an instruction.
SPACE BAR	Moves the cursor [], creates spaces, and erases characters from the screen.
SHIFT	When pressed, will cause the upper character on a two-character key to be printed on the screen.
CAPS LOCK	When pressed, on an Apple IIe, will cause capital letters to be printed on the screen.

Special Symbols

+	Use this symbol when you want to add with your Apple.
−	Use this symbol when you want to subtract with your Apple.
/	Use this symbol when you want to divide with your Apple.
*	Use this symbol when you want to multiply with your Apple.





Getting Started with Applesoft: Activity 1

Enter:

```
HOME
PRINT "I'M USING AN APPLE."
PRINT "25 + 25"
PRINT  25 + 25
PRINT "372 - 218"
PRINT  372 - 218
PRINT  "10 * 10"
PRINT   10 * 10
PRINT   "100/2"
PRINT    100/2
HOME
```

Enter:

```
10  PRINT "       *"
20  PRINT "     *   *"
30  PRINT "   *       *"
40  PRINT "   *  U    *"
50  PRINT "   *  S    *"
60  PRINT "   *  A    *"
70  PRINT "   *       *"
80  PRINT "   *       *"
90  PRINT "  *         *"
100 PRINT " *           *"
110 PRINT "*************"
120 PRINT " | | | | | | "
130 SPEED = 5
140 PRINT:PRINT:PRINT:PRINT
150 PRINT:PRINT:PRINT:PRINT
160 SPEED = 255
```

Enter:

```
10  HOME
20  PRINT "THIS IS NORMAL SPEED."
30  SPEED = 5
40  PRINT "THIS IS A SLOWER SPEED."
50  SPEED = 255
60  PRINT "BACK TO NORMAL SPEED."
```

Enter:

```
RUN
NEW
```

■

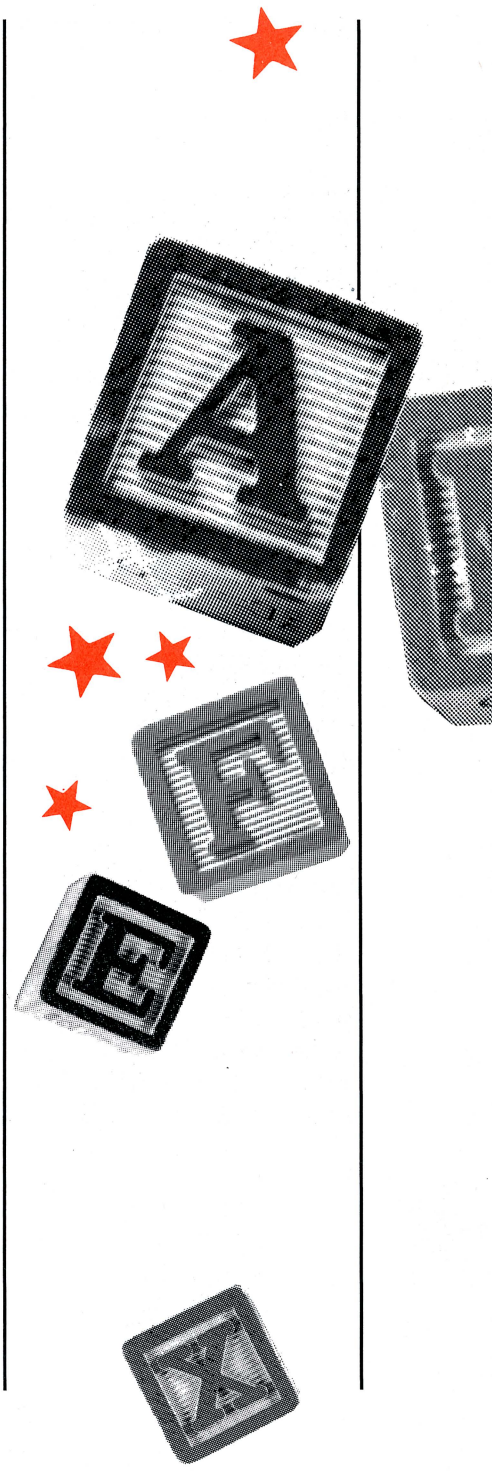
Projects

1 Change the take-off speed of the rocket in the program above.

2 Use the commands you have learned to create a program that prints a countdown (5 . . . 4 . . . 3 . . . 2 . . . 1 . . . 0 . . . BLAST OFF!).

3 Change the program so that the rocket flies off the screen.

4 Make a fleet of rockets that blast off at different times.



Applesoft Building Blocks

Don't worry about making mistakes. Everyone makes mistakes when they work with a computer—even computer experts. Page 106 of this book lists some of the error messages that you might see when you program in BASIC.

More Applesoft Commands and Statements for You to Try

REM	Allows remarks or reminders to be written into the program.
PRINT CHR$ (7)	This causes the Apple to make a sound.
FLASH	This commands print on the screen to flash.
INVERSE	This commands print on the screen to be displayed in inverse color.
NORMAL	This commands the FLASH or INVERSE commands to be turned off.

Apple II+ and IIe Keys and Their Functions

←	The left arrow key moves the cursor to the left and erases writing from the computer's memory, but not from the screen.
→	The right arrow key moves the cursor to the right, retypes what is on the screen, and puts it back into the memory.

■

Getting Started with Applesoft: Activity 2

Enter:

```
NEW
HOME

10 REM  THIS PROGRAM WILL MAKE YOUR APPLE BEEP
20 PRINT CHR$ (7)

RUN   (From now on you will not be reminded to type NEW to
       clear the computer's memory, or to type
       RUN to start your programs.)
```

Enter:

```
10 REM THIS PROGRAM WILL MAKE
20 REM A MESSAGE FLASH ON AND OFF.
30 HOME
40 FLASH
50 PRINT "WATCH ME FLASH!"
60 PRINT "TOM, DICK, AND HARRY!"
70 PRINT:PRINT:PRINT
80 NORMAL
90 PRINT "TIME TO STOP FLASHING."
```

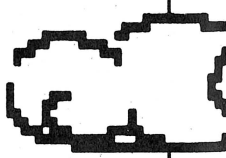
Enter:

```
10 REM THIS PROGRAM SHOWS
20 REM HOW INVERSE AND
30 REM NORMAL WORK.
40 HOME
50 PRINT "THIS IS NORMAL PRINT."
60 PRINT
70 INVERSE
80 PRINT "THIS IS INVERSE PRINT."
90 PRINT
100 NORMAL
```

Enter:

```
10  REM  THIS PROGRAM MAKES THE APPLE BEEP
20  REM  AT DIFFERENT SPEEDS.
30  HOME
40  FLASH
50  PRINT "ARE YOU READY?"
60  PRINT:PRINT:PRINT
70  NORMAL
80  SPEED = 200
90  PRINT:PRINT:PRINT
100 PRINT "A 1, AND A 2, AND A 3!"
110 PRINT CHR$ (7)
```

continued . . .

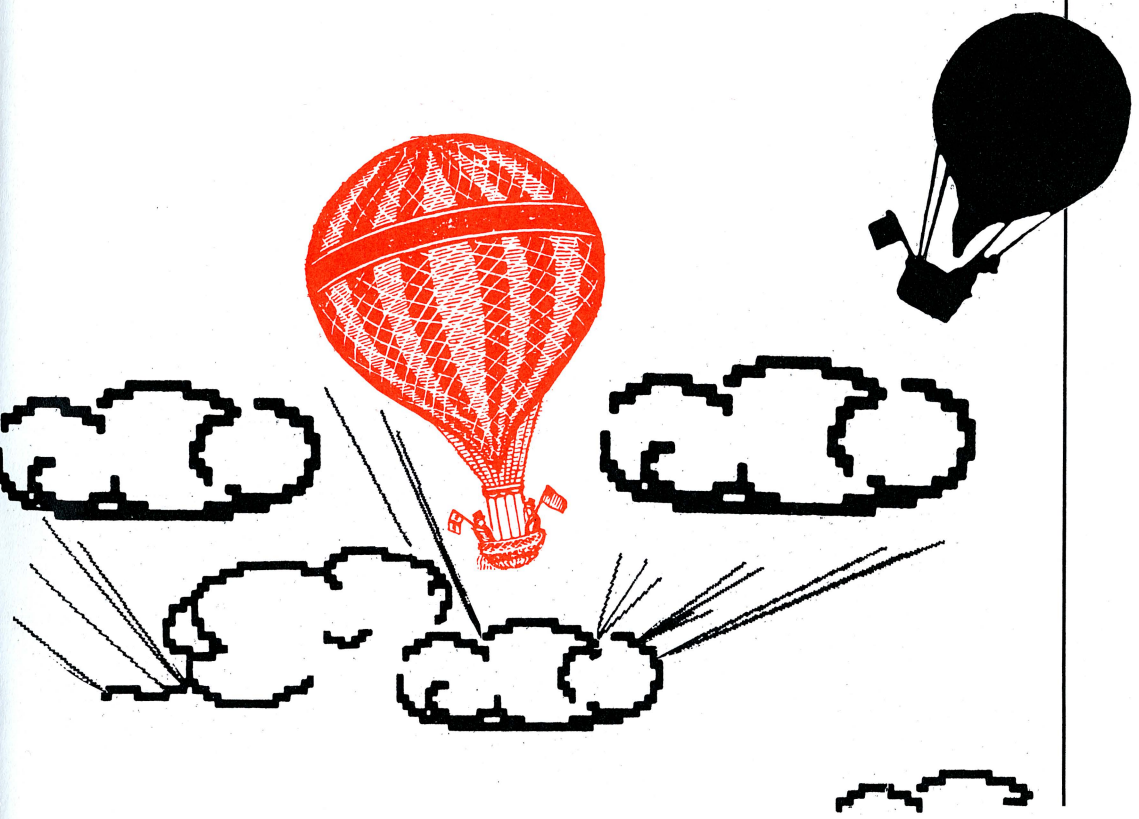


```
120 SPEED = 150
130 PRINT CHR$ (7)
140 SPEED = 100
150 PRINT CHR$ (4)
160 SPEED = 1
170 PRINT CHR$ (7)
180 PRINT:PRINT:PRINT
190 PRINT "AH! SUCH SWEET MUSIC!"
200 SPEED = 255
```

Projects

1 Try to create a program that draws a picture of a hot-air balloon that will move off the screen and flash as it moves.

2 Change the program that makes the Apple beep so that it beeps faster and longer.



Applesoft Building Blocks

Applesoft Commands and Statements for You to Try

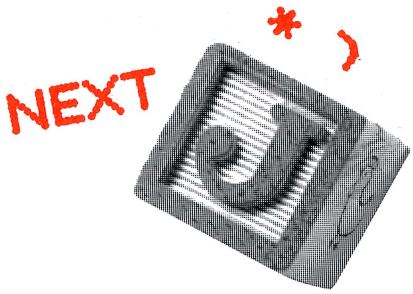
CONT	Commands the computer to continue a program that has been stopped by STOP, END, or by pressing CONTROL-C.
GOTO	Commands the computer to jump to a program line number.
INPUT	Commands the computer to ask the user to enter information.
LET	Assigns a value to a variable.
?	A short way to enter a PRINT command.

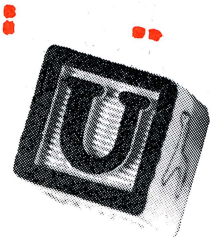
Apple II+ and IIe Keys and Their Functions

CTRL-C	Hold down the CONTROL key and press the C key to stop a program. It is sometimes necessary to press RETURN along with CTRL-C to stop a program.

Special Symbols You Will Use

,	When a comma is used at the end of a PRINT statement, the output is printed into successive zones.
;	When a semicolon is used at the end of a PRINT statement, it causes the cursor to be left at the end of that line and prevents a new line from being started.





Getting Started with Applesoft: Activity 3

Enter:

```
10 REM  THIS PROGRAM DEMONSTRATES A
20 REM  CONTINUOUS LOOP.
30 HOME
40 PRINT "I WILL PRINT UNTIL YOU PRESS CONTROL C"
50 GOTO 10
```

Enter:

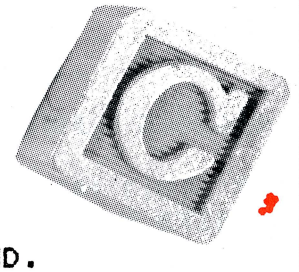
```
10 REM THIS PROGRAM DEMONSTRATES HOW A
20 REM COMMA CAN AFFECT PRINTING.
30 HOME
40 PRINT "I AM THE GREATEST!",
50 GOTO 40
```

Enter:

```
10 REM THIS PROGRAM DEMONSTRATES HOW A
20 REM SEMICOLON CAN AFFECT PRINTING.
30 HOME
40 PRINT "I AM THE GREATEST!";
50 GOTO 40
```

Enter:

```
10 REM THIS PROGRAM DEMONSTRATES A
20 REM SHORTCUT FOR THE PRINT COMMAND.
30 HOME
40 ? "THIS PROGRAM THROWS ME FOR A LOOP!"
50 ?
60 ?
70 GOTO 40
```



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Projects

1 Use what you have learned about commas and semicolons to write a program that will print a picture of a Christmas tree. Give your tree some lights that flash.

2 Try stopping one of the programs above with CONTROL-C and restarting it with the CONT command.

Getting Started with Applesoft: Activity 4

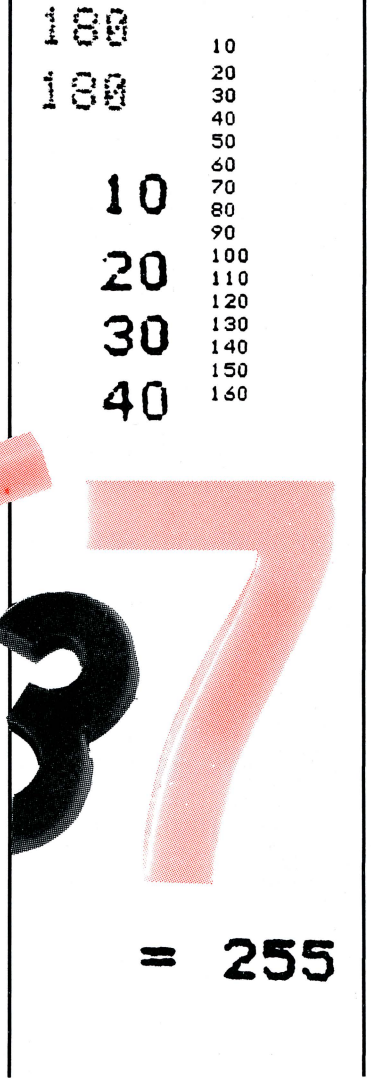
```
Enter:

10  REM THIS PROGRAM DEMONSTRATES THE
20  REM USE OF THE INPUT COMMAND.
30  HOME
40  PRINT "WHAT IS YOUR FIRST NAME?"
50  INPUT F$
60  PRINT "WHAT IS YOUR MIDDLE NAME?"
70  INPUT M$
80  PRINT "WHAT IS YOUR LAST NAME?"
90  INPUT L$
100 PRINT F$ " " M$ " " L$
```

```
Enter:

10 REM THIS PROGRAM GUESSES NUMBERS.
20 HOME
30 PRINT "THINK OF A 3 DIGIT NUMBER."
40 PRINT "ALL THREE DIGITS MUST BE THE SAME."
50 PRINT:PRINT
60 PRINT "FOR EXAMPLE: 777."
70 INPUT "WHAT IS THE SUM OF THE DIGITS?: ";S
80 PRINT "YOUR NUMBER IS ";S/3
```

continued . . .



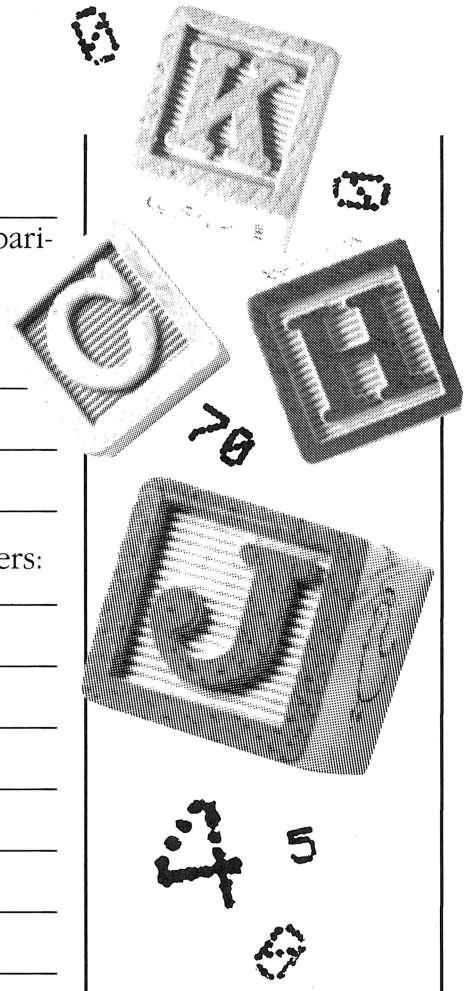
■

Enter:

```
10 REM THIS PROGRAM DEMONSTRATES THE
20 REM USE OF VARIABLES.
30 HOME
40 LET A$ = "KNOCK, KNOCK."
50 LET B$ = "WHO'S THERE?"
60 PRINT "WHAT IS YOUR FIRST NAME?"
70 INPUT N$
80 HOME
90 PRINT A$ " " B$ " " N$
```

Enter:

```
10 REM THIS PROGRAM DEMONSTRATES HOW
20 REM TO CONVERT INCHES TO CENTIMETERS.
30 HOME
40 PRINT "HOW MANY INCHES TALL ARE YOU?"
50 INPUT I
60 LET C = I * 2.54
70 PRINT "YOU ARE:"
80 PRINT:PRINT
90 PRINT C ;" CENTIMETERS TALL."
```



Applesoft Building Blocks

Applesoft Commands and Statements for You to Try

IF . . . THEN	A BASIC program statement used to make comparisons and decisions.

Special Symbols You Will Use

^	10^2
SQR ( )	Square root

All of the symbols below are used to compare the value of numbers:

>	Greater than a value.
<	Less than a value.
=	Equal to a value.
<>	Not equal to a value.
>=	Greater than or equal to a value.
<=	Less than or equal to a value.

When you type PRINT 5 > 3, the Apple responds with a 1 for true or a 0 for false.
You will also learn that your Apple can do more than one kind of arithmetic problem at a time. For example:
6 * (5−2) + 4/2 ^ 2

■

However, the Apple does its calculations in a particular order. The order that the Apple follows is:

1 Operations in parentheses first.

2 Powers are next.

3 Multiplication, division, and square roots.

4 Addition and subtraction (starting from the left of a problem) are done last.

Getting Started with Applesoft: Activity 5

Enter:

```
PRINT 100 > 25
PRINT 44 < 344
PRINT 9 * 9 > 2 * 2
PRINT 33 + 7 <> 41
PRINT 24 + 8 >= 30
PRINT 24 + 8 <= 30
PRINT SQR (25)
PRINT SQR (100)
PRINT 10^2
PRINT 3^3
PRINT 6 * (77-3)+ 24/8 + SQR (16) - 2^2
```

Enter:

```
10  REM  THIS PROGRAM CARES ABOUT YOU.
20  HOME
30  PRINT "HOW ARE YOU FEELING TODAY?"
40  PRINT:PRINT
50  PRINT "ARE YOU FEELING GOOD OR BAD?"
60  INPUT A$
70  IF A$ = "GOOD" THEN PRINT "I'M HAPPY FOR YOU!"
80  IF A$ = "BAD" THEN PRINT "THAT'S YOUR PROBLEM!"
```

continued . . .

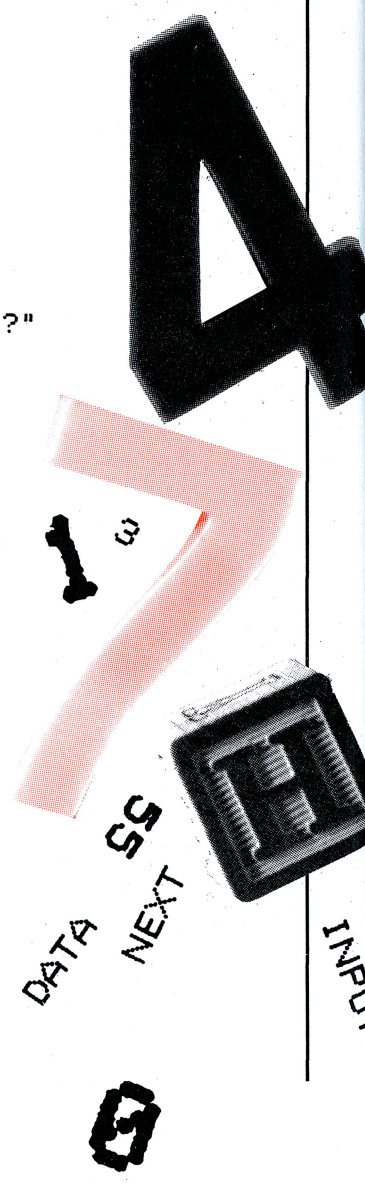
■

```
Enter:

10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO USE IF...THEN.
30  HOME
40  PRINT "HOW OLD ARE YOU?" :PRINT
50  INPUT N
60  IF N < 18 THEN PRINT "YOU'RE NOT OLD ENOUGH TO VOTE YET."
70  IF N >= 18 THEN PRINT "YOU'RE OLD ENOUGH TO VOTE."
```

```
Enter:

10  REM   THIS PROGRAM DEMONSTRATES THE
20  REM   USE OF THE <> SYMBOL.
30  PRINT "HAVE YOU EATEN TODAY?" :PRINT
40  PRINT "PLEASE ANSWER YES OR NO"
50  INPUT A$
60  IF A$ <> "YES" THEN PRINT "YOU MUST BE HUNGRY."
70  IF A$ = "YES" THEN PRINT "DID YOU SAVE SOME FOR ME?"
```



Applesoft Building Blocks

Applesoft Commands and Statements for You to Try

FOR . . . NEXT	BASIC programming statements that work together to create counter-controlled loops.
STEP	A BASIC programming statement that allows counter-controlled loops to be counted in patterns (for example, fives, tens, or reverse order).

Getting Started with Applesoft: Activity 6

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW TO
20  REM  CREATE SPACES WITH TAB.
30  PRINT TAB(5); "I"
40  PRINT
50  PRINT TAB(10); "AM"
60  PRINT
70  PRINT TAB(15); "GOING"
80  PRINT
90  PRINT TAB (20); "DOWN"
```

Projects

1 Create a program that prints numbers from 1 to 10 diagonally on the screen.

2 Create a program that prints a movie marquee with the title of your favorite movie in inverse letters.

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO USE FOR...NEXT TO COUNT.
30  FOR  Z = 1 TO 20
40  PRINT TAB(10); "WATCH ME COUNT."
50  PRINT Z
60  NEXT Z
```

```
10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO USE FOR...NEXT TO COUNT.
30  LET C = 0
40  FOR G = 1 TO 10
50  PRINT "I'M JUST A COUNTING FOOL!"
60  LET C = C + 1
70  PRINT C
80  PRINT
90  NEXT G
```

■

Projects

1 Create a program that counts from 1 to 100 and prints your name.

2 Create a program that counts from 1 to 50 and prints stars (*).

★

★

Getting Started with Applesoft: Activity 7

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES A
20  REM  DELAYED COUNTER.
30  FOR I = 1 TO 5
40  PRINT
50  PRINT "I'LL COUNT AND PAUSE..."
60  PRINT
70  PRINT I
80  REM  THIS SECTION DELAYS THE COUNTER.
90  FOR J = 1 TO 2000
100 NEXT J
110 PRINT
120 NEXT I
```

Projects

1 Change the delay time in the program above from 2000 to 1000.

2 Set the delay time to equal one second.

■

```
Enter:

10   REM  THIS PROGRAM DEMONSTRATES HOW
20   REM  TO COUNT USING STEP.
30   HOME
40   FOR A = 0 TO 30 STEP 5
50   PRINT A
60   PRINT:PRINT
70   NEXT A

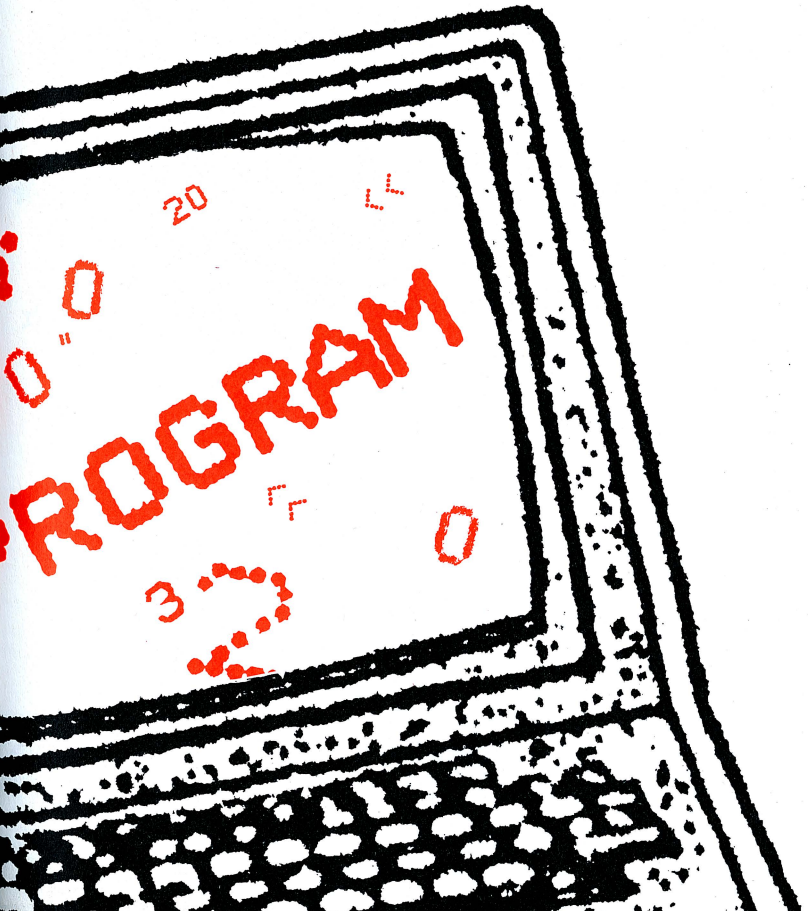
Enter:

10   REM  THIS PROGRAM DEMONSTRATES HOW
20   REM  TO COUNT BACKWARDS.
30   HOME
40   FOR A = 5 TO 1 STEP -1
50   PRINT A
60   PRINT:PRINT
70   NEXT A
```

Projects

1 Create a program that counts backwards from 50 by two's.

2 Create a program that lists all the odd numbers from 1 to 99.



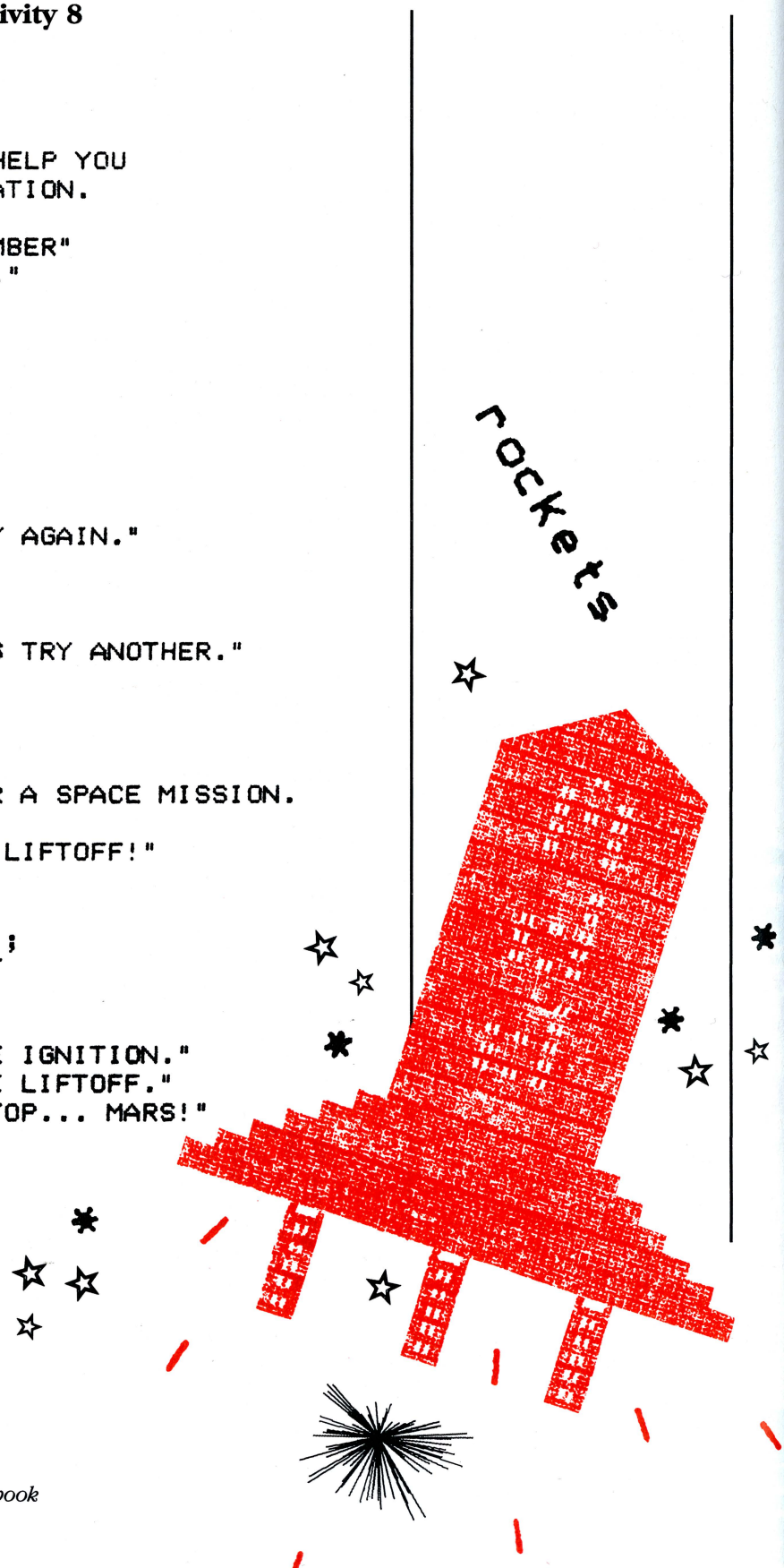
Getting Started with Applesoft: Activity 8

Enter:

```
10  REM  THIS PROGRAM WILL HELP YOU
20  REM  PRACTICE MULTIPLICATION.
30  HOME
40  PRINT "PLEASE TYPE A NUMBER"
50  PRINT "BETWEEN 1 AND 12."
60  PRINT
70  INPUT N
80  FOR I = 1 TO 12
90  PRINT
100 PRINT N;"*";I;"=";
110 INPUT M
120 IF M = N *I THEN 170
130 PRINT
140 PRINT "SORRY, PLEASE TRY AGAIN."
150 PRINT
160 GOTO 100
170 PRINT
180 PRINT "GREAT JOB!  LET'S TRY ANOTHER."
190 NEXT I
```

Enter:

```
10  REM  THIS PROGRAM IS FOR A SPACE MISSION.
20  HOME: SPEED = 100
30  PRINT "10 SECONDS UNTIL LIFTOFF!"
40  PRINT
50  FOR B = 9 TO 0 STEP - 1
60  PRINT B:  PRINT CHR$ (7);
70  FOR T = 1 TO 500: NEXT T
80  NEXT B
90  INVERSE
100 PRINT TAB (15); "WE HAVE IGNITION."
110 PRINT TAB (15); "WE HAVE LIFTOFF."
120 PRINT TAB (15); "NEXT STOP... MARS!"
130 SPEED = 255
140 NORMAL
```



■

Projects

1 Create a program that will help you practice division.

2 Create a program that counts down and displays a rocket lifting off.

Applesoft Building Blocks

BASIC Commands and Statements for You to Try

HTAB	A BASIC command that moves the cursor to a desired column on the screen.
VTAB	A BASIC command that moves the cursor to a desired row on the screen.
INT	A BASIC command that instructs the computer to print a whole number.
RND	A BASIC command that instructs the computer to pick a number at random.
GOSUB-RETURN	BASIC commands that instruct a program to execute a subroutine and then exit the subroutine.
PEEK	This BASIC command reads the contents of a specific location in the computer's random-access memory. PEEK (-16336) is used to create sounds with the Apple.

Getting Started with Applesoft: Activity 9

Enter:

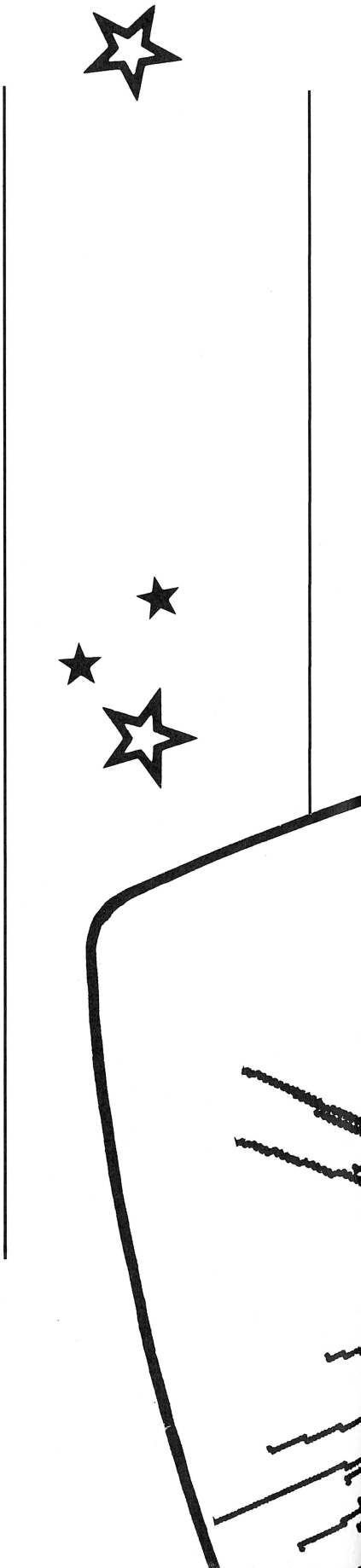
```
10  REM  THIS PROGRAM DEMONSTRATES
20  REM  HOW TO PRINT WITH VTAB.
30  HOME
40  VTAB 8:  PRINT "PRINT AT ROW 8."
50  VTAB 16: PRINT "PRINT AT ROW 16."
60  VTAB 24: PRINT "PRINT AT ROW 24."
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES
20  REM  HOW TO PRINT WITH HTAB.
30  HOME
40  HTAB 5:  PRINT "* STAR IS IN COLUMN 5."
50  HTAB 10: PRINT "* STAR IS IN COLUMN 10."
60  HTAB 15: PRINT "* STAR IS IN COLUMN 15."
```

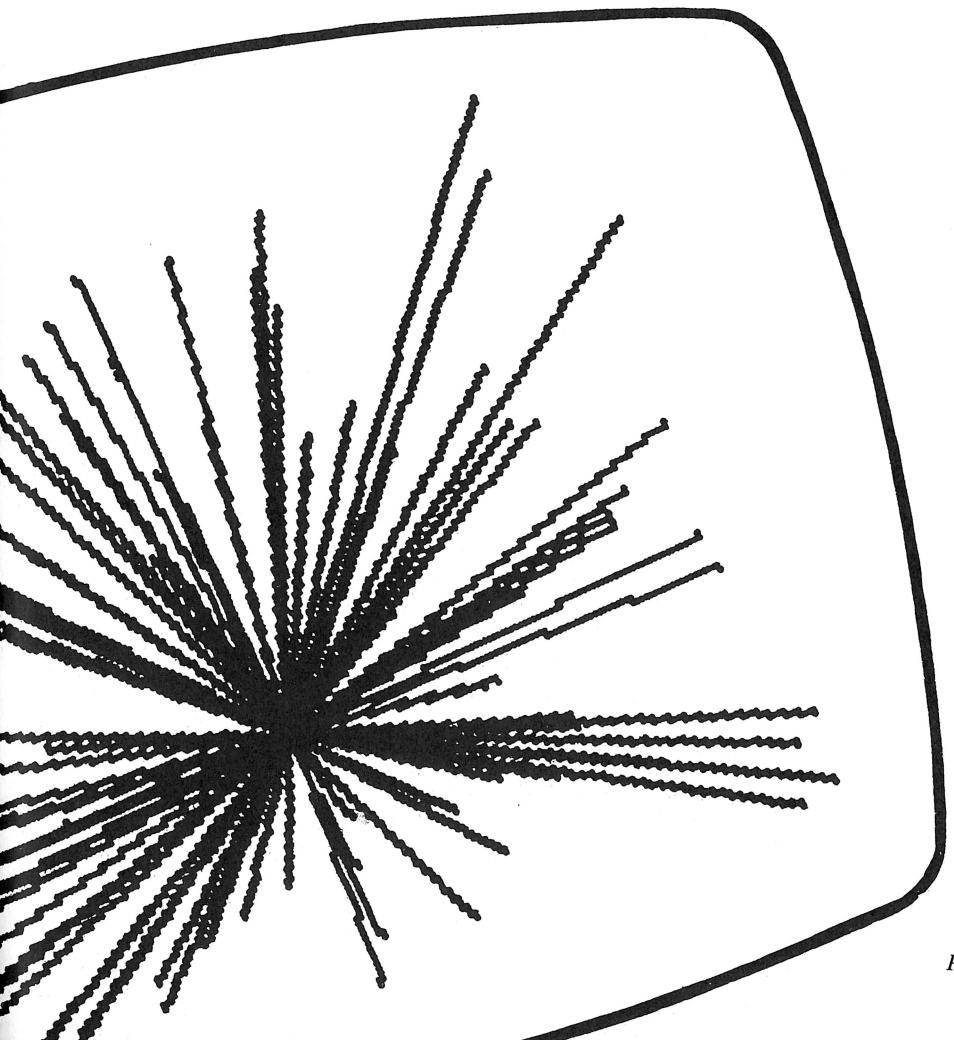
Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW TO
20  REM  MOVE A SYMBOL WITH HTAB AND VTAB.
30  HOME
40  LET A$ = " "
50  LET B$ = "^"
60  VTAB 8
70  FOR Z = 1 TO 39
80  HTAB Z
90  FOR D = 1 TO 100
100 NEXT D
110 PRINT A$ + B$
120 NEXT Z
```



Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO USE VTAB AND HTAB TOGETHER.
30  HOME
40  SPEED = 100
50  VTAB 1: HTAB 1
60  INPUT "HOWDY! DO YOU LIKE COMPUTERS?"; A$
70  IF A$ = "YES" THEN 120
80  IF A$ = "NO" THEN 150
90  VTAB 5: HTAB 10
100 PRINT "PLEASE ENTER YES OR NO."
110 GOTO 50
120 INVERSE
130 PRINT "GOOD FOR YOU!"
140 GOTO 170
150 FLASH
160 PRINT "WELL...THAT'S TOO BAD!"
170 SPEED = 255
180 NORMAL
```



Getting Started with Applesoft: Activity 10

Enter:

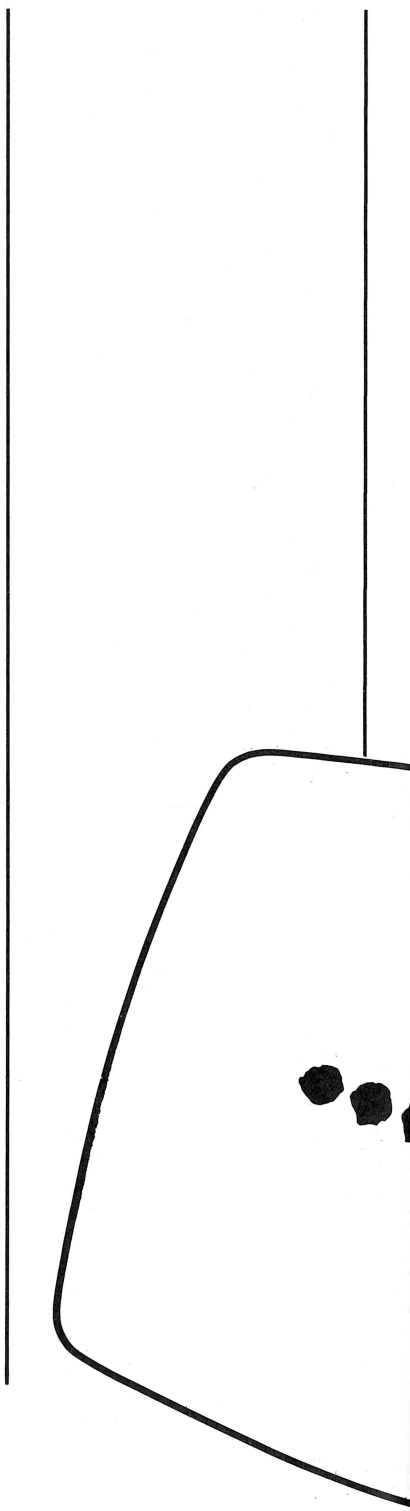
```
10  REM  THIS PROGRAM DEMONSTRATES HOW TO
20  REM  SHOOT ARROWS ACROSS THE SCREEN.
30  HOME
40  A = 1
50  FOR B = 1 TO 34
60  HTAB A + B
70  SPEED = 100
80  PRINT "------>"
90  SPEED = 255
100 HTAB A + B
110 NEXT B
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO PRINT NUMBERS AT RANDOM.
30  HOME
40  FOR A = 1 TO 10
50  PRINT RND (1)
60  NEXT A
```

Enter:

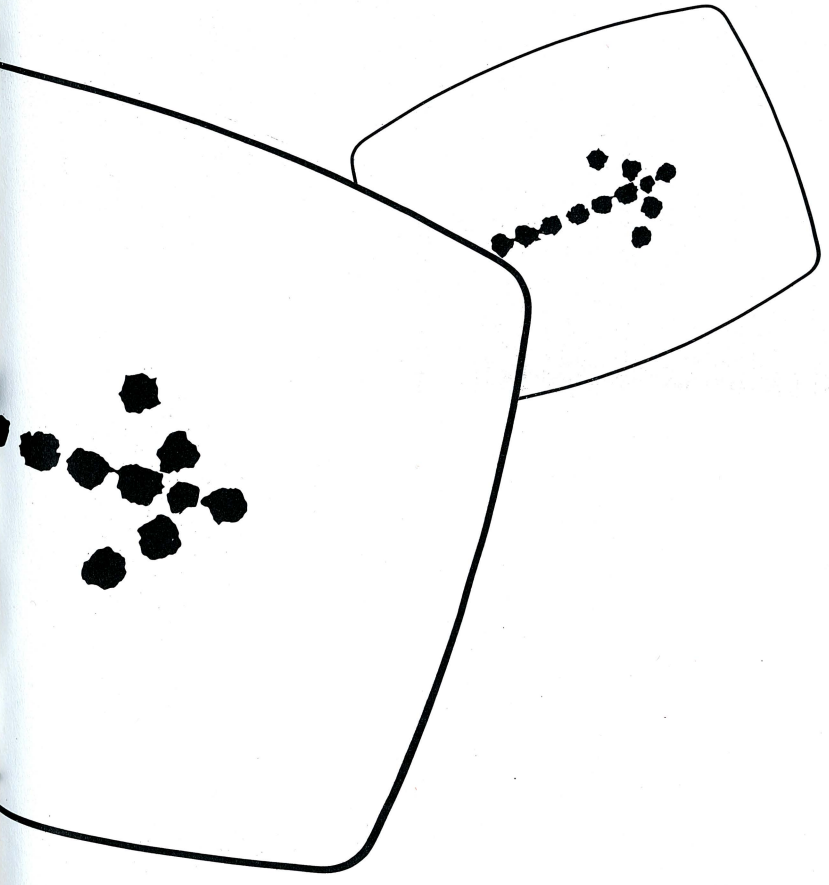
```
10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO USE RANDOM TO PICK A NUMBER
30  REM  BETWEEN 1 AND 10.
40  HOME
50  PRINT INT (RND (1) * 10)
60  FOR A = 1 TO 200
70  NEXT A
80  GOTO 50
```

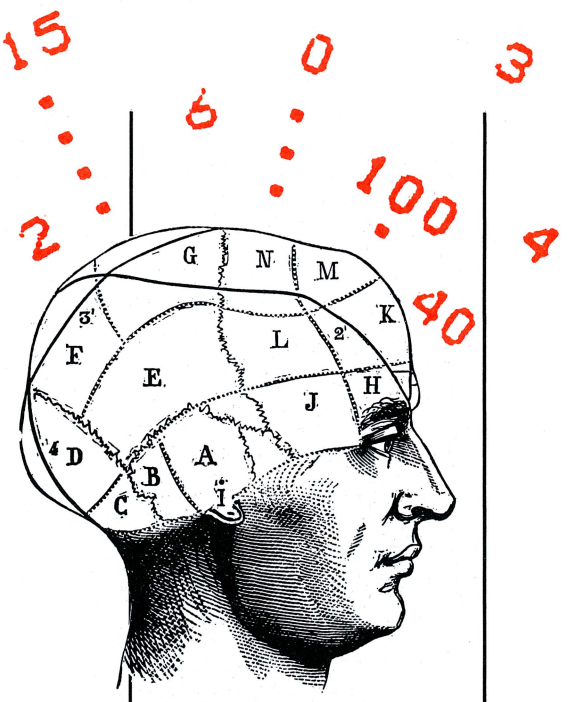


■

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES A
20  REM  NUMBER GAME USING RND AND INT.
30  HOME
40  PRINT "I'M THINKING OF A NUMBER."
50  PRINT
60  PRINT "THE NUMBER IS BETWEEN 1 AND 100."
70  PRINT
80  X = INT (RND (1) * 100 + 1)
90  INPUT "ENTER YOUR GUESS";G
100 PRINT
110 IF G < X THEN 160
120 IF G = X THEN 190
130 PRINT "YOU GUESSED TOO HIGH.  TRY AGAIN."
140 PRINT
150 GOTO 90
160 PRINT "YOU GUESSED TOO LOW.  TRY AGAIN."
170 PRINT
180 GOTO 90
190 PRINT "FANTASTIC!  YOU'RE CORRECT."
```



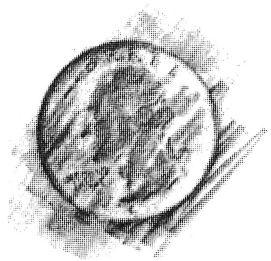


Q: Why couldn't the computer stay awake?
A: Because the key "board" it!

