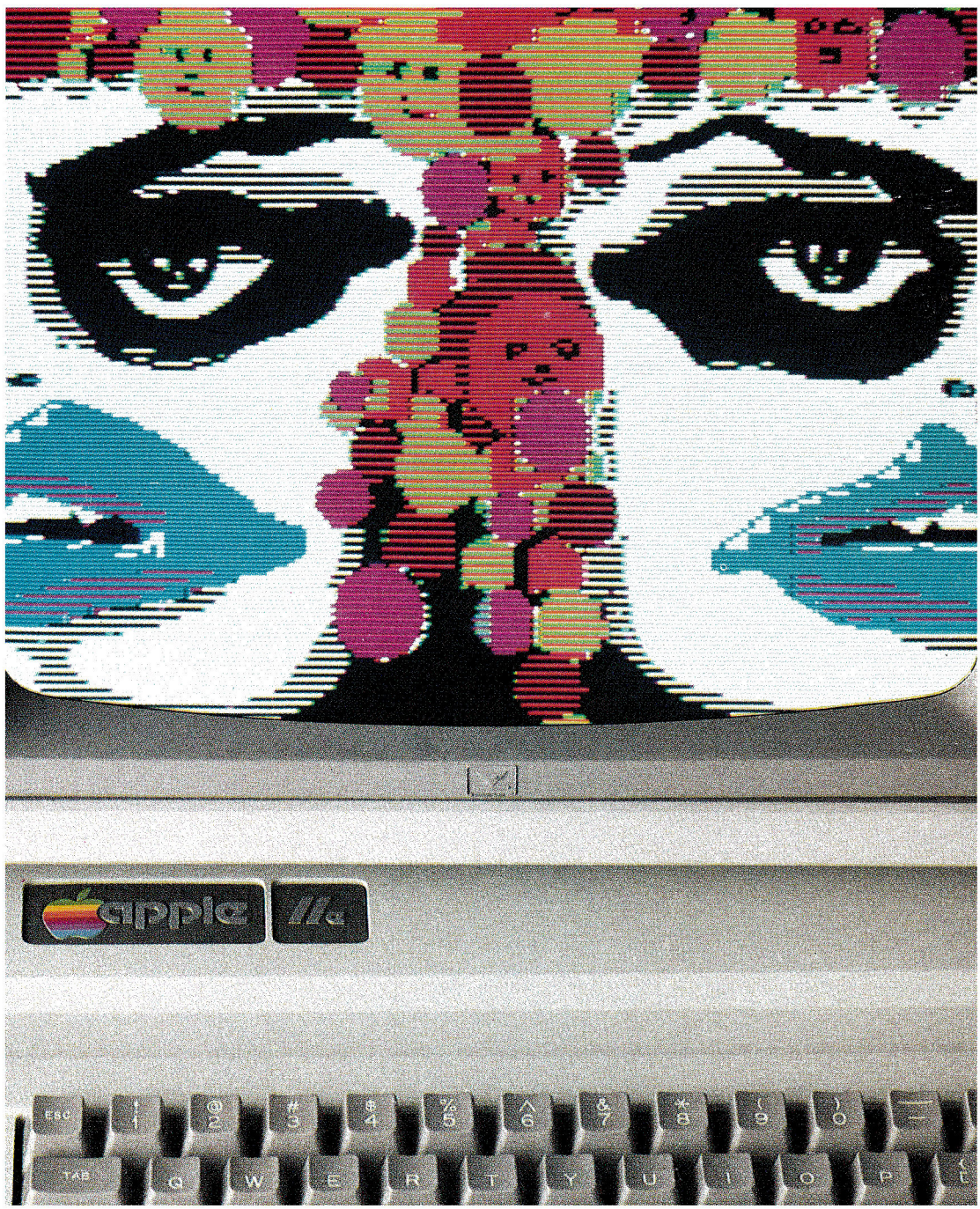
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VOLUME 1 ISSUE 2
DECEMBER 1983
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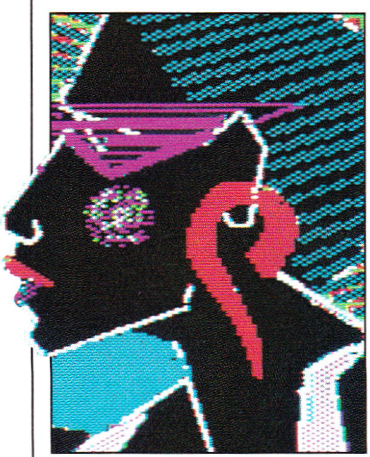
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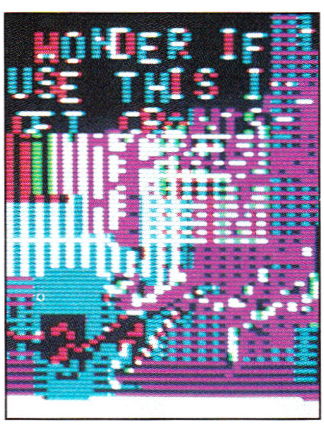
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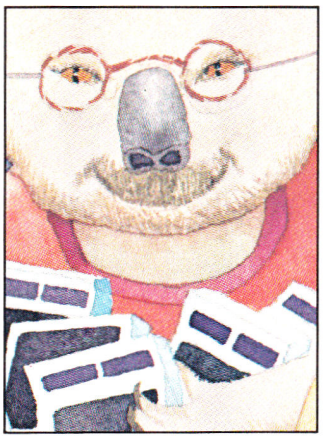
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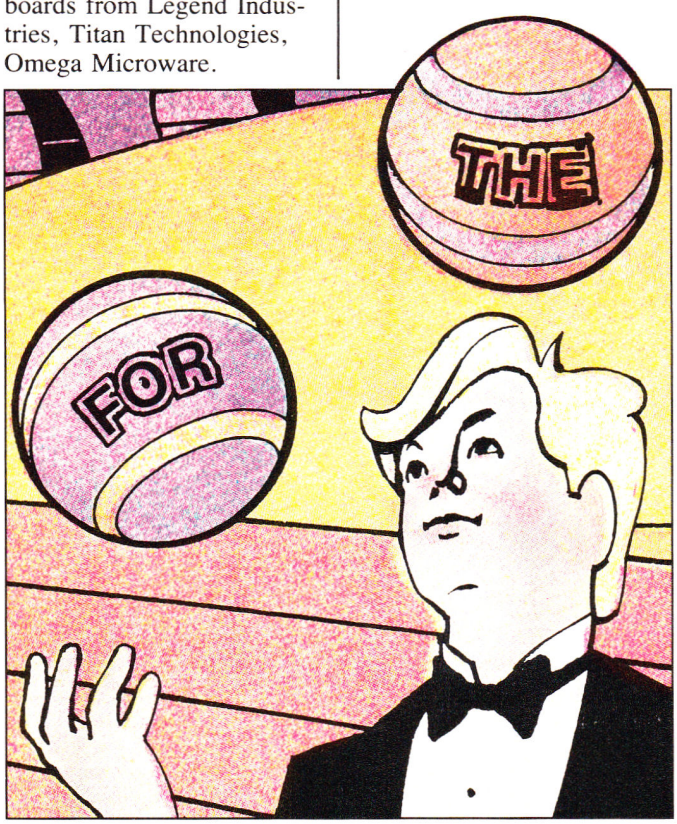
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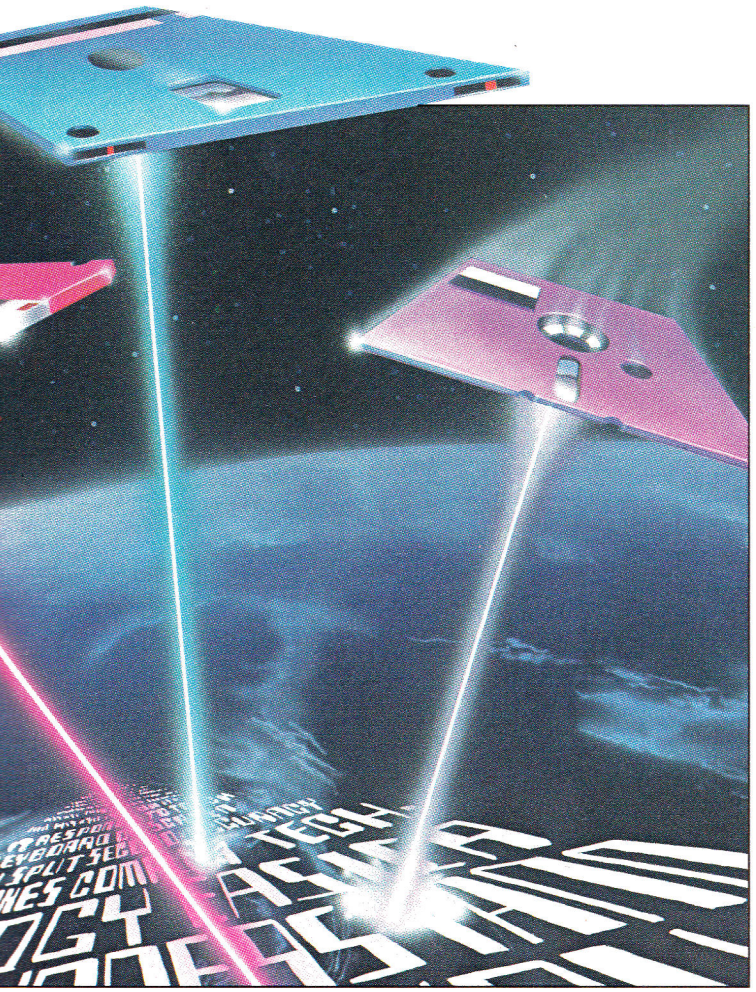
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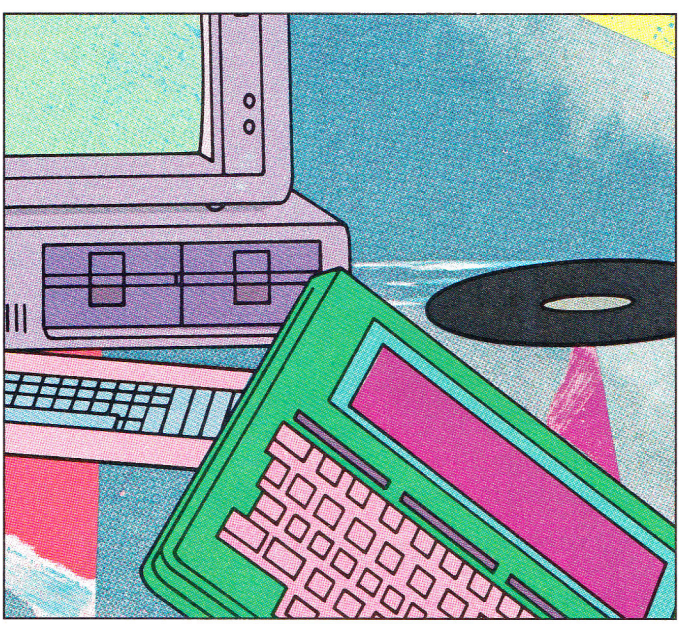
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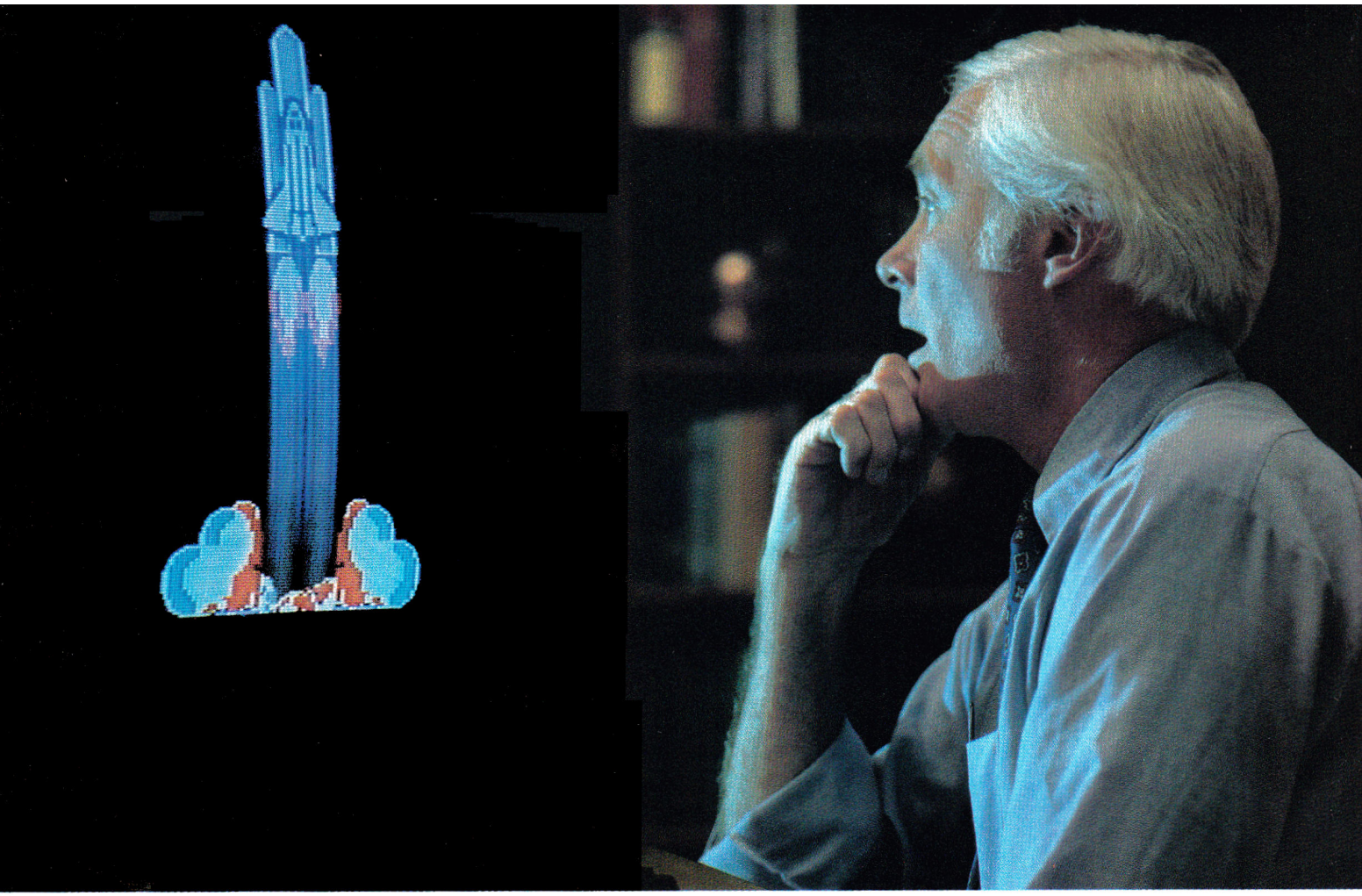
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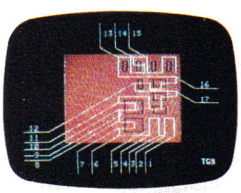


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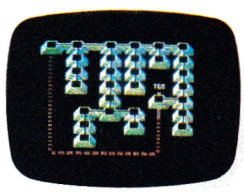


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Inside Apple

Vol. 1, No. 4

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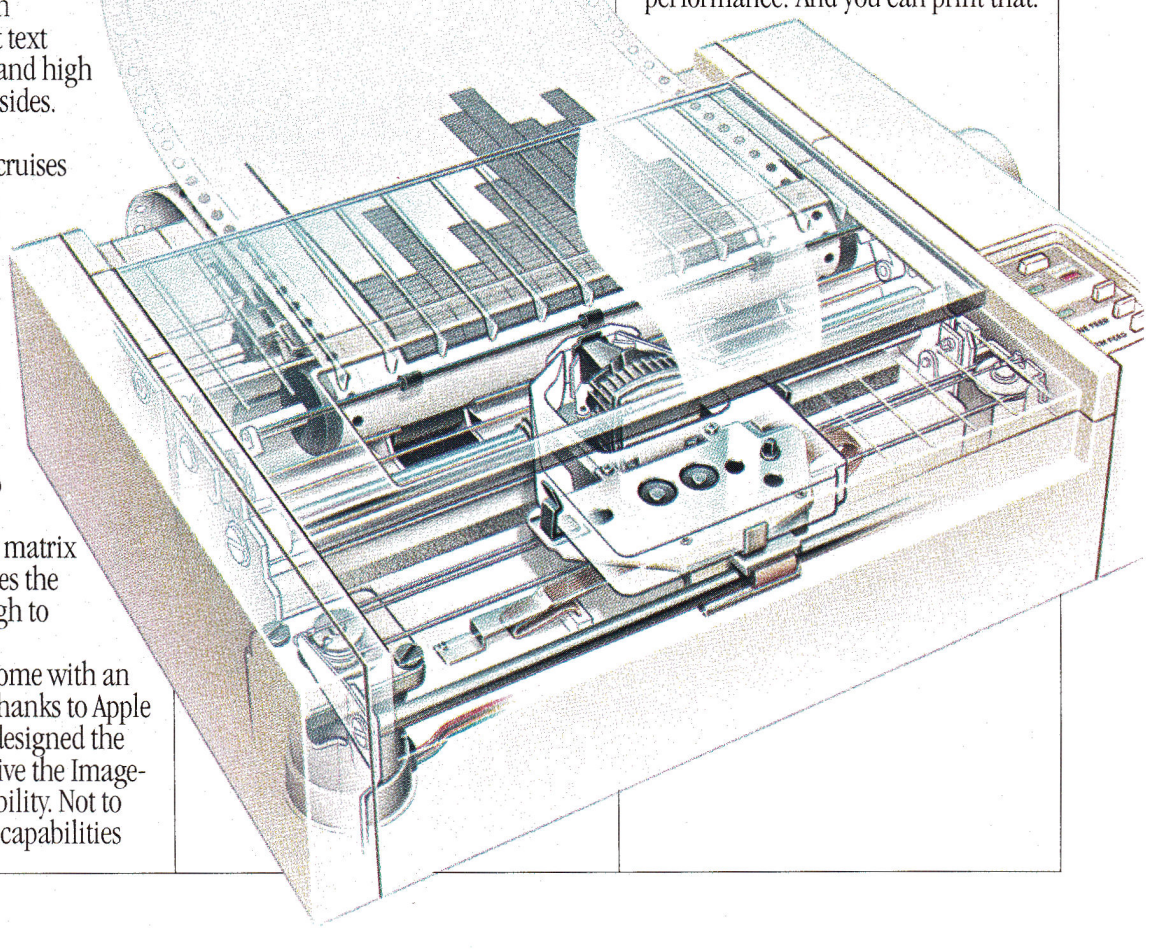
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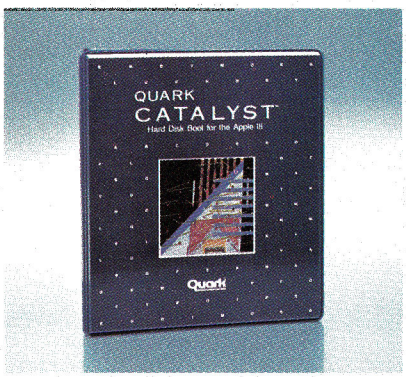
Catalyst allows you to take a wide variety of software programs and store them on your ProFile. Once they're on your ProFile, you just select the program you want from the Catalyst menu that appears on your monitor — then Catalyst does the rest. You'll never have to boot those programs again.

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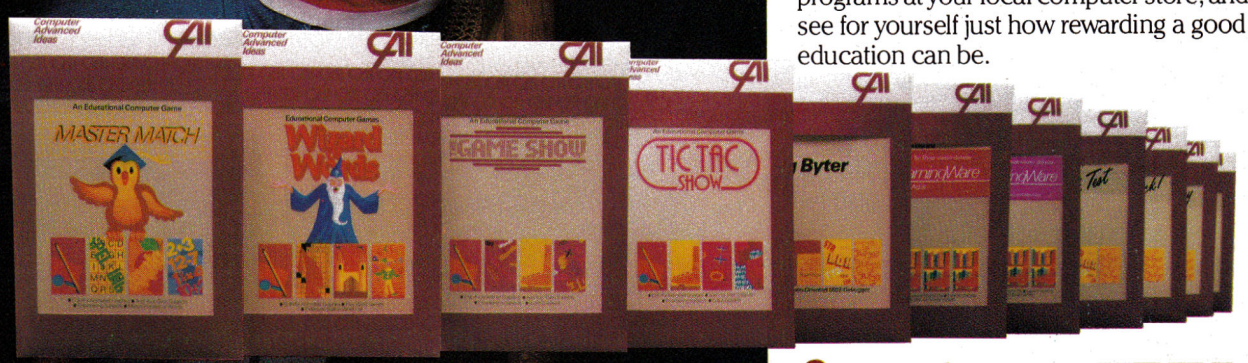
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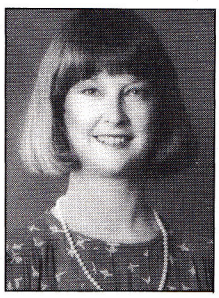
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CIRCLE 107 ON READER SERVICE CARD

EDITORIAL
A MESSAGE FROM MAGGIE



Welcome to the second issue of *A+, the Independent Guide for Apple Computing*. Our theme for this issue focuses on computer graphics, black-and-white or color images generated on a computer screen or printed out on paper. Businesspeople as well as artists are increasingly turning to these computer images in their efforts to communicate information aesthetically. Graphic images can take on as many forms as the imagination does. The only limitation has been the computer equipment and software that produce these images, but the tremendous advances in technology over the last several years have removed most limits on what you can produce with a computer.

Using graphics to aid communication is as old as mankind. The earliest examples we have found of using graphics to communicate ideas are some cave drawings in southern France. Fifteen thousand years ago, during the end of the Ice Age, our ancestors drew vivid and colorful images of the animals they hunted and revered. Although we will never be certain about the purpose of these drawings, we can speculate that they were used in religious and ritualistic rites to pass down traditions and customs. Trapping and killing a giant bison must have required a lot of planning. Depicting the tactics of capturing such a huge beast—on the ground or on a cave wall—could have aided the hunters.

How mankind first hit upon the idea of putting down information in a visual form and thus creating a system of writing remains a mystery, but archeologists tell us that this critical development occurred around 5000 years ago somewhere in the arid lands of Egypt and Mesopotamia. Early writers used symbols or pictographs to record their interpretations of daily life, the past, and what the future would hold. The Egyptian hieroglyphics painted on the interior walls of the giant pyramids represent a beautiful and intriguing example of graphic communication by ancient man.

From drawings of pharaohs and princesses, animals and gods, we progressed to symbols and finally to letters of various alphabets. As we advanced from pictures to letters, we did not abandon our need and desire to communicate with visual images, however. Even the earliest books included some form of graphic illustration. Now, as we move away from a labor-intensive industrialized society and further into an information-intensive technological one, graphics are becoming more and more important to help pare down the massive amount of information generated by the increased use of computers.

Like other groundbreaking developments, the new electronic art is sure to generate heated debate and controversy.

Before the advent of computer-generated graphics, graphs and charts had to be laboriously produced by hand or, even worse, by typewriter. Today, as personal computers become ubiquitous, graphs, charts, and illustrations are easier to produce and are therefore becoming more common. These graphs and charts will soon be considered crude compared to the advanced graphics software and hardware that is under development—that is not to say that we cannot produce some spectacular results with personal computers today.

In this issue we explore the multifaceted aspects of graphics in business and the arts. We have articles on using *VisiTrend + VisiPlot*, using *LisaDraw*, and producing business graphics on the Apple III. You can produce graphics on the screen and print them out on a printer—printer technology, like software technology, is making definite strides. One example of new printer technology is the ink-jet printer by Olivetti, which we review in this issue. We also cover the language aspect of graphics with articles on *Logo* and *SuperPILOT*.

An issue on graphics would not be complete without an article on the fine arts, so we have included a comprehensive article on how various people are using their Apples to produce works of art. You might doubt that electronically generated images are really art, but we maintain that computer-graphic images on a screen or in printed form represent a new form of art. Like other groundbreaking developments, the new electronic art is sure to generate heated debate and controversy.

Besides articles on graphics, product reviews, and our regular columns, we also have an interview with Steve Wozniak, who has recently returned to Apple Computer. His return is welcome, and his engineering talents have already been put to good use. I hear that he has developed a "mouse" cursor-controller for the Apple IIe, which may well be available by the time you read this issue.

I would like to apologize to Mike Markkula and John Sculley for misspelling their names in our first issue. That issue contained several other misspellings, which has thoroughly convinced me of the merits of spelling checkers—that's why we've included a review of *Sensible Speller* in this issue! One last tidbit: I hear that a color version of the Lisa computer will be announced soon—probably in December.

Don't forget to write us letters with comments and suggestions for articles you'd like to read, as well as questions for our Rescue Squad section.

Maggie Canon

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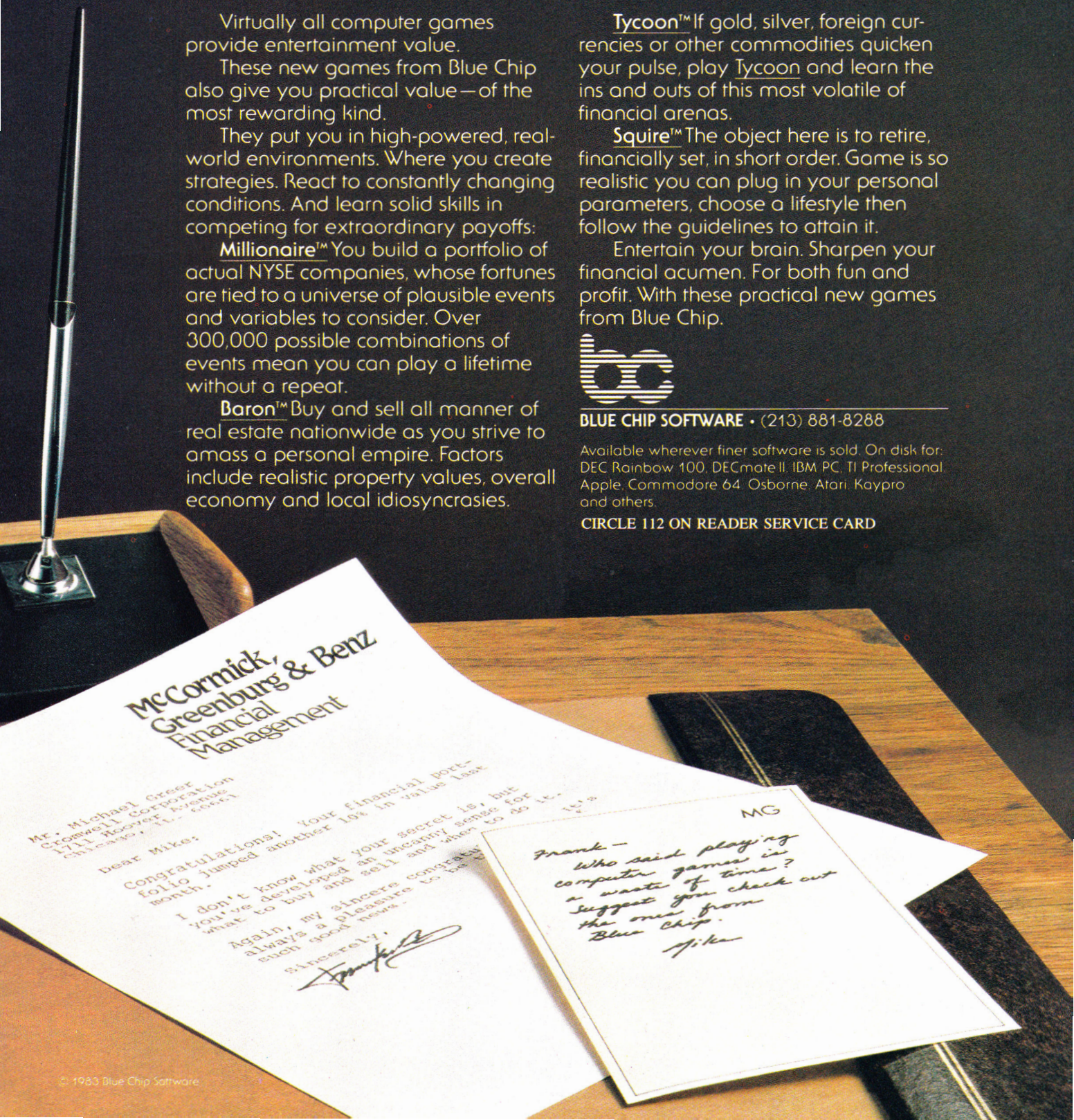
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OLD APPLE HELPS SWEEPS CLEAN

Maybe a computer *can* help almost any business. This month our vote for most unusual computer goes to Mr. Chimney Cricket Co., a chimney sweeping company that depends on an Apple III to keep its cash flow unclogged.

Owners John and Carolyn Cline found that the paperwork involved in a lucrative chimney-sweeping business was too much to handle alone, so they invested in a used Apple III, purchased from a friend. So far they've used the Mail List Manager software that came with their package, but are gearing up to use the computerized mailing list, word processing, and scheduling functions.

Right now, they say, the machine is almost too big for their business. But when the company has had a chance to grow into it, the Clines are sure they and their computer will be very well sooted.

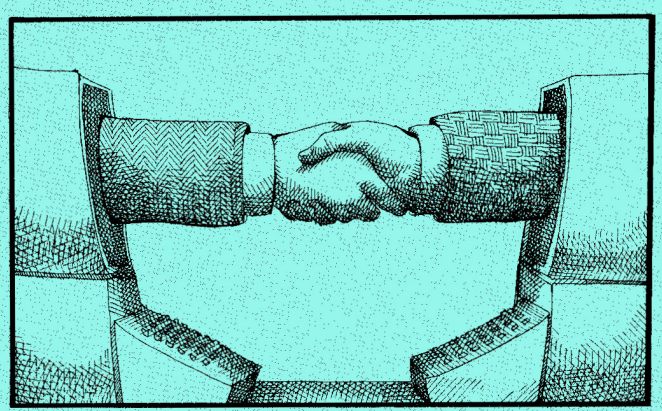


TYING INTO THE AQUARIAN NETWORK

What do you do with your computer after word processing and Pac-Man? A Washington, D.C.-based group called the Public Interest Computer Association is exploring the heady realms of computer-related social issues. It wants to pinpoint some other "appropriate" applications for the power of the silicon chip.

Marc Rothenberg, director of PICA, says, "We don't think technology is bad, but we'd like to ask questions a little more profound than whether this program can footnote."

PICA has two distinct purposes. It is, first, an adjunct and helper for nonprofit organizations, especially the smaller public-interest groups that can't afford to tie into an Apple network. Rothenberg told *A+* that PICA, as a membership association, sponsors sharing of resources among its various users groups through articles, seminars, and its newsletter, *Nexus*.



Second, PICA is an information clearinghouse on such computer-related topics as possible health hazards of VDTs, computerization and the workplace, and invasion of privacy.

Says Rothenberg: "Public-interest groups fall between the cracks in the computer industry; they're neither business groups nor home user groups."

For more information, contact PICA at 122 Maryland Avenue N.E., Washington, D.C. 20002 (202) 544-4171.

THE TABLET WRITES AGAIN

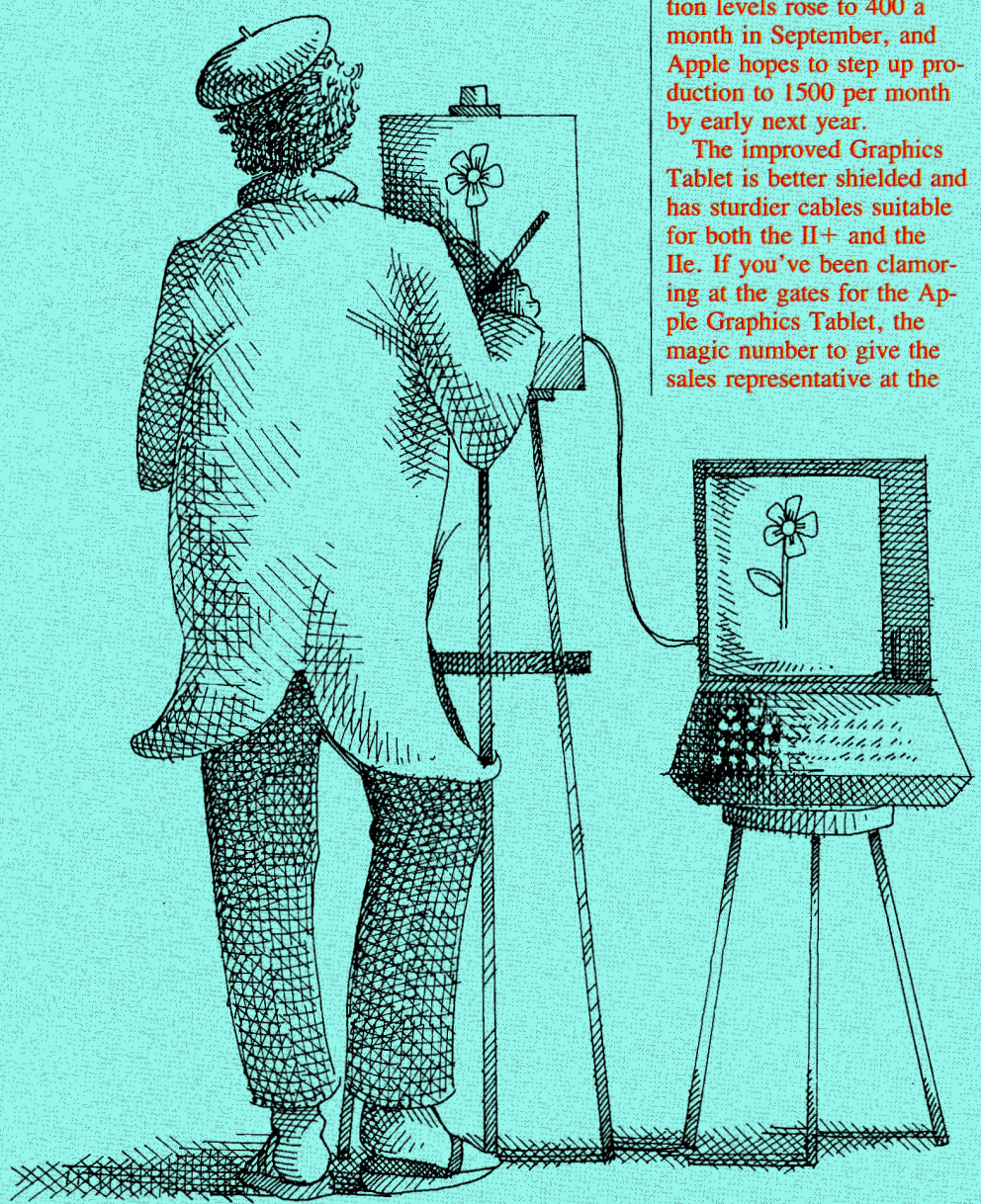
Good news for artists, draftsmen, and others interested in producing high-quality graphics with their Apple—the Apple Graphics Tablet is back.

The Apple Graphics Tablet, you may remember, was a flat tablet and a metal-tipped pen that plugged into a peripheral slot. With this tablet and the proper software packages, the user could draw on the screen by drawing on the pad, painting images in a wide variety of formats down to pixel-by-pixel detail. Many thought that the tablet was Apple's best graphics tool.

Unfortunately, this artist's best friend was out of production for about a year and a half, because it couldn't meet FCC standards for RF noise.

Now, however, 100 of the new FCC-approved models have been shipped to various engineering schools that had back-ordered the tablets. Production levels rose to 400 a month in September, and Apple hopes to step up production to 1500 per month by early next year.

The improved Graphics Tablet is better shielded and has sturdier cables suitable for both the II+ and the IIe. If you've been clamoring at the gates for the Apple Graphics Tablet, the magic number to give the sales representative at the store is A2M2007; the cost is a paltry $795.



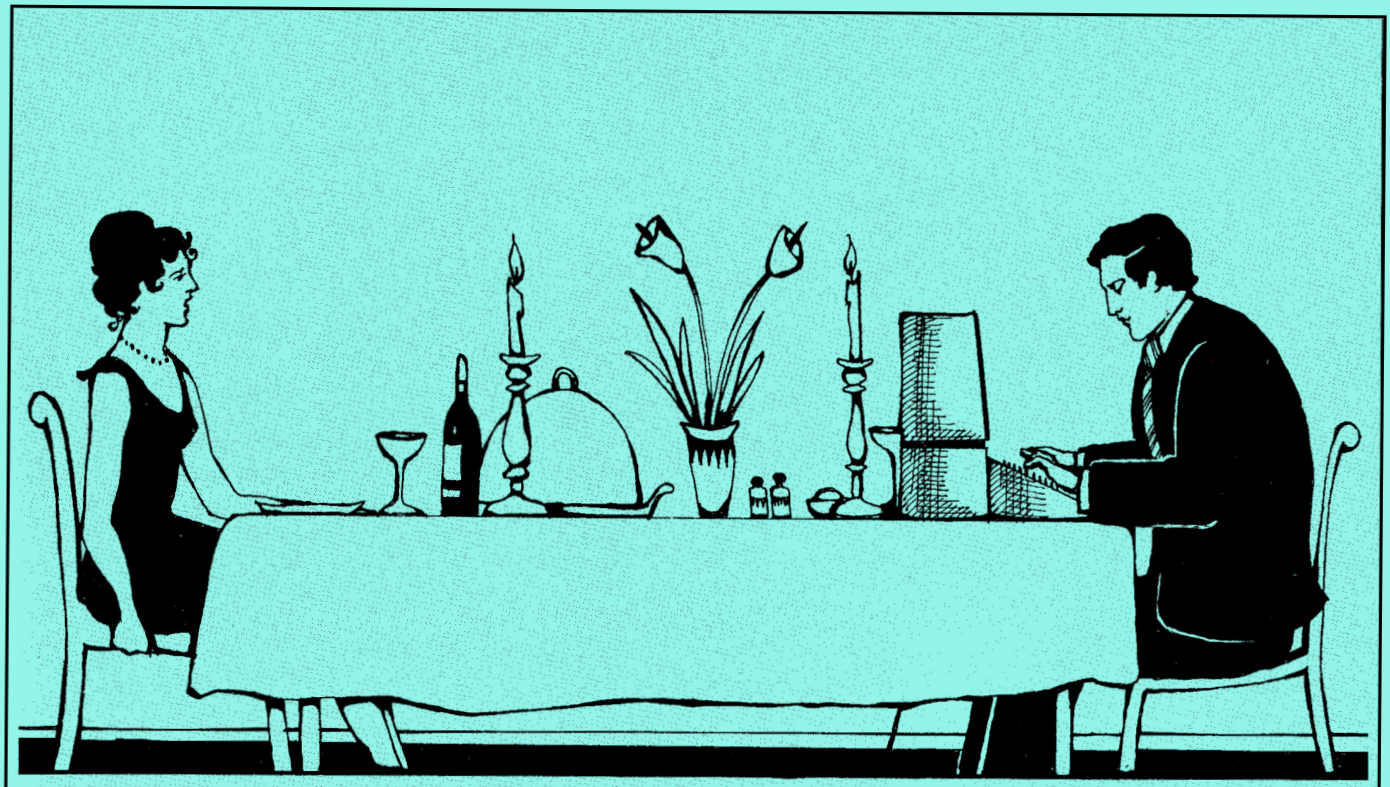
HOW TO LOVE A HACKER

Does your spouse make a beeline for the Apple in the den after giving you only a quick hello and a peck on the cheek? Feeling abandoned?

Then blow out the candles on that neglected romantic dinner, sit down, and face it. You are married to a data fiend. As San Diego psychologist Thomas McDonald would say, your spouse is a "sci-tech" personality. So, he explains, you'd do well to learn certain tricks to help you cope with this modern problem.

First, McDonald advises, apply the scientific method. Your mate is used to dealing with things that are patient, don't criticize, never tire, do what they're told, and don't care how one looks. Experiment with ways to help your hacker ease back into human relations.

- Don't spring things on your spouse suddenly. Your sci-tech mate doesn't make quick decisions and probably doesn't like spontaneity, either.
- Ask yes-or-no questions. For example, instead of saying, "Well, what do you think?" try, "Do you want to see the movie tonight?"
- Get acquainted with the computer rather than resenting it. It's not the computer's fault.
- "Hear" your mate's non-verbal messages of



affection. Sci-tech types often have trouble speaking their feelings.

- Finally, find other interests of your own. Maybe *you* are the one who can put the zing back into your life.

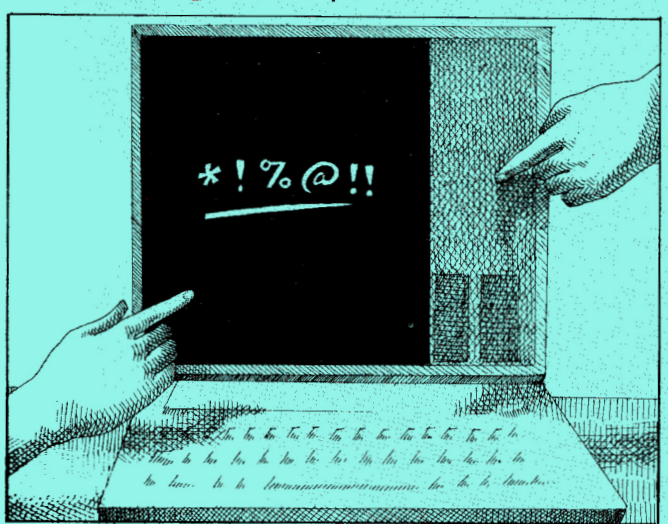
THE NAME-CALLING GAME

If you've been suppressing a string of perfect putdowns all day long at the office, if you cherish a secret desire to emulate Don Rickles, or if you simply want to take the gloves off and dig into a good insult-fest, here's the program for you.

Unload that torrent of venom at your hapless Apple II or IIe with the aid of an interactive insult game called *Abuse*. "You insult *Abuse* and *Abuse* insults you," say the instructions. Manufactured by Don't Ask Computer Software in Los Angeles, *Abuse* lets you either exchange putdowns with your computer, as in the Insult Exchange in the comic strip *B.C.*, or hunt the secret words in a special game option.

Abuse, like the more famous interactive language program *Eliza*, keeps a set of key words and responses for you to ferret out. For example, if you malign the name of Apple Computer, the game will snap back, "Don't make fun of the Woz." Other choice rejoinders include, "May sadistic weathermen pour mayonnaise on your best friend," "Wise up, you dull-witted heap," and "Your inner self saves dead cats."

If you don't like those insults, think up your own, you nauseating Neanderthals. Now get outta here, I mean it.



IS THE MACINTOSH BUTTONED UP FOR THE WINTER

Macintosh, the newest fruit Apple Computer will bear, comes out a little off season—in January.

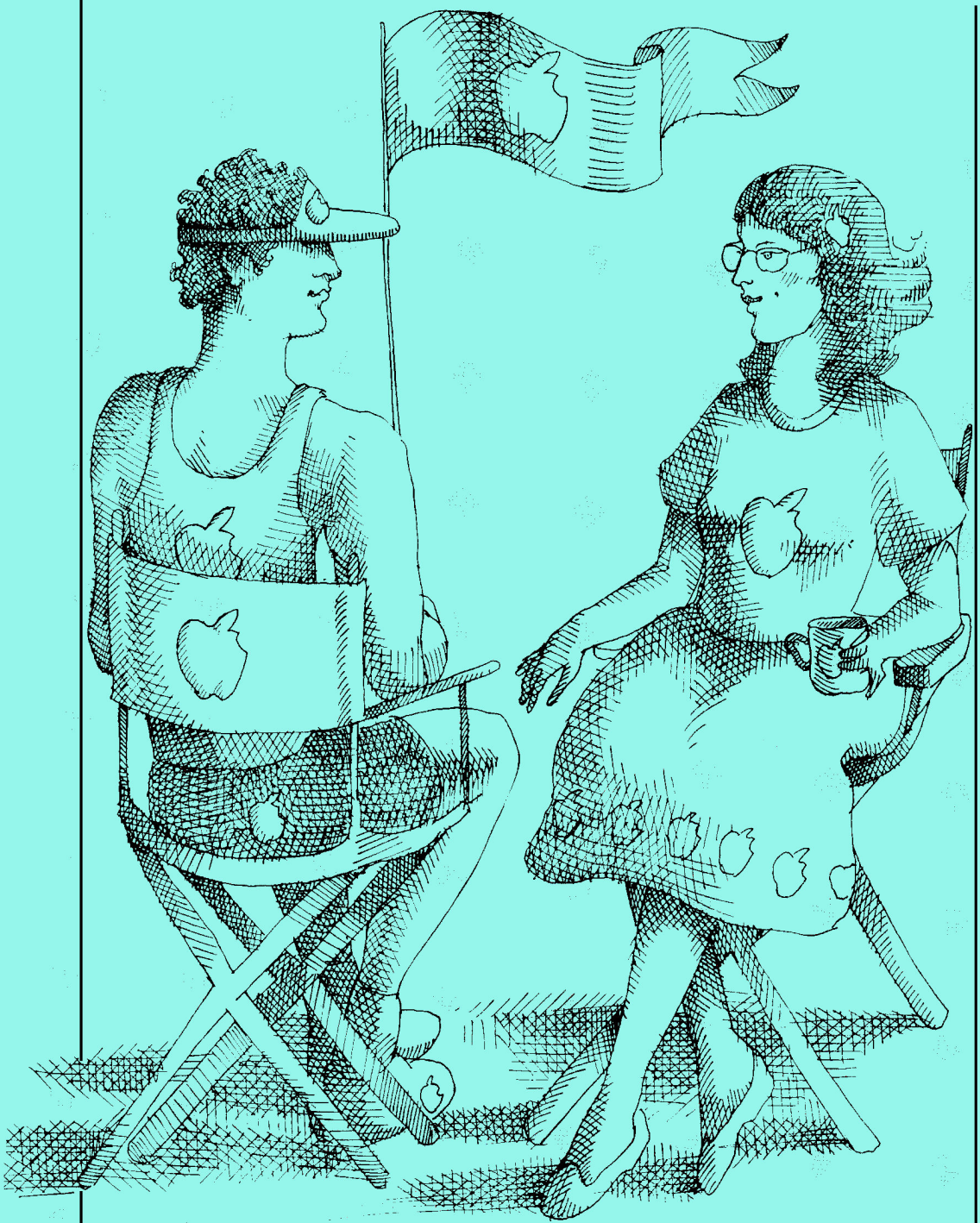
Originally, the new machine was scheduled for release earlier but reportedly was delayed. Not much is known about the Mac, but what is, is that the new computer will be like the Lisa, but cheaper. And, according to Apple president John Sculley, the new machine will be compatible not only with the Lisa and other Apple products but the IBM XT as well.

An innovation connected with the 68000 chip would allow compatibility between the two companies' computers. This chip accomplishes the interaction by allowing the Macintosh to emulate the XT.

THE KIDS NEED NOT WAIT

Computers have gone to 5000 schools as part of Apple's "Kids Can't Wait" program. As far as Linda Merrill is concerned, that means the program is right on target.

"They're just shipping them as fast as they can," said Merrill, who oversees the program through the Apple Foundation. In all, 9250 schools will receive the complimentary computers. According to Merrill, the 5000 shipped fits right into the original plan of dispatching them between July and September at a rate of 3000



per month.

The eligible schools include all the public schools in California, as well as nonprofit private schools with enrollments exceeding 100, private special-education schools regardless of enrollment which are state certified and nonprofit, and other selected institutions.

Teacher Education and Computer Centers throughout California will receive five Apple systems instead of a one.

To participate in the program, each school was required to complete an orientation session with a dealer. The number of eligible schools that didn't respond to Apple's offer was "almost negligible," said Merrill, "and they're working on followup on the others."

The systems, which retail for $2364 each, total an actual cost to Apple of $5 million, or $1 million in after-tax costs. On the retail market, the systems would fetch more than $21 million.

APPLE PANS DOWDY

Imagine how stylish you'd feel working at your Apple II+ in a satin jacket, sweat pants and lapel pin, all bearing the Apple logo?

Well, dream no longer. Apple Computer, Inc., has just come out with The Apple Collection, a line of private-label clothing and personal accessories, each displaying Apple's rainbow insignia.

Sweatshirts, running shorts, gear bags, jewelry, and Swiss Army knives are among the items in the collection. There also are cocktail napkins, sailboards, beer mugs, director's chairs, and wall clocks.

For more information contact: The Apple Collection, P.O. Box 306, Half Moon Bay, CA 94109. And, remember, Christmas is just around the corner.

THE JOB CORE

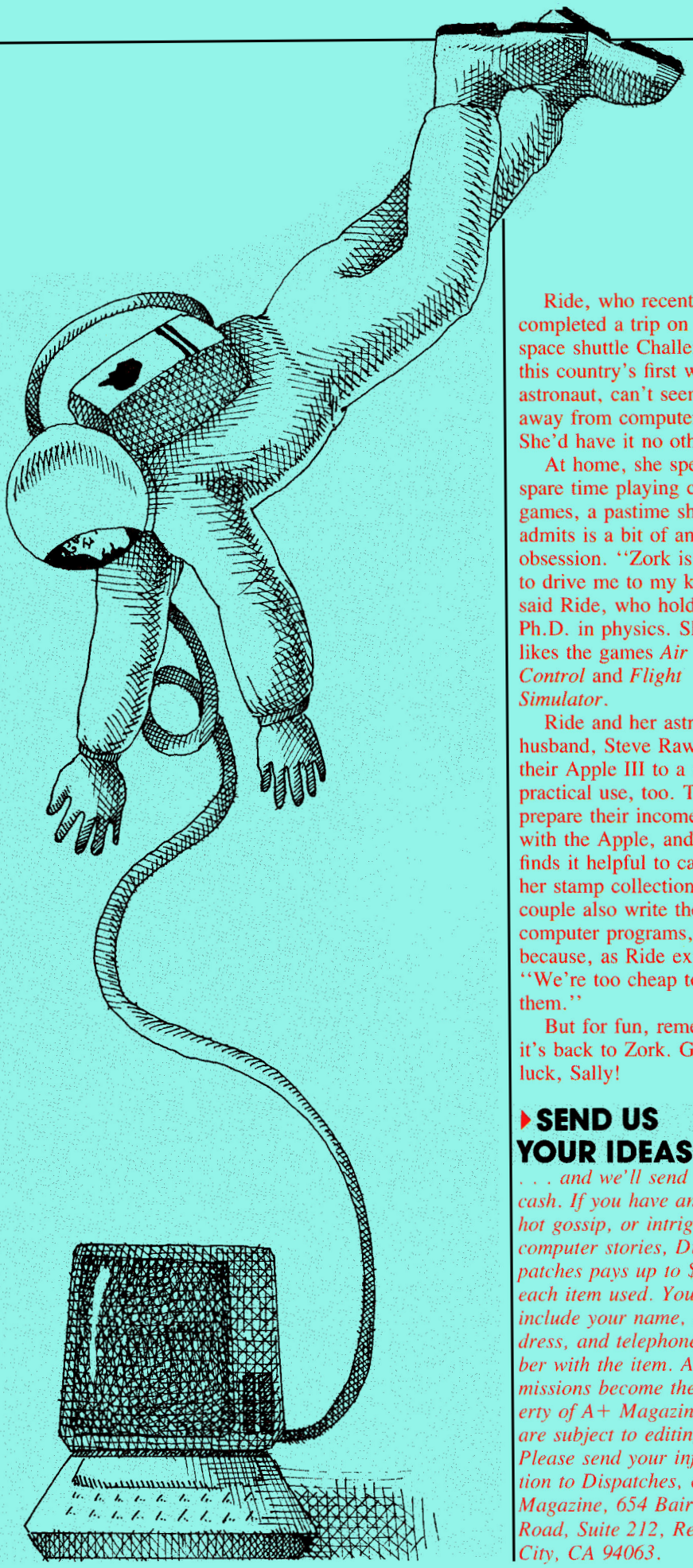
"What in the world am I going to do about getting a job," your teenage son or

daughter asks you plaintively. Before you send him or her to stand in the unemployment line, you might investigate a career-guidance system called *Career Directions*.

This menu-driven occupational guidance counselor assesses the user's interests and preferences, analyzes the information, and classifies it into one of 12 different categories, from art and science to (believe it or not) physical skills. In-depth data is available for 460 specific occupations, based on breakdowns from the U.S. Department of Labor Statistics.

Once the student knows where he or she wants to go, the program offers a planning guide that shows the most profitable paths to vocational schools, two- or four-year colleges, or even (shudder) directly onto the job market.

Career Directions was originally manufactured by Systems Design Associates, Inc., a firm in Charleston, West Virginia, as an aid for guidance counselors at the junior high or lower-level high school. However, the system is available to any individual with an Apple II, II+, or IIe. It might come in hand as an antidote to those post-recession blues.



After a hard day of training on life-supporting computers used in space travel, what does astronaut Sally Ride do for fun? Hit the computers once again.

Ride, who recently completed a trip on the space shuttle Challenger as this country's first woman astronaut, can't seem to get away from computers. She'd have it no other way.

At home, she spends her spare time playing computer games, a pastime she admits is a bit of an obsession. "Zork is going to drive me to my knees," said Ride, who holds a Ph.D. in physics. She also likes the games *Air Traffic Control* and *Flight Simulator*.

Ride and her astronaut husband, Steve Rawley, put their Apple III to a more practical use, too. The two prepare their income taxes with the Apple, and Ride finds it helpful to catalog her stamp collection. The couple also write their own computer programs, because, as Ride explains, "We're too cheap to buy them."

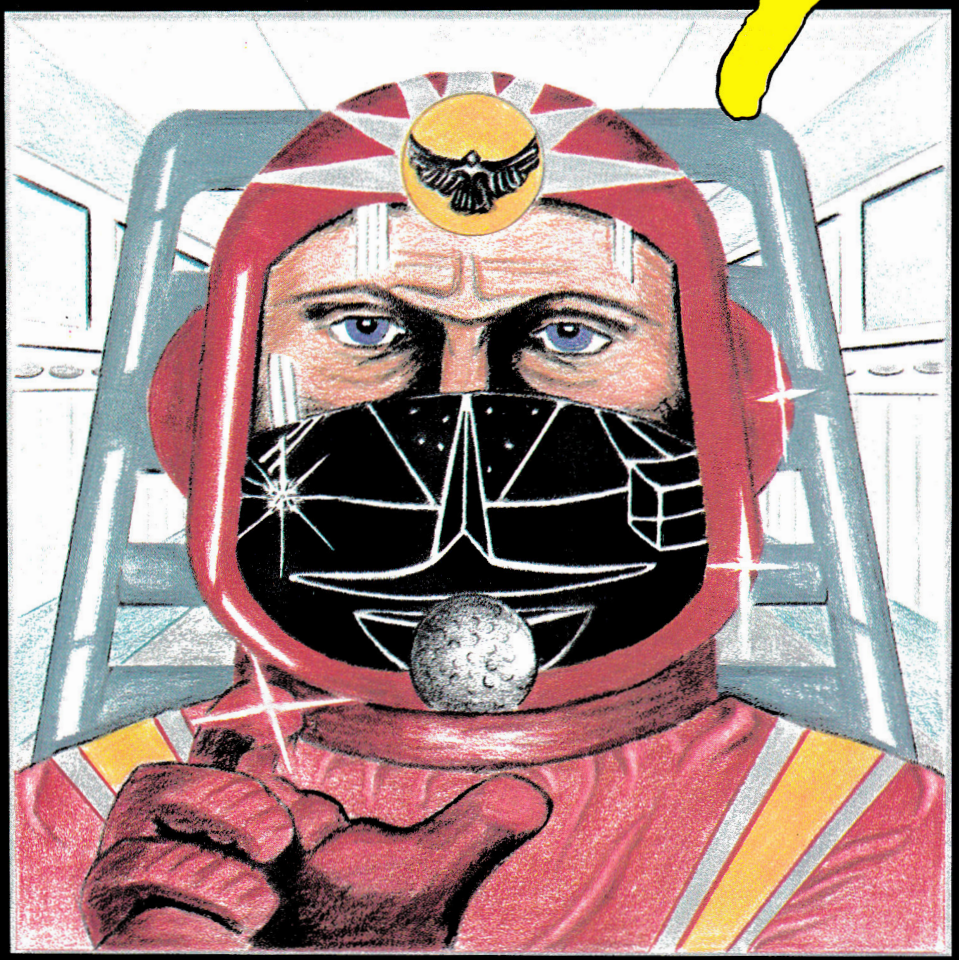
But for fun, remember, it's back to Zork. Good luck, Sally!

SEND US YOUR IDEAS...

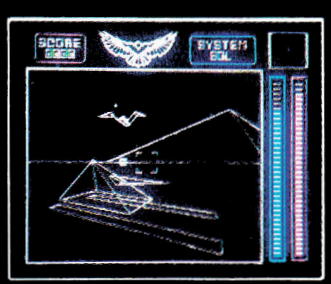
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STELLAR 7

by Damon Slye ™



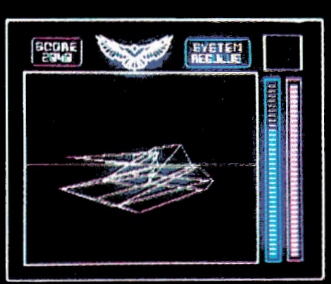
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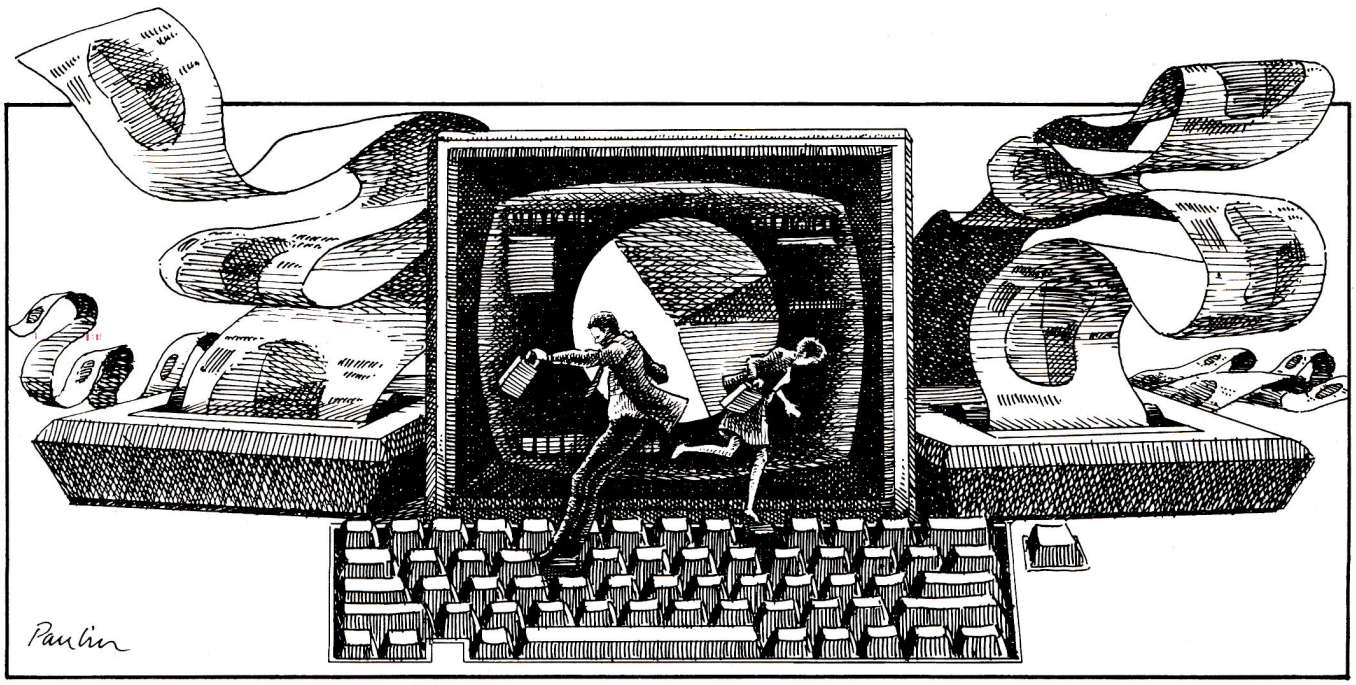
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CIRCLE 133 ON READER SERVICE CARD

THOUGHTWARE/BY STEVE ROSENTHAL

You don't have to know about the inner workings of your Apple to use its graphics abilities, but it can't hurt.



BITS, STROKES, DOTS

One of the essential characteristics of good computer systems is that you can get useful results from them without knowing much about exactly how they work or what goes on inside. A companion characteristic is almost always that you can get better results, the more you know about the process.

Using graphics on Apple computers certainly fits this description. Although you don't need special knowledge of graphics to happily use one of the many commercial graphics programs for the Apple II or III families or *LisaDraw* on the Lisa, you might want to know something about what goes on behind the screen, to make the most of your system.

Graphics and Apples have always been closely linked—affordable graphics is one of the key attractions that has made the Apple II such a popular machine. By making some clever uses of memory and some judicious trade-offs, the Apple II provides good-quality images without special added graphics boards or memory.

Similarly, the Apple III allows for full color with medium detail, limited color with finer detail, and black and white for the sharpest image. And the Lisa, though limited to black and white, offers fine enough detail to be able to show not only graphics, but also to include labels within images in a half a dozen recognizably different type styles in a whole range of sizes.

Graphics and Apples have always been closely linked.

The on-screen end of the graphics is just the final product. Before your software can show you invaders from space, chart your sales figures, or illustrate your math lesson, it has to rely on what is inside the skin of your Apple.

Vectors, Strokes, and Rasters

In general, displays divide into two major families. One is called vector or stroke graphics, while the other is called raster graphics—all the Apples use raster graphics.

Vector-graphic systems draw the image by compiling a list of line segments (the vectors), and sending them out to a hardware subsystem that writes each line segment on the screen (the stroke generator). On many systems, additional hardware circuits make arcs and circles, which otherwise would require many small straight lines.

The circuitry for vector graphics is

relatively costly, and its designers need a detailed knowledge of the output-video display. Because it takes time to draw each line segment and the whole display must repeat frequently enough to prevent visual flicker, the total line capacity of each vector-graphic image is limited. Text characters in particular must be limited, as they contain many small strokes and curves.

Raster-graphic systems, on the other hand, make each image out of a regular grid of dots. By turning the appropriate dots on or off, raster-graphic systems can form characters, shapes, and complete images. The necessary circuitry is much simpler, and showing a completely full screen is just as easy as showing an empty one.

The raster part of raster graphics comes from the way the video system draws the dot pattern on the screen. Just as with the video image in television, the video system sweeps a beam across the screen in a series of lines, with each line just underneath the last, to create a raster graphic.

In television and similar forms of video, the brightness of the beam can vary as it sweeps out each line, giving a picture with shading gradations. With computer graphics, the beam simply turns on and off, so at each of the specified dot positions the result is either a bright or dark spot.

Adding color or shading to a raster-graphics picture is conceptually simple. At each dot position, several bits of memory keep track of not only whether the particular dot is on or off, but also how brightly it should be lit and in what color. The system can encode these values or set each possible shade or color on a separate layer of memory bits (called a memory plane).

The price you pay for the convenience and lower cost of raster graphics is threefold. Because images are made of limited numbers of dots, edges can appear jagged, especially on diagonal lines; because each dot must be individually set, a relatively large number of operations is necessary to construct an image; and because each point requires one memory bit, whether it is dark or lit, a blank or sparse image takes the same amount of memory as a highly complex drawing.

Enter the Software

Although some hardware approaches can help overcome these limitations of raster graphics, the solution on most microcomputers has been to turn to software. Using the appropriate software, a raster-graphic system can provide many of the advantages of vector graphics, while keeping the flexibility, low cost, and video compatibility of the raster method.

The problem of jagged edges is perhaps the hardest to fix in software. Because a screen is made up of definite dot locations aligned in horizontal and vertical rows, any line that is even slightly off from the vertical or horizontal must travel some distance along one of the available directions, jump a single dot, travel some more, jump another single dot, and so on. Each jump is visible, especially because our visual-recognition patterns make us particularly sensitive to breaks in lines. Unfortunately, complete software solutions for this problem require far more dots than what is available on the Apple II and III.

The problem of jagged edges is perhaps the hardest to fix in software.

The large number of instructions necessary for creating each image doesn't present an insurmountable problem. For other kinds of programming, high-level languages let the computer itself translate each high-level-language statement into more machine-level statements. Similarly, software routines can translate higher-level graphics commands into the individual dots that make up an image.

On the Apple II, for example, instead of having to set each image bit directly, you can instead call upon a set of routines in the permanent ROM software to translate more complex commands into dots. Or, even better, you can use the built-in plotting commands of Applesoft or Integer BASIC. Best of all, you can use several languages (such as Logo or PILOT) and programs that take care of all the details for you.

Using high-level graphics commands is also one way of saving space for storing graphic images. If you have created the graphic by using a high-level language or at least the ROM routines, you may be able simply to store the description in this original form. Although this approach means that the software has to retranslate the description into dots each time, it can save large amounts of storage space.

Using the software to translate instructions into bit-map form also means that graphics can be written in vector form but actually drawn with rasters. Just as the vector-generating circuitry on a vector-graphic system translates a display list into on-screen lines and arcs, software programs can take a display list and use it to turn the correct bits in the map on and off. Although this process takes more time than having the hardware do the translation, it does allow programs and applications that more naturally use vector-graphic representation also to run on raster-graphic computers such as the Apple.

Graphics on the Apple II

The Apple II has two separate systems for producing graphic images. The true graphics system is called Hi-Res (high-resolution) mode, while an added Low-Res (low-resolution) mode shares memory space and circuitry with non-graphic text presentation.

In hi-res, dots in a grid 320 across by 192 down form the on-screen image. The Apple II circuitry makes the image by reading the state of the bits in an 8192-byte-long area in memory and translating the bits into light and dark dots. Since this image-refreshing process occurs 60 times per second, any change in the bit map seems to be reflected instantaneously in the image.

Actually, reading the bit images is a little bit more complicated, because the high bit of each byte is for color information. Starting with the low bit of location 8192 (equal to $2000 hexadecimal), each one of a group of seven bits (skipping the high bits of each byte) represents one of 320 dots on the first line or the succeeding dots on each of the 191 other lines down the screen.

Another slight complication is that there are actually two separate memory areas for the hi-res bit map. Along with the page 1 area at location 8192, there is also a second page of the same size at location 16,384.

These two memory-bit maps are essentially coequals. The bit contents of the two memory areas are completely independent, but only one at a time connects to the video circuitry to create the on-screen image. By having the software access a particular memory location, a program can switch from showing the image corresponding to page 1 to showing page 2, or back the other way.

Conceptually, however, we can think of the Apple screen as simply the visible image of the bit map. To change the image, we simply change the map. Furthermore, because hi-res graphics are just bit patterns, it does not matter what process we used to create them. An image a BASIC program makes carries no hint of its parentage, and we can use it

just as well in an assembly-language program. A drawing pad or light-pen can find use in an Applesoft animation program.

Apple II Color Graphics

When the Apple II and even III were designed, memory was still too expensive for the computers to offer more than one plane of video memory at an affordable price. As a result, some clever data-compression techniques were used to allow full color graphics with only a small increase in memory usage.

Two methods on the Apple II compressed the color information into fewer bits. The first method grouped colors into two families and used one bit for every seven dots to pick the color family. The second made the position of each dot on the screen part of the color specification along with the bit map.

The two Apple color families are red and blue plus black (no color) for one family, and violet and green plus black (again, no color) for the other. The Apples form other colors, including white, by setting adjacent dots to the needed constituents and letting our eyes add them together.

The high bit of each byte sets the color family for the seven dots that byte controls. If the high bit is a 0, then the family is black, violet, and green. If it's 1, then the dots will be black, red, or blue.

Stripped of the technical details, this means that in a short horizontal region of the screen, you can't mix violet and green with red or blue.

Within the two families, we still have the question of which color goes with each dot. In the Apple family, the method is simple: any dot that is an odd number of dots in from the left side must be green, red, or black; any dot in an even-numbered column must be violet, blue, or black. Column numbering starts with column 0.

Since only one color family is active in each byte, knowing the column number and the family tells us precisely what color should display for a hi-res bit set to a 1. If the color-family bit is high, then odd dots are red and even dots are blue. If the color family bit is a 0, then odd dots are green and even dots are violet. No matter what the family or position, a 0 in the bit map leaves a black dot on the screen.

All of this information translates into a slight restriction on what you can do. If you want to draw a vertical line in color, only some vertical positions can be certain colors. If you want a color other than red, violet, blue, or green, you'll have to make your figure at least two dots wide to let your eyes combine adjacent dots.

Low-Res Graphics

The second graphics mode on the Apple is called *low-res* because it divides the screen into only 48 rows across with 40 boxes per row. Unlike hi-res, which has its own reserved space in memory, low-res graphics shares the same space with the text area.

In fact, you can think of low-res almost as a text mode with a special character set. Each character is two squares high, and each square can be any of 16 colors (counting black and white as two colors). By simple multiplication, you can see that with 16 possibilities for the top square and 16 for the bottom, each pair has 256 possible combinations, precisely the number that fits in a single byte.

The software sets a specified memory-location pair so the Apple circuitry knows whether to interpret this common memory area as text or as graphics. By accessing the text switch, a program tells the hardware to use the text character set and interpret the bit patterns as letters. On the other hand, if the low-res graphics switch was last accessed, the circuitry interprets the bit patterns as instructions on how to make blocks.

Unlike hi-res, which has its own reserved space in memory, low-res graphics shares the same space with the text area.

The actual memory location for the low-res and text area is the 1024 bytes of memory starting at $0400 (equal to decimal 1024). Just as for hi-res, a second page reserves 1024 characters, starting at $0800 (2048 decimal).

If you happen to have done the multiplication for this one, you may have noticed that the 64 characters reserved for low-res won't fit on the screen. Since the screen doesn't have room for them, the byte positions become available for the use of I/O cards—not even a byte is wasted.

Mixed Modes

Many applications need to let you easily add text to a graphic image. Hi-res achieves this ability by treating letters as graphic images and having their dot patterns moved into the bit-map area of memory. In low-res, however, the

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blocks are too coarse to permit their use for text.

Hardware that allowed the free mixing of text and graphics would be the best solution. Although the appropriate circuitry would have been too complex for the Apple II, we do have a good partial solution. Under control of the software, the Apple can split off the bottom sixth of the screen and leave this area in the Text mode rather than using it for low- or high-resolution graphics. Thus, software programs can add labels to drawings, ask questions, or report on what they are doing or how far a process has gone.

In fact, most Apple programming languages assume that you'll want a mixed mode. When an Applesoft program issues the HGR command to switch to hi-res graphics, the default assumption is that you want hi-res on the upper portion of the screen and four text lines on the bottom. If you want all graphics, you have to peek or poke the soft switch that sets the All Graphics mode. Similarly, the GR command converts only the top five-sixths of the text/low-res screen to graphics.

Graphics on the III and the Lisa

By the time the Apple III was designed, memory was more affordable, and the page structure allowed for a basic memory size larger than 64 kilobytes. Consequently, more memory was available for allocation to the screen bit map, which made more detailed images and more color possible. Full hi-res color was still too big a leap, however, so the III also uses data-compression techniques for hi-res color images.

In black and white, the Apple III has a 280 × 192 mode, just like the Apple II and it also has a 560 × 192 mode, with twice as many points. This mode doubles again in the new III Plus, which has twice as many vertical lines per picture.

The III has two different color-graphics modes. One is a full 16-color mode, with medium resolution, while the higher-resolution mode offers a more limited choice of colors.

In the first mode, with 140 dots across, any of 16 colors is available at every dot position. Odd and even dot position have no restrictions or any effect on neighboring dots if you change one dot.

With the right software, an Apple III in this mode, along with a good color monitor, can produce quite lifelike color pictures of scenes that don't need fine details. Although lacking the graduations of color and intensity possible on a traditional video system, the III partially compensates with the ability to let you control each individual dot.

If you want to trade some of that color freedom for higher resolution, the III also offers a 280-dot-per-line color mode. In this mode, each region of seven horizontal dots is assigned two possible colors (which can include black or white). Then, within each group of seven, each dot can be assigned either of the two available color values.

If you use a Lisa, then the color vs. detail trade-off has been made for you. The Lisa has no color graphics mode. Instead, it features a dot resolution of 364 lines high by 720 dots across. Because the connection between memory and screen is through software, the bit map can be allocated anywhere in the Lisa's megabyte memory. Consequently, if your software needs extra bit maps for animation or for constructing one image while showing another, that's no problem at all.

So, there are some of the possibilities. In the other graphics articles in this issue, you'll get some idea of what other people have done with Apple graphics. If you'd like to be a program author as well as user, plenty of unexplored applications are still waiting for you. ✚

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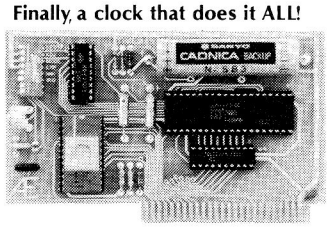
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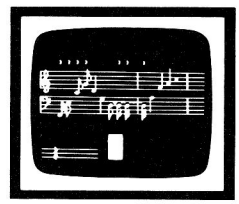
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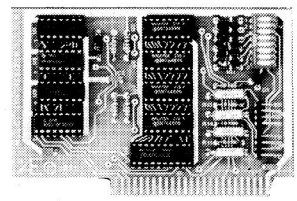
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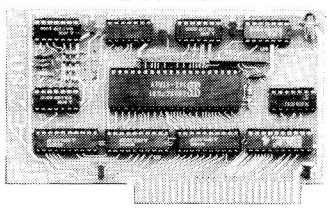




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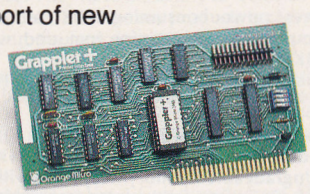
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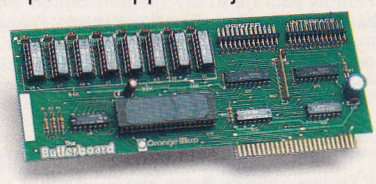
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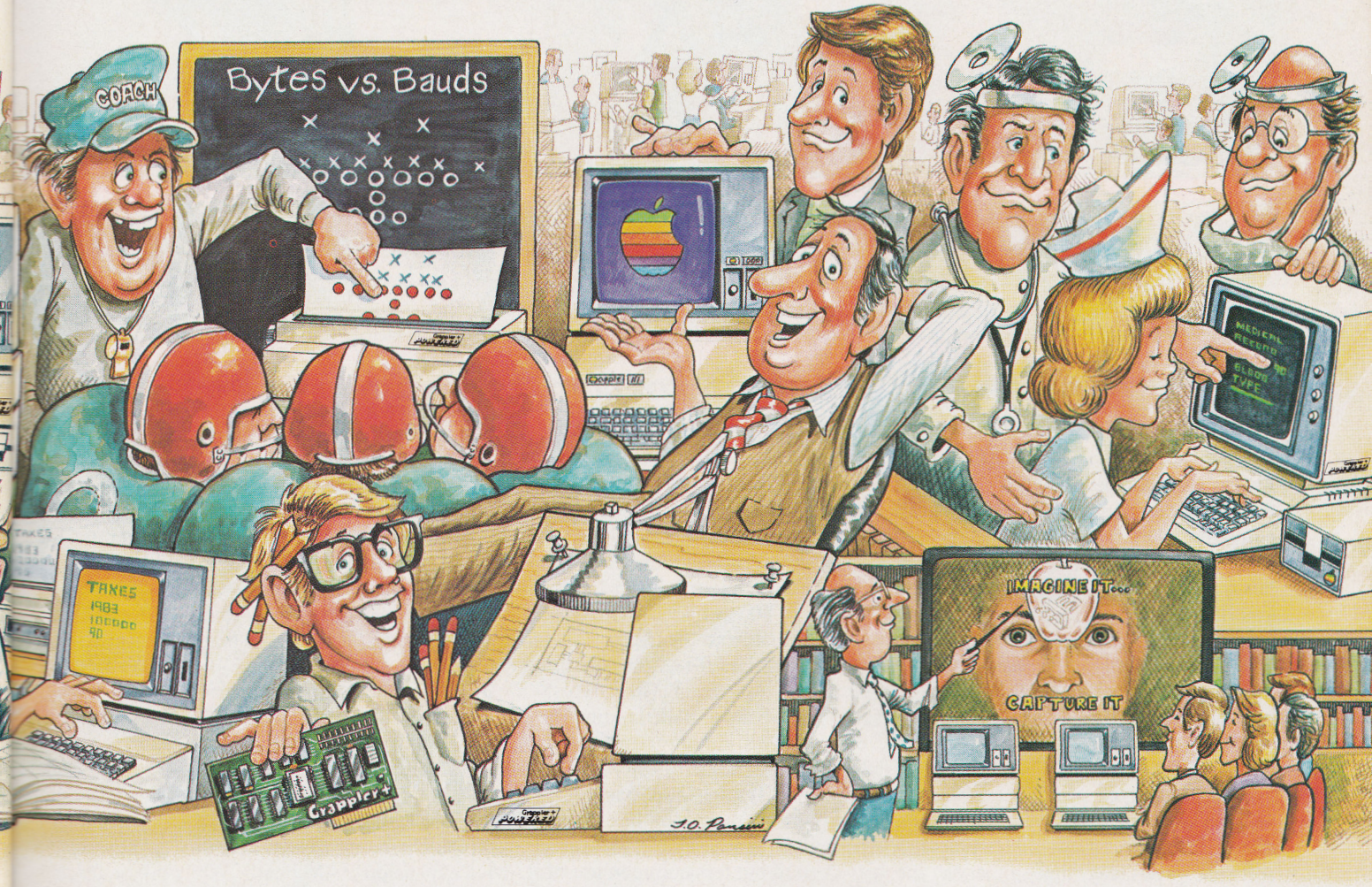
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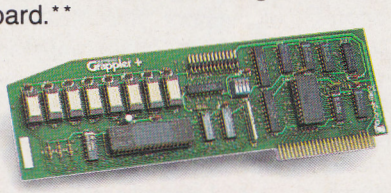
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EXP YOUR RAM

A comparison of three 128K RAM boards from: Legend Industry, Titan Technology, Omega Microware.

Unless you are a person who brags about the number of kilobytes of RAM in your computer, the speed of your microprocessor's clock, which type of computer bus you use, and other such esoterics, you have to be able to derive a tangible benefit from using a RAM-expansion board if you're going to consider buying one. The basic benefits are simple: speedy operation of programs and the ability of programs to handle more variables and larger models.

One popular use of RAM boards is to support larger models in *VisiCalc*. Each of the RAM boards in this article has software available that expands the amount of RAM available to hold the *VisiCalc* model and data. A 48K Apple can hold an 18K model. With a 128K RAM board, the limit on a *VisiCalc* model increases to 138K bytes. In addition to expanding the memory, the Omega Microware program significantly speeds the loading and saving of *VisiCalc* files. Rather than taking minutes to load, a full-size *VisiCalc* model can be loaded or saved in 20 seconds.

The second main application of RAM boards is as a disk-drive emulator, often referred to as a pseudodisk. Software supplied with the RAM boards modifies the Apple disk-operating system (DOS 3.3) so that the RAM board appears to BASIC, CP/M, Pascal, and machine-language programs to be a disk drive. RAM-card-based pseudodisks have no moving parts and are much faster than real disk drives. Unlike normal disks, though, pseudodisks store information stored in a volatile form, so it disappears when you turn your Apple off. High-speed-transfer programs can transfer a complete floppy to or from a pseudodisk in about 20 seconds. Pseudodisks are most valuable in such tasks as sorting disk-based data files from a mailing list or database program. Other typical uses of pseudodisks include holding the various overlays or program segments of large programs such as the UCSD Pascal operating system, fast backup of data and program disks, and fast execution of compilers and assemblers.

A third but less common use of RAM expansion boards is to expand the variable- or array-storage space available to Applesoft programs. This application is mainly of interest to people who write their own software or buy custom software, since they have to specially tailor programs to take advantage of the added memory.

What Is a RAM Expansion Board?

The 6502 microprocessor that is the heart of the Apple can directly access only 64K bytes of memory. In a 64K Apple, 48K is the RAM (random-access memory), 12K holds the BASIC language and monitor ROMs (read-only memory), and the remaining 4K is for communication with the various peripherals plugged into the expansion slots and for reading and writing to the built-in I/O (speaker, game paddles, and keyboard).

You have to "remove" something electronically from the Apple to get a place or "address" where the 6502 microprocessor can read and write to extra RAM. The Apple language card and other 16K RAM boards disable or electrically "remove" the BASIC and monitor ROMs and use that 12K block to address the extra RAM. To get the last 4K of the 16K of expansion RAM, the bottom 4K of the added RAM is itself disabled, and a second 4K block takes its place.

A larger RAM board works in a similar fashion, with each of eight 16K blocks being treated the same as a 16K expansion-RAM board. While this setup may sound complicated, in reality it uses only a few instructions, takes only a couple of microseconds to complete, and, with the proper software, is transparent to the user.

The result is that although the 6502 processor can only address 64K of memory at once, this electronic trickery (called "bank swapping") lets the 6502 effectively utilize much larger amounts of memory. Specifically, using Legend Industries' bank-swapping scheme, the Apple can theoretically access up to 4 megabytes of expansion RAM in 256 banks of 16K each.

Hardware vs. Software

As I started collecting information for this article, I focused on the available hardware, but in comparing the various manufacturers' offerings, I found that the important differences were in the supporting software, rather than the

A N D

hardware. All of the boards I looked at were of quality construction and design, and all should be reliable in operation. What differs is that some provide excellent software for running with *VisiCalc*, while others provide excellent pseudodisk software for DOS 3.3, Pascal, and CP/M. The other difference among the products is that the documentation runs the gamut of excellent to disgusting.

Here are some of the criteria I used to evaluate the software and documentation:

1. Does the software perform as the mythical "reasonably prudent man" would expect and issue understandable error messages when it cannot perform as expected?

Pseudodisks are most valuable in such tasks as sorting disk-based data files from a mailing list or database program.

2. Does the software erroneously erase files or otherwise destroy data?
3. Can a relatively unsophisticated user understand the "operator's guide" section of the manual, or is it directed toward computer professionals and "hackers"?
4. Clearly written manuals are of no use if the software does not work as the manual describes.

Well, now that I have laid the groundwork, let's look at some boards and software.

Legend Industries Ltd.

Legend, the "oldtimer" in the Apple RAM-expansion-board business, has been making RAM boards since early 1981. Its first offerings were 64K and 128K boards that used the 64K-bit RAM chip. The company's latest product, the S' Card, uses either 64K-bit chips for a maximum of 256K bytes, or the new 256K-bit chips for a maximum of 1 full megabyte of expansion memory. A full line of software products supports the two boards illustrated in figure 1.

VC Plus comes with all RAM-expansion boards, as does a DOS 3.3 pseudodisk emulation program. With the return of the warranty card, you get free Pascal or CP/M pseudodisk software. The "Super" series of DOS 3.3 and Pascal emulators comes with the 256K S' Card; the *Super Emulator* is also available separately for $59.95, and you can get a *Pascal Super Emulator* for $29.95.

The documentation is well written and organized. I found the manuals easy to use, both during installation and configuration and as reference guides while I used the programs. One odd note is that although Legend obviously invested a lot of effort in good manuals, the documentation is reproduced from what appears to be an Epson MX-80 printout, rather than being typeset or printed out on a letter-quality printer.

The *VC Plus* program is designed to be booted before you load *VisiCalc*. It expands the memory available for *VisiCalc* up to 138K, using 128K bytes of expansion RAM in any combination of 64K, 128K, or larger RAM boards. *VC Plus* does not have a high-speed load-and-save function, as does Omega Microware, and loading large *VisiCalc* files takes several minutes. *VC Plus* supports both the standard 40-column display and the 80-column Videx Video Term.

The *Super Emulator* program is a combination of two earlier programs, the *Memory Master* and the *Disk Emulator*. With this program you can use up to 512K of RAM to emulate a disk drive with up to 100 tracks. You access this emulated disk drive or pseudodisk with normal DOS 3.3 commands, so almost all programs that use disk I/O can use the pseudodisk. One of the steps in the configuration process is to select which slot and drive will be emulated. Typically the pseudodisk goes into slot 5, drive 1, in a system that already has two normal drives assigned to slot 6.

Since the pseudodisk loses its data when you turn the power off, you should be sure to save the data from the pseudodisk back onto a normal floppy disk before shutting down the system. Although the normal COPYA and FID programs Apple Computer supplies can do the copying, Legend has added the new commands .M and .U for mounting and updating floppy disks. These high-speed-transfer routines transfer a full diskette of data to or from the pseudodisk in only 18 seconds. Several other commands are available when you use the first 16K bank of the RAM-expansion card to hold DOS, including .H, which displays a short description of the other ten commands. When you relocate the DOS on the RAM board, 8.5K more RAM is added to the program and variable storage space available to BASIC.

Although Pascal is a powerful structured language, it can sometimes be a nuisance to program in because the Pascal operating system is larger than the memory of the Apple. This means that every time you go to the filer, editor, or

compiler, you have to load it from disk. The loading process is quicker and less bothersome if you relocate all the commonly used utilities on the RAM-card-based pseudodisk. The Pascal pseudodisk software is normally installed as volume #10 and can be up to 480 blocks (240K) with two 128K cards or the S' Card with 256K or RAM.

The pseudodisk programs let the 128K RAM board emulate a floppy-disk drive under the DOS 3.3, CP/M, and Pascal environments.

Legend's software and documentation met or exceeded all my expectations, except for the long time required to load large *VisiCalc* files. I am particularly impressed by the potential future expansion of the S' Card to 1 megabyte when 256K-bit RAMs become readily available.

Saturn 128K RAM Board, by Titan Technologies

The second company to enter the Apple II RAM-expansion market was Saturn Systems, now known as Titan Technologies.

Titan offers both a 64K and a 128K RAM board. The software included with these boards is:

DOS 3.3 Pseudodisk
CP/M Pseudodisk
Pascal Pseudodisk
Ramexpand
Movedos

(For optional software available, see figure 2.)

The pseudodisk programs let the 128K RAM board emulate a floppy-disk drive under the DOS 3.3, CP/M, and Pascal environments. As with all of the pseudodisk emulators, the advantage over mechanical disk drives is faster operation.

The *Ramexpand* program extends the amount of RAM available to Applesoft and Integer BASIC programs, which can use the extra RAM for data or program segments and routines. The *Movedos* program is compatible with the pseudodisk programs and uses 16K of the RAM-board memory to hold portions of DOS 3.3. This frees up 10.5K that DOS normally occupies at the top of the motherboard's 48K RAM, increasing the memory for Applesoft or Integer BASIC programs by 10.5K.

The Saturn operations manual is well written, with excellent information on such things as the effect of the Apple language board. Unlike the 16K RAM cards of other vendors, the Apple language card enables an autostart ROM on the card whenever the expansion RAM is disabled. Therefore the 128K RAM board cannot use the 2K block of addresses the auto-start ROM occupies. Since the 128K RAM board has eight banks of memory, a total of 16K of memory is lost, canceling out the extra RAM the language card provides. Legend and Saturn both discuss this problem, with Legend providing instructions on how to perform a simple modification to eliminate the conflict between the boards, thereby regaining the 16K or RAM the language card gives you.

The documentation described the installation of the board clearly, I had some minor, irritating problems while setting up and installing the software. For example, at one point the manual directs you to type RUN PSEUDODISK. In reality the program name is PSEUDO DISK (no hyphen), and after you catalog the disk, the problem is obvious and easy to overcome. Another problem was that the program that modifies the FID program did not function if FID was locked. Instead of giving the expected error response of FILE LOCKED, the system just stopped, and I had to turn off the computer to get things running again. Again, a little bit of familiarity with the Apple and some common sense isolated the problem, but a new user might have been forced to get dealer assistance or to call Saturn to resolve a problem that more thoroughly tested software could have prevented.

If you intend to do your own programming or to have programs written for you, the detailed description of the *Ramexpand* and *Ember* programs may be of interest. *Ramexpand*, which comes with the RAM board, is a set of utility subroutines accessible from Applesoft and Integer BASIC that rapidly transfers

Figure 1: Software supporting Legend's RAM expansion boards.

PROGRAM	FEATURES
VC Plus	Preboot for *VisiCalc*. Expands maximum model size to 138K when used with 128K of memory on the RAM board. VC Plus supports both the 40-column display and the 80-column Videx Video Term.
Disk Emulator	DOS 3.3 pseudodisk.
Memory Master	Moves DOS onto the RAM board to release 8.5K memory for use by BASIC.
Super Emulator	Enhanced version of *Disk Emulator;* includes *Memory Master*'s features.
Pascal Soft-Disk	Pseudodisk for Pascal.
Pascal Super Emulator	Enhanced version of Pascal pseudodisk.
CP/M Fast Disk	CP/M pseudodisk.
PCPI	Pseudodisk for PCPI's Appli-Card (6 MHz CP/M card).

Figure 2: Optional software available for Saturn 64K and 128K RAM boards.

VC Expand	Expands the memory available to *VisiCalc*. Supports only 40-column display.
VC Expand 80	Expands *VisiCalc* memory while supporting either a 40-column display or an 80-column display using popular 80-column cards. Runs on the Apple II and Apple II+.
VC Expand IIe	Expands *VisiCalc* RAM and supports 40- or 80-column displays. Runs on the Apple IIe.
Ember	Expands the variable-, string-, and array-storage memory available to Applesoft.

Figure 3: Optional software packages for Ramex 128K board.

Super Expander	*VisiCalc* RAM expander. 40 columns only.
Super Expander 80	*VisiCalc* RAM expander. Supports 80- or 40-column display.
Super Expander Plus	*VisiCalc* RAM Expander. Adds extra commands to *VisiCalc*. Supports 40- or 80-column display.



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PRODUCT INFORMATION

Legend Industries, Ltd. 2220 Scott Lake Road
Pontiac, MI 48054 (313) 674-0953

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S' Card with 64K	$399
S' Card with 256K	$725
64KC with 64K	$325
128KDE with 128K	$599

SOFTWARE

VC Plus	Supplied w/cards
Disk Emulator	Supplied w/cards
Memory Master	Supplied w/cards
Super Emulator	$59.95, supplied with 256K S' Card
Pascal Soft-Disk	$49.95 One of these two can be obtained free of charge when
CP/M Fast Disk	$69.95 warranty card is returned.
Pascal Super Emulator	$29.95
PCPI	$19.95

Titan Technologies, Inc. (Formerly Saturn Systems, Inc.)
3990 Varsity Drive, Ann Arbor, MI 48104 (313) 973-8422

HARDWARE

Saturn 64K	$349
Saturn 128K	$499

SOFTWARE

CP/M Pseudodisk	Supplied with boards
Pascal Pseudodisk	Supplied with boards
DOS 3.3 Pseudodisk	Supplied with boards
VC Expand	$69
VC Expand 80	$89
VC Expand IIe	$69
Ember	$50

Omega Microware, Inc., 222 South Riverside Plaza
Chicago, IL 60606 (312) 648-1715

HARDWARE

Ramex-128 with 128K	$499

SOFTWARE

DOS 3.3 Pseudodisk	Supplied with RAM board
Pascal Pseudodisk	Supplied with RAM board
Super Expander	$64.95
Super Expander 80	$99.95
Super Expander Plus	$125

Alpha Byte Computer Products, 31245 La Baya Drive
Westlake Village, CA 91362 (213) 706-0333

HARDWARE

Alpha RAM 128K	$299 (projected price)

data between program memory and the memory on the RAM expansion board. *Ember* is an optional replacement for *Ramexpand* that automatically puts variables into expansion RAM.

Ramex 128K Board by Omega Microware

Omega Microware, a relative newcomer to the RAM-expansion field, released the Ramex 128K board and the *Super Expander Plus* software series in early 1983. The Ramex 128K board comes with DOS 3.3 and Pascal pseudodisk software for emulation of disk drives (see figure 3).

The outstanding product from Omega Microware is the *Super Expander Plus*. This software, which you boot before loading *VisiCalc*, increases the amount of RAM available to 136K when you use a single 128K RAM board, and 256K when you use two 128K boards.

The outstanding product from Omega Microware is the *Super Expander Plus*. This software, which you boot before loading *VisiCalc*, increases the amount of RAM available to 136K when you use a single 128K RAM board, and 256K when you use two 128K boards.