Getting Started with Applesoft: Activity 11

Enter:

```
10  REM  THIS PROGRAM DEMOSTRATES
20  REM  A SUBROUTINE.
30  HOME
40  PRINT "PRESS ANY KEY TO BEGIN."
50  PRINT "THE SUBROUTINE."
60  INPUT T$
70  GOSUB 190
80  PRINT "I'M BACK FROM THE SUBROUTINE."
90  PRINT "IT WAS GREAT AND NOW..."
100 PRINT
110 PRINT "PRESS ANY KEY TO SEND ME"
120 PRINT "AWAY AGAIN."
130 INPUT T$
140 PRINT
150 PRINT "I'M OFF AGAIN TO THE SUBROUTINE!"
160 GOSUB 190
170 PRINT "I'VE RETURNED ONCE AGAIN!"
180 END
190 REM  THIS IS THE SUBROUTINE.
200 PRINT "I'M IN THE SUBROUTINE."
210 FOR Z = 1 TO 3000:NEXT Z
220 PRINT CHR$ (7)
230 RETURN
```

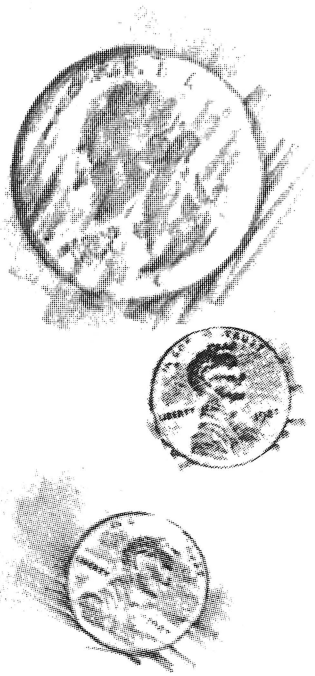


Enter:

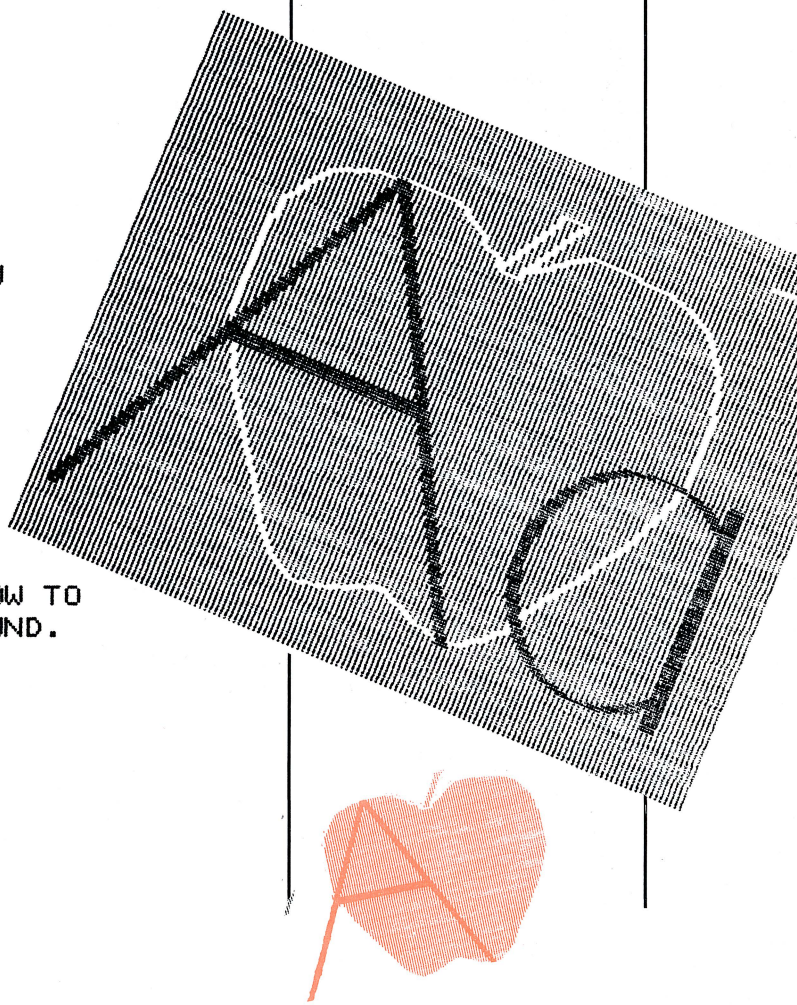
```
10  REM  THIS PROGRAM TOTALS COIN
20  REM  VALUES USING GOSUBS.
30  HOME
40  PRINT "I CAN FIGURE OUT THE"
50  PRINT "VALUE OF COINS."
60  PRINT
70  P$ = "PENNIES"
80  V = 1
90  GOSUB 210
100 P$ = "NICKELS"
```

continued . . .

Q: Why did the computer buy a new ten-speed?
A: It wanted to go on a "byte" ride.



```
110 V = 5
120 GOSUB 210
130 P$ = "DIMES"
140 V = 10
150 GOSUB 210
160 P$ = "QUARTERS"
170 V = 25
180 GOSUB 210
190 PRINT "YOUR COINS ARE WORTH $";T/100
200 END
210 INPUT "HOW MANY COINS?";N
220 PRINT
230 PRINT N; " ";P$; " = "; N * V; " CENTS"
240 T = N + T * V
250 RETURN
```



Getting Started with Applesoft: Activity 12

Enter:

```
10 REM  THIS PROGRAM DEMONSTRATES HOW
20 REM  TO MAKE THE APPLE HUM.
30 HOME
40 FOR A = 1 TO 500
50 S = PEEK (-16336)
60 NEXT A
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW TO
20  REM  MAKE A DIFFERENT HUMMING SOUND.
30  HOME
40  FOR A = 1 TO 50
50  S = PEEK (-16336) - PEEK (-16336)
60  + PEEK (-16336)
70  NEXT A
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES
20  REM  ANOTHER HUMMING SOUND!!!
30  HOME
40  FOR A = 1 TO 100
50  S = PEEK (-16336) - PEEK (-16336) + 4 * PEEK (-16336)
    - 9 * PEEK (-16336)
60  S = 5 * PEEK (-16336)
70  S = 10 * PEEK (-16336)
80  NEXT A
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW TO
20  REM  MAKE A SPACECRAFT MOVE WITH SOUND.
30  HOME
40  VTAB 24:HTAB 1
50  PRINT "    ^^"
60  PRINT "<<<<(>>>>"
70  PRINT "<<<<(>>>>"
80  PRINT "    VV"
90  PRINT "    **"
100 PRINT
110 FOR A = 1 TO 11
120 FOR X = 1 TO 15
130 S = PEEK (-16336) + PEEK (-16336)
140 S = - PEEK (-16336) - PEEK (-16336)
150 S = 8 * PEEK (-16336) - 3 * PEEK (-16336)
160 NEXT X
170 NEXT A
```

Common Applesoft Error Messages

If you make a mistake in Applesoft BASIC, the computer will try to help you by printing an error message. Listed below are some common error messages.

1 SYNTAX ERROR
This message will appear if you misspell a word, use incorrect punctuation, add extra characters, or use a word that is not in the BASIC language. For example:
PRINNT "HELLO"

2 NEXT WITHOUT FOR
This message will appear if you forget to match a NEXT statement with a FOR statement or if you use the wrong name for the variable. For example:
FOR I = 1 TO 10
NEXT Z

3 UNDEF'D STATEMENT
This message will appear if you use a GOTO or a GOSUB with a line number that is not in your program.

4 CAN'T CONTINUE
This message will appear if you try to continue a program when no program exists or after an error or change has occurred in the program.

5 ILLEGAL QUANTITY
This message will appear if you use a number value that is too big or too small. For example:
SPEED = 400

6 OVERFLOW
This message will appear if you program the computer to calculate an answer that is too large for the computer to calculate.

7 TYPE MISMATCH
This message will appear if you try to input a number into a string variable, or a word or letter into a numeric variable. For example:
LET A$ = 55

8 DIVISION BY ZERO
This message will appear if you try to divide by zero.

Programs That Don't Bite

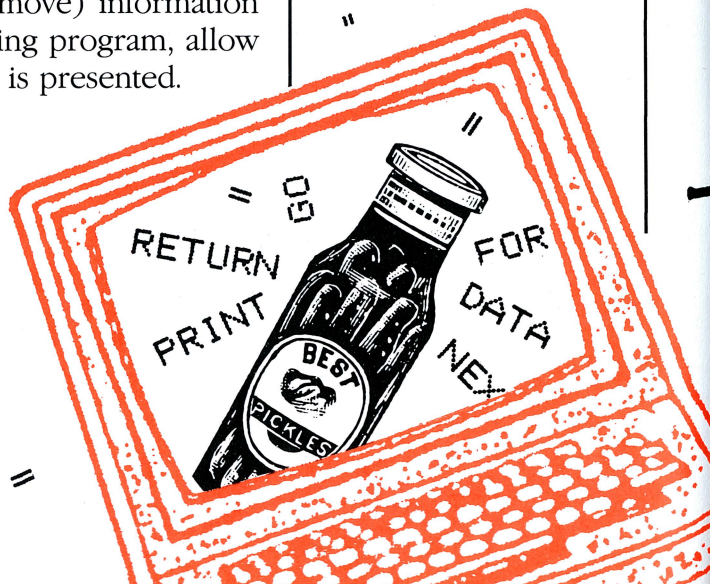
Have you ever used a program that frustrated you so much you started talking to your computer? Such programs are not "user friendly." This means that the person(s) who wrote the program did not design it carefully enough. Some people can tolerate programs that are difficult to use, but everyone would rather have programs that are easy to use and understand.

Here's a list of suggestions that will help you think about how to write user-friendly programs. You may not be able to program well enough yet to make your programs totally friendly; however, it's a good idea to keep these points in mind for your own programs and programs you might purchase.

1 A program should have instructions that are brief and clear. No one likes to read more directions than are necessary.
PRESS RETURN FOR THE INSTRUCTIONS

2 Programs with a lot of instructions should not require the user to read the instructions each time the program is used. Why make the user read about something he or she already knows?
WELCOME TO ATTACK OF THE PICKLES!
WOULD YOU LIKE INSTRUCTIONS? Y/N

3 Avoid writing programs that automatically scroll (move) information past the user. Unless you are writing a speed reading program, allow the user to control the speed at which information is presented.
PRESS RETURN TO CONTINUE



4 Whenever possible, try to provide the user with a key that can be pressed to return to the directions or to a "help" page. Sometimes people forget what they are supposed to do. (Do you?)
PRESS ESC FOR HELP

5 Try to write programs that interact with the user. Interactive programs can make a computer seem less threatening to some people.
PLEASE TYPE YOUR NAME
SAM MILLER
I'M GLAD TO MEET YOU, SAM.

6 Don't clutter the screen with words or pictures. Try to lay out whatever appears on the screen so that it is pleasing to the eye. Don't hesitate to use the entire screen.
PICK A KILLER PICKLE . . .
USE THE SPACE BAR TO SELECT.
MARVIN THE MANGLER
DON THE DILL
GUS THE GRUESOME GHERKIN

7 Figure out in advance what kind of errors the users might make. Try to write programs that will trap errors made by the user; for example, if the user has been playing a game and accidentally makes a spelling error, your program should not crash.
YOU MISSPELLED PICKLE; PLEASE ENTER THE WORD AGAIN.

Here are some other guidelines that make a program friendly to use:
The user should not have to do a lot of key pressing.

- Use graphics to help explain ideas.
- Game programs should allow several players to play, have different levels of difficulty, and should keep track of players' scores.
- Design programs that are easy to change by someone with programming experience. You can do this by writing programs in parts and including REM statements that explain each part of your program.

Project

```
10  REM  COMPUTERIZED JUMBLE
11  DIM A$(6):A$ = "JUMBLE"
12  GOSUB 2000
14  VTAB 15
20  PRINT "THE COMPUTER WILL GIVE YOU A": PRINT
25  PRINT "SCRAMBLED WORD- YOU TYPE IN THE ANSWER"
30  VTAB 20: PRINT "PRESS ANY KEY TO BEGIN ":: GET G$
40  HOME
45 T = 0
50  FOR I = 1 TO 5
60  READ X$,Y$
65  VTAB 10: PRINT X$;"              ":
70  GOSUB 1000
80  INPUT Q$
85  PRINT
90  IF Q$ = D$ THEN 120
95  PRINT "NOPE, THE WORD IS NOT  ";Q$
105  GOTO 140
120 PRINT "GREAT! YOU GOT IT!"
130 T = T + 1
140  IF I < 5 THEN  PRINT "TRY THE NEXT ONE"
145  FOR P = 1 TO 1000: NEXT P
147  HOME
150  NEXT I
155  PRINT " OUT OF 5 WORDS, YOU GOT ";T;" CORRECT."
160  END
200  DATA  CAIBS,52413,TAAGOLC,3247651,SIDK,3214,TRUNRE,314652,P
     NIUT,32145
1000 C = 1
1005 D$ = ""
1010  FOR J = 1 TO  LEN (Y$)
1015 Z$ = MID$ (Y$,J,1)
1020  IF  VAL (Z$) = C THEN 1030
1025  NEXT J
1030 D$ = D$ +  MID$ (X$,J,1)
1035 C = C + 1
1040  IF C <  =  LEN (Y$) THEN 1010
1045  RETURN
2000  HOME : PRINT "C O M P U T E R I Z E D . . . .": PRINT : PRINT
```

continued . . .

```
2001  FOR I = 1 TO 6
2002  FOR J = 1 TO 6:A(J) = 0: NEXT J
2003 B$ = ""
2005  FOR C = 1 TO 6
2010 R =  INT ( RND (1) * 6) + 1
2020  IF A(R) <  > 0 THEN 2010
2030 B$ = B$ +  MID$ (A$,R,1) + " "
2035 A(R) = 1
2040  NEXT C
2042  HTAB 15: PRINT B$: CHR (7):
2043  NEXT I: PRINT
2044  HTAB 15: FLASH : PRINT "J U M B L E": NORMAL
2045  RETURN
```

Zabinski, M.P. and Massola, F., *Apple II for Kids from 8 to 80:* Howard W. Sams & Co., Inc., Indianapolis, IN, 1984, p. 141. Reprinted by permision of Howard W. Sams & Co., Inc.

Project

```
10  REM  CIPHER MAKER
12  HOME
13  PRINT
14  PRINT
20  PRINT "CODE MAKING PROGRAM"
21  PRINT
22  PRINT
30  PRINT "ENTER A SENTENCE FOR CODING:"
31  PRINT
32  INPUT S$
33  PRINT
35 L =  LEN (S$)
40  FOR I = 1 TO L STEP 2
45 P$ =  MID$ (S$,I,2)
50 Q$ =  RIGHT $ (P$,1) +  LEFT$ (P$,1)
55 L$ = L$ + Q$
60  NEXT I
65  PRINT
66  PRINT "HERE IS THE CODED SENTENCE:"
67  PRINT
70  PRINT L$
```

Carlson, E.H., *Kids and the Apple:* Datamost, Inc., Chatsworth, CA, 1982, p. 193. Reprinted by permission. Copyright 1982 Datamost, Inc.

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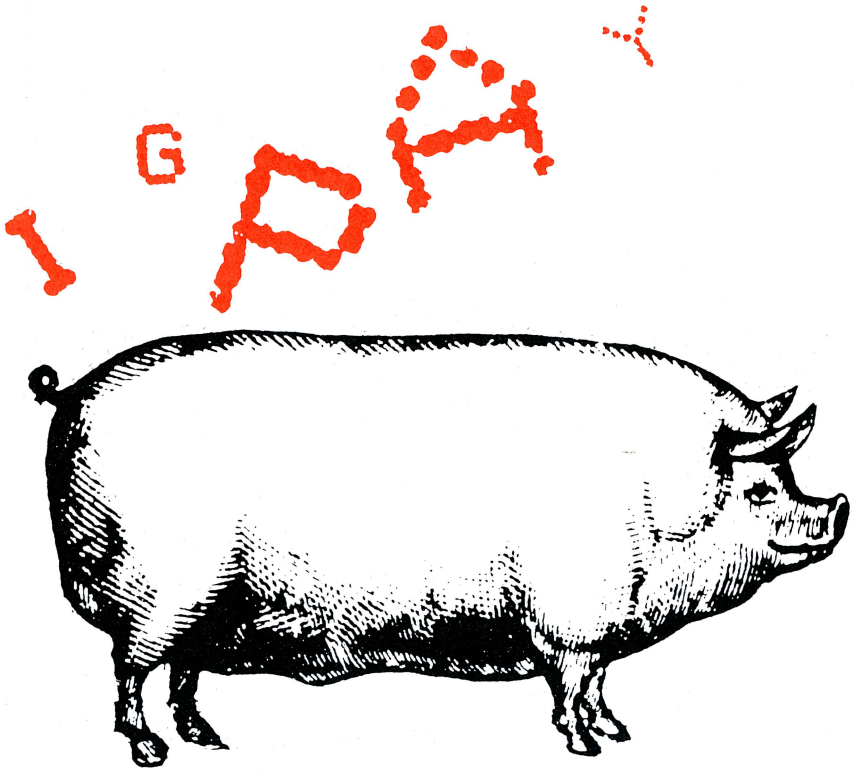
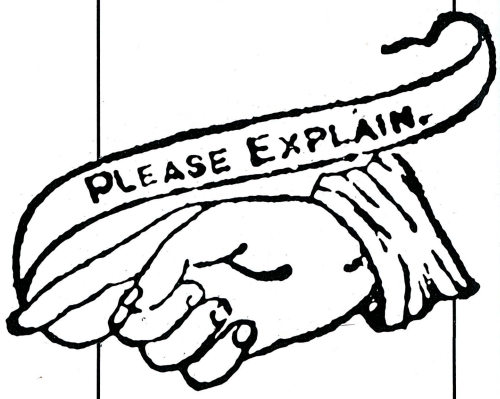
Project

```
10  REM  QUESTION ANSWERER
12  HOME
13  PRINT : PRINT : PRINT
20  PRINT "ENTER A QUESTION"
21  PRINT
25  INPUT Q$
28 L =  LEN (Q$)
30 :
31  REM    TAKE OFF THE QUESTION MARK
32 :
33 Q$ =  LEFT$ (Q$,L - 1) + "."
34  PRINT
35 :
36  REM  LOOK FOR THE END OF THE FIRST WORD
38 :
39  FOR I = 1 TO L
40 C$ =  MID$ (Q$,I,1)
54  IF C$ = " " THEN S1 = I:I = L
46  NEXT I
47 :
48  REM   LOOK FOR THE END OF THE SECOND WORD
49 :
50  FOR I = S1 + 1 TO L
```





Carlson, E.H., *Kids and the Apple:* Datamost, Inc., Chatsworth, CA, 1982, p. 193. Reprinted by permission. Copyright 1982 Datamost, Inc.

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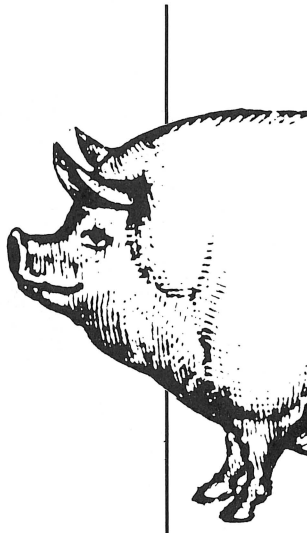
Project

```
10  REM *** PIG LATIN ***
12  HOME
13  PRINT : PRINT : PRINT
20  PRINT "THIS IS A PIG LATIN PROGRAM"
21  PRINT
25  PRINT
30  INPUT "GIVE ME A WORD:  ";W$
32  PRINT : PRINT
40 F$ =  LEFT$ (W$,1)
42 E$ = F$ + "AY"
44  IF F$ = "A" THEN E$ = "LAY"
46  IF F$ = "E" THEN E$ = "LEE"
48  IF F$ = "I" THEN E$ = "LIE"
50  IF F$ = "O" THEN E$ = "LO"
52  IF F$ = "U" THEN E$ = "LU"
70 L$ = RIGHT$ (W$, LEN (W$) - 1) + E$
80  PRINT L$
85  PRINT : PRINT
90  GOTO 30
```

Project

```
10  REM  BACKWARD ADDED TO FORWARD
12  HOME
13  PRINT : PRINT : PRINT
20  INPUT "GIVE ME A NUMBER:  ";N
30 N$ = STR$ (N)
35 L =  LEN (N$)
40  FOR I = 1 TO L
45 B$ = B$ + MID$ (N$,L + 1 - I,1)
50 B = VAL (B$)
55  NEXT I
57  PRINT : PRINT : PRINT : PRINT : PRINT
60  PRINT "   ";N
61  PRINT " +";B
65  PRINT "  "; LEFT $ ("----------",L)
70 A = N + B
72 A$ =  STR$ (A)
75  IF  LEN (A$) = L THEN  PRINT A
76  IF  LEN (A$) = L + 1 THEN  PRINT " ";A
99  END
```



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Carlson, E.H., *Kids and the Apple:* Datamost, Inc., Chatsworth, CA, 1982, p. 194. Reprinted by permission. Copyright 1982 Datamost, Inc.

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Micro Bits!

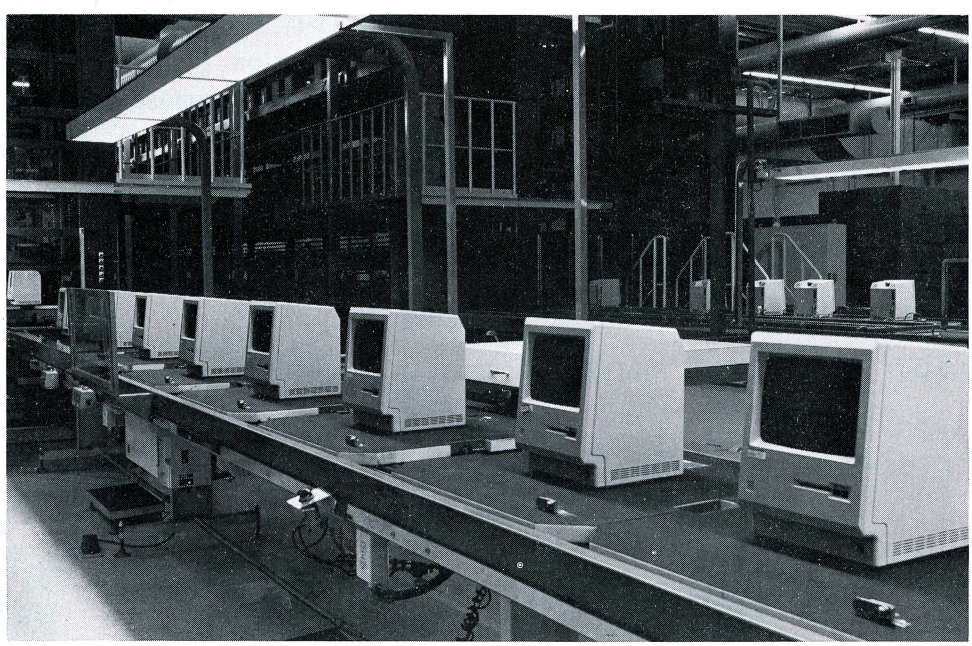
Macintosh Goes to College

Drexel University in Pennsylvania has declared that a personal computer is a required educational tool. During 1984, some 1,850 Drexel freshmen purchased their own Apple Macintoshes!

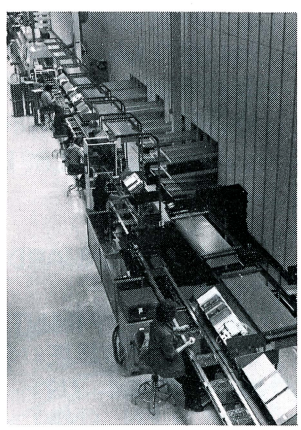
Students and teachers at Drexel are using their Macs in many different ways. For example, chemistry students are learning how to rearrange atoms to form different molecules by lassoing the images with MacPaint (a graphics program for the Macintosh) and moving them with the Mac's mouse.

Students on campus are using their new Macs to write term papers and programs and to illustrate work for their classes. At Drexel, the Macintosh is rapidly replacing teachers' blackboards and students' typewriters.

Speaking of the Macintosh, the factory that makes the Apple Macintosh is truly amazing! Apple has an automated factory that can build a Mac every 27 seconds! Apple has plans to increase their production speed so that one Mac may be built every 13 seconds!



27 SEC



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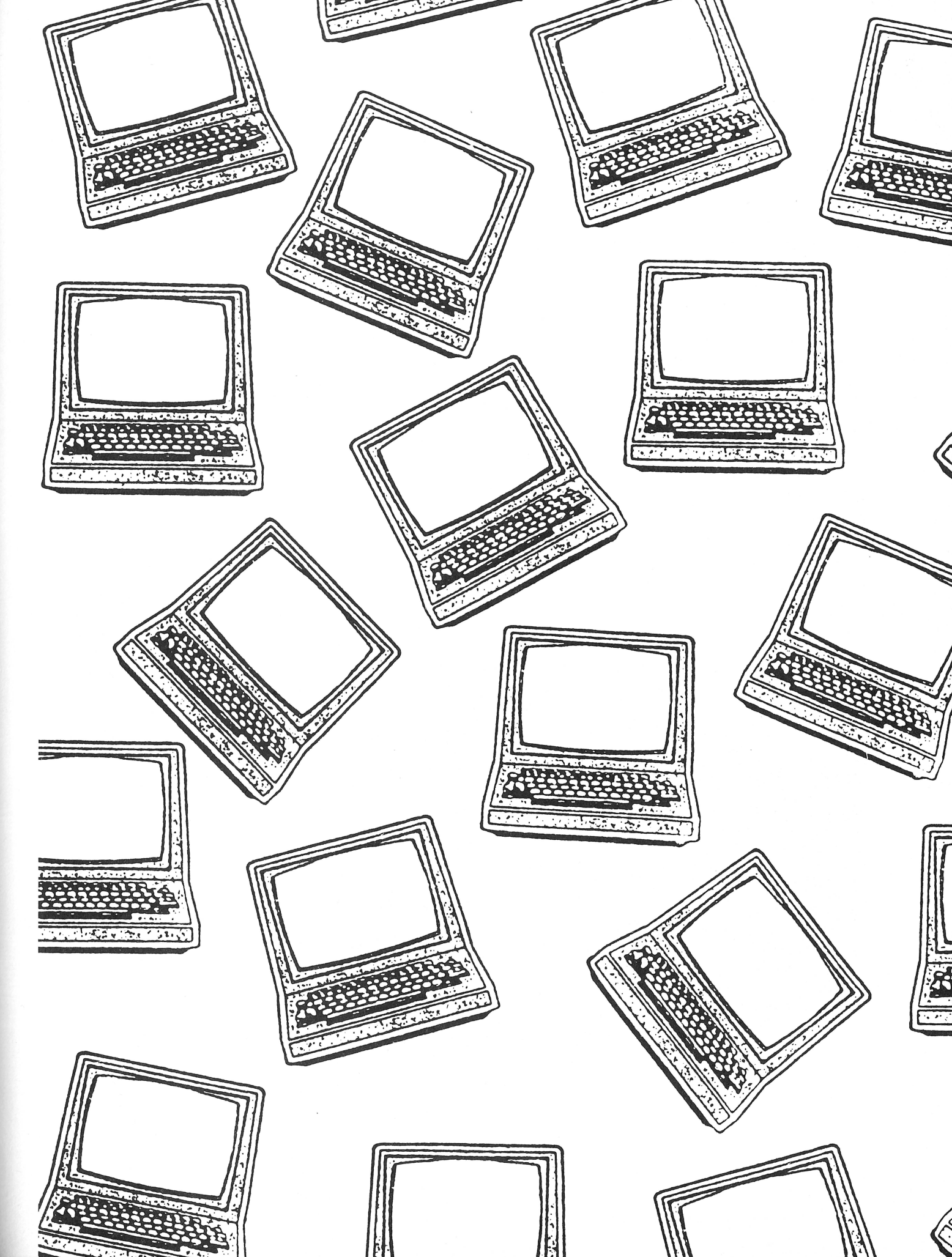


6

Low-Resolution Graphics

Notes to the Club Advisor

Chapter Overview

This chapter introduces the Apple's low-resolution graphics capabilities. The various activities and projects should provide club members with models for learning about programming low-resolution graphics in an enjoyable way.

Minimum Prerequisites

Most club members should be able to complete the activities presented in this chapter without an extensive background in Applesoft BASIC programming; however, prior completion of the chapter on Applesoft BASIC programming is recommended.

Several things the club advisor can do to help club members learn more about programming low-resolution graphics are listed below.

1 Explain the coordinate system that is used to plot locations on the low-resolution screen.

2 Demonstrate how to use the low-resolution grid for planning a picture. A suggested method is to use an overhead transparency of the grid, draw a simple shape (arrow, line, etc.), and record the grid numbers that correspond with each location that is filled. The numbers should then be used to write the programming instructions for drawing the graphic. A reproducible planning grid is included in this chapter.

3 Have resource books on hand for club members who may want additional models and information about programming low-resolution graphics. Some suggested texts are listed below.

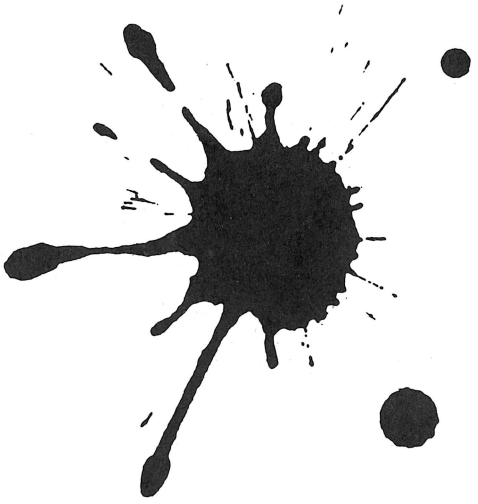
Applesoft BASIC Programmer's Reference Manual
by Scott Kamins
Apple Computers, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

An Apple For Kids
by Sharon Boren
dilithium Press
8285 S.W. Nimbus
Suite 151
Beaverton, OR 97005

Computers For Kids
by Sally Larsen
Creative Computing Press
P.O. Box 789-M
Morristown, NJ 07960

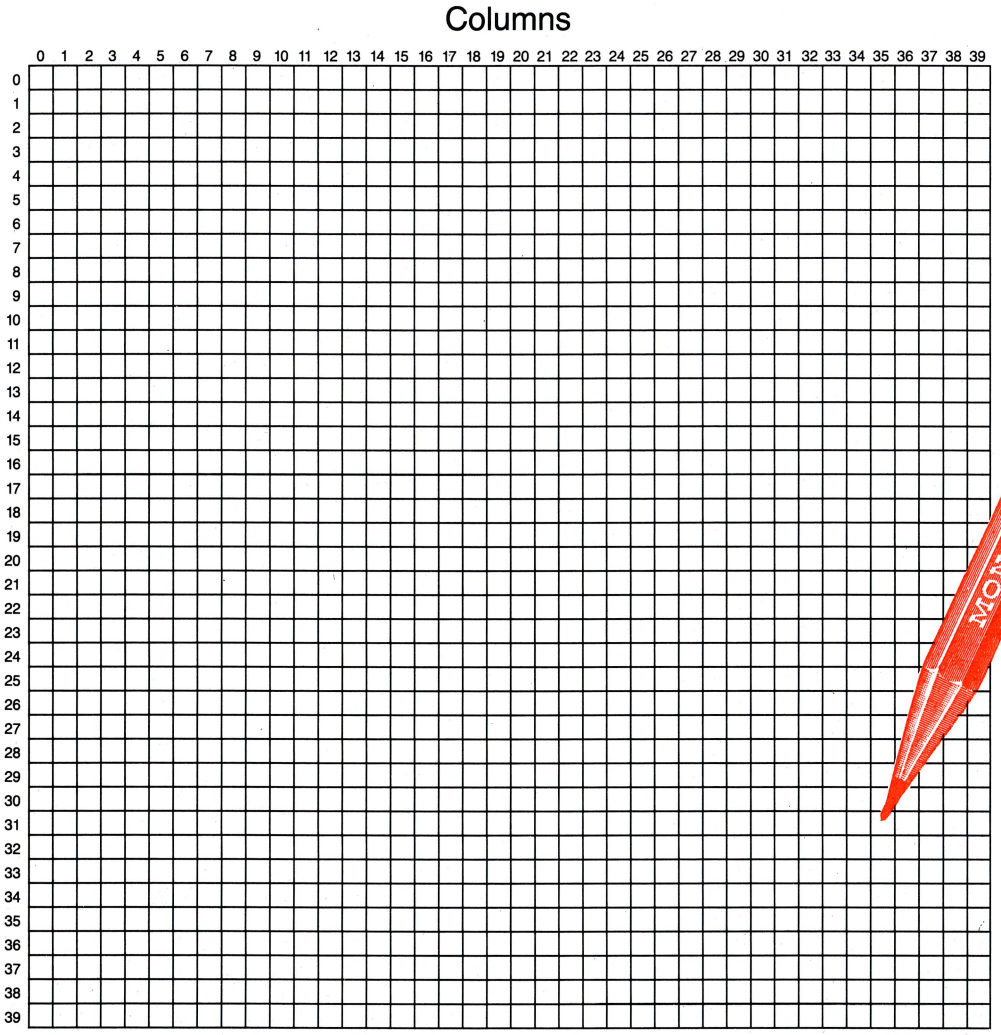
Advance Preparation

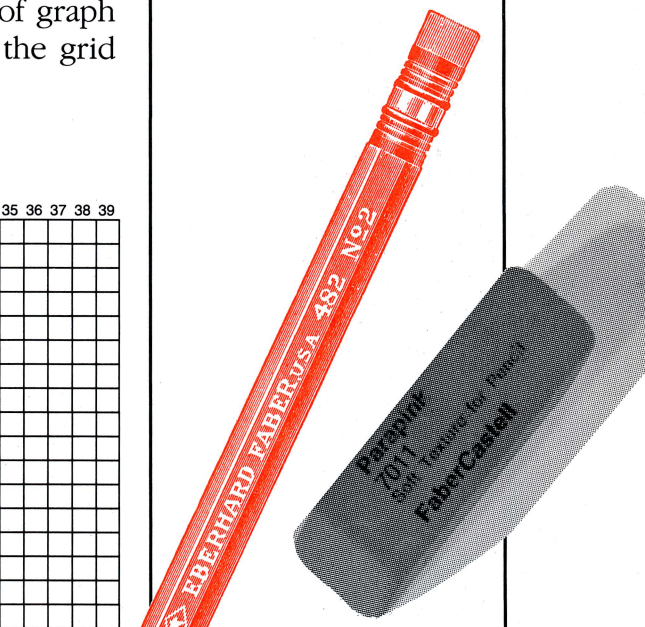
The club advisor should try to become familiar with the activities and projects presented in the chapter. The club advisor should also consider the use of a large-screen color monitor for group demonstrations and utilities for printing screen displays.



Introduction to Low-Resolution Graphics

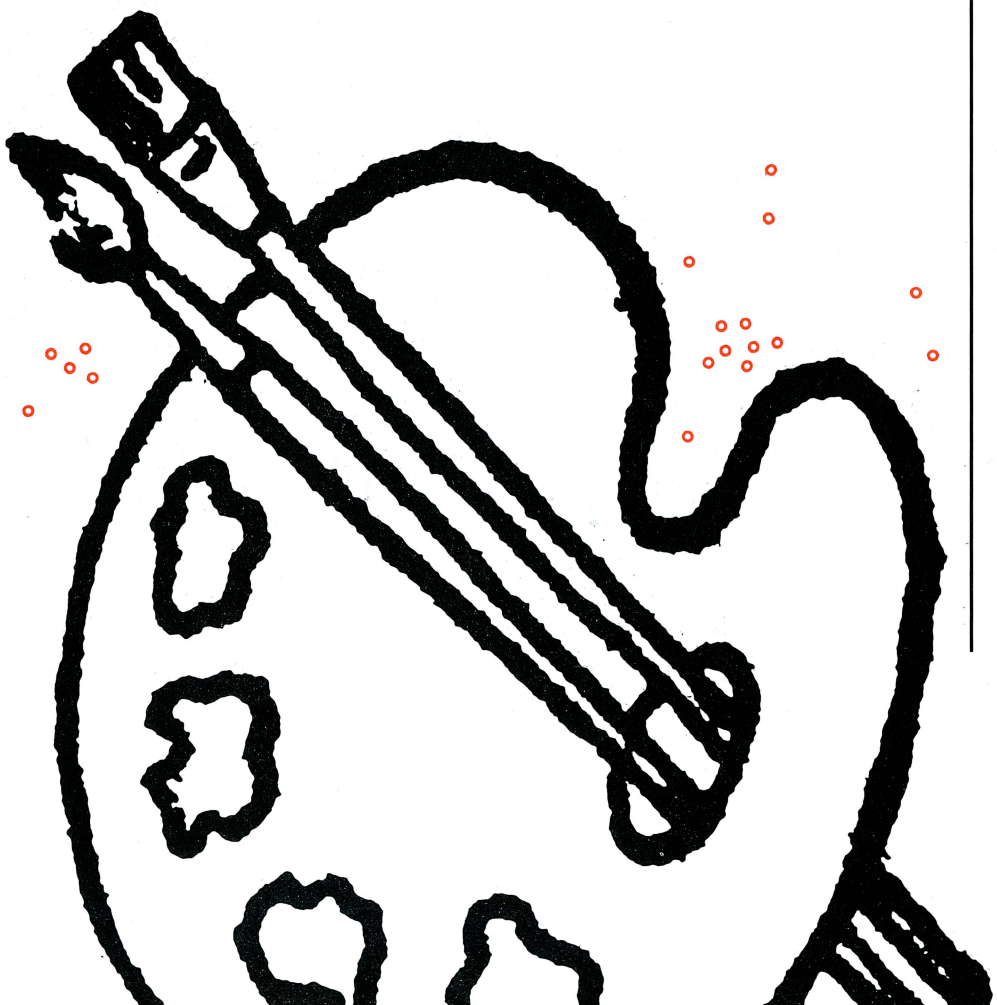
Using low-resolution (low-res) graphics, you can add pictures to a program. The Apple's screen is like a checkerboard or a piece of graph paper. It is divided into a grid of rectangles that looks like the grid below.





Notice that the grid is divided into 40 horizontal rows and 40 vertical columns for a total of 1,600 different blocks. Each block can be filled with one of 16 colors. If you have a color monitor, you can create low-resolution graphics using the number codes listed below.

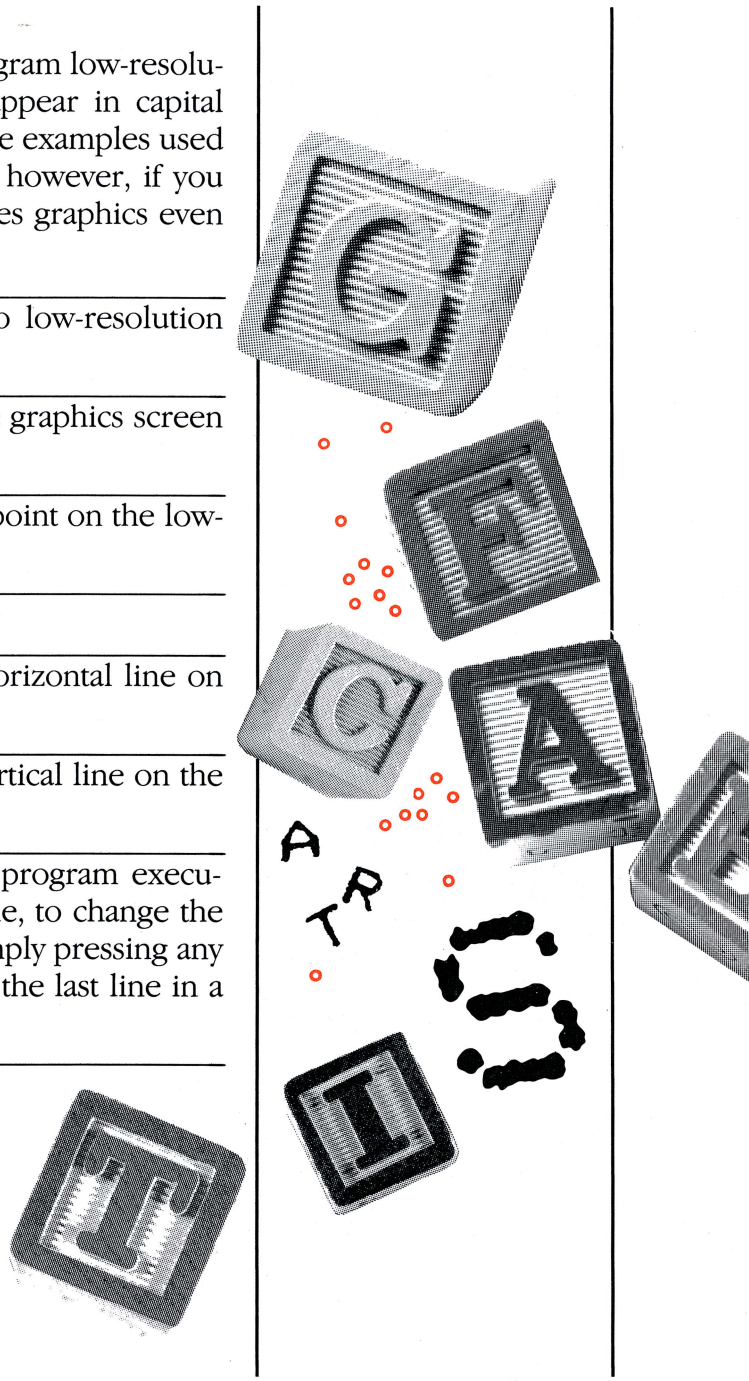
Low-Res Graphics Colors			
0	Black	8	Brown
1	Magenta	9	Orange
2	Dark Blue	10	Gray 2
3	Purple	11	Pink
4	Green	12	Light Green
5	Gray 1	13	Yellow
6	Medium Blue	14	Aquamarine
7	Light Blue	15	White



BASIC Low-Res Building Blocks

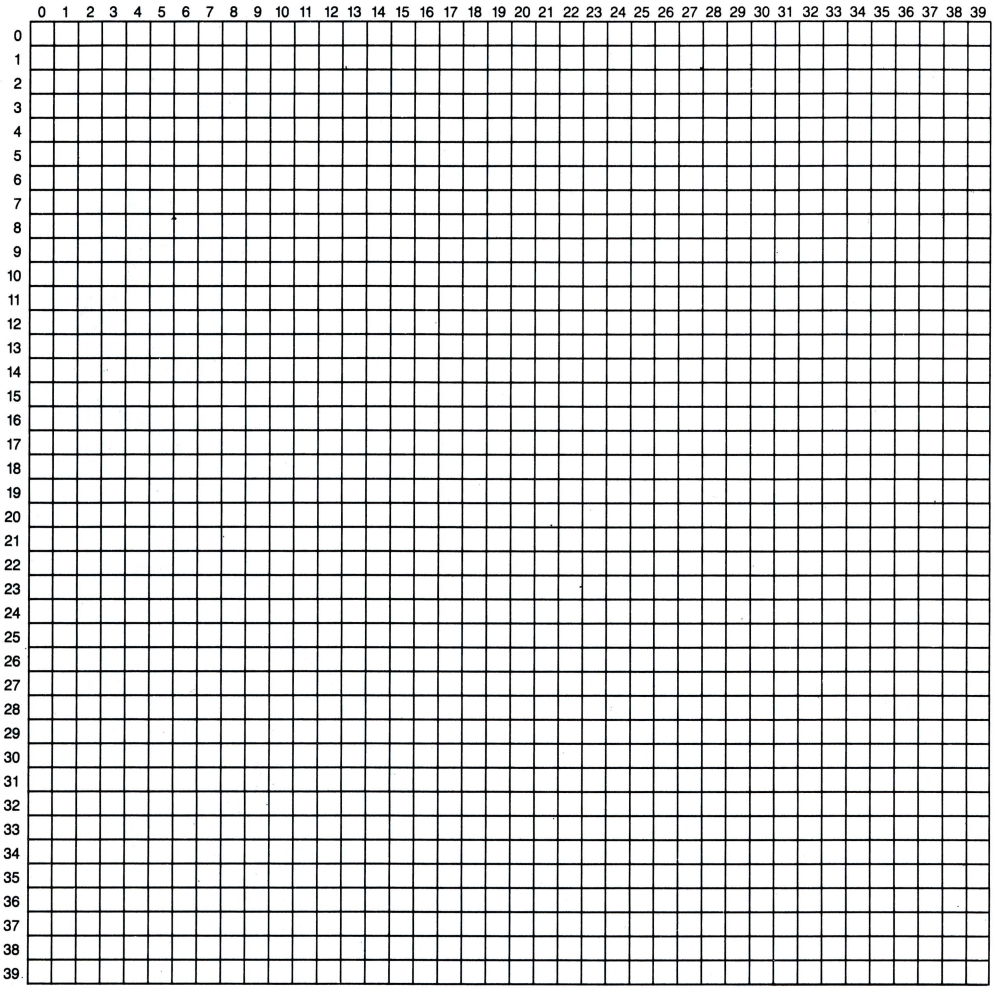
The next few pages will help you learn how to program low-resolution graphics in BASIC. Type the instructions that appear in capital letters. Press RETURN after each instruction. Most of the examples used in this section can be used without a color monitor; however, if you have a color monitor, you will be able to enjoy low-res graphics even more.