A significant feature common to all Omega *Super Expander* programs is a high-speed transfer program. The program can load a full 136K model in only 20 seconds, as compared to the several minutes that *VisiCalc* takes to load even a smaller 34K model using standard DOS 3.3 routines.

These features alone would make the

A significant feature common to all Omega *Super Expander* programs is a high-speed transfer program.

Omega board and software useful, but *Super Expander Plus* adds many new features to *VisiCalc*. Among the extra features are the ability to suppress the display of values or formulas in desired cells, the ability to write-protect any given set of cells, improved formatting features, and a powerful tabbing feature that is useful in automatically sequencing the cursor to the next desired (but not necessarily contiguous) cell in models used for repetitive data entry.

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thorough explanations and plenty of examples. The only failing I found in *Super Expander Plus* was inadequate error trapping. For example, when I started to use the program, I erroneously tried to do a high-speed save onto a disk with the normal DOS 3.3 format. Unfortunately, rather than telling me that this procedure was impossible, the disk drive

I strongly recommend the Omega Microware Ramex 128K board and the *Super Expander Plus* software for the serious *VisiCalc* user.

ran for several seconds and everything seemed normal. When I tried to load that disk later, I discovered that the *VisiCalc* file had not been saved. I also found that an I/O error (such as a disk-drive door being open) during a high-speed save would lock up the program, and all data would be lost. Omega Microware is addressing these problems, and a new revision with improved error trapping should be available by press time. To date, registered users have received updates free of charge through Omega Microware's liberal update policy.

The Omega RAM Board and *Super Expander Plus* software are compatible with the Apple II, Apple II+, and the Apple IIe. They also support the Apple IIe's 80-column-display card and the popular Video Term 80-column card by Videx, along with Double Vision and Omni Vision by Computer Stop, and the Sup R Term by M&R Enterprises.

I strongly recommend the Omega Microware Ramex 128K board and the *Super Expander Plus* software for the serious *VisiCalc* user. On the other hand, the pseudodisk documentation and owner's manual that come with the board are of much lower quality. The software may be good, but the manual is obtuse and inscrutable, and I was never able to get the Pascal pseudodisk software to work. The DOS 3.3 pseudodisk software functions adequately, although the supporting documentation is confusing.

Alpha Byte

Alpha Byte is developing a 128K/512K RAM card that will operate like either a Saturn or a Legend 128K card when it's populated with 64K-bit RAM ICs. When loaded with the new 256K-bit RAMs, the Alpha Byte card will have 512K bytes of storage. As I write, Alpha Byte is completing the software and documentation, and Alpha Byte expects to have the RAM card, a *VisiCalc* preboot, and pseudodisk emulation software available by the end of 1983.

Related Products and Future Trends

Lest I leave the impression that RAM-expansion boards are the only way of getting high-speed disk emulation, I should mention related products. One is the RAMdisk 320 by Axlon, San Jose, California. It consists of 320K bytes of RAM, an interface card that plugs into the Apple, and disk-drive emulation software. An important feature of the RAMdisk 320 is its three-hour battery backup system. The battery protects the data written to the RAMdisk from short power failures as well as from the occasions when a program goes awry and you must reboot by turning off the Apple because the Reset key has no effect.

Interstellar Drive by Pion, Watertown, Massachusetts, is similar to the RAMdisk. Another related product is the BUBDISK by MPC Peripherals, San Diego, California, which uses magnetic bubble memories to store data. Although magnetic bubble memories are slower than RAM ICs, the magnetic bubbles are nonvolatile; i.e., they do not need power to maintain stored data.

The long-term future of bubble memories is still unclear, as they are receiving stiff competition from battery-backed-up CMOS RAM. I do not know of any manufacturers of CMOS RAM boards for the

Although Pascal is a powerful structured language, it can sometimes be a nuisance to program in because the Pascal operating system is larger than the memory of the Apple.

Apple, but it is quite feasible to provide essentially nonvolatile memory by combining CMOS RAMs with lithium batteries. The cost of such systems is several times that of the 64K-bit NMOS dynamic RAMs today's boards use, but the dropping cost of ICs may make this type of board more attractive in the future. ✚

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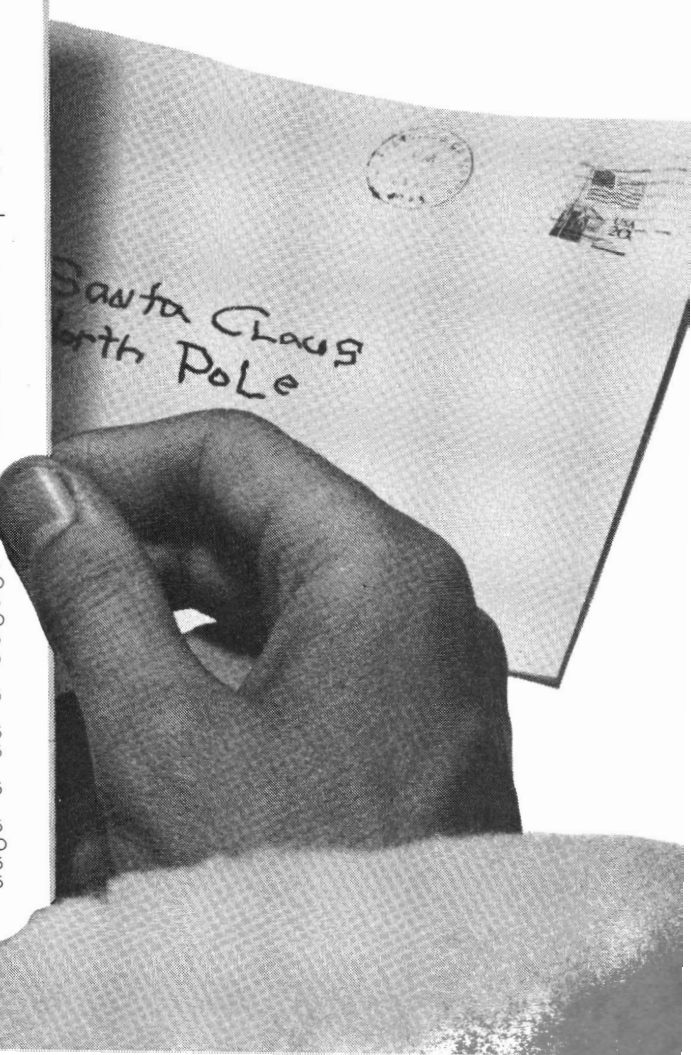
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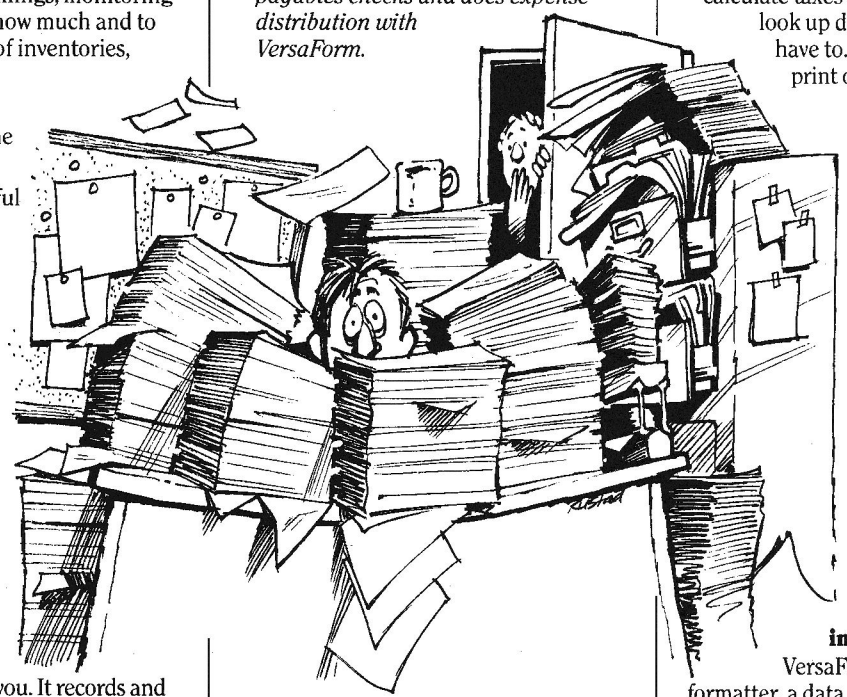
VersaForm starts with your existing forms and procedures. As you copy your forms onto the screen, VersaForm automatically creates a database for you. It records and saves information from Purchase Orders, Invoices, Job Estimates, Disbursement Ledgers...maybe even a few things you're not recording that you should be.

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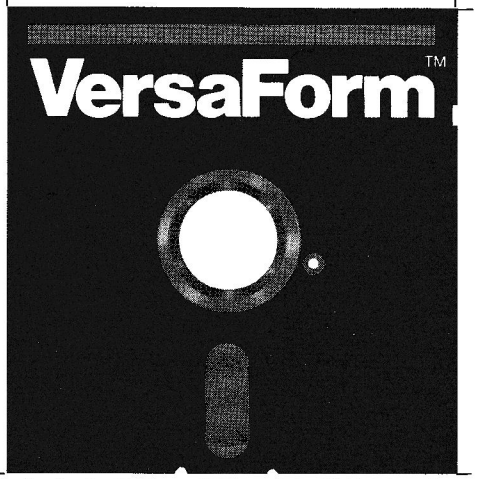
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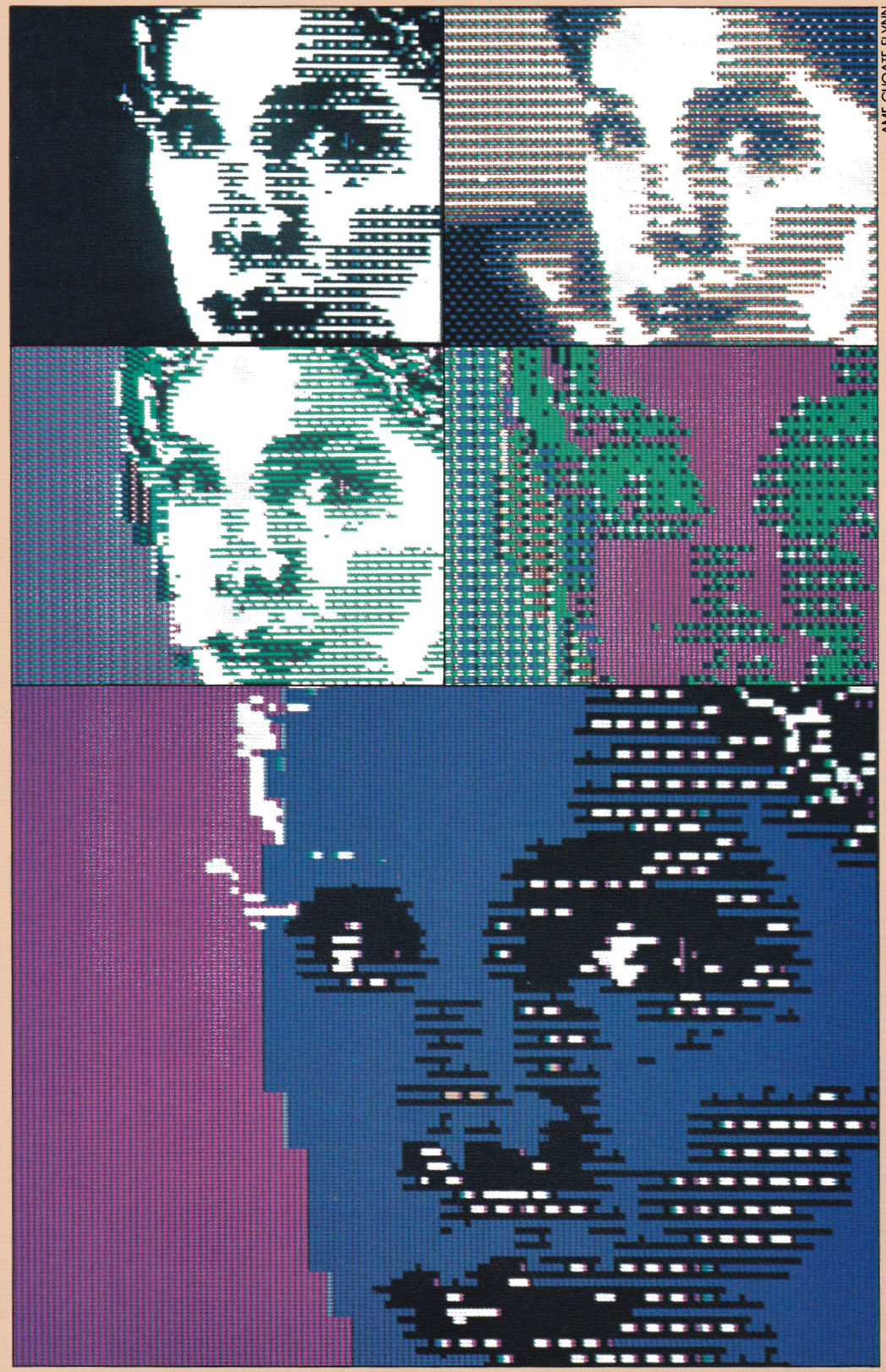
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CIRCLE 121 ON READER SERVICE CARD

NEW BRUSHES OLD DREAMS

Since the Industrial Revolution, technology and creativity have diverged. Micro-computers re-unite the arts and the sciences.



AMÉ CHOATE FLYNN

Remember Michaelangelo, the famous structural engineer? (He did a few paintings and sculptures, too.) And what about that competitor of his, the naturalist-turned-physiologist-turned-metallurgist, Da Vinci? Or the chemist, Rembrandt?

Michaelangelo. Da Vinci. Rembrandt. Artists, of course. But scientists too, like countless other pushers of pen, pencil, and paintbrush since before recorded history. The distinction between artist and scientist was an artificial one before the Industrial Revolution came along to teach us all about specialization. Before that, if you weren't a chemist, you couldn't grind and mix your own pigments and mediums for a painting such as *The Night Watch*. If

you weren't an engineer, you'd never get that block of marble into your studio, let alone carve it into something as perfect as *David*.

It's like that in computer art, too.

I won't call it computer graphics: Computer graphics are pie charts and spirograph patterns. Art, now and always, is a combination of human creativity and the physical possibilities of a medium, preferably with both stretched to their limits.

Digital Innovation

Computer art, especially on the microcomputer level, probably will do more to bridge the gap between artist and scientist than any other art form of the twentieth century. It's a natural, inevitable progression. What the Industrial Revolution split asunder, the Electronic Revolution has brought together again by offering the first total innovation in art since paleolithic humans began scrawling on cave walls—the computer. Computer art is a medium in which brush and canvas are the same. The possibilities are uncharted, the limits unknown, the potential immense.

Small wonder, then, that technological artists are beginning to explore computers. Some of the problems faced are ones all artists share: choices of subject matter, intention, and meaning. Other problems, particularly those caused by the limitations of current hardware and software, are unique to the form (though in art a limitation is often an opportunity in disguise for those creative enough to take advantage of it). We'll examine all of these areas by looking at the histories, pieces, and techniques of some of the artists working with Apples today.

But first, some basics.

Tools of the Trade

In all visual arts you need something to create an image, something to create it on, some way to store it, and some way to display it. Computer art combines the first two, but is otherwise similar to traditional art.

They're both simple enough. The Apple II, Apple II+, and Apple IIe all are admirably suited, when combined with the right software and hardware, for making multicolored images on the low-resolution and high-resolution screens. There are many graphic software packages available, such as *The Designer's Toolkit, Micro-Illustrator, Painter Power,* and the big three from Penguin Software: *The Complete Graphics System II, Special Effects,* and *The Graphics Magician*. These packages have different features. Their usefulness will vary depending on what effects you want to achieve and what hardware you use. The two inexpensive



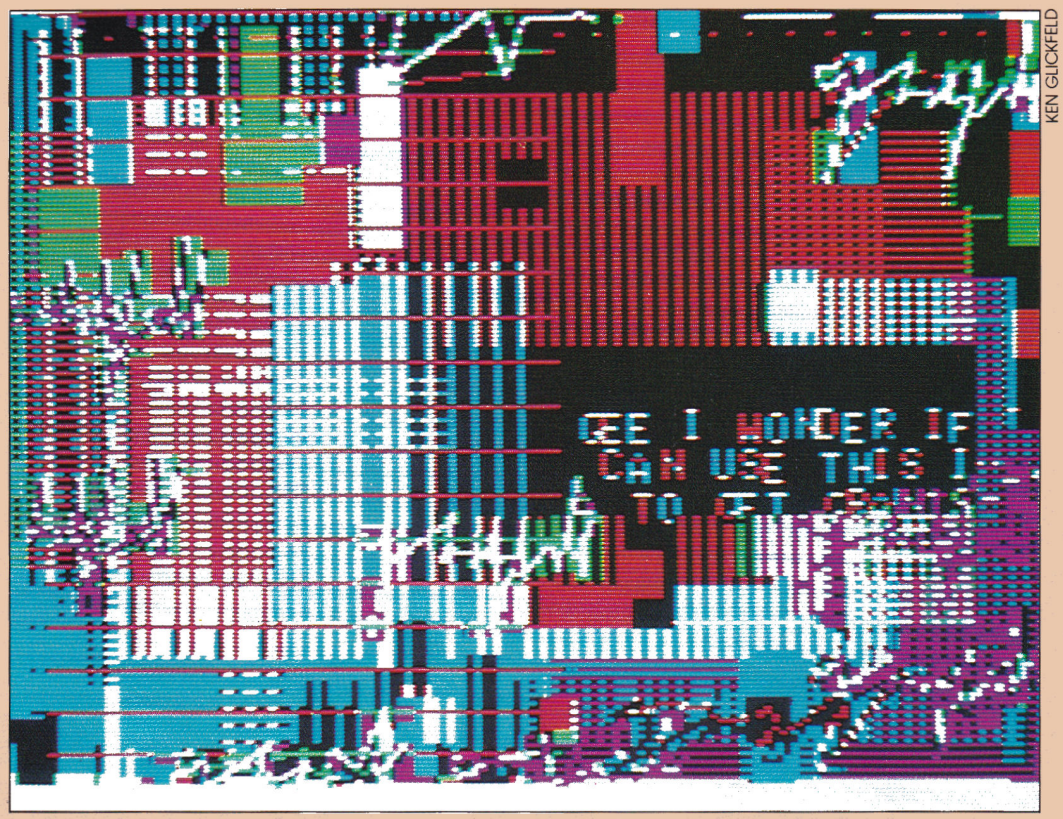
graphics tablets available for Apples, Koalapad and Powerpad, both are designed around versions of *Micro-Illustrator*. The more expensive Apple Graphics Tablet (now meeting FCC standards for RF emissions, and in production again after two years off the market) is

Getting images where they can be seen is a bit tougher.

better suited for *The Designer's Toolkit*. Game paddles and joysticks that don't automatically return to center position also can be useful input devices for almost all the software packages, although they don't offer the precision of a tablet. You also can use more unusual tools, such as the Gibson light pen (which draws directly on a monitor screen) or any one of several video digitizing cameras (as their name implies, these break the camera's picture down into pixels and place that image in computer memory).

To store the image, once it is created, requires only a standard floppy or hard disk drive.

Getting images where they can be seen is a bit tougher. They can be shown to people on a computer monitor, of course, but an artist can't lug an entire computer system around. Several good screen-dump programs exist, but color printers still are quite expensive, and never are as bright as the colors on the monitor screen. The solution to these problems is a photograph or slide. These can be taken by pointing a camera at the monitor screen or by using a somewhat expensive screen-printing camera that takes its signal directly from the computer. At least one company, Visual Horizons in Rochester, New York, will do this commercially from image files sent to them on disk or over the phone lines.



KEN GLICKFELD

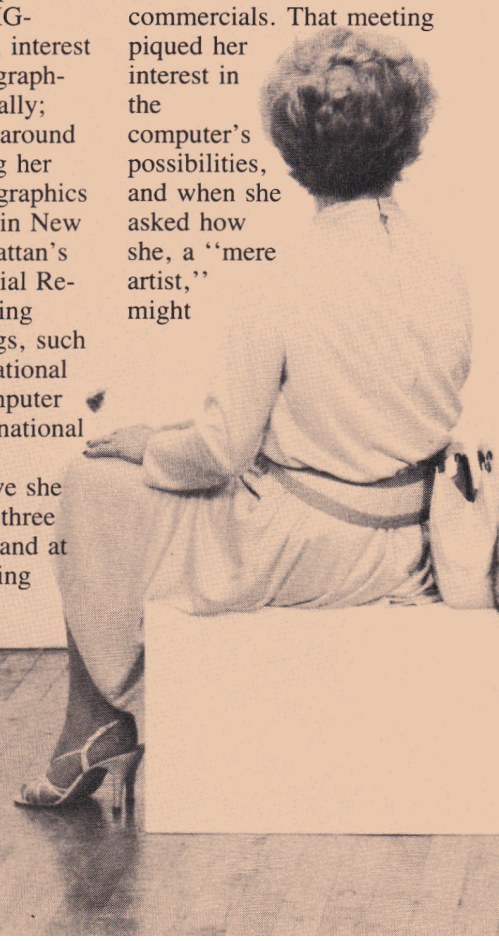
Now for the artists.

She's Everywhere

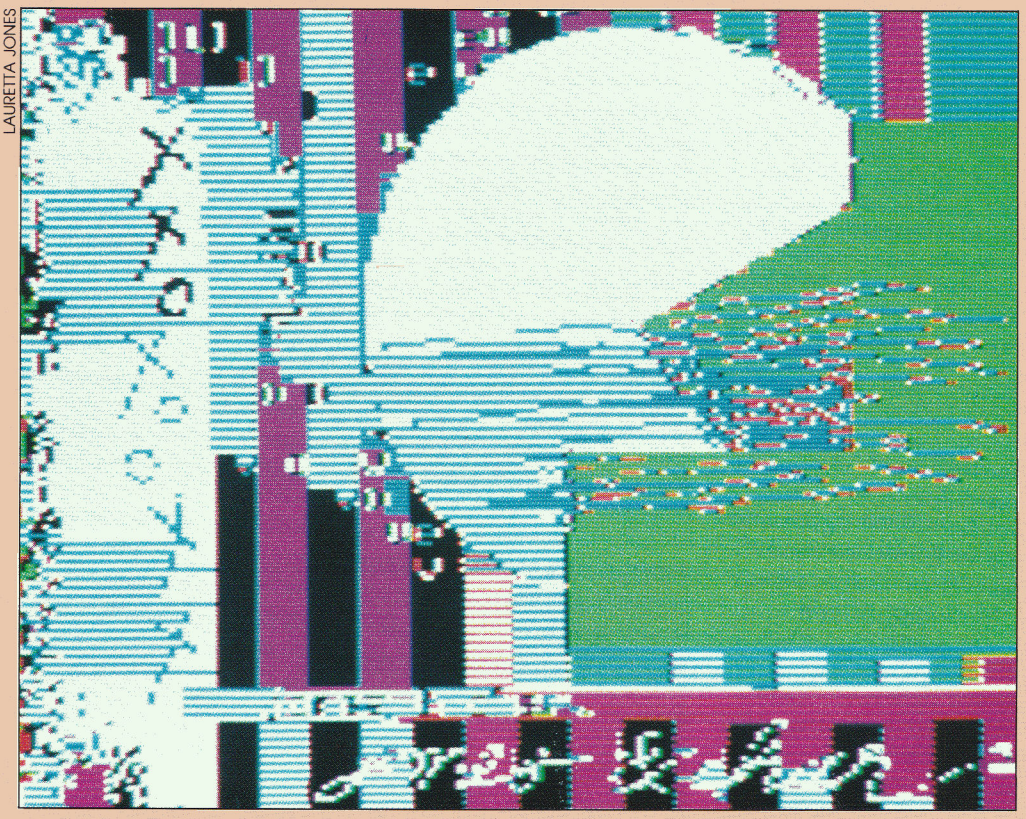
Call Ame Choate Flynn ubiquitous, because wherever you go in the field of Apple computer art and graphics, no matter what software writer, hardware vendor, or computer artist you talk to, sooner or later you will be referred to Ame. You'll also see her everywhere: at the Symposium on Small Computers in the Arts and at SIGGRAPH (the special interest group on computer graphics), both held annually; lecturing in schools around the country; teaching her course in computer graphics (the first of its kind in New York City, at Manhattan's New School for Social Research); and organizing groups and gatherings, such as this year's International Apple/IBM PC Computer Fair at the UN International School.

It's hard to believe she got her start a mere three years ago, in 1980, and at that time knew nothing about computers.

A chance encounter changed her life. She met one of the executives of Digital Effects, a major company in the field of digital animation for television commercials. That meeting piqued her interest in the computer's possibilities, and when she asked how she, a "mere artist," might



LAURETTA JONES



learn more, someone suggested that she attend SIGGRAPH. She did. With her eyes wide and her heart set on getting involved, she did a lot of careful research and finally decided that the Apple was the only computer capable of reasonable graphics—the only one, in any case, that she, not having a spare $100,000 could afford.

From there it was an uphill battle, as she and her husband, Tom, struggled to teach themselves and to get their fledgling company, Technigraphics, off the ground. Along the way they inspired a number of other artists, freely shared their own discoveries and developments, and helped more than one software or hardware package grow to reasonable usefulness. The Penguin packages, in particular, have benefitted from Ame's constructive criticism.

Technigraphics has been so successful that Ame has little time to work on computer art for its own sake, and instead devotes nearly all of her efforts to commercial packages for various corporate clients.

Her favorite system is a combination of the Apple Graphics Tablet and *The Designer's Toolkit,* the functions of which can be accessed from the tablet itself, using an overlay provided with the software. But—illustrating one of the basic techniques of Apple computer art—Ame might start with a digitized video image, then use the tablet and *Designer's Toolkit* to alter that, then go even further and use a module from *Special Effects* or *The Graphics Magician* to alter the image again. Once an image is in the graphics page on the Apple, virtually any combination of different hardware and software systems can be applied to it successfully.

PhotoImagery

A video digitizing camera (used with both the CommSoft and Microworks interfaces) is an important tool for Pennsylvania artist Thomas Porett, but that's not surprising, since he came to the computer from a background in photography. His work, which earned him a Guggenheim fellowship in 1971, had always had a technological bent to it, but it wasn't until he found that computers could be linked to electronic music synthesizers (another interest of his) that he began to consider including them in his art.

"I hadn't been terribly impressed by the computer graphics I'd seen. It was all mathematical and symmetrical. Very engineer-like, not art at all. But when I discovered that you could take a photo image, put it into the computer, and process that in interesting ways . . . well, it was just the most flexible tool I could ask for."

The more he learned, the more his interest grew. Today he has an extensive setup, including the two video digitizers mentioned above, an Apple graphics tablet and a Koalapad, the *Micro-Illustrator* software package, and a Lang camera to take slides directly from the monitor screen.

One of his biggest interests is in computer art as an experiential device for gallery display.

The first of his systems to work with this concept was an endlessly changing image-piece called *SOFTLAND*. It was a set of stored-picture databases that were constantly being combined in new and different ways. "The imagery was referential, not strictly ab-

stract. It implied landscapes, malleable and changing, containing both land and human image forms. In one part of the program, the screen is filled with a 'rain' of infants floating across the monitor like a specter of falling cherubs.'' It was intended to shock and amuse, Porett says.

Two other pieces in this vein, both done on the low-resolution screen, were *MASKS,* in which the viewer sees a stream of somber, frightening faces that have been digitized into masks, and a more humorous one called *ANIMAL DREAMS,* designed for children, which is full of animal shapes running, jumping, and chasing each other to a soundtrack written by Thomas on his ARP 2600 synthesizer.

His newest and most elaborate piece is *IKONS: AN INTERACTIVE IMAGE JOURNEY*. In this work, the viewer touches the flat surface of the Koalapad, which has been labelled

'I wouldn't want to do something that wasn't on the computer any longer.'

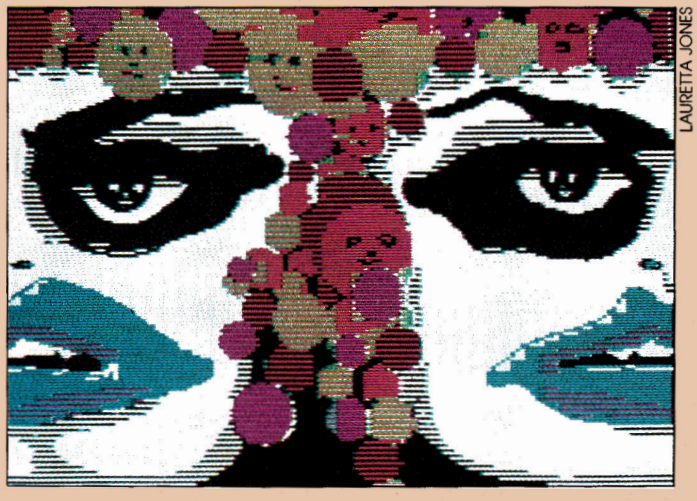
with various kinds of experiences. The monitor screen then begins a random, unpredictable sequence of images that the viewer can stop, hold for contemplation, or change by branching into another stream.

Illustrations

Lauretta Jones is a professional illustrator, and though she once kept feet in both traditional and electronic camps, today she does her illustrations exclusively with her Apple.

''I fell in love with computers. That's the only way I can put it. About three years ago, my brother got an Apple and we played games on it, and that was fun, but it had nothing to do with my career. Then one day he brought home a drawing program—a low resolution, very crude kind of thing—and he said, 'You're going to love it.' He was right. I was knocked right over. And as I've learned more, I've fallen in love with the process—with every step of making an image, as well as with the final image itself. I wouldn't want to do something that wasn't on the computer any longer,'' she says.

Her first choice of software is *The Designer's Toolkit,* but if memory space on a disk is a problem, she'll use *Graphics Magician,* which saves space by storing not the image itself, but the instructions for reconstructing the image. For special projects she will use whatever is appropriate. An example is her use of the *Utopia Graphic Tablet System* (written by rock star Todd Rundgren) to work on a series of


LAURETTA JONES


LAURETTA JONES





THOMAS PORETT

elaborate initial capitals. "I'll draw out the letter, then tape that picture to the tablet, and transfer it to the computer by tracing it. Then I'll use *Utopia* to blow it up much larger on the screen and tighten and modify the design extensively."

One non-commercial project she has been working on is a collaboration with photographer Alan Zenreich. She takes his photos, which are very formal facial portraits, and uses color xeroxes to blow the slides up to a size that can be taped onto the graphics tablet. She then generates an "electronic warpaint" with her equipment, based on the facial structure in the portrait. After a slide is taken of her design, Alan combines her electronic tatooing with his portraits in the darkroom, and the result is a hybrid mix of brightly-colored pixels and realistic photography.

"Our sample piece summed it all up," says Jones. "It showed a pair of computer-outlined hands holding a real camera. It's interesting being on the edge of technology. At least, the edge as represented by microcomputers. The big guys have all this money, time, and support for research and development, but down here on the micro level we're always coming up against problems for which there aren't quite yet proper solutions . . . and figuring our way around them."

Pixels No Problem

Lauretta Jones does a lot of her illustration work for the art directors of advertising agencies, and over the last three years she has had to educate more than a few about just how far microcomputer art has come. One art director she would never have to lecture, though, is Carl Van Brunt. He's been through it all himself. After seeing big and small systems, he opted for the Apple.

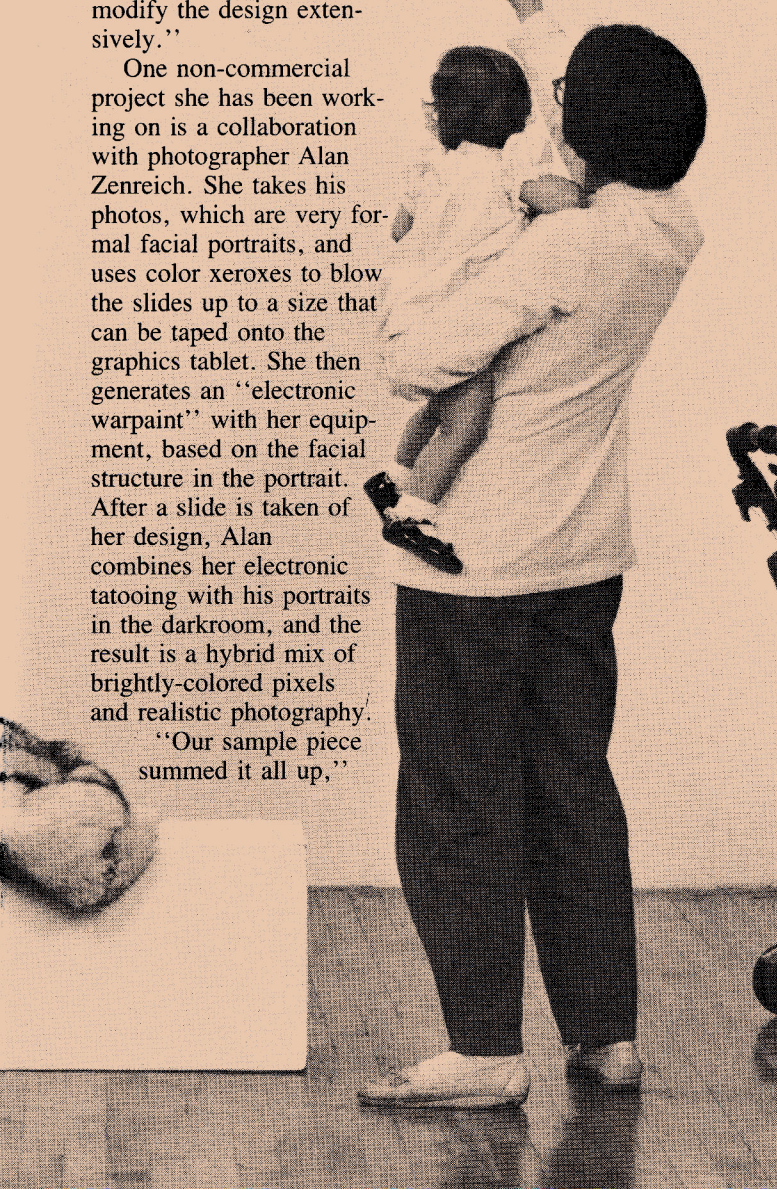
The problems of pixels aren't problems at all, but advantages.

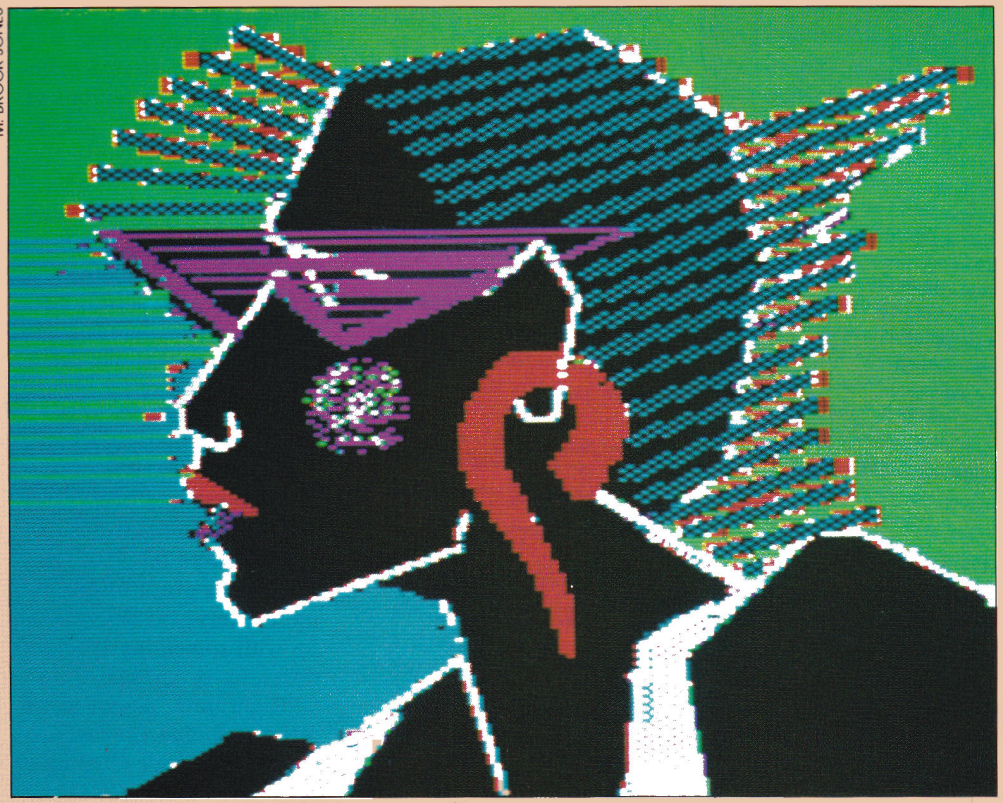
"Basically, the kind of thinking you need to use to approach art on the Apple is exactly the same kind you'd use on a larger system, so it makes a great introduction to the field," he says. Carl says he is most at home thinking graphically—that is, in two dimensions, instead of the normal three-dimensional conventions of sculptural art. That makes him comfortable with modern abstract art and with the look of art on the computer monitor. To him, the problems of pixels aren't problems at all, but advantages. "I like seeing the pixels. I also like the fact that I can make instant changes in color or position, things that would take hours in a normal painting. That gives more options, which means more thought, and the more thinking you do about a given image the more likely you are to come up with something special, different, or unusual."

Right now, one of the techniques that excites him most is using his CommSoft digitizing camera.

"For some reason the images you get with it really seem to penetrate and get deeply into the subject," he says. "Maybe it's because the camera leaves out so much detail, so that you only get the basic elements instead of all the distracting surface. The portraits I've made this way just seem to have a very haunting quality about them."

After digitizing, he'll work on a portrait or picture with his Gibson light pen or the Micro-Painter to do color changes, flips, silhouettes, and other things, and then will print it out in black and white on an Epson FX-80. Using a popular screen-dump program called *Zoom Grafix*, he prints out one enlarged section at a time. He lays the sections





M. BROOK JONES

together into an oversized—24-inch by 28-inch—composite. "You get this wonderful interplay between the overall image, which is legible from two to three feet, and this unpredictable grid-pattern made up of the pixels. I like that a lot." He plans to blow this image up even further, onto canvas or board, and use the pixel grid as the basis for a painting about six feet high.

"As a painter, before I got the computer I tended to do combinations of abstract and representational imagery, with little bits of whimsy. I was also inspired by jazz a lot, and put jazz figures in my work. The computer has changed that some. It's giving me a way to link the abstract and the representational in an integrated way. People are hanging the two styles side by side in galleries these days, but this puts them together in one image."

Intense Teacher

What are these odd qualities that win the computer its converts?

Some of them seem rather unlikely. A case in point: Roberta Schwartz, for 19 years a junior high school art teacher in New York City's public school system, wasn't a typical candidate for a computing junkie. But the home-computer boom seemed very interesting, so she started reading magazines and asking questions of her friends. At a computer store, seeing computers for the first time outside of an advertisement, she had one simple question: "Is there anything I can do to break it?" Assured by the salesperson that, short of dropping it on the floor or hurling it from her apartment window, she could not, she bought an Apple, two disk drives, an Epson, a monitor, and *The Complete Graphics System*.

She had just applied for a sabbatical from teaching when she arrived home with her booty. The sabbatical gave her some free time.

One "click," and she was hooked. Roberta spent a full year bent over her computer, learning it thoroughly. She's the same with any new software or hardware she comes across.

"I'm very intense whenever I do anything," she says. That's an understatement. In fact, she's taken things so far that she has begun to market her own programs. One, a graphics software package for children, has just been contracted to Penguin Software. And she is scheduled to teach computer animation and graphics at both the New School and the New York University School of Continuing Education. No more junior high school.

Is there anything I can do to break it?

"My art always had been intricate and detailed, and with the computer I went right back to it. When I started I didn't have a graphics tablet because I couldn't see spending the extra money until I was sure that I was enjoying this. By the time I was sure, the tablets were off the market. So I was working with a program called *E-Z DRAW*, in which you plot your pictures one pixel at a time. It wasn't so foreign to me. I have the patience for that kind of thing. But it sure astonished other people when they found out how I worked."

Roberta finally has acquired a used Apple graphics tablet, and wonders how she did all that tedious pixel-pushing. The intensity remains, but it's been trans-



ferred to shape-table animation work using the *Graphics Magician* package, which also requires pixel-by-pixel plotting. Some people's personal styles just run too deep to change.

Tantalizing Monitor

RANDOM ACCESSORY, a gallery computer art piece, is Ken Glickfeld at his purest. It consists of one color monitor and a black box with three red buttons and a joystick. Left alone, the monitor will run through an interesting but random series of changes, with Mondrian-like color bars and veils and grids rippling across the screen, occasionally broken by phrases that sound like selections from a Zen Buddhist novel about the New York experience. The machine is fun to watch, but a lot more fun to shake hands with. Pressing different combinations of the buttons and moving the joystick makes the random variation changes tantalizingly incomprehensible. Just when you think you've got it down and know which of the seven different functions in the box you'll get if you press a certain button and move the joystick just so, the blasted thing changes on you. Call it a video game for intellectuals, if you wish. I got more of a kick out of figuring out how to make it flash its "Our minds fuse and all ideas are one" message consistently then I ever did out of Pac-Man.

One of *RANDOM ACCESSORY*'s functions is to place Ken's squiggly signature on the screen, making it the only art piece I know which the viewer signs th artist's name for him.



CARL VAN BRUNT

That particular piece, and others by Ken, didn't come out of any of the standard software packages. He writes his own.

After ten years in the theater doing technical work, he moved into sculpture—first figurative, and later, electromechanical, including a string of coin-operated sculptures. "They force you to watch them until they finish, because you've invested your money," he says. A computer was a simple step from there because it was the one device in which he could make a true model of the way he thought, and do it in a way that allowed viewer interaction.

Like Roberta Schwartz, Ken Glickfeld is entirely self-taught. "People kept asking me 'What's it do?' until I could answer that question. I suppose I could have gone to a technician and worked with somebody who already knew how to control the beast, but my feeling was that I would then be filtering my ideas through somebody else, and I don't want that. I would rather work on a simplified level than have somebody else dictate or determine what I do," he says.

Ken has written so many programs he can hardly keep track of them on his disk listings. One of the more interesting ones was done to take advantage of his IDS color printer, which uses a ribbon with the four printing-process colors—magenta, cyan, yellow, and black—to create a spectrum of colors. In it, a series of 100 images shows two abstracted galaxies colliding and coalescing. It's quite gorgeous, particularly since he took the time and effort to print it all out on 100% rag bond art paper, instead of on a lower quality computer bond.

"If you don't try to fight the equipment, then you can go a long way with it. But you have to learn the kinds of marks that it makes. If you are slavish about trying to copy reality, then it won't work for you," he says.

Audio-Visuals

Steve Sullivan first encountered computer art because he was working on audio-visual presentations for business clients. When they got interested in microcomputers, he felt he'd better investigate.

"I'm the kind of a guy who goes into an art store and sees a new pen or crayon, and I've got to buy it right away and try it out. I want to take home anything new and learn not only how to use it, but how to combine it with other things."

He uses the computer extensively in his audio-visual work, mostly as a source of cartoons—some of them animated. Steve was the man who discovered that *Graphics Magician*'s way of packing a picture into a small disk space created opportunities for real-time animation effects—something its designers had never planned. But his real interest is his mixed-media pieces.

"I will do a printout of a drawing, or an abstract pattern, and then I'll make a xerox transparency and a xerox print of it at the same time, so that they're precisely the same size and will register if I place the transparency on top of the print," he explains. "Then I'll treat the transparency like an animation cell, painting on the back side of it, which creates very snappy color effects. Then I'll work over the paper print with other techniques. When I put them together, it's a whole mishmash of media, but I get a whole new look.

"Every time you sit down in front of one of these computers you get a new idea. I don't know anyone—I'm talking about artists now—who works at a computer for more than a few minutes who doesn't get excited by it."

Unified Paths

There you are: Seven artists are rediscovering a long-ignored truth—the truth that science and art are really the same road to the same place. There are some in the future, thanks to the computer, who will

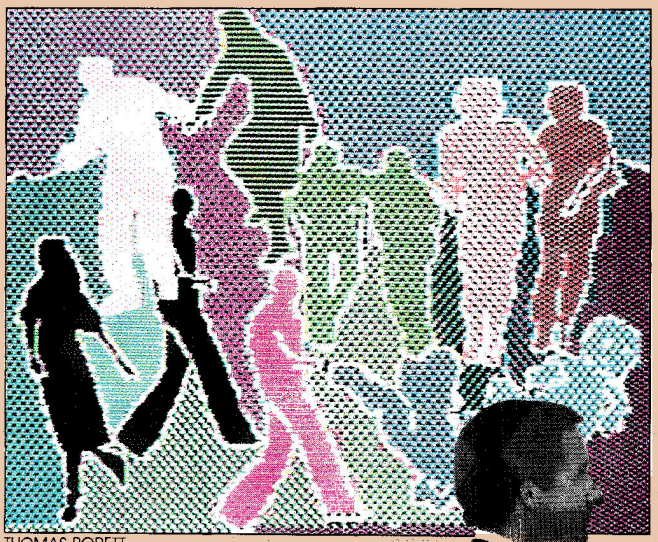


THOMAS PORETT

never know otherwise.

Last year, and again this year, NYU's Alternate Media Center and the Teachers and Writers Collaborative—a group dedicated to getting writers, artists, and dancers into public school workshops—ran a series of classes for fourth and fifth graders. An artist trained in the use of an Apple Graphics Tablet, a digitizing camera, and several different software packages showed the children how to begin. Some of the pictures the children produced are printed here. They are incredible pieces, as imaginative as any of the works by the adults with whom they share these pages.

Where the minds of these children will go, walking that unified road, is part of the promise of tomorrow. ✚



THOMAS PORETT

Electronic Painting Programs

E-Z DRAW ($39.95) from Sirius Software Inc., 10364 Rockingham Drive, Sacramento CA 95827. 916-366-1195.

MICRO-PAINTER ($34.95) from DataSoft Inc., 9421 Winnetka Avenue, Chatsworth CA 91311. 213-701-5161.

DESIGNER'S TOOLKIT, for Apple Graphics Tablet, ($225) available from Apple Computer and dealers.

PAINTER POWER ($40.00) from Micro Lab, 2699 Skokie Valley Road, Highland Park IL 60035. 312-433-7550.