GR	Commands the computer to switch to low-resolution graphics mode and erases the screen.
TEXT	Commands the computer to return the graphics screen to direct mode.
PLOT	Commands the computer to display a point on the low-res screen.
COLOR =	Assigns a color for low-res graphics.
HLIN	Commands the computer to draw a horizontal line on the low-res screen.
VLIN	Commands the computer to draw a vertical line on the low-res screen.
GET	Commands the computer to suspend program execution until a key is pressed. For example, to change the low-res screen to the text screen by simply pressing any key, enter the following commands as the last line in a program: GET T$:TEXT



Low-Res Planning Grid

You will find the grid below quite helpful in planning low-res graphics with your Apple computer. Make copies of this page to help you plan your low-res programs.



Getting Started with Low-Res Graphics: Activity 1

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES
20  REM  HOW TO DRAW A BLOCK.
30  GR
40  COLOR = 15
50  PLOT 19,19
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO DRAW A LINE.
30  GR
40  COLOR = 15
50  FOR X = 0 TO 39
60  PLOT X,15
70  NEXT X
```

Projects

1 Write a program that draws a block in each corner of the screen.

2 Write a program that draws a picture frame around the screen.

3 Write a program that draws your initials on the screen.

Enter:

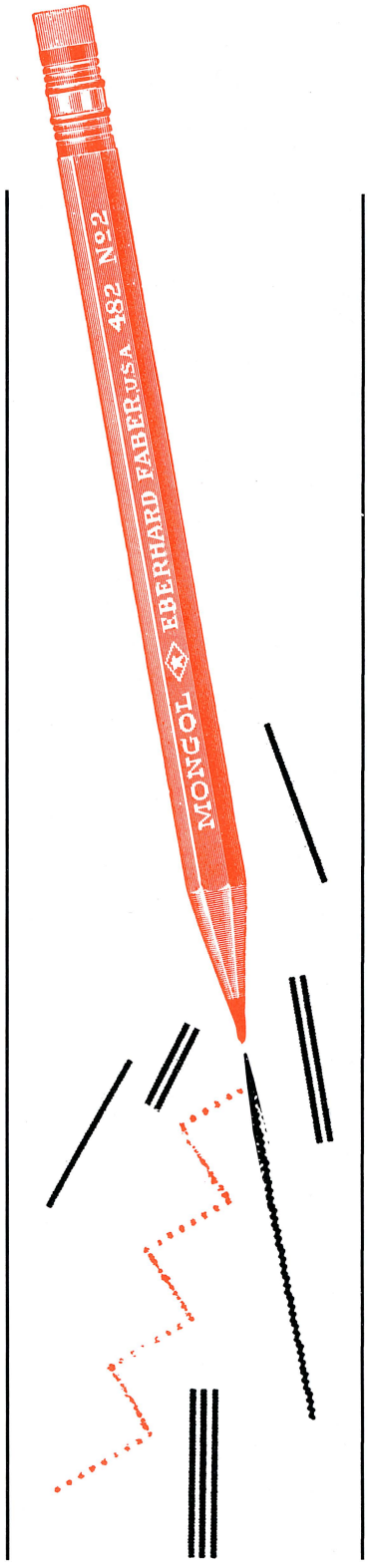
```
10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO RESTORE THE TEXT SCREEN.
30  GR
40  COLOR = 15
50  PLOT 19,19
60  REM  THIS PART OF THE PROGRAM
70  REM  RESTORES THE TEXT SCREEN
80  REM  WHEN YOU PRESS A KEY.
90  GET T$:TEXT:HOME
```

continued . . .

■

Enter:

```
10   REM  THIS PROGRAM DEMONSTRATES HOW
20   REM  TO DRAW A DIAGONAL LINE.
30   GR
40   COLOR = 15
50   FOR X = 0 TO 39
60   Y = X
70   PLOT X,Y
80   NEXT X
```



Getting Started with Low-Res Graphics: Activity 2

Enter:

```
10   REM THIS PROGRAM DEMONSTRATES HOW
20   REM TO DRAW A VERTICAL LINE.
30   GR
40   COLOR = 15
50   VLIN 0, 39 AT 0
```

Enter:

```
10   REM  THIS PROGRAM DEMONSTRATES HOW
20   REM  TO DRAW A HORIZONTAL LINE.
30   GR
40   COLOR = 15
50   HLIN 0,39 AT 0
```

■

Projects

1 Write a program that draws the letter "T" on the screen.

2 Write a program that uses lines and blocks to write your initials.

3 Write a program that draws a picture of a ship.

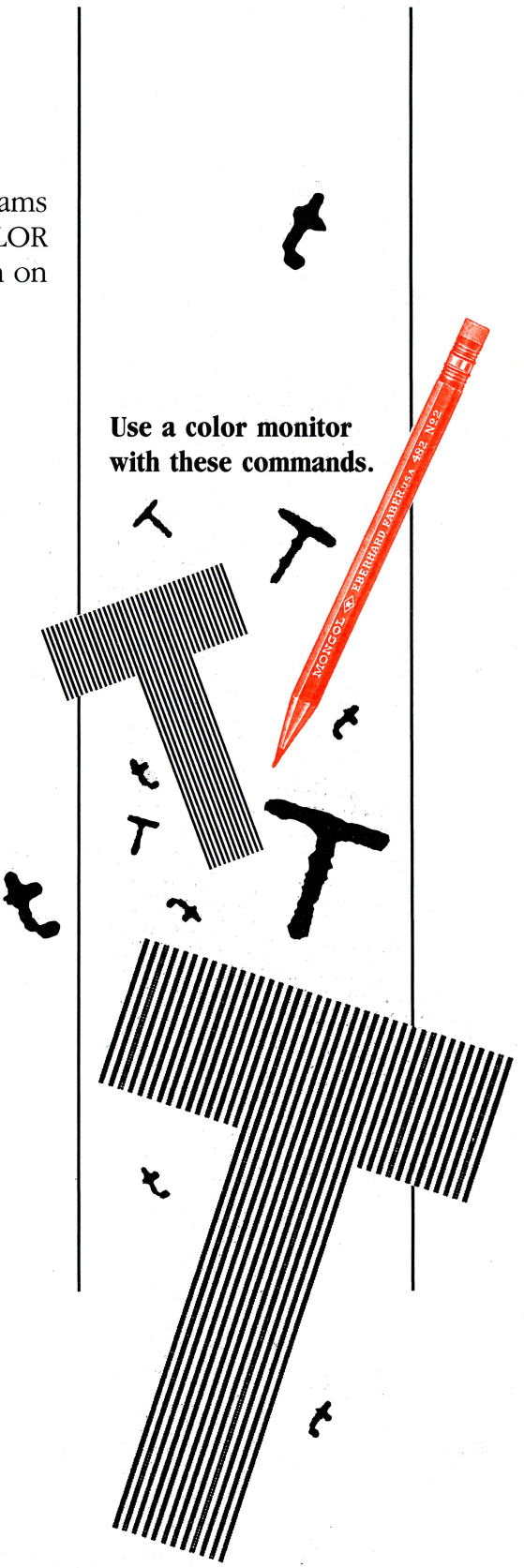
4 If you have a color monitor, try to change the color of your programs by using a different color number (COLOR = 2 for dark blue, COLOR = 8 for brown, etc). A chart listing Apple's color numbers is given on page 115.

Enter:

```
10  REM  THIS PROGRAM DISPLAYS
20  REM  THE APPLE'S COLORS.
30  GR
40  FOR C = 0 TO 15
50  COLOR = C
60  HLIN 0,39 AT C * 2
70  NEXT C
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO DRAW BLOCKS AT RANDOM.
30  GR
40  COLOR = 15
50  X = INT (RND (1) * 40)
60  Y = INT (RND (1) * 40)
70  PLOT X,Y
80  GOTO 50
```



Use a color monitor with these commands.

Getting Started with Low-Res Graphics: Activity 3

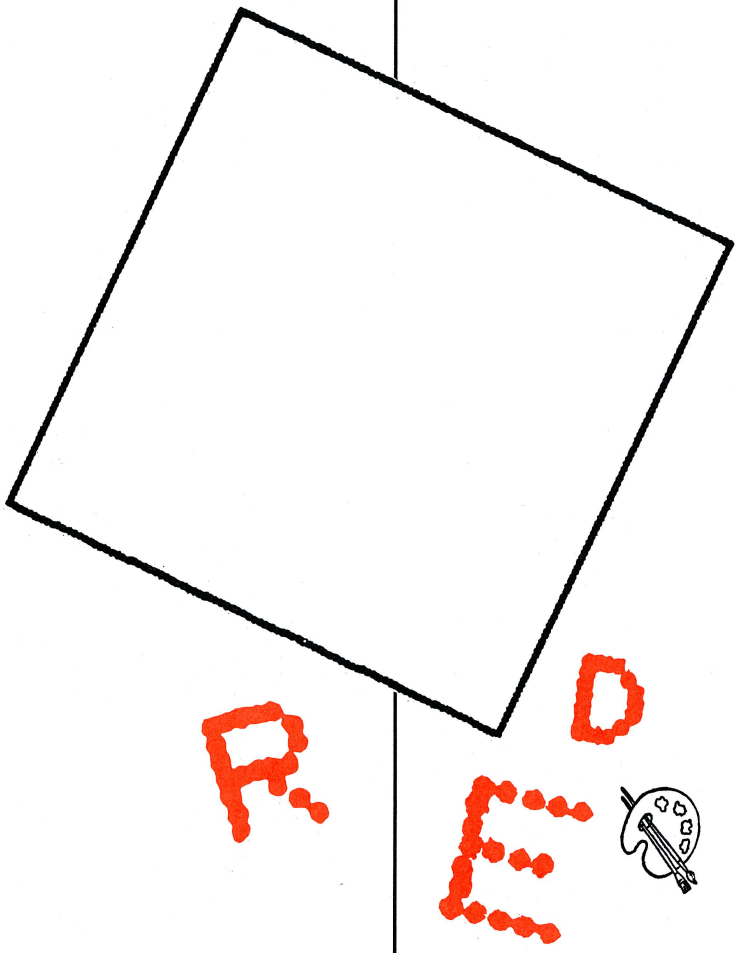
Use a color monitor with these commands.

Enter:

```
10  REM  USE THIS PROGRAM TO
20  REM  DRAW COLORED BLOCKS.
30  GR
40  C = INT (RND (1) * 16)
50  COLOR = C
60  X = INT (RND (1) * 40)
70  Y = INT (RND (1) * 40)
80  PLOT X,Y
90  GOTO 40
```

Enter:

```
10  REM  THIS PROGRAM LIGHTS UP
20  REM  THE SCREEN THEN TURNS
30  REM  OFF THE LIGHTS.
40  GR
50  COLOR = 15
60  FOR Y = 0 TO 39
70  HLIN 0,39 AT Y
80  NEXT Y
90  COLOR = 0
100 X = INT (RND (1) * 40)
110 Y = INT (RND (1) * 40)
120 PLOT X,Y
130 GOTO 90
```



■

Enter:

```
10  REM  THIS PROGRAM CHANGES
20  REM  BACKGROUND COLORS.
30  GR
40  FOR HUE = 1 TO 15
50  COLOR = HUE
60  FOR ROW = 0 TO 39
70  HLIN 0,39 AT ROW
80  NEXT ROW
90  COLOR = HUE - 1
100 FOR COLUMN = 0 TO 39
110 VLIN 0, 39 AT COLUMN
120 NEXT COLUMN
130 NEXT HUE
```

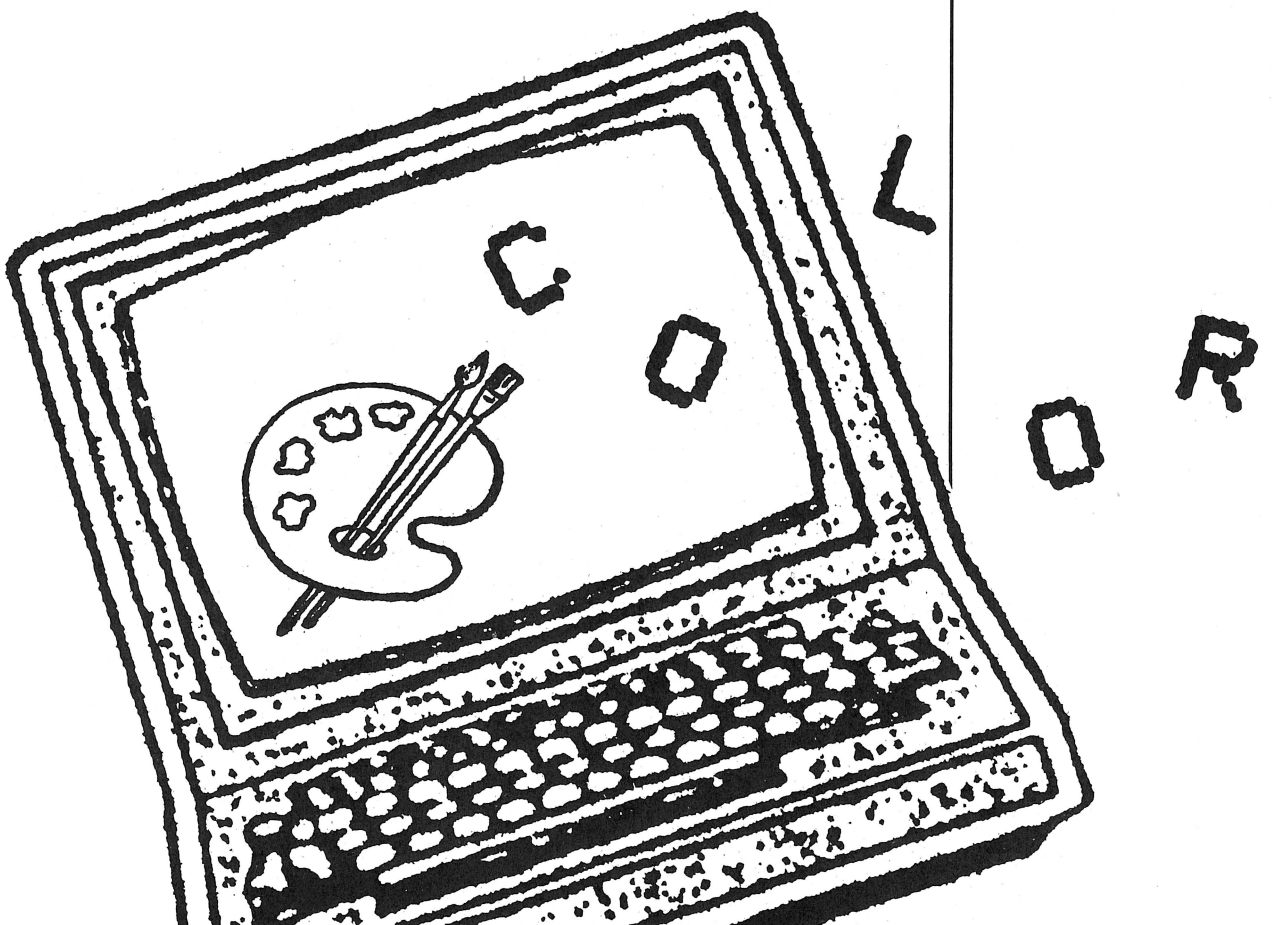
Use a color monitor with these commands.

Projects

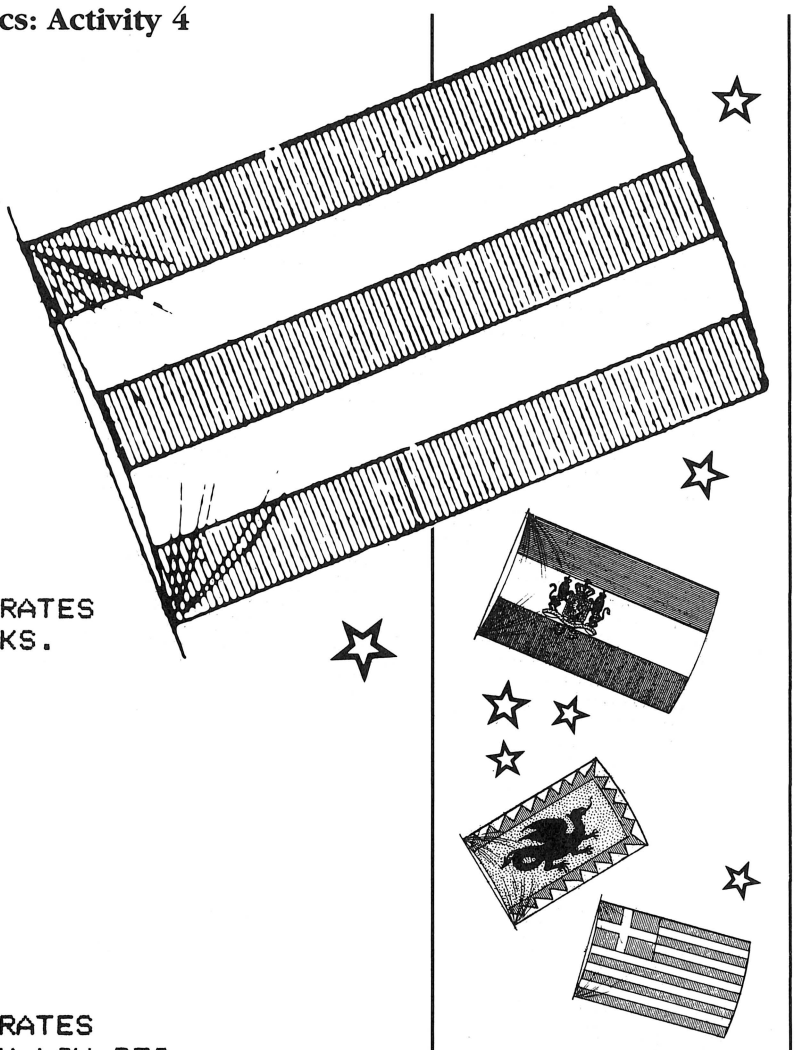
1 Write a program that randomly draws colored lines.

2 Write a program that lights up the screen in different colors.

3 Write a program that randomly changes background color.



Getting Started with Low-Res Graphics: Activity 4



Enter:

```
10  REM  THIS PROGRAM DRAWS
20  REM  A QUICK FLAG.
30  HOME:GR
40  COLOR = 15
50  FOR Y = 0 TO 16
60  HLIN 0,12 AT Y
70  NEXT Y
80  TEXT
90  GET T$:TEXT:HOME
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES
20  REM  HOW TO LIGHT UP BLOCKS.
30  GR
40  COLOR = 15
50  FOR X = 1 TO 39 STEP 3
60  Y = 19
70  PLOT X,Y
80  NEXT X
90  GET T$:TEXT:HOME
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES
20  REM  HOW TO USE INPUT WITH LOW RES.
30  GR
40  FOR X = 0 TO 19
50  PRINT "TYPE A NUMBER FROM 1 TO 15."
60  INPUT N
70  COLOR = N
80  VLIN X,39 - X AT X
90  NEXT X
```

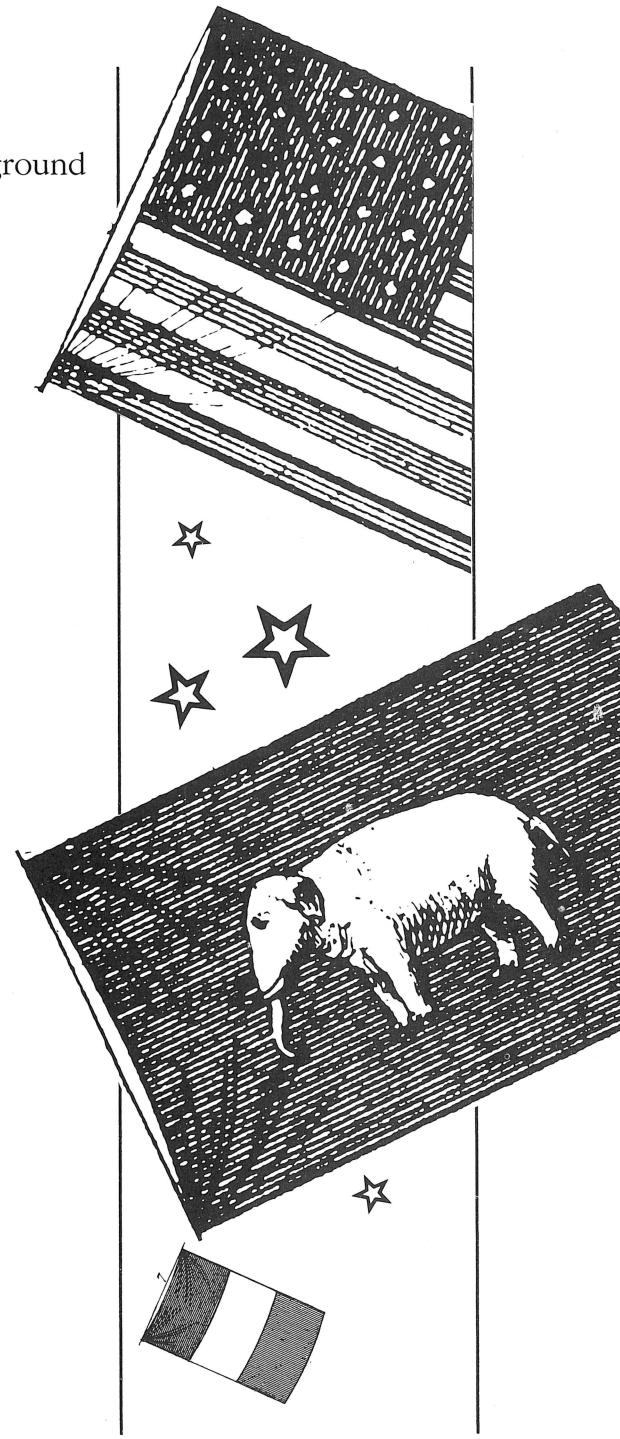
■

Projects

1 Write a program that draws a flag in different colors.

2 Write a program that uses INPUT so the user can choose a background color.

3 Write a program that lights up blocks in different colors.



Getting Started with Low-Res Graphics: Activity 5

```
Enter:

10  REM  THIS PROGRAM DEMONSTRATES
20  REM  ANOTHER WAY TO USE INPUT.
30  GR
40  PRINT "LET'S DRAW COLORED LINES."
50  PRINT "PICK A NUMBER FROM 1 TO 15."
60  INPUT C
70  COLOR = C
80  PRINT:PRINT:PRINT:PRINT
90  PRINT "WHAT COLUMN DO YOU WANT TO"
100 PRINT "START DRAWING AT? (1 TO 39)"
110 INPUT A
120 PRINT "WHERE SHOULD THE LINE STOP?"
130 PRINT "SELECT A NUMBER FROM 1 TO 39."
140 INPUT B
150 PRINT "WHICH ROW DO YOU WANT TO"
160 PRINT "DRAW THE LINE IN? (0 TO 39)"
170 INPUT R
180 HLIN A,B AT R
190 GOTO 40

Enter:

10  REM  THIS PROGRAM WILL MAKE A
20  REM  BLOCK HOP DOWN STAIRS.
30  GR
40  COLOR = 15
```

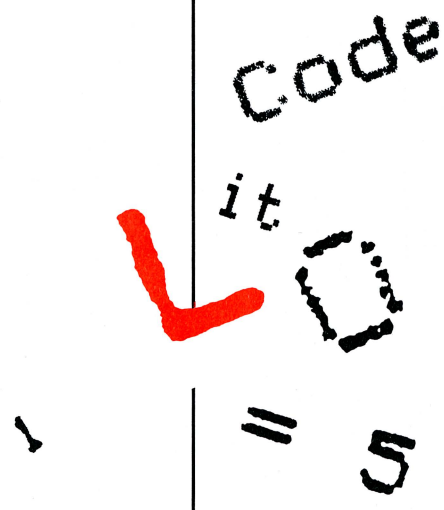
continued . . .

```
50  FOR S = 1 TO 39
60  HLIN 1,S AT S
70  NEXT S
80  FOR B = 0 TO 38
90  COLOR = 1
100 PLOT B + 1, B
110 IF B = 0 THEN 140
120 COLOR = 0
130 PLOT B + 1, B - 1
140 FOR TD = 1 TO 150
150 NEXT TD
160 IF B = 38 THEN 210
170 COLOR = 1
180 PLOT B + 2, B
190 COLOR = 0
200 PLOT B + 1, B
210 NEXT B
```

Getting Started with Low-Res Graphics: Activity 6

Enter:

```
10  REM  THIS PROGRAM PRINTS A
20  REM  FLASHING X.
30  HOME: GOTO 110
40  FOR A = 0 TO 39
50  PLOT A, A
60  PLOT A, 39 - A
70  NEXT A
80  FOR B = 1 TO 100
90  NEXT B
100 RETURN
110 VTAB 22: HTAB 15
120 PRINT "FLASHY!!!!"
130 GR
140 FOR C = 1 TO 5
150 COLOR = 0: GOSUB 40
160 COLOR = 15: GOSUB 40
170 NEXT C
180 GET T$: TEXT: HOME
```



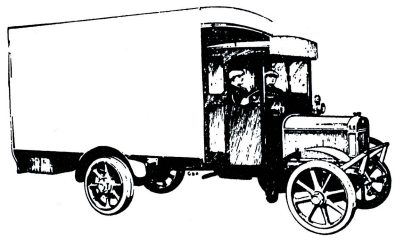
Q: What did the disk say to the disk drive?
A: Let's take a spin.

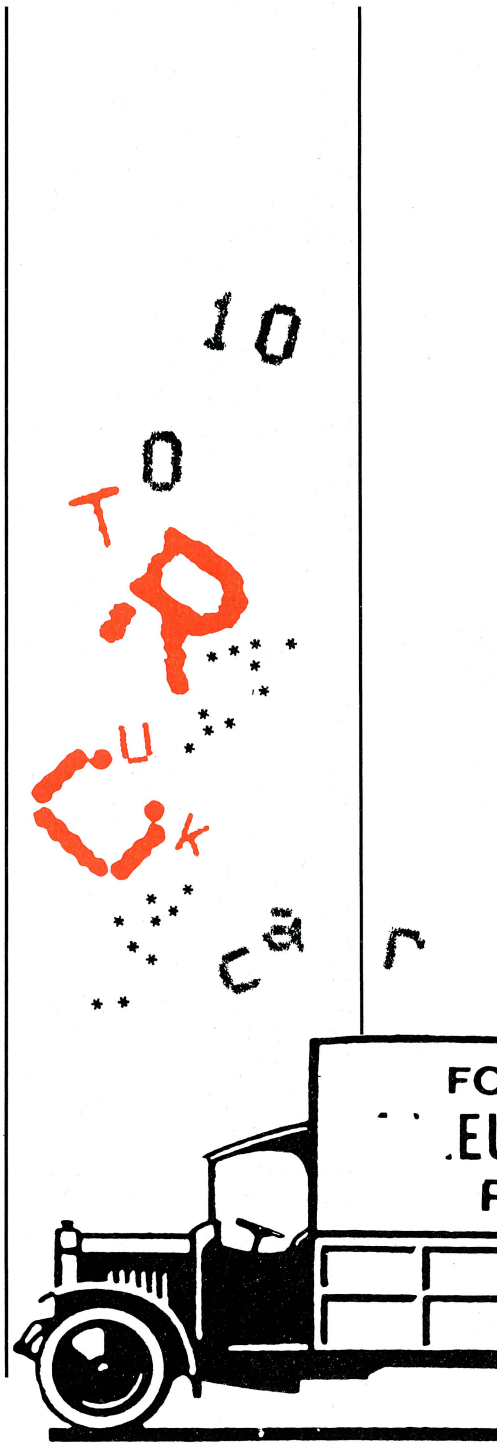
Enter:

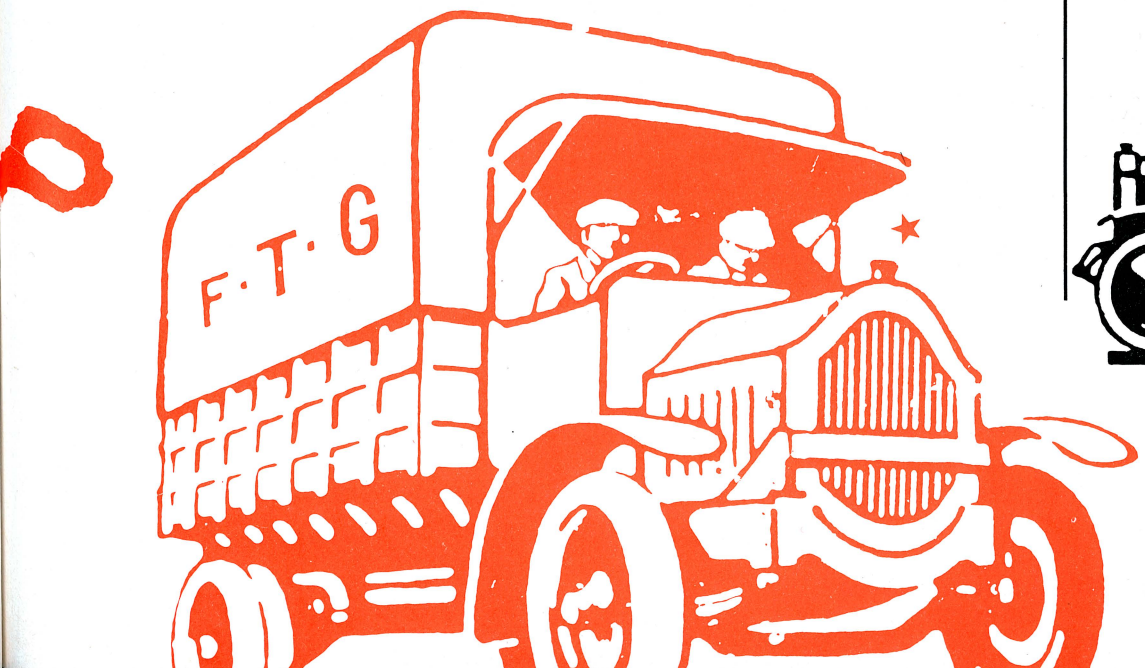
```
10  REM  THIS PROGRAM DRAWS A TRUCK.
20  GR
30  COLOR = 15
40  HLIN 0, 10 AT 15
50  HLIN 0, 11 AT 16
60  HLIN 0, 12 AT 17
70  PLOT 1, 18
80  PLOT 10, 18
```

Enter:

```
10  REM  THIS PROGRAM DRAWS A
20  REM  TRUCK AND MOVES IT.
30  GR
40  C = 0
50  A = 0
60  COLOR = 15
70  GOSUB 130
80  COLOR = 0
90  GOSUB 130
100 C = C + 1
110 IF C = 30 THEN 190
120 GOTO 60
130 HLIN C, C + 5 AT A
140 HLIN C, C + 6 AT A + 1
150 HLIN C, C + 7 AT A + 2
160 PLOT C + 1, A + 3
170 PLOT C + 4, A + 3
180 RETURN
190 END
```



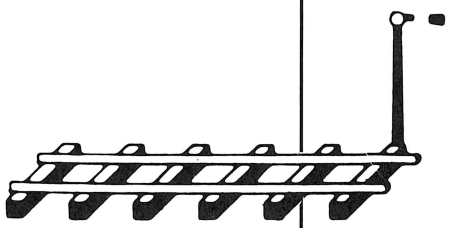




Getting Started with Low-Res Graphics: Activity 7

Enter:

```
10  REM  THIS PROGRAM MOVES AN ARROW.
20  GOTO 140
30  COLOR = C1
40  HLIN A, A + 7 AT B
50  HLIN A, A + 7 AT B + 1
60  HLIN A, A + 7 AT B + 2
70  VLIN B - 2, B + 4 AT A + 8
80  VLIN B - 1, B + 3 AT A + 9
90  VLIN B, B + 2 AT A + 10
100 PLOT A + 11, B + 1
110 RETURN
120 FOR J = 1 TO 250
130 NEXT J: RETURN
140 B = 4
150 GR
160 FOR A = 0 TO 27 STEP 2
170 C1 = 2
180 GOSUB 30
190 GOSUB 120
200 GR
210 NEXT A
```



Project

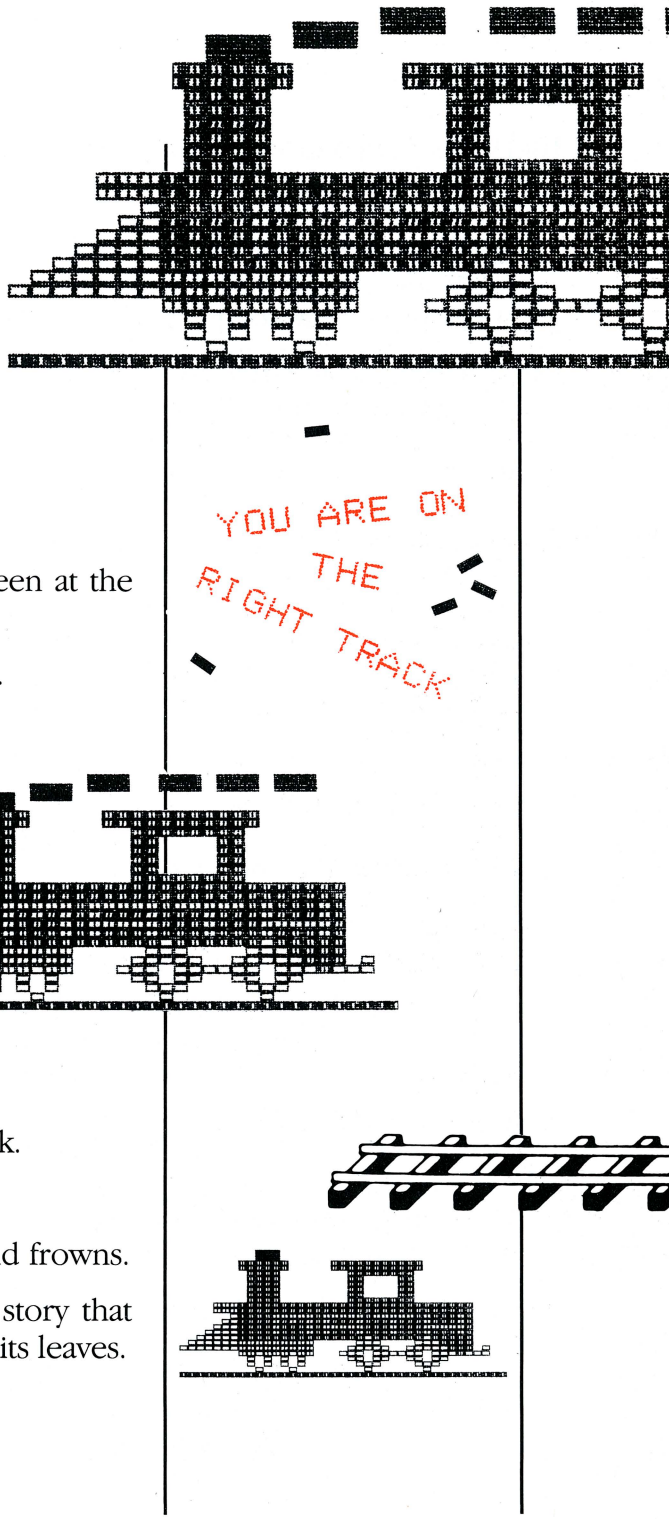
1 Write a program that moves an arrow across the screen from right to left.

2 Write a program that moves an arrow from right to left and another arrow from left to right.

3 Write a program that moves the arrow around the edge of the entire screen.

Enter

```
10   REM  THIS PROGRAM DRAWS A CURVED
20   REM  LINE IN LOW RES GRAPHICS.
30   GR
40   COLOR = 1
50   FOR A = 0 TO 39  STEP 3.5
60   B = INT (39 - .02 * A * A)
70   PLOT A,B
80   NEXT A
```



Projects

1 Write a program that draws several curved lines on the screen at the same time.

2 Write a program that draws a curved line in different colors.

3 Write a program that draws a circle.

Low-Res Graphics Projects

Write a program using low-res graphics that:

1 Displays the Apple Computer logo.

2 Allows two people to play tic-tac-toe.

3 Draws a picture of a robot that moves across the screen.

4 Draws a picture of a train with smoke coming out of its stack.

5 Draws an airplane that drops a bomb on a ship.

6 Draws a face with eyes that blink and a mouth that smiles and frowns.

7 Combines text and graphics. You might create a computer story that shows a tree changing colors from season to season or losing its leaves.

8 Draws a rocket that blasts off the screen.

9 Draws a maze that allows a block to be guided through it.

■

10 Draws the picture shown below:

11 Create a disk with low-res graphics programs that you or other club members have written. Create a "master" program that runs the programs one after another. You might want to play some recorded music at the same time the programs are being run.

12 Examine the low-res programs on the next few pages. Select one to program or change.

A Low-Res Game: Towers of Hanoi

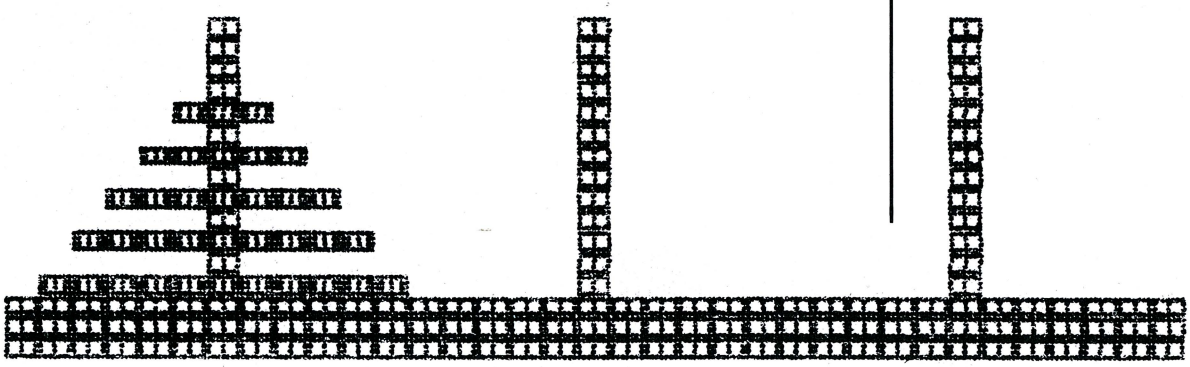
The ancient puzzle, Towers of Hanoi, uses five different sized disks and three pegs. The game begins with the five disks stacked on the left peg as shown below.

The object of the game is to get all the disks placed in the same order on the third peg. Here are the rules of the game:

1 Only one disk may be moved at a time.

2 A larger disk may never be placed on top of a smaller disk.

Bruce Presley, author of *A Guide To Programming in Applesoft,* published by Lawrenceville Press Inc., has created a program for playing the Towers of Hanoi game. The program is listed on the next page. Enter the program exactly as it appears, then play the game! You might want to modify the program by adding a few instructions about how to play the game. For example, when the program displays the following message: FROM TOWER, TO TOWER? you must enter the number of the tower you are moving a disk from (1, 2, or 3), press RETURN, then enter the number of the tower you want to move the disk to (1, 2, or 3).

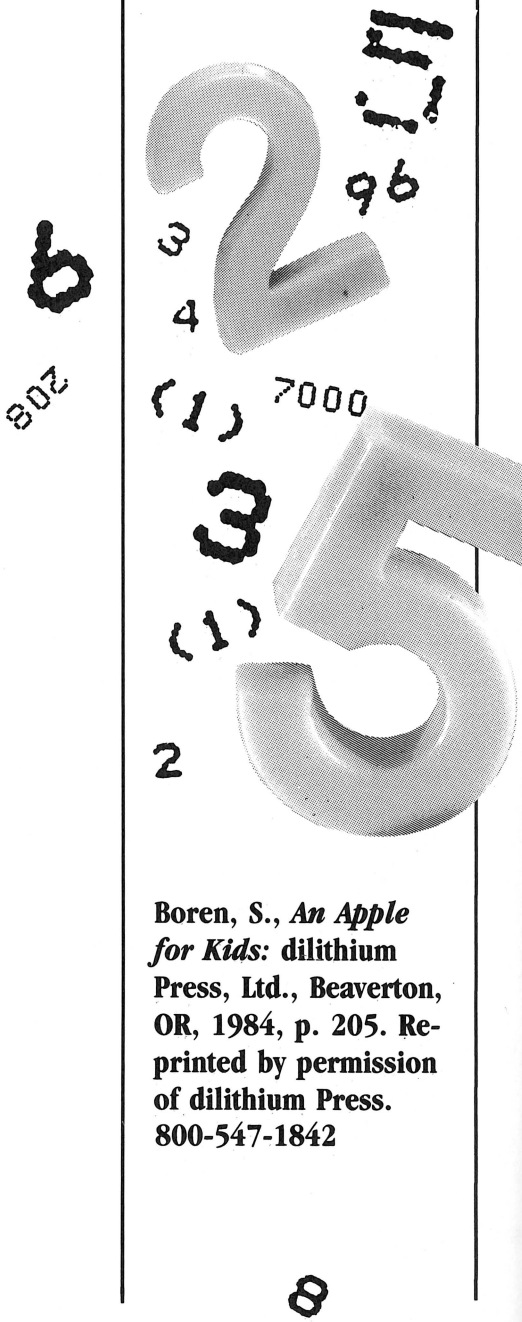


```
10  REM  TOWERS OF HANOI PROBLEM
20  REM       GRAPHICS CHAPTER
30  REM
40  REM  PLOT THE BASE AND PEGS IN GREEN
50  REM
60  HOME : GR : COLOR= 12: DIM A(3,5)
70  FOR X = 33 TO 35: HLIN 2,36 AT X: NEXT X
80  VLIN 20,33 AT 8
90  VLIN 20,33 AT 19: VLIN 20,33 AT 30
100  REM
110  REM  INITIALIZE 3 ARRAYS FOR EACH PEG
120  REM
130  COLOR= 1: FOR X = 1 TO 5
140  HLIN 8 - X,8 + X AT 2 * X + 22
150 A(1,X) = X:A(2,X) = 0:A(3,X) = 0
160  NEXT X
170  REM
180  REM   MOVEMENT OF DISKS
190  REM
200  INPUT "FROM TOWER, TO TOWER? ";T1,T2
210 DISK = 0: FOR X = 1 TO 5
220  IF DISK > 0 OR A(T1,X) = 0 THEN 260
230 DISK = A(T1,X):XCTR = 8 + (T1 - 1) * 11:A(T1,X) = 0
240  COLOR= 0: HLIN XCTR - DISK,XCTR + DISK AT 2 * X + 22
250  COLOR= 12: PLOT XCTR,2 * X + 22: COLOR= 1
260  NEXT X
270  IF DISK = 0 THEN PRINT "NO DISK THERE!": GOTO 200
280 EMPTY = 0: FOR X = 5 TO 1 STEP - 1
290  IF EMPTY = 0 AND A(T2,X) = 0 THEN EMPTY = X
300  NEXT X: IF EMPTY = 5 THEN 330
310  IF A(T2,EMPTY + 1) > DISK THEN 330
320  PRINT "YOU CAN'T DO THAT!":T2 = T1: GOTO 280
330  REM  PLOT THE DISK AT A(T2,EMPTY)
340 X = 8 + (T2 - 1) * 11:Y = 2 * EMPTY + 22
350  COLOR= 1: HLIN X - DISK,X + DISK AT Y
360 A(T2,EMPTY) = DISK
370  PRINT : IF T2 = 1 OR EMPTY < > 1 THEN 200
380  PRINT "GOOD SHOW OL' CHAP!"
```

Presley, Bruce, *A Guide to Programming in Apple Soft:* Lawrenceville Press, Inc., Florence, KY, 1982, p. E17. Reprinted by permission of Lawrenceville Press.

Project