THE ILLUSTRATOR ($150.00) from Island Graphics, Box V, Bethel Island CA 94511. 415-684-2664.

THE COMPLETE GRAPHICS SYSTEM II ($69.95), *SPECIAL EFFECTS* ($59.95), and *GRAPHICS MAGICIAN* ($39.95) from Penguin Software, 830 4th Avenue, Geneva IL 60134. 312-232-1984. (*COMPLETE GRAPHICS SYSTEM* and *SPECIAL EFFECTS* are available together on one disk for $79.98).

UTOPIA GRAPHICS TABLET SYSTEM ($75.00), for Apple Graphics Tablet, by Todd Rundgren. Officially discontinued by Apple, but still available at some Apple dealers.

DOUBLESTUFF ($39.95) for Apple IIE, from Doublestuff Software, 2053 West 11th Street, Brooklyn NY 11223. 212-449-6300.

Graphics Hardware

APPLE GRAPHICS TABLET ($795.00), available again from Apple Computer and dealers, order # A2M2007.

KOALAPAD ($124.95) from Koala Technologies, 3100 Patrick Henry Drive, Santa Clara, CA 95050.408-986-8866.Comes packaged with *Micro-Illustrator* software.

POWERPAD ($99.95) from Chalk Board Inc., 3772 Pleasantdale Road, Atlanta GA 30340. 800-241-3989. Runs *Micro-Illustrator* ($49.95) and its own painting software, *Leo's 'Lectric Paintbrush* ($24.95 each).

GIBSON LIGHT PEN SYSTEM ($349 with software), from Gibson Laboratories, 23192-D Verdugo Drive, Laguna Hills CA 92653. 714-770-5000.

IDS PRISM 80 or *PRISM 132 COLOR PRINTERS* ($1299.00 and $1499.00 respectively), from DataProducts SPG, 1299 Rt. 13 South, Milford NH 03055. 603-673-9100.

COMMSOFT PHOTOCASTER VIDEO DIGITIZER ($499.95), $749.95 with camera, from CommSoft, 665 Maybell Avenue, Palo Alto CA 94306. 415-493-2184.

LANG VIDEOSLIDE 35 ($2599.00) from Lang Systems Inc., 1010 O'Brien Drive, Menlo Park CA 94025. 415-328-5555.

Graphics/Printer Dump Software

ZOOM GRAFIX ($49.95), from Phoenix Software, 64 Lake Zurich Drive, Lake Zurich IL 60047. 312-438-4850.

Services and Organizations

TECHNIGRAPHICS, Ame Choate Flynn and Tom Flynn, 111 Hicks Street #17B, Brooklyn NY 11201. 212-625-1348.

VISUAL HORIZONS COMPUTER SLIDE EXPRESS, Rochester NY 14623. 716-424-5300.

ALTERNATE MEDIA CENTER, New York University, Tisch School of the Arts. Apple Bytes project funded by the Revson Foundation. For information, contact Mary Abadie at 212-598-2852.

Gallery location courtesy of Stella Polaris Gallery, Los Angeles

▸ GRAPHICS

BY BARBARA E. McMULLEN AND JOHN F. McMULLEN

VISITREND STEP B

Putting Visitrend + Visiplot To Use

If you want people to look at your numbers, you're better off with a chart or a graph. And if you've developed your numbers with the *VisiCalc* spreadsheet program, you can now pick from several programs that make turning out charts and graphs a simple task. One of the more popular and powerful of these programs is *VisiTrend + VisiPlot,* from VisiCorp.

VisiTrend + VisiPlot can take models you have developed with the *VisiCalc* spreadsheet program and turn them into half a dozen different kinds of charts. You can have bar charts, line charts, pie charts, and more. Charts can be combined, stored, and either displayed on the screen or printed out.

You can also use the *VisiTrend* part of the program to check for patterns and correlations in your data. Among the choices you have are simple averages, moving averages, percent change, data smoothing, and several types of correlations. You can even take these new sets of numbers you have developed with the program and read them back into a *VisiCalc* model.

You can enter data for *VisiTrend + VisiPlot* directly with an editing mode and through a *VisiCalc* model. You can also make graphs of data from other programs that use the DIF (Data Interchange Format) file structure. And if you do your own programming, the *VisiTrend + VisiPlot* manual also explains how *VisiTrend + VisiPlot* can read data from ordinary Apple text files.

To see what a difference some charts could make, take a look at the examples on pages 50-51. Whether it's just for your own use or to show to other people, a picture that's worth a mere thousand words can often be worth an infinity of numbers.

The *VisiTrend + VisiPlot* system consists of three subsystems. In brief, the subsystems are:

- Storage Management Subsystem—Used to manipulate the series for temporary storage in the computer memory and for permanent storage on a diskette. Up to 16 series, or 645 data elements, can be stored at once in the memory. Any of these can be stored on the diskette as one file, and any number of files can be stored on the diskettes.
- VisiTrend Subsystem—Used to perform statistical analyses on one or more of the series in the memory.
- VisiPlot Subsystem—Used to plot in graphic form one or more of the series in the memory.

You can use *VisiTrend + VisiPlot* to perform statistical analyses on your *VisiCalc* models—including generating new series to test various hypotheses and then returning the new series to your *VisiCalc* model—or to plot series transferred from your *VisiCalc* model to *VisiPlot*.

VISITREND + VISIPLOT

VISIPLOT SUBSYSTEM

Line charts
Bar charts
Area charts
Pie charts
Hi-lo charts
Scatter charts
Line-and-bar charts
Comparative bar charts
Hi-lo and line charts
Two-windows feature
Multiple plot overlays

HOW TO LOAD VISICALC DATA INTO *VISITREND + VISIPLOT*

First load your *VisiCalc* model with the data diskette in drive 2. If you are creating a new model for transferring data, create your model, and save it in *VisiCalc* in the normal fashion. Remember to enter ,D2 after you have keyed in the name under which you wish to save the file. This method saves the file on the diskette in disk drive 2.

Now select the data you wish to transfer to *VisiTrend + VisiPlot*. Place your *VisiCalc* cursor on the top left-hand matrix entry on the block of data you wish to transfer. This block can contain more than one data series. For example, suppose you have daily closing prices for a security in column B, the daily New York Stock Exchange composite index in column C, and the daily Dow Jones Industrial Average in column D. To transfer all three series, place your cursor on the first matrix entry in column B, the first closing price.

If you wish to name your own series, then place your cursor on the column heading rather than on the first entry in the column. *VisiTrend + VisiPlot* will then use the column heading as the name of the series. The system automatically

VISIPLOT

YSTEP

assigns names to all unnamed series.

Now save your selected data as a DIF file. Key / to enter the Command mode, S to save your model and # to save it as a DIF file. You will be asked whether you wish to save or load (DATA: SAVE LOAD). Key S to save. You will be asked the name of the DIF file (DATA SAVE: FILE FOR SAVING). Key in the name you wish to give to this DIF file. To avoid future confusion, key the name, followed by a period and the suffix DIF (e.g., SECURITY XYZ.DIF). You will now be asked to enter the coordinate of the bottom-right-hand matrix entry point of the data block you are saving. In this example it would be the last matrix entry in the Dow Jones Industrial Average column. You can enter the actual matrix entry or you can manually move your cursor to it, using your right and left arrows and space bar. When your cursor is in position, depress the Return key. You will receive the cue DATA SAVE: R, C OR RETURN (to indicate whether your series are contained in rows or columns). In this example, key in C for column. The DIF file will be saved on the diskette in disk drive 2.

Remove your *VisiCalc* program diskette from disk drive 1 and insert your *VisiTrend + VisiPlot* program diskette in disk drive 1. Key / for the Command mode, S for storage, and Q to quit; depress Return.

Wait patiently until you see the *VisiTrend + VisiPlot* Storage Management Subsystem menu on the screen.

On the Storage Management menu, move your cursor with the right and left arrows to load. Depress the Return key. Select your DIF file by moving the cursor to it with the right and left arrows and depressing Return.

You will be asked to supply the periodicity of the data series. Because our example uses daily data, enter 30. Depress Return. You will next be prompted to supply the starting year and period.

When the loading is completed, the system will present you with a list of the series that have been created. At this time you should determine which of these you wish to save as a group in a *VisiTrend + VisiPlot* file. You can break them up into more than one file, and any single series can be stored in any number of files.

The system included English words, rather than the confusing computer jargon that is so common in software programs.

Return to the Storage Management menu by depressing Return and move your cursor to save a series. Select the series to be saved in the first file by moving your cursor to the series and depressing the space bar to mark it. Continue this process until you have marked all the series in any one file. Depress Return.

You never have to perform this procedure again. The next time you wish to load the series, you will simply load the file you have just created, which contains the series you wish to work with.

THE HISTORY OF *VISITREND + VISIPLOT*

Software designer Mitch Kapor and backers Dan Fylstra and Peter Jennings, who founded the computer firm Personal Software (now called VisiCorp), got together because they wanted to develop a statistical-analysis system that interfaced with *VisiCalc*, the well-known analytical program for Apple computers.

Kapor was not a computer scientist by training, but by the time he met Fylstra and Jennings, he had designed a computer system called Tiny TROLL and was enrolled in the accelerated master's program at the Massachusetts Institute of Technology's Sloane School. Tiny TROLL is a statistical-analysis and graphics system based on MIT's time-sharing language.

Working for Personal Software, Kapor developed *VisiPlot* and *VisiTrend + VisiPlot*. The history of these new systems and the company and people who backed it represents one of the real successes of the microcomputer industry and is a tribute to Kapor.

The Programs' Genesis

Kapor's move to the computer field came quickly after he bought an Apple II and learned to program in BASIC. Right away, he understood both the untapped power of such systems and the possible commercial value of useful software. From that experience was born Tiny TROLL, the precursor of *VisiTrend + VisiPlot*.

Kapor's newly designed system had

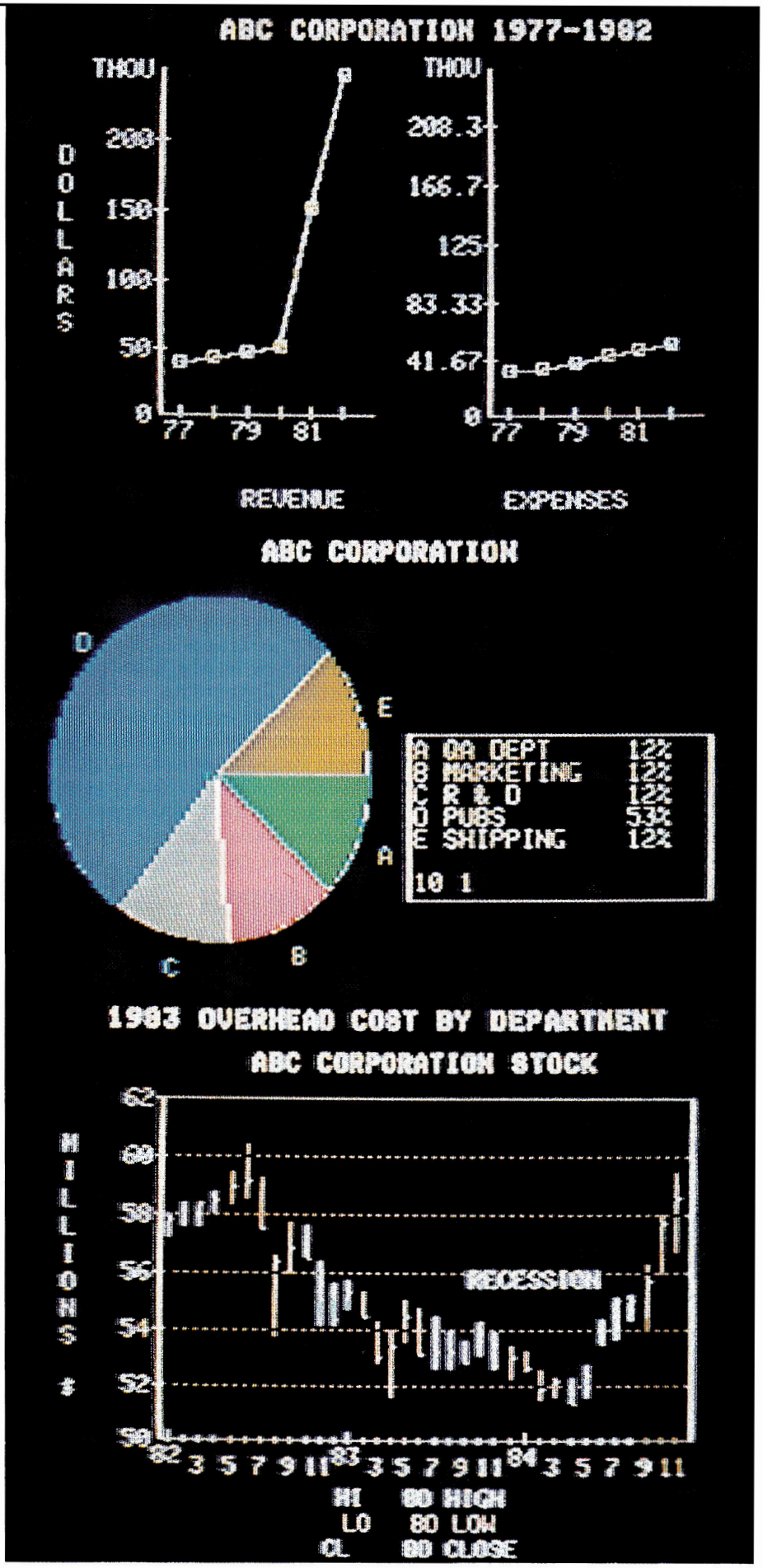
wide-ranging abilities. It could perform standard statistical analysis, such as maximum, mean, average, and standard deviation; perform multiple linear regressions; transform data sets in conjunction with other data sets or based on mathematical expressions; and produce both tabular statistical reports and high-resolution graphs.

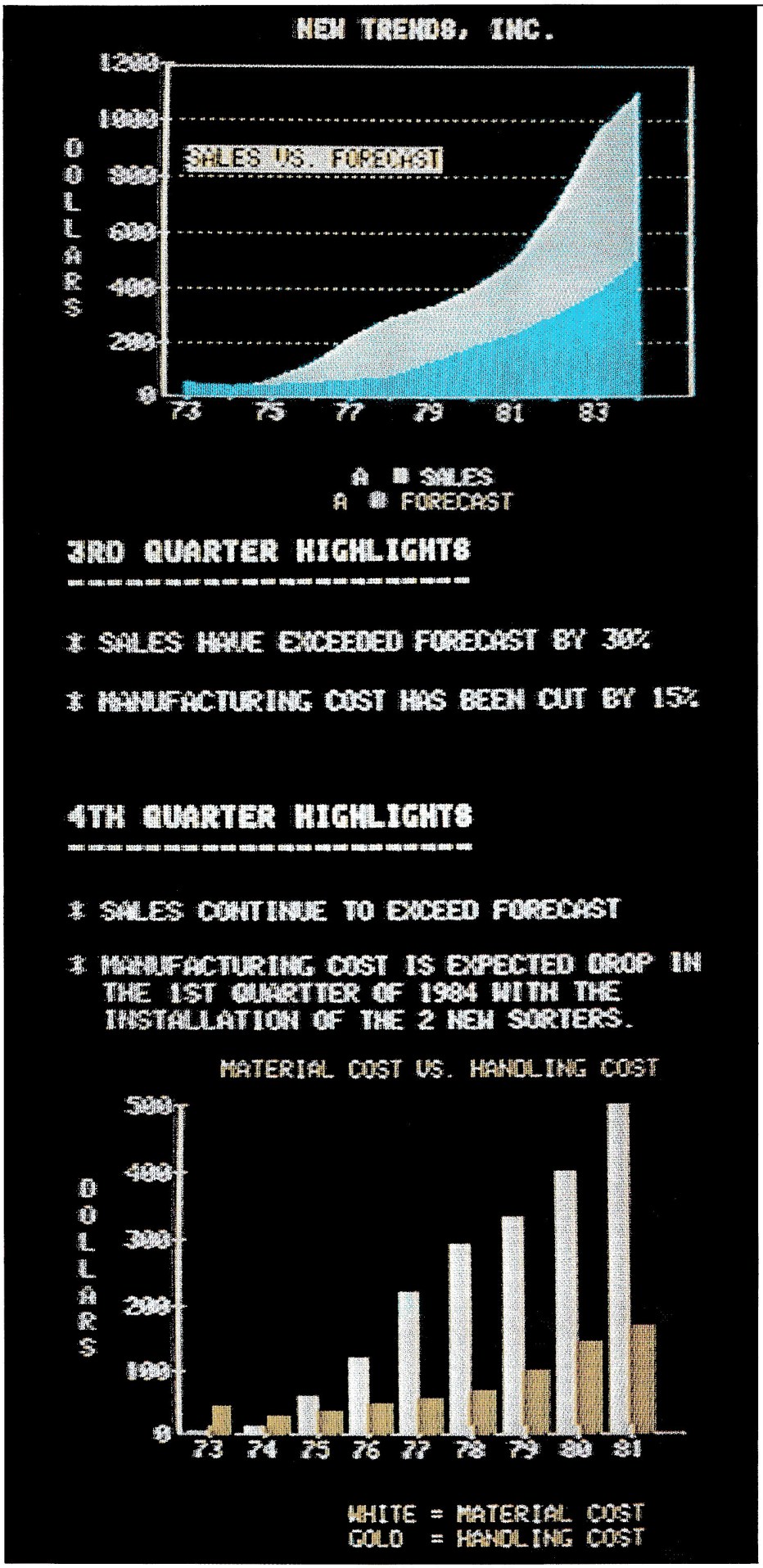
Those who wanted both the analytical functions of VisiCalc and the graphics of Tiny TROLL found it annoying that they had to combine the two systems manually.

The command structure of Tiny TROLL was so similar to that of TROLL that anyone familiar with TROLL could easily make the transition to the new program. Tiny TROLL's documentation included examples as well as articles explaining various statistical theories. The program was useful for time-series analysis and in such areas as stock-and-commodity price charting, financial-ratio analysis, estimation of demand function for consumer goods, analysis of securities performance, depreciation calculations, and mathematical-function plotting.

A Wish List

Once Tiny TROLL gained exposure, many professionals already familiar with *VisiCalc* started using Kapor's system. The systems were functionally complementary, but each fell short of what some users needed. Those who wanted both the analytical functions of *VisiCalc* and the graphics of Tiny TROLL found it annoying that they had to combine the two systems manually. They also wanted more functions. So, little by lit-





tle, Kapor began compiling a wish list.

The list eventually included multigraph formats, the ability to print graphs from within a program, the addition of built-in functions to statistical portions, the use of the Apple color-graphic capabilities to develop slide-show-type graphs, and a simplified method of user interaction with the computer.

After Kapor turned his wish list into *VisiTrend + VisiPlot,* computer users had a comprehensive product. The new level of ease for users was as important as the features were. The system included English words, rather than the confusing computer jargon that is so common in software programs. Words such as *Plot, Exit,* and *Color* appear on the banner-type menus. For example, when the cursor moves to one of these words, a longer English description of the choice appears on another line. The user chooses the option simply by depressing the Return key after the cursor is at the desired choice.

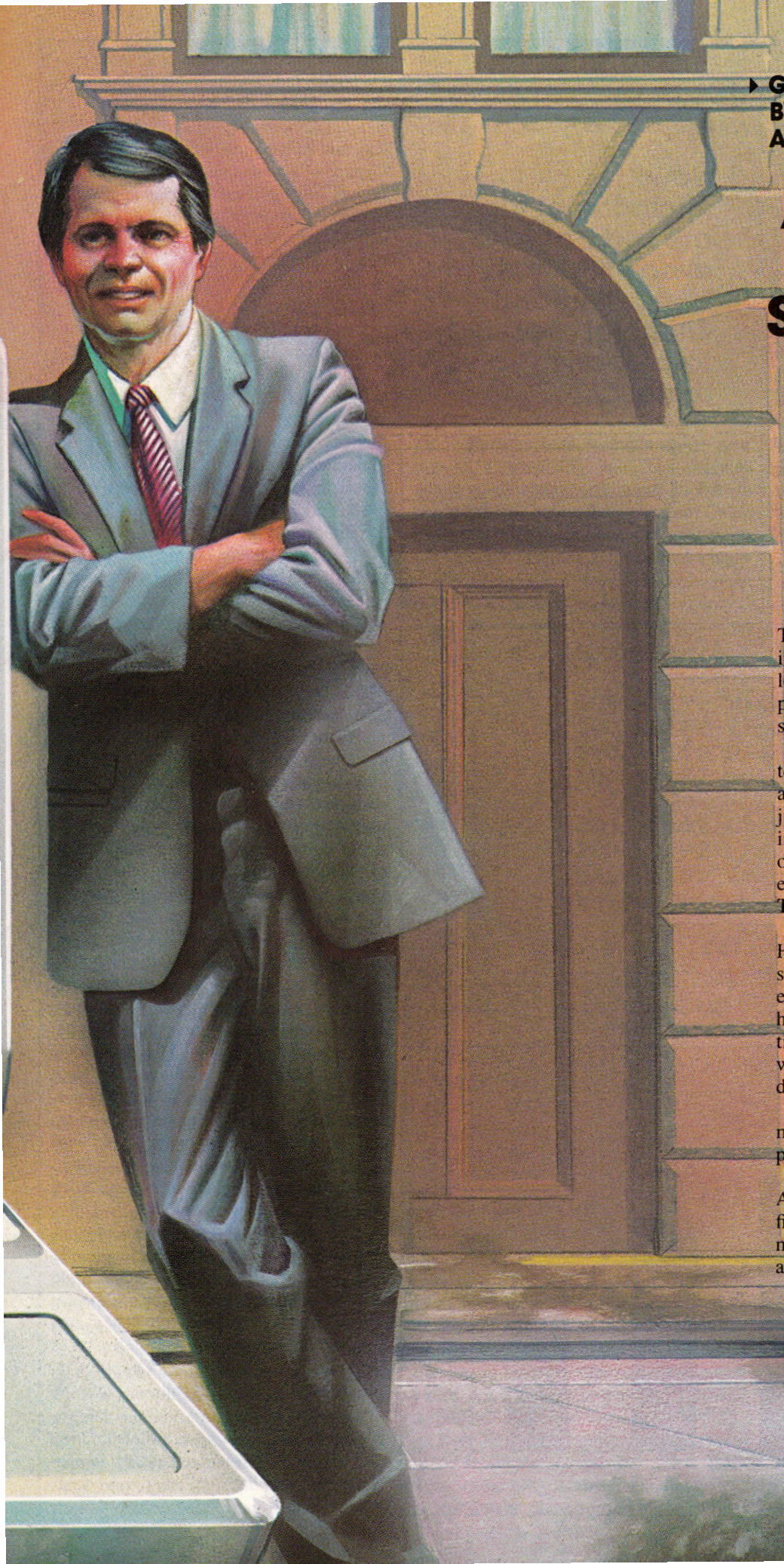
This method of interaction represents a significant departure from the single-letter commands of *VisiCalc* or the cryptic commands of Tiny TROLL. It has become the standard method of interaction for other VisiCorp products, other vendors' products, and those developed later by Kapor.

Since the development of the *VisiTrend + VisiPlot* system, Kapor has

The history of these new systems represents one of the real successes of the microcomputer industry and is a tribute to Kapor.

gone on to establish his own company, Lotus Development Corporation, and has introduced a well-received product called *1-2-3.*


abc
apple II



GRAPHICS
BY BARBARA E. McMULLEN
AND JOHN F. McMULLEN

ABC CASTS APPLE IN SUPPORTING ROLE

Self-taught graphics wiz jazzes up the TV giant's sales materials with Apple graphics.

The story of Mike Hudak's interest and involvement with microcomputers parallels the experience of many businesspeople who seek out these machines to streamline their work.

Four years ago, Hudak, who is director of research for the network-owned and -operated stations of ABC-TV, had just bought an Apple II and was exploring its uses. After he brought it into his office to work on projects, his new interest had a snowball effect.

The Ball Gets Rolling

Once staff members saw his Apple, Hudak said, it piqued their curiosity. He started exchanging ideas about computers with coworkers who had them at home. Others would ask him what abilities the Apple had that could help them with their work. As interest grew, he drew support from management.

"I had pretty good backing from management," he said. "They saw the potential."

Now, microcomputers are used at ABC for everything from budgeting and financial planning to preparing sales material. For instance, Hudak has used an Apple II to produce video cassettes

that sales representatives can take to clients' offices for presentations.

That array of functions is possible because of the combination of hardware and software that makes up the microcomputer system in Hudak's ABC office. It includes Hudak's initial Apple II, a Corvus Winchester System, a Houston Instruments Plotter, and memory-expansion and 80-column boards.

Hudak's first uses of his system were for budgeting and financial planning with *VisiCalc*. He then moved into other fields, such as monitoring and displaying overnight ratings and developing sales material. The role of microcomputers at ABC continued to expand.

Using *Apple Plot*, Hudak could immediately prepare graphic representations of marketing statistics. Previously, it could take the art department days to accomplish the same results. *Ultraplot* gave him more flexibility in displaying the descriptive text in the graph area. *VisiTrend + VisiPlot*, interfaced with *VisiCalc*, helped him extract data, perform statistical analysis on it, and interpret it graphically (see examples below).

Now, microcomputers are used at ABC for everything from budgeting and financial planning to preparing sales material.

All of these developments gave the ABC research staff added flexibility for analyzing data and reduced the time necessary to complete the process, but the finished product needed improvement.

To upgrade the quality of his presentations, Hudak employed the *Executive Briefing System, Apple Business Graphics,* and *Slide Show* software packages. Groups of clients could view the presentations, which used large-screen output controlled by the computer. Now a firm selling video services could use video output to present recent and relevant demographic information.

Selling TV to TV

And then came the coup de grace—selling television to television.

Hukak got this idea after seeing the prototype of a microprocessor board that interfaced an Apple II to videotape devices. His goal was to transfer Apple-generated graphics directly to videotape. He arranged, through Adwar Video in New York, for his office to be a test site for the prototype.

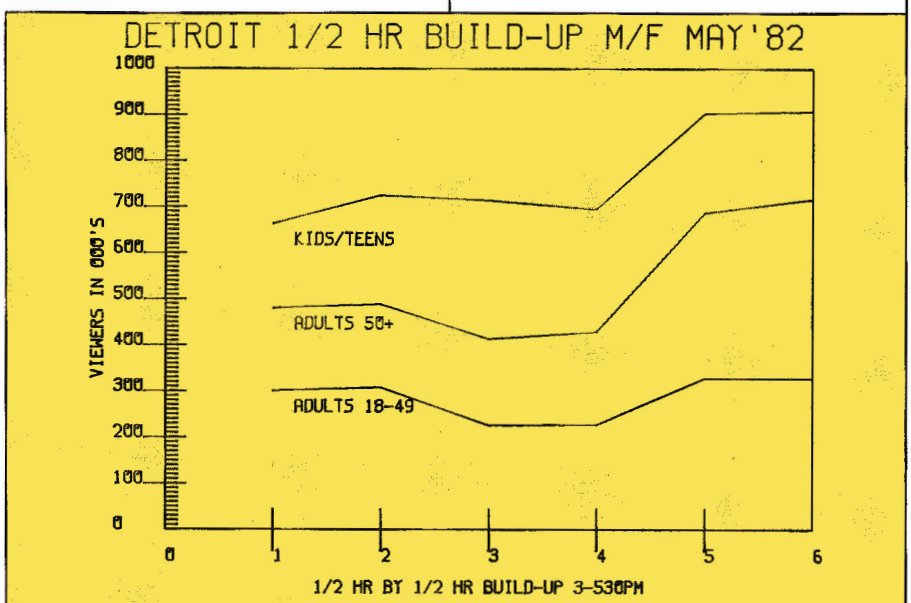
This new system enabled Hudak and his staff to produce videocassettes for the sales staff's use. ABC's film editors could add video script and voice-overs, and ABC's video capacity was used to provide high-quality marketing output. Now, the staff could develop specific introductions for individual clients.

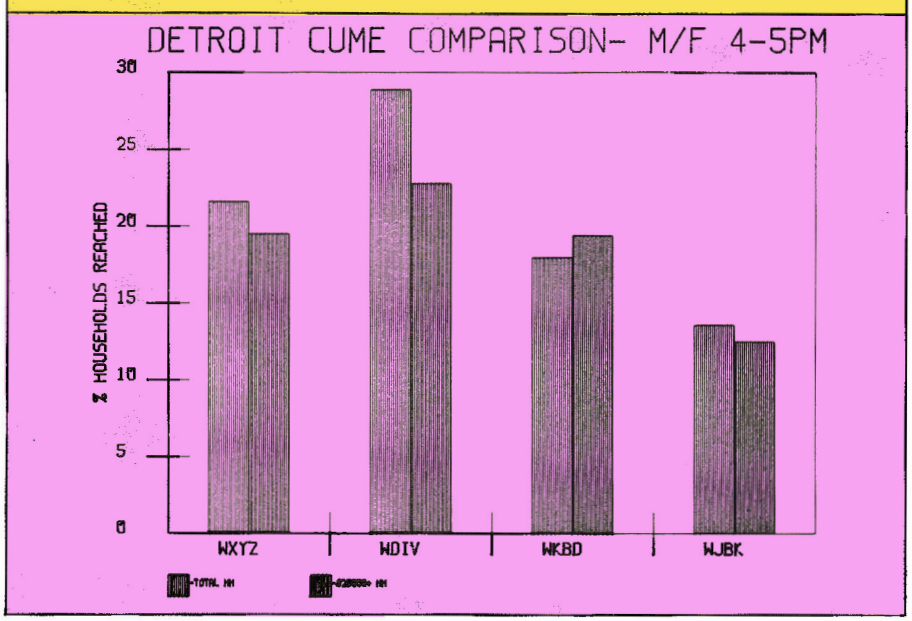
All in all, the introduction of microcomputers had a significant impact on Hudak's work. The information presented to prospective or existing clients was now more timely and relevant, and ABC could deliver it in a way that was both efficient and consistent with the public image of a major television network.

About his involvement with microcomputers, Hudak says, "A person has to consider himself lucky if his hobby and livelihood become the same."

Like many executives who have moved into the computer field, Hudak didn't plan it that way. His bachelor's degree from Iona College in New Rochelle, New York, is in political science. He served as a Marine in Vietnam, and he later worked eight years with A.C. Nielsen, the television-rating firm, before joining WABC-TV in New York in 1977 as director of research. In 1981, Hudak was promoted to his present position with the parent organization.

In his spare time, Hudak teaches three courses in business at New York's New School for Social Research. They are, appropriately enough, Apple Business Graphics I, Apple Business Graphics II, and IBM Business Graphics. ✚





We thank the Computer Store of Oakland and VisiCorp for their assistance in providing us with slides of VisiTrend + VisiPlot screens.

▶GRAPHICS/BY WILLIAM O'BRIEN

A THOUSAND WORDS IS WORTH A PICTURE

Apple III graphics program solves data overload.

A business can be run either poorly or well. If it's run poorly, it doesn't last very long. If it's run well, then the amount of work required to maintain its position can be tremendous. In fact, by the time most people decide they need the assistance of a computer, it's usually long overdue. I will examine a business that solved some of its problems with an Apple III, a program called *Apple III Business Graphics,* and a printer-interface card that does a little more than simply sit between the computer and the output device.

For a while, the problems involved with running the business were under control. Accountants paraded in volumes of reports and stacks of ruled green paper. The reports were temporarily pushed aside, the massive 11×17-inch sheets unfurled, and bottom lines scanned to determine whether Alka-Seltzer or champagne was the order of the day.

That was fine for a while. But when the computer age arrived, reports could be written faster. Electronic spreadsheets allowed countless predictions to be generated for speculative bottom-line analysis. But the by-product of computerization was actually an increase in the amount of work, which meant accountants were still poring over countless bottom lines. What to do?

Images

The fastest way to express a concept is with a picture. If we combine pictures with a computer, we have a product capable of alleviating much of the drudgery of daily corporate existence. Of course, to use a computer in this way, it must have a versatile graphic ability. It should also be capable of displaying the images created either on the screen or a printer. Considering these criteria, the solution to many business problems could be an Apple III.

Options

Without external programs, the Apple III is capable of four distinct display options, or modes, as outlined in table 1.

Mode #	Description	Buffer
0	280 x 192 Black & White	1
1	280 x 192 Limited Color	1
2	560 x 192 Black & White	1
3	140 x 192 Full Color	1
4	280 x 192 Black & White	2
5	280 x 192 Limited Color	2
6	560 x 192 Black & White	2
7	140 x 192 Full Color	2

Table 1 Color Display Modes

Name	Number	Name	Number
Black	0	Brown	8
Magenta	1	Orange	9
Dark Blue	2	Grey	10
Lavender	3	Pink	11
Dark Green	4	Green	12
Grey	5	Yellow	13
Medium Blue	6	Aqua	14
Light Blue	7	White	15

Table 2 Color Codes

In mode 1, all dots on the graphic screen exist in families of seven. When any dot in that family is assigned a color, all of the dots in the group are set to that color. Color options, by the way, are outlined in table 2.

Each of these graphic modes has two possible display areas or buffers (sections of memory where the actual graphic work takes place). Each of the buffers in modes 1, 2, or 3 occupies 16K, while mode 0 occupies only 8K for each buffer. Looking at the arrangement of the buffers, you will see that if you use both buffers of mode 0 and buffer 2 of either of the other three modes, you can have three graphic display areas available at all times. This is possible because none of the graphic displays erases the others unless the same buffers are used. However, were you to use the first buffer of either modes 1, 2, or 3, you would erase everything created in mode 0, buffer or not, because their work areas are coincidental.

Pokes and Peeks

Many computers require a series of peeks and pokes in a certain area of

memory if you want to use their graphics. This area switches on dots and changes color. This requirement is not true with the Apple III.

Part of the power of this computer is its ability to allow overlay files to be called into memory. These files, called invokable modules, are written in machine code. They contain instruction sets needed to access capabilities contained in the Apple III without forcing a programmer to worry about addressing the necessary internal procedures directly. When you bought your Apple III, something called BGRAF.INV was included with the files on the *Business BASIC* diskette. It's a graphics-handling routine, but not one that you can load or run. Instead, it is used as an overlay.

To use it, you would call it into memory. Using the word PERFORM, you can channel your own program to any of the sections it contains by naming that section and setting the parameters for the action you expect it to perform. In the case of BGRAF.INV, if you wanted to select a mode and buffer, you would type:

PERFORM GRAFIXMODE (%MODE,%BUFFER)

where %MODE and %BUFFER are integers that you have previously set to the values you want. GRAFIXMODE is a label referring to that section of the BGRAF module that contains the instructions for performing the mode and buffer assignment. Likewise, you could PERFORM DOTAT (%X,%Y); PERFORM LINETO(%X,%Y); PERFORM FILLCOLOR%(COLOR) and more. All you do is point to that section and tell the Apple III what values to pass, and BGRAF takes care of how the deed is done.

If we combine pictures with a computer, we have a product capable of alleviating much of the drudgery of daily corporate existence.

As comprehensive as these procedures may be, your original task was, after all, to simplify your business practices. It would not be appropriate to obligate someone to learn the process of creating graphics from scratch, even using the shortcuts offered by BGRAF.INV.

Simplify, Simplify

The solution is to use software that utilizes the routines contained in BGRAF without involving you in more than you want to do. You want a package called *Apple III Business Graphics (BG III)*, written by Business & Professional Software, Inc., and distributed through Apple Computer's *Special Delivery Software Program*.

Table 3 lists most of the equipment you will need to use the program, but some explanations are needed.

If you don't have a hard-disk drive, it's possible to get by with a 128K Apple III. *BG III* is a large program, and the additional memory used by the ProFile (Apple's hard-disk drive) driver can cause a memory overflow on the older 128K machines.

Without a hard disk, however, you can only store a maximum of eight screen pictures on a floppy diskette, so, if you intend to save many of them, you may need ProFile. (That would be true, for example, if you didn't have one of the *BG III*-supported printers or plotters and were using an alternate display method.) The computations needed to create the graphs are done in memory. The more memory you have available, the quicker the calculations will go and the faster the graphs will be drawn.

Although the Silentype printer was an effective tool some three years ago—it was quiet and could copy the Apple II graphic screen without additional programming—its slow speed and thermal-paper output make it only marginally acceptable by today's standards. However, using a letter-quality printer such as the Qume to generate graphs regularly would put excessive strain on the printing mechanism and almost certainly raise the cost of maintenance.

The principle behind the Apple III has always been total system integration that does not require active user participation.

Plotters are effective graphic-reproduction devices. They are also expensive. While a sophisticated system such as *BG III* would demand high output quality to print the graphs you have made, there are times when a little extra

```
Apple /// with minimum 128K
External Apple /// Drive
Color Monitor2
Monitor ///
Profile3

Apple Silentype Printer
Hewlett Packard 7225A/B
Houston Instruments HIPLOT (DMP 3, DMP 4)
Qume Sprint 5/45 or 5/55

1
  Current Apple ///'s are sold only in 256K
  configuration.
2
  If a color display is required
3
  See text for restrictions of a floppy only
  system
```

Table 3
Recommended Equipment for Using Apple ///
Business Graphics

```
-->EDIT

1:        ? "1981"  .7
2:        ? "1982"  .9
3:        ? "1983"  1.1
4:        ? "1984"  1.5
5:        ? END
-->
```

Table 4a
Sample Edit Session

work and a dot-matrix printer might do just as well. Before you get into that, let's look at *BG III*.

In English

The best type of program is one that doesn't require the user to know more than absolutely necessary. In the case of graphs and charts, the data is the important thing, not the technique used to generate the final output. *BG III* lets you enter data and convert it into a variety of graphic images, including line, area, pie, and bar (either vertical or horizontal) graphs. These can also be interwoven to produce complex data images. Perhaps the best feature of all is that *BG III* uses ordinary English commands to produce them.

Imagine producing visual information for your own company. From 1981 to 1985, profits have grown, and now you want to convey that information to prospective investors. It could be passed on verbally, but, as we've said, pictures communicate more efficiently. We can use *BG III* to provide that link between information and understanding.

The program comes with three diskettes: a "boot" diskette that contains the *SOS* files and drivers, the program diskette, and a data diskette that contains sample information and help screens. Put the boot diskette in the internal drive; either turn on the Apple III or, if it's already on, press the Control and Reset keys. You will be asked to insert the program diskette and press Return. The *Business Graphics* logo will appear, and when you press Return again, you will be at the command line of *BG III*.

Creating Graphs

To enter the data for your graph, type the word Edit and press Return. *BG III* contains a parser that examines all of the words you give it. Generally, it expects to find a verb to direct it to perform some action; a noun to tell it the action you want performed; and, in some cases, parameters to set the limits of the action you desire.

```
--> SET VERTICAL TITLE "REVENUE IN MILLIONS"
--> SET HORIZONTAL TITLE "YEARS"
--> DRAW LINE
```

Table 4b Adding Titles

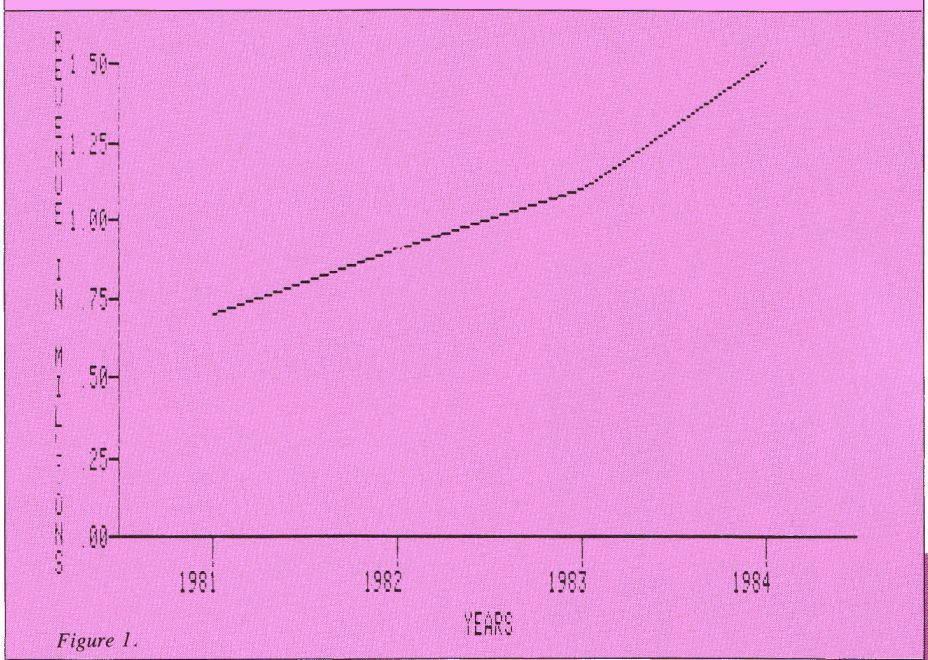


Figure 1.

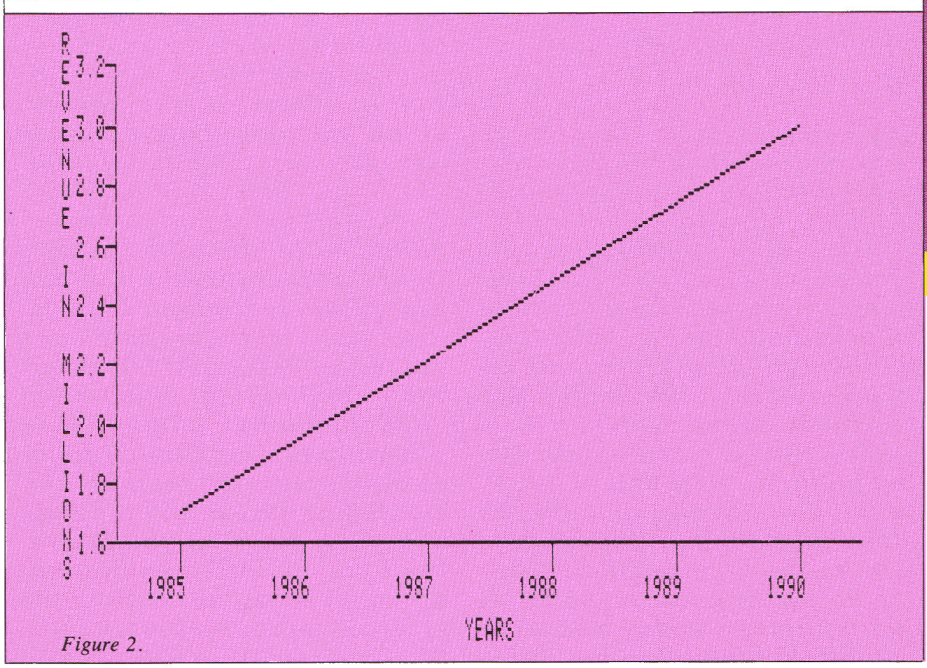


Figure 2.

Part of the power of this computer is its ability to allow overlay files to be called into memory.

After issuing the Edit command, you are prompted with the number 1 and a question mark. *BG III* is now waiting for two pieces of information to be entered: the horizontal and vertical components of your graph. It expects the data to be entered in that order. Table 4a runs through a sample session with EDIT. Notice that one set of data is enclosed in quotes. You define labels, the non-numeric components of your graph, in this way. When you have entered the

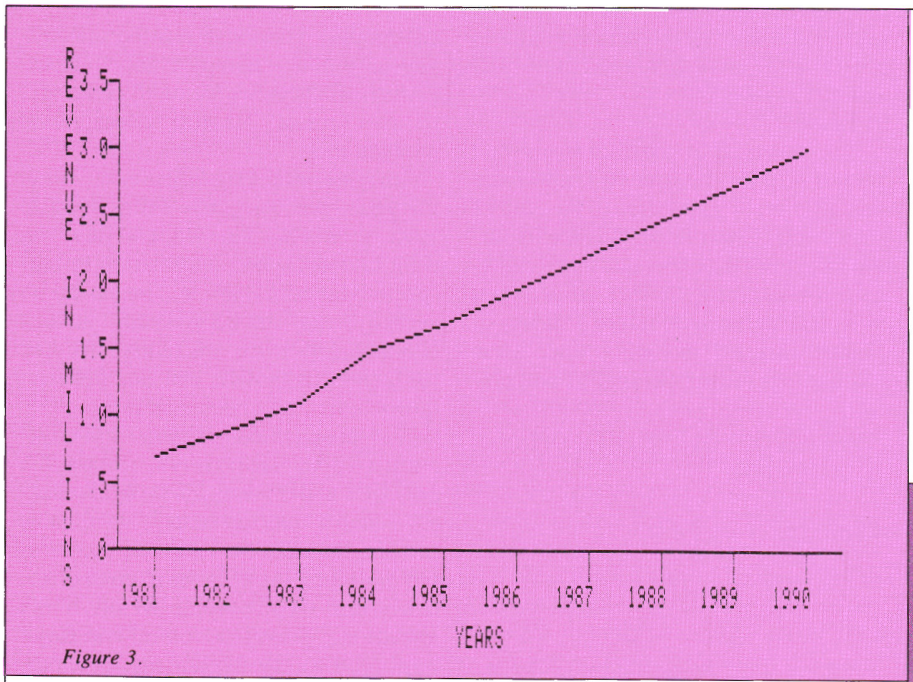


Figure 3.