```
 10 REM**GUESS A NUMBER GAME**
 20 HOME
 30 REM**CHOOSE A RANDOM NUMBER**
 40 LET N=INT(1+RND(1)*100)
 50 REM**BEGIN GAME**
 60 HTAB(10): VTAB(5):?"GUESS A NUMBER
    GAME"
 70 HTAB(2) : VTAB(8):?"GUESS A NUMBER
    BETWEEN 1 AND 100"
 80 INPUT G
 90 IF G=N THEN 120
100 IF G>N THEN ?"TOO HIGH. GUESS AGAIN.":
    GOTO 80
110 IF G<N THEN ?"TOO LOW. GUESS AGAIN.":
    GOTO 80
120 REM**CORRECT GUESS**
130 REM **GRAPHIC**
140 GR: COLOR=2
150 PLOT 22,17 : PLOT 24,17
160 COLOR=13
170 PLOT 23,19
180 COLOR=11
190 PLOT20,20: PLOT21,21: PLOT22,22: PLOT
    23,22: PLOT 24,22: PLOT 25,21: PLOT 26,20
200 FOR T=1 TO 1000:NEXT T
210 REM ** CONGRATULATE THE PLAYER**
220 TEXT: HOME
230 HTAB 5: VTAB 5:? "YOU ARE RIGHT! TRY
    AGAIN";
240 INPUT Q$
250 IF Q$="YES" THEN 20
260 HTAB8: VTAB8:?"THANKS FOR PLAYING."
    PLAYING."
270 END
```



Boren, S., *An Apple for Kids:* dilithium Press, Ltd., Beaverton, OR, 1984, p. 205. Reprinted by permission of dilithium Press. 800-547-1842

Micro Bits!

Smashing Computers

A lot of people think that their computer is simply smashing, but other people just want to smash their computer. Have you ever felt like hitting your computer when you can't make it do what you want it to do? Hitting a computer can cause costly damage, but MicroTie, Inc., a company in Albuquerque, New Mexico, has devised a solution for people who feel like punishing their machines.

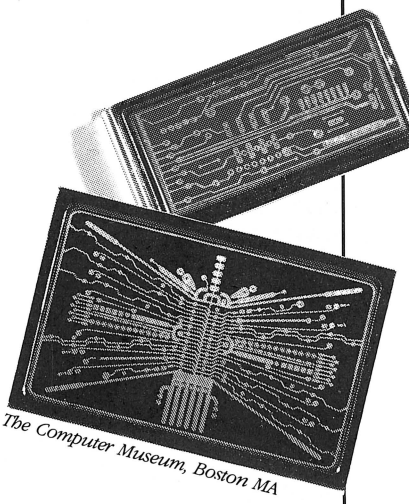
Now you can take a whack on your computer without wrecking it. MicroTie sells a 17-inch-long foam rubber baseball bat, the Byte Bat, especially for hitting home computers. The Byte Bat allows you to gain revenge on your computer on days when you feel that it is user-unfriendly.

Trying to smash machines is not a new idea. In the early 1800s, the Luddites, a group of workers in England, went on a rampage and destroyed textile mills because they believed that the machines were responsible for unemployment and low wages.

A Chip Off the Old Frock

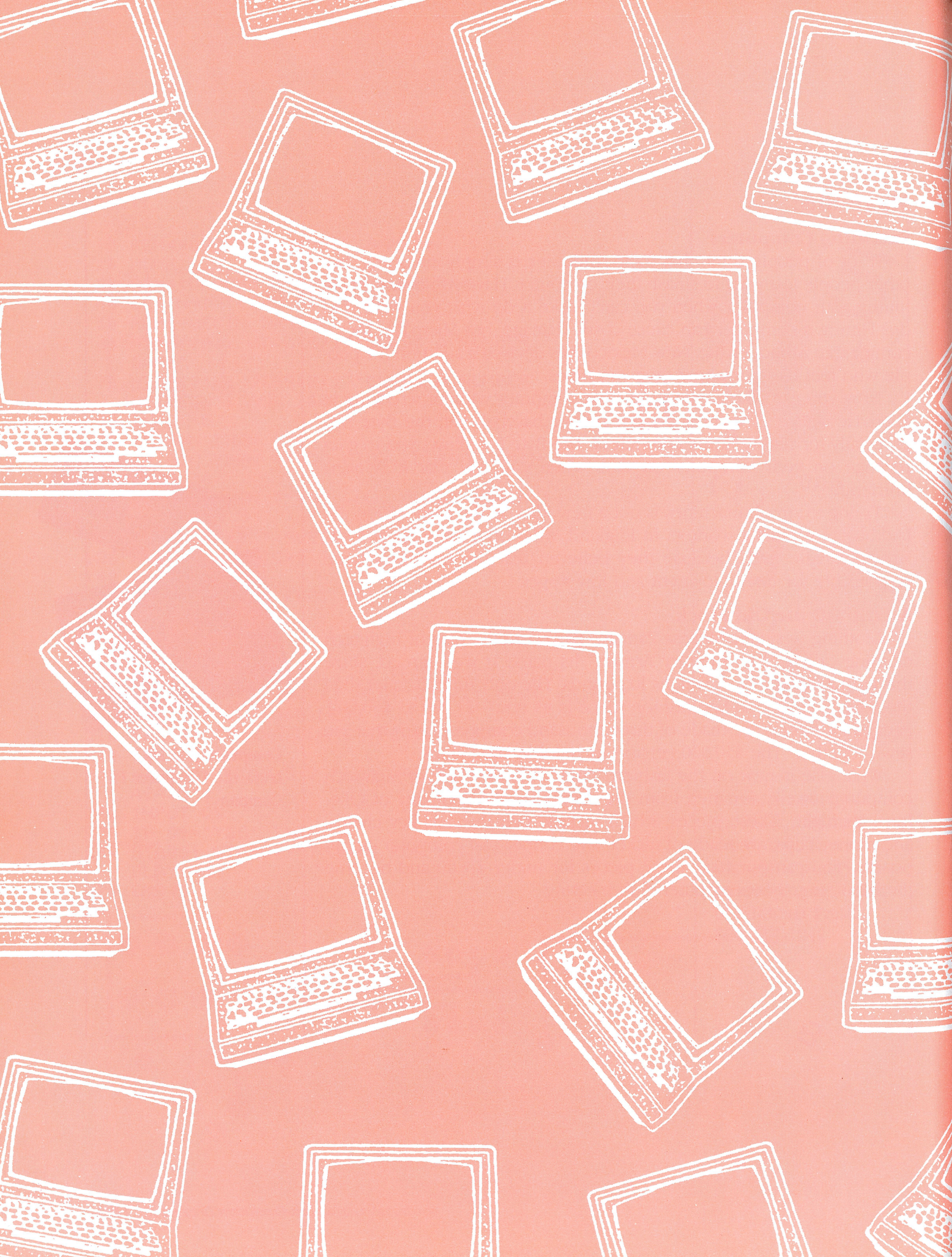
Clothing designer Melissa Panages has created a line of high-tech clothing called "20th Century Armor." Its name is well-earned, since this garment, a kimono, weighs l0 pounds. The only thing heavier than the weight of this on-line fashion piece is its cost—$1,000 to $50,000. Panage's kimonos are made of three thousand computer chips that are sewn together. The $50,000 version uses gold-plated chips.

What else is new on the fashion "circuit"? A new line of high-tech computer jewelry for men from the Computer FX Company of Okemos, Michigan. These pieces, which include belt buckles, key chains, and money clips, are made of nickel- and copper-cast computer circuit boards. You can purchase these pieces for under $l5.00 and become the hit of your next computer club meeting.



The Computer Museum, Boston MA

Computer jewelry from the Computer Fx Company.



7

High-Resolution Graphics

Notes to the Club Advisor

Chapter Overview

This chapter introduces the Apple's high-resolution graphics capabilities. The various activities and projects should provide club members with models for learning about programming high-resolution graphics in an enjoyable way.

Minimum Prerequisites

Most club members should be able to complete the activities presented in this chapter without an extensive background in Applesoft BASIC programming; however, prior completion of the chapters on Applesoft BASIC programming and low-resolution graphics is recommended.

Several things that the club advisor can do to help club members learn more about programming high-resolution graphics are listed below.

1 Explain the coordinate system that is used to plot locations on the high-res screen.

2 Demonstrate how to use the high-resolution planning grid. A suggested method is to project an overhead transparency of the grid, draw a simple shape on the grid (a box), and record the grid numbers that correspond with each location that is filled. The numbers should then be used to write the programming instructions for drawing the graphic. A reproducible planning grid is included in this chapter.

3 Have resource books on hand for students who may want additional models and information about programming high-resolution graphics. Some suggested texts are:

Applesoft BASIC Programmer's Reference Manual
by Scott Kamins
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

Art and Graphics on the Apple II/IIe
by William DeWitt
Wiley Press
605 Third Avenue
New York, NY 10158

Apple Graphics Activities Handbook
by H.J. Bailey & E. Kerlin
Robert J. Brady Company
Bowie, MD 20715

Advance Preparation

The club advisor should become familiar with the activities and projects presented in this chapter. The advisor should also consider the use of a large screen color monitor for group demonstrations and utility software, special interface cards, and a dot-matrix printer for printing screen displays.

Q: What did the programmer take for his headache?
A: A graphics tablet.

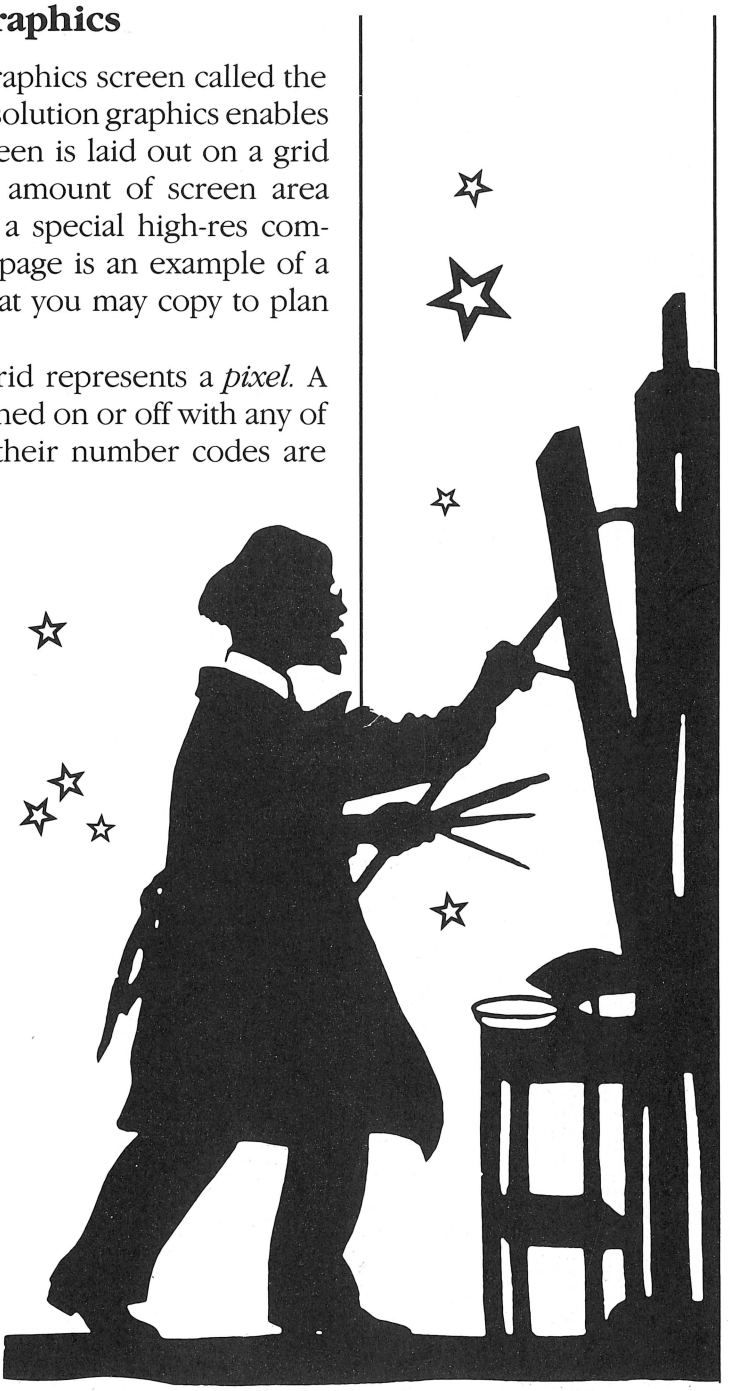
Introduction to High-Resolution Graphics

The Apple computer has another kind of graphics screen called the "high-resolution" or "high-res" screen. High-resolution graphics enables you to draw with more detail because the screen is laid out on a grid that is 280 X 160. You can also expand the amount of screen area available for graphics to 280 X 192 by using a special high-res command presented in this chapter. On the next page is an example of a section of a 280 X 192 high-res screen grid that you may copy to plan your drawings.

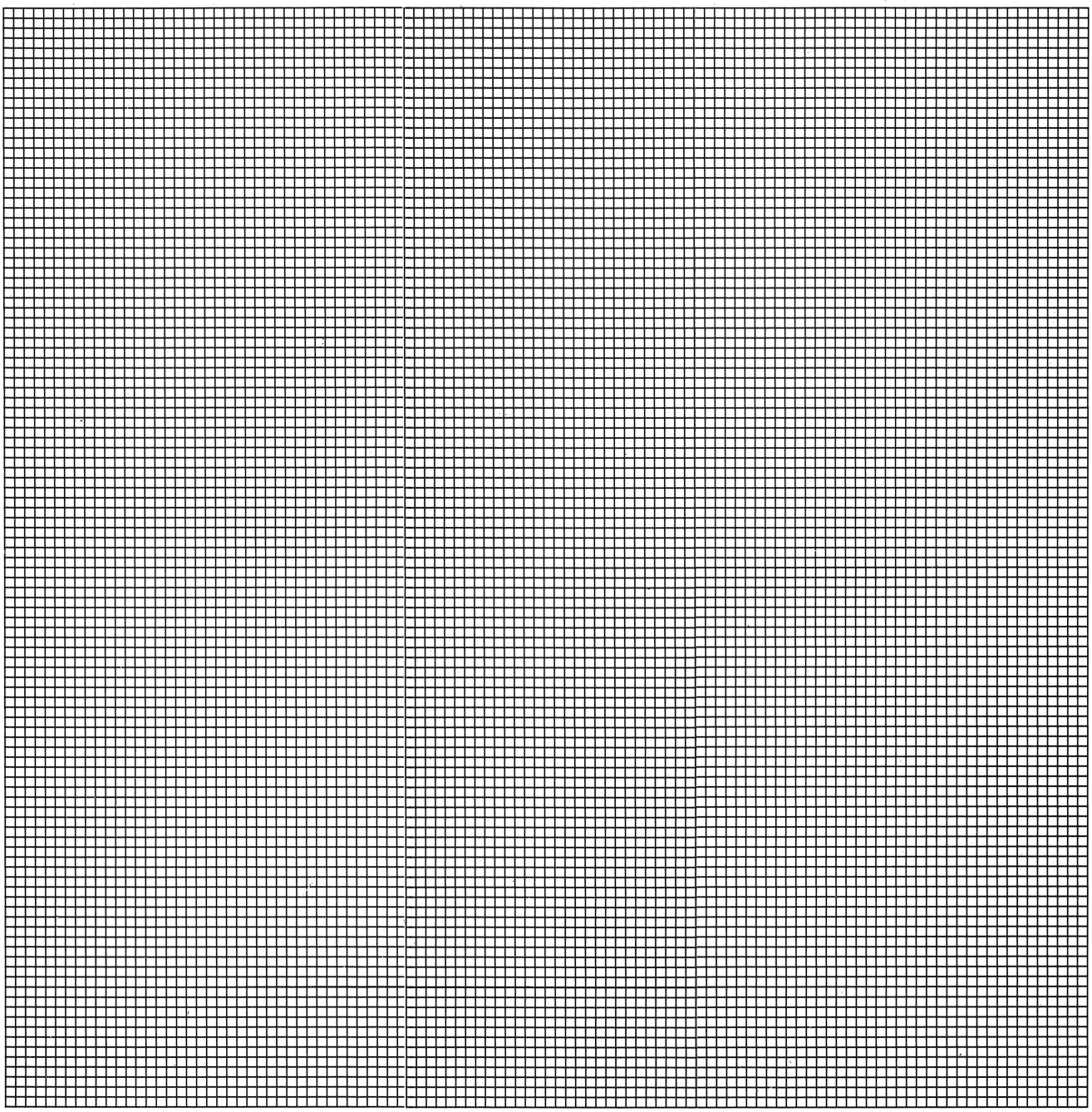
Each tiny square on the high-res screen grid represents a *pixel.* A pixel is a location on the screen that can be turned on or off with any of the high-res colors. The high-res colors and their number codes are listed below.

High-Res Graphics Colors

0	Black 1	4	Black 2
1	Green	5	Orange
2	Violet	6	Blue
3	White 1	7	White 2



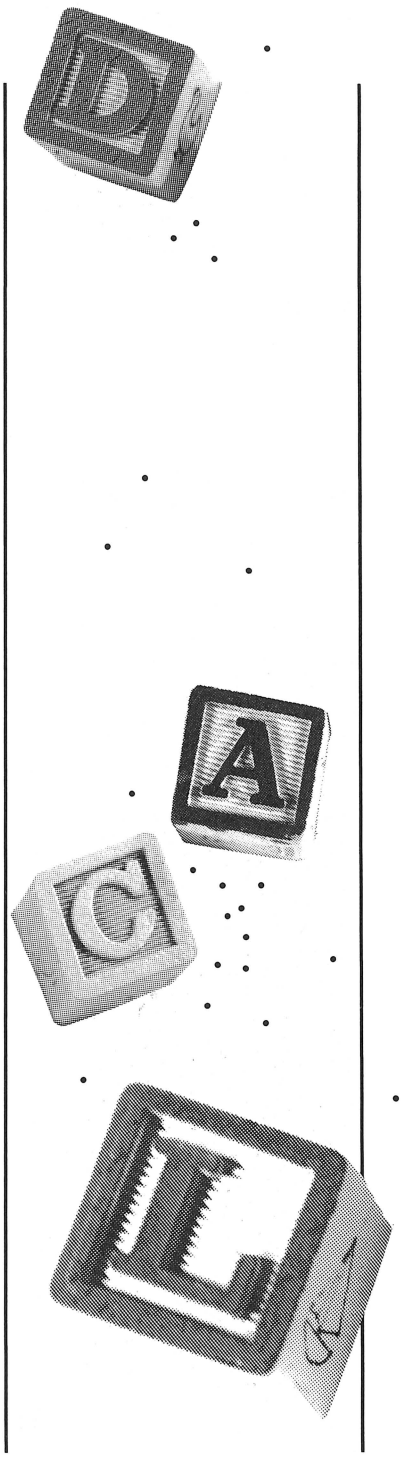
High Resolution Planning Grid



BASIC High-Res Building Blocks

The next few pages will help you learn how to program high-resolution graphics in Applesoft BASIC. Type the instructions that appear in capital letters. Press RETURN after each instruction. Most of the examples used in this section can be used without a color monitor; however, if you have a color monitor, you will be able to enjoy high-res graphics even more.

HGR	The HGR statement clears the high-res screen and reserves a text window at the bottom of the screen.
HGR2	The HGR2 statement clears the high-res screen. It also allows the entire screen to be used for graphics.
HCOLOR	The HCOLOR statement controls the selection of color for high-res graphics.
HPLOT	The HPLOT statement is used to plot points and lines in high-res graphics.
SIN	This trigonometry function built in the AppleSoft BASIC language computes the sine of an angle.
COS	This trigonometry function built in the AppleSoft BASIC language computes the cosine of an angle.
PEEK	This BASIC command reads the contents of a specific location in the computer's random-access memory.
POKE	This BASIC command places data directly into a specific location in the computer's random-access memory.



Getting Started with High-Res Graphics: Activity 1

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES
20  REM  HOW TO DRAW A DOT.
30  HGR
40  HCOLOR = 7
50  HPLOT 140, 95
60  GET T$:TEXT:HOME
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES
20  REM  HOW TO DRAW A LINE.
30  HGR
40  HCOLOR = 7
50  HPLOT 1,1 TO 140,90
60  GET T$:TEXT:HOME
```

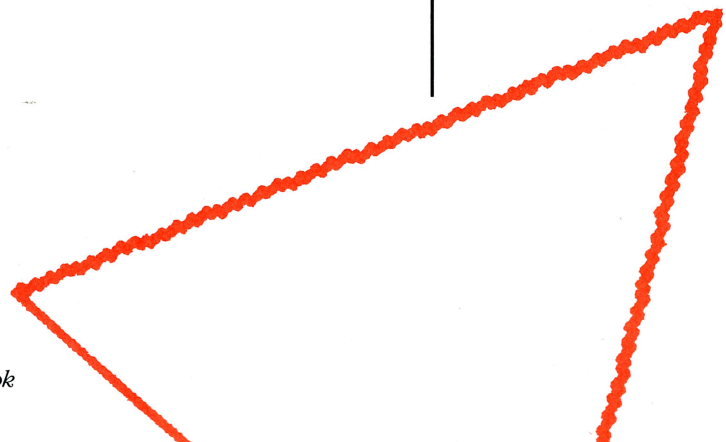
Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW TO
20  REM  DRAW A BORDER AROUND THE SCREEN.
30  HGR
40  HCOLOR = 7
50  HPLOT 1,1 TO 279, 1 TO 279,159
60  HPLOT TO 1,159 TO 1,1
70  GET T$:TEXT:HOME
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO DRAW PARALLEL LINES.
30  HGR
40  HCOLOR = 7
50  FOR A = 60 TO 120 STEP 3
60  HPLOT 100,A TO 200,A
70  NEXT A
80  GET T$:TEXT:HOME
```

Q: What did the programmer say to the stunt pilot?
A: Wow! You sure threw me for a loop!



■

Projects

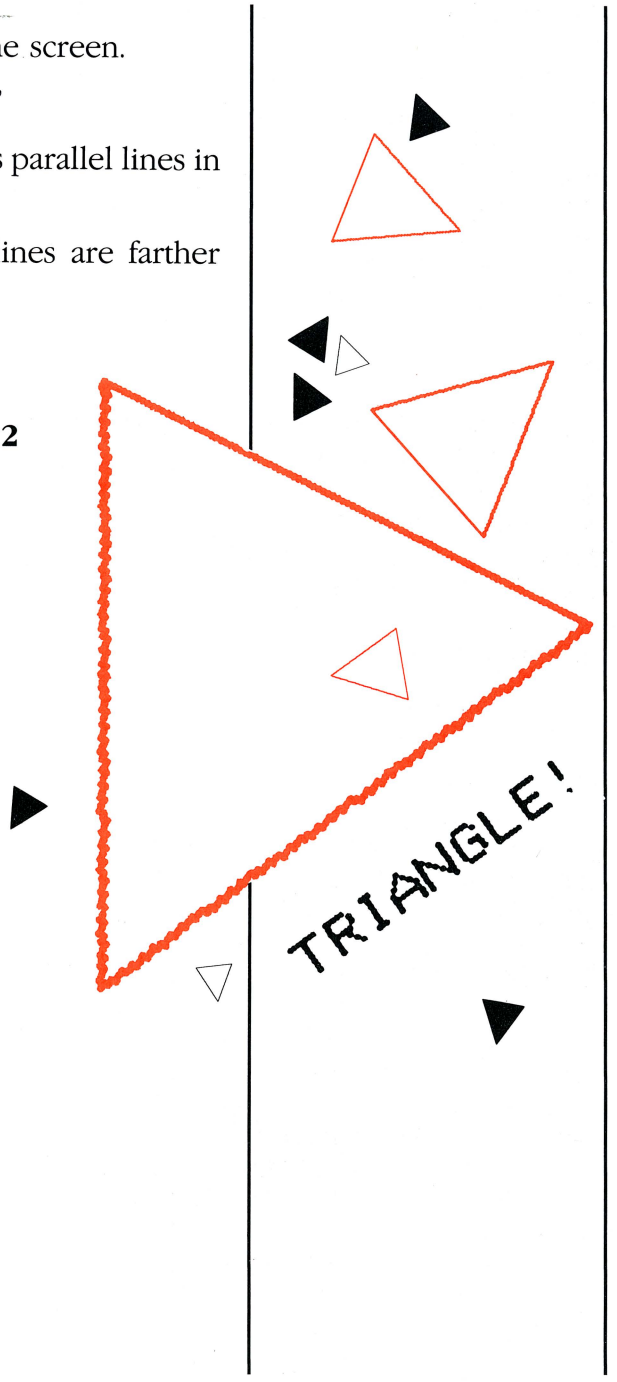
1 Write a program that draws a dot in each corner of the screen.

2 Write a program that draws a picture of the letter "X."

3 If you have a color monitor, write a program that draws parallel lines in different colors.

4 Modify the last program above so that the parallel lines are farther apart.

5 Write a program that draws your initials.



Getting Started with High-Res Graphics: Activity 2

```
Enter:

10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO DRAW A LINE SLOWLY.
30  HGR
40  HCOLOR = 7
50  FOR I = 90 TO 260
60  HPLOT I,90
70  NEXT I
80  GET T$:TEXT:HOME
```

```
Enter:

10  REM  THIS PROGRAM DEMONSTRATES
20  REM  HOW TO DRAW A TRIANGLE.
30  HGR
40  HCOLOR = 7
50  HPLOT 3,10 TO 3,159 TO 140,159
60  HPLOT 3,10 TO 140,159
70  GET T$:TEXT:HOME
```

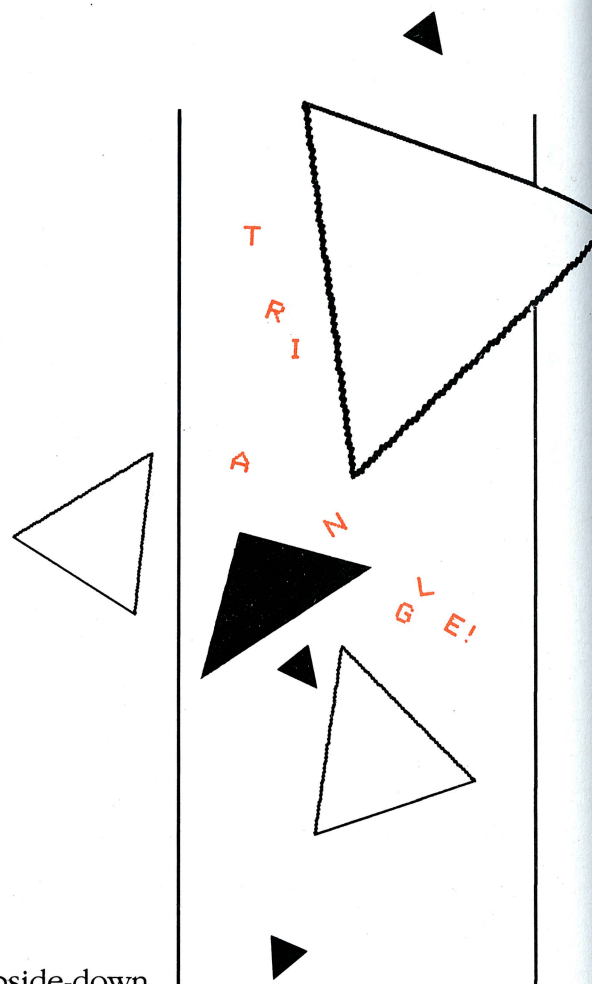
continued . . .

Enter:

```
10   REM  THIS PROGRAM DEMONSTRATES ANOTHER
20   REM  WAY TO DRAW A TRIANGLE.
30   HGR
40   HCOLOR = 7
50   HPLOT 140,10 TO 278,10 TO 278,160
60   HPLOT 140,10 TO 278,160
70   GET T$:TEXT:HOME
```

Enter:

```
10   REM  THIS PROGRAM DEMONSTRATES HOW
20   REM  TO DRAW A SWEEPING TRIANGLE.
30   HGR
40   HCOLOR = 7
50   FOR I = 90 TO 260
60   HPLOT I,20 TO 260,90
70   NEXT I
80   GET T$:TEXT:HOME
```



Projects

1 Write a program that draws a square slowly.

2 Write a program that draws back-to-back triangles or an upside-down triangle.

3 Write a program that combines a triangle and a square to draw a house.

Getting Started with High-Res Graphics: Activity 3

Enter:

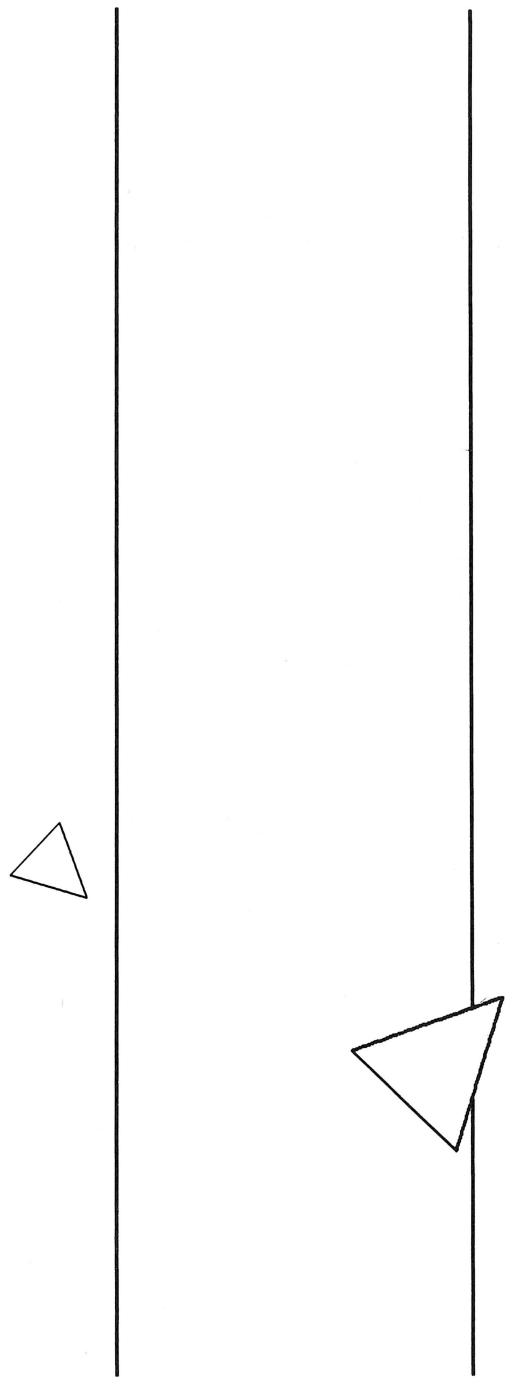
```
10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO SHADE PART OF THE SCREEN.
30  HGR
40  HCOLOR = 7
50  FOR A = 60 TO 120
60  HPLOT 100,A TO 200,A
70  NEXT A
80  GET T$:TEXT:HOME
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  WIPE THE SCREEN VERTICALLY.
30  HGR
40  HCOLOR = 7
50  FOR I = 0 TO 159
60  HPLOT 0,I TO 279,I
70  NEXT I
80  GET T$:TEXT:HOME
```

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  WIPE THE SCREEN HORIZONTALLY.
30  HGR
40  HCOLOR = 7
50  FOR I = 0 TO 279
60  HPLOT I,0 TO I,159
70  NEXT I
80  GET T$:TEXT:HOME
```



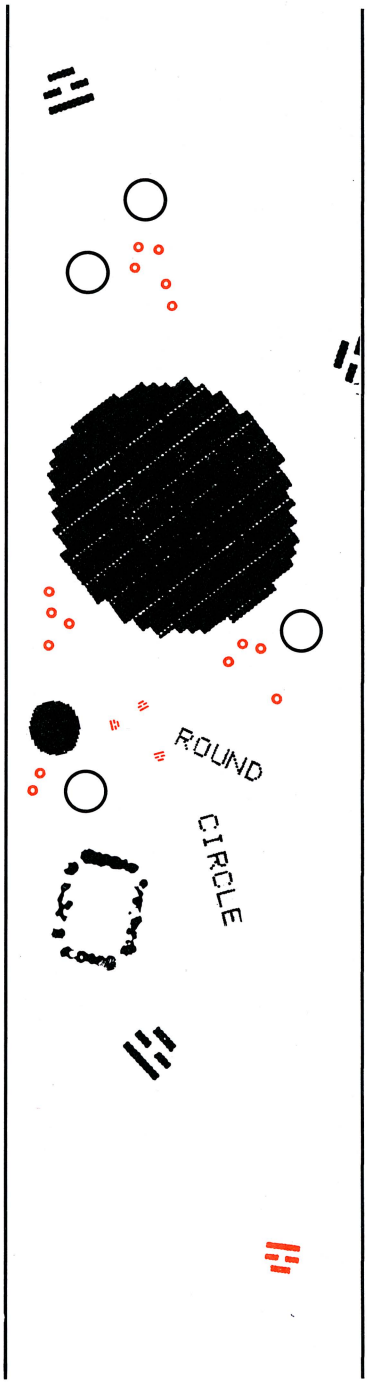
Projects

1 Write a program that shades each corner of the screen with a small square. If you have a color monitor, make each square a different color.

2 Write a program that shades a triangle, a rectangle, or any other geometric figure.

3 If you have a color monitor, change the programs above so that they wipe the screen with different colors.

4 Write a program that wipes the screen from corner to corner.



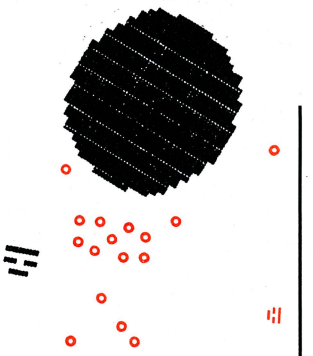
Getting Started with High-Res Graphics: Activity 4

```
Enter:

10  REM  THIS PROGRAM DEMONSTRATES
20  REM  HOW TO DRAW A CIRCLE.
30  HGR
40  HCOLOR = 7
50  POKE 49234,0
60  R = 60
70  FOR I = 0 TO 6.26 STEP .05
80  X = R * SIN (I)
90  Y = R * COS (I)
100 HPLOT 140 + X, 80 + Y
110 NEXT I
120 GET T$:TEXT:HOME
```

```
Enter:

10  REM  THIS PROGRAM DEMONSTRATES HOW
20  REM  TO ANIMATE A CIRCLE.
30  GOTO 150
40  HGR
50  HCOLOR = C1
60  FOR C = 0 TO 6.3 STEP .1
70  X = R * COS (C)
80  Y = R * SIN (C)
90  HPLOT H + X, V + Y
```



```
100 NEXT C
110 RETURN
120 FOR A = 1 TO 25
130 NEXT A
140 RETURN
150 R = 30: V = 40
160 HGR
170 FOR H = 90 TO 210 STEP 10
180 C1 = 7
190 GOSUB 50:GOSUB 120
200 C1 = 0
210 GOSUB 50
220 V = V + 15
230 NEXT H
240 GET T$:TEXT:HOME
```

Projects

1. If you have a color monitor, write a program that draws circles in different colors.
2. Write a program that draws different size circles.
3. Write a program that draws a circle that is completely shaded or write a program that draws a circle and shades everything but the circle.

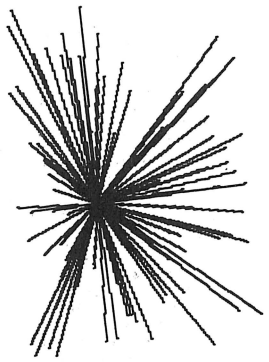
Getting Started with High-Res Graphics: Activity 5

Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES
20  REM  HOW TO DRAW A TRIANGLE.
30  HGR
40  HCOLOR = 7
50  FOR X = 0 TO 80
60  HPLOT 135 - X,60 + X TO 135,60 + X
70  NEXT X
80  PRINT "THE GREAT TRIANGLE!"
90  GET T$:TEXT:HOME
```

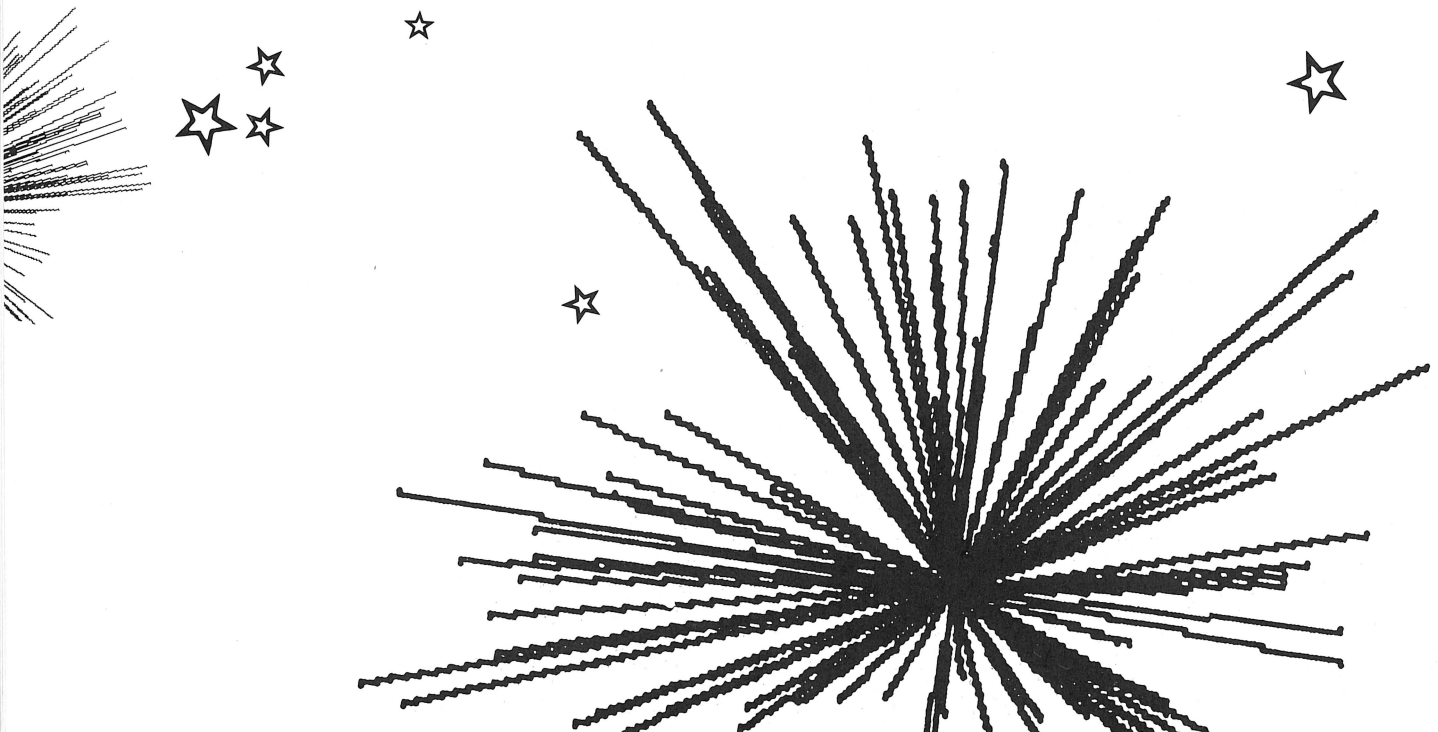
Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES
20  REM  HOW TO DRAW A STARBURST.
30  HGR
40  POKE - 16302,0
50  HCOLOR = 7
60  FOR I = 1 TO 100
70  HPLOT 140,96
80  X = INT (250 * RND (1))
90  Y = INT (150 * RND (1))
100 HPLOT TO X,Y
110 NEXT I
120 GET T$:TEXT:HOME
```



Enter:

```
10  REM  THIS PROGRAM DEMONSTRATES HOW TO
20  REM  DRAW GRAPHICS ON SEPARATE PAGES
30  HGR
40  HCOLOR = 7
50  REM  THIS PAGE DRAWS A TRIANGLE.
60  HPLOT 140,30 TO 190,120 TO 90, 120 TO 140,30
70  GET T$
80  REM  THIS PAGE DRAWS A SQUARE.
90  HGR2
100 HPLOT 90,30 TO 190,30 TO 190,120 TO 90,120, TO 90,30
110 GET T$:TEXT:HOME
```



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Project TUBULAR DYNAMICS

```
  1  REM PROGRAM 5.5
 10  HGR:POKE 49234,0:HCOLOR= 7
 20  R= 80
 30  FORI= 0 TO 6.28 STEP .03
 40  X= R*SIN(1)
 50  Y= R*COS(1)
 60  HPLOT 80 + X, 92 + Y
 70  HPLOT 90 + X, 90 + Y
 80  HPLOT 100 + X, 88 + Y
 90  HPLOT 110 + X, 86 + Y
100  HPLOT 120 + X, 86 + Y
110  HPLOT 130 + X, 88 + Y
120  HPLOT 140 + X, 90 + Y
130  HPLOT 150 + X, 92 + Y
140  HPLOT 160 + X, 94 + Y
150  HPLOT 170 + X, 96 + Y
160  HPLOT 180 + X, 98 + Y
170  HPLOT 190 + X, 100 + Y
180  HPLOT 200 + X, 102 + Y
190  NEXT I
```

DeWitt, W.H., *Art & Graphics on the Apple II/IIe:* John Wiley & Sons, Inc., New York, NY, 1984, p. 37. Reprinted by permission of John Wiley & Sons, Inc.
◀

Anstis, S., *Write Your Own Apple Games:* Creative Computing Press, Morris Plains, NJ, 1983, p. 115. Reprinted by permission of Creative Computing Press.
◀

Project

Squirals

```
10  REM  SQUIRALS-----
20  REM BY FRED GUNTHER, CREATIVE COMPUTING JANUARY 1983---
30 PI = 3.14159:W = PI / 180
50 ANGLE = 360 *  RND (3):R = 5 *  RND (3): REM  RADIUS
60  HGR2  :X = 140:Y = 96: HCOLOR= 3:A = ANGLE
70 XN = X + R *  COS (W * A):YN = Y + R *  SIN (W * A)
80  ONERR  GOTO 50
90  HPLOT X,Y TO XN,YN
100 A = A + ANGLE
110 R = R + 1
120 X = XN:Y = YN
130  GOTO 70
```

■

Project POLYGON FIGURE

```
10  REM
15  DIM X(15),Y(15)
20  HOME : VTAB 22
30  HGR : HCOLOR= 3
40 PI = 3.1415926:F = 1.1
50 XC = 140:YC = 80:R = 88
60  INPUT "ENTER NUBMER OF SIDES (3-15) ";N
70  IF N < 3 OR N > 15 THEN 60
80  GOSUB 200: REM   CALCULATE PO
     INTS
90  FOR J = 1 TO N - 1
100  FOR K = J + 1 TO N
110  HPLOT XC + X(J),YC + Y(J) TO
     XC + X(K),YC + Y(K)
120  NEXT K: NEXT J
125  VTAB 24
130  INVERSE : PRINT "ANOTHER PLOT?":
     NORMAL : PRINT  SPC( 1)
140  GET G$
150  IF G$ = "Y" THEN 20
160  TEXT : HOME : END
200  REM   CALCULATE POINTS
210  FOR I = 1 TO N
220 AD = I * 360 / N
230 AR = AD * PI / 180
240 X(I) = R *  COS (AR)
250 Y(I) = R *  SIN (AR)
260 Y(I) =  - Y(I) / F
270  NEXT I: RETURN
```

Hall R., *Apple Basic,*: Prentice-Hall, Inc., Englewood Cliffs, NJ, 1982, p. 122. Reprinted by permision of Prentice-Hall, Inc.

■

Project

```
 10  REM  ********************
 20  REM  *                  *
 30  REM  *      TARGET      *
 40  REM  *                  *
 50  REM  *        BY        *
 60  REM  *                  *
 70  REM  *  STUART ANSTIS   *
 80  REM  *                  *
 90  REM  ********************
100  W$(0) = "BAD":W$(1) = "POOR":W$(2) = "FAIR":W$(3) =
     "GOOD":W$(4) =  "GREAT!!"
110  TEXT : HOME : VTAB 22
120  PRINT "HIT SPACE BAR TO SHOOT TARGET (20 SHOTS)"
130  GR
140  REM   DRAW PISTOL -----
150  COLOR = 12
160 P = 34 *  RND (1) + 1
170  HLIN 0,7 AT P
180  HLIN 0,5 AT P + 1
190  FOR J = 1 TO 2: VLIN P + 1,P + 5 AT J: NEXT J
200  COLOR= 0
210  FOR K = 0 TO 7: VLIN 0,P - 1 AT K: VLIN P + 6,39 AT K: NEXT K
220 X = 20
230 SOLD = 8
240 SSPD = 3
250 XSPD = 3 *  RND (1)
260  REM  DRAW TARGET -----
270 X = X + XSPD
280  IF X > 1 AND X < 35 THEN  GOTO 310
290 XSPD =  - 1 * XSPD
300  GOTO 370
310  COLOR= 1
320  VLIN X,X + 5 AT 39
330  COLOR= 0
340  VLIN 0,X -1 AT 39
350  VLIN X + 6,39 AT 39
360 KEY = PEEK ( - 16384)
370  IF KEY > 127 THEN GOTO 400
380  GOTO 270
```

Anstis, S., *Write Your Own Apple Games:* Creative Computing Press, Morris Plains, NJ, 1983, p. 49. Reprinted by permission of Creative Computing Press.

■

Project

```
 20  TEXT : HOME
 30  HTAB 10: PRINT "LISSAJOU FIGURES"
 40  VTAB 10: HTAB 5
 50  INPUT "HARMONIC RATIO: TYPE IN TWO NUMBERS AND HIT
     RETURN AFTER EACH ...";H,V
100  HGR
110  HCOLOR= 3
115  HPLOT 140,80
120  FOR K = 0 TO 6.4 STEP 0.05
130 X = 140 + 80 *  SIN (H * K)
140 Y = 80 + 80 *  SIN (V * K)
160  HPLOT  TO X,Y
170  NEXT K
180  VTAB 24
190  PRINT "WANT ANOTHER (Y/N)     ";
200  GET Y$
210  IF Y$ = "Y" THEN 20
```

Anstis, S., *Write Your Own Apple Games:* Creative Computing Press, Morris Plains, NJ, 1983, p. 110. Reprinted by permission of Creative Computing Press.

Graphics Software and Related Products

Below are listed some graphics software programs and related products for the Apple Computer that you may find interesting.

Apple Mechanic
Alpha Plot
Beagle Brothers Micro Software
4315 Sierra Vista
San Diego, CA 92103

Delta Drawing
Spinnaker Software
215 First Street
Cambridge, MA 02142

GraFORTH
Insoft
7933 SW Sirrus Drive
Beaverton, OR 97005

Hi-Res Secret
Avant-Garde Software
P.O. Box 30160
Eugene, OR 97403

Koala Pad Touch Tablet
Koala Technologies Corp.
1800 Embarcadero Road
Palo Alto, CA 94303

MousePaint II
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

Paint Program
Super Slide Show
Animation Graphics, Inc.
11317 Sunset Hills Road
Reston, VA 22090

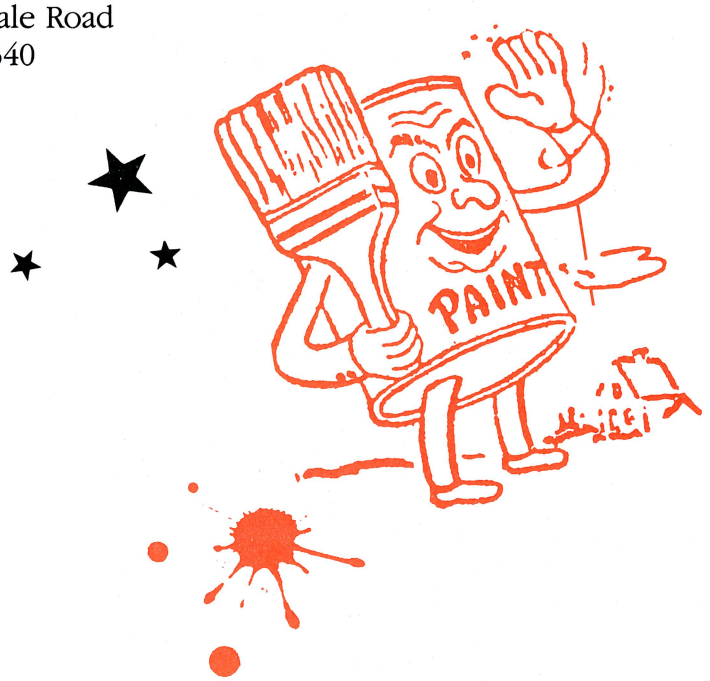
Picture Writer
Scarborough Systems, Inc.
25 N. Broadway
Tarrytown, NY 10591

Power Pad
Chalkboard, Inc.
3772 Pleasantdale Road
Atlanta, GA 30340

Shapes in Color
Hayden Software
600 Suffolk Street
Lowell, MA 01853

The Complete Graphics System
Graphics Magician
Penguin Software
P.O. Box 311
Geneva, IL 60134

Turtle Tracks
Scholastic, Inc.
1120 Wall Street West
P.O. Box 641
Lyndhurst, NJ 07075



Micro Bits!

Playing for Pay

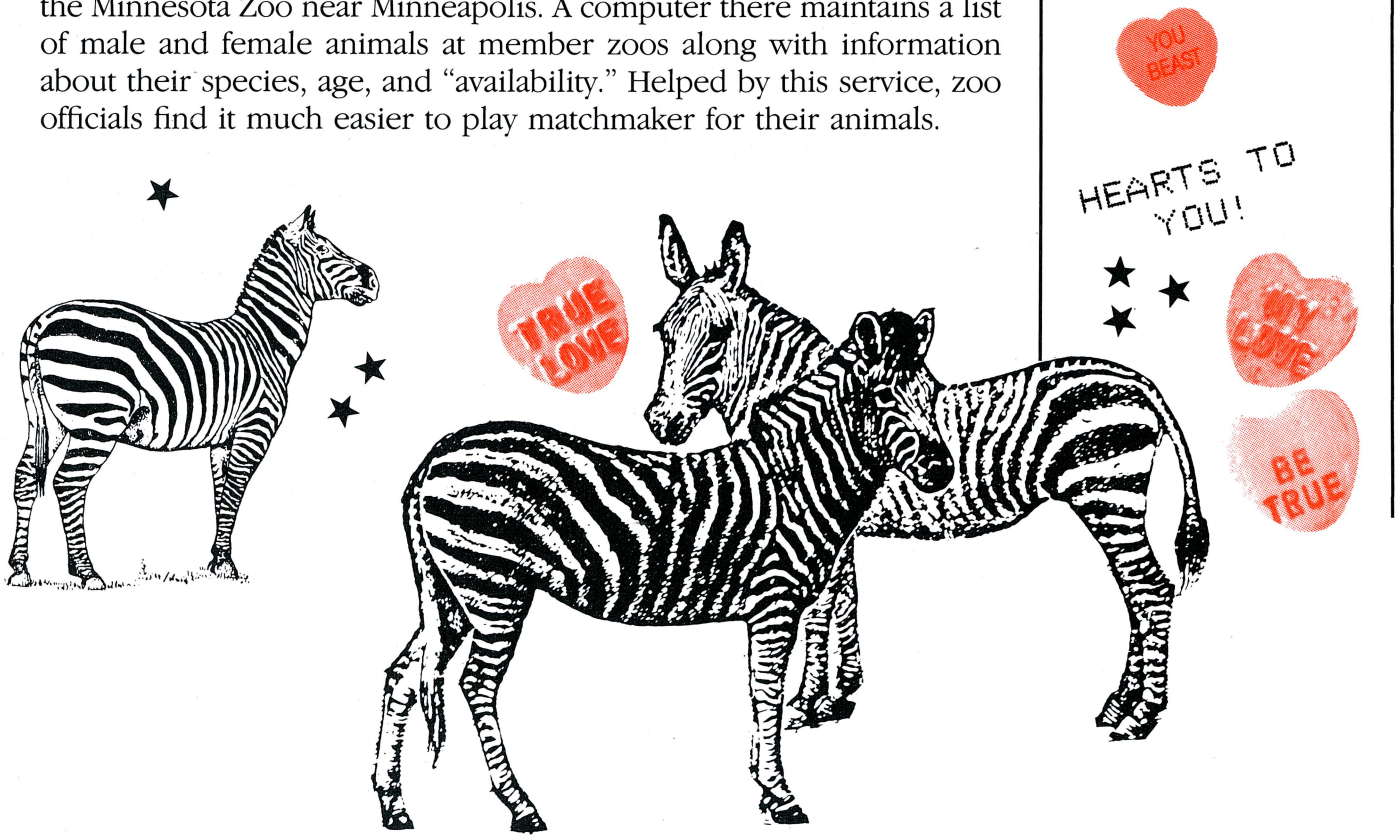
Like many teenagers, Vince Speziale of San Jose, California, enjoys playing video games. But unlike most of them, Vince gets paid to do so. He works as a game tester for Imagic, a video game company. For three hours after school every day, Vince tests new games in a room filled with computers and other testers like himself. Vince and the other testers look for bugs in the games and work directly with the game designers to track down and get rid of these bugs.

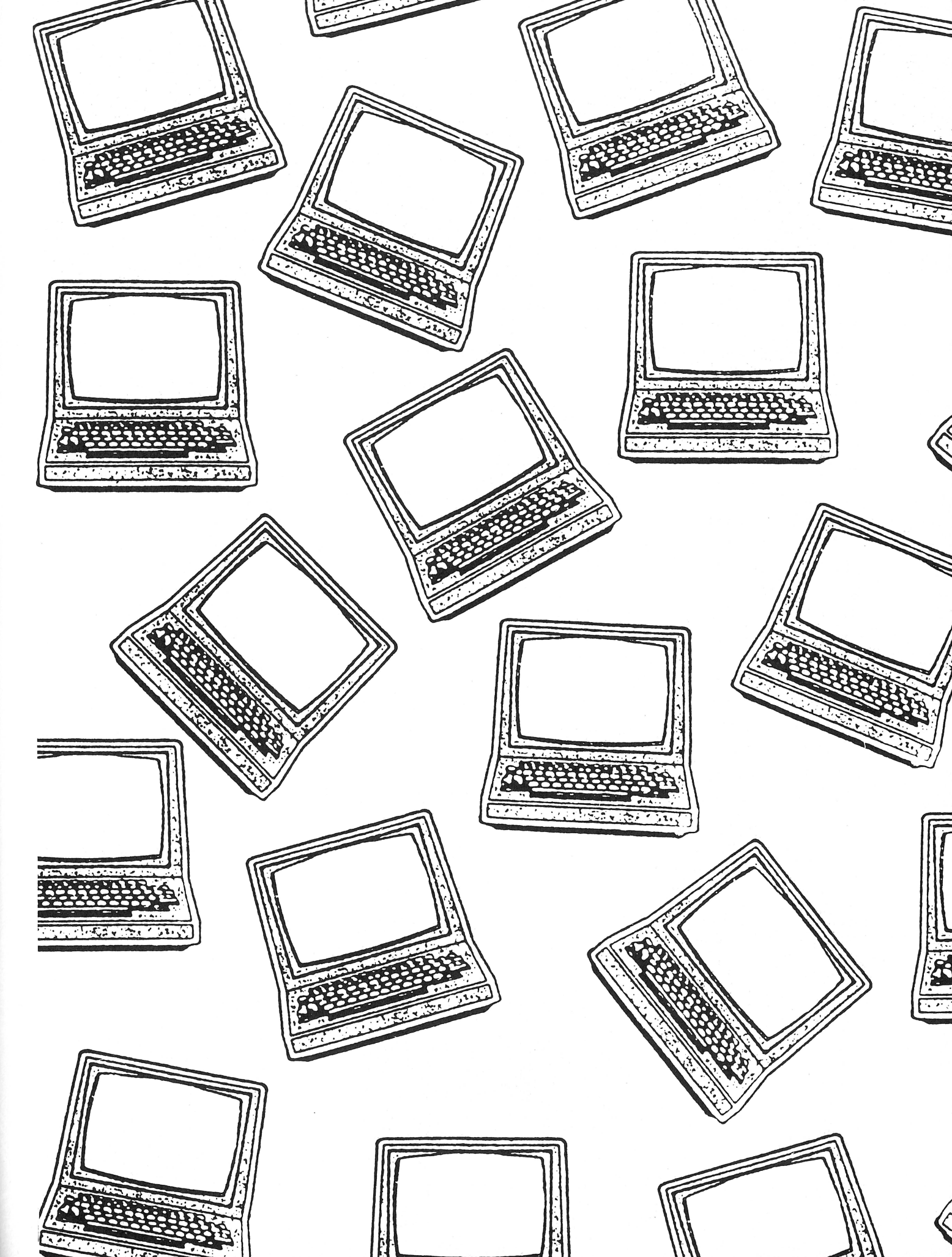
Besides enjoying his work, Vince feels that being a game tester will help him in the future since he wants to work with computers as a career. He says, however, that he doesn't play video games as much at home as he once did.

How About a Date?

Humans aren't the only ones who sometimes have a hard time getting a date with just the "right type." Thousands of rare and endangered animals in zoos around the world find it even more difficult meeting Mr. or Ms. "Right." Since the only chance some of these animal species have for survival is through the help of "matchmakers," it is very important to get them together occasionally for captive breeding.

Zoo officials have responded to this problem by creating a data base called the "International Species Inventory System," which is located at the Minnesota Zoo near Minneapolis. A computer there maintains a list of male and female animals at member zoos along with information about their species, age, and "availability." Helped by this service, zoo officials find it much easier to play matchmaker for their animals.





Word Processing

8

Notes to the Club Advisor

Chapter Overview

This chapter introduces activities and projects that should provide club members with models for learning about word processing in an enjoyable way. The chapter is designed for use with any word-processing program.

Minimum Prerequisites

It is helpful if the club members have had prior instruction in keyboarding skills. If a club member is not an accomplished typist, the club advisor might remind him/her to sit up straight, place both hands on the "home row" keys, and to use more than one finger when typing.

There are a number of typing and keyboard familiarization programs available for Apple computers that club members can use to improve their typing skills. Some suggested programs are listed below.

APPLE PRESENTS . . . APPLE (provided with Apple systems)

Hi-Res Mastertype
Scarborough Systems, Inc.
480 California Avenue
Suite 206
Palo Alto, CA 94306

Typing Tutor
Microsoft Consumer Products
400 108th Avenue, N.E.
Bellevue, WA 98004

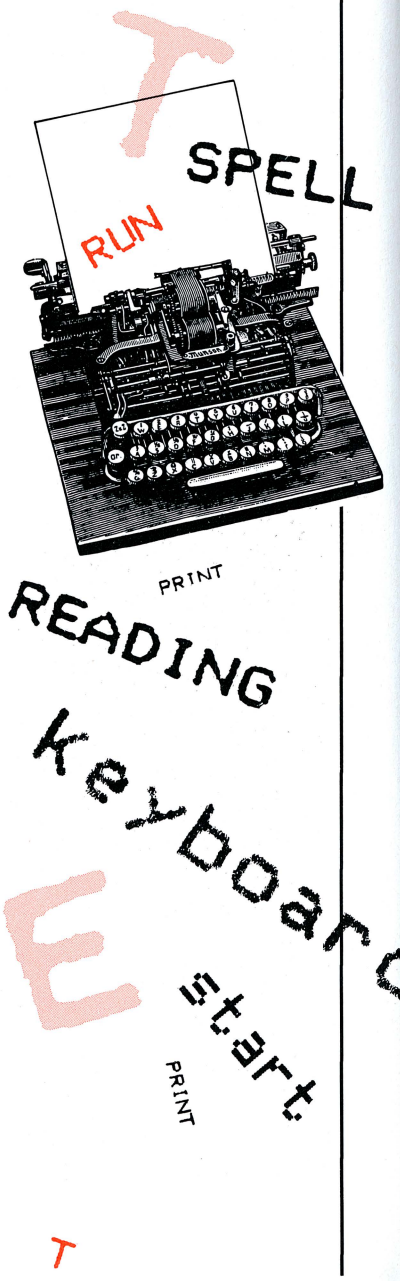
Advance Preparation

The club advisor should become familiar with the word-processing program(s) that the club members will use. A list of word-processing programs for use with Apple computers is provided in this chapter.

Assist club members in selecting activities from the chapter that match their skill level and interests. Whenever possible, allow club members to assist each other.

Several activities require the use of files that should be prepared in advance by the club advisor or knowledgeable club members.

One or more printers should be available when club members are completing word-processing activities. The club advisor should make sure that each member understands how to properly load and use a printer. A brief list of instructions about how to use the club's printer(s) should be posted in a central location.



Introduction to Word Processing

Exactly what is word processing and why is everyone so excited about it? Word processing is using a computer to write. If you have ever slaved over a typewriter trying to correct a sentence, then you'll want to explore word processing. Word processors are the ultimate intelligent typewriter.

Let's imagine that you've typed a 20-page paper about the country of Czechoslovakia. As you proudly proofread your paper, you discover that you have spelled Czechoslovakia incorrectly on every page. With a typewritten paper, you would have to read the entire paper to locate and correct the misspelled words. With a word processor, you could use a common word-processing function, FIND, to automatically locate and correct each misspelling of Czechoslovakia. This process would be completed in a matter of seconds!

Word processing, or computerized writing, is a direct result of improvements made in computer technology. The roots of the word processor can be traced back to the invention of mechanical typewriters. Typewriters were introduced in the mid- to late 1800s. The earliest typewriters were huge and quite difficult to use. Even so, they allowed a writer to produce a lot of written material. Electric typewriters came along in 1920.

The development of the microchip and microcomputers in the early 1970s made computerized writing possible. Early word-processing

computers could perform no tasks other than word processing; such word processors, widely used today in business, are referred to as "dedicated word processors."

Today virtually every home computer can be used for a variety of purposes including word processing. Word-processing programs that convert a microcomputer into a word processor are available for almost every brand of microcomputer.

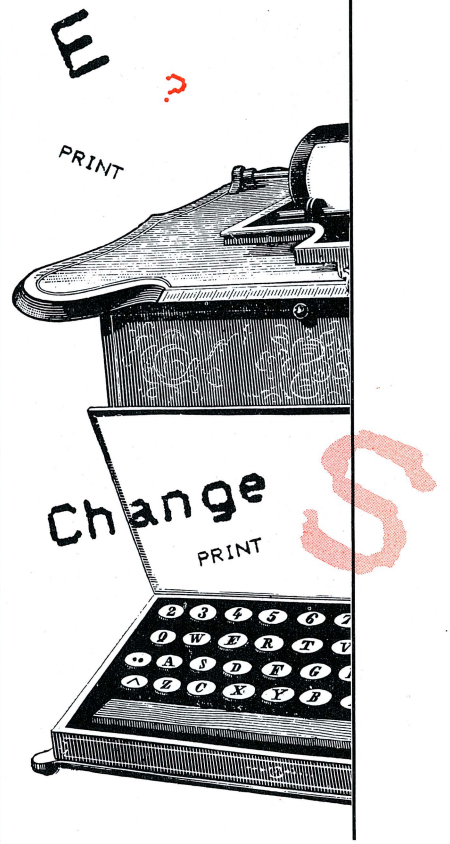
The only thing that a modern word processor and a typewriter really have in common is a keyboard. Word processors allow a writer to easily create and rearrange text, move or delete passages, and print highly readable copies. This is possible because a microcomputer displays written work on a video screen. Video screens are much more flexible than paper.

There are a number of reasons why word processing is so convenient:

1 It is extremely easy to make changes with a word processor.
2 Retyping an entire paper is unnecessary.
3 Spelling and typing errors can be detected by the computer.
4 Word processors are quiet.
5 Word processors are portable.
6 Word processors are fun.

There are also a number of word-processing tools, or programs, that can be used to make writing easier. For example, spelling checkers can be used to help you check and correct the spelling of words. Some programs allow your computer to automatically create an index or table of contents. There are even programs that will check your grammar. A grammar-checking program can tell you when a phrase is awkward, commonly misused, redundant, or simply too wordy. All of these programs can be used with a word-processing program to make writing less difficult. No typewriter exists that can do all of these things.

One of the most fantastic word-processing programs available today is *MacWrite*. *MacWrite* is Apple Computer's word-processing program available for the Macintosh. To use *MacWrite*, you must operate a peripheral control device called a "mouse." The mouse is about the size

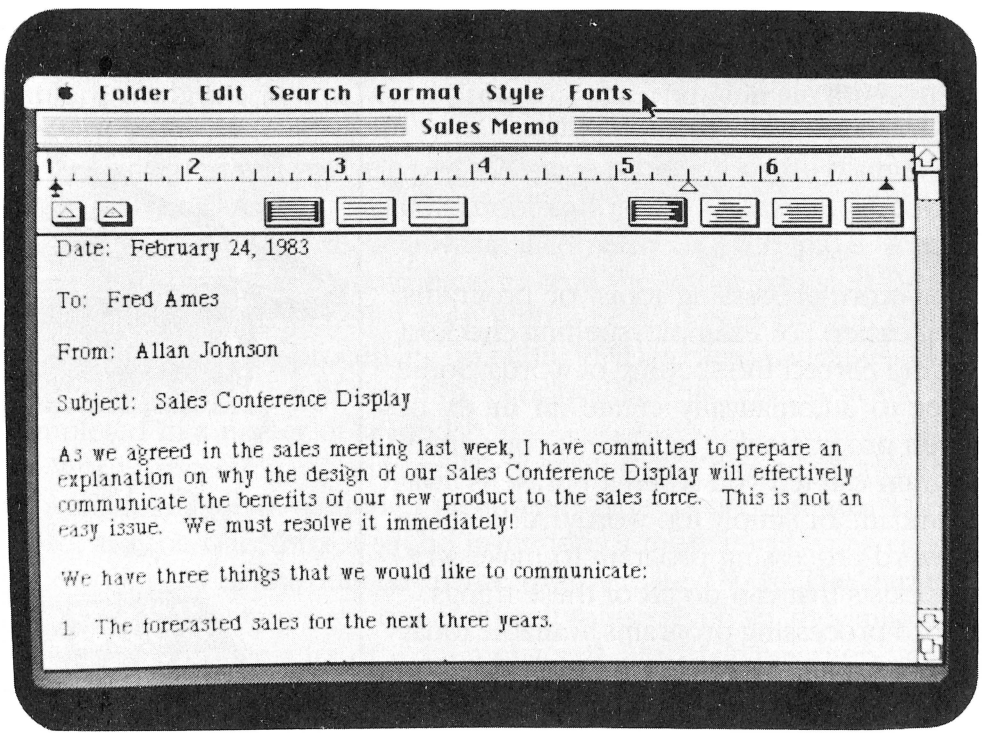


of a deck of cards and has a button on the front of it. Instead of typing instructions on the keyboard to use *MacWrite*, the mouse is moved across a flat surface. When the mouse is moved, a corresponding pointer is moved on the Macintosh's video display.

MacWrite's video display shows a number of pictures called "icons." To select a word-processing function, the user must move the pointer with the mouse over an icon and push the button on the mouse to activate that function.

The icons are very easy to understand because they are a menu that uses pictures instead of words. On the next page are some sample icons from *MacWrite*. Can you figure out what each means?

MacWrite Icons

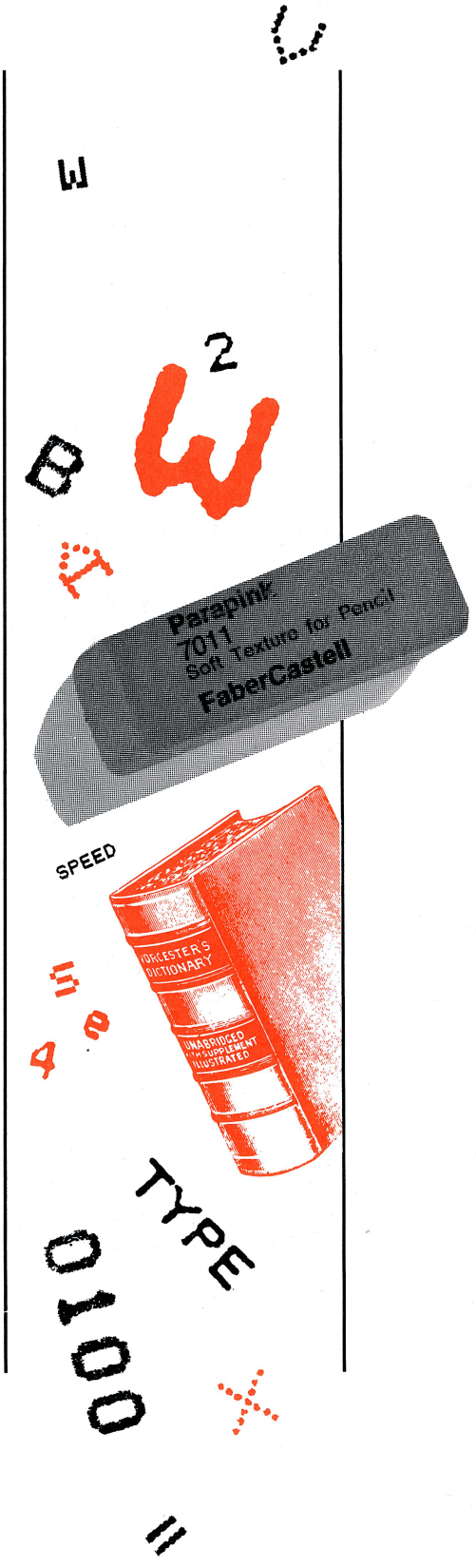


Macintosh software menus use icons instead of words.

Word-Processing Glossary

Listed below are some common word-processing terms and their meanings.

BACK-UP	To copy a file or files onto a disk other than the original. A back-up disk provides protection against losing data.
BLOCK	A continuous section of text that can be manipulated by the writer. Blocks can be sentences or paragraphs.
BUFFER	A part of memory used for temporary storage.
CURSOR	A special marker on the screen that indicates where typed text will appear.
DELETE	A word-processing function that allows text to be erased.
EDITING	Making changes in text.
EMBEDDED COMMAND	A print formatting command inserted within a document that allows the margins, spacing, and other formatting features of text to be changed.
FILE	A collection of data stored on a disk.
FIND	A word-processing function that allows the user to find characters or symbols within the text.
FORMAT	The pattern selected for printing text.
INSERT	A word-processing function that allows text to be placed within the text.
MENU	A list displayed on a screen that provides a choice of word-processing functions.

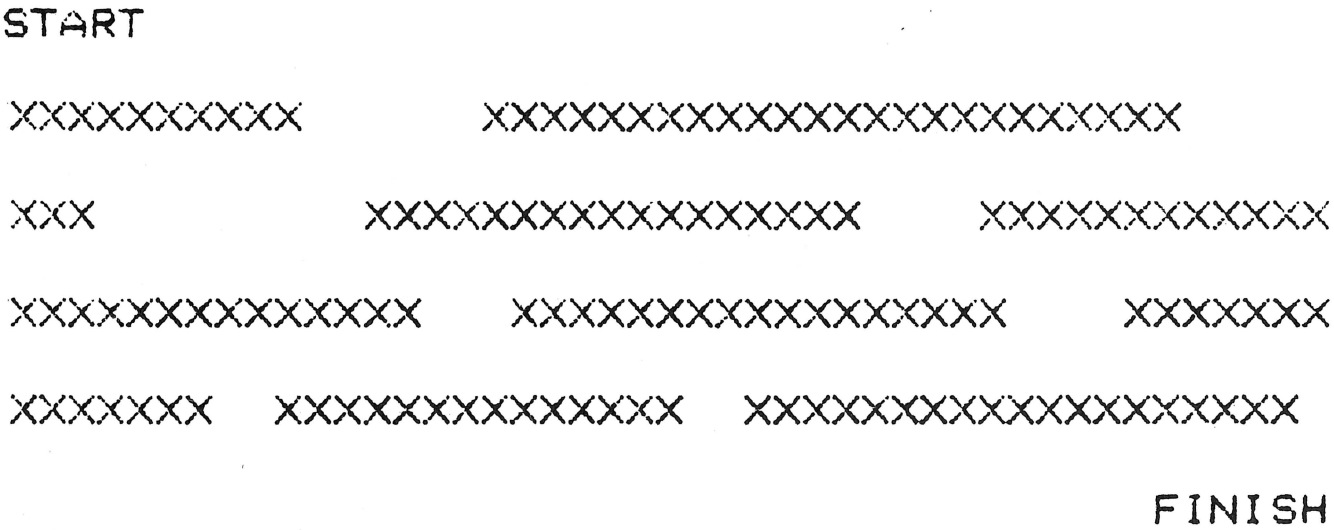


PROMPT	A message from the computer that provides or requests information.
REPLACE	A word-processing function that allows the user to find and then replace words or symbols within the text.
SCROLLING	The movement of text on the screen, either vertically or horizontally.
SPELLING CHECKER	A program used with a word-processing program to assist the user in proofreading his or her text.
WORD WRAP	A word-processing function in which the computer calculates how many words will fit on a line before automatically moving words to the next line.

Getting Started with Word Processing: Activity 1

Skill: Entering text and moving the cursor around the screen.

Load your word-processing program, then make a simple maze like the one shown below.



Projects

1 Practice moving the cursor through the maze. Use the arrow keys on your Apple keyboard whenever you can. Sometimes you will need to use the spacebar. See if you can make it through the maze without bumping into an X.

2 If your club has a printer, print your maze. You might want to create a collection of mazes done by other club members and hold a contest to see who can create the most difficult maze.

3 Learn how to save your maze on a disk so that other club members can try to solve it.

4 Create a maze and place the names of club members inside it. See how fast you can move the cursor through the maze and erase all the names. Keep track of your time. Hold a club contest to see who is the fastest at solving the maze.

Getting Started with Word Processing: Activity 2

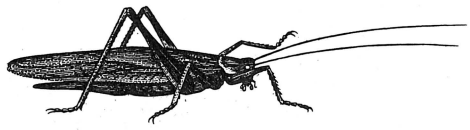
Skill: Using the replace function in a word-processing program.

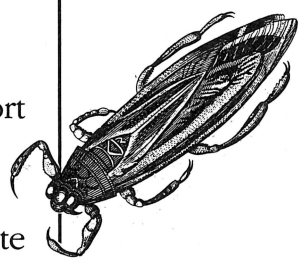
Load a word-processing program, then type the following short story:

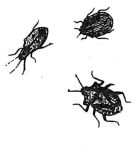
Don't Bug Me!

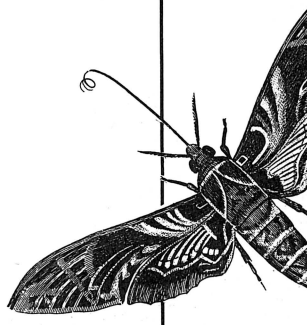
Lisa belonged to the Micro-Maniacs computer club. Her favorite thing to do at each computer club meeting was to write her own programs. She wrote game programs, lame programs, and burn-your-brain programs. Lisa was enthusiastic but not very good as a programmer. It seems that all her programs were filled with mistakes because she didn't spend any time planning her ideas.

Her club leader, Ben Byte, kept telling her, "Lisa, your program has once again been invaded by bugs." But Lisa didn't care. She replied, "Don't bug me about bugs, they're no big deal. There're bigger things in life than a few bugs in your basic."









Projects

1 Use the replace function of your word-processing program to change the name of the main character in the story from Lisa to another name.

2 Complete the story, *Don't Bug Me!* Tell what happens to Lisa at her next club meeting and how she handles the bugs in her BASIC.

3 Create a file disk for club members to save their own versions of the story. Save your completed story on the file disk. Load and compare the different versions later. Remember that each member has to use a different name for the story when they save it.

Getting Started with Word Processing: Activity 3

Skill: Deleting and moving text.

Load a word-processing program, then type the following sentences:

Too Much Popcorn!

a) The room began to fill with popcorn.
b) Billy got out the pan, popcorn, oil, and salt.
c) He shook the pan over the burner to keep the popcorn from burning.
d) He turned on the stove.
e) Billy was barely able to get to the phone and call the fire department to rescue him.
f) He next poured the oil into the pan, filled the pan with popcorn, and put it on the stove.
g) "How about some popcorn, Mom?" asked Billy. "I'll make it."

Projects

1 The sentences in the story, *Too Much Popcorn*, are not in the correct order. Your job is to put them in the proper sequence so the story makes sense. If you have time, delete the letters next to each sentence and retype the sentences into a paragraph.

2 Create your own story that has events that are out of order. Save it on a disk and challenge other clubs to place your story in the correct order.

Getting Started with Word Processing: Activity 4

Skill: Entering and saving text.

The club advisor or a club member should use a word-processing program to enter the information below into the computer and save it on a disk.

The Voice in the Computer

Scene 1

It was a dark and stormy night. The thunder and lightning woke Randy Rom after midnight. He was sitting in front of his Apple computer when he heard a voice coming from it.

Computer: "Raaannddy, I'm hungry. You haven't fed me today."
Randy: "Who said that?"
Computer: "It's me Randy, your computer, and I'm hungry."
Randy: "I can't believe this is happening to me. What do you want?"
Computer: "Feed me right now!"
Randy: "I have two questions. What do computers eat and why haven't you ever talked to me before?"
Computer:
Randy:
Computer:
Randy:
Computer:
Randy:

Projects

1 Your job is to type all of scene 1 and complete the rest of the script for *The Voice in the Computer.*

2 Learn how to save what you have typed, then print a copy. If you have time, you might want to add more scenes to the play. You might also want to turn this into a group project by having different club members write other scenes to complete the play.

Getting Started with Word Processing: Activity 5

Skill: Creating a form.

A word-processing program can help you save time. For example, instead of retyping your club meeting announcements for each meeting, you can save time by creating an announcement form and inserting the important information.

Examine the sample announcement form below. Load a word-processing program, then type this or a similar form. The information in parentheses is just an example. You will need to type in your own information whenever you use the form you create. Save the form you have created on a disk. It will now be ready for you to use whenever you need it.

A word-processing program can help you save time. Instead of retyping your club meeting announcements for each meeting, you can save time by creating an announcement form and inserting the important information.

Computer Club Meeting

WHAT:	(The Micro-Maniacs Apple Computer Club will have its regular weekly meeting with a guest speaker. Dr. C. P. Yew will discuss artificial intelligence and organic vegetable diets for computer enthusiasts.)
WHERE:	(Room 232 in the Language Arts Computer Lab, Herman Hollerith Middle School.)
WHEN:	(Wednesday, June 6 at 4:00)
WHO:	(Club members, guests, parents, and anyone else with an interest in computers.)

Projects

1 Practice creating other forms. You might want to make a form for a:
- Meeting agenda
- Meeting minutes
- Meeting attendance list
- List of club officers

2 Some word-processing programs allow you to create form letters using special commands. Find out if your word-processing program can do this and, if so, learn how to use those commands.

Getting Started with Word Processing: Activity 6

Skill: Integrating word-processing functions.

The club advisor should create separate text files that contain sentence starters. Have club members work alone or together. There should be one file for each club member or pair of members. The files should be saved with the name(s) of club member(s) as shown in the example below. The club members will need to know how to catalog, load, and save files.

The object of this activity is to have club members complete the sentence starters in each file. The completed sentences should be merged to create a short story by loading in one completed file after another.

Projects

1 For fun, rearrange the order of the files and read the story in this new sequence.

2 Club members may want to create their own story starter files.

Some examples of sentence starters are:

First file: Club member's name(s): Jill & Bill

Sample sentences: There once was a Micro-Maniac club member named _____. The strangest thing about _____ was _____.

Second file: Club member's name(s): Fred & Ted

Sample sentences: One day while _____ was at the _____ he/she decided to _____.

Third file: Club member's name(s): Biff & Betty

Sample sentences: The next thing _____ knew, a large _____ jumped out from behind the _____.

Fourth file: Club member's name(s): Mary & Terry

Sample sentences: Luckily, _____ saw three other club members coming down the street. They were _____, _____, and _____.

Fifth file: Club member's name(s): Steve & Cleve

Sample sentences: With the help of _____, _____, and _____, _____ was able to overpower the _____. All the Micro-Maniacs were happy as they walked down the road singing _____.

Getting Started with Word Processing: Activity 7

Skill: Deleting and inserting text.

The club advisor or a club member should use a word-processing program to enter the information below into the computer and save it on a disk.

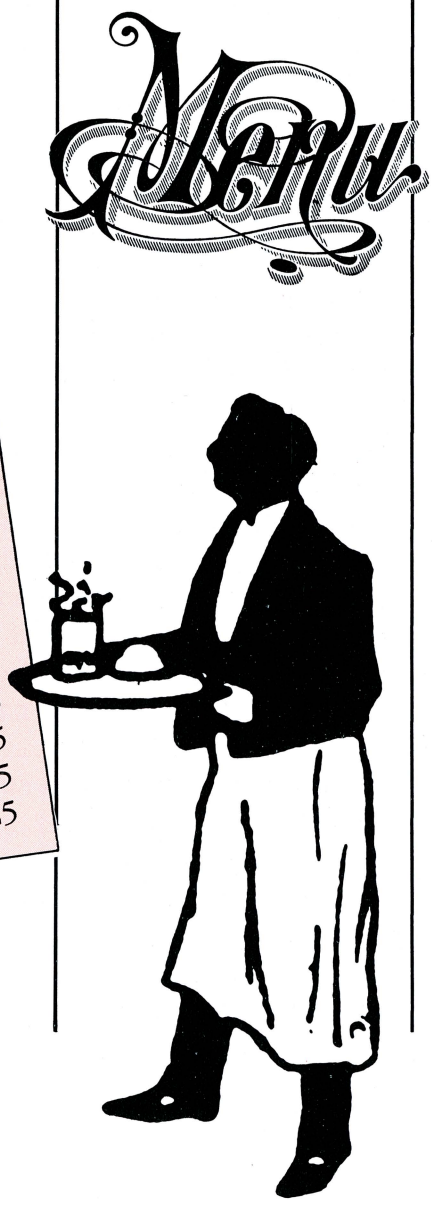
Gourmet Delights

The menu below is from that well-known restaurant, Tomain Tavern. The chef at the tavern is a great cook but a terrible speller. See if you can find and correct all of the spelling mistakes in his menu. (There are 21 mistakes.)

Chef Leo L'Ulcer's House Specialties

Charcoil Broiled Stake	$12.95
Lobster Tales	$14.95
Steamed Collieflour	$4.95
Bowel of Mushroom Soup	$2.95
Meet Loaf	$15.95
Zookini Bread	$4.50
Smoked Shirt Ribs	$9.95
Baycon and Eggs	$3.95
Homemaid Dull Pickles	$1.95
Hot Spicy Chilly	$4.45
Glass of Red Whine	$1.95
Shrimp Chow Main	$6.75
Tune-A-Fish Samwhich	$1.25
Dish of Seemless Grapes	$1.75
Blewbury Pie	$1.25
Toematoe Soup	$ .95
Biskits and Gravy	$8.95
Hot Fudge Sunday	$7.25

Q: What's a computer's favorite cookie?
A: A chocolate "chip."



Getting Started with Word Processing: Activity 8

Skill: Moving text.

The club advisor or a club member should use a word-processing program to enter the information below into the computer and save it on a disk.

A Mixed-Up Story

Randy Rom wrote the story below for his English class. He wrote the story at midnight and was so tired that he didn't write his story in the correct order. Use your word-processing program's ability to move blocks of text to rearrange Randy's story so that it makes sense.

Slenderfella

The next day, a massive search was started by the FBI to find the mysterious video champ. FBI agents went door-to-door searching for the one person whose hand would fit the joystick perfectly. When the agents came to Slenderfella's house and shoved the joystick in his hand, his mother, brothers, and the agents opened their mouths in amazement when the joystick fit perfectly. Special Agent Elliot Mess immediately slapped handcuffs on Slenderfella and said, "You're all washed up, dog-breath! We've been trying to find the person who stole the Air Force's new missile guidance control for months. You'll spend the rest of your life up the river scrubbing floors with a toothbrush!" As Slenderfella hung his head, he muttered, "I should have known. Slime doesn't pay."

Suddenly, a puff of smoke and blinding flash of light appeared before Slenderfella. When the smoke cleared an ancient-looking man was standing in front of Slenderfella. He had a long white beard, a flowing purple robe, and a pointed black hat. He coughed and said, "Howdy kid. I'm your video godfather. Take this magical joystick and this wig to disguise yourself and get over to the video contest right away! But remember you must leave the video game parlor by midnight or you will turn into a lump of coal."

One day, he heard on the radio that there was going to be a great video-game contest. The winner would receive a custom-built home video-game arcade. Slenderfella wished he could enter the contest, but while his mother and brothers went off to practice day after day, Slenderfella was at home with his toothbrush.

Q: What did the factory worker say to the half-built computer?
A: Hold your circuits; ROM wasn't built in a day.

Once upon a time long, long ago in a distant land lived a poor lad named Slenderfella. Slenderfella lived in Akron, Ohio, with his mother and his three wicked brothers, Sleazy, Slimey, and Charles. His was a hard life. His mother and brothers would leave each morning for Veronica's Video Palace to play video games until late in the evening. Slenderfella, however, was forced to stay at home and scrub the slime off the floors with a toothbrush. Oh, how he wished he could be at the Video Palace playing video games!

Slenderfella had no desire to become a lump of coal, so he raced to Veronica's with his long red wig and his solid gold, diamond-studded joystick. His brothers, thinking he was a beautiful girl, allowed him to play at their machine. He attached his magical joystick, inserted his lucky quarter, and began to zap alien spaceships right and left. After an hour, the score was Aliens 0, Slenderfella 6,003,567,987. A large crowd had gathered around to watch this stranger play. Suddenly the digital clock on the wall indicated that it was 11:59. Slenderfella looked up and bolted out the door so fast that he dropped his joystick.
THE END

Getting Started with Word Processing: Activity 9

Skill: Using the replace function in a word-processing program.

1 The club advisor or a club member should use a word-processing program to enter the information into the computer and save it on a disk. It may be fun to have club members make up short paragraphs of their own to practice finding and replacing words that change the meaning of a story.

Different Ideas

You can use a word-processing program to quickly change the meaning of a story. Use your word-processing program's find and replace function to locate and change the words listed in column 1 to the words listed in column 2.

Find	**Replace With**
smart	stupid

Clarence really thought he was a smart kid. He believed he was so smart that he could outsmart the local police. Here's Clarence's smart plan. He planned to start a club for smart people, charge them dues, and then leave town. But the police found out about Clarence's smart plan. When the police chief came to take Clarence to jail, he said, "Clarence, something you should know is smart is as smart does."

Find	**Replace With**
quiet	noisy

Lisa was very shy and quiet. She was so quiet that most people didn't even know she was around. Because she was quiet, Lisa was hired to work in the library. Her job was to hang up signs that said, "Please be quiet in the library." She would also visit the children's section of the library and praise the children for being quiet.

■

Getting Started with Word Processing: Activity 10

Skill: Deleting and inserting text.

The club advisor or a club member should use a word-processing program to enter the information below into the computer and save it on a disk.

Replace the words in parentheses in the letter. You may want to create your own crazy letter for other club members to use.

A Letter from Camp Ram-Rom-Rom

Dear Mom,

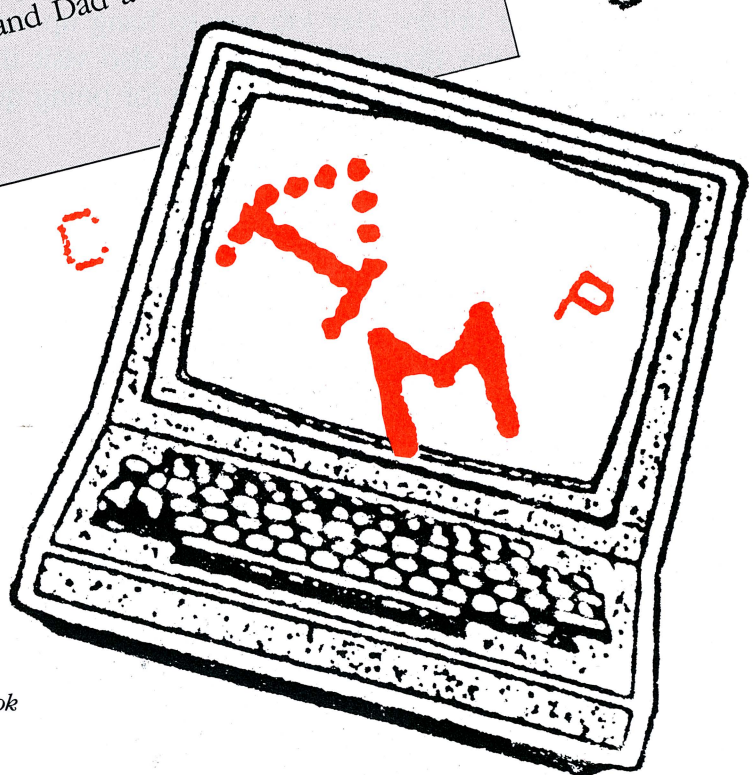
I just love (Camp Ram-Rom-Rom.) This place is (great!) I live in a (log cabin) with three other computer campers. Their names are (Cal Commodore, Eddie Epson, and Adam Osborne.) We've named our (little log cabin) (The Apple Crate.) (Eddie) wanted to name it the (Koala Pad,) but nobody liked that idea except him.

Every day we get up and work on (programs) until (lunch time.) I've written some very interesting programs. I've spent the last 24 hours converting the (Declaration of Independence) into binary code. Today, I plan to take a hike into the woods with my (portable computer.)

The food is (wonderful;) I (love) it! For breakfast, I had (soft drinks and potato chips) and for lunch we're having (beer nuts and coffee.) They really turn you into a (man) here at camp!

Camp will be over on (August 22.) I'm really looking forward to coming home because I miss you and Dad a lot. Has Sis joined the (Marines) yet? I hope so!

Love,
(Randy)



■

Word-Processing Projects

1 Create a club newsletter or magazine. Club members can be assigned to write, edit, layout, and print articles that are contributed.

2 Write to other computer clubs to exchange information and ideas. You can receive information about how to contact other computer clubs by writing to:

The Apple Computer Clubs
P.O. Box 948
Lowell, MA 01853

3 Write an article for The Apple Computer Clubs' official newsletter, *Computer Student.* You might tell about interesting people, projects, or programs your club has been involved with.

4 Write for software directories. Some addresses are listed below.

The Blue Book for the Apple Computer
Visual Materials, Inc.
4170 Grove Avenue
Gurnee, IL 60031

The Book of Apple Computer Software
The Book Company
16720 Hawthorne Boulevard
Lawndale, CA 90260

Swift's Educational Software Directory-Apple II Edition
Sterling Swift Publishing Company
7901 South IH-35
Austin, TX 78744

5 You might also write the Apple Computer company to obtain more information about your club's computers, peripherals, and items of interest for Apple computer users. Write to:

Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

6 Learn how to print labels using your word-processing program. You might want to print mailing labels for club correspondence or labels for club software.

■

7 Visit a business that uses a dedicated word-processing system instead of a microcomputer.

8 Visit a printing company that uses computerized typesetting equipment to learn how word processors are used in different ways.