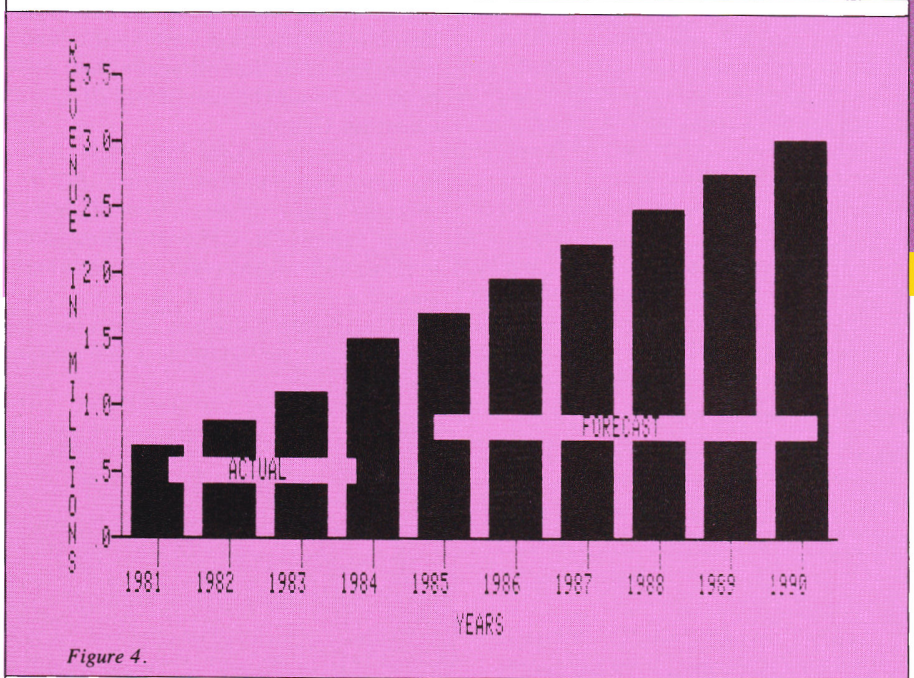


Figure 4.

```
Centronics 122
Centronics 739
Epson MX-70
Epson MX-100
Epson Type II
Epson 82
IDS Prism
NEC 8023
C. Itoh 8015
Okidata 82A (with dot
addressable graphics)
Okidata 83A (with dot
addressable graphics)
```

Table 5 PKASO addressable printers

data, type END. *BG III* will ask for additional commands by using the --> as a prompt.

With just this information, you can generate a graph, but we can add a little flourish. Table 4b illustrates the additional commands needed to add horizontal and vertical titles. The last command is the instruction to draw the graph. Figure 1 is the result.

Store what you've just entered by typing SAVE .D2/ACTUAL.

.D2 is a designated Apple III disk drive, and ACTUAL is a name you have selected. Now type in EDIT LABELS. Again, you are greeted by the editing prompt, but this time you press the Return key through the labels you've already entered until you come to a blank line. Add the labels for the years 1985 through 1990. When you're finished, use END again to let *BG III* know.

The --> prompt will appear again, indicating that you still need some calculations. First, type in CLEAR SCREEN to erase the existing graphic picture; then you tell *BG III* to extrapolate along your present data points by typing FIT LINE. A second or two will go by, and you'll be told the standardized error used in the calculation. Tell it to GENERATE 1985 1990 so it can produce the actual data points you need. Finally, enter DRAW LINE to create the graph you see in figure 2. Save the data you've just generated by typing SAVE .D2/FORECAST. The transition from graphic screen to text screen occurs as soon as you begin to type in a command.

The more memory you have available, the quicker the calculations will go and the faster the graphs will be drawn.

Continuity

So far, you have two graphs: one represents actual revenue, the other expected revenues based on current trends. Excellent though they are, they give no sense of continuity, which is important for any presentation. Type CLEAR to erase all of the data in memory, including the graph. Now tell it to LOAD .D2/ACTUAL, followed, at the prompt, by APPEND .D2/FORECAST, and finally DRAW LINE. The resulting continuous line graph is shown in figure 3. It represents both current performance and expected results from 1981 through 1990. Store this by typing SAVE .D2\COMBINED.

Since what you are after is heightened visual impact, clear the screen and enter the command DRAW BAR. This will create a bar graph with your data displayed boldly. To differentiate between actual and forecasted data, *BG III* allows us another option called the floating title. You enter SET HORIZONTAL

Printer Character Sizes

Size	Code	Command
5 CPI	8	~E8,
6	9	~E9,
8.25	10	~E10,
10	0	~E0,
12	1	~E1,
16.5	2	~E2,

Print Format Commands

~Dn,	(Where n is a number between 0 and 255 used to set the physical width of the printed line.)
~CL,R,W,	(Where C is the defining character, L is the left margin, R is the right margin and W is the wrap margin, where printing continues for lines that exceed the preset width.)
~Fn,(T1),...,(Tn)	(Where n is the number of tabs to set and (T1) through (Tn) are the Tab positions.)
~F0,	(Clears all Tabs.)
~I,	(Advances to next Tab position.)
~Tn	(n=0 for standard 6 LPI n=1 for Hires print spacing n=2 gray scale or 6 dot spacing n=3 Bit graphics 7 dot spacing)
~L,	(Send form feed.)
~J,	(Send line feed.)

Text Screen Dump Commands

~Pn,	(n=0 -> 40 col standard screen 1 n=1 -> 40 col screen 2 * n=2 -> 80 col standard screen n=3 -> 80 col reversed interlace *)

[* - for custom software]

Table 6
PKASO Command Options

FLOATING TITLE "ACTUAL". This will draw the word ACTUAL on the screen, but not in a permanent location. Using the arrow keys, you can move the word left, right, up, or down until it's where you want it. Pressing RETURN fixes its position. We can do the same with the word FORECAST. A possible result is shown in figure 4.

At any time you could print a copy of your graph on one of the supported printers or plotters by typing WRITE SCREEN <device>, where <device> is any of the possibilities listed in table 3. However, what if you had none of those devices, as might be the case if your current budget allowed only for a dot-matrix printer? For that, a little foresight and some investigation is needed.

Printers

The principle behind the Apple III has always been total system integration that does not require active user participation. Simply stated, it means that anything and everything connected to the Apple III should be operable without users having to worry about how it works. The disk drives are a prime example of this. They are controlled by driver files contained in the *SOS.DRIVER* program that is loaded in when the system is booted. We open or close a file, but have no other involvement in the

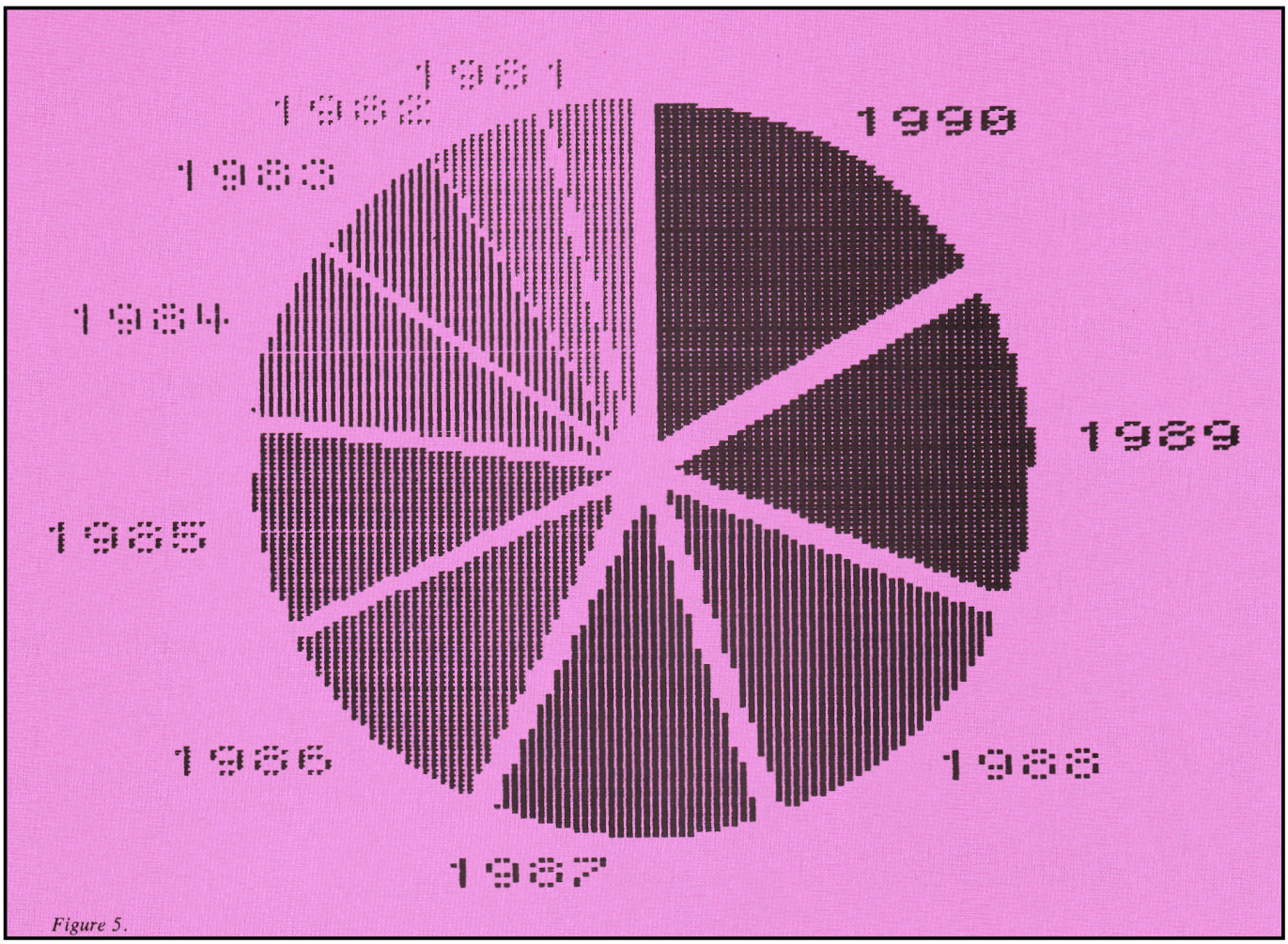


Figure 5.

specifics of data handling. In theory, all such devices should work this way.

BG III takes advantage of this concept by accessing a predefined printing device in *SOS* when you use the WRITE SCREEN <device> command described above. You need to know nothing about your printer. *BG III* looks at your device driver and does it for you.

Interactive Structures, located in Bala Cynwyd, Pennsylvania, has expanded this concept. The company manufactures a printer-interface card called PKASO for the Apple III. It contains a printer driver in ROM (read-only memory) that allows any of a number of printers (see table 5) to be used with the Apple III without regard to the individual printer-command codes. This is done by sending the card a predefined attention code, a command code that informs it of the type of command that follows, and a parameter list to set the boundaries or scope of the command. You access any functions that can be performed by the printer by sending commands to the card. The ROM intercepts and interprets those commands for the printer.

Changing printers does not mean you must retreat into different programs to reconstruct print-command formats, but that you must simply change the ROM on the PKASO card to account for the new device. The word PKASO implies a certain amount of graphic ability, because the card can be used to print Apple III graphic screens on any of the supported printers (note that the IDS Prism is a color printer). The range of commands available is shown in table 6. Also, should your printer contain features that are not universal among those supported, commands can be issued directly to it, bypassing the card entirely.

At any time you could print a copy of your graph on one of the supported printers or plotters.

All of the illustrations contained here were done using a C. Itoh 8015 dot-matrix printer. It's not supported by *Business Graphics III*, but is entirely useable with the PKASO card. The procedure is slightly different than printing directly from *BG III*.

Saving Graphs

You may want to print a graph, such as the one covering 1981 through 1984. Rather than typing WRITE SCREEN <device>, you can put a picture of it on a disk drive using SAVE SCREEN .D2/ACTUAL.

It's helpful to mention here that *BG III* adds some specifications to the name you've selected. When you save just the data for a graph with a filename such as .D2/ACTUAL, *BG III* transforms the name into .D2/ACTUAL.P.DATA (the 'P' stands for Points); your screen file, on the other hand, is saved as .D2/ACTUAL.S.DATA.

When you want to print, enter QUIT at the --> prompt. You'll notice that a line of text appears at the top of your screen. *Business Graphics III* is written in Pascal, and the picture data it saves is in Pascal data format.

Interactive Structures provides both a

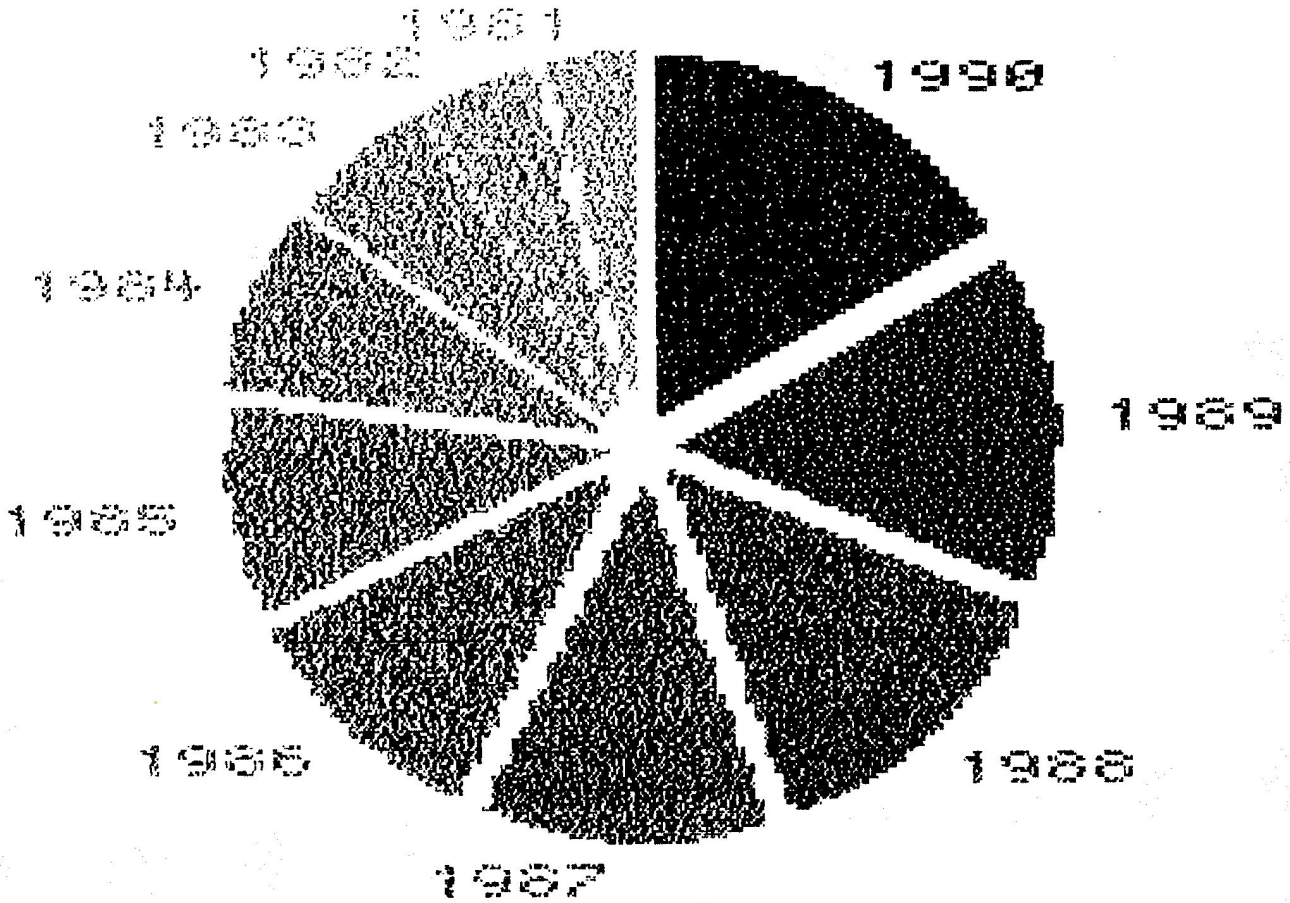


Figure 6.

BASIC and a Pascal graphics printing program, which is useful since the pictures created by *BG III* are not readily accessible via a BASIC program.

Noting the top of your screen once more, you'll see several Pascal commands. Only one concerns us, the X)ecute command, which allows a program to be run. Insert a diskette that contains the Interactive Structures program PRINTPIX.CODE into an available disk drive. Press X and, at the question, "What program?", type in the drive number and PRINTPIX.CODE. Once Printpix has loaded, you will be prompted to enter the name of the picture you want to print and how you want it printed (rotated, direct white-black correspondence or inverted, and size). Printpix will interpret the screen display for your individual printer.

If you're dealing with colors as in a pie chart, for example, PKASO has an excellent feature that allows it to assume certain things about color presentations. This feature is called randomizing. Each of the points on the Apple III screen is a definite memory location that is either on or off. The screen has physical boundaries that are visible when you're printing in color or in gray scale on a black-and-white printer. The Randomize option assumes that between any two adjacent memory locations of the same color, that color will also be present between them, and prints it that way.

Producing images such as graphs requires some assistance. *Business Graphics III* provides the help you need.

This avoids a choppy look and produces a smooth graphic image. The differences can be seen in figures 5 and 6.

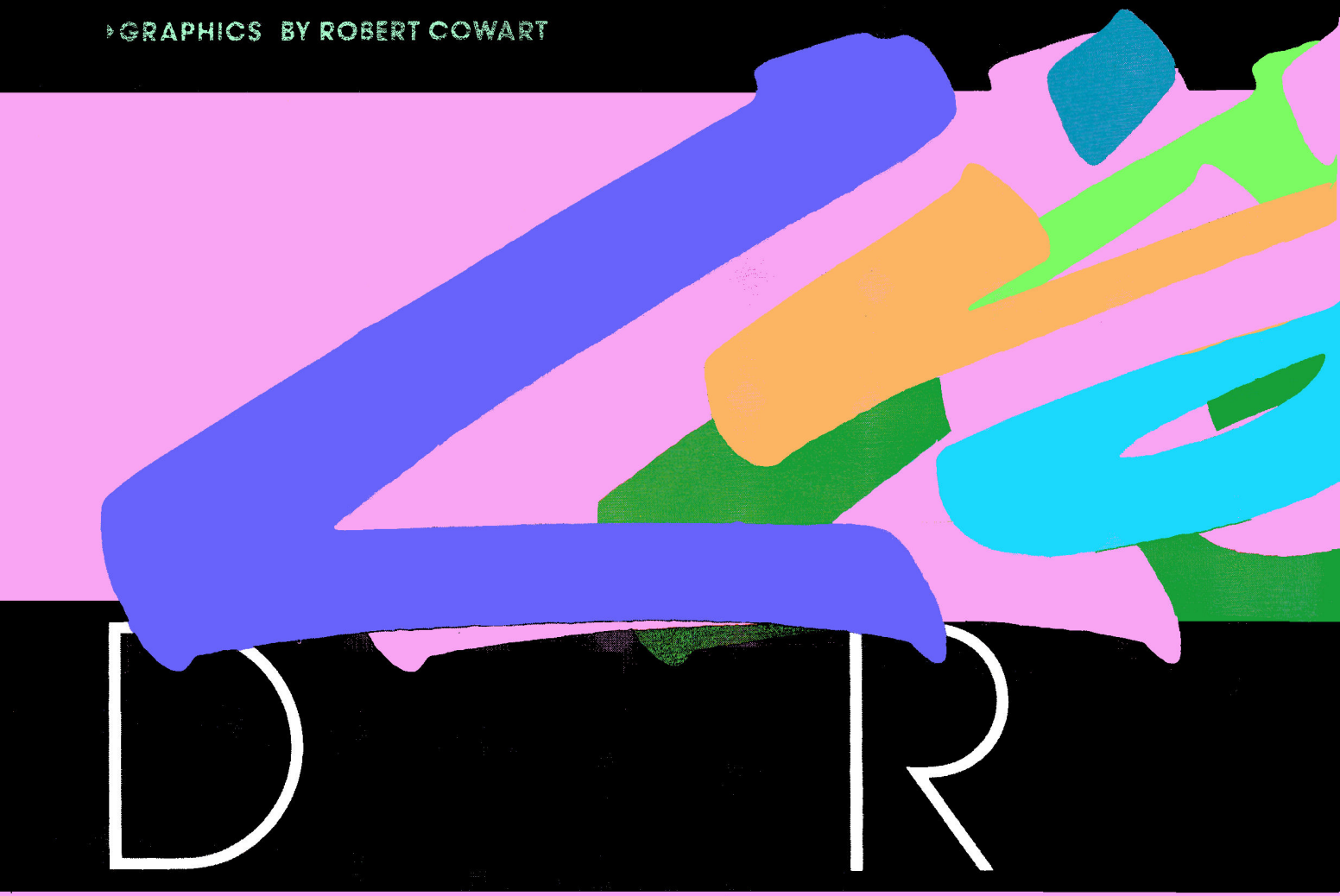
More Features

As you've seen, the Apple III has versatile graphics capabilities that are accessible through the Apple-supplied BGRAF.INV invokable module. Even so, producing sophisticated images such as graphs requires some assistance. *Business Graphics III* provides the help you need.

What we've covered just scratches the surface of the components we're using. With the Apple III, even the character set may be redefined, allowing up to 128 printable graphic characters if you wish. The PKASO card can perform dumps of any graphic or text screen. Its other features include the ability to print with the current Apple III character set (Gothic, Roman, Apple, byte, standard, stop, inverse). You can also program your printer's graphic abilities directly by using the card's Super Hi Res mode, set page margins, and use forward and reverse line feeds. All use commands directed at the PKASO card rather than the printer.

The transition from numeric information to graphic data is handled admirably by *Business Graphics III*. It includes options to design graphs in monochrome or color and in a variety of formats without forcing you to undertake a tutorial in Apple III graphics. That's probably the most important thing of all when you're trying to balance time and effort. ✚

GRAPHICS BY ROBERT COWART



An overview and product analysis of Apple's graphics tool for the Lisa computer.

If a picture is really worth a thousand words, then Apple's newest and most sophisticated computer-graphics program, *LisaDraw*, may be one of the most powerful communications tools since word processing.

Why? Because *LisaDraw* for the Apple Lisa computer, along with a dot-matrix printer, allows you to rapidly create and print an endless number and variety of pictures.

What Is *LisaDraw*?

LisaDraw is a computer-graphics program that allows you to easily create flowcharts, pictures, technical diagrams, and maps for reports and presentations. *LisaDraw* enables you to produce lines, rectangles, circles, polygons, and other geometric shapes, as well as freehand drawings. You can add text in a variety of sizes and styles to complete your drawings. To quote the *LisaDraw* manual, "*LisaDraw* can assist you to effectively conceptualize and communicate information, with professional looking graphics." Once you have created a chart or drawing, you can print out a hard copy for subsequent photocopying or production of transparencies or slides.

Making the most of all these abilities requires little time and training on the user's part, thanks to the Lisa's ease of use.

The Lisa Operating Environment

Ready mastery of the *LisaDraw* program derives from the general scheme of the Lisa's "operating environment." This term describes the graphically oriented operating system that serves as the Lisa's user interface. For those of you who have not read about or seen the Lisa in action, a brief description of this concept is in order before futher discussion of *LisaDraw*.

The Lisa's origins

The people at Apple Computer have conducted some enlightening studies using their own employees as subjects. One investigation determined how much time was necessary for a non-computer-literate person to become moderately proficient in performing practical tasks on a computer. As it turned out, even at Apple, a firm at which most employees use computers, the typical training time for a new employee is between 20 and 40 hours.

This need for extensive training is a liability for any business that plans to computerize its activities to any significant degree. Although it's often overlooked, the cost of training, either through direct cash outlay or as a result of loss of time and productivity, can be substantial.

Based on its research, Apple set out to create a computer system that would dramatically decrease this time/cost factor. The result was the Lisa.

This computer is remarkably different from other microcomputers in many ways. To begin with, the hardware pack-

age includes a "mouse," which is a small box connected to the computer (see figure 1). A rubber ball on the bottom of the mouse is free to rotate in any direction, and the top of the device has one push-button switch. By moving the mouse around on a flat surface (typically your desktop) and/or clicking the button on top, you tell the Lisa what to do.

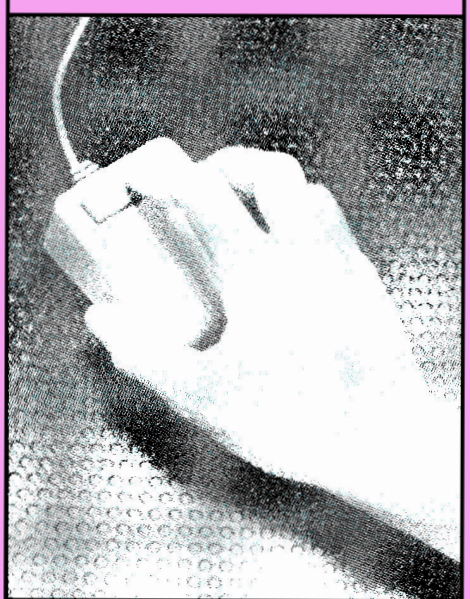


Figure 1.

This method relates to the other distinguishing characteristic of the Lisa, its unique pictorial approach to the presentation and maintenance of files. The Lisa works the same way most of us do. I generally shuffle papers around on my desk, leaving some projects still pending while beginning another. The Lisa allows me to do the same, but on an *electronic* desktop.

Desktop Layout

Shortly after you turn the Lisa on, a desktop screen appears (see figure 2). Along the bottom edge of the desktop are some small graphic objects called icons. A black arrow, whose position you control by moving the mouse, appears in the upper-left-hand corner. Along the top edge of the screen, in the "menu bar," are several words: File/Print, Edit, View, and Disk.

By using only the mouse, you can direct the Lisa to perform most functions (open or copy files, run programs, or rearrange your desk, to name a few) through two command modes: Select and Instruct.

First, you position the small black arrow on the icon of your choice and press the button on the mouse. This selects the icon, as indicated when the icon switches in color from white to black. This procedure tells the Lisa what to work with.

For example, one of the icons in figure 2 is labeled "ProFile" (the name of the five-megabyte hard disk attached to the Lisa). Suppose you selected the ProFile icon. Now the Lisa displays a list of possible "instruction" options across the top of the screen in the menu bar and waits for your next move. Next you tell the computer what to do with the ProFile, by moving the arrow up to your choice in the menu and clicking the mouse button.

Opening an Icon

Say you wanted to see what files (documents and programs) were on the ProFile. You would first position the arrow on "File/Print." If you held down the mouse button and moved the arrow downward, the menu would "unfold,"

giving you several instruction subchoices (see figure 2). Next you would move the arrow cursor down to "Open ProFile" and release the button. Finally the Lisa would perform the action, displaying the relevant information (see figure 3).

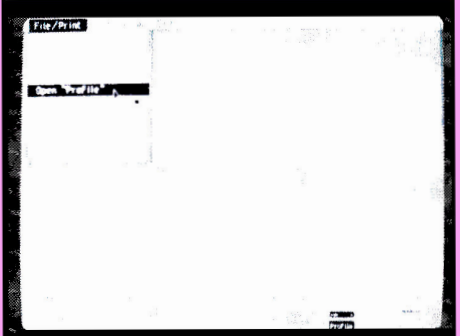


Figure 2.

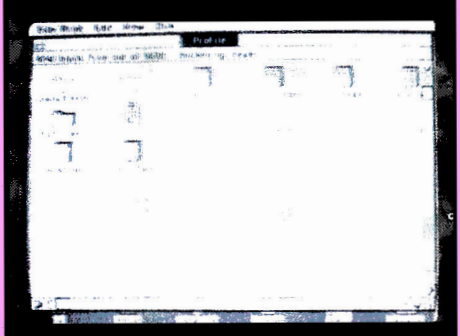


Figure 3.

That's basically all there is to operating any of the programs and utilities, including *LisaDraw*, that run on the Lisa. Of course, in order to do word processing or other text entry, you would have to use the keyboard, but even then, the mouse comes in handy for moving around within the text and editing it.

Now that you have a basic understanding of the Lisa's "personality," a description of the commands and techniques for using the *LisaDraw* program will make sense.

Learning the Hard Way

Although I am an old hand at computers, I had never used a Lisa before I began researching this review. Thus, I was in a good position to register first impressions similar to those the average person might experience.

My first approach when I'm faced with a new product is simply to try it, even when I know that I should read the manual. Besides, I want to get an idea of just how lost an average user can get if he or she acts as impulsively as I do. Shooting from the hip usually works fairly well for me, but it didn't do the trick this time. The Lisa was just too different from any product I was familiar with. After only a minute of experimentation, I had four different "windows" overlaying each other on the screen and couldn't figure out what to do next.

Admitting temporary defeat, I decided to try it from square one, following what turned out to be a concise and informative manual.

Learning the Easy Way

The first thing I noticed about the manual was its high quality—in fact, this observation applies to all of the Lisa manuals. The pages (about 300 of them) are contained in an attractively designed cloth-covered three-ring binder. All pages are typeset and include high-resolution black-and-white photographs where necessary. An appropriate illustration accompanies every reference to an occurrence on the screen, and special attention to the graphic design of chapter dividers is evident.

Even from the start, it was almost impossible for me to do anything wrong if I followed the manual faithfully. The first page of the manual details all of the hardware and software contingencies

It was almost impossible for me to do anything wrong if I followed the manual faithfully.

that you have to take care of before you use the *LisaDraw* program.

Next, the manual told me to read section A of the Lisa owners' guide for a basic introduction to the computer. Only then, after handling the preliminaries, should I move on to one of the first three chapters, depending on my level of expertise:

1. Section A of the manual contains a basic description of the essentials necessary for using *LisaDraw*.
2. Section B, the tutorial section, contains self-paced instructions for learning more of the details.
3. Section C contains a reference guide with in-depth examples and explanations

In that LisaDraw is a visual program, it defies description to some extent.

of each *LisaDraw* feature.

Incidentally, all of the other Lisa manuals (*LisaCalc*, *LisaWrite*, *LisaGraph*, *LisaList*, and *LisaProject*) adhere to this arrangement as well.

To avoid missing any clues, I decided to study sections 1 and 2 completely. I found both to be well thought out and easy to follow. I didn't have any questions that the writers didn't anticipate. Each subsection begins with an overview and ends with a summary.

Some Tutorial Specifics

In that *LisaDraw* is a visual program, it defies description to some extent, but the illustrations included here should help.

If you refer back to figure 2, you will notice that that one of the icons that looks like a file folder is labeled "*LisaDraw* Examples." When you open this folder, an additional window appears on the screen (see figure 4).

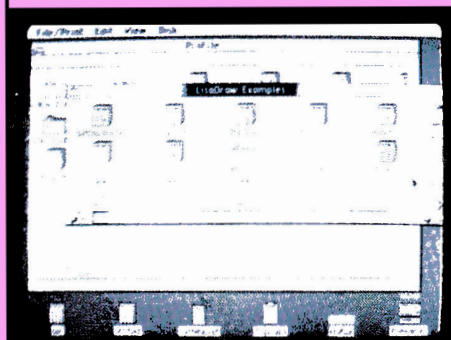


Figure 4.

In the lower window you see the icons for the documents in the *LisaDraw* Examples folder, which contains tutorial examples.

Stationery Pads

The icons look like pads of paper because they contain an infinite supply of each picture sample, much as all the pages on a pad of form paper are identical. Thus, each novice user can pull off a copy of the example, modify it, and throw it away, still leaving an unlimited number of originals for the next beginner.

The first few exercises took me through the steps required to "pull off" and modify one copy of the the Getting Started stationery pad. Using some of the *LisaDraw* commands that I will describe next, I modified, without too much difficulty, the original picture (figure 5). You can see the result in figure 6.

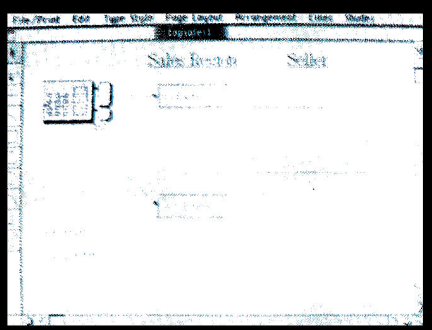


Figure 5.

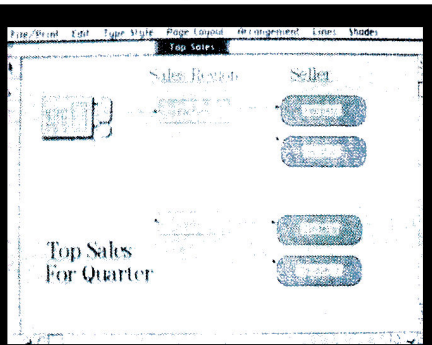


Figure 6.

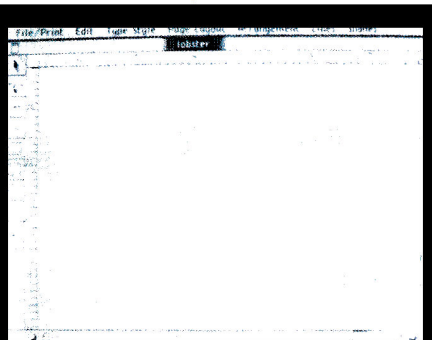


Figure 7.

With that experience under my belt, I felt ready to start a drawing from scratch.

Creating a New Document

Whenever you create a new "document" (i.e., file), you need a piece of paper. So the program instructed me to "pull off" a new piece of *LisaDraw* paper (using the mouse), and then name it (using the keyboard). Next I had to open the file by selecting my new file's icon, pulling down the File/Edit menu from the menu bar, and choosing "Open 'Lobster.' " Now I had a new blank screen for experimentation (see figure 7).

What You Can Do with *LisaDraw*

Now for the details. Although *LisaDraw* is missing a few abilities, what it can do is impressive. Thanks to the combination of efficient programming and the Motorola 68000 microprocessor chip (the heart of the Lisa), the computer performs most tasks rather quickly.

On the left side of the blank screen

You can add text in a variety of sizes and styles to complete your drawings.



(figure 7), you will see a series of shapes called the "palette." To create a shape on the screen, you just transfer one from the palette by using the mouse. Your cursor, like a brush, draws the image on the screen. The choices available from the menu bar vary, depending on which palette symbol you are using.

Text

Skipping the first symbol for now, notice the TEXT palette symbol. When you select this symbol, the cursor changes shape to remind you that you are in the text mode. By positioning the cursor at the point where you want the text to begin and then clicking the mouse button, you make a new blinking cursor appear that is independent of the mouse location. You start typing, and letters appear wherever this second cursor is.

The Text mode has several particularly nice features. From the menu bar, you can select whether you want your text to be right-, left-, or center-justified. Center-justifying is useful for placing labels in the middle of boxes, circles, or other shapes.

Additionally, you have a choice of text sizes and styles, both normal and proportionally spaced (see figure 8).

Horizontal/Vertical Lines

The next palette symbol is the + sign, which you use to create horizontal and

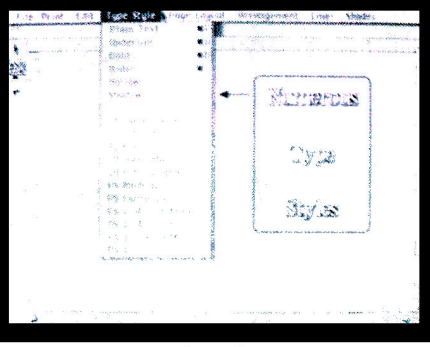


Figure 8.

vertical lines. After selecting this symbol, you can easily draw perfectly straight lines, which you might need in technical drawings or organizational charts.

The menu-bar choice marked "Lines" lets you change the width and shade of the lines you have drawn (see figure 9). You can also elect to add arrow points to one or both ends of a line.

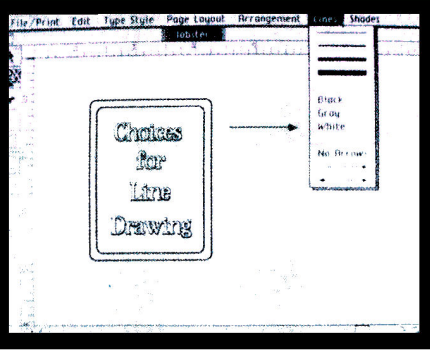


Figure 9.

Diagonal Lines

The slanted-line palette symbol is for drawing diagonal lines. The fun part about this one is that, although one end of your line remains fixed, the other end is free-floating. You can vary both its distance from and relation to the first

point. Once again, as with all the other shapes, you can select from the menu bar the width and shade of the lines you draw.

Boxes

This palette symbol allows creation of a square or rectangle with one stroke of the mouse. Just by moving the mouse from the desired upper-left-corner position down to the right, you'll get a box. The next palette symbol works the same way, but it gives you boxes with rounded corners (as in figure 6) instead of 90° ones. In addition, you can choose various degrees of roundness for your corners from the menu bar.

Circles

Circles and ellipses work the same way boxes do. As with boxes, drawing circles is a quick process, but sometimes they are a big jagged looking, especially in the case of long and narrow ellipses.

Arcs

Drawing arcs (small portions of circles) takes a little getting used to and requires some tricky hand-eye coordina-

LISA DRAW IN EVERYDAY USES

1. Forms creation (see figure 11) is one of the easiest applications of *LisaDraw*, because of its line- and box-drawing abilities. You can create an endless "pad" with a form you design, such as shipping labels, memos, receipts, and invoices. When you need a copy of the form, you "tear off" a new sheet, fill in the blanks, and print it out. Or, design a form, print it out with text areas blank, and make as many photocopies as you expect to need for a while. Voilà! You've eliminated the design, layout and printing cost of a new form. If you want to change the form later, it will be a snap.

2. Another popular area is presentation graphics (figure 12). Professional-looking overhead transparencies for business meetings are quick and simple with *LisaDraw* and an office photocopy machine.

3. Mechanical, electronic, architectural, and city-planning drawings: Applications requiring hard copy in exact scale can benefit from the *LisaDraw* Rulers feature. Engineers at Apple use *LisaDraw* for creating printed-circuit-board design, schematic diagrams, mechanical spec drawings, and digital-electronic-timing diagrams (figure 13).

4. Pictorial diagrams: The example "Spa Plans" (figure 14), is the actual plans the author of *LisaDraw* used to help design his spa.

5. Map drawing is possible, though it requires a bit of coordination. You can create accurate maps by using custom rulers (figure 15). One limitation to remember in this application is *LisaDraw*'s inability to enter text sideways.

6. Meeting or party announcements, product brochures, and flyers are other obvious applications (figure 16).

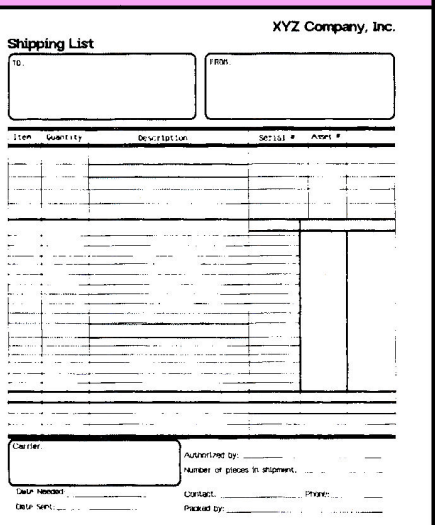


Figure 11.

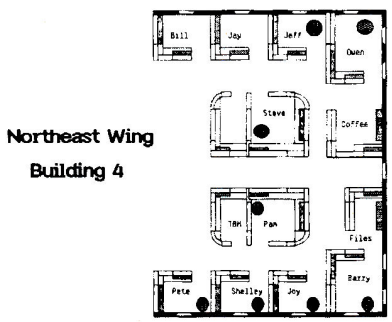


Figure 13.

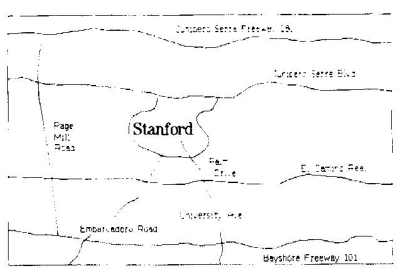


Figure 15.

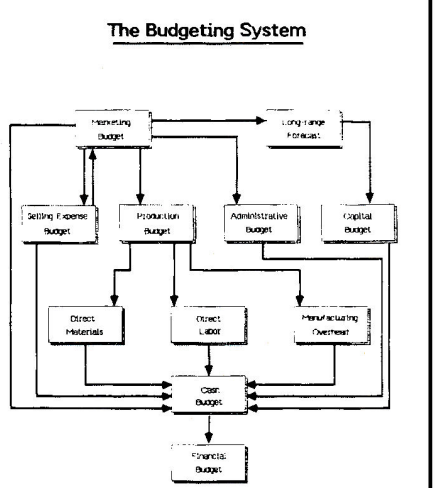


Figure 12.

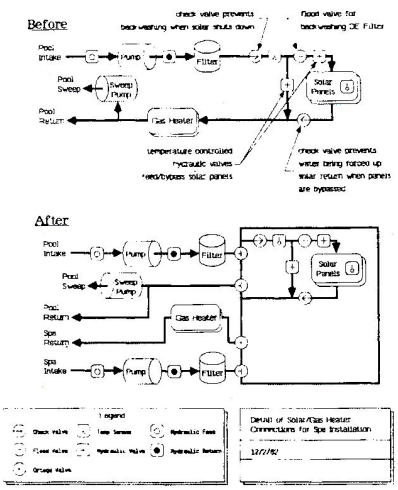


Figure 14.

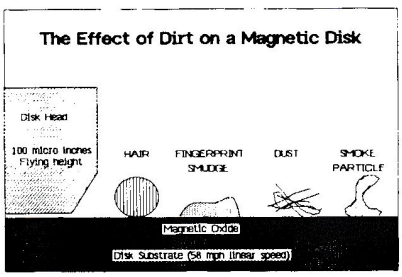


Figure 16.

tion. Once you do succeed in creating an arc, even though it does not appear to be an enclosed shape (all you see is a curved line), you still have the option of shading it in. You'll end up with a wedge shape that you can use for creating pie charts.

Freehand Lines

If you're really coordinated, the most creative approach is freehand drawing. By simply moving the mouse around on your desk, you form a shape on the screen. It's just like drawing with a pencil, except for the distance between your hand and the image.

The only problem with this function, as well as with the next one, polygons, is that after a few squiggles you run out of "ink." That is, you have to return the cursor to the palette to reselect the Freehand symbol. This intentional limitation is supposed to discourage reckless "scribbling" that might exceed the memory capacity of the Lisa.

Polygons

This symbol allows you to create irregular objects with many straight sides. In my opinion, *LisaDraw*'s author saved the best one for last. This one is really fun to play with because, as with diagonal lines, you can manipulate one end point. But now, instead of stopping after you select your second end point, you create a new fixed starting point

If you're really coordinated, the most creative approach is freehand drawing.

each time you click the button on the mouse.

The Change Symbol

Finally, there is the Change symbol, an arrow, at the top of the palette. When you select it, you can manipulate any objects that already exist on the screen. This ability to modify your existing images makes *LisaDraw* more powerful than many other graphics programs for microcomputers. Some of them "lock" images after they are created, preventing later manipulation.

You can use the Change symbol alone or in conjunction with several submenus from the menu bar to determine how the Lisa should modify objects on the screen. All changes can apply either to the document as a whole or to selected

If your drawings have to be to scale, you can line the perimeter of the drawing area with rulers.

parts of the document, even very minuscule ones. Suppose you have some text within a circle within a square. You can increase or decrease any of these elements in size, height, width, or shade (either as a group or independently). In addition, you can change the relative positions of the objects or delete any one item from the document altogether.

Advanced Features

LisaDraw offers a group of advanced features related to the change symbol and the menu bar in general. They can add special touches to your drawings.

RULER LINES

If your drawings have to be to scale, you can line the perimeter of the drawing area with rulers (using either English or metric markings, or your own custom ruler). As you move the cursor, thin lines move along the rulers to indicate your exact location. Another option helps you create shapes of precise sizes (to 1/100 inch). This feature maintains a continual update of the size of the image you are working with. As you move the cursor, it quickly calculates the size and reports it on the screen.

DRAWING SIZE

The total drawing size can be larger than one screen. A menu command allows you to declare the total size you desire, from one 8½ × 11-inch page up to 90 × 48 inches. If your document is larger than one page, you have to print it out in sections and tape them together or dry-mount them later.

TYPES OF PAPER

LisaDraw gives you three choices of electronic "paper" to create your drawings on: plain, grid, and "auto-grid." Plain paper is simply blank. Grid paper has light lines to help you place things correctly. Auto-grid paper "pulls" your objects into alignment with the grid lines automatically. Incidentally, all work on the Lisa appears as black or gray lines on a white background, which I found much easier on the eyes than the usual white on black.

DUPLICATION

The Edit menu has an option for duplicating a selected figure. It allows easy creation of flow and organization charts or anything else that uses repetitive shapes.

SHADING

Pulling down the Shades menu reveals 36 possible shades and patterns with which you can fill your shapes (see figure 10). One of them results in transparency. A particularly advanced feature

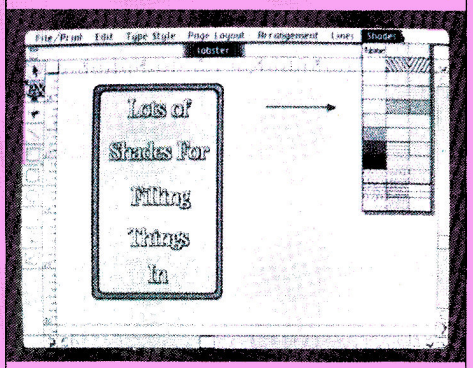


Figure 10.

of the shading command is the ability to shade complex images that contain shapes within them. A circle inside a box will not be shaded in when the box is. Complex polygons with internal lines turn out quite interestingly.

LOCKING and UNLOCKING

You can "lock" any objects to prevent tampering. Once you have carefully sized and placed an object, you don't want to move it accidentally, so this feature is welcome. "Unlocking" reverses this process.

CUTTING and PASTING

Sometimes you may want to move a particular part of one drawing into another drawing. This type of "cutting and

pasting'' is easy with the Edit menu.

SMOOTHING, UNSMOOTHING, and RESHAPING

Freehand drawings can come out a little rough. These three features allow you to redefine the shape of your freehand lines and to smooth them or make them more jagged. I found the Unsmooth command to be a lot of fun because it transformed my paltry scribbles into instant Picassos.

MOVE to BACK/FRONT

Suppose you drew a series of images, shaded them in, and placed them one on top of another. The back/front commands enable you to determine which ones appear to be on the ''top'' and ''bottom'' of the stack.

ALIGN OBJECTS

The Arrangement menu allows you to line up selected objects and text in various ways. If, for example, you wanted to align a series of circles, you could easily instruct *LisaDraw* to do this, based on the left, right, top, bottom, or center of the circles.

UNDO LAST CHANGE

This command, which is part of all the Lisa programs, can be a real lifesaver. It ''undoes'' whatever you did last, allowing you to recover from otherwise fatal errors (such as erasing the entire screen), and it also lets you experiment with effects to see how they will look before committing yourself to them.

Error Messages

LisaDraw's error messages are well conceived. If I did something stupid, I first heard a warning tone. If I tried again, an overlay appeared that told me what I was doing wrong and how to correct my procedure.