How to Buy a Word-Processing Program

One morning you wake up to discover that you have won $150 in the Publisher's Clearinghouse Sweepstakes. You realize that now you can finally afford that one piece of software that you've been waiting to buy. It's not the *Cave of Destruction* or *Bork*; it's a word-processing program. After all these years of laboriously writing papers for school by hand, you finally decided to enter the Information Age! However, there's one problem that you didn't anticipate. There are at least a hundred word-processing programs to choose from! Which one is right for you?

The checklist below will help you think about how to buy a word-processing program.

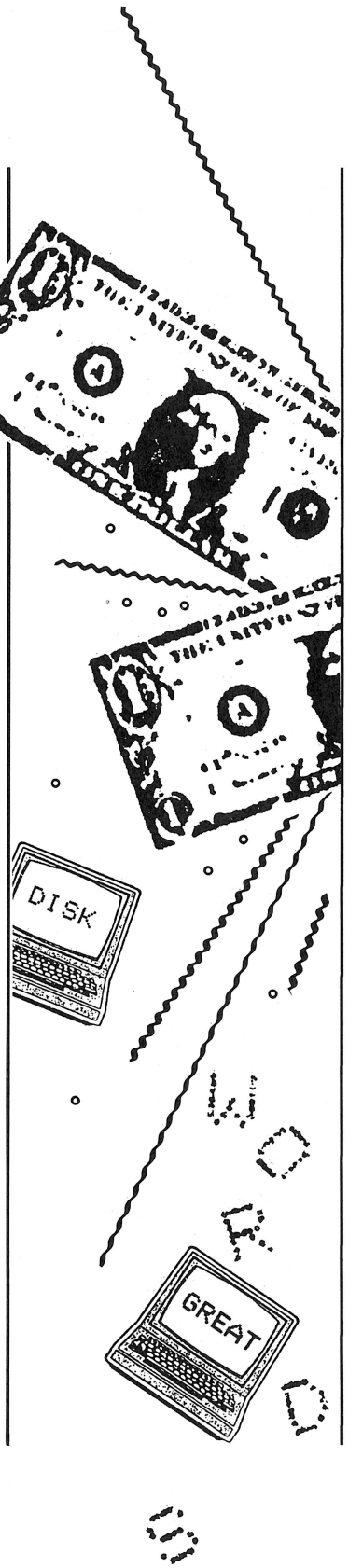
1 Check the manual. Can you understand the printed instructions that come with the word-processing program? A good manual will have an index, reference pages, and easy-to-read instructions.

2 Start a file. Type some material to find out how quickly the word-processing program works. Can you create and edit text in the same mode, or do you have to switch back and forth between modes?

3 Move the cursor. Can you move the cursor easily to any location on the screen? Does the program have a special function that allows you to easily move to the beginning or end of the text?

4 Make a mistake. Misspell some words and then try to correct them. Does the program allow you to delete and insert words with ease? Try to erase an entire sentence or paragraph. If you change your mind, does the program allow you to restore what you have erased?

5 Start a new file. Can you easily save, retrieve, and delete files with the program?



6 Print a document. Print the material you have typed. Does the program allow you to easily change margin settings, line spacing, and other useful formatting features?

7 Compare print with screen. When material is printed out, does it appear the same on the printed page as it does on the screen? You may discover that it is quite difficult to use a word-processing program that does not print text exactly as it appears on the screen.

8 Check the other features. Try working with other features commonly found in word-processing programs. Use search and replace commands, embedded commands, tabs, underlining, and any other special features. You might also check to see if a spelling checker or integrated data-base program is available for use with the program.

9 Check the service and warranty. Is a back-up disk provided with the program? If not, find out what the procedure is for obtaining one. You will always want to have a back-up for any software you own. You will also want to find out what the publisher's policy is for replacement of faulty disks.

Word-Processing and Related Software

Below are some word-processing programs available for the Apple computer that you may be interested in using.

Word Processors

Apple Writer
AppleWorks
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

Bank Street Writer
Scholastic Software
P.O. Box 7502
2931 E. McCarty Street
Jefferson City, MO 65102

Homeword
Sierra On-Line, Inc.
Sierra Building
Coarsegold, CA 93614

Magic Slate
Sunburst Communications
39 Washington Avenue
Pleasantville, NY 10570

PFS: Write
Software Publishing Corp.
1901 Landing Drive
Mt. View, CA 94043

Pie Writer
Hayden Software
600 Suffolk Street
Lowell, MA 01853

Spelling Checkers
Bank Street Speller
Scholastic Software
P.O. Box 7502
2931 East McCarty Street
Jefferson City, MO 65102

Sensible Speller
Sensible Software
6619 Perham Drive
Bloomfield, MI 48033

The Dictionary
Sierra On-Line, Inc.
Sierra Building
Coarsegold, CA 93614

The Speller
Hayden Software
600 Suffolk Street
Lowell, MA 01853

Creative Writing
Story Tree
Scholastic Software
P.O. Box 7502
2931 E. McCarty Street
Jefferson City, MO 65102

Micro Bits!

Electronic Shopping

Computers are being used in all sorts of ways to help people shop. At the Prestonwood Town Center in Dallas, Texas, four computer terminals have been installed in the shopping mall.

Shoppers simply touch a button at any one of the four terminals to obtain information about the stores located in the mall. Merchant information, displayed in colored text and graphics, includes current sales within the mall, store specialties, special events, and a detailed gift-selection guide.

Another example of computerized shopping is the Smart Card. The Smart Card resembles a credit card, but it's a special kind of credit card. Smart Card has a tiny chip imbedded within the plastic in the upper left-hand corner. The Smart Card also has a four-digit code that identifies the owner of the card. If the card were to be stolen and three successive wrong digits were entered, the card would self-destruct. The

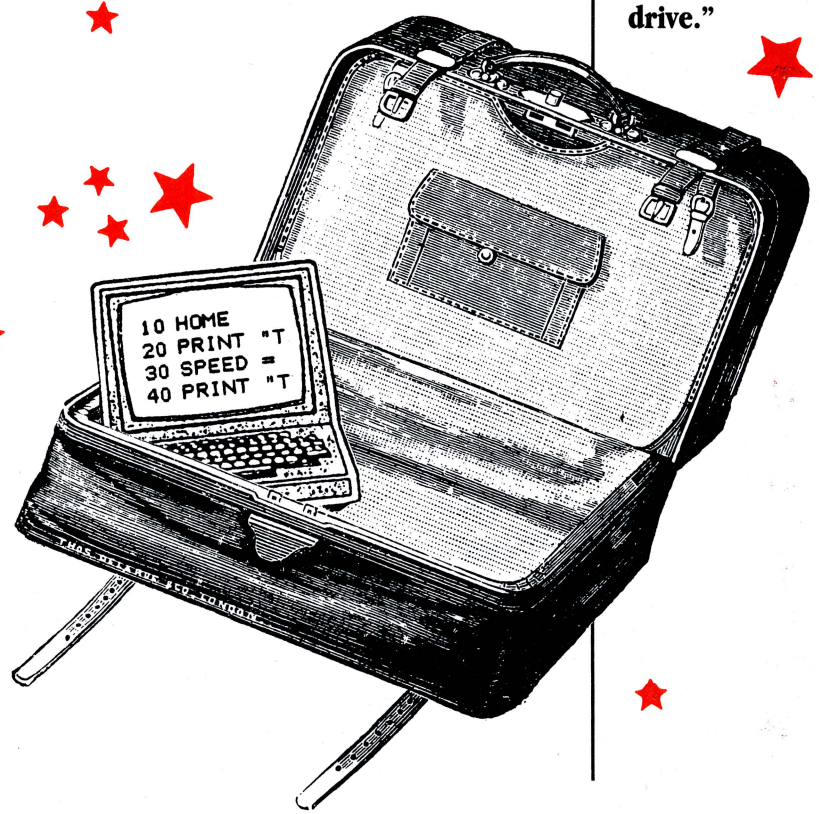
Smart Card eliminates the need to go to the bank except to deposit money. It can be used to pay for telephone calls and a variety of other purchases. Some experts believe that electronic money cards like the Smart Card may eventually eliminate the need for people to carry paper money or coins.

Wilderness Computing

Now you can take your computer with you if you ever decide to climb Mount Everest! An Oakland, California company, Sage Designs, has created a backpack for carrying portable home computers that weigh up to 30 pounds.

The Compupak is really intended for people who need to carry their portable computer with them when they travel—not necessarily into wilderness areas. Can you imagine sitting on a mountain top with your Apple IIc, eating a freeze-dried dinner, and playing your favorite computer game?

Q: How does a computer travel?
A: She lets the "disk drive."



Apple Logo

9

Notes to the Club Advisor

Chapter Overview

This chapter introduces the Apple Logo programming language. The chapter's objective is not to teach club members everything about Logo but to introduce projects and activities that members will enjoy. The chapter emphasizes turtle graphics although a few list-processing activities are also included. Use of the chapter with the Terrapin or Krell versions of Logo is possible with some minor modifications.

Minimum Prerequisites

Several things a club advisor can do to help club members learn about programming in Apple Logo are listed below.

1 Whenever possible try to relate turtle graphics activities to concrete tasks such as working with geoboards and tangrams and even having club members "play turtle" to simulate the behaviors of Logo's electronic turtle.

2 If a club member does not have good directional orientation, preteach concepts like left and right and the number of degrees in a circle. Stickers can be placed on club members' hands labeled left and right; protractors and "turtle spinners" can be used to teach about degrees.

3 Have resource books on hand for club members who may want additional models and information about programming in Apple Logo. Some suggested texts are listed below.

Getting Started With Logo
by Sam Miller and Ron Thorkildsen
DLM Teaching Resources
One DLM Park
Allen, TX 75002

Learning With Apple Logo
by Daniel Watt
McGraw-Hill Book Company
1221 Avenue of the Americas
New York, NY 10020

Apple Logo Primer
by Gary Bitter and Nancy Watson
Reston Publishing Company, Inc.
Reston, VA 22090

Apple Logo
by Harold Abelson
Byte/McGraw-Hill
70 Main Street
Peterborough, NH 03458

Advance Preparation

The club advisor should become familiar with the activities and projects presented in the chapter. It is also helpful to obtain a large-screen color monitor for group demonstrations and a dot-matrix printer with software or interface for printing graphics.

Introduction to the Logo Language

Logo is a computer language; however, unlike the BASIC programming language, Logo is not "built in to" the Apple computer. The Logo programming language is on a disk and must first be loaded into the computer.

There are several versions of Logo; however, this chapter is written specifically for the Apple Logo version. If you are using the Terrapin or Krell version of Logo, you can still complete the activities by making a few minor command changes. A cross-reference chart of Apple, Terrapin, and Krell Logo commands is provided on page 204.

There will also be a few minor differences in working with Logo on an Apple II+ and an Apple IIe. These changes are mentioned when appropriate.

To begin using Logo, follow these steps:

1. Slide the Logo diskette into the disk drive and close the door.
2. Turn on the computer.
3. Turn on the monitor.
4. If the version of Logo you are using asks you to insert your own disk, ignore the message. Press the RETURN key to continue loading Logo. When the Logo language has been loaded into the computer, the following message should appear on the screen: WELCOME TO LOGO.
5. A flashing box should appear in the upper left corner of the screen next to a question mark. The question mark means that Logo is waiting for you to type something. The flashing box is the cursor. The cursor shows the spot where your typing will appear.
6. To begin drawing "turtle graphics" with Logo, you must fetch the "turtle." The turtle is the name of a triangle shape ▲ that will appear on the center of the screen when you type CLEARSCREEN or CS and press the RETURN key. Type CS to make the turtle appear. Remember to refer to the cross-reference chart on page 204 if you are not using Apple Logo.

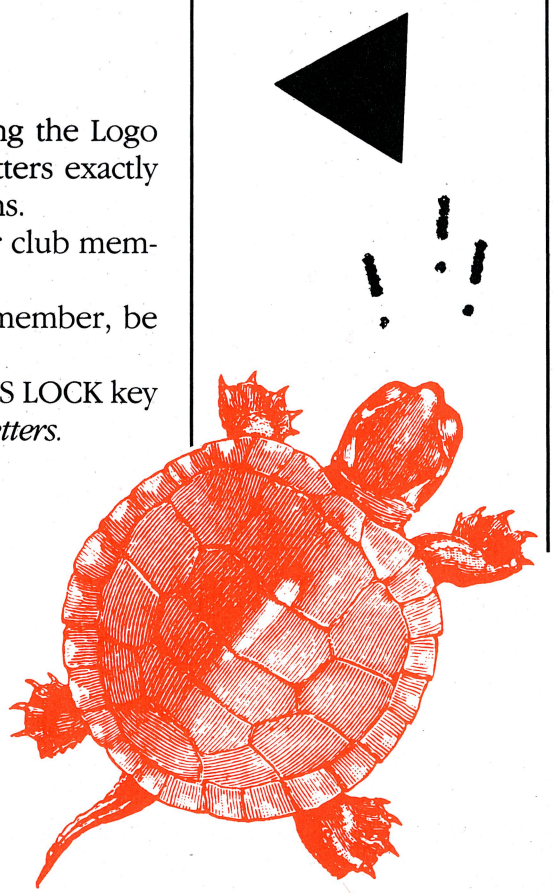
Apple Logo Building Blocks

This section presents commands and activities for using the Logo programming language. Type the instructions in capital letters exactly as they appear. Press RETURN after each line of instructions.

If you have a problem, ask your club advisor or another club member for help.

If you're working at the computer with another club member, be sure to take turns and help each other.

If you are using an Apple IIe computer, be sure the CAPS LOCK key is down. *All Logo commands must be entered in capital letters.*



Apple Logo Commands for You to Try

Long Name	Short Name	Explanation
CLEARSCREEN	CS	Clears the screen and puts the turtle in the center of the screen. Example: CS
FORWARD	FD	Commands the turtle to move forward. Example: FD 85
BACK	BK	Commands the turtle to move backward. Example: BK 54
RIGHT	RT	Commands the turtle to turn to its right. Example: RT 45
LEFT	LT	Commands the turtle to turn to its left. Example: LT 90
FENCE		Prevents the turtle from moving outside the boundary of the screen. Example: FENCE
WRAP		Removes the FENCE command and allows the turtle to go past the boundary of the screen and wrap around to the other side. Example: WRAP

Apple II+ and IIe Keys and Their Functions

←	The left arrow moves the cursor to the left and erases writing from the screen.

Getting Started with Apple Logo: Activity 1

```
Enter:

CLEARSCREEN
FORWARD 40
BACK 25
RIGHT 45

Enter:

CS
FENCE
FD 150

Enter:

CS   FD 50   RT 90   FD 50   RT 90   FD 50
RT 90   FD 50   RT 90

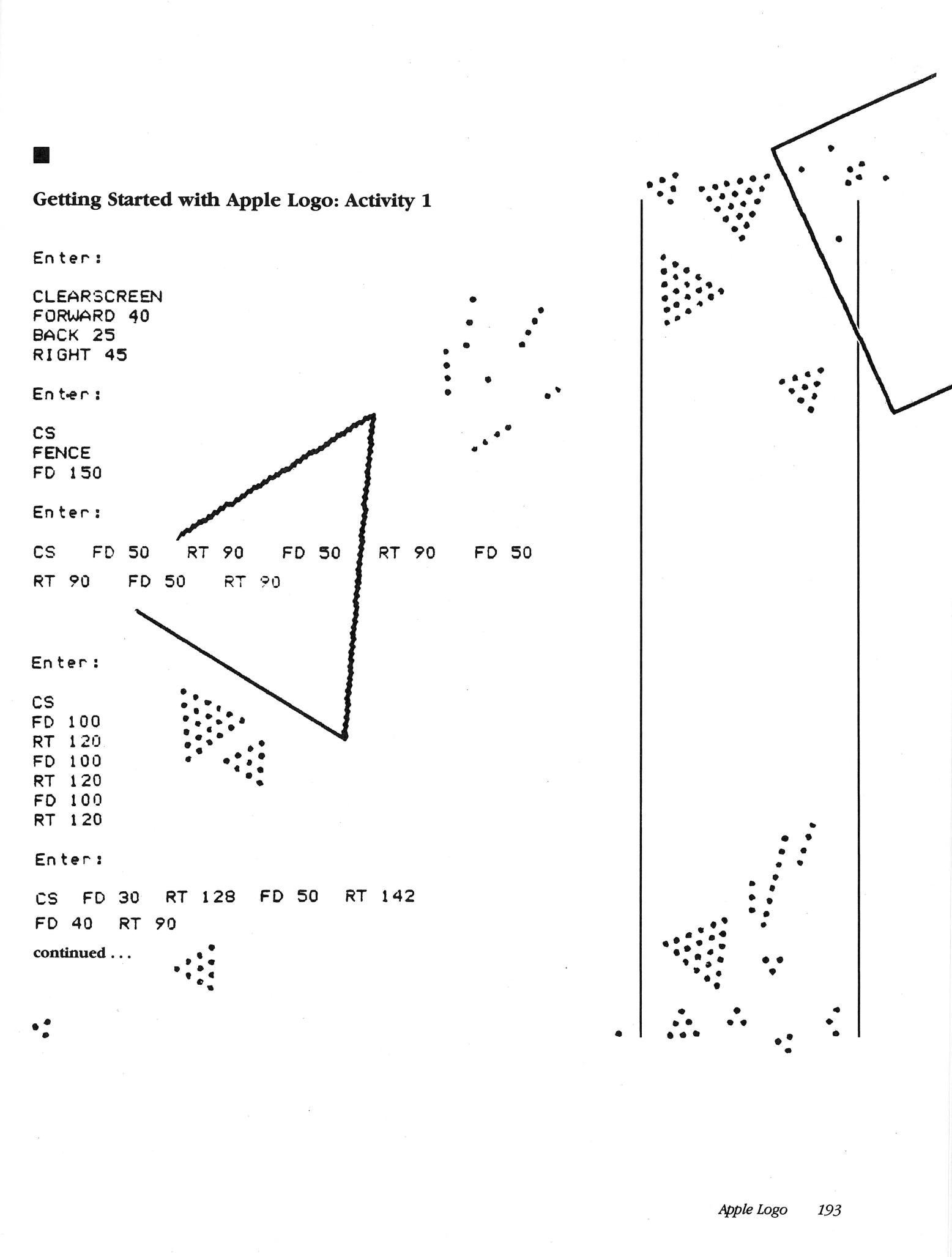

Enter:

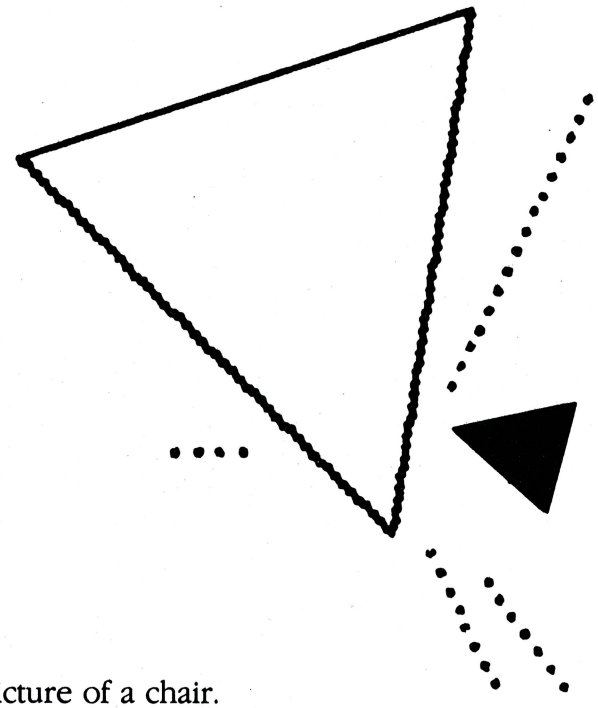
CS
FD 100
RT 120
FD 100
RT 120
FD 100
RT 120

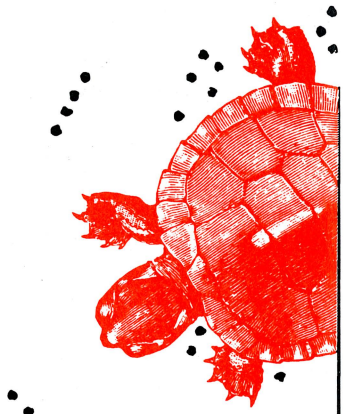
Enter:

CS  FD 30  RT 128  FD 50  RT 142
FD 40  RT 90
```

continued . . .







```
Enter:

CS
FD 50   RT 90
FD 20   LT 90
FD 10   LT 90
FD 50   LT 90
FD 10   LT 90
FD 20   RT 90
FD 50   LT 90
FD 10
```

Projects

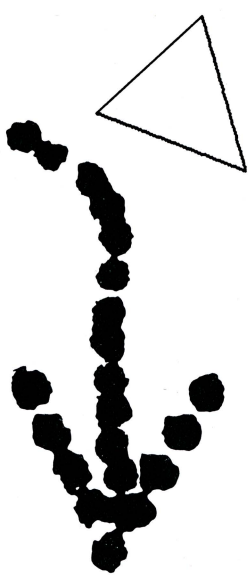
1 Make the turtle draw a picture of a chair.

2 Make the turtle draw a staircase.

3 Make a mystery drawing. Use the numbers for your answers to the questions below as input numbers for the following Logo commands:

FORWARD	_____	What is your age?
RIGHT	_____	How tall are you in inches?
FORWARD	_____	How much do you weigh?
BACK	_____	What is the sum of the digits in your home phone number?
LEFT	_____	What number do you get if you multiply the number of letters in your last name by five?

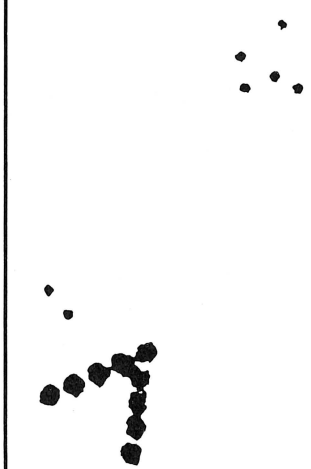
4 Enter FENCE; then try to figure out how many "turtle steps" the turtle can take before Logo answers TURTLE OUT OF BOUNDS.



Apple Logo Building Blocks

Apple Logo Commands for You to Try

Long Name	Short Name	Explanation
HIDETURTLE	HT	Commands the turtle to become invisible. Example: HT
SHOWTURTLE	ST	Commands the turtle to become visible again. Example: ST
PENUP	PU	Commands the turtle to move without drawing a line. Example: PU FD 50
PENDOWN	PD	Commands the turtle to draw lines again. Example: PD
HOME		Commands the turtle to return to the center of the screen. Example: FD 50 RT 45 FD 50 HOME.
PENERASE	PE	Commands the turtle to erase lines. Example: FD 80 PE BK 80
PENREVERSE	PX	Commands the turtle to draw on blank parts of the screen and erase lines that have already been drawn. Example: PX FD 70 RT 90 FD 70 RT 90 FD 70 RT 90 FD 70 RT 90. Type PENDOWN or PD to command Logo to stop PENREVERSE.



Getting Started with Apple Logo: Activity 2

Enter:

```
CLEARSCREEN
FORWARD 30
PENUP
FORWARD 30
PENDOWN
FORWARD 50
RIGHT 120
FORWARD 50
HOME
```

Enter:

```
CLEARSCREEN
FORWARD 100
PENERASE
BACK 80
PENDOWN
```

Enter:

```
CS   FD 40  RT 90  FD 40
LT 90  FD 40  RT 90  FD 40
```

Enter:

```
CS
FD 25
PU
FD 10
PD
FD 25
PU
FD 10
PD
FD 25
```

Enter:

```
CS
PX
FD 80
BK 80
FD 80
RT 90
FD 60
LT 90
FD 15
LT 135
FD 150
PD
```

Getting Started with Apple Logo: Activity 3

```
Enter:

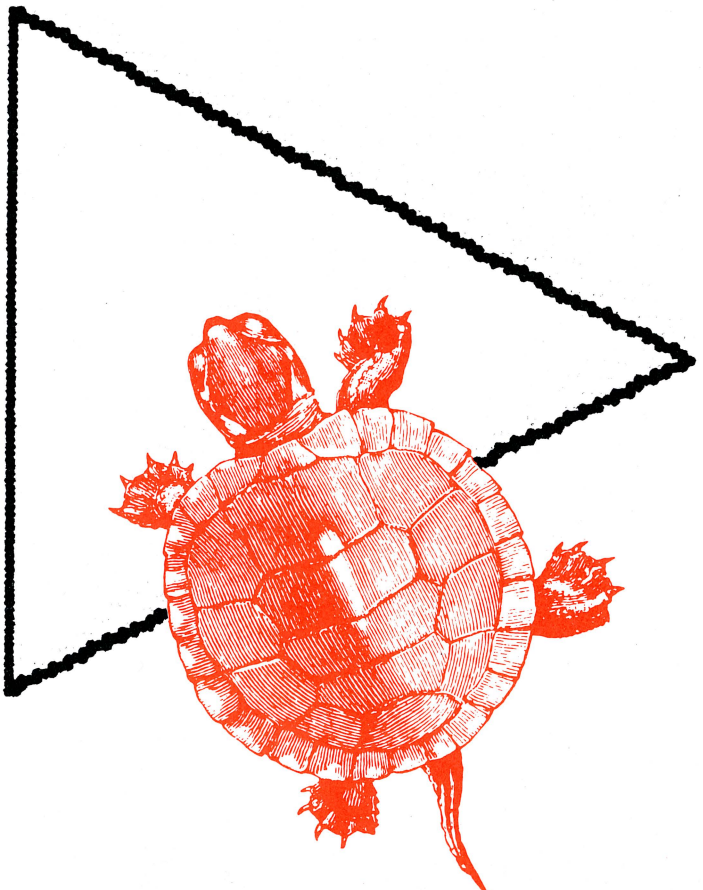
CLEARSCREEN
HIDETURTLE
FORWARD 100
RIGHT 120
FORWARD 100
RIGHT 120
FORWARD 100
RIGHT 120
SHOWTURTLE
```

```
Enter:

CS
RT 30
FD 80
RT 60
FD 80
HOME
```

Projects

1. Make the turtle draw a triangle that uses left turns.
2. Draw a box; then erase it with the PENERASE command.
3. Draw a maze with the turtle; then move the turtle through the maze with the pen up.
4. Make the turtle draw your initials.



Apple Logo Building Blocks

Apple Logo Commands for You to Try

Long Name	Short Name	Explanation
PRINT	PR	Commands Logo to print letters and numbers. Example: PRINT [HELLO]
TYPE		Similar to PRINT except it does not move to the next line. Example: TYPE "HELLO Remember to use the " before the message you want printed.

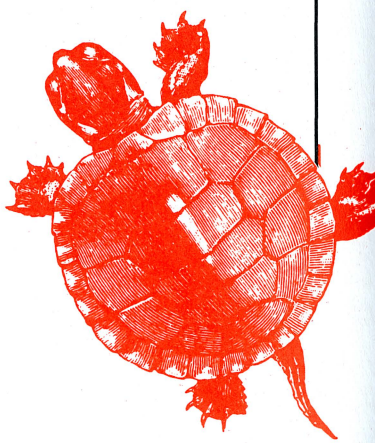
Apple II+ and IIe Keys and Their Functions

[	The bracket signals Logo that you want to print a message. Example: PRINT [HI]
]	It is also used with the REPEAT command to enclose the instructions that are to be repeated.

To make an opening bracket [on an Apple II+, hold down the SHIFT key and then type the N key. To make a closing bracket] on an Apple II+, hold down the SHIFT key and then type the M key. This procedure is not necessary with an Apple IIe because bracket keys are on the IIe keyboard.

Special Symbols

+	Use this symbol when you want to add with Logo. Example: PR 100 + 50
−	Use this symbol when you want to subtract with Logo. Example: PR 189 − 24
*	Use this symbol when you want to multiply with Logo. Example: PR 5 * 5
/	Use this symbol when you want to divide with Logo. Example: 50/2



Getting Started with Apple Logo: Activity 4

Enter:

```
PRINT [I'M USING AN APPLE COMPUTER]
PR [I BELONG TO AN APPLE COMPUTER CLUB]
```

Enter:

```
PR [1000 + 1000]
PR 1000 + 1000
```

Enter:

```
PR [218 - 47]
PR 218 - 47
```

Enter:

```
PR [43 * 5]
PR 43 * 5
```

Enter:

```
PR [90/3]
PR 90/3
```

Enter:

```
PR [(3 + 5) * 7]
PR (3 + 5) * 7
```

Enter:

```
FD 90 + 10
RT 2 * 60
FD 150 - 50
RT 240/2
FD 300/3
RT 80 + 40
```

Enter:

```
PR "TOP  PR "BOTTOM
```

Enter:

```
PR [LET'S SKIP A LINE, THEN]
PR []
PR [PRINT THIS MESSAGE: GOOD WORK!]
```

Enter:

```
TYPE "TOGETHERNESS  TYPE "IS  TYPE "WONDERFUL
```

Apple Logo Building Blocks

Apple Logo Commands for You to Try

SETBG	Commands Logo to change the background color of the screen. Example: SETBG 3
SETPC	Commands Logo to change the pencolor the turtle draws with. Example: SETPC 4

Color Numbers for Use with the SETBG and SETPC Commands

0 = Black	3 = Violet
1 = White	4 = Orange
2 = Green	5 = Blue

Keys That Control the Screen

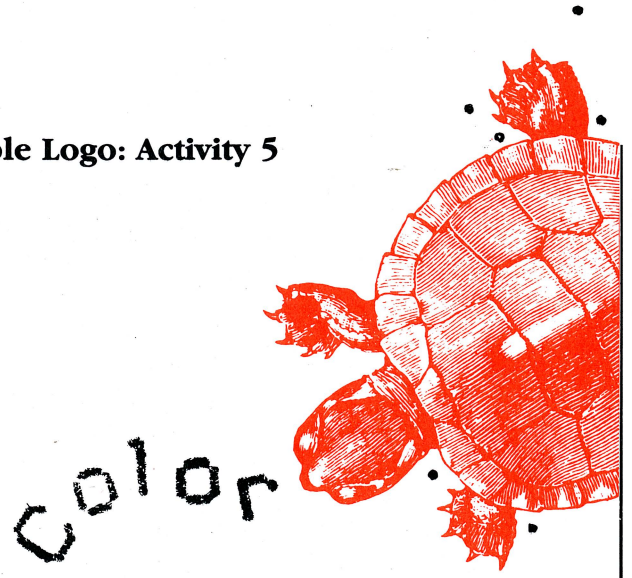
CTRL L	or FULLSCREEN Allows the entire screen to be used for drawing.
CTRL S	or SPLITSCREEN Reserves the bottom four lines of the screen for writing.
CTRL T	or TEXTSCREEN Allows the entire screen to be used for writing.

Keys That Control the Cursor

If you discover a typing error before you press RETURN, there are several keys that you may use to make corrections. These keys are called control keys. The control key on an Apple II+ is labeled CTRL; it is labeled CONTROL on an Apple IIe. The abbreviation CTRL is used in this chapter for the control key. All control key commands are used together with a letter key (CTRL B or F) and require two keys to be pressed at the same time.

CTRL B	Moves the cursor *back* one space.
CTRL F	Moves the cursor *forward* one space.
CTRL D	Deletes the character under the cursor.

Getting Started with Apple Logo: Activity 5



Use a color monitor with these commands.

Enter:

```
SETBG 5
SETBG 4
SETBG 3
SETBG 2
SETBG 1
SETBG 0
```

Enter:

```
SETPC 1
FD 30
RT 60
SETPC 2
FD 30
RT 60
SETPC 3
FD 30
RT 60
SETPC 4
```

continued . . .

```
FD 30
RT 60
SETPC 5
FD 30
RT 60
SETPC 0
FD 30
RT 90
TEXTSCREEN
FULLSCREEN
SPLITSCREEN
```

Projects

1 Try using Logo as a word processor. First, press CTRL T to obtain the entire textscreen; then type or use either the PRINT or TYPE commands to write several sentences or a paragraph. Use CTRL B, CTRL F, and CTRL D to edit your work. The CLEARTEXT command will allow you to clear all text from the textscreen.

2 Experiment with different background colors and pencolors. Create a drawing; then change the background color of the drawing.

3 Make the turtle draw a picture that uses all of the pencolors.

4 Use Logo's calculator to solve the following math problem: 423 * 5 + 790 − 63/2. Then make up your own problems to solve.

5 Find out Logo's current background color; then enter: PRINT BACKGROUND

Apple Logo Building Blocks

Apple Logo Commands for You to Try

REPEAT	Commands Logo to repeat the operations contained within the brackets as many times as specified. Example: REPEAT 4 [FD 100 RT 90]

Other Helpful Control Keys

CTRL G	Stops any Logo command. When CTRL G is pressed, Logo will display the following message: STOPPED!
CTRL W	Causes Logo to pause. To resume working with Logo, press any key on the keyboard.

Getting Started with Apple Logo: Activity 6

Enter:

```
REPEAT 4 [FD 100 RT 90]
```

Enter:

```
REPEAT 360 [FD 1 RT 1]
```

Enter:

```
PX
REPEAT 8 [FD 70 RT 90]
```

Enter:

```
REPEAT 3 [FD 90 RT 120]
```

Enter:

```
REPEAT 8 [FD 110 RT 135]
```

Enter:

```
REPEAT 9 [FD 50 RT 80]
```

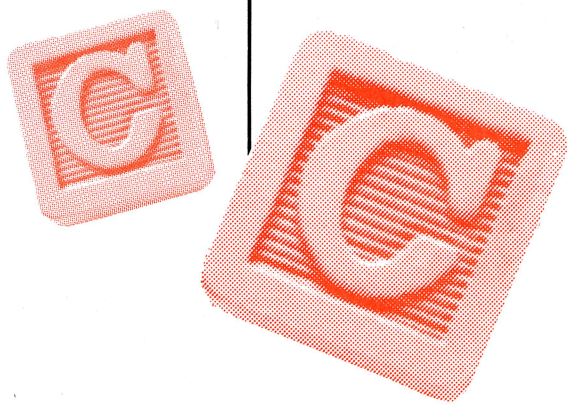
Enter:

```
REPEAT 24 [FD 100 RT 105]
```

Enter:

```
REPEAT 11 [FD 20 RT 360/11]
```

continued . . .



```
Enter:

REPEAT 10 [REPEAT 4 [FD 30 RT 90] LT 36]
REPEAT 5 [SETBG 1 SETBG 0]


Enter:

REPEAT 8 [REPEAT 4 [FD 25 RT 90] FD 25 LT 45]
```

Projects

1 Enter the commands listed below. Study the commands and the shapes they draw. Can you figure out the rule used for finding the number to REPEAT and the number of degrees RIGHT needed to draw a closed shape?

```
Enter:

REPEAT 10 [FD 40 RT 360/10]

Enter:

REPEAT 8 [FD 40 RT 360/8]

Enter:

REPEAT 5 [FD 40 RT 360/5]
```

2 Here are some more interesting things to do with REPEAT.

```
Enter:

TEXTSCREEN
REPEAT 10 [PR 150 * 6]

Enter:

TEXTSCREEN
REPEAT 20 [PR [SAY IT AGAIN SAM!]]
```

continued . . .

```
Enter:

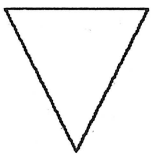
REPEAT 7 [TYPE "HELLO]

Enter:

TEXTSCREEN
REPEAT 500 [TYPE "APPLE]

Enter:

REPEAT 50 [FD 1 + 1]
```



3 Try to make the turtle draw half of a circle.

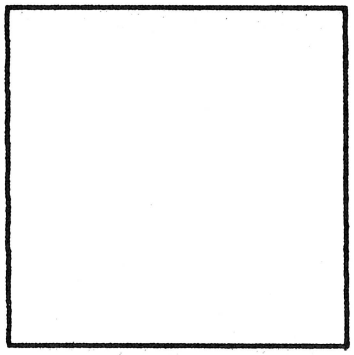
4 Experiment with different inputs with the commands below.

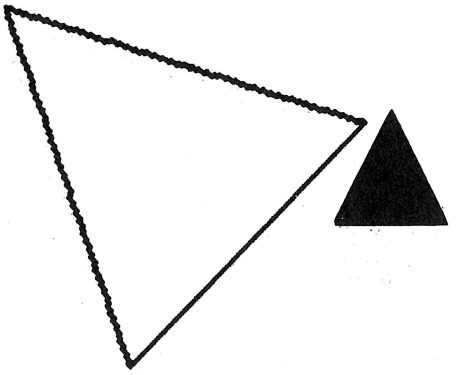
```
Enter:

REPEAT 2 [ REPEAT_____[FD 30 RT 120] LT_____]

Enter:

REPEAT _____ [FD 40 RT 360/_____ *_____]
```





Apple Logo Building Blocks

Apple Logo Commands for You to Try

Long Name	Short Name	Explanation
WAIT		Commands Logo to momentarily pause in operation and then continue. Example: WAIT 60 will make Logo pause for one second.
CIRCLER		Commands the turtle to make a circle that turns right and can change size. You can specify any size *radius* with a number. The radius is the distance from the center of the circle to the outside of the circle and determines the size of the circle. Example: CIRCLER 60
CIRCLEL		Commands the turtle to make a circle that turns left and can change size. Example: CIRCLEL 75
ARCRIGHT	ARCR	Commands the turtle to draw a piece of a circle that turns right. This command requires two numbers. The first number tells how wide to make the circle (radius), and the second number tells how much of a circle piece you want the turtle to draw (number of degrees). Example: ARCR 50 90
ARCLEFT	ARCL	Commands the turtle to draw a piece of a circle that turns left and can change size. Example: ARCL 20 60

Getting Started with Apple Logo: Activity 7

```
Enter:

REPEAT 5 [FD 10 WAIT 60]

Enter:

REPEAT 5 [SETBG 1 WAIT 20 SETBG 0 WAIT 20]

Enter:

REPEAT 6 [TYPE "ONE  WAIT 60  TYPE "TWO  WAIT 60]

Enter:

CIRCLER  50
CIRCLER  20
CIRCLEL  50
CIRCLEL  20

Enter:

ARCRIGHT  50  90
HOME
ARCLEFT  50  90
HOME
```

```
Enter:

REPEAT  6 [ARCR 60  90  RT 90
 ARCR 60  90  RT 30]

Enter:

CIRCLER  40
ARCR  40  80
ARCL  20  60
ARCR  20  90
RT  90
ARCR  20  90
```

Projects

1. Make the turtle draw a picture of a target.
2. Make the turtle draw a picture of a face.
3. Use ARCR and ARCL commands to make the turtle draw waves.
4. Make the turtle slowly draw a square by using the WAIT command to pause as each side is being drawn.

Creating Procedures with Apple Logo

So far you have learned how to write programs in Logo and run them immediately. A way to save time and type less is to teach the computer a *procedure* that can be used again and again. Procedures are reusable sets of Logo instructions. For example, let's pretend that you would like to type only one word to make a square appear on the screen instead of always typing the commands for a square. The steps listed below demonstrate one way to create or *define* a procedure for drawing a square.

1 Enter:

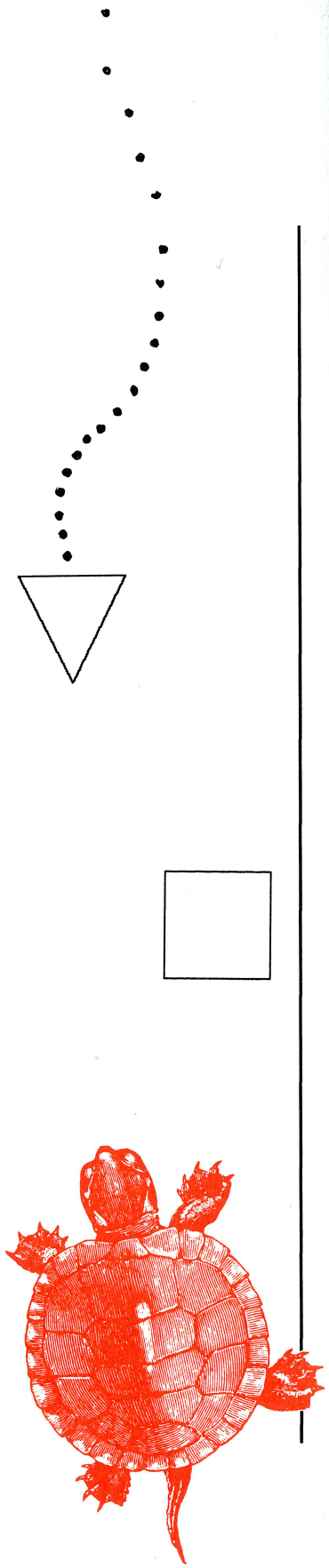
```
TO SQUARE
REPEAT 4 [FD 75 RT 90]
END
```

2 Notice that the first line begins with the command TO. TO followed by a name tells the computer that you want to create a procedure. Also notice that when TO is entered the computer changes the ? prompt to a >.

3 When you are through entering the commands for a procedure, enter the word END and press RETURN. This tells the computer that you are done. Once this is done the ? prompt will appear and you are ready to use your procedure. The computer will also print the message SQUARE DEFINED on the screen. This message tells you that your procedure has been entered and is stored in the computer's memory.

4 To run the procedure enter SQUARE and press RETURN.

5 The computer will draw this square each time you enter SQUARE.



Getting Started with Apple Logo: Activity 8

Enter:

```
TO BOX
REPEAT 4 [FD 85 RT 90]
END
```

Enter:

```
TO TRIANGLE
REPEAT 3 [FD 60 RT 120]
END
```

Enter:

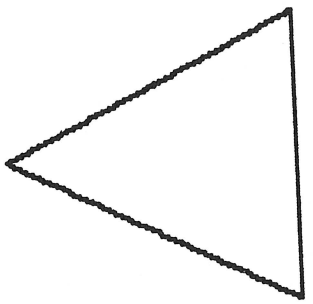
```
TO FLASH
REPEAT 5 [SETBG 1  SETBG 0]
END
```

Enter:

```
TO NAMES
TEXTSCREEN
REPEAT 500 [TYPE "APPLE
WAIT 60
REPEAT 500 [TYPE "COMPUTER]
END
```

Enter:

```
TO STAR
REPEAT 5 [FD 50 RT 144]
END
```



Projects

1. Define a procedure that will make the turtle draw a window.
2. Define a procedure that will make the turtle draw a flag.
3. Define a procedure that will make the turtle draw a mystery drawing.
4. Define a procedure that uses circles, arcs, and color commands.

Editing Procedures

You know that when you make mistakes with Logo, the computer will send you a message to let you know that you've made a mistake. But what happens if you make a mistake while you are creating a Logo procedure? No problem! Logo has a special feature called the "edit mode" that allows you to change or create procedures. Let's practice entering and editing a procedure.

1 Enter:

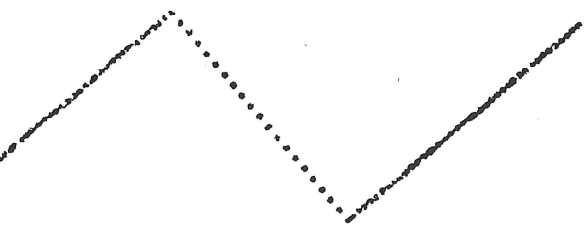
```
TO THREE
CIRCLER 30
CIRCLER 40
END
```

2 To edit this procedure to add another circle, enter:
EDIT "THREE and press RETURN
Be sure to place a quotation mark " in front of the procedure name ("THREE) or you will receive the following message: THREE DIDN'T OUTPUT TO EDIT, and you will not be in the editing mode.

3 Your screen should now look something like this:

```
TO THREE
CIRCLER 30
CIRCLER 40
END
```

LOGO EDITOR



4 To move the cursor around in the editor, you will need to use the editing commands listed below.

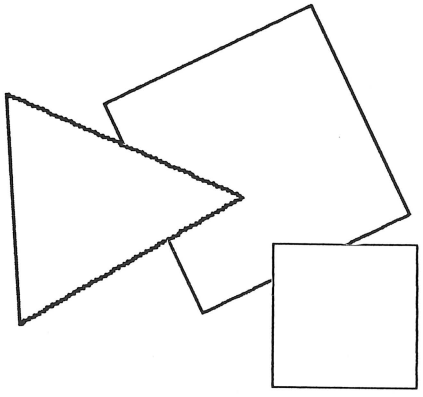
CTRL P	Moves the cursor up to the *previous* line.
CTRL N	Moves the cursor down to the *next* line.
CTRL A	Moves the cursor to the *beginning* of a line.
CTRL E	Moves the cursor to the *end* of a line.
CTRL B	Moves the cursor *back* one space.
CTRL F	Moves the cursor *forward* one space.
CTRL O	Opens a new line at the cursor.
CTRL D	Deletes the character under the cursor.
CTRL K	"Kills" or deletes an entire line.

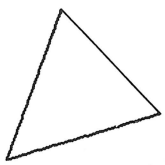
5 Add CIRCLER 50 to the last line of the procedure titled THREE, then leave the editor by entering CTRL C. Logo will respond with a message similar to this: THREE DEFINED. Enter THREE, then press RETURN to see the new THREE procedure.

6 If you want to leave the editor without making any changes, just enter CTRL G.

Joining Procedures

When you work with Logo you can join procedures together to create new procedures. Joining procedures together takes some planning, but once you've mastered the idea you will find your work with Logo much more enjoyable.





The examples below demonstrate ways that procedures can be joined together to form new procedures. Enter each example in order and study the result.

Enter:

```
TO BOX
REPEAT 4 [FD 70  RT 90]
END
```

Enter:

```
TO FAN
REPEAT 18 [BOX  FD 20  RT 20]
END
```

Enter:

```
TO FUN
FD 60
RT 120
FD 20
LT 90
BK 40
END
```

Enter:

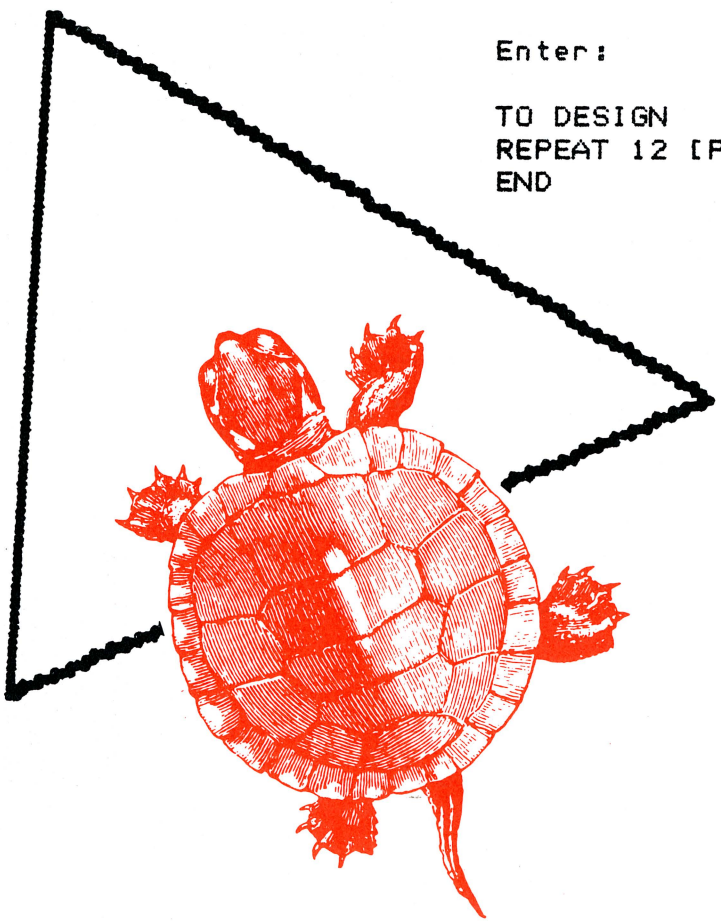
```
TO SUPERFUN
REPEAT 12 [FUN]
END
```

Enter:

```
TO PATTERN
ARCR 60  90
RT 90
ARCR 60 90
RT 90
END
```

Enter:

```
TO DESIGN
REPEAT 12 [PATTERN  RT 30]
END
```

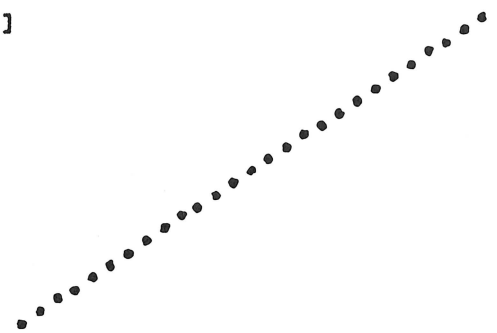


Projects

1 Join the two procedures below to make a new procedure named HOUSE.

```
TO  FRAME
REPEAT  4 [FD 80   RT 90]
END

TO  ROOF
LT 90
FD 90
RT 120
FD 90
RT 120
FD 90
RT 30
END
```

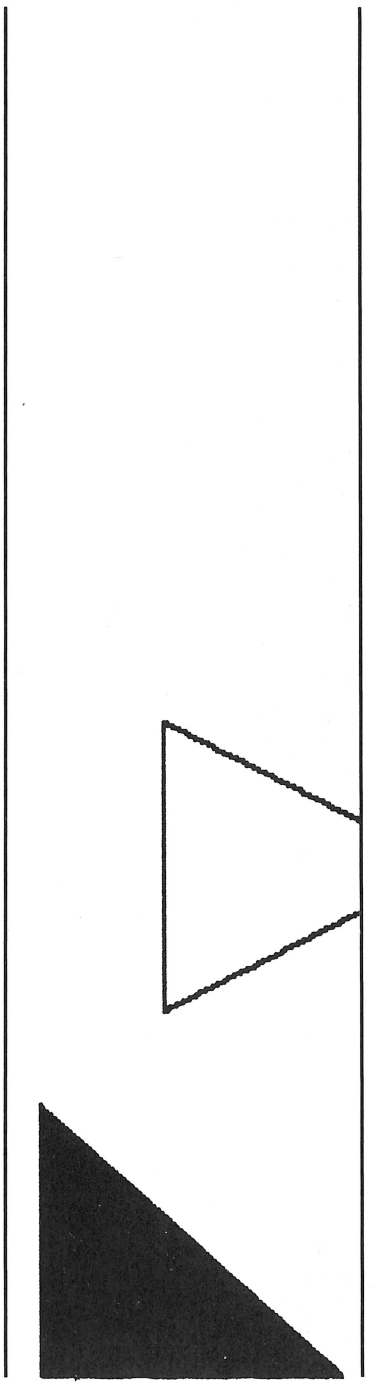


2 Draw a picture of a person. Label each part (subprocedure) of your drawing, then make procedures that draw each part. Combine the procedures into a single procedure (superprocedure) that will draw the entire person. Your superprocedure might look like this:

```
TO PERSON          ARMS
BODY               HEAD
LEGS               END
```

3 Draw a picture of an outdoor scene. Label each part of your drawing, then make the subprocedures that draw each part. Combine each of the subprocedures into a superprocedure that draws the entire scene. Your superprocedure might look like this:

```
TO PICTURE         TREES
ROAD               CLOUDS
CABIN              SUN
MOUNTAINS          END
```



Procedures That Vary

You can create procedures with Logo that will let you change the value of one or more inputs. The procedure below is an example of a procedure that can vary. Notice the colon (:) next to the word SIZE. This tells the computer to expect an input that will be assigned as a value in BOX.

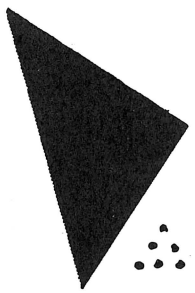
1 Enter:

```
TO BOX  :SIZE
REPEAT 4 [FD  :SIZE  RT 90]
END
```

2 Enter BOX 40 and press RETURN. Logo will draw a box with sides that are 40 turtle steps.

3 Enter BOX 60 and press RETURN. Logo will draw a box with sides that are 60 turtle steps.

4 Enter the procedures listed below; then enter the suggested input numbers. Experiment with different inputs in each procedure.



```
Enter:

TO TRIANGLE  :SIZE
REPEAT 3 [ FD :SIZE   RT 120]
END
```

```
Enter:

TRIANGLE 10
TRIANGLE 30
```

```
Enter:

TO MYSTERY  :SIDE    :TURN
REPEAT 3 [FD :SIDE   RT  :TURN]
END
```

```
Enter:

MYSTERY  80 150
REPEAT 6 [MYSTERY  80  150]
REPEAT 6 [MYSTERY  80  100]
```

Getting Started with Apple Logo: Activity 9

```
Enter:

TO STARS  :SIZE
REPEAT 5 [FD  :SIZE  RT 144]
END
```

```
Enter:

STARS  50
STARS  60
```

```
TO SQUARE  :SIZE
REPEAT 4 [FD :SIZE  RT 90]
END

Enter:

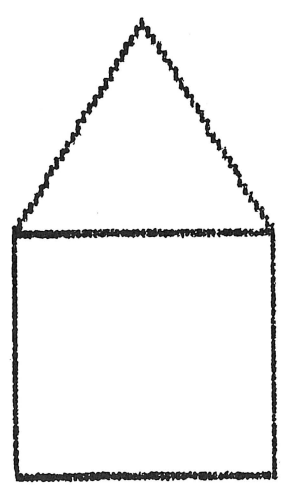
SQUARE 50
SQUARE 90

Enter:

TO RECTANGLE  :LENGTH  :WIDTH
FD  :LENGTH
RT 90
FD  :WIDTH
RT 90
FD  :LENGTH
RT 90
FD  :WIDTH
RT 90
END

Enter:

RECTANGLE  60 20
RECTANGLE  10 50
```



```
Enter:

TO POLY  :SIDES     :SIZE
REPEAT   :SIDES [FD  :SIZE     RT 360/:SIDES]
END

Enter:

POLY    5     50
POLY    3    100
POLY    8     30
```

Working with Disks

It is a good idea to save the procedures you have created on your own file diskette so that you can use them to make new procedures. To learn how to work with disks when you use Logo, read the following sections.

Preparing a Blank Disk

1 Insert the DOS 3.3 System master in the disk drive and start the computer.

2 Remove the System Master and insert a blank disk; then type INIT HELLO and press RETURN.

3 When the disk drive stops whirring, your disk will be ready for you to save Logo's STARTUP AIDS. The STARTUP AIDS are a library of special procedures that must be placed on your disk.

4 Remove your blank disk and insert the Logo language disk. Start the computer again to load Logo.

5 After Logo prints the message WELCOME TO LOGO, remove the Logo disk and insert your blank disk.

6 Enter: SAVE "STARTUP "AIDS and press RETURN. When the disk drive stops, you will be ready to save a Logo procedure on your disk.

File Handling Commands

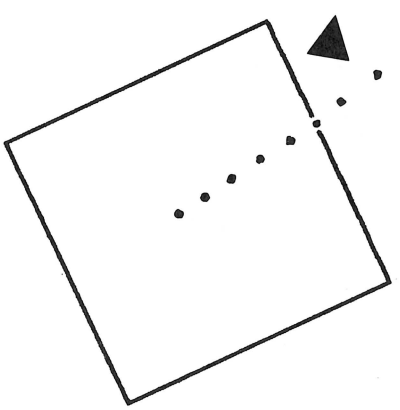
1 SAVE commands Logo to copy all of your procedures on a disk in a file. A file is much like a file folder in a filing cabinet. One file can hold many different procedures. Let's practice saving the following Logo procedure. Make sure your prepared disk is in the disk drive.

```
Enter:

TO PRACTICE
REPEAT 4 [FD 100  RT 90]
END

Enter:

SAVE "PRACTICE
```



■

2 CATALOG is the command that lets you see the name of each file on a disk. Let's use CATALOG to see if the procedure named PRACTICE was saved.
Enter:
CATALOG
The screen should display the following:
T 6 STARTUP.LOGO
T 2 PRACTICE.LOGO
Notice that Logo adds the ending .LOGO to all file names. You should not use the .LOGO ending when saving or loading a file.

3 LOAD commands Logo to copy information from your file into the computer. Anytime you start up Logo, you can copy your files into Logo's memory without having to retype each procedure. To see how this works, turn off the computer; then load the Logo language from the Logo disk.

Insert your disk with the procedure PRACTICE into the disk drive when Logo prints the following message:

4 When the WELCOME TO LOGO message appears on the screen, you will be able to load your Logo file(s).
Enter:
LOAD "PRACTICE

When the disk drive stops, a copy of your file should be in the computer's memory.

5 POTS commands Logo to print out the titles of all the procedures that are in the computer's memory. POTS is an abbreviation for Print Out TitleS.
Enter:
POTS

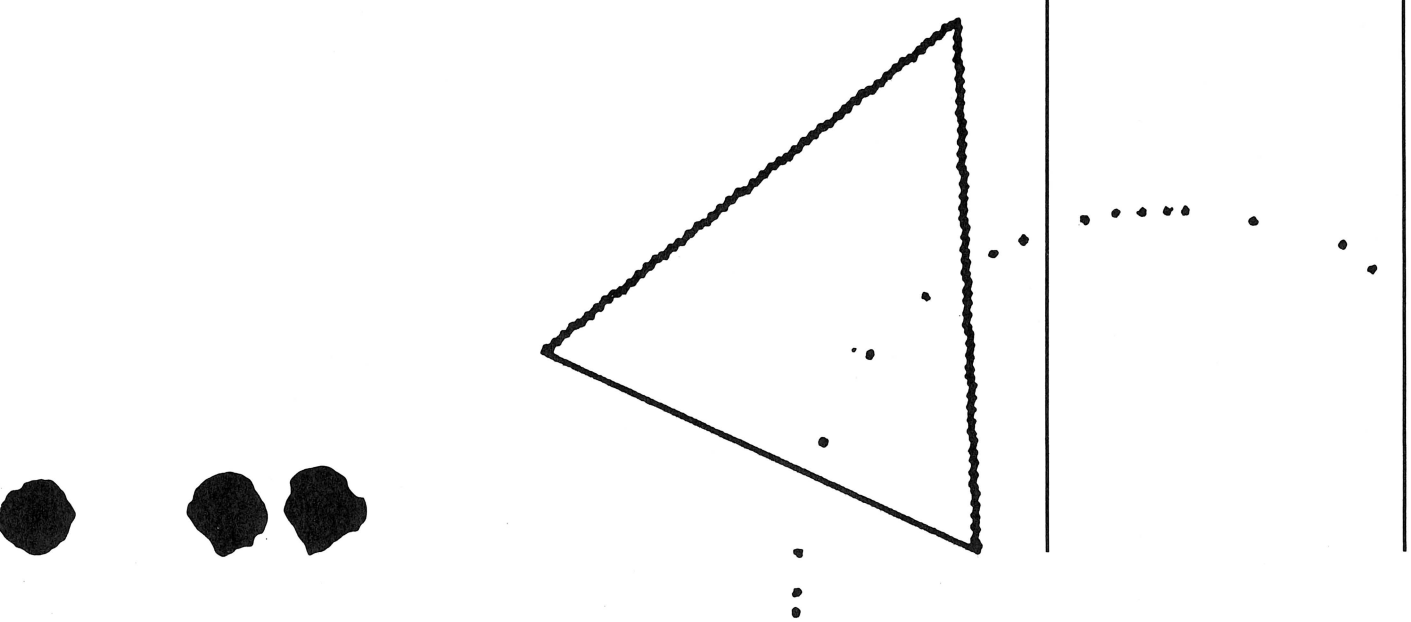
6 POPS commands Logo to print the definitions of all procedures that are in the computer's memory. POPS is an abbreviation for Print Out ProcedureS.
Enter:
POPS

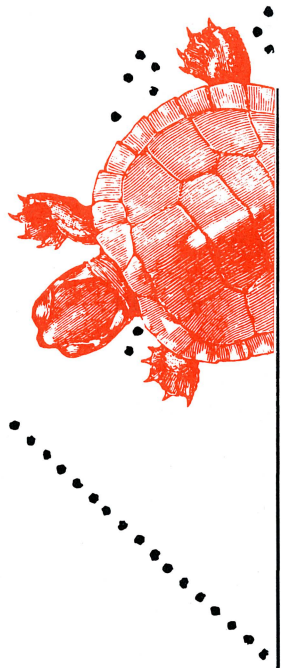
7 PO commands Logo to Print Out the definition of any single procedure that is in the computer's memory.
Enter:
PO "PRACTICE

8 ERASE or ER commands Logo to erase a procedure that is in the computer's memory. ERALL commands Logo to erase all the procedures in the computer's memory. ERASE, ER, and ERALL do not affect the files on a disk.
Enter:
ER "PRACTICE

9 ERASEFILE commands Logo to erase a file saved on a disk.
Enter:
ERASEFILE "PRACTICE

CATALOG the disk to see if the file named PRACTICE has been removed.





Summary of Apple Logo File Handling Commands

SAVE	Commands Logo to copy all of your procedures on a disk.
CATALOG	Commands Logo to let you see the name(s) of all files on a disk.
LOAD	Commands Logo to copy information from a file on a disk into the computer.
ERASEFILE	Commands Logo to erase a file saved on a disk.
POTS	Commands Logo to print out the titles of all the procedures that are in the computer's memory.
POPS	Commands Logo to print the definitions of all procedures that are in the computer's memory.
PO	Commands Logo to print out the definition of a single procedure that is in the computer's memory.
ER	Commands Logo to erase a procedure that is in the computer's memory.
ERALL	Commands Logo to erase all the procedures in the computer's memory.

Recursion

Another powerful idea in Logo is that procedures can restart themselves over and over again. Such procedures are called *recursive* procedures and will allow you to do a lot of interesting things. Take a moment to examine the examples below.

```
TO  SAM              (this is the name of the procedure)
PRINT [SAM]          (this commands Logo to print the word "SAM")
SAM                  (this commands Logo to start the procedure again)
END
```

```
Enter:

SAM
```

The SAM procedure will continue to run forever because each time the procedure name is encountered within the procedure, the program returns to the beginning, follows the directions within the procedure, then returns to the beginning again.

Later in this chapter you will learn how to control recursive procedures, but for now you can stop any recursive procedure in one of two ways:

Press CTRL G	Commands Logo to stop the procedure.
Press CTRL W	Commands Logo to pause or wait. When any key is pressed the procedure will continue.

Here are a few more recursive procedures for you to try.

```
Enter:

TO  BOXES
REPEAT 4 [FD 80  RT 90]  RT 10
BOXES
END

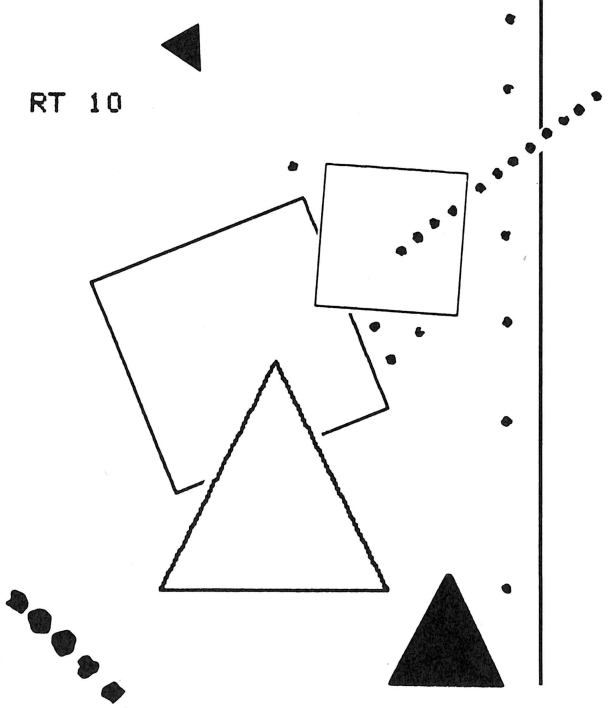
Enter:

BOXES

TO POLY  :SIDE   :TURN
FD  :SIDE
RT  :TURN
POLY  :SIDE  :TURN
END

Enter:

POLY  60   80
POLY  80  144
```



Getting Started with Apple Logo: Activity 10

```
Enter:

TO SLINKY  :SIZE
CIRCLER   :SIZE
PU  RT 90  FD 10  LT 90   PD
SLINKY  :SIZE
END

Enter:

SLINKY  60

Enter:

TO SPIN  :SIZE
CIRCLER  :SIZE
RT 20
SPIN  :SIZE
END

Enter:

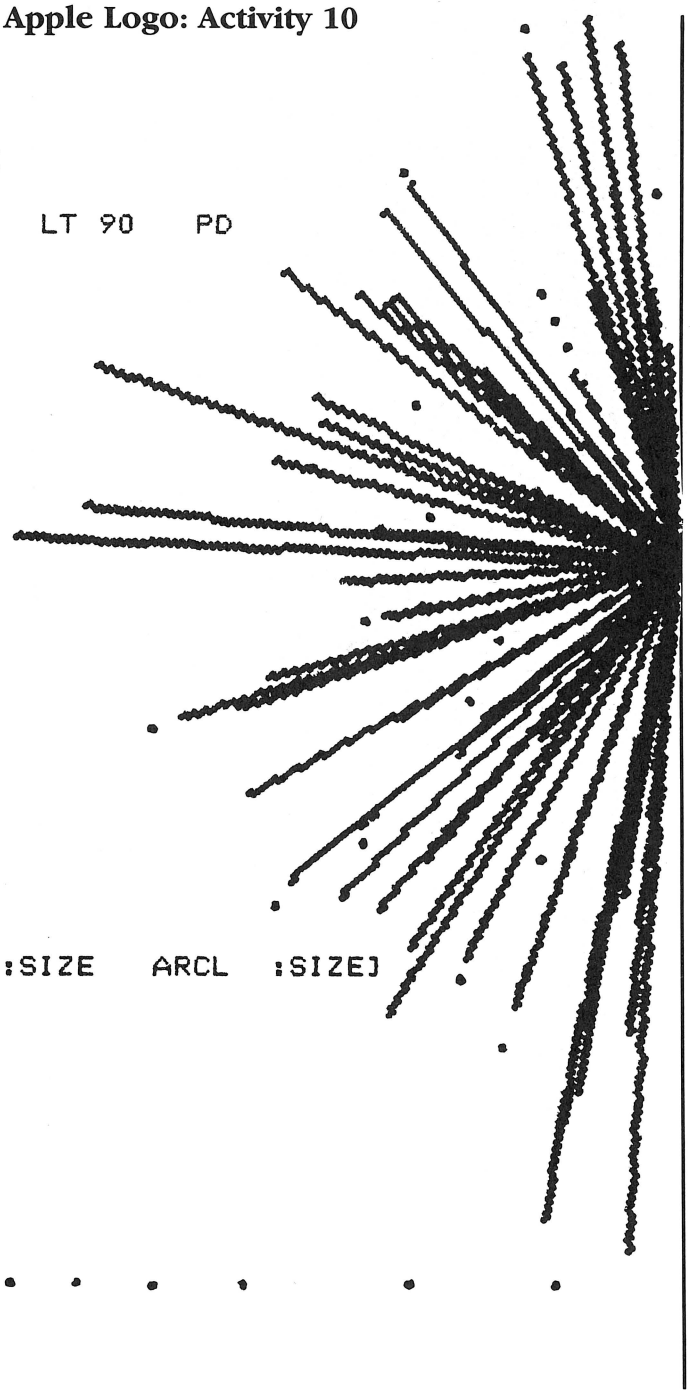
SPIN  80

Enter:

TO RAY  :SIZE
REPEAT 2 [ARCR  :SIZE   ARCL  :SIZE]
END

Enter:

TO SUN  :SIZE
RAY  :SIZE
RT 160
SUN  :SIZE
END
```



Apple Logo Building Blocks

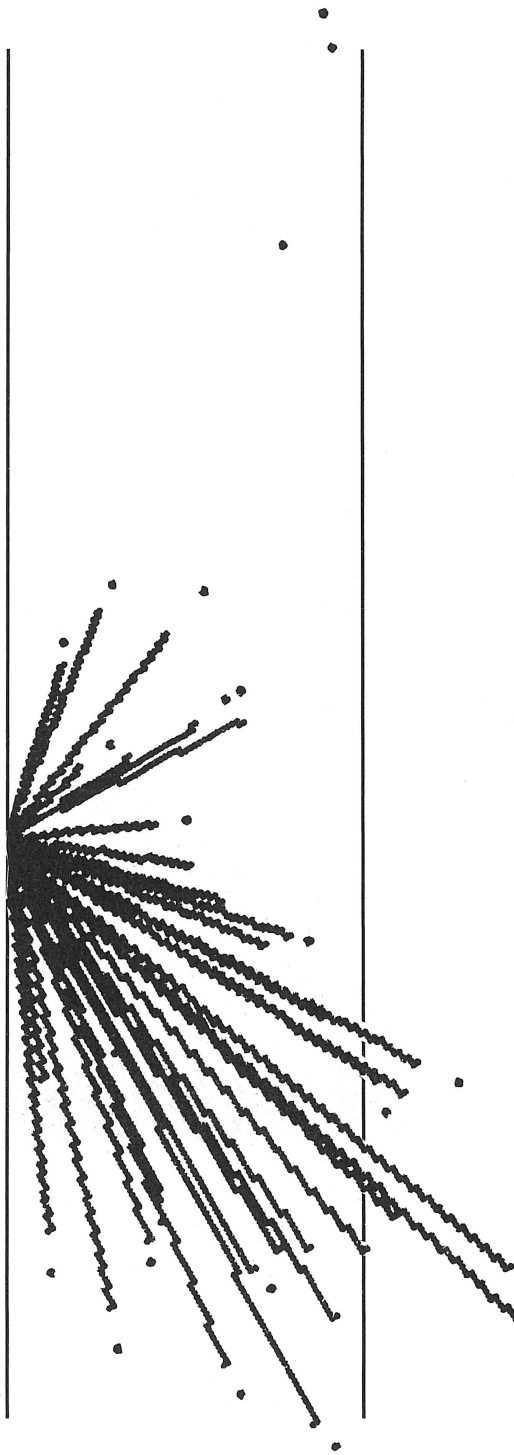
Apple Logo Commands for You to Try

STOP	Causes a procedure to stop when the command STOP is encountered. Example: IF :SIZE < 2 [STOP]
IF	IF the condition specified is met, then the instructions contained in the brackets are executed. IF the condition is not met, then the entire statement is ignored. Example: IF :SIZE > 100 [STOP]
POS	Commands Logo to print the turtle's position on the screen in terms of its X and Y coordinates. Example: PR POS
SETX	Commands Logo to make the turtle move along the X axis. Example: SETX 50
SETY	Commands Logo to make the turtle move along the Y axis. Example: SETY −35
SETPOS	Commands Logo to make the turtle move to the X and Y coordinates specified. Example: SETPOS [50 50]
RANDOM	Commands Logo to select a number at random. Example: RANDOM 10

Special Symbols

All of the symbols below are used to compare the value of numbers.

>	Greater than a value.
<	Less than a value.
=	Equal to a value.



Getting Started with Apple Logo: Activity 11

```
Enter:

SETX   50
SETY   70
SETX  -50
SETY    0
SETX    0

Enter:

SETPOS  [100 50]
PR POS
```

```
Enter:

TO  STAR
REPEAT 5 [FD 20 RT 144]
END

Enter:

TO PATTERN  :STEP
STAR
PU
RT 90  FD  :STEP  LT 90
PD
END

Enter:

ROWSTAR
PU
HT
STEPOS  [-130  75]
PD
REPEAT 13 [PATTERN 20]
END
```

```
Enter:

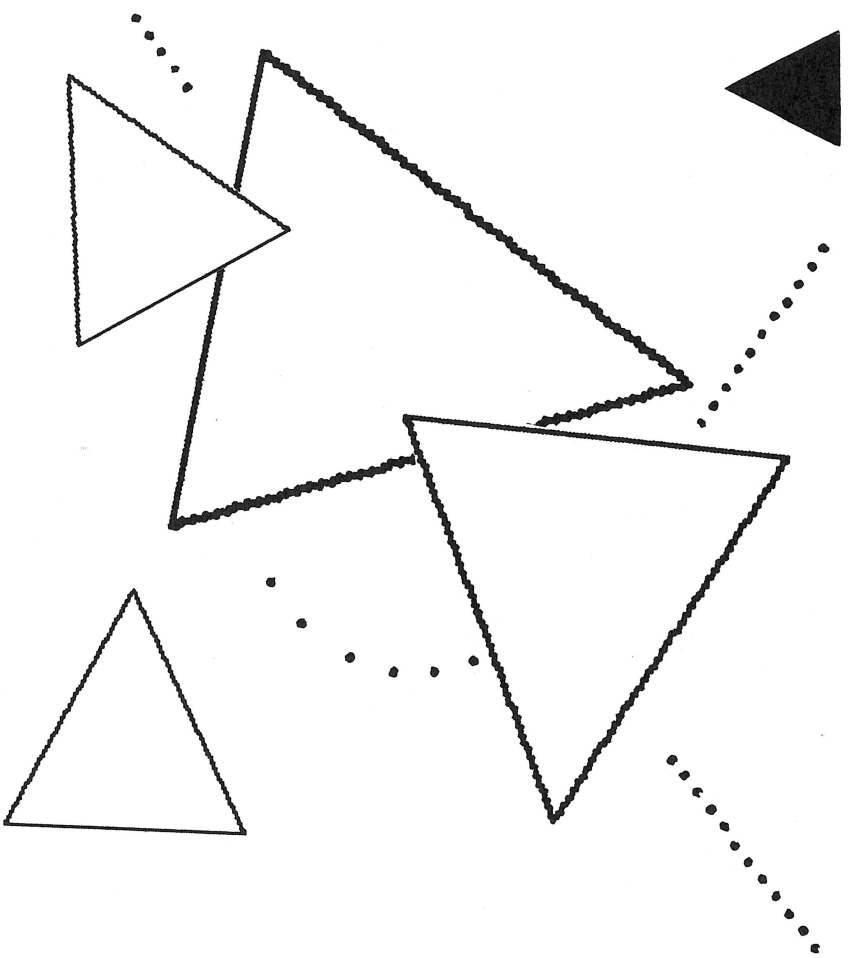
ROWSTAR

Enter:

PR RANDOM   10
PR RANDOM  100
PR RANDOM 1000

Enter:

REPEAT 10 [FD RANDOM 50  RT RANDOM 360]
```



Getting Started with Apple Logo: Activity 12

```
Enter:

TO COUNT20  :NUMBER
IF :NUMBER = 21 [STOP]
PR :NUMBER
COUNT20 :NUMBER + 1
END

Enter:

COUNT20   1
```

```
Enter:

TO SPIRO2  :SIZE  :ANGLE   :NUMBER
SPIRO2  :SIZE  :ANGLE  :SIZE  :NUMBER
SPIRO1  :SIZE  :ANGLE  :NUMBER
END

Enter:

SPIRO2  20 120  5
SPIRO2  15  90  5
```

```
Enter:

TO POLYSPIRAL  :SIZE   :ANGLE   :NUMBER
IF :SIZE  > 150 [STOP]
FD :SIZE
RT :ANGLE
POLYSPIRAL (:SIZE + :NUMBER) :ANGLE :NUMBER
END

Enter:

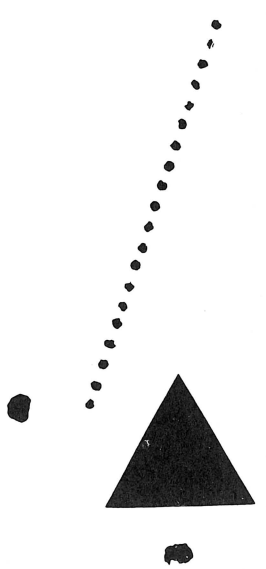
POLYSPIRAL  1 122  2
POLYSPIRAL  1  90  2

Enter:

COUNT25  1

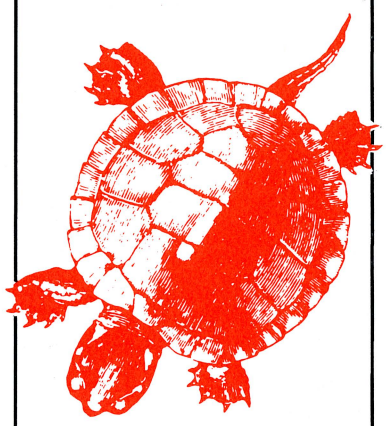
Enter:

TO SPIRO1  :SIZE  :ANGLE  :STEP  :NUMBER
IF :NUMBER = 0 [STOP]
FD :SIZE
RT :ANGLE
SPIRO1 (:SIZE + :STEP) :ANGLE :STEP (:NUMBER - 1)
END
```



Projects

Enter the Logo procedures listed below. Some of the procedures include Logo commands that have not been introduced in this chapter. Examine the commands to see if you can figure out how they work.



Enter:

```
TO STAIRS
MAKE "X -100
PU
SETPOS [-100  -100]
PD
REPEAT 20 [SETX :X  MAKE "X  :X + 10]
END
```

Enter:

```
TO POINTS
HT
MAKE  "X   RANDOM 150
MAKE  "Y   RANDOM 200
DOT (SE :X -  100  :Y - 100)
POINTS
END
```

Enter:

```
TO QUESTIONS
PR [WHAT IS YOUR NAME?]
MAKE "NAME READLIST
TYPE  [HELLO!] TYPE CHAR 32
PR :NAME
PR [HOW ARE YOU TODAY?]
END
```

```
Enter:

TO DRAWINGS
PR [PLEASE SELECT A DRAWING]
PR [SQUARE]
PR [TRIANGLE]
MAKE "ANS FIRST READLIST
IF :ANS =  "SQUARE [REPEAT 4 [FD 80 RT 90]
IF :ANS =  "TRIANGLE [REPEAT 3 [FD 80 RT 120]
END
```

Common Apple Logo Error Messages

If you make a mistake in Apple Logo, the computer will try to help you by printing an error message. Listed below are some common error messages.

1 I DON'T KNOW HOW TO . . .
This message will appear if you misspell a word, do not space correctly, use incorrect punctuation, add extra characters, or use a word that is not in the Logo language. For example:

2 NOT ENOUGH INPUTS TO . . .
This message will appear if you forget to tell Logo how many times you want to repeat commands enclosed in brackets. For example:

REPEAT [FORWARD 50]

This message will also appear if you define a procedure with inputs that will vary without including a colon (:). For example:

TO SQUARE SIDE
REPEAT [:SIDE RT 90]
END

3 . . . DIDN'T OUTPUT TO EDIT
This message will appear if you try to edit a procedure without placing a quotation mark (") in front of the procedure name. For example:

EDIT SQUARE

This message will also appear if you try to save or erase a Logo procedure without placing a quotation mark (") in front of the procedure name. For example:

SAVE SQUARE

4 . . .IS A PRIMITIVE
This message will appear if you try to name a procedure with a name that is reserved as a Logo command. For example:

TO RANDOM

5 TURTLE OUT OF BOUNDS
This message will appear when Logo is in the FENCE mode and you try to move the turtle beyond the boundary of the screen. For example:

FD 2000

Cross-Reference Chart for Apple, Terrapin and Krell Logo

If you are not using Apple Logo with this chapter, you can still enjoy the activities and projects by making a few minor changes in commands. The chart below will allow you to convert all of the commands used in this chapter from Apple Logo to Terrapin or Krell Logo.

Apple Logo Command	Terrapin/Krell Equivalent
SETPC	PENCOLOR
SETBG	BACKGROUND
CLEARSCREEN	DRAW
FENCE	NOWRAP
CTRL L	CTRL F
POS	XCOR or YCOR
POPS	PO ALL
ERALL	ERASE ALL
SETPOS	SETXY

EDIT	Does not require a quotation mark (") in front of a procedure name to enter the Logo Editor.

LOAD	READ
CTRL B	<——
CTRL F	——>
<——	ESC
WAIT CIRCLER CIRCLEL ARCL ARCR PENERASE	All of these can be defined as procedures and saved on a disk for use with Terrapin/ Krell Logo. They are frequently available on utility disks for these versions and are also specified in many manuals.
PENREVERSE	none
TYPE	none

Micro Bits!

Who's in Charge?

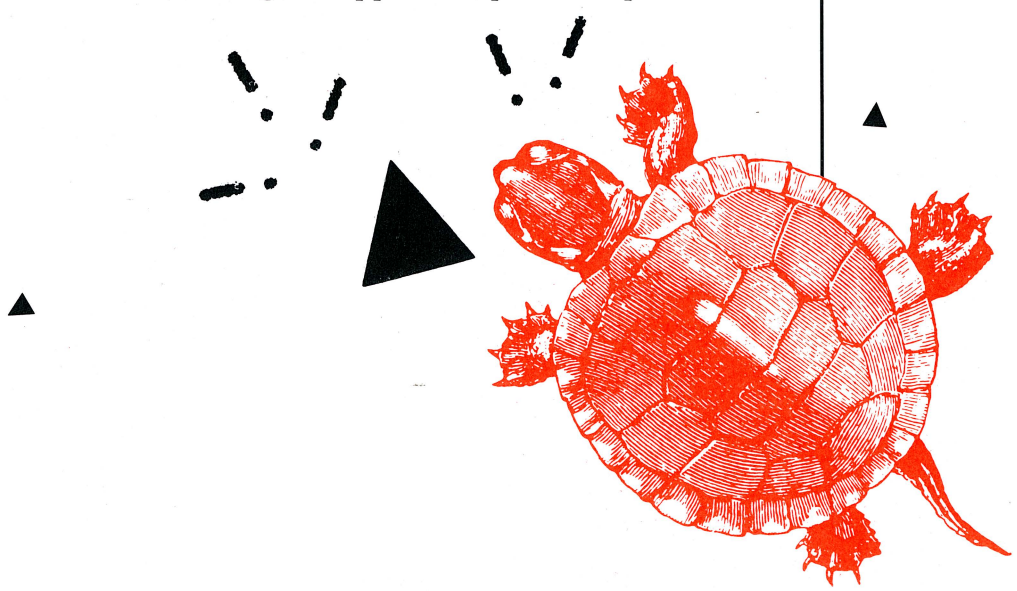
Max Weissman, a 16-year-old student at Collegiate School in New York City, spends part of every school day in charge of the school's computer lab. In his job as a computer room manager, Max is responsible for a computer with seven terminals, two printers, and a hard disk drive. He also spends a lot of time helping younger students learn about computers and computer programming.

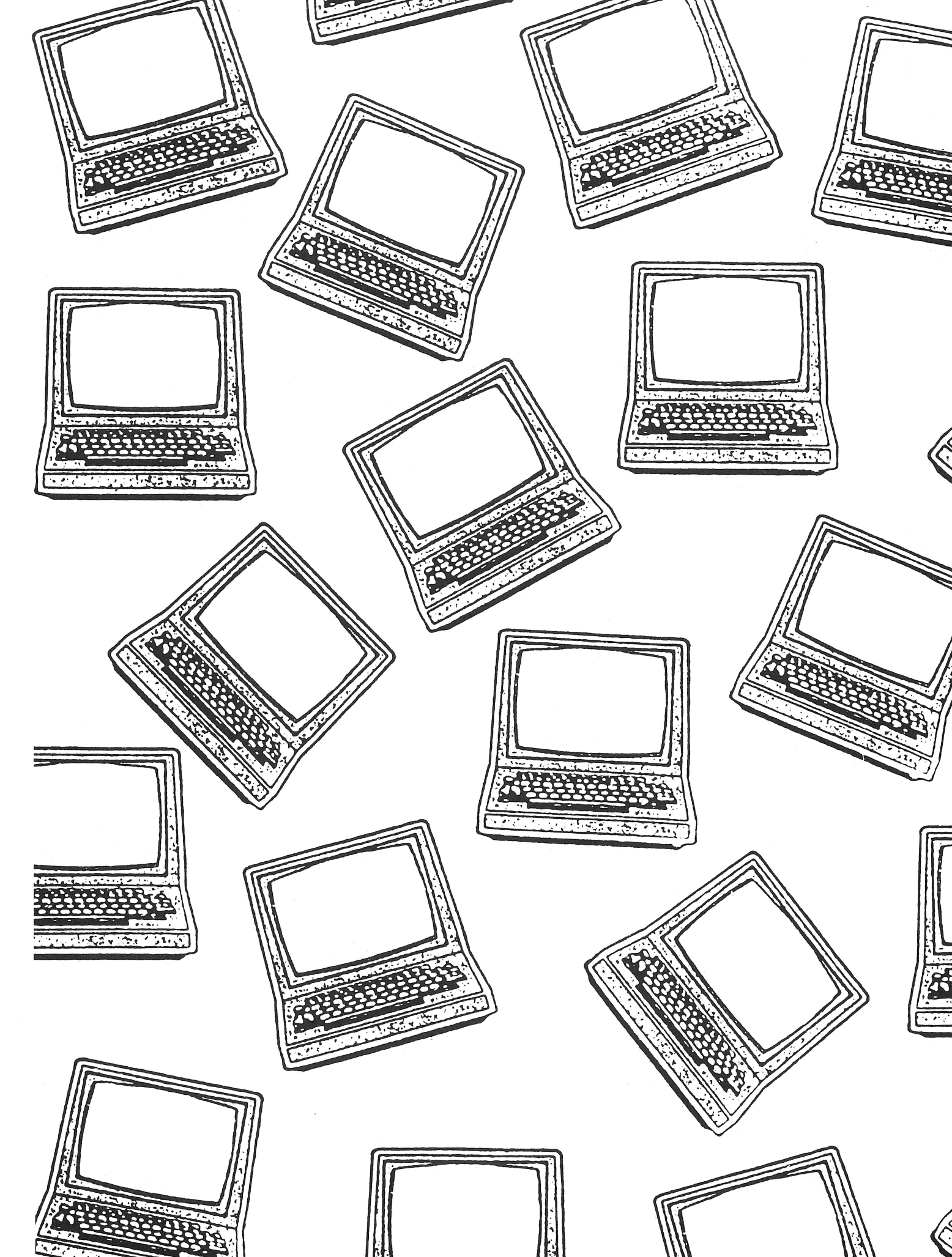
According to Max, the teaching he gets to do as part of his job is very enjoyable but he thinks that it is much more difficult to show the school's teachers how to use the computer than it is to work with kids. Max says that the real advantage to working in the computer room is that his programming skills have improved a great deal.

Up and Coming

Tuan Le, a student at Como Park Senior High in St. Paul, Minnesota, has a bright future ahead of him in computer programming. Le was one of six winners in the 1984 Apple Computer Club Contest. Born in Viet Nam, Le has been a U.S. resident for nine years and began programming in machine language as a sophomore in high school.

Le's program, which earned him $1000 in the nationwide competition, helps students understand the intricacies of Euclidean geometry. The program simulates a compass and a straight edge for geometric constructions on the computer. Written in machine language, the program is menu-driven and provides problems and examples. It took Tuan six months to create the program. Tuan, 16 years old, has already been approached about working for Apple Computer Corporation.





What Are Data Bases?

10

Notes to the Club Advisor

Chapter Overview

This chapter introduces club members to data bases and data-base management. The objective of the chapter is not to make club members data-base experts but rather to provide them with information and activities that will help them see how data bases can be used.

Minimum Prerequisites

Several things the club advisor can do to help club members learn about data bases are listed below.

1. Identify which club members already have knowledge about data bases and have them assist less-experienced members.
2. Conduct "mini-lessons" with club members on specific topics and skills related to the projects and activities.
3. Help club members in arranging visits to businesses that use data-base management systems.
4. Help club members arrange guest speakers for club meetings who can discuss and demonstrate how they might use data bases.
5. Have resource books on hand for club members who may want additional information about data bases. Most books on computer literacy contain chapters on data bases and data-base management.
6. Help club members arrange use of an on-line data-base service.

Advance Preparation

The club advisor should become familiar with the activities and projects presented in this chapter. Be sure to have a printer available when club members are working with data bases.

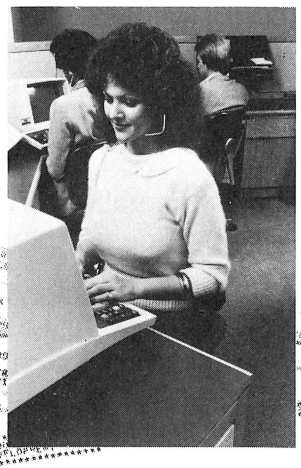
Data Bases

What do a phone book, an encyclopedia, a dictionary, and a card catalog all have in common? They are all *data bases*—organized collections of information. People have the need to keep track of all kinds of information. To do so they create data bases. Data bases can contain a wide variety of information, like an encyclopedia, or only a very specific type, like a personal collection of recipe cards. But regardless of the type of data base, to be useful it must be organized so the user can easily get information.

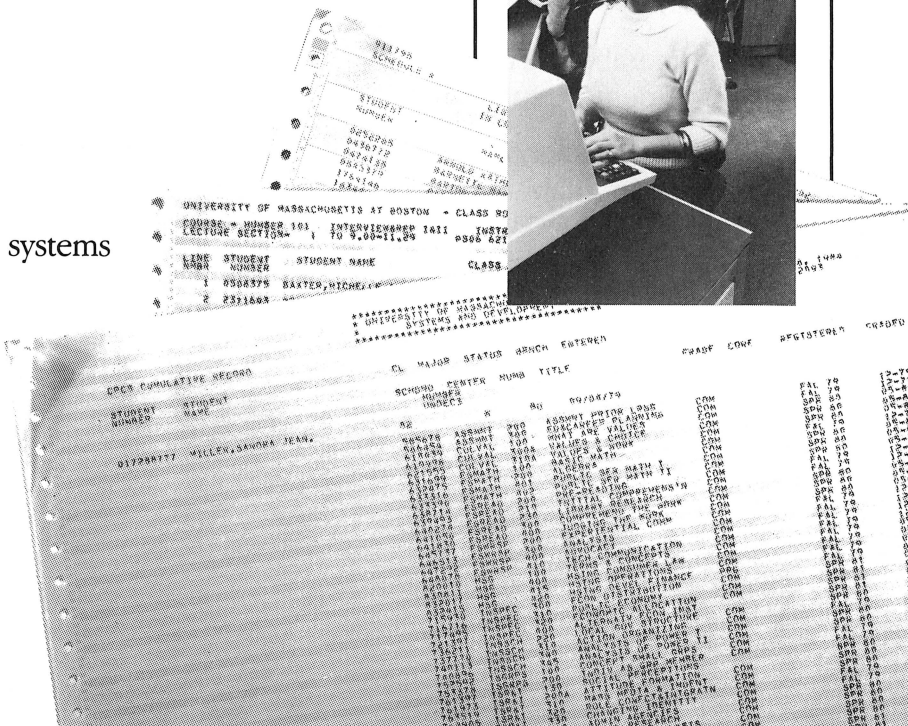
The phone book is organized in alphabetical order by last names. An encyclopedia is organized in alphabetical order by subject area. Most card catalogs are arranged in alphabetical order by title, author, subject, or sometimes all three. Each system is useful for getting certain types of information but not useful for others. For example, it is easy to find out how many people in a phone book have the name of Brown, but it is not easy to find out how many of the people listed live on a particular street, nor is it easy to get a list of all people named Michael. This is a limitation of all written data bases. The computer has made it possible to overcome this limitation. Now both home and business users are able to store, organize, and retrieve information more quickly and easily than was ever before possible.