Problems

On the negative side, *LisaDraw* does have some obvious shortcomings.

1. It does not allow for ''rotation'' of objects, as some other graphics programs, such as North Star's *Imagemaker*, do. For example, you must resort to polygon or line drawing if you want to create a diamond shape. Rotating a square would be faster and more exact.
2. You cannot shrink a multipage image to see if the general proportions are correct.
3. You cannot easily create letters larger than one-third inch high. A feature that let you do so would be useful for making signs and labels.
4. Some functions, such as booting and loading the *LisaDraw* program, take quite a bit of time (several minutes). This is too long. According to Apple, this sluggishness is the fault of the operating system and will be cured in the next release.

It undoes whatever you did last, allowing you to recover from otherwise fatal errors.

Conclusions

LisaDraw is a powerful and flexible tool for image creation. My hat is off to both the author and those who created the machine and operating system *LisaDraw* depends on. The documentation is among the best I have ever seen (and I've seen a lot!).

Finally, keep in mind that the Lisa/*LisaDraw* package is not inexpensive. Whether the *LisaDraw* program alone justifies the expense involved in running it is a decision only you can make. If ease of use, a multitude of features, elimination of training hassles, and the ability to run other Lisa packages are important to you, then the Lisa and *LisaDraw* may be the right choice. ✚

=) A+ REPORT CARD (=

Lisa with *LisaDraw*

Training time	:A
Hardware ease of use	:B
Software ease of use	:A
On Screen Messages	:A
User Friendliness	:A
Documentation	:A
Speed	:B
Cost/Benefit Ratio	:C
Overall score	:B

=) STATISTICS: (=

PRICES

Apple Lisa	Includes a two-megabyte hard disk, two 860K floppy-disk drives, and a mouse; no printer. $6995
Dot-matrix printer	For printing out your drawings. Has 80 columns. $675. Requires an extra parallel-interface board, which costs an additional $195.
Daisy-wheel printer	Prints in letter quality and can also print graphics, though the dot-matrix printer is recommended for graphics. $2195.
Software:	Complete package of six Lisa applications, the Six Pack, is available for $1195. Six Pack with dot-matrix printer and parallel-interface card is $1495.

LisaDraw	$395
LisaProject	$395
LisaWrite	$295
LisaGraph	$295
LisaCalc	$295
LisaList	$195

COBOL $995
BASIC $295 DecBASIC plus
Pascal $595 Compiled

LisaDraw *was written in Pascal by Mark Cutter. LisaDraw is the only Lisa application written single-handedly. It contains 20,000 lines of code and took two years to complete.*



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2.

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3.

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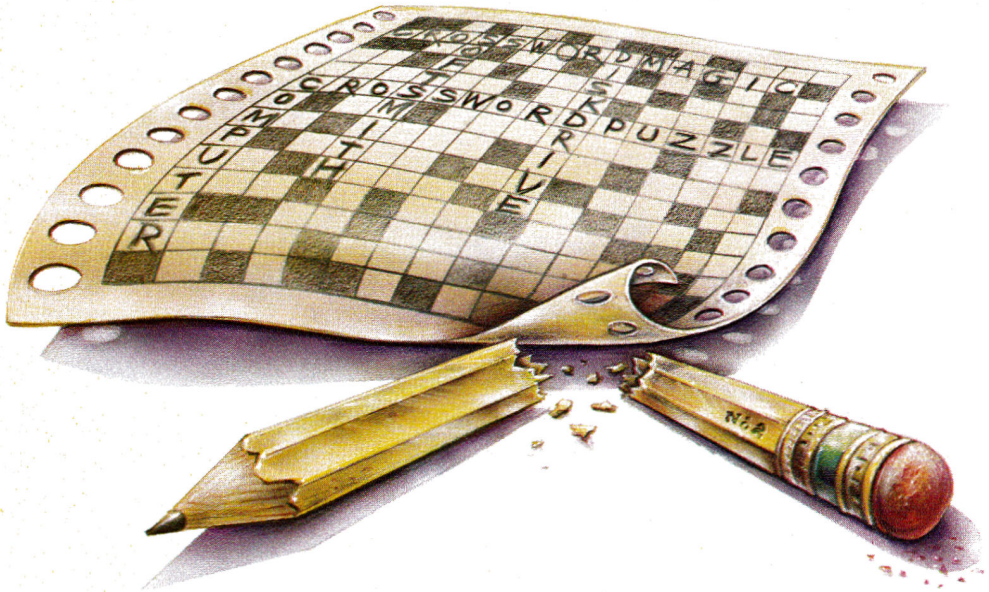
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With Crossword Magic, you create your own puzzles to challenge your friends. First you choose a topic; then you enter words using the keyboard. Crossword Magic automatically fits the common letters together to form a familiar crossword grid. If there is no opening for the word you enter, the program saves it and fits it in later.

Next comes the fun. After the puzzle is full, Crossword Magic prompts you for a clue to go with each word. Make your clues as obscure, humorous or serious as you want. You can save the puzzle and clues on disk for later play on the screen, or have them printed out to send to friends.

Crossword Magic runs on the Apple® II, II + and IIe; Franklin Ace™ and Atari 800® computers with 48K RAM. A disk drive is required; printer is optional.

More than just a game, Crossword Magic is also an excellent educational tool for helping children of all ages improve their spelling and vocabulary skills. It is one of the programs in the Softsmith library of quality software — the largest library of programs under one brand name.

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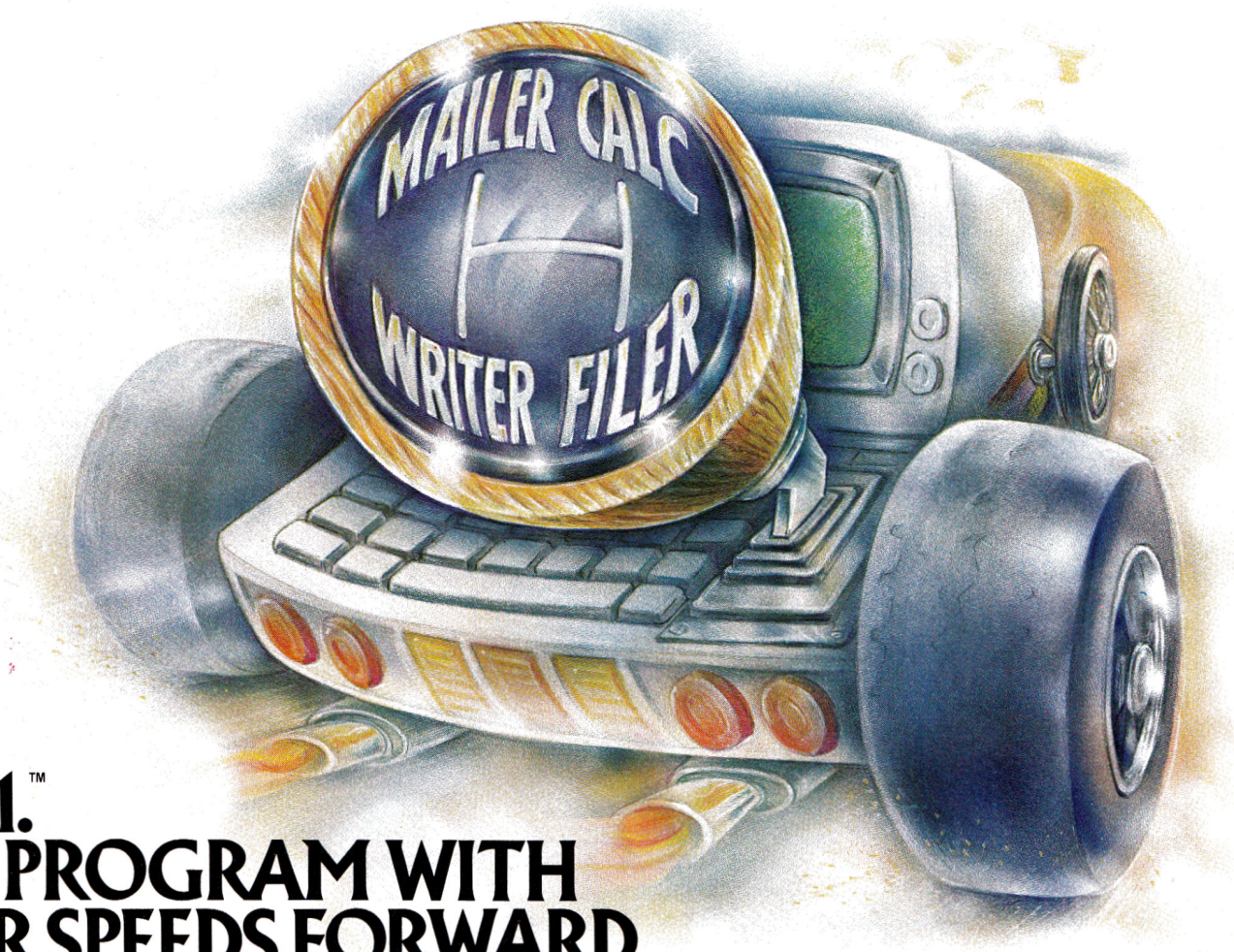
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OUT OF THE JUMBLE COMES WORD JUGGLER

A writer's review of word processors finds Word Juggler is the best in its field.

Word Juggler 2.5
Quark Engineering
2525 West Evans Ave.
Suite 220
Denver, CO 80219
(303) 934-2211
List Price: $295; *Lexicheck* spelling checker, $149.
Requires: 128K, one disk drive.

CIRCLE 750 ON READER'S SERVICE CARD

I took the hard-knocks approach to learning about word processors before I stumbled on *Word Juggler,* the best I've found of these programs

As a writer who uses a computer daily in his work, the software program features nearly everything I look for in word processing. And overall, it's very easy to use.

In discovering the best software program, I unfortunately learned what not to buy. In several instances, I bought some undesirables. I started as a novice with the *Easywriter* program put out by Apple and ended, still dissatisfied, with the *Apple Writer III*. Along the way, I also bought Micropro's *Wordstar*.

My travels took me from one uninformed salesman to another in a variety of computer stores. I often settled for products that simply could not do the job.

Now, computer-wise, and happy to have found a highly competent software program, let me tell you about *Word Juggler*.

Quark Engineering of Denver, Colorado, produces the program, which sells for $295. It requires 128K and a one-disk drive. For an additional $149, you can buy the *Lexicheck* spelling checker. *Lexicheck* is the optional program which comes with dictionaries and finds misspelled words.

My experience with *Word Juggler* is based mainly on Version 2.1, but I also reviewed the newer Version 2.5.

Lots of Praise

With few exceptions, *Word Juggler* is superb. Some of the better features include two safety devices, one which keeps the system from crashing and another which saves files when the disk is full. Other pluses are that the software fully exploits the keyboard and the printer's capabilities. Another feature allows the writer to review any part of the text quickly.

A very readable user manual comes with the program, but it's hardly necessary. The *Word Juggler* is so thoughtfully put together that I have seen friends learn to use it quickly without any prior knowledge.

The ease of using *Word Juggler* becomes apparent when the nine-option menu (See figure 1) comes on the screen after the boot-up. Next you select option 8 to set the default parameter for your printer. You need to do this only once unless you want to later switch to a printer. If you should enter the wrong command during this process, the Escape key will invariably rescue you. It has for me. In fact, in the two years I've used the program, I've brought the system down by accident only once.

As I mentioned, it also comes with a safeguard to avoid losing text when the disk is full. This feature deserves special mention. If you have used *Wordstar,* you know how easy it is to lose a file in memory when your disk suddenly seems full. An alerting message provided with *Word Juggler* lessens the chances of that happening. When the message, DESK FULL, appears on the screen, you simply move to the main menu and select option 6.This then formats a blank disk in the internal drive without losing the file you want to save.

Some of the newer features on the later version improve on an already excellent product.

For instance, one very exciting new feature is the *Word Juggler's* ability to insert DOS 3.3 and Apple Pascal text files into the document. This is done by using the Utilities menu (See figure 2). It can also produce a catalog of either format.

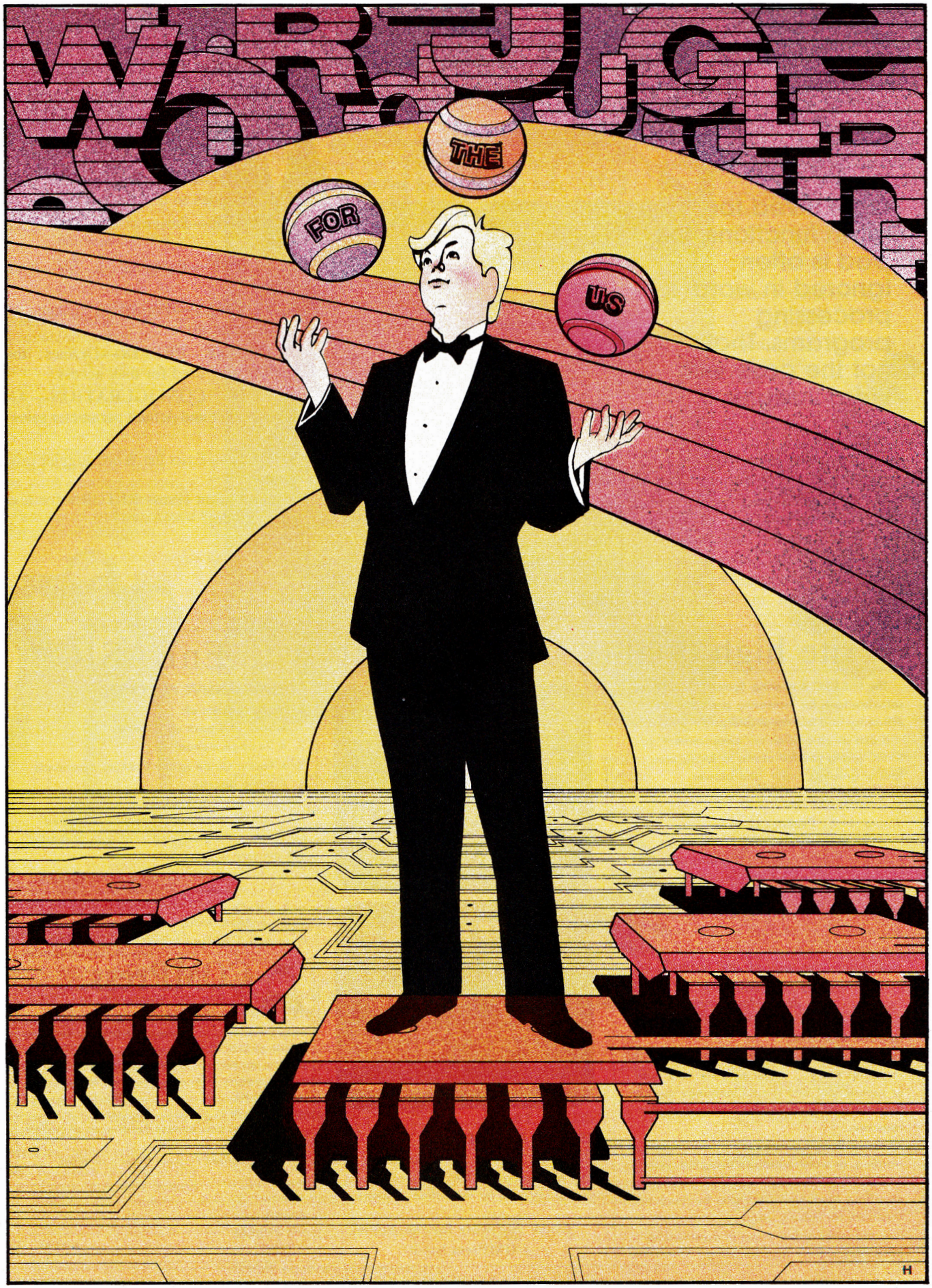
New Version Streamlines

Version 2.5 also has eliminated one of the steps necessary in the 2.1 style. Using the previous version, I would begin each session with option 7, "Define Prefix," by changing the default setting from .d1 to .d2. This would allow me to keep *Lexicheck* where it belongs in internal drive and all the Load and Store functions would automatically address my file disk in drive 2. The new Utilities module, evoked from the text entry mode by pressing both the closed apple and 1 keys on the numeric pad, adds seven handy enhancements. Of those, option 7 allows the prefix default to be changed.

In discovering the best software program, I unfortunately learned what not to buy.

Setting time and date, a problem for Apple III owners, is a breeze with *Word Juggler* if you have installed a clock chip. On the *Word Juggler* program I can do this simply, by choosing option 3.

After setting the time and date, Return brings you back to the text entry


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mode. This makes for a very easy procedure if starting a new file. Option 8 on the main menu (See figure 1) allows you to set the default for such common printer parameters as margins and line space. The option of overriding these with on-screen commands is an example of *Word Juggler*'s ability to exploit Apple III's keyboard by minimizing key strokes.

Conceived for math functions, the pad is often ignored in word processing programs. That's not the case with Word Juggler.

Smart Design

Word Juggler's economic design is evidenced in its use of the numeric pad. Conceived for math functions, the pad is often ignored in word processing programs. That's not the case with *Word Juggler*. Each of its 13 keys has a pertinent function, the abilities of which are especially apparent in the "cut and paste" areas, for instance.

To store a block, you simply press shift, then "4," and, following the prompts on the screen, place the cursor at the beginning and end of the block you wish to store. You complete the function by entering a path name and hitting the return key.

To load that same block, just press "4," give the path name, and then the block will appear at the current cursor position. Similarly, the "5" key can be used to copy a block of text, and it can be moved by pressing "shift 5."

Two templates come with the program. One template is a strip to lay above the top row of keys, and the other is a rectangle with a cutout for the numeric pad.

These are labeled with 41 of the most commonly used commands. Since the main keyboard's top row also is used for text entry, a command mode must be called before invoking the special functions of those keys. This is done by pressing Escape. When a format function is called, the program spells it out on the screen and underlines it for easy identification.

Unlike *Wordstar*, the program will not format text on the screen in real time,

Word Juggler (version 2.5)

Options:

1. NEW—Erases all text and goes to text entry mode.

2. CATALOG—Lists all files in a directory.

3. LOAD—Loads a document from disk and goes to text entry mode.

4. STORE—Stores document on disk.

5. PURGE—Removes a file from disk.

6. FORMAT—Formats a diskette in the internal drive.

7. DEFINE PREFIX—Defines the prefix to be used for disk access.

8. EDIT CONFIGURATION—Allows printer and default parameter selection.

9. QUIT—Exits the Word Juggler program.

Which option (Press RETURN for text entry mode)?

Figure 1: Word Juggler's *main menu appears upon boot-up. It can be called from text entry mode by pressing ENTER on the numeric pad.*

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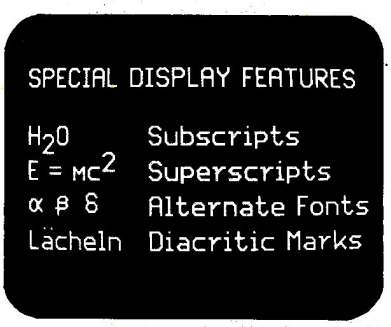
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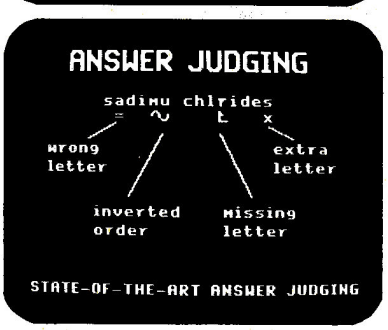
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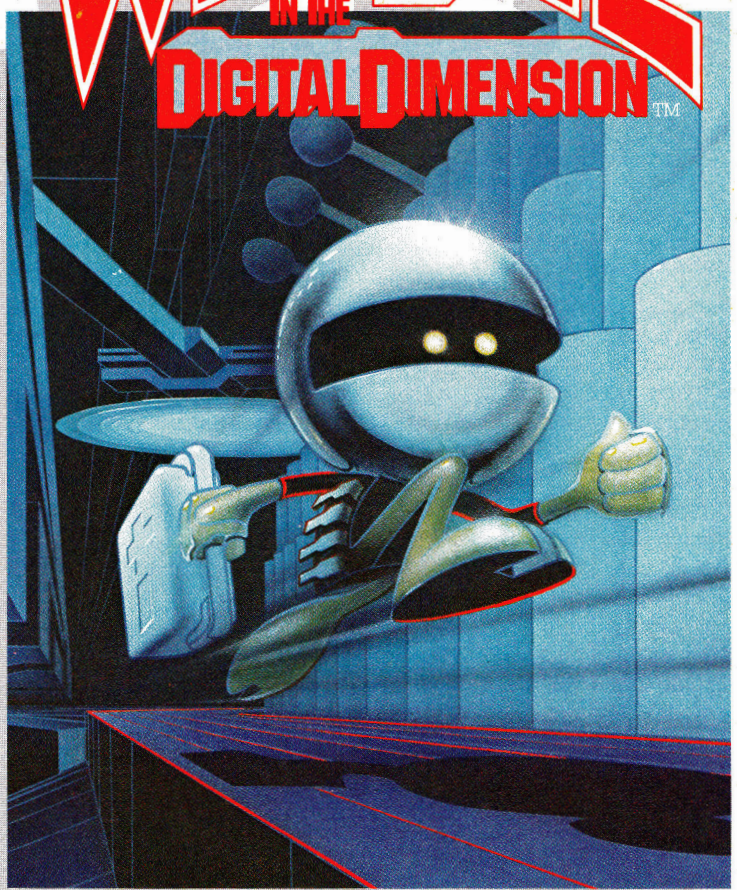
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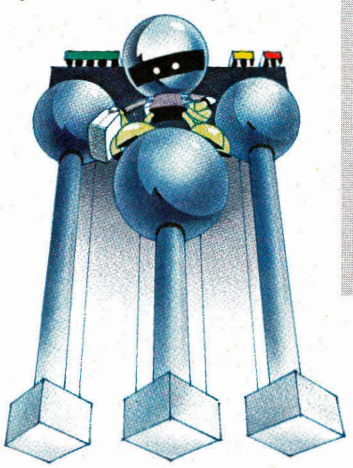
WILLY BYTE IN THE DIGITAL DIMENSION™



CHARACTERS

Willy Byte: electronic hero
Hex Luthor: digital archvillian
Cybil Nibble: 13 year-old player of Willy Byte in the Digital Dimension
Sidney Nibble: 16 year-old brother

Scene – A suburban home in the 1980's on a late Sunday evening. A teenager, Cybil Nibble, has been playing (for the umpteenth time) Willy Byte in the Digital Dimension, the newest creation in computer software from Data Trek, Inc. She decides to go to bed and quickly enters into a deep sleep that plunges her into the Digital Dimension. She finds herself on the ground gazing at eight towering electronic circuit poles, each emitting an orange glow that consumes the entire sky. Fascinated and perplexed by the sudden change in



environments, Cybil notices an animated object, high in the heavens, swinging from pole to pole.

Cybil (whispering to herself): The lightning speed, the energetic response, the total commitment, it must be Willy Byte!

(At that moment the game's charismatic electronic hero, Willy, sees Cybil and slides gracefully down the pole to meet his newest acquaintance.)

Willy Byte (cheerfully): Greetings, Cybil! Welcome to the Digital Dimension.

Cybil: The Digital what?

Willy: You know my home, the inside of your computer. Watch this!

(Off he scampers about the keyboard room, pulling and tugging on each bit while dodging the stinging sensation of static charges. As soon as Willy completes his task and the byte has safely left the keyboard room, a pale expression comes over Willy's face.)

Cybil: Are you alright?

Willy Byte (concerned): Problems in the Power Room.

Cybil (confused): What problems?

Willy Byte (assertive): Follow me!

(As Willy and Cybil sprint toward the I/O port, a sinister laugh is heard from above – the laughter of Hex Luthor. Suddenly a bolt of static charge is seen thundering its way toward Willy Byte.)

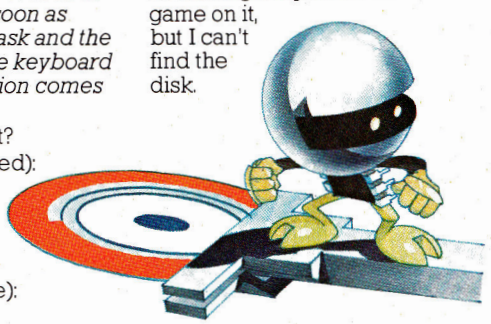
Cybil: Watch out, Willy!

(Cybil awakens from her dream to find her brother Sidney standing in her doorway.)

Sidney (concerned): Cybil, are you alright?

Cybil: I guess I was dreaming.

Sidney: As I was walking to the kitchen I noticed that the computer was left on. The screen's got a picture of a new game on it, but I can't find the disk.



Cybil (animatedly): Yeah, it's Willy Byte in the Digital Dimension. Mom and Dad bought it for us. I'll show you.

Sidney (sarcastically): They did what!?

Cybil *(on a sudden upsurge of emotion)*: Dad says that when I play Willy Byte I **learn** all kinds of stuff about computers.

Sidney: Like what?

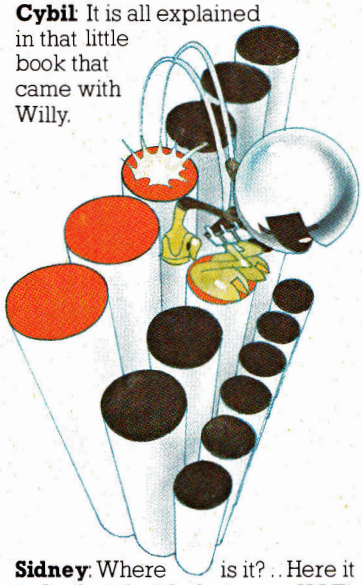
Cybil: First you jump into the CPU room. And then there are lots of other game rooms to explore, and each is a part of the computer.

Sidney: Oh really?

Cybil: Yeah! And in **this** game you guide Willy on his wild adventures while he skydives into the Power room, operates a crane in the RAM room, bounces in and out of the CPU, and zips around the Disk Drive room. I got extra points for flowcharting Willy's . . .

Sidney (perplexed): Flowcharting? What's flowcharting?

Cybil: It is all explained in that little book that came with Willy.



Sidney: Where is it? . . Here it is. Look at that! Is that cover HOT! It looks like an album cover. From the looks of all these pictures, . . . This looks great . . . Got to Play! Where's the disk? . . . Cybil!

Cybil (dashing to the computer): Mom and Dad will let us play as long as we want and I'm first.

Sidney (impatiently): Go for it!

Look for Willy Byte in the Digital Dimension at your nearest dealer or call DTI Data Trek toll-free at **(800) 654-SOFT.** In California, call toll-free **(800) 652-DATA.**

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Word Juggler Utilities (version 1.2)

1. Insert DOS 3.3 Text File
2. Insert Apple Pascal Text File
3. Set Date and Time
4. Create Subdirectory
5. Install User Printer Filter
6. Recreate Parameters File
7. Define Default Prefix
8. Define External Procedure Path

WHICH OPTION (0 to exit)?

Figure 2: Pressing closed Apple and "]" on the numeric pad produces the utilities menu, which makes version 2.5 considerably more flexible than previous Word Juggler *releases.*

but by pressing "." on the numeric pad, it instantly displays your documentation just as it appears in print (See figure 3). This is true unless you are not using a dot matrix printer's expanded or condensed fonts. Words or characters with special print instructions, such as bold or underline, appear in inverse. If you have formatted your text for more than 80 columns, the left and right arrows are available for scrolling horizontally to see any part of the text. By simultaneously pressing the control and "." keys, you can select a single or consecutive series of pages to view. In the shift mode, these same commands send text to the printer, while also supporting multiple printouts.

Exploiting the Apple

Instructions for creating assembly language printer filters are included in the manual so you can take full advantage of your printer's features. Five ready-made, easily installed filters are included on the diskette. They are for the Apple dot matrix printer, also work with C. Itoh 8510, NEC 8023 and others, Epson, with or without *Graftrax Plus, Anadex* 9500/9501 and IDS-560. Depending on the printer, these filters support bold, underlining, super/subscripting, and multiple pitch features. Special escape or control sequences may also be sent to the printer by pressing "ESCAPE P" and entering the required characters in the hexi-decimal form, preceded by a "$" sign. For example, the "$OE" tells my NEC Spinwriter to select the thimble's alternate font, and the "$OE" turn activates my Epson MX-80's condensed font mode. Normal mode is restored by "$OF" and "12," respectively.

Using *Word Juggler*'s predefined time variables, you can easily add the time and date to your text, using any combination of the 10 provided. For example, "($date) ($time)" might yield "09/18/83 12:23 PM" and "($month) ($day#), ($year) ($time24)" would print out "September 18, 1983 13:23."

Another salient feature concerning variables is the one for the built-in mailing list. Version 2.5 includes compatibility with files created by two database programs marketed by other companies. They are Apple's Quickfile and Software Publishing Corporation's *PFS.* (For an illustration of the conversion of *PFS* item names to *Word Juggler* variables, see figure 4.) Both files can be

Print Form (version 1.0)

Options:

1. Word Juggler mailing list.
2. Quickfile datafile.
3. PFS datafile.

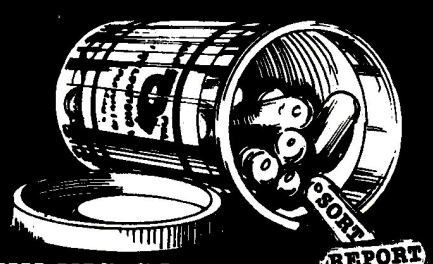
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Which Option (0 to exit)?

Figure 3: Pressing closed Apple and "." on the numeric pad produces the Print Form menu, a handy feature not found in previous versions of Word Juggler.

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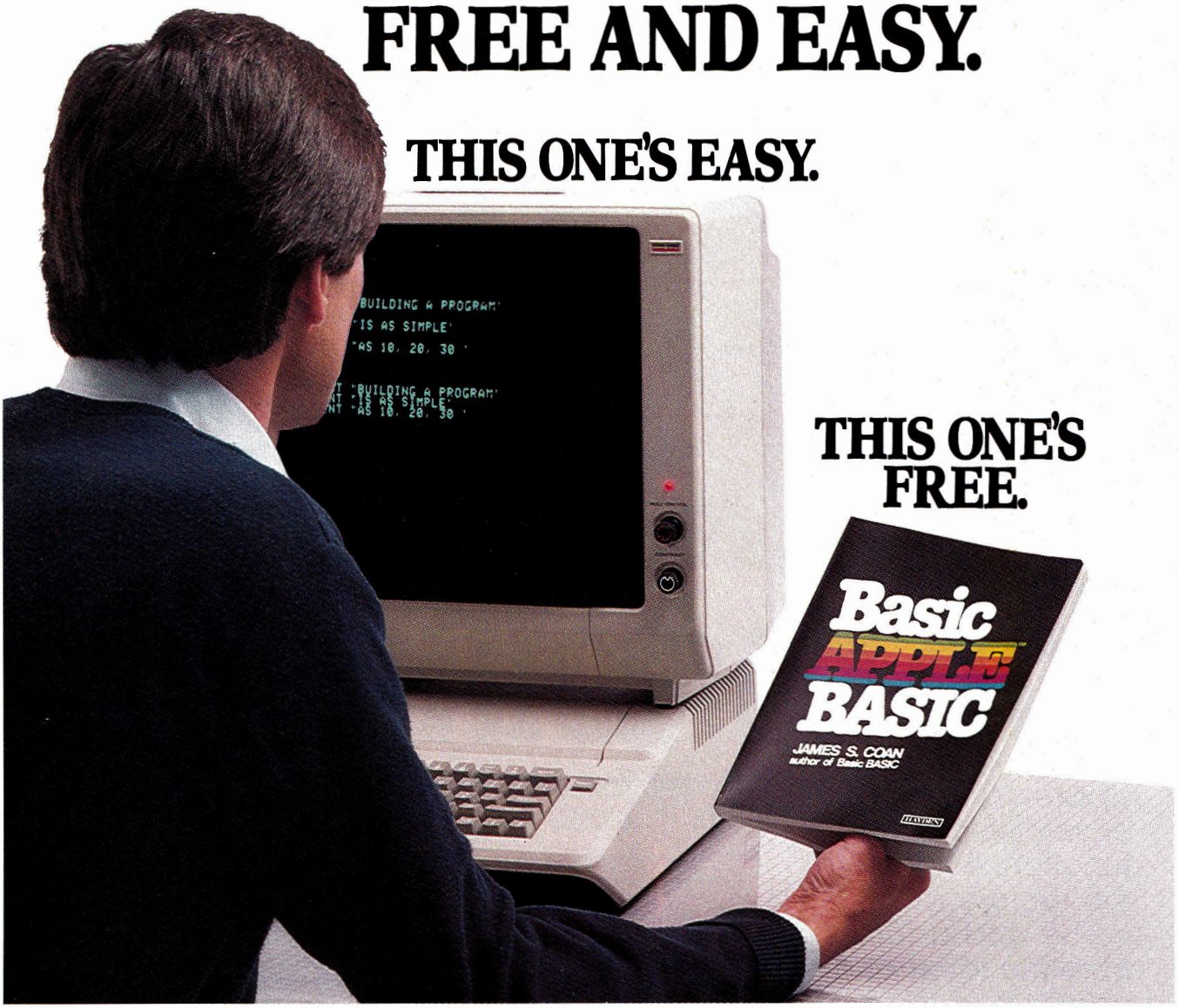
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integrated by using the print form options (See figure 3). This enhancement also makes it easy to use the flexible, yet limited-capacity, mailing list feature. Depending on the machine's memory, there can be 129 or 252, six-field entries.

Good News for Letter Writers

Letter writers will appreciate the envelope-copying function. It takes the recipient's name and address from the letter and copies it at the proper position on a standard envelope. You simply insert the envelope into your printer, place the cursor at the beginning of the name, and hit "2" on the numeric pad once for each line of the address. A control-shift, then "2" puts your Apple III into the Typewriter mode and gives you direct access to the printer—including, if the function is available, full cursor movement up, down and across the paper.

Problem Solved with Short Memory

Word Juggler is a line-oriented program, which means you use a line each time the Return key is struck. Designed as such, you tend to reach the end of the file quickly. The capacity is 799 for a 128K machine, 1535 if you have 256K.

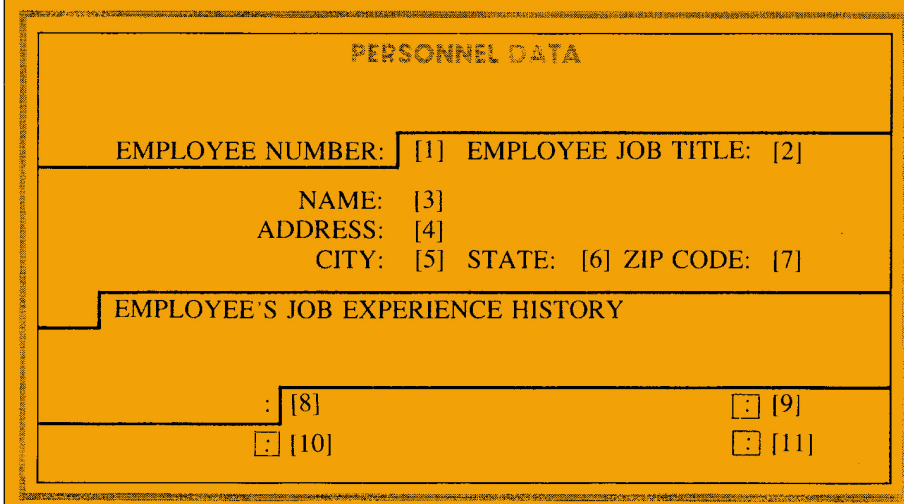
To conserve line space, a Skip command is provided. It allows you to insert a contiguous blank space of up to 127 lines. This can come in handy if you wish to leave space for illustrations. There are two ways to create files that stretch beyond the system's line capacity. You can either break them up and use the Let command to redefine the page variable, such as LET (page)=12, or you can chain print them by invoking the Insert Document command and giving the path name of the file you wish to attach.

Letter writers will appreciate the envelope-copying function. It takes the recipient's name and address from the letter and copies it at the proper position on a standard envelope.

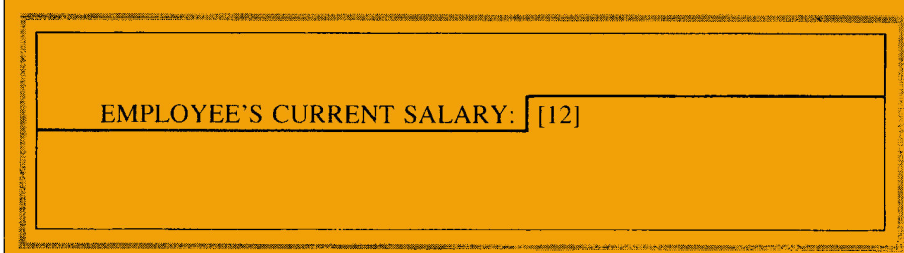
In my particular case, I have written lengthy dramatic scripts requiring as many as five different files, yet this has not been a major problem. By using the

PFS 'item name' to Word Juggler variable conversion

a) All leading blanks are ignored.
b) Blanks within item names are converted to a single period.
c) Trailing colons or periods on item names are removed.
d) All alphabetic characters are converted to uppercase.
e) All characters are ignored after line wrap in item names occupying more than one line.
f) As a consequence of a & e above, if the first item name on a PFS page (screen) does not appear on line 0, it will be treated as a null variable.
g) Null variables are converted to "*FIELDn" (where n ranges from 1 to 999).
h) Variables are gathered from *all* pages (screens) of a multipage form, even though the Print Form interface displays only the first page.
i) Attachment pages are *not* supported.



(PAGE 1)

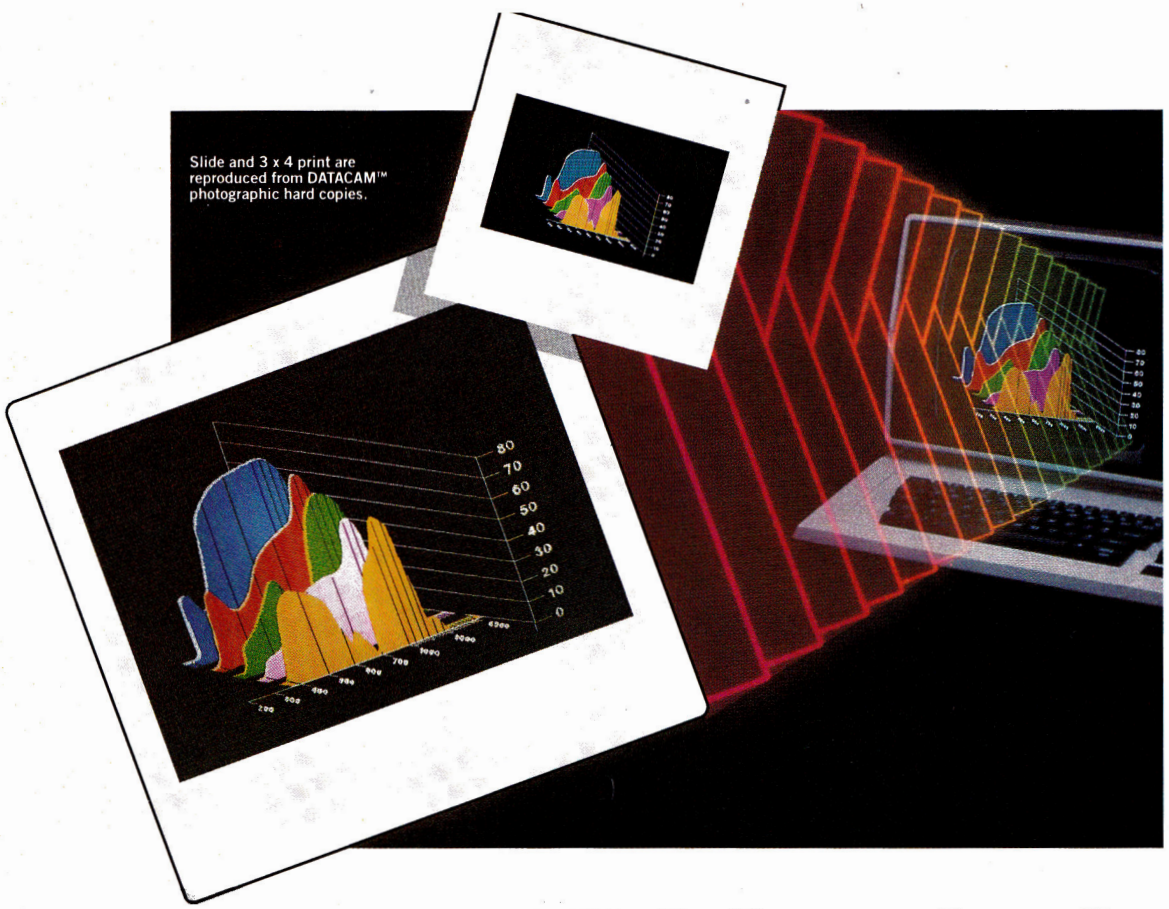


(PAGE 2)

***** EXAMPLE *****

Variable	name	notes
[1]	PERSONNEL.DATA	a,b,e
[2]	EMPLOYEE.JOB.TITLE	b,c,d
[3]	NAME	c
[4]	ADDRESS	c
[5]	CITY	c
[6]	STATE	c
[7]	ZIP.CODE	b,c
[8]	EMPLOYEE'S.JOB.EXPERIENCE.HISTORY	b,d,e
[9]	*FIELD1	g
[10]	*FIELD2	g
[11]	*FIELD3	g
[12]	*FIELD4	a,e,f,g,h

Figure 4: Example of PFS screens and Word Juggler letters with variables marked.



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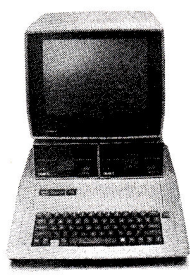
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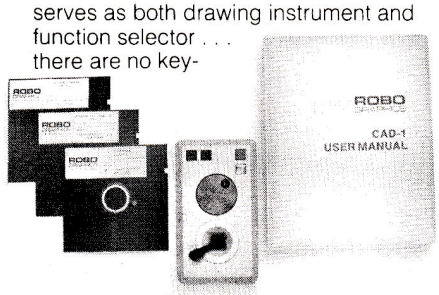
Finally, there is a breakthrough in computer aided drafting and design that makes this work-saving technology affordable for every school, architect, engineer, designer and draftsperson.

The new Robographics CAD-1 system works with a standard off-the-shelf Apple* II+ or //e computer. A complete CAD-1 hardware and software package sells for $1,095, and you can add a drafting plotter for as little as $1,495!



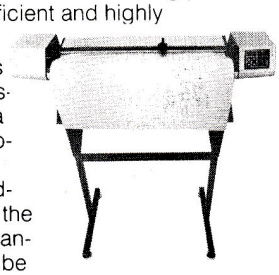
Yet, this is a serious drafting and design system emulating other CAD installations costing over $15,000.

CAD-1 utilizes a unique handheld controller which serves as both drawing instrument and function selector . . . there are no key-



stroke commands to interrupt the workflow. And, when the drawing is completed, line work of reproduction quality can be plotted on paper, vellum or drafting film.

The easy-to-learn CAD-1 drafting process is fast, efficient and highly productive.



To preview this remarkable system, send for a free CAD-1 brochure, or send $17 for your advance copy of the CAD-1 User Manual. Credit will be given when you order a system.

Major credit cards accepted.

See your Apple dealer today for a demonstration or contact us directly.

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CIRCLE 183 ON READER SERVICE CARD

Insert Document, you still can look at the files in sequence. Unfortunately, the program will not perform a word search beyond the file that is in the memory.

While *Word Juggler* is an excellent product, it's not without faults.

One serious problem is with the Find function. It will search for the first location of a character string, but it will not continue by repeating the procedure. The deficiency can be very awkward if you are looking for all the recurrences of the string. Automatic change, on the other hand, is supported.

Unlike *Wordstar*, *Word Juggler* will not automatically write a backup file, but since the entire file stays in memory, it's easy to save the file twice. You must, of course, vary the file name.

The optional spelling program will check a document fairly quickly.

Other minor problems are that the system has neither a hyphenation nor footnote feature. Footnotes must be created manually, which could be a nuisance for those in law, for instance, who use them frequently.

A Quick Fix for Bad Spellers

Lexicheck, the optional spelling program, will check a document fairly quickly. For example, it took 36 seconds to run my 2742-word text through the basic and extensive auxiliary dictionaries, give a word count and take me through the text showing each word in and out of context. Once this is done, the choices are to leave the word as is, add it to the auxiliary dictionary or change it.

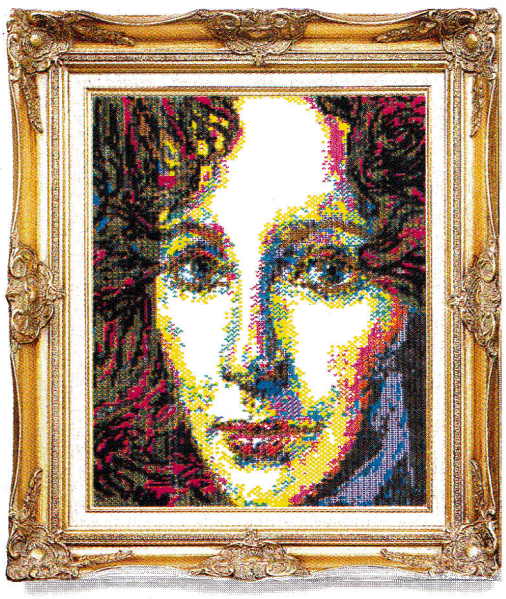
Lexicheck comes with a compressed basic 50,000-word dictionary, which can be extended. On a disk, 13,000 words can be added, on a *Lexicheck* disk, 3000 words. A legal dictionary containing 8000 words also is available.

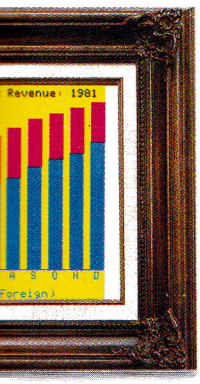
The spelling program comes with a copyable disk. Other Quark programs designed to work with *Word Juggler* are *Terminus*, an RS232 communications program, *TypeFace*, a typesetting interface, and an accessory interface program that gives the program access to Apple's *Mail List Manager*.