Some common types of computerized data-base systems are listed below:

1. Airlines ticket reservation systems
2. Hotel reservation systems
3. Government tax record systems
4. Police record systems
5. Supermarket inventory systems
6. University and college student record systems



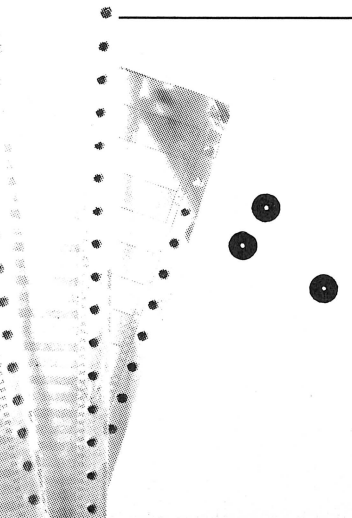
Reservation agents use the computerized SABRE reservations system. Photo courtesy of American Airlines.

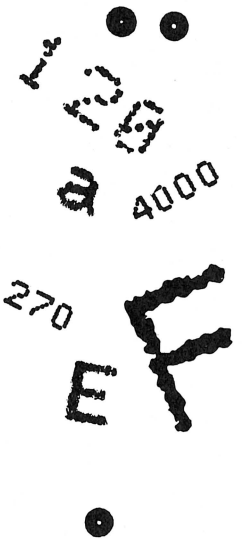


Data-Base Glossary

Some common data-base management terms and their meanings are listed below.

CREATE	To organize a new file within a data base.
DATA BASE	An organized collection of information.
DATA BANK	Another term for ON-LINE DATA BASE.
DELETE	To erase a record from a file.
FIELD	A category of information within a record.
FILE	A single subject or topic within a data-base system. For example, in an encyclopedia the section on China would represent a single file.
FILER	A common name used for personal data-base management programs.
INQUIRY	The question(s) asked to get or retrieve information from a data base.
KEY	The field characteristic by which a file is searched for specific information. For example, in a file on dogs, to find out all the dogs that weigh over 100 pounds, the key would be "greater than 100 pounds" (> 100).
LIST	A printout of a data-base search.
MODEM	An interface device that allows a user to communicate with an on-line data base using a telephone and a microcomputer.



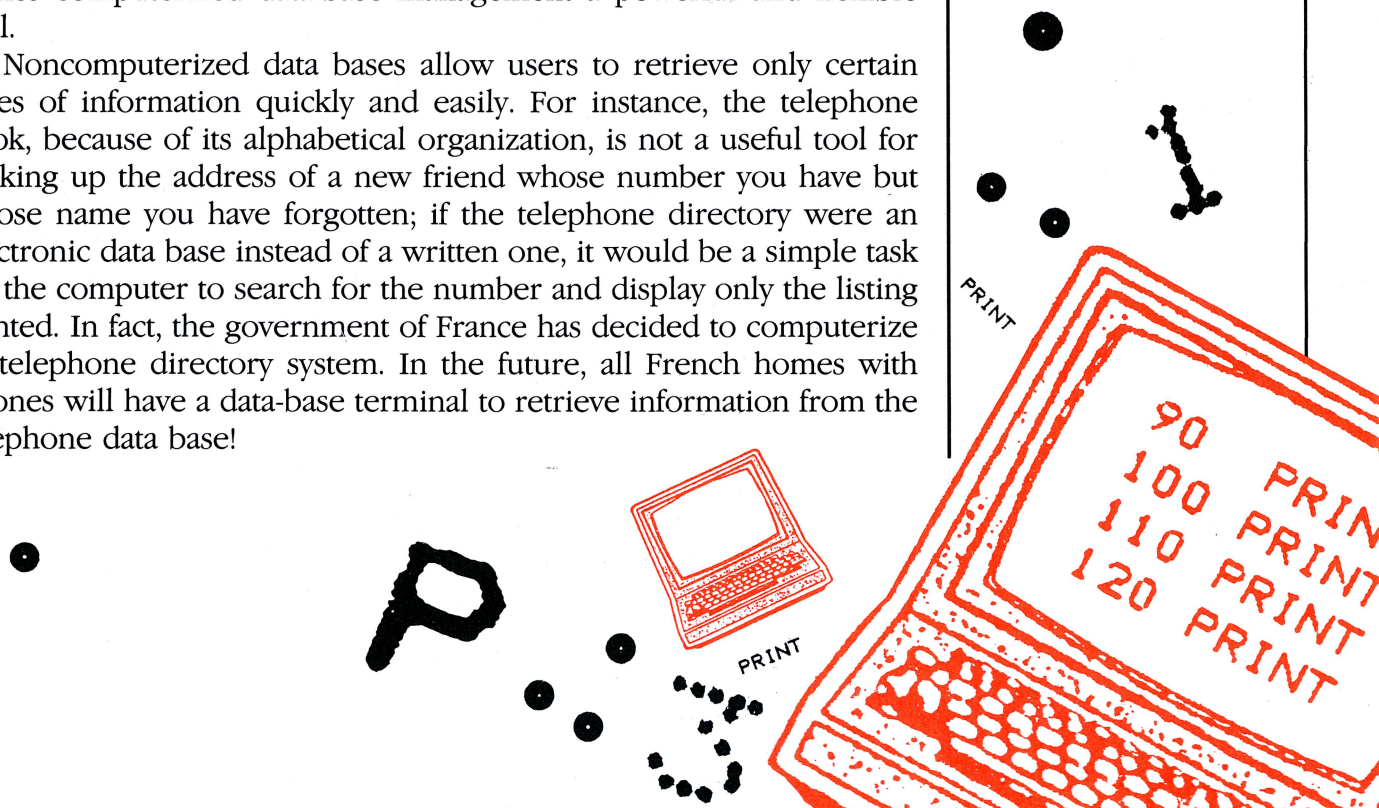


ON-LINE DATA BASE	A large-scale data base that contains large amounts of information and can be accessed by many users.
RECORD	A subtopic within a file. For example, in a file on dogs, the specific information about each breed of dog would be called a record.
RETRIEVAL	The process of getting information from a data base.
SEARCH	The term that means to look through a data base for specific information.
UPDATING	The act of including current information to an already existing record within a file.

Data-Base Management Systems

Data-base management systems are available for all microcomputers. These programs store, organize, and retrieve information from a data base. They make it possible to design data bases that can be stored on disks and sorted or searched in a variety of ways. It is this ability to quickly reorganize and retrieve desired information that makes computerized data-base management a powerful and flexible tool.

Noncomputerized data bases allow users to retrieve only certain types of information quickly and easily. For instance, the telephone book, because of its alphabetical organization, is not a useful tool for looking up the address of a new friend whose number you have but whose name you have forgotten; if the telephone directory were an electronic data base instead of a written one, it would be a simple task for the computer to search for the number and display only the listing wanted. In fact, the government of France has decided to computerize its telephone directory system. In the future, all French homes with phones will have a data-base terminal to retrieve information from the telephone data base!



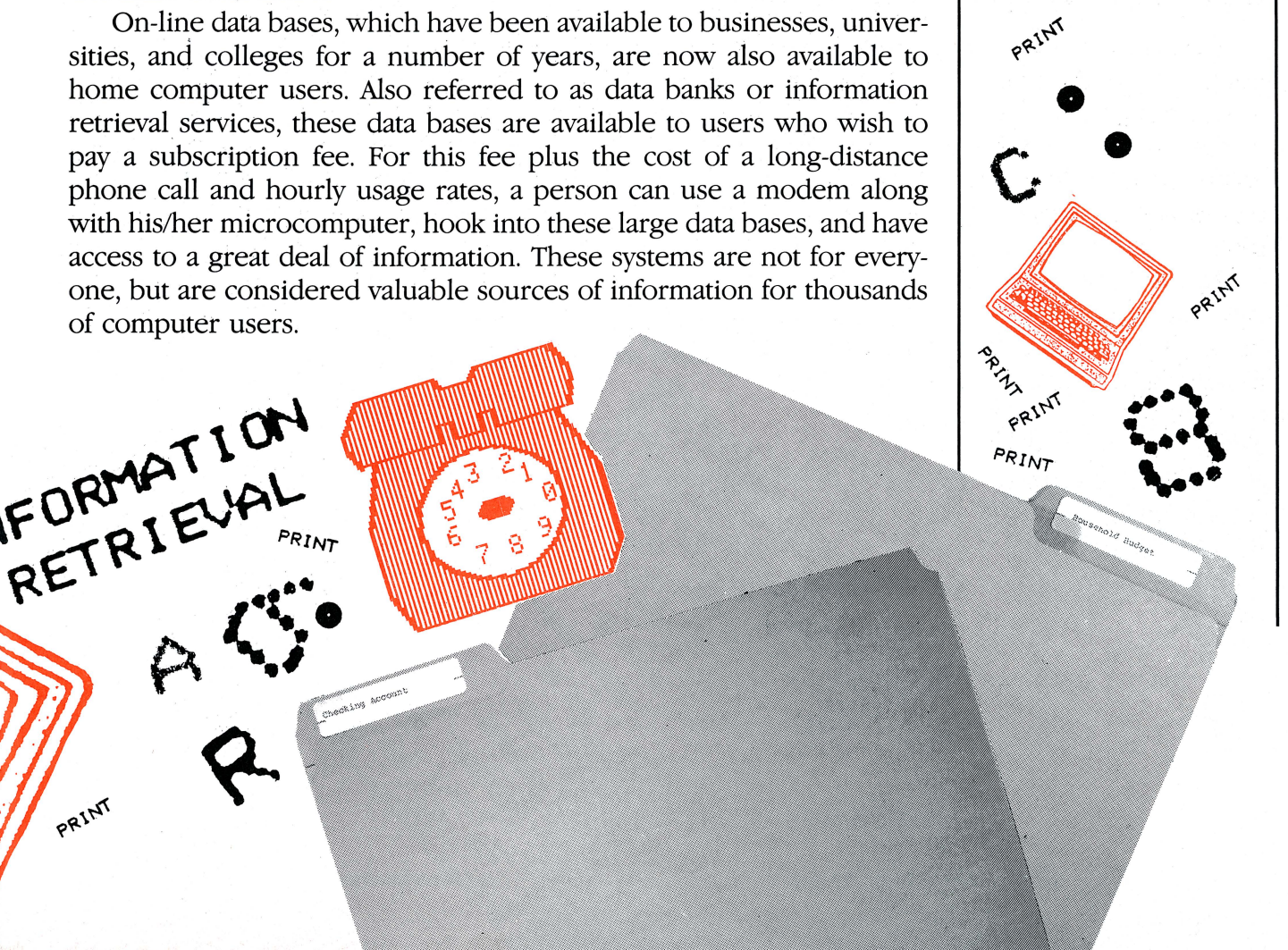
Public and Private Data Bases

People use data-base management programs, or filers, to keep track of checking accounts, household budgets, addresses, recipes, and birthdays of friends and relatives. Salesmen keep files of their customers, and doctors and hospitals maintain files on their patients' health records and billings. Each of these is an example of a personal or private data base. The information in a private data base is available only to the person, business, or agency that created it.

Public data bases are collections of information available to anyone who wants them. These data bases are usually not free and may contain a wide variety of different kinds of information or may be very specific in content. An example of a special interest public data base is an organ transplant data base. Over the last few years, as organ transplants have become common, it has become necessary to develop a system for doctors and hospitals to quickly locate available organs. National organ transplant data-base systems have already been responsible for saving the lives of thousands of patients who might otherwise have died.

On-Line Data Bases

On-line data bases, which have been available to businesses, universities, and colleges for a number of years, are now also available to home computer users. Also referred to as data banks or information retrieval services, these data bases are available to users who wish to pay a subscription fee. For this fee plus the cost of a long-distance phone call and hourly usage rates, a person can use a modem along with his/her microcomputer, hook into these large data bases, and have access to a great deal of information. These systems are not for everyone, but are considered valuable sources of information for thousands of computer users.



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Getting Started with Data-Base Management: Activity 1

Skill: Creating a data-base file.

The first step in using data-base management is to create the data-base files. This takes some advance planning by the user to be sure that the information stored in the data base is stored in a way that makes doing data searches easy. The length of each data field (maximum number of characters) must be specified during the file creation. Some filers do not allow this to be changed once it is entered.

1 Follow the directions included in the documentation with a filer program for creating and saving a data-base file entitled APPLE COMPUTER CLUB MEMBER INFORMATION that includes the following data fields.

Name
Address
Phone number
Age
Grade
Type of computer owned
Title of favorite program

2 Create and save a file entitled COMPUTER CLUB SOFTWARE LIST that includes the following data fields:

Program title
Program type
Hardware needed
Owned by
Price of program

3 Create and save a data-base file for storing some type of information that you would like to organize. Some suggestions are:
Programs written by (member's name)
Addresses and phone numbers

4 Some filers allow you to modify or delete data fields within a data-base file. If yours does, try to do so with one of the files you have created above.

Getting Started with Data-Base Management: Activity 2

Skill: Entering records into and updating records within a data-base file.

Now that the data-base file has been created, it is possible to enter data into the data fields. It's not necessary to enter them alphabetically because the filer program and the computer can do it for you quickly and easily.

1 Load your filer program and the APPLE COMPUTER CLUB MEMBER INFORMATION file. Collect the necessary information about the members of your club and follow the directions provided on the screen and/or in the documentation for entering data records.

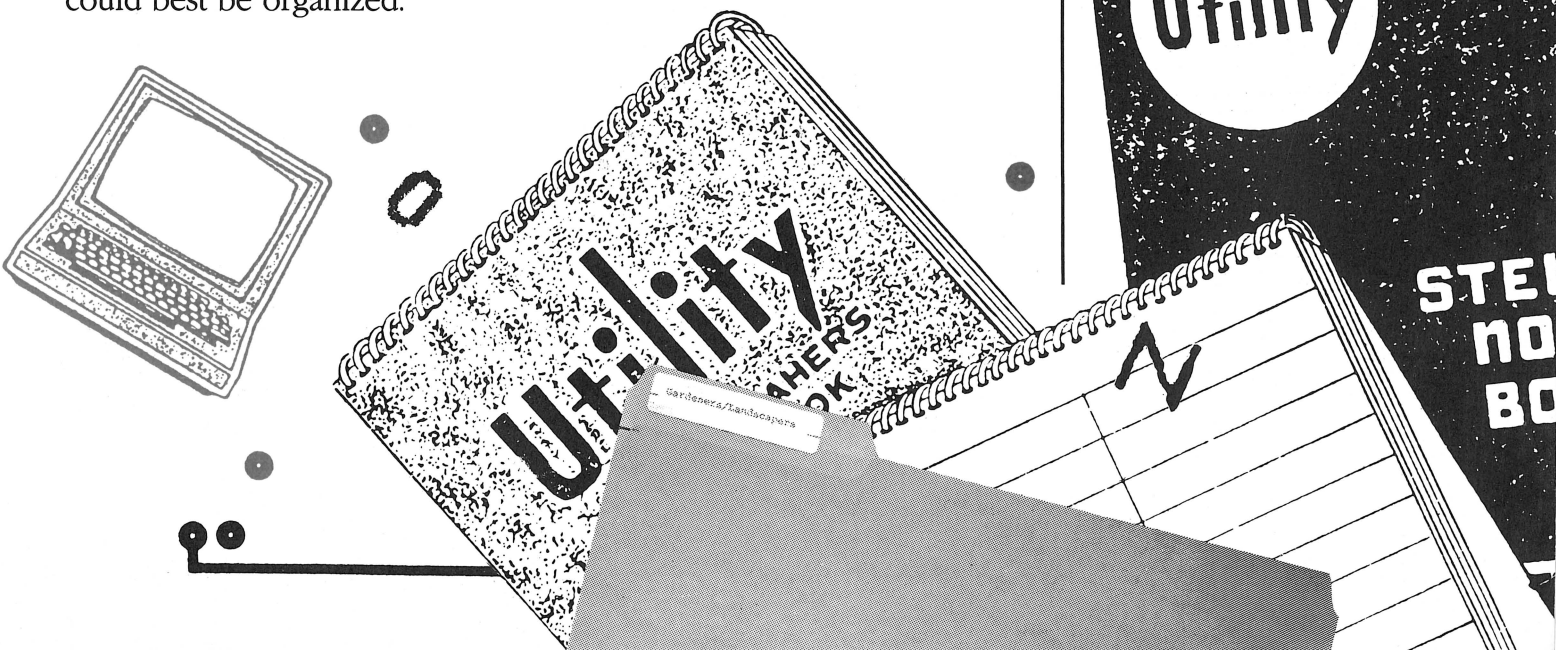
2 For practice, pretend that everyone in your club has just had a birthday and been promoted to the next grade in school. Update the information in the Age and Grade data fields for each record entered.

3 Load the data-base file entitled COMPUTER CLUB SOFTWARE LIST and enter the information for each data record.

4 Use the information in the FAMILY OF APPLES chapter in this book to create a data-base file and enter data records about the various members of the Apple computer family.

5 Use a filer program to create a data-base file and store records that will help you with a school assignment. A filer might be especially helpful if you need to collect information for a social studies report on states, countries, continents, or historical dates, places, and people.

6 Use a filer to create and store records of information found in the "Computer Careers" section in Chapter Two of this book. Think carefully about what important information should be included and how it could best be organized.



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Getting Started with Data-Base Management: Activity 3

Skill: Sorting and retrieving information from a data-base file.

Once a data-base file is created and data records are entered, the user is able to rearrange (sort) and get (retrieve) information from it. If the data fields have been carefully defined, the search function of the filer program can quickly select only certain desired files from the data base.

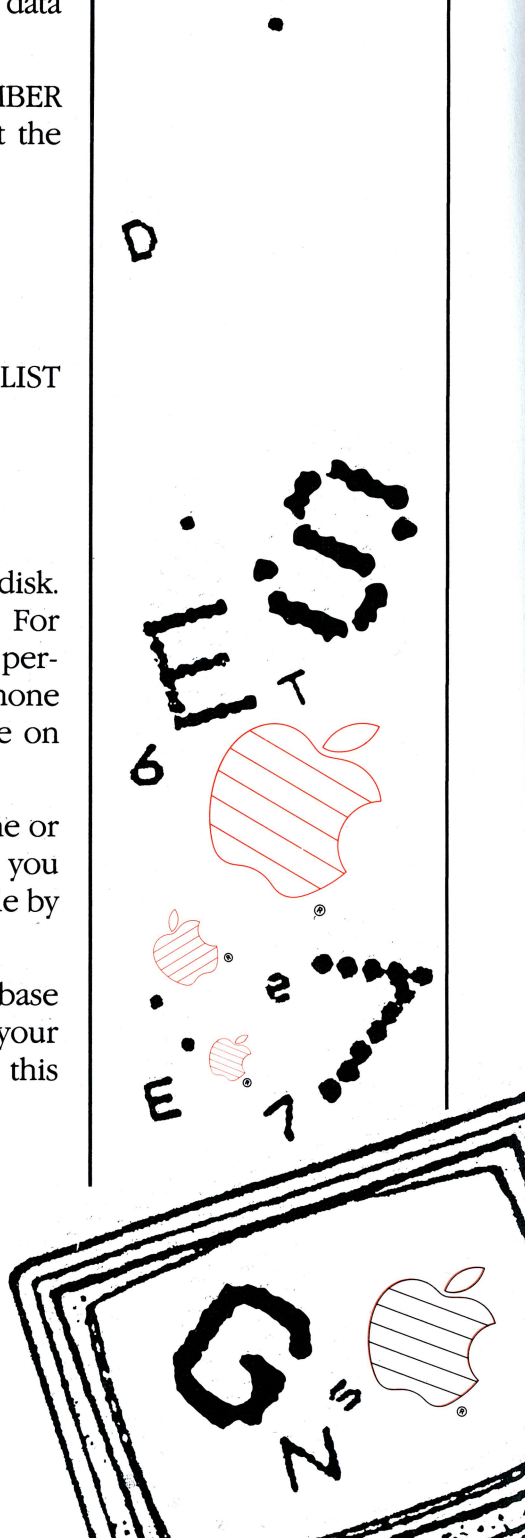
1 Load your filer program and the APPLE COMPUTER CLUB MEMBER INFORMATION file. Use the search function of the filer to select the following records from the file:
Club members who are in the 6th grade.
Club members who are in the 6th grade and are 12 years old.
Club members whose names begin with the letters A–M.
Club members who own an Apple IIe computer.

2 Load your filer program and the COMPUTER CLUB SOFTWARE LIST file. Do a data search to select the following records:
Game-type programs.
Programs that need a printer.
Programs that cost over $50.

3 Load your filer program and any file that you have saved on a file disk. Do a data search that selects records on three different fields. For example, you could search a Phone Number/Address file for all persons with last names beginning with the letters N–Z *and* whose phone numbers begin with a certain prefix (485, 367, etc.) *and* who live on First or Second Street.

4 Use the sort function of your filer program to put the records in one or more files on your file disk into a different sequence. For example, you may want to sort the COMPUTER CLUB MEMBER INFORMATION file by last name, first name, or grade level.

5 All filers provide the option of printing a listing of the total data-base file or selected records from a search. Use the print/list function of your filer to print a listing of some of the searches you have done in this activity.



Getting Started with Data-Base Management: Activity 4

Skill: Adding and deleting records in an existing file.

Many times it will be necessary to add new records to a file or delete records that are no longer needed in the file. For example, when a new student enrolls in your school, his/her record must be added to the enrollment file; when a student moves away, his/her record must be deleted from the file. It is possible with most filer programs to either add the record to the end of the existing file and then use the sort function to resequence the entire file or insert it into the desired location directly.

1 Load your filer program and the COMPUTER CLUB MEMBERSHIP INFORMATION FILE created in Activity 1. If there have been any new members added to the club, follow the directions in your program documentation for adding a file record. If not, make up the information for a few new members and add their records.

2 From the file above, follow the directions in the documentation for deleting unwanted records from the file. Don't worry about messing up your data-base file. If you are making up record information, don't save the new information on your file disk. The old file records will still be there.

3 Practice adding and deleting records from any of the files you have saved on disk. Remember that after you add records to a file, you will need to resort your file to get the new records in the proper sequence.

4 Use the search of your filer program to retrieve specific types of records from a file. For example, you could retrieve only the records of programs from the COMPUTER CLUB SOFTWARE LIST that need a color monitor then delete them for practice. Or you might practice adding records to the same file for any new software that has been purchased by the club or a club member.

5 After adding new records to a file, use the sort function to put the file records into the proper sequence or into a different sequence.

6 Make a comparison of how long it takes to add records to the end of a file and resort and how long it takes to insert records directly into their desired locations(s).

Projects

1 Create a data base that contains the names and addresses of other Apple Computer Clubs that you have written to or would like to write to.

2 Create a data base that contains information about the books, magazines, and other resource materials that your club owns.

3 Create a data base that contains the names, addresses, and other information about resource persons who have visited your club meetings or whom your club has visited.

4 Visit a business that uses electronic data-base management to see how data bases are used in the business world.

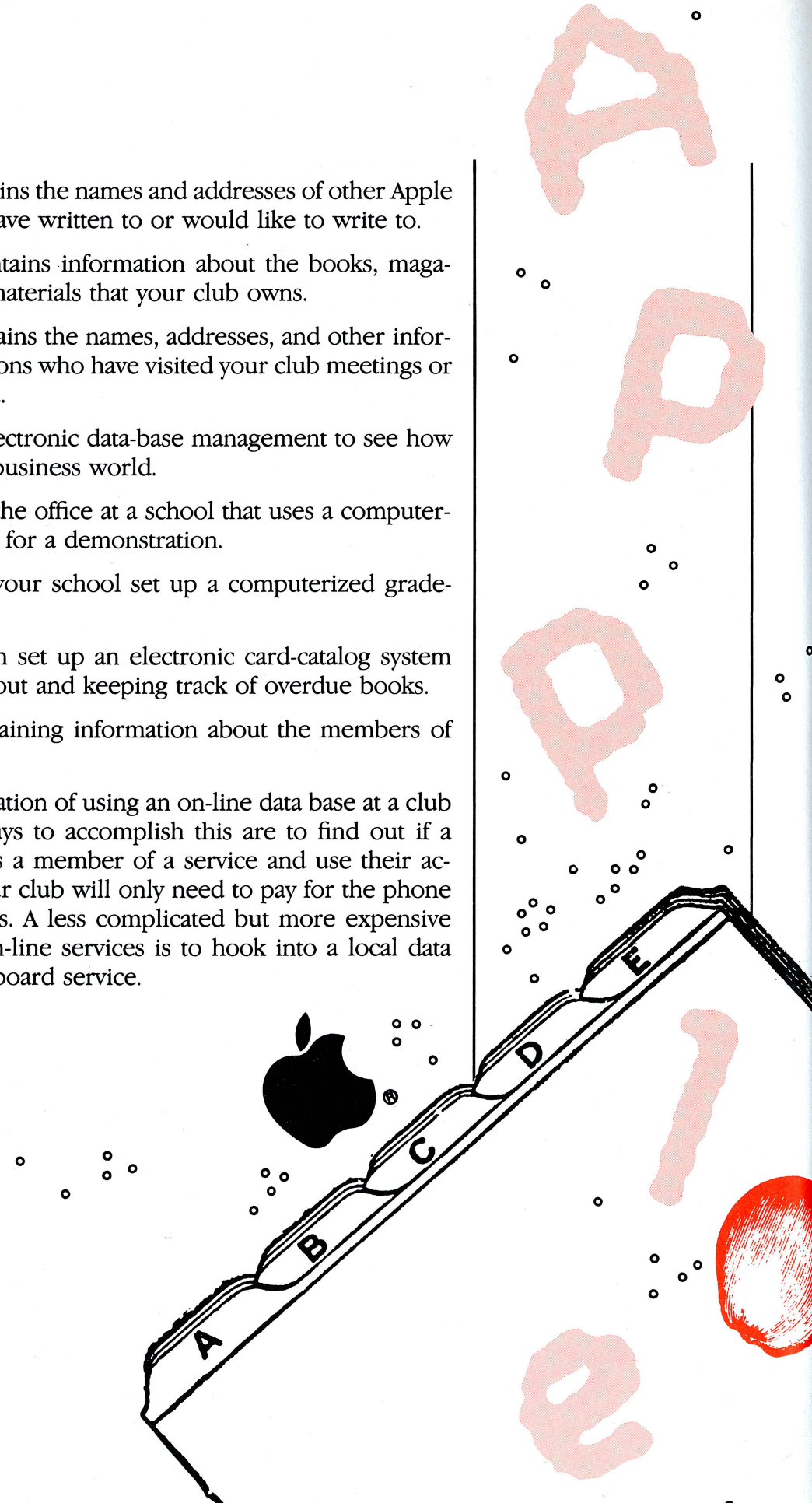
5 If possible, arrange to visit the office at a school that uses a computerized record-keeping system for a demonstration.

6 Offer to help a teacher at your school set up a computerized grade-keeping system.

7 Help your school's librarian set up an electronic card-catalog system for checking books in and out and keeping track of overdue books.

8 Create a data-base file containing information about the members of the club.

9 Arrange to have a demonstration of using an on-line data base at a club meeting. Some possible ways to accomplish this are to find out if a parent of a club member is a member of a service and use their account code. In this way, your club will only need to pay for the phone charges and hourly use fees. A less complicated but more expensive way to be introduced to on-line services is to hook into a local data base or electronic bulletin-board service.



Data-Base Management Programs

There are a number of data-base management programs, or filers, available for the Apple computer. Each has its own capabilities, and certain ones are better suited for some jobs than others. Some are special use data-base management programs while others are general use programs. Each of the programs below has been suggested for school use and would be a good choice for your club.

AppleWorks
Quick File II
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

DATAMASTER
(Included as part of *MICRO DISCOVERY A Computer Literacy Program*)
Science Research Associates, Inc.
Educational Courseware
155 North Wacker Drive
Chicago, IL 60606

DataFax
Link Systems
1640 19th Street
Santa Monica, CA 90404

pfs: FILE
Software Publishing Corp.
1901 Landings Drive
Mountain View, CA 94043

On-Line Data-Base Services

There are many information retrieval services in operation in the U.S. and other countries. Some of them are very specialized in the types of information they contain and therefore are of interest to relatively few people. Others, however, feature a wide variety of consumer-oriented data bases including news, sports, entertainment, electronic mail, catalog shopping, education, and programming languages. A few of the most popular are listed below.

CompuServe
CompuServe, Consumer Information Service
Arlington Center Boulevard
P.O. Box 20212
Columbus, OH 43220
(800) 848-8199
or (614) 457-0802

Delphi
General Videotex Corp.
3 Blackstone Street
Cambridge, MA 02139
(617) 491-3393

Knowledge Index
Dialog Information Services, Inc.
3460 Hillview Avenue
Palo Alto, CA 94304
(800) 528-6050 ext. 415
or (800) 227-1927

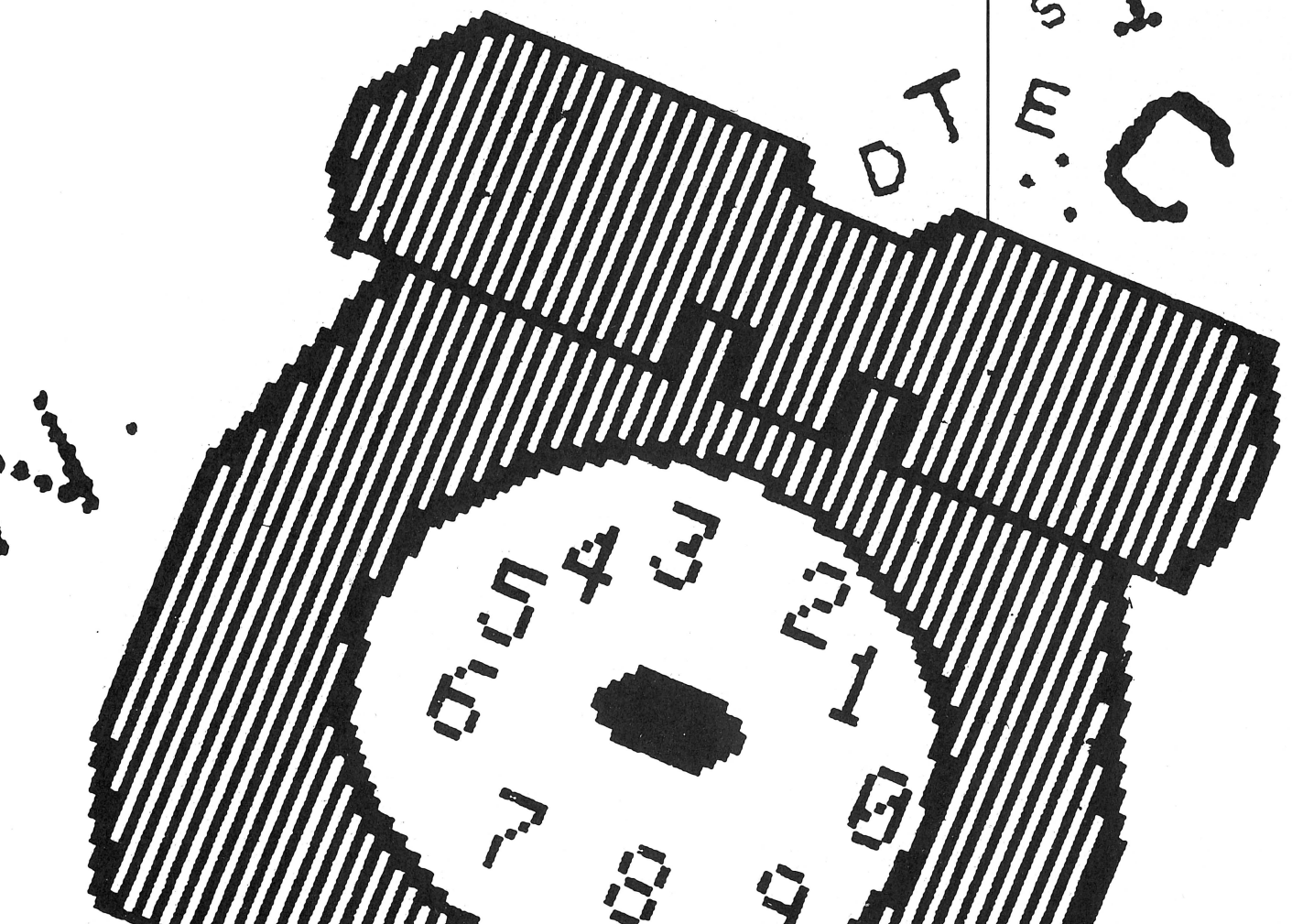
The Source
Source Telecomputing Corp.
1616 Anderson Road
McLean, VA 22102
(800) 336-3366

How Computers Talk to Each Other

Using an on-line data base involves one computer communicating with another. For this communication to take place, a modem and communications software are necessary. A modem (modulator-demodulator) is an I/O interface device that allows a microcomputer to send and receive data over telephone lines. Communications software converts digital data into sounds that are sent through the mouthpiece of the telephone headset just as speech is. The modem and communications software on the receiving computer then retranslates the sounds into digital data. In this way, the two computers "talk" to each other.

How to Get Started with On-Line Data Bases

The services listed above require subscription fees, hourly usage fees, and long-distance telephone charges. They also require some practice in learning their use. A good way to get started with on-line data bases is by using a local on-line data base or bulletin board. Most larger cities have one or more of these services. They are generally inexpensive and easier to use than the larger services. Check with your local Apple users' group for information about those in your area.



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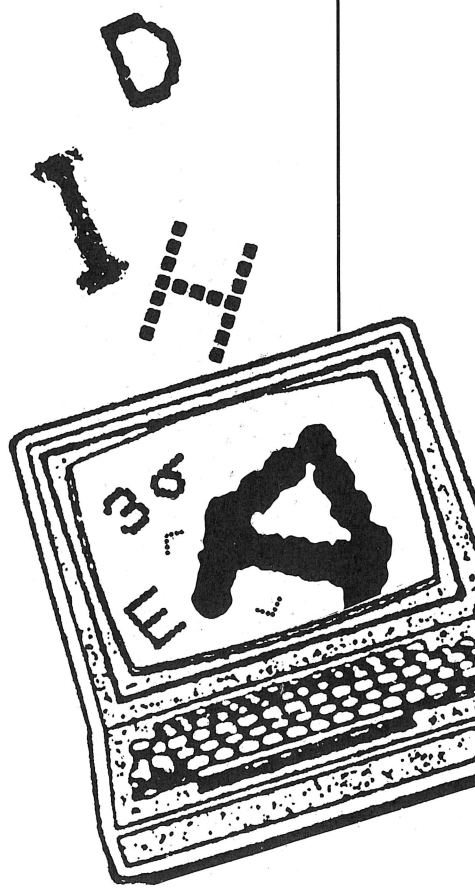

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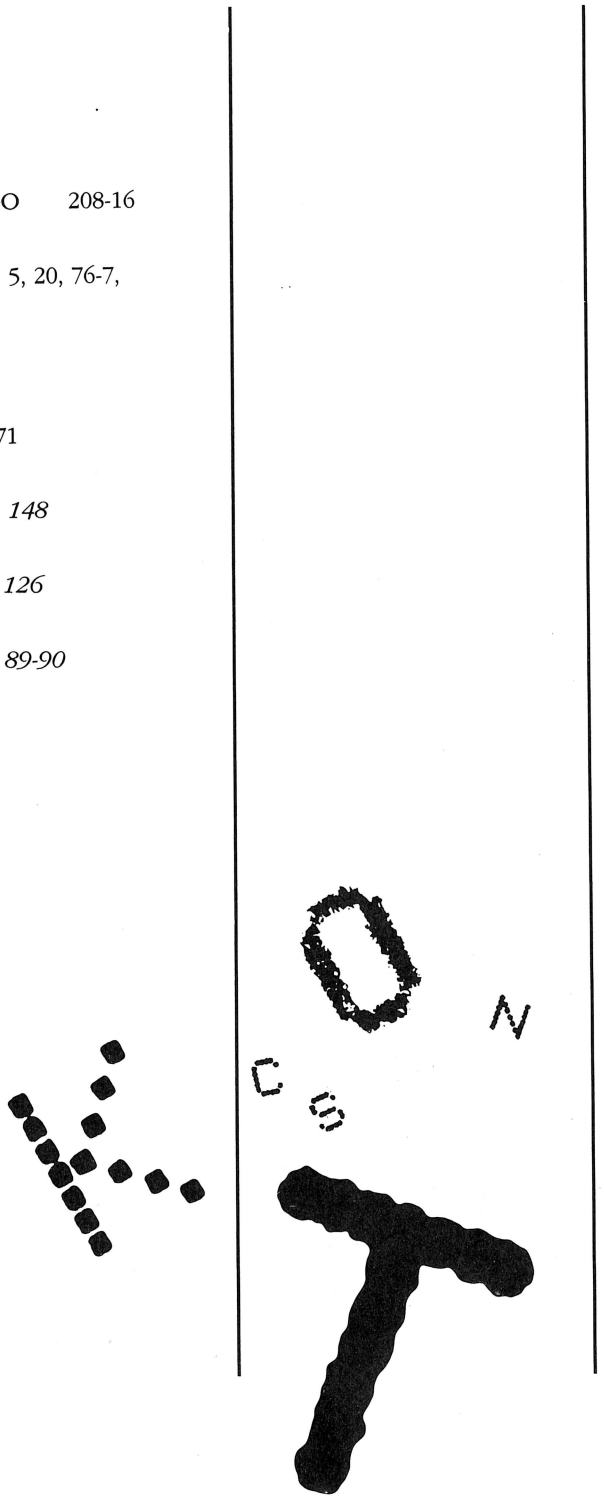

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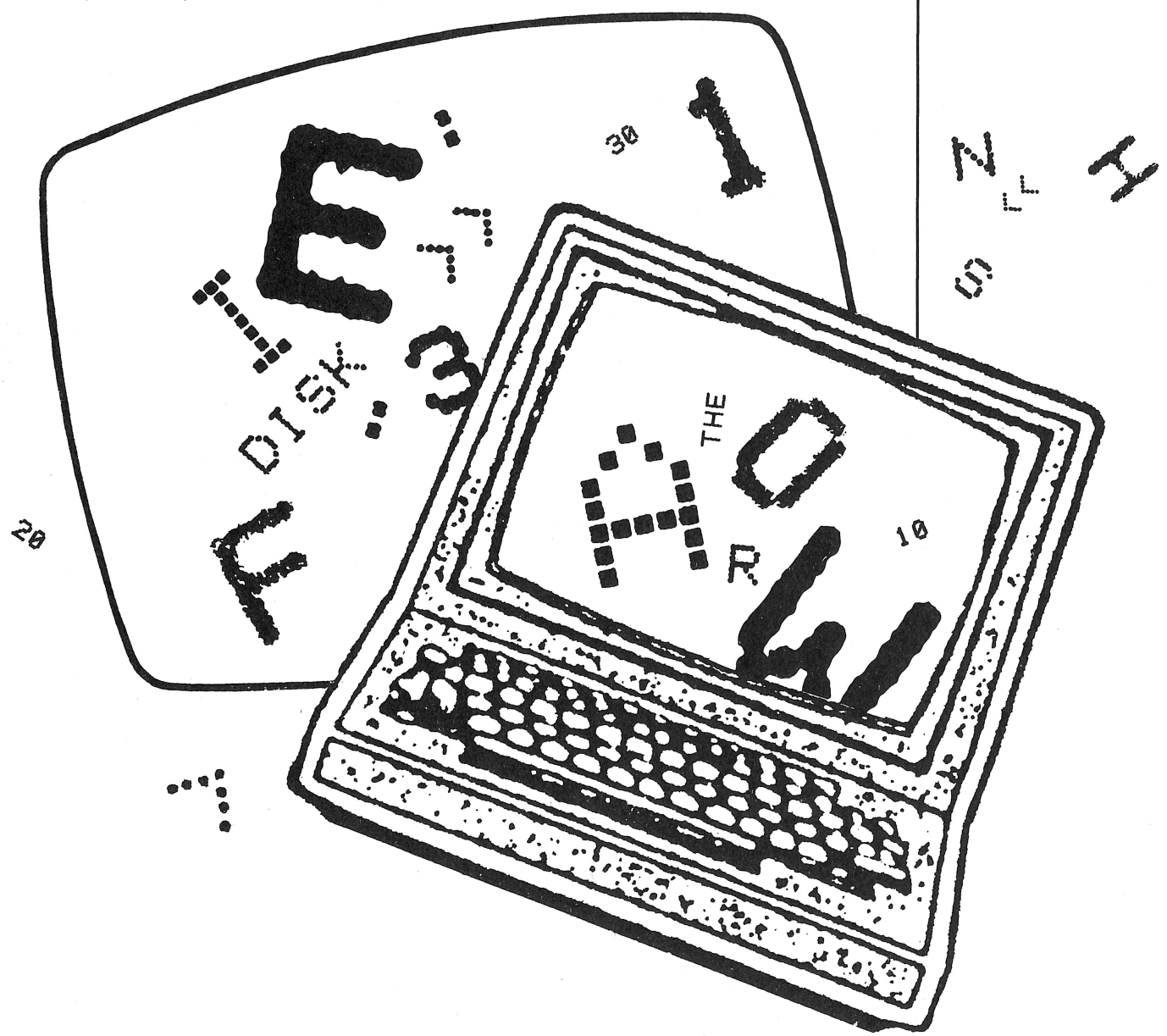

About The Apple Computer Clubs

The Apple Computer Clubs program, instituted by Apple Computer, Inc., in 1983 and managed by Computer Publishing Services, Inc. of Lowell, Massachusetts, has enjoyed tremendous success in its efforts to promote and recognize excellence in the use of microcomputers by youth. Since its inception, the program has helped over 15,000 elementary and secondary schools and other youth organizations to organize their own computer clubs. Apple Computer Clubs have now been established in every state in the U.S., as well as in Canada, Australia, Hong Kong, Singapore, South Africa, and fifteen other countries around the world.

The Apple Computer Clubs' purpose is fivefold:

1. to encourage innovative uses of microcomputers;

2. to serve as an international forum for the discussion of issues in the field of educational computing;

3. to encourage and recognize by means of competitions and awards the accomplishments of individuals and groups involved in microcomputing;

4. to promote cooperation and communication between youths and adults through the sharing of knowledge and expertise in computer use; and

5. to foster the use of computers and computer skills for the betterment of mankind.

Computer clubs allow elementary and secondary school-age students to explore educational applications of computers in a flexible environment free from the pressures of grades. Additionally, clubs provide members with opportunities to share ideas and expertise with other students and computer professionals. All Apple Computer Clubs receive *Computer Student,* a bi-monthly newsletter (written in part by club members) that highlights activities of other computer clubs, offers news and commentary about educational computing, and presents competitions and contests of a varied nature. The highlight of the competitions is the Annual International Apple Computer Clubs' Competition, which each year offers exciting awards for innovative projects to clubs from around the world. Finally, clubs receive a Certificate of Membership, identifying their club as a member in the international network of Apple Computer Clubs, and a discount on all Apple Computer Clubs publications and products.

Clubs can be sponsored by public or private schools, civic, fraternal or religious organizations, public libraries, youth organizations, or by interested groups of neighbors and friends. In addition to these organizational memberships, family memberships are available for those individuals and their families who want to personally belong to the Apple Computer Clubs. For more information about the Apple Computer Clubs and participation in this international network of interested microcomputer users, contact:

Apple Computer Clubs Membership
217 Jackson Street
P.O. Box 948
Lowell, Massachusetts 01853

Computers

It's here! One of the first key books in The Official Apple Computer Clubs Book series—a series designed to enhance the computer skills of close to half a million Apple Computer Club members, as well as those of young Apple users, their parents, and teachers.

The Apple Computer Clubs Activities Handbook is packed with dozens of hands-on projects and stimulating ideas on; • programming in BASIC and Logo • word processing • music and graphics • game design • data management • software evaluation • developing entrepreneurial skills • and much more.

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Appropriate for students at all levels—from elementary school through college—***The Apple Computer Clubs Activities Handbook*** helps kids channel "computer power" into fun, productive applications. It's a book they'll want to use every day—at school, at home, or in their community.

Dick Casabonne is president of Computer Publishing Services, Inc., which manages the Apple Computer Clubs programs. He works closely with TALMIS, a leading market research firm in educational computing. He also publishes *TEENAGE,* a student-researched and -written general-purpose magazine. A former teacher and librarian, Mr. Casabonne has worked with children and computers since 1969. He earned his undergraduate degree from Brown University and his Master of Education degree in Instructional Technology from Boston University.

The Official Apple Computer Club series is a resource of books and other projects designed to meet the needs of all computer users, including students, teachers, and parents. The first three books are *The Apple Computer Clubs Activities Handbook, The Apple Computer Clubs Parents' Guide,* and *The Winning Programs: The First Annual Apple Computer Clubs Competition.* They are written by individuals closely involved with computer users and demonstrate a concern for educational computing wherever it takes place—at school or at home. The writers reflect the enthusiasm and commitment inherent in the Apple Computer Clubs. Each book in the series offers insights and guidelines for individual growth and enjoyment with computers.

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