I would estimate spending 5000 words logged in with *Word Juggler*. I have since learned well how to run *Wordstar* on Apple III and how to reduce key strokes on my *Basis 108*. But in spite of my new-found competence with other systems, I still prefer *Word Juggler*. ✚

DID PICASSO DO IT?



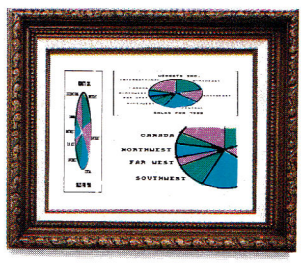


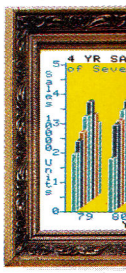


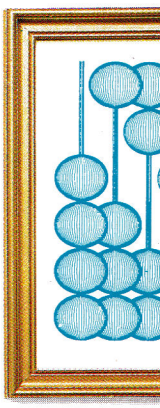












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Upgrade the Apple II, II+, IIe or III computer and any parallel printer to a complete text and graphics output system with the newest and most versatile interface, PKASO/U. (Pronounced "Picasso," the "U" is for Universal). And make use of every capability available from the printer. And gain additional text and graphics features to turn every printout into a masterpiece.

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- Full color for printers with color capability.
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- Aspecting, with separate width and height adjustments for any size and aspect ratio.
- Windowing, the printout of any selected portion of a graphics image in any size — equal, enlarged or reduced, another PKASO/U exclusive.
- Low-cost clock/calendar option for time/date stamping, available soon.

Get Universal Compatibility with Current/Future Technology.

Link the Apple computer with any and all major parallel printers of today or tomorrow. Unlike other printing interfaces which are limited by ROMs or DIP switches with pre-set configurations, PKASO/U is completely configurable for either present or yet-to-come Centronics parallel-interfaced printers. Another only-from-PKASO/U feature.

Add ShuffleBuffer for a Complete Upgrade.

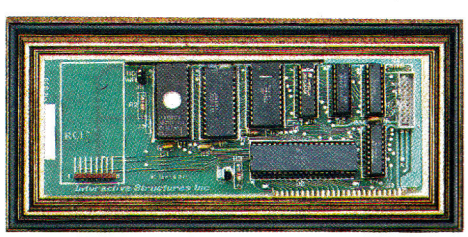
The new Buffer with a Brain, ShuffleBuffer, does the printer-feeding work of the Apple so the computer is free to perform other tasks. It's the only buffer that can rearrange stored data, mix and merge, repeat and reprint. Ask your dealer for a demonstration.

Pays for Itself with Color Ribbon Savings.

Exclusive Mosaic Mode suspends color dot overprinting operation, uses color dots printed next to each other (not on top of each other) to achieve the desired shade. And since fewer dots are printed, less ink is used, ribbon life is doubled and the PKASO/U pays for itself in ribbons saved.

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▸ PROGRAMMING/BY ELLEN THRO

APPLE, IBM, AND RADIO SHACK HIT IT OFF

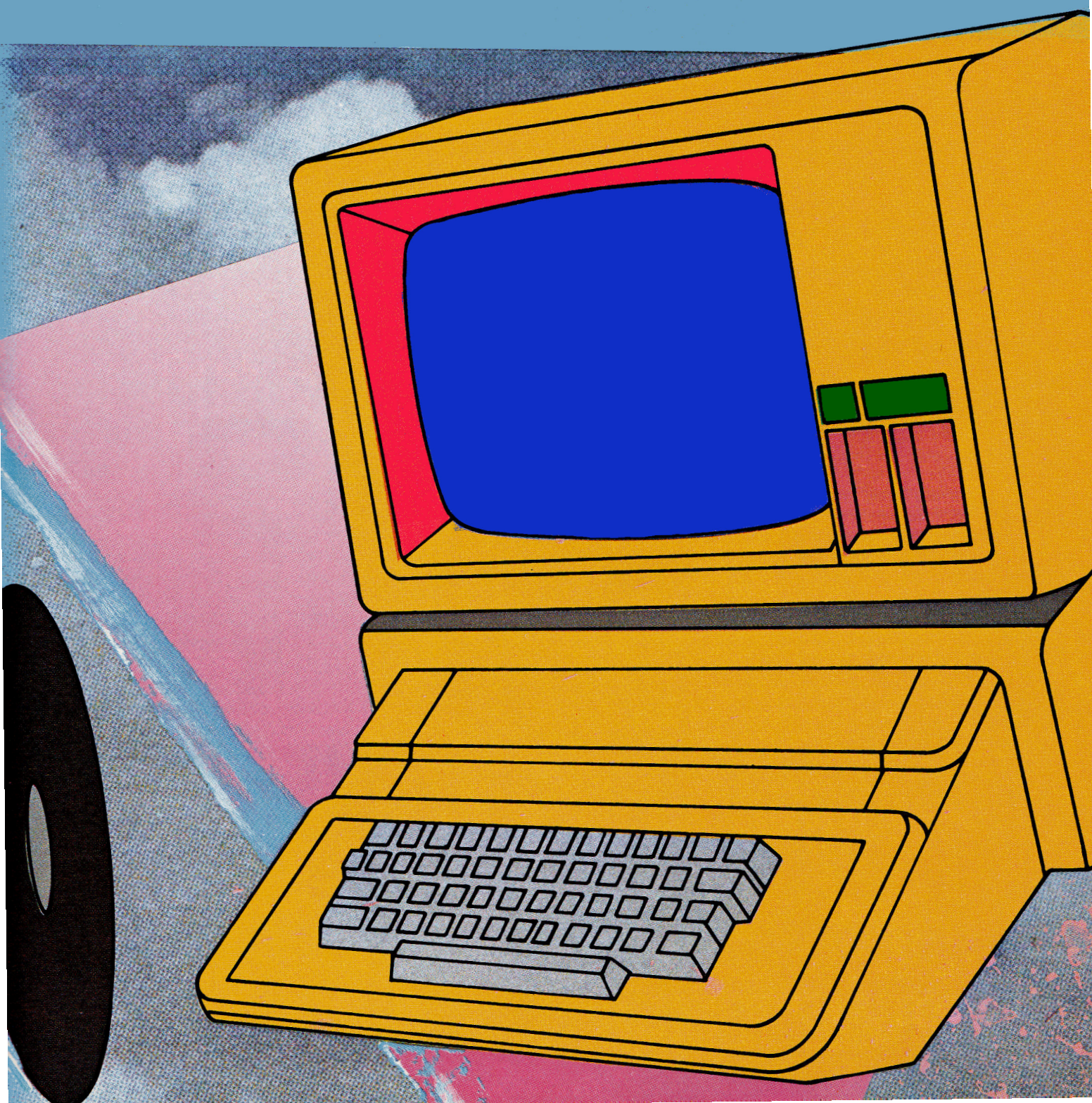
Sharing data with friends and business associates, even if they haven't discovered Apples.



Mark and Sally have been friends for years. When they were in college, they traded tapes to play on their cassette recorders, even though they had different brands. When they graduated from college, both acquired videotape recorders—different brands, again, but the same format. So they have happily traded these tapes, too. Now each owns a personal computer—one an Apple, the other, Brand X—and they would like to continue their tradition by trading disk files.

But as they—and all computer users—soon discovered, disk sizes and formats, as well as variations in microprocessors, make file transfer more of an adventure into the unknown than a simple "here's my disk."

Because interest has been confined to dedicated enthusiasts, explanations of



the process of information exchange and the hardware and software products involved range from mildly murky to totally opaque.

More people are becoming concerned about this dilemma, though, especially as the advent of lap-size computers offers them the possibility of transferring data written in the field to the Apple for incorporation in larger files or for further processing.

Come along with *A+*, as we clear a path through the jungle known as "data communications."

Overview

Your Apple can play several roles in transferring data:

- It can be one half of an equal partnership with another computer—personal, mini, or mainframe—in which one sends data and the other receives it. A combination of hardware and software is needed to achieve this kind of setup.
- It can be either the "master," which controls both its own data movement and that of the other computer, or the "slave," whose data transfer the master controls. This arrangement involves the use of appropriate software.
- It can become an "emulation terminal," allowing it to act as an operating unit of a mainframe system, or as another brand of personal computer. This strategy requires hardware or a combined hardware and software package.

So an Apple owner can transfer data between Apple and Apple, Apple and another personal computer, or Apple and mainframe. Furthermore, the two computers can be sitting side by side or separated by long distances. In the latter case, communication takes place in one of several ways: (1) by direct computer-to-computer telephone line; (2) by indirect telephone line, with an information service, such as The Source, as the intermediary; in this case, the sender transmits the data to the mainframe, and the receiver retrieves it later; or (3) by direct communication from an earth station to a satellite and back to an earth station (a recent option).

Regardless of the computers involved and their distance from each other, the same kinds of equipment are needed. The hardware allows the physical connection, and the software on each end carries out the sending and receiving of data.

Hardware

The basic hardware includes a serial port (also called an RS-232C port); serial cable; a null connector for direct, side-by-side transfer; and, for long-distance transmission, a modem. The serial port for the Apple is on a card that fits into one of the slots inside the computer.

The modem is designed to change computer data into the tones that travel over telephone lines and then turn it back into computer data. You can also use a modem for communications when the computers are side-by-side, but you don't have to. Modems range from simple transmitters of data to "intelligent" systems (often with associated software) that dial the telephone automatically, log on to information services, and otherwise perform automatically.

The hardware and software products involved range from mildly murky to totally opaque.

The modem may be a combination of an outside device and a card in an Apple slot, or it may be entirely on a card.

Some "communications cards" for the Apple combine the serial port with some of the functions the modem or the software handle otherwise. Some modems also incorporate serial ports.

For side-by-side transmission, the cables from each computer should be joined by a "null connector," a cord or plug that imitates a modem, to meet system requirements.

Software

Software is difficult to generalize about, because it ranges from simple programs that feed data at a set speed over the line to elaborate programs that can change data formats and handle the entire process of data transfer, including "master-slave" relationships. Some transfer data from computer memory to computer memory; others automatically transfer information from one disk to another.

You can purchase commercial software, obtain it from the public domain through electronic bulletin boards or Apple users' groups, or use custom-written programs for a particular situation that you write yourself or hire a consultant to do.

Basic System

To sum up, the basic setup for long-distance communication looks like figure 1 (below). For direct communication, it looks like figure 2.

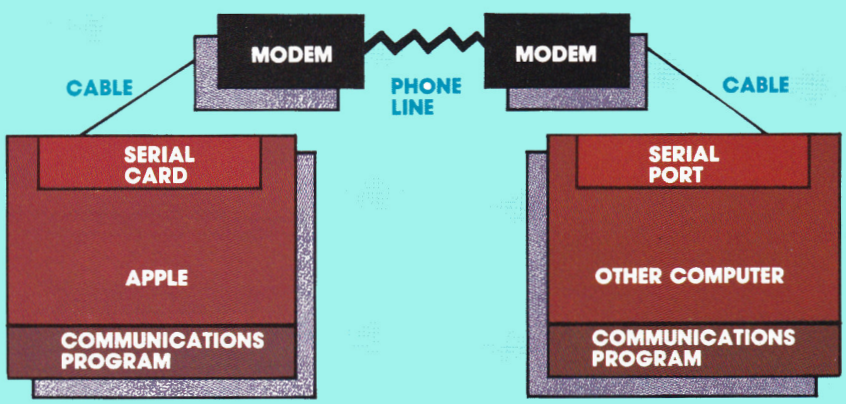


FIGURE 1

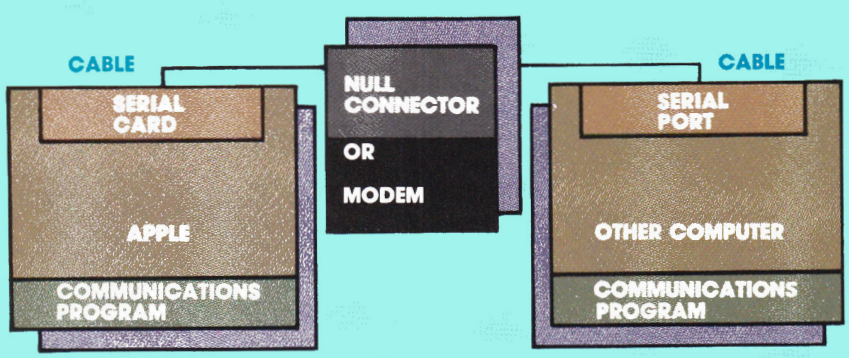
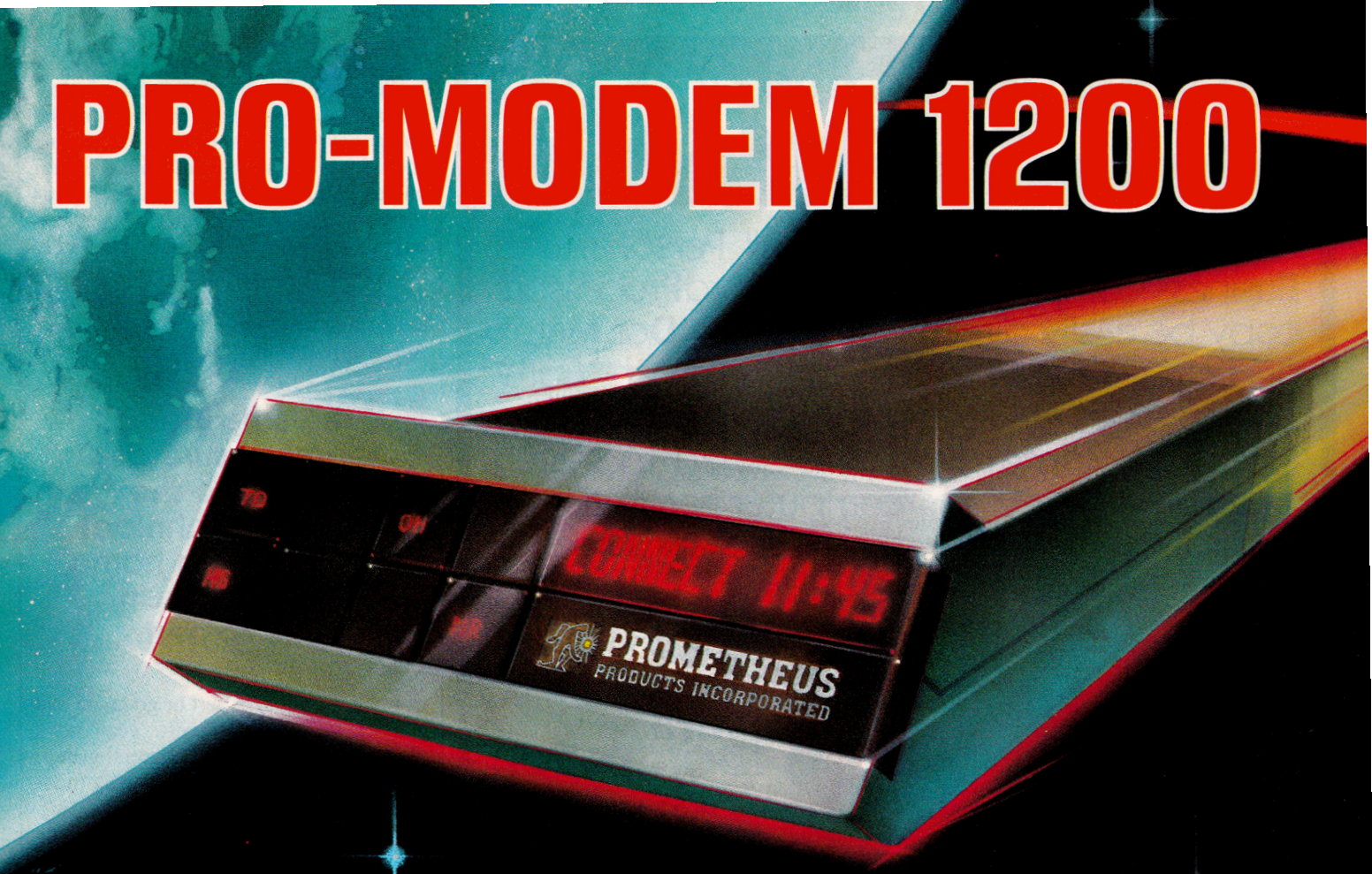


FIGURE 2

PRO-MODEM 1200



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Compare the $495 PRO-MODEM 1200 with any other modem on the market. For example, you'd have to buy both the Hayes Smartmodem 1200 plus their Chronograph for about $950 to get a modem with time base.

PRO-MODEM 1200 is easy to use. A convenient "Help" command displays the Menu of operating command choices for quick reference whenever there's a question about what to do next. Extensive internal and remote self-diagnostics assure that the system is operating properly. Some of the other standard features include Auto Answer, Touch Tone and Pulse Dialing, and Programmable Intelligent Dialing.

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SEE US AT COMDEX, BOOTH 720



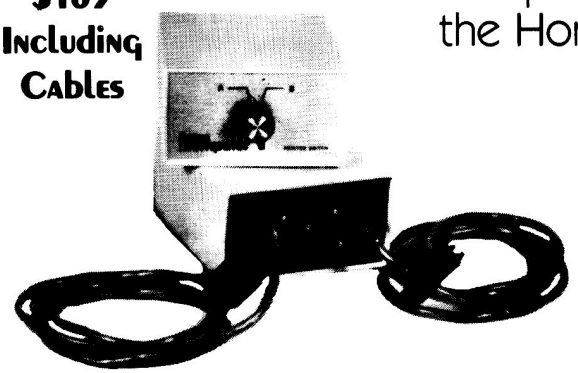
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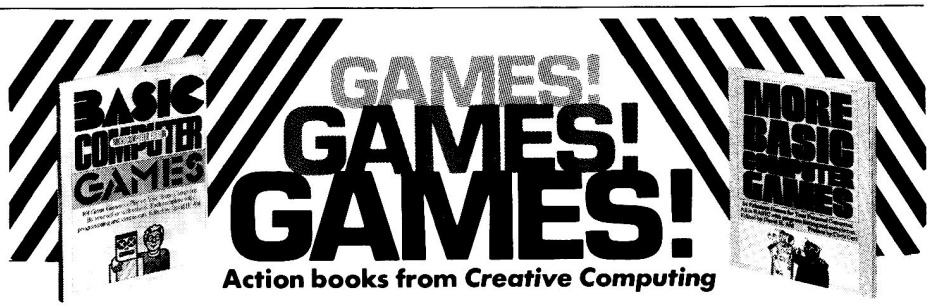


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When you go to purchase a system, explain what you want and be sure the components are compatible. The cable should have a serial-card connector on one end and a modem- or null-compatible connector on the other. If you are buying components at various stores, take your manuals, and even already acquired cards and connectors, with you to be sure everything fits. If the salesperson seems unsure, ask to speak to the resident technical expert or go home and contact an outside expert, such as a member of the local Apple users' group. (It is worthwhile to pay the usually modest fee to join.)

If the salesperson seems unsure ask to speak to the resident technical expert or go home and contact an outside expert.

Vocabulary of Data Communications

Even if you purchase the most automated communications system with the most detailed, well-written manuals, you'll need to be familiar with some communications terms:

- Serial transmission—transmitting data one bit at a time. Since each character in an Apple system consists of eight bits (one byte), each group of eight is preceded and followed by bits that separate the data bytes.
- RS-232C—the standard for serial transmission, which assigns the function to each pin and wire in a serial connection.
- Serial or RS-232 port/card—the connection in the computer that allows serial transmission. Some computers have direct ports, while others, such as the Apple, need slot cards.
- Baud—the speed of data transmission, measured in bits per second. The rate of character transmission is approximately one-tenth the baud rate. For instance, 1200 baud transmits about 120 characters per second (about the speed of a dot-matrix printer). Baud rates range from 300 to 19,200, with 300–4800 the most common. Modems that transmit at a maximum of 300 baud cost $200–300, and those that permit 1200 baud or higher begin at about $500.
- Log-on—establish a connection between remote computers.

Instant one-button color printing.



Press here.

It's just that easy! Any time you want to print what's on your Apple's screen just hit the copy button on your Transtar 315 color printer with our PICS card installed, and it's done! No special programming, no lengthy code sequences, no need to exit your program! Just press the button and it prints!

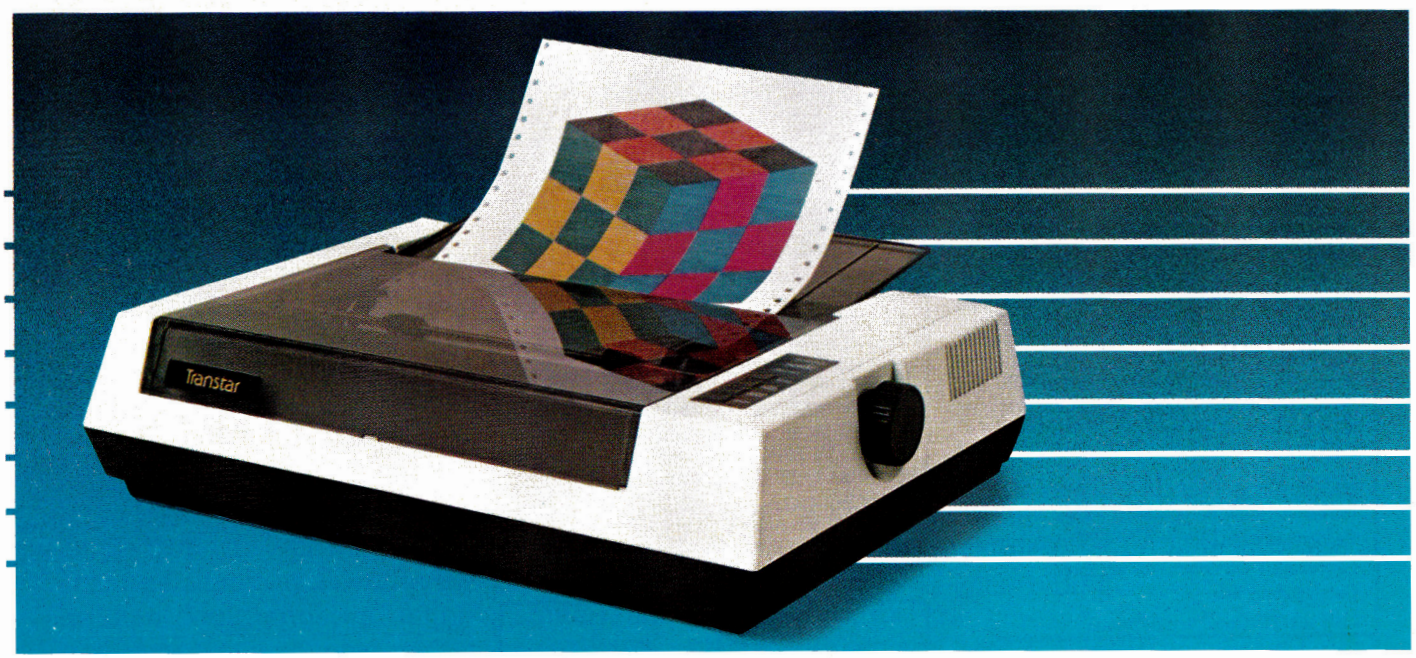
By adding the optional PICS card to your $599 Transtar 315 color printer, you've opened up a whole new world of easy color printing. For the first time ever, our PICS parallel interface card enables you to screendump virtually any program -- graphics, charts, games -- even copy-protected software! Specially designed only for the Apple II, II+, IIe, and Franklin computers, the Transtar 315 PICS card does the work of a parallel card and a lot more and costs only $119.95.

At the push of a button, Transtar's innovative new 4-color diagonal ribbon will print up to 7 colors and more than 30 shades in a single pass.

The 315 is precision-built to exacting standards by Seikosha, the most experienced company of the famous Seiko group--recognized worldwide for quality and dependability. In fact, one of the nicest things about Transtar's 6-month warranty on parts and labor is that you'll probably never use it!

Innovative, inexpensive, dependable, easy: the Transtar 315. Color printing has never looked so good!

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*PICS cards are currently available for Apples and Franklins. PICS cards for other computers will be available in the future.

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- On-line—two computers are connected remotely.
- ASCII files—ASCII code is a two-digit, 128-character standard used for formatting data for transmission to printers and other computers. ASCII files, which include Apple text files, are those that use this format.

The easiest files to transfer between different computer brands are standard ASCII files, which are regular text files.

- Full duplex—a connection capable of simultaneous two-way transmission.
- Half duplex—a connection capable of only one-way communication at a time. Some half-duplex modems provide higher baud rates at a lower cost than do full-duplex modems.
- Parity—a verification system for accurate transmission, involving the addition of a bit to determine the number of 0's and 1's in each byte. Parity may be odd, even, or disregarded.
- Stop bit—a bit indicating the end of a character. There can be one or two stop bits.

Possible Pitfalls

Jeffrey Stumpf, a San Diego electronics engineer and computer consultant, emphasized for *A+* these points that the beginner should keep in mind:

- TYPE OF DATA SENT: The easiest files to transfer between different computer brands are standard ASCII files, which are regular text files. You can also exchange binary, machine-language, and BASIC files between two Apples—you can transfer them from other brands most easily if you convert them into text files first. The Apple will not be able to interpret those, though, because they are written in languages different from the ones the Apple understands. You'll have to write or acquire a conversion program to translate the foreign language into the Apple's language. Even a BASIC program sent as a text file will need syntax corrections before you can run it on your Apple. As long as they are encased in a text file, however, all the words or numbers will appear, even if the computer cannot use them as is. The easiest way to modify a file is in a word processor or text editor.
- SPECIAL PROBLEMS WITH CP/M: BASIC-to-CP/M file exchanges present special problems. The two systems format one bit differently in each byte, and BASIC files use a simple carriage return, while CP/M files use a carriage return/line-feed return. You need a special conversion program at one end or the other to make the data conform to the system in question. Here again, the word processor can come to the rescue most easily if you want to make the changes manually. Conversion programs are also available through users' groups or commercially.
- CONSULTANTS: A conversion of this type, custom-tailored for the system, may take 12 hours of work for a consultant. Fees range from $30 to $200 an hour.
- CHOOSING A SYSTEM: Each user must decide on the relative value of time and money. A custom or commercial program that does the transfer and conversion automatically may be expensive, but if you do not want to spend the time to perform these functions individually each time, the add-

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Recognizable ESCAPE and INSERT mode cursors

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Catalog abort key

Lists text files to screen or printer

"Of all the DOS enhancement packages reviewed in Peeling II to date, **DIVERSI-DOS** is the most powerful in terms of its capabilities coupled with its price. **DIVERSI-DOS** is the only product to speed up all areas of DOS—LOAD/BLOAD, RUN/BRUN, SAVE/BSAVE, as well as the READ and WRITE of text files...The documentation is superb. (Rating AA)"
— Peelings II Magazine

WHAT ARE YOU WAITING FOR???

Are you tired of waiting for DOS to load and save files? Are you tired of waiting for DOS to finish so you can type again? Are you tired of waiting for your printer? When you buy **DIVERSI-DOS™**, by Bill Basham, you won't have to wait any more! Here's why:

1. DOS speed-up: Apple DOS 3.3 takes 18 disk revolutions to read a single track, whereas **DIVERSI-DOS** reads or writes a track in just 2 revolutions. This speeds up file processing tremendously (see table).
2. Keyboard Buffer: **DIVERSI-DOS** allows you to type ahead, as fast as you can, without missing a single character.
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DIVERSI-DOS, the QUADRUPLE utility, requires a 48K Apple II, II+ or //e with DOS 3.3. A simple, menu-driven installation program is included on the un-protected disk. So what are you waiting for?

	APPLE DOS	DIVERSI-DOS
SAVE‡	27.1 sec.	5.9 sec.
LOAD‡	19.2 sec.	4.5 sec.
BSAVE*	13.6 sec.	4.1 sec.
BLOAD*	9.5 sec.	2.6 sec.
READ**	42.2 sec.	12.4 sec.
WRITE**	44.6 sec.	14.9 sec.
APPEND**	21.3 sec.	2.3 sec.

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ed cost may be worth it. Most business users prefer the hands-off approach, while many hobbyists prefer to do their own transfers and conversions to increase their knowledge of the systems involved.

Two Scenarios

- Of the many combinations of hardware and software for data transmission, here are two examples of direct data transfer from another brand of computer to the Apple II.

TRS-80 Model 100 to Apple II

Sandra Drummer is the regional sales representative for a diversified manufacturing company. She already has an Apple II with 64K memory in her office on which she keeps records of clients, prospects, and sales; she also uses it to write sales reports. Since she travels extensively, she decided to purchase a TRS-80 Model 100 lap-size computer (at Radio Shack stores, the 32K version runs about $1200) to take with her, and then transfer her notes and records to the Apple when she returned to the office. Her Apple already has an Apple Super Serial card for her printer, and the Model 100 has a built-in communications program. So she needed to purchase only a cable (about $20) and a null connector (about $30) for the Model 100. For the Apple she purchased two things, a cable (about $30) with a card attachment on one end and a null-connector plug on the other, and the communications program *ASCII Express—The Professional* (Southwestern Data Systems, $130).

The Model 100 will transmit any text file in its memory.

The Model 100 will transmit any text file in its memory, and you can reenter BASIC programs written on it in the text-editor format, to be transferred as text files. You can also create graphics on this computer, but they cannot be transmitted.

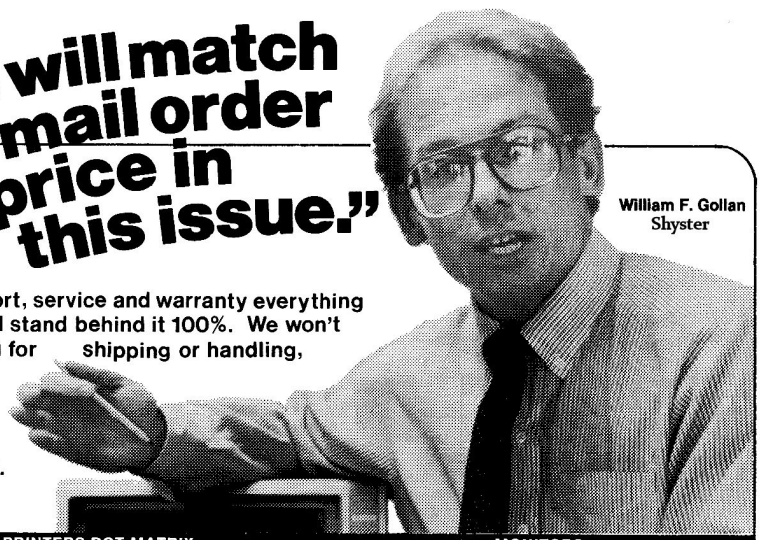
The Model 100 communications program is called *TELCOM;* you can use it with the built-in modem or the RS-232 port. To send data (or "upload"), this is the procedure:

Attach the Model 100's serial cable to the serial port at the left rear, and the null adapter. Similarly, connect the Apple's serial cable to the serial card and the null adapter, so the setup looks like figure 3 (page 92).

On the Model 100, set the ACP/DIR switch on the left side at DIR and the ANS/ORIG switch at ORIG. The program is set to transmit via the modem at 300 baud, with a word length of seven bits (the eighth bit is ignored), and one stop bit. To "enable" (activate) the RS-232 port, press function key F3 and enter the baud rate desired, from 75 to 19,200. (The sender can also change the other characteristics, but this is not necessary here.) To have full-duplex transmission with the characters transmitted before they show on the display, press key F4.

On the Apple, load *ASCII Express—Professional*. This program comes with an inch-thick manual, which is somewhat laborious to read, but it describes in detail the procedures for using the many options available within the program. Follow the menu to create the installation program, selecting uppercase/lowercase display, type of card or modem, slot number, and transmission information. BE SURE THE TRANSMISSION CHARACTERISTICS ARE THE SAME FOR BOTH SYSTEMS: If you

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selected 1200 baud for the Model 100, do the same for the Apple. Compare the other characteristics as well. Save this program so it will be available in the future. (With the Apple IIe, this program operates only at 300 baud.)

Finally, again from the menu, turn on the "copy buffer," which will receive the file from the Model 100. Be sure to do this BEFORE going any further on the Model 100.

When you have done this, you're ready to transfer the file. To upload from the Model 100, press function key F3, type the filename, and press Enter (the equivalent of Return). When transmission is completed, release the line with key F8 (the Bye command).

They have realized that being able to trade data on their disks would be helpful.

Now the text file is in the Apple's memory. You should save it on a disk immediately. It is available for later use, or you can enter *ASCII Express— Professional*'s text editor to make formatting or syntax changes.

IBM PC to Apple

George A. and Thomas Z. are partners in a landscape contracting business. Over a year ago, they purchased personal computers, and since each handles different aspects of the firm, it didn't seem to matter that George decided to get an IBM PC, while Thomas opted for an Apple II+. Since then, however, they have realized that being able to trade data on their disks would be helpful. (Avoiding mountains of paper was one of the reasons they got computers in the first place.) They selected a communications program that performs PC-to-Apple transfers, *Apple-IBM Connection* ($195, from Alpha Software Corporation). It transfers files either way between Apple and IBM PC, two Apples, or two IBM PCs.

To meet the program's requirements, Thomas purchased a 16K board (under $100) to increase his Apple's memory to 64K. He could have purchased a serial card if he'd wanted to do only local data transfers, but he decided on a Hayes MicroModem II ($300), since he might wish to communicate with colleagues in various locations. He placed the modem card in slot 3.

George's IBM PC already had the required 96K memory and DOS 1.1 (*Apple-IBM Connection* is also available in a 64K version.) He purchased an IBM asynchronous board (about $130) and a crossover cable the software manual recommended. Their hooked-up system looks like figure 4 (below).

Here is how to transfer data from the IBM PC to the Apple:

The software system comes with two program disks, one for the IBM PC and one for the Apple. You can use the Apple disk as is, but you first have to transfer the contents of the IBM PC disk to a program disk, which you use from then on. Next, load the text to be transferred and use the IBM Reform disk utility to change it into Apple format. Save this on a disk.

Now load the IBM program disk. It shows a line that reads "Evaluating Communications Interface." Follow the menu to select the baud rate, card/modem selection, and the send/receive option SEND. Remove this disk and replace it with the disk containing the Apple-formatted file.

For the Apple, load the communications disk and leave the disk in the drive. Follow the screen menu, selecting the appropriate serial card/modem option and the SAME baud rate that you already entered in the IBM PC. The next options are to select "crossover cable" and RECEIVE.

Now press the Escape key on both computers.

At this point remove the disk from the Apple drive and replace it with a blank disk to receive the data.

When the phrase "link established" appears on both screens, the Apple user (the receiver) types the filename and the IBM PC user (the sender) types the same filename. This procedure activates the disk drives and transfers the data to the Apple disk.

This program also has options for establishing a "master-slave" linkup, where the entire transfer is handled from one computer, and for making syntax changes for CP/M–DOS transfers.

Before-You-Buy Checklist

If you are a novice, you may wish to pursue two different avenues at the same time: the users' group and the hardware and software stores.

Computer-users' groups consist of dedicated computerists interested in expanding their knowledge of computer systems. Most larger Apple users' groups have various special-interest groups (called SIGs) and often include a communications SIG. If you are not sure whom to contact, go to a general meeting

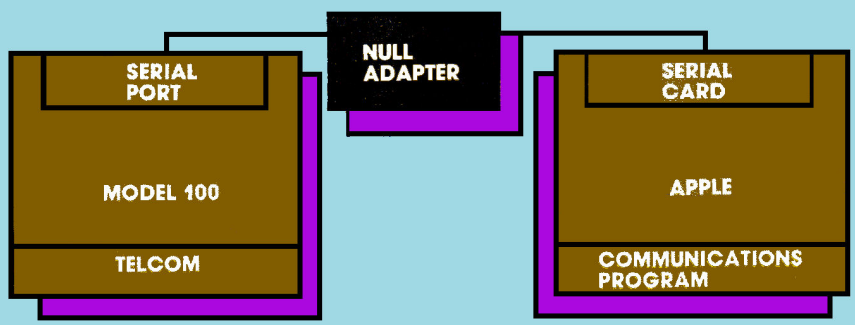


FIGURE 3

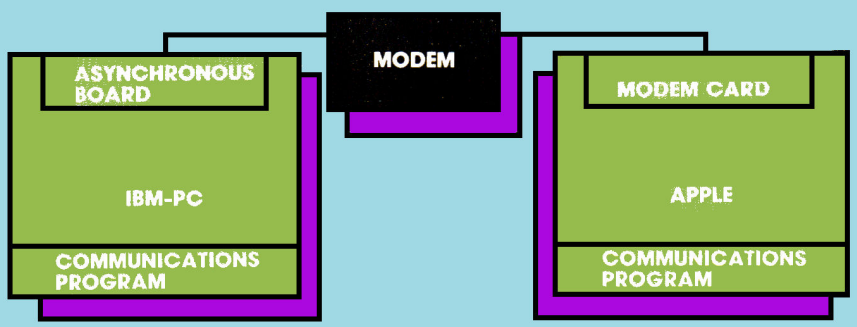


FIGURE 4

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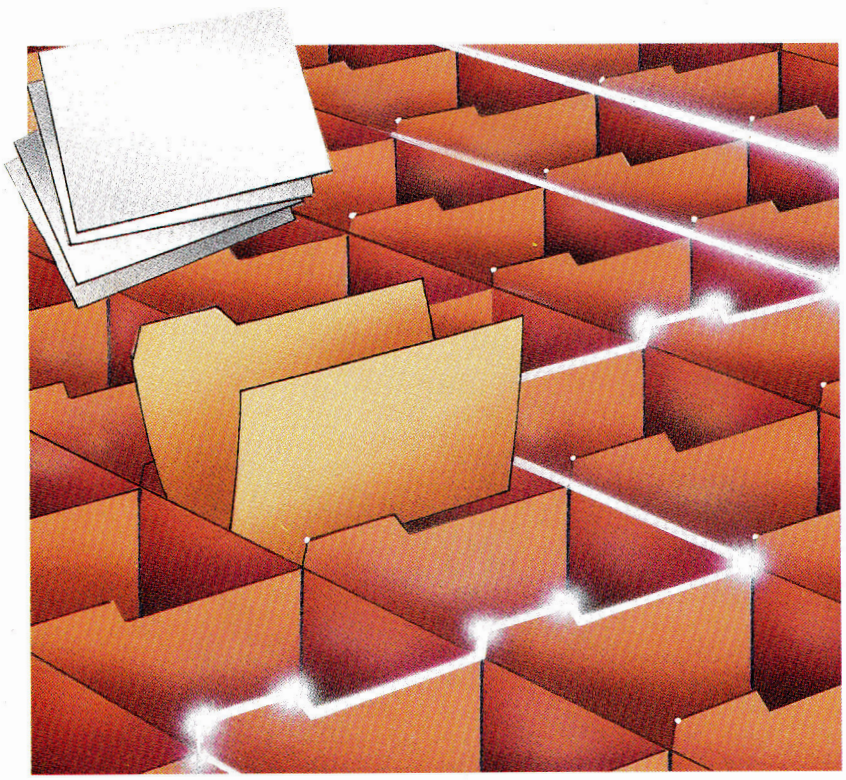
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and ask. (Most computer stores can put you in touch with the local group.) People will be generous with their time and knowledge.

But be careful. Many users' group members would rather spend hours writing their own software and exploring all the possibilities than finding the quickest answer to a communications problem. If you are that type of computer user, you have probably found a new group of friends. But if you are in a hurry or want a "hands-off" system that does the job without your intervention and also provides lots of printed help—and, for moments of desperation, a "hot line"—you may be better off with commercial software and service.

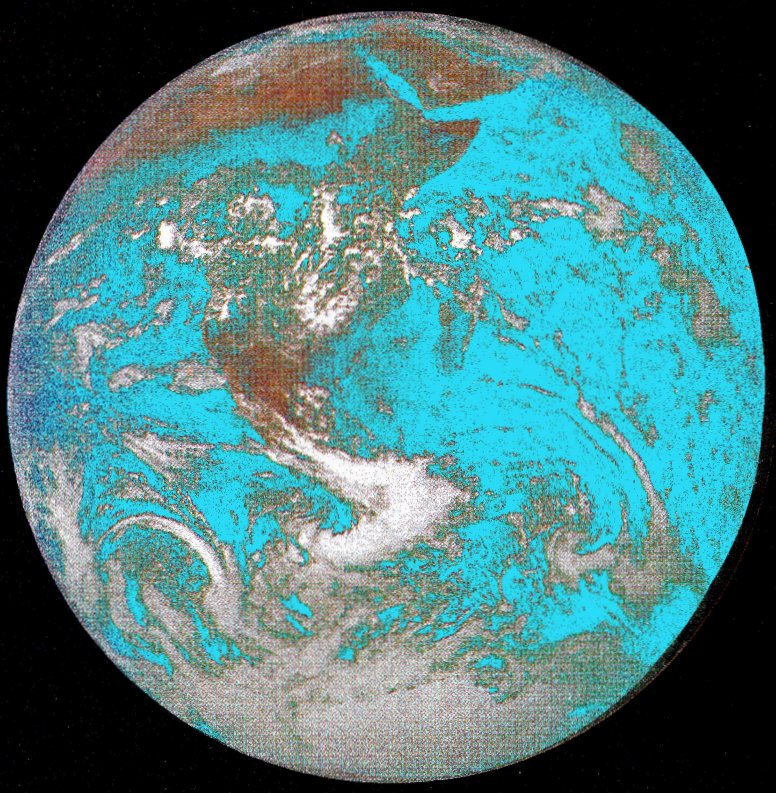
Many people believe a certain public-domain program known generically as *MODEM* is superior to much commercial software.

The same holds true for public-domain software. Many people believe a certain public-domain program known generically as *MODEM* is superior to much commercial software. Many variations of *MODEM* exist, but the documentation is usually meager, and the program is most popular among computer hobbyists.

To find out which category you belong in, and to guide you as you shop for hardware and software, answer these questions:

- Do I want to transfer data for business or as a hobby?
- What kind of files will I be sending—text (data? word processing?), binary, or machine language? Will CP/M be involved?
- Will I be transferring a few long files or many short ones? How often will I be transferring data—daily? weekly?
- How important is speed of transmission to me? Is the extra cost of speedier transmission worth it?
- How involved do I want to be with the transmission process—do I want the hardware and software to do it all?
- How involved do I want to be in the data—do I want to make the syntax corrections, or do I want them performed for me? ✚

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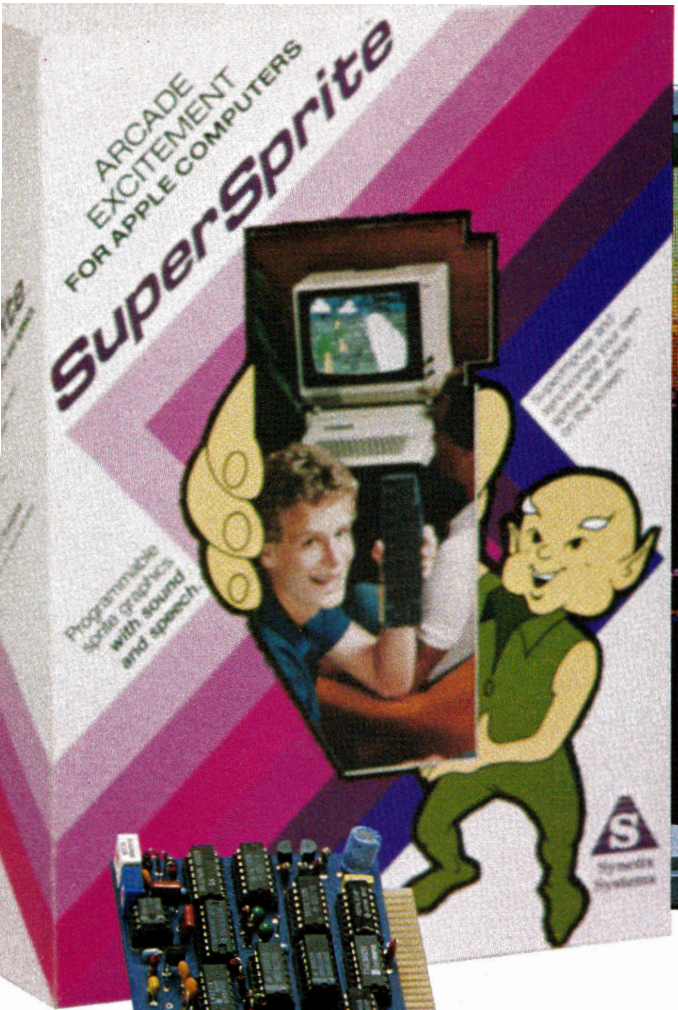
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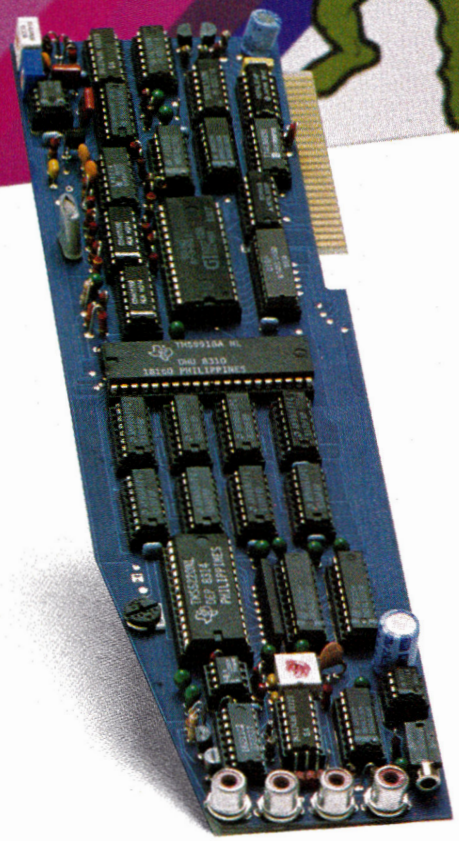
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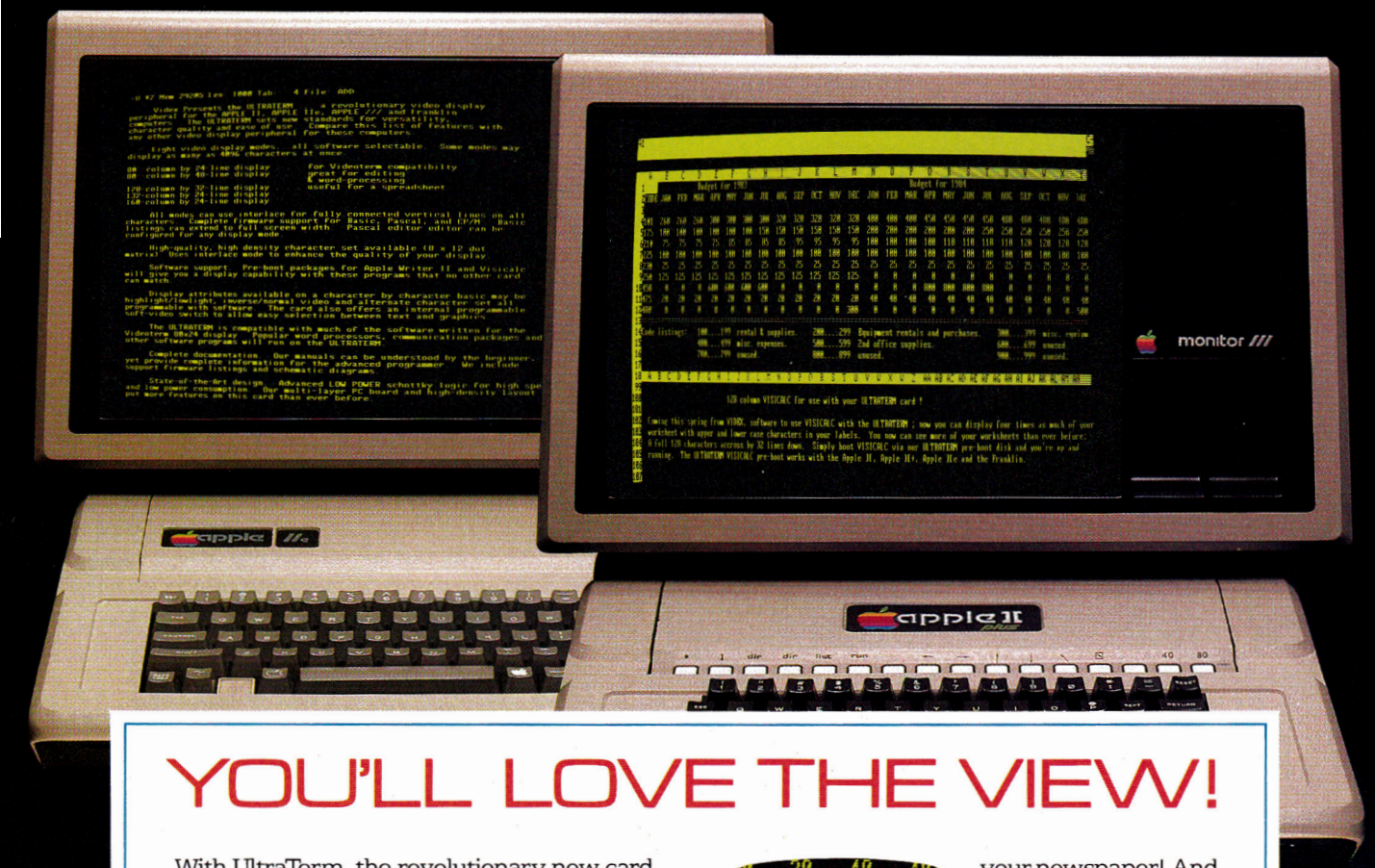
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SuperPILOT adds flexible graphics to a language written for the easy development of interactive instructional programs. With this version of the *PILOT* language, you can create computer-based lessons including customized graphics, sound effects, and music, as well as written lesson material.

PILOT is a programming language designed specifically for the development of interactive teaching programs (see box 1). Although the original version of *PILOT* assumed that the user had only a Teletype or similar simple text-only terminal, several improved versions have appeared in the last few years. The *SuperPILOT* version distributed by Apple Computer makes full use of the graphics and sound capabilities of the Apple II, II+, and IIe computers.

SuperPILOT provides three ways to use graphics: the Draw mode (graphics editor), the Programmed mode, and the Character Font Editing mode. The Draw mode lets you prepare complex drawings for later inclusion into lessons. The Programmed mode makes simple pictures during the running of a *PILOT* program, and the Character Font Editing mode is for creating special alphabets and pictorial animation.

The Draw Mode

The Draw mode is the easiest and most natural of the graphics modes. This mode gives you the ability to sketch complex pictures on the computer screen and then save these pictures on disk as a graphics file. You can recall the picture later for further editing or for inclusion on the screen as an integral part of a lesson program.

The graphics editor works like a computerized Etcha-Sketch, with the artist's brush a rubber-band-like cursor. You can control the cursor either with game paddles or with logically arranged direction keys on the Apple keyboard.

The best way to envisage how this cursor works is to think of the single point where the cursor lies as a tiny but extremely flexible rubber band. With your direction keys (or paddles), you pull on one end of the rubber band, stretching it in the desired direction, while the other end stays put in its original spot.

Assume you pulled straight up on the cursor. Where you initially had a tiny blinking dot in the center of your screen (the cursor origin), you now have a straight blinking line extending upwards toward the top edge of the screen. (The blinking indicates that this cursor line is temporary and not a part of your drawing.) Now, if you were to use your right direction key, the top part of the cursor would stretch toward the right-hand top side of the screen, still producing a straight, but now diagonally sloped line, stretching from the origin (see figure 1).

PILOT is a programming language designed specifically for the development of interactive teaching programs.

You can move the cursor in this fashion in any direction and to any length within the boundaries of the screen. When the end of the cursor is positioned where you want it, you can give a command that draws a straight solid line along the length of the cursor. The cursor origin now moves to the end of the line you just drew (i.e., the pulling end of the cursor now becomes the new origin).

The editor also has some other options. Instead of drawing a line, you could use a jump command to snap the cursor origin over to the new location of the pulling end (without drawing a line). This would leave you with a relocated cursor-dot origin, ready to be stretched into action again.

The editor also allows the fast and automatic creation of rectangular, square, circular, and oval shapes. The simple concept here is that the ends of the cursor stretched in a slanted direction can mark two opposite corners of an imaginary rectangle. The Box command draws the rectangle that goes through those corners. If the angle of the line is 45°, the box will go over just as far as it goes up, and the result will be a square.

To make a circle or an oval, you use a similar procedure. First, you set the corners of a rectangle using the ends of the rubber band to form the corners. Then you enter the Circle command. Instead of drawing a rectangular box, this command draws the largest circle or oval that would fit inside such a box. Again, a line at a 45° angle produces the figure that is just as wide as it is high—in this case, a circle (see figure 2).

Since you cannot directly draw a randomly curved line with the rubber-band cursor (as you can with a free-form draw mode and a light pen or graphics tablet), you have to approximate curves with a series of straight lines in small, angled increments (the shorter the lines, the truer the curves). Fortunately, *PILOT* gives you a great deal of flexibility in moving the cursor; you can quickly adjust the increments for fine detail work or for large, sweeping moves.

SuperPILOT also allows you to fill in shapes or background areas easily with up to six different colors on the screen. If you place the cursor within the target area, a single keystroke command can

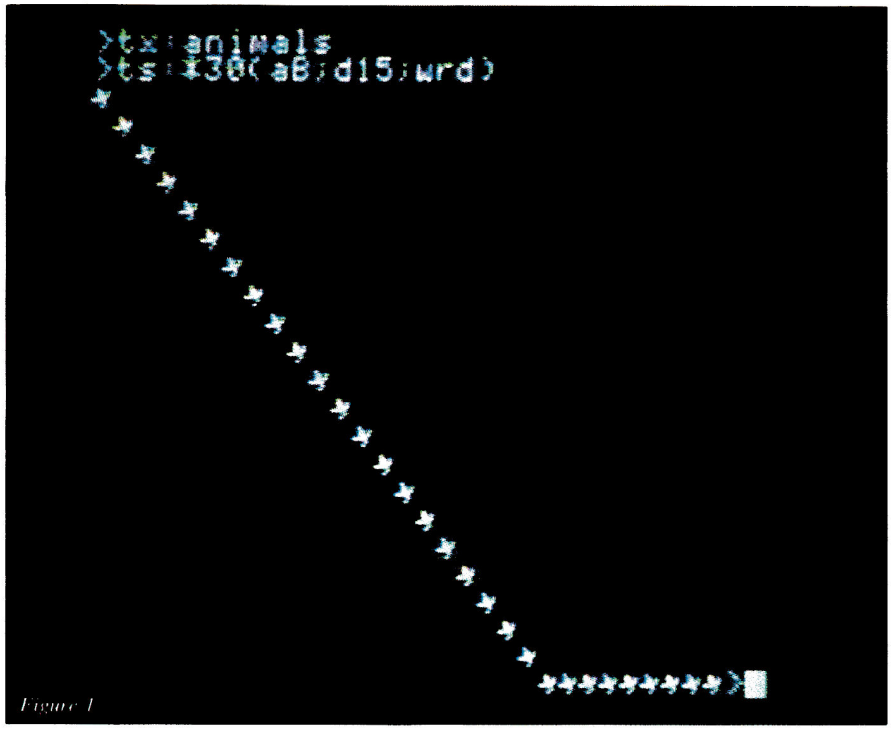


Figure 1

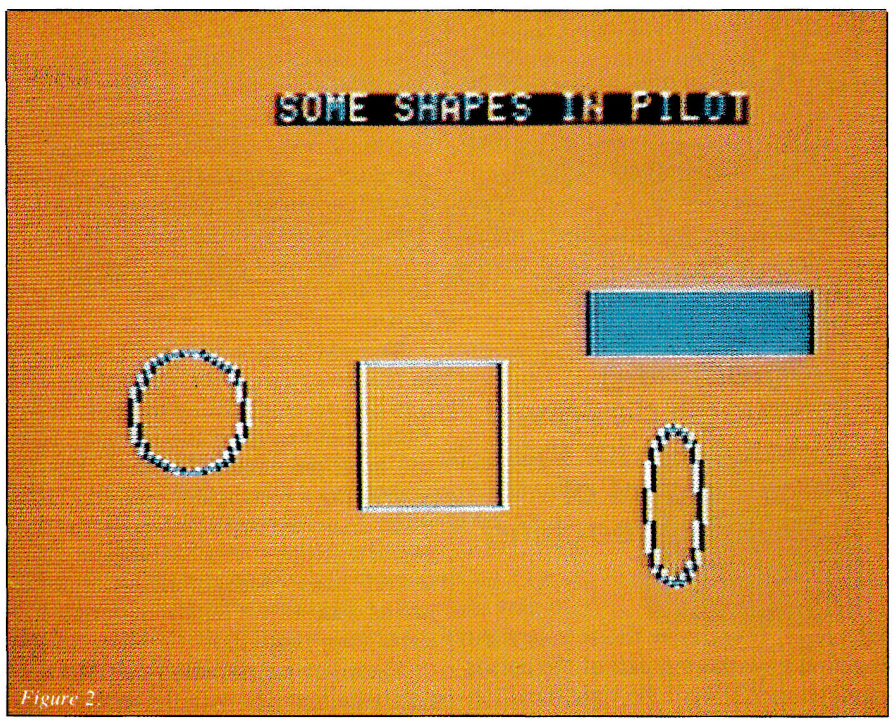


Figure 2

fill the shape with the desired color.

For use with a color monitor, *SuperPILOT* gives you direct control over the color for tracing out each pattern. You can pick from four colors, black, white, and "reverse." With Reverse Draw in effect, a line drawn over different areas is always visible, as it assumes the opposite of the color over which it travels. This feature is particularly useful when you are drawing over complex and colorful images.

Another feature of the graphics editor is that it allows the insertion of uppercase or lowercase text anywhere on the graphic image. Text appears as white lettering on a black background wherever you place it. The rubber-band cursor positions the text origin.

Graphic Editing and Quickdraw

One of the nicer features of the Draw mode is that it has a true graphics editor. You can add, erase, or change any single command that went into making a picture and have the resulting picture redrawn on the screen. Along with fixing mistakes, you can also relocate elements or the origin for the entire picture, change colors, and so on.

You can edit graphics in this way because the graphics editor normally doesn't keep track of the picture itself, but rather of the sequence of instructions it takes to completely draw the picture. When you edit, you simply change this list, and the resulting picture reflects that change the next time the computer redraws it.

If you have a long and complex set of instructions, this redrawing process can be quite slow, though. If you want to use the drawings in a lesson, add them as background to another drawing, or otherwise use them but not change them, *SuperPILOT* also lets you save the pictures in completed form. Within *PILOT*, this picture-storage mode is called Quickdraw.

Quickdraw is a way of storing the picture on the disk in a screen-dump (a dot-by-dot map of the screen) file. You can add images you store in this manner behind the drawing on which you are currently working. This feature gives you a de facto cut-and-paste editing capability. Thus, you can perfect the small individual elements of a picture and then build infinitely complex, cumulative images from those elements.

You can add, erase, or change any single command that went into making a picture and have the resulting picture redrawn on the screen.

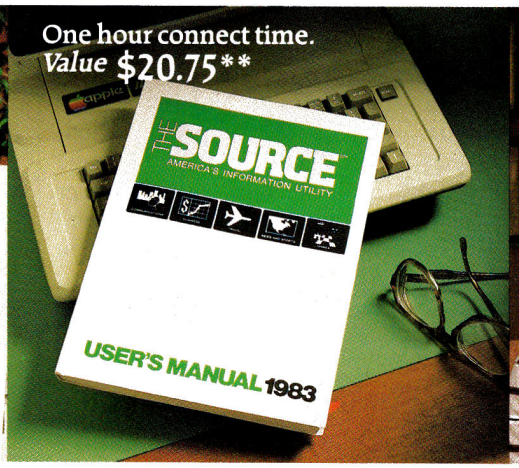
Since Quickdraw images are screen bit maps, they are the same as a screen-dump image from any other program. This means that you can save pictures you create in *PILOT* and use them in other programs. Similarly, images you've generated with other programs, including free-hand sketching programs, can also be part of a *PILOT* image.

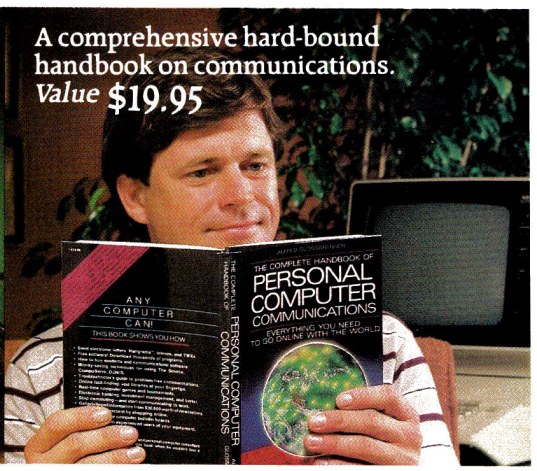
Program Mode Drawings

Another important graphics mode in *PILOT* offers the drawing capabilities of the programming language itself. *SuperPILOT* includes two complete sets of graphing commands, both of which you can use to make screen images as you run the *PILOT* program. Whereas images developed with the graphics editor are immediately available on the screen, if you use the lesson text editor to create

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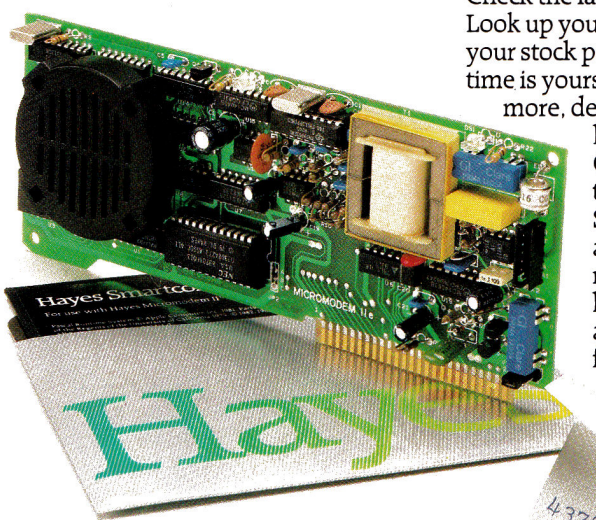






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CIRCLE 271 ON READER SERVICE CARD

programs with graphics commands, you must run the program to see the resulting graphics.

The first and oldest of the programmed-graphics methods uses Cartesian (x and y) coordinates to draw and position the cursor. As with high-resolution plotting in BASIC, you specify points by giving their vertical and horizontal positions.

Along with the direct plotting of points, this mode also allows for drawing of lines from point to point, for changes in color, and for movement without the creation of an image. One nice feature is that all points are relative to the current "origin" reference point, and you can move this point with a simple command. So, you can draw a standard image at different locations by changing the current origin.

The second programmed-graphics method is called relative movement or turtle graphics (TG). This method, which is also used in the Logo language (see box 2), is much easier for younger children and most adults to work with.

The central concept of TG is that you can command a "turtle" (cursor) to walk forward or backward or spin around. As it moves, the turtle can drag a pen across the screen that marks any color you specify, or it can raise the pen and leave no trail.

So, for example, we can issue the command

```
g:d100;s90
```

meaning move the turtle (cursor) while drawing (d) a line 100 units long. Then spin (s) the turtle 90° to the right. With a little imagination, we can see that repeating this command four times brings us back to our starting position, resulting in a square. Adding a repeat factor, we can write our routine as

```
g:*4(d100;s90).
```

SuperPILOT even lets you nest repeat factors inside each other in order to create more complex shapes. For example, the command

```
g:o250,250;*6(*4(d100;s90)s
60)
```

creates a circle formed by six squares (see figure 3), making a flower-like

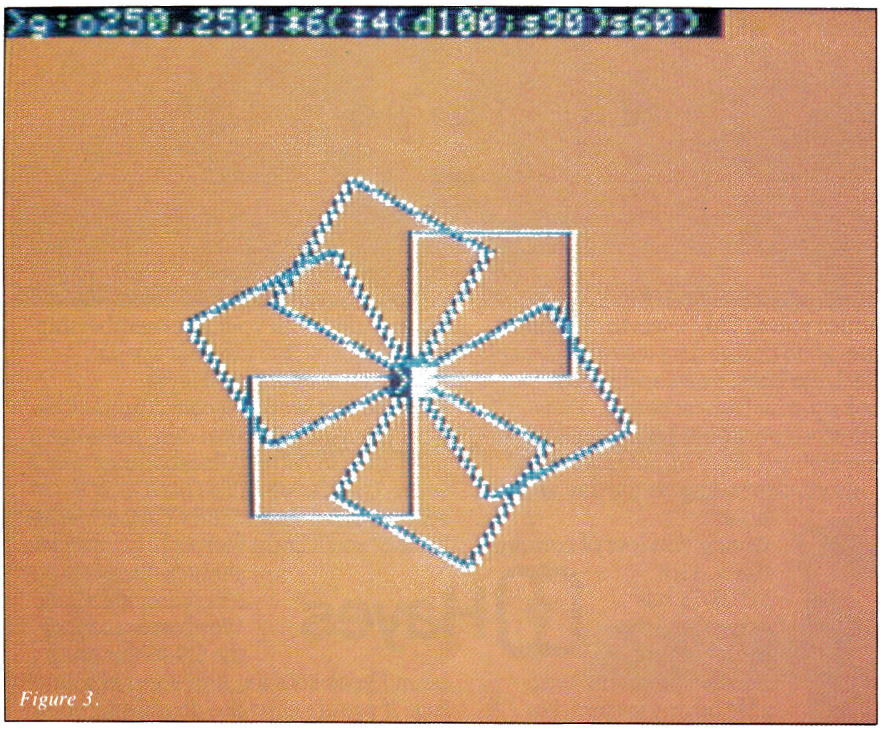
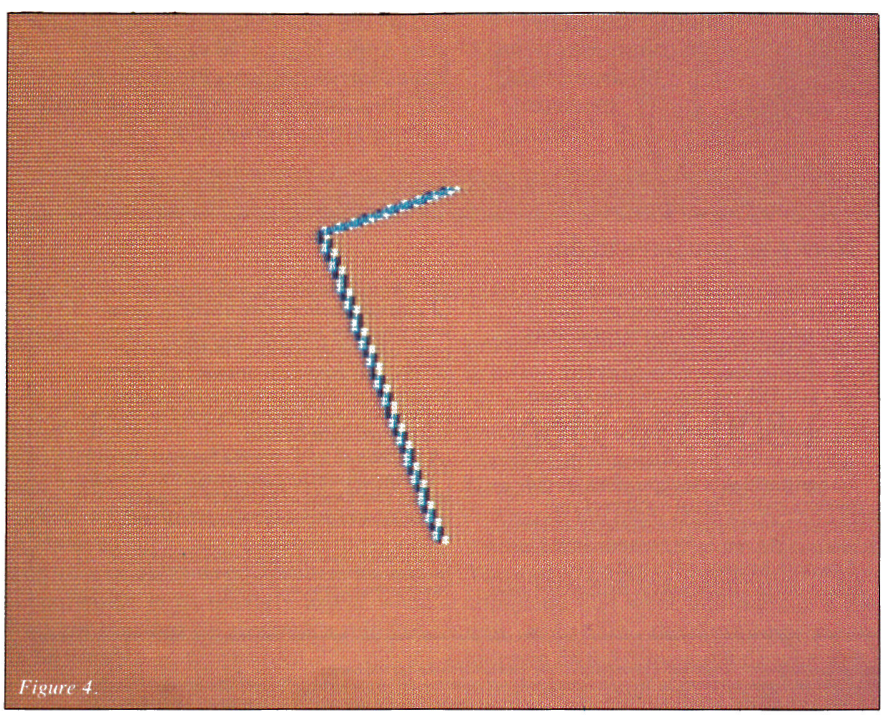


Figure 3.


Figure 4.

If you place the cursor within the target area, a single keystroke command can fill the shape with the desired color.

shape *(note: command on screen should be one line only)*. Translated into English, this command tells the program, "place the cursor origin near the center of the screen, using Cartesian coordinates. Next, repeat the following procedure six times, turning 60° after each one (create six squares): do the following routine four times: (create a square) move 100 units forward and then turn 90°."

Procedures

The *PILOT* language also allows the construction of new commands called subroutines or procedures. Once you've defined them, you can use these commands over and over again. Certain procedures create shapes that you can position anywhere on the screen, and you can join these procedures together like building blocks to build or design more complex images.

For example, we could define our square as a procedure:

```
*Square
g:*4(d100;s90)
e:
```

We can then use this procedure in the

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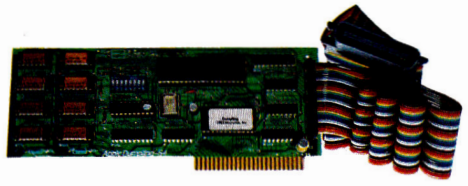
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CIRCLE 151 ON READER SERVICE CARD

construction of other procedures to create more complex geometric shapes.

One of the most salient features of the PILOT language is its ability to integrate and manipulate text within a graphic display.

The following hypothetical procedure puts a triangular shape on top of our square in order to create a house shape: `*HouseSquareTriangleE:`

One of the most salient features of the *PILOT* language is its ability to integrate and manipulate text within a graphic display. *PILOT* gives you, for example, a view-port function, which creates a window where you can display and scroll text. The size of the view port can vary from the entire screen to as small as one character across.

PILOT gives you both a text and graphics cursor for the purpose of displaying text. Thus, while the view port is scrolling a message—which you control by using the text cursor commands—your graphics cursor allows you to simultaneously project text on top of your images elsewhere on the screen.

With *PILOT*, you also have 17 different commands for text manipulation, material, to testing routines, or on to entirely new lessons. Wrong answers, on the other hand, may prompt repetition, review, or tutorial sections.

A program section illustrating a few common instructions is shown above.

Both *PILOT* and *SuperPILOT* are major extensions of the original Common *PILOT* by Dr. John Starkweather. Both include graphics capabilities, a separate Author mode, editing of inputs, and extensions to control audiovisual equipment.

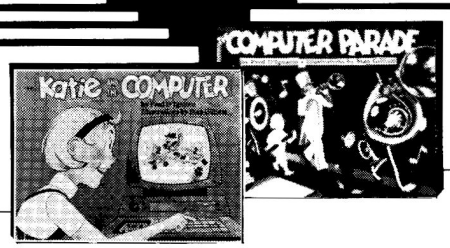
SuperPILOT, the newer version, includes several additions and improvements to PILOT, principally being turtle graphics and an Immediate mode. The Immediate mode tells *PILOT* to execute individual commands as you type them in. Turtle graphics, a feature commonly in *Logo* languages, provides programmers with relative-movement commands (as an adjunct to Cartesian-coordinate graphic-cursor movement).

BOX 1 A QUICK INTRODUCTION TO PILOT

Interactive-lesson capability is the key to *PILOT*'s power as a teaching tool. The typical *PILOT* lesson program relies heavily on student input to determine the direction it takes. Right answers can move a student quickly to more difficult

PILOT PROGRAM	EXPLANATION
`*Family`	(Label for this section.)
`T: Do you have any sisters or brothers?`	(Display this text.)
`A:`	(Accept the student response.)
`M: NO`	(Was "no" in the answer ?)
`JY: Pets`	(If so, skip to next section)
`*Oldest`	(Label this point.)
`T: Are you the oldest one?`	(Display this text.)
`A: $o$`	(Accept answer, store in $o.)
`M: YES! YEAH! YUP`	(Check for any of these answers.)
`JY: Pets`	(If found, go on to next section.)
`M: NO`	(Was "no" in the answer?)
`JY: Pets`	(If so, skip to next section.)
`T: I don't understand: $o$`	(Answer wasn't yes nor no. Display text and the answer given.)
`J: Oldest`	(Jump back to the label Oldest.)
`*Pets`	(Section labeled Pets.)
`GX: Pets`	(Display pets graphic made with graphics editor.)
`Rest of program`	

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such as character size, character styles, modes of use, line spacing, foreground colors, and so on. The program-generated graphics allows even more elaborate color choice and display than does the graphics editor.

Font Editing and Animation

Another graphics feature of the *PILOT* language is character or font editing. This feature allows you to design customized characters for foreign languages, or small shapes and figures. You can make characters and specially designed shapes move in animation sequence.

You also have 17 different commands for text manipulation, such as character size, character styles, modes of use, line spacing, foreground colors.

Here's how you do it. The font editor displays an oversize blowup of text character cells, which permits you to edit and manipulate the individual screen dots that form a cell. In this manner, you can create a large customized shape or character that, upon leaving the font editor, will be displayed in normal-character size. These custom forms will remain in an alternative-character-set file until you need them for, say, animation.

Suppose we had created a tiny beelike figure and stored it in an alternative character set called "animals":

```
tx:animals
```
(calls up the alternative set in which our figure is represented on the keyboard by the letter B)

```
ts:*30(aB;dl5;wr)
```
(tells the program to repeat 30 times: flash the bee on the screen `[aB]` then pause 15/60 second `[dl5]`, then walk right `[wr]` one position)

The result is that we see a bee zing across the screen (see figure 4).

The Walk command between the animate commands creates the animation effect. The Animate command rapidly displays an image; the Walk command moves the text cursor to a new position, where the next image will appear; and the Delay command causes a pause

between one image and the next, giving you control over the movement of the figure.

You can create and animate larger and more complex figures simply by designing single character cells to be a jigsaw-like piece of a larger image. By using simple *PILOT* commands, you are able to figuratively glue these pieces together to display or animate the larger figure. A moving stick figure of a man would be a typical application of this process.

No More Dull Lessons

You can see, even after this short look at Apple *PILOT*, that this program lets you make your lessons a virtual three-ring circus of graphics and special effects.

For example, on the same screen you can be displaying a background picture that you created in the graphics editor and then had the program call onto the screen. On top of that, you can be drawing a complex TG graphic (programmed in *PILOT*).

In the middle of all this you can have double-size multicolored text scrolling within your view port. At the bottom an animated figure can be popping across the screen, and in addition to all this, text can appear over the graphics images.

When you get the graphics down, you can also add sound—*PILOT* has a sound editor as well. If you have the right equipment, a set of commands lets you control videotape or videodisc players. *PILOT* also includes log file to enable you to see how well students do with the lessons (and how well the lesson does with the students), special input editing commands, and numerous other more specialized features for experts.

As it moves, the turtle can drag a pen across the screen that marks any color you specify, or it can raise the pen and leave no trail.

If you have the imagination and the willingness to learn to use them, *PILOT* and *SuperPILOT* have the features you need to make sure your computer-based lessons never turn out to be dull. ✚

PILOT *(published by Apple Computer) comes in two versions,* PILOT *and* SuperPILOT. *The list price of* PILOT *is $150;* SuperPILOT *is $200. Many Apple dealers stock* SuperPILOT, *and most will order it for you if they don't.*

PILOT *requires a minimum system configuration of an Apple II or II+ with 48K RAM, an Apple II language card, two Apple II disk drives, and a TV or monitor.*

BOX 2 PILOT AND LOGO

Although *PILOT* and *Logo* are both closely associated with educational uses and now both usually include turtle graphics, they are really quite different.

PILOT is a lesson-presentation language, a way of assisting an author in teaching a student. Although the responses can alter the flow of the lesson, the essential control remains with the lesson author.

PILOT is also more word-oriented. Despite the addition of extensive graphics features in versions such as Apple *SuperPILOT*, the core of the *PILOT* language was originally text presentation and text response. So the language includes many features for working with text, even as graphic presentation, pointer inputs, and other visual features have been added.

Logo, on the other hand, is at its best as a method for free exploration of concepts in computers, math, and logic. Turtle graphics give users an immediate sense of what their programs can do. The language does also include list and text facilities.

Both languages were written so people without programming experience could easily learn to write their own software, but *Logo* was specifically written so children, even young children, could quickly learn to use it.

The other principal difference is that *Logo*, unlike *PILOT*, is meant to be extensible. Starting with the initially defined "primitives," you can define more and more powerful procedures in *Logo* and then use them as if they were built-in parts of the language. In contrast to *Logo*, *PILOT* does not have a true recursive programming ability, nor does it have the extensive procedural and structured programming capability of *Logo*.

Many versions of both *PILOT* and *Logo* are available for various computers, including the Apple II family. Although this article made use of the Apple Computer version, it was not meant as a comparison with other versions.



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▸EDUCATION / BY ELLEN THRO

YOU, YOUR KID, AND YOUR APPLE

Getting in touch with how your kids are using computers.

Quiz for Apple-owning parent

1. *Computer uses will teach my child to be*
   - *A. More creative*
   - *B. More logical*
   - *C. A better student*
   - *D. Better prepared for life in the 21st century*
2. *My child should learn*
   - *A. BASIC*
   - *B. Word processing*
   - *C. Logo*
   - *D. Computer literacy*
3. *Games*
   - *A. Develop hand-eye coordination*
   - *B. Turn the brain to mush*
   - *C. Teach strategic thinking*
   - *D. Teach my child to hang out at the arcade*
4. *Instead of sitting at a computer, my child should better be*
   - *A. Straightening the bedroom*
   - *B. Practicing the piano*
   - *C. Playing out in the fresh air*
   - *D. Reading a book*

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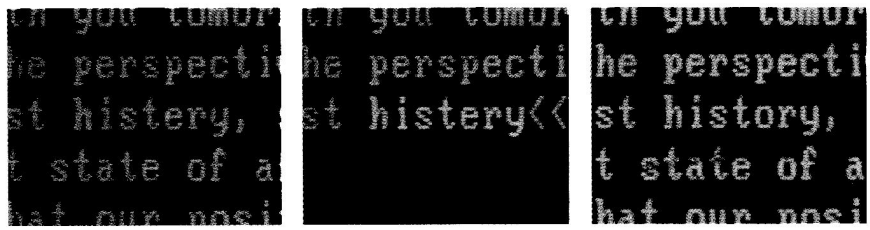
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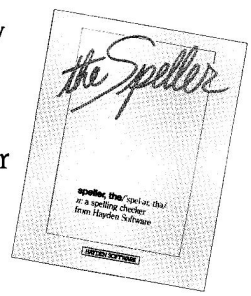
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they try to answer this question. Are you one of them? Join the crowd!

For instance, would you be surprised to learn that all of the answers to the preceding quiz are correct—at least in part? Computer use needn't be incompatible with soccer, reading, or even doing chores around the house. And it can foster constructive as well as undesirable behavior. With teenagers, the choice of whether and how to use a computer is usually theirs. For children below the age of 12 the parents' role is vital. Here are ten practical steps to help you plan and carry out an enjoyable introduction to the computer for your under-12-year-old right at home.

Step 1. Find Out the State of Computer Education in Your Child's School.

You may like what you see and want to tie your home efforts into it. Or you may want to strike out on your own.

What's going on in grade and junior high schools right now? If your local school doesn't have one or more computers yet, it probably will soon. The school-to-computer connection that began in high schools is trickling down. But this is upsetting the educational community.

The whole idea of computers in children's education makes some educators nervous because the flow of expertise confounds their experience. Normally, educators are innovators, but most agree that the impetus for school computer curriculums comes from parental pressure on school boards. "The kids know more than the teachers, and the teachers know more than the administrators," as one administrator, himself recently enlightened, put it.

As a result, teachers are flocking to classes themselves to learn about computers. Because of the speed with which personal computers have come onto the educational scene, some teachers fear their roles in the classroom will be undermined. They often prefer to integrate the computer into the traditional setting and curriculum by using Computer-Assisted Instruction (CAI). CAI software features drill and practice in specific subjects such as reading, math, and geography.

Other educators believe computers offer a revolution in thought, education, and the teacher-pupil relationship. They welcome the transformation from teacher into more of a facilitator and less of a manager, as one teacher puts it, using computerized, individual programs based on each student's needs.

This same pattern shows up in computer camps. So if you're considering one of these camps for your child, look at the curriculum and talk to the operators, to find out if it fits into your educational philosophy.

Step 2. Make a Working Definition of Computer Literacy

Your child's adult world, the twenty-first century, is 17 years away. It will almost certainly be oriented to nonmanufacturing and information jobs. According to educational consultant Dr. Nolan Estes, 20 years ago one-quarter of the work force was employed in the information industry. In 1983 the figure has risen to 50 percent. When today's kindergartners graduate from high school, the figure will be 74 percent. The reason for this is the computer. Some observers compare the advent of personal computers to the invention of the printing press, or even to the invention of the alphabet, in the way it is revolutionizing access to information.

As one of the five percent of US households with personal computers, you and your family already have one foot in the twenty-first century. The problem: How to take your twentieth century educational and computer experiences and use them to help your children prepare for their adult world. The shorthand phrase for all of this is "computer literacy."

Being in favor of computer literacy these days is virtually compulsory for everyone—educators, politicians, tycoons. Finding out what is meant by the phrase is something else again. Does it mean knowing how to program in a high-level language? Machine language? Does it mean knowing how to select and use applications software? Or knowing about the computer's uses and role in our present and future lives? Or all of the above?

How about a definition for children? "Using a computer to get information that you need and feeling comfortable in doing so," is the way one San Diego educator put it. Another one thinks that a child should learn to use a computer well enough so that it becomes like a pencil. It is a tool for getting work done.

Your definition of computer literacy may depend on how you use your Apple. According to one recent survey, the three main uses of home computers are applications—games, business, and education, with games leading the list. Household management and word processing follow.

Should your child learn to program in order to be computer literate? If so, in

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We were astounded! When we offered Money Street with a money back guarantee, we figured about 10% would be returned. That's normal.

But our returns run less than one percent! What's more, customers write enthusiastic letters daily about Money Street. For example:

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- Chris Bayha, Portland, OR: "I use it for my rental properties and for my business. It performs beautifully and is a great value."
- Dan Thomas, Elgin, IL: "The program has proved the hype of the Money Street as really too modest. How many programs are there that you can't think of one thing you would do differently?"

One reason for this enthusiasm is that Money Street lets customers do their own books. Keeping records has always been a bother, and an expensive one, especially for small one-person business or the independent professional. But Money Street solves the problem. Here's what Weston Cotten of Highlands, Texas says:

"I am an attorney with several business interests I run out of my office. I use nothing more complex than my checkbook to keep my financial records in shape for tax time. Your program has helped me to be a better record keeper and has allowed me to look forward to tax time with a better outlook."

$99 For a checkbook program? Money Street isn't cheap, in fact it's one of the more costly checkbook programs. But with software, as with everything else, you get what you pay for:

- Money Street is fast! Example: 9 seconds from boot to data entry. Example: 5 seconds from the main menu to any sub-section. Example: 18 seconds start-up-to print time.
- Money Street is easy to use! There are no complex set-ups; no monthly cut off. Gary Rominger of Sacramento, CA wrote: "Your claim of 30 minutes to learn it is fully justified."
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Saves money eight ways:

1. Finds tax deductions and credits.
2. Saves CPA write-up fees.
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4. Saves accounting time; provides input for journals, ledgers, and reports. The program also doubles as a mini-accounts receivable, inventory keeper, and job cost system.
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8. Changes your financial attitudes; puts you in control.

Who can use it? Anyone using a checkbook: Lawyers, investors, doctors, general partners, professionals, small business, mini-corporations. It's ideal for people with multiple sources of income, trustee accounts, pension and profit sharing plans, and owners of real estate.

Take farmers, for example: they can treat each crop or herd as a separate profit center. Stan Vasa of Lincoln, NE, says: "I use Money Street to keep my farm records and find the program to be excellent."

Why not get the best? Sure, you can buy a cheap program just as you can buy a cheap clock. But is it really worth it?

Many customers report that "home accounting" programs are difficult to learn, clumsy to use, and obsessed with budgeting; that only Money Street gives the speed, the ease of use, and the many reports needed.

Bill Sampler, Fairfax Station, VA puts it this way: "One way I judge a program's worth is how easy it is to use after you have been away from it for a couple of weeks. Money Street is no problem, it runs like a fine jeweled watch."

So, Money Street pleases customers just as a Porsche pleases drivers. Top quality costs more; that's a fact of life. But isn't quality always worth it?

One of our customers, Buzz Buggerman of Orlando, FL said: "We use Money Street in our law office. We figure it's not the cost of the program that's important, but how much time it takes to set it up, learn it, and run it. Money Street's a breeze."

How it works. On your computer screen, you create a facsimile of your checkbook. You see 17 items per screen, and can scroll for more. As the computer balances your checking account, you give each check or deposit its own category code.



PROGRAM FEATURES

● 100 user-defined accounts ● On screen chart of accounts ● Account sub totals, grand totals ● Handles unlimited checking accounts ● Three minute year-end rollover ● Credit card accounting ● Full editing, even after entry ● Check search and scan screen ● Help screen ● Wildcard searches

PROGRAM LIMITS

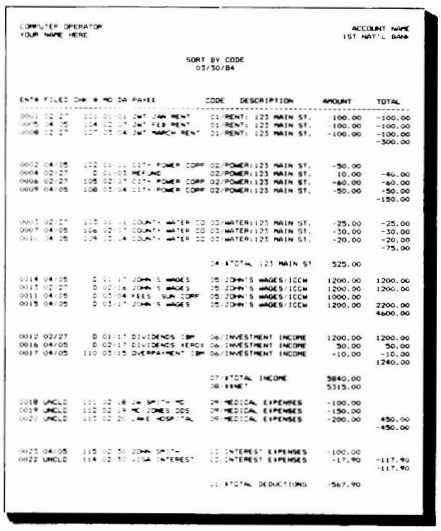
● 2400 checks per data disk ● 200 uncleared items ● Scan speed: 6 per second ● Amount limit: $999,999.99 ● 100 account categories

DOES MANY JOBS

● Finds tax deductions ● Single entry accounting ● Job costing ● Budgets and estimates ● Mini accounts receivable ● Mini inventory ● Tracks personal loans ● Real estate rentals ● Stock purchases/sales ● Increases "float"

CHECKING ACCOUNT MANAGER

● Prints trial reconciliation ● Balances checkbook and statement ● Creates cancelled check file ● Prints detailed audit trail ● Includes check register ● Prints checkbook "history" ● Captures monthly income ● Easy to use



15 Ready-to-print reports! Press four keys and the program will print any of 15 different reports. Just select from the Report Menu, and the program does the rest. Start-up to print time is usually 20 seconds. Reports include:

● Monthly code totals ● To-date code totals ● Sort by amount ● List code dictionary ● Sort by payee ● List deposits ● List uncleared checks ● List uncleared deposits ● List all entries ● Sort by date cleared ● Print check registry ● Print selected month ● Print selected code ● List code totals ● List monthly totals

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The program is copy protected. We sell back-up disks for $10. We also offer a special utility disk that makes two back-up copies, makes quick copies of data disks, and allows fast sorts of selected months or code categories. Price is $25.

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Dealers: Write or call for price list.

CIRCLE 177 ON READER SERVICE CARD

what language and at what age?

One view is that most computer-related uses and jobs will not require knowledge of a computer language. Software and hardware will be applications-oriented, and few people will be involved in actual programming.

Many educators believe programming develops logic and creative thinking. But as professor Sally Pickert of Catholic University of America warns, knowing how to program won't necessarily make your child smarter or better at solving problems. In classrooms, about 80% of the children take readily to computer languages, and two are widely taught—BASIC and Logo.

Logo grew out of artificial intelligence research, and its structure makes it equally usable for graphics and abstract problems. Graphic shapes are created with a triangular "turtle" whose long point has direction. For young children, Logo's outstanding feature is recursion—its ability to use previously-defined terms in programs. Logo may be taught to preschoolers since the user needs only a few words or keystrokes to "tell the turtle to draw a picture." This approach puts the child in command of the computer immediately—a nice feeling at any age.

If your child has a physical disability, many specialized adaptations are available or easily constructed.

A less expensive way to start a young child on the same path is with a programmable toy robot such as Big Trak from Milton Bradley Company. A pen tied to it will draw designs on a sheet of paper as the toy moves along its programmed route.

The other popular choice is the best-known language for home computers, BASIC. BASIC is old-fashioned in many ways because it was written when computers were long on people, but short on RAM. And changes in one part of the program usually entail changes throughout. But a lot of materials are available for teaching it and many schools offer it, usually beginning about the fourth grade.

Step 3. Start Your Plan Now, Even if Your Child Is a Pre-Kindergartner.

When should you start your child out with the computer? One Boston-area Apple owner, the mother of three children under the age of ten, thought six or seven was a good age to start for her oldest.

Then she noticed something. One day the four-year-old got out some colored construction paper, scissors, and tape and began snipping away. What was he making? "A disk drive," he announced. Sure enough, a paper disk drive, complete with "on" light, soon graced the computer room.

Depending on your young child's interest, you can start describing what the computer does by using software that requires only one or two keys, a joystick, or turtle graphics. This plan is suitable for any under-fourth graders. You can add more keyboard activities as they learn to read. In the fourth grade children can learn BASIC and—something that may surprise you—word processing. Many teachers have found that word processing is ideal for an introduction to the computer because it presents immediate results without requiring much technical aptitude.

If your child has a physical disability, many specialized adaptations are available or easily constructed to make the computer usable and helpful. Contact your local special education center for leads, or write to Apple Computer Inc., 20525 Mariani Ave., Cupertino, CA 95014 for resource material on the subject.

Step 4. Be Aware of Your Own Motivations in Wanting Your Child to Learn about the Computer.

Here are some reasons why parents want their children to learn about computers. One or more of them may be yours, and you may have others, as well:

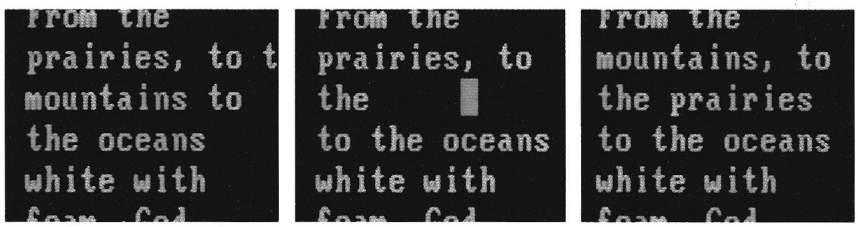
- For supplemental education;
- To promote togetherness;
- To encourage creativity;
- For drill and practice in specific subjects;
- To increase a child's freedom and ability to communicate.

You must decide how much interaction you and your child can take. Some youngsters need lots of nurturing, while others do best with some cheering from the sidelines or afterwards.

Step 5. Set Goals

Set some goals for the child, but don't engrave them in granite. You should decide how much like school you want the home computer experience to be. At one west coast computer camp, the kids sat at Apples learning BASIC out of a

FOR JUST $60 YOU CAN MOVE MOUNTAINS.



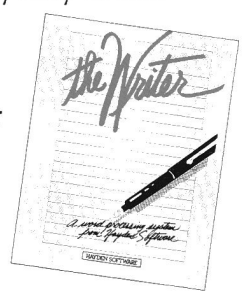
With The Writer from Hayden Software, you can move "mountains", "prairies", sentences – or even entire paragraphs with ease.

Based on the powerful PIE:Writer, The Writer gives you all the word processing features you would expect in software costing hundreds more. And its simple format makes it very easy to use.

So when you're ready to move up to real word processing for very little money, The Writer* from Hayden is the only way to go.

For more information, see your local retailer, or call 1-800-343-1218 (In MA 617-937-0200). Hayden Software, 600 Suffolk St, Lowell, MA 01853.

*Runs on the Apple II, II+, IIe, the IBM PC and compatibles.



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Some Very Good Reasons to Buy an Echo Speech Synthesizer.

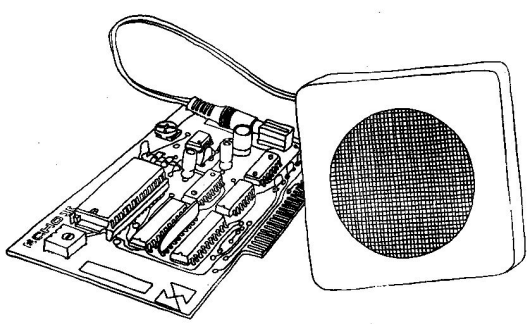
We're confident we have the most intelligible, versatile, and economical speech synthesizer on the market. Once you hear it, we're sure you'll be convinced too. All ECHOs are capable of speaking in four different voice modes which range from a robotic machine voice to natural female speech. (The fixed speech and custom modes are optional.)

It's Easy To Use

Unlike other speech systems, the ECHOs are very simple to use. It only takes a minute or two to get the ECHO talking. Any text which can be printed to the screen can be spoken. If you've written a BASIC program you can add speech with simple modifications.

Software Compatibility

Not only can you add speech to the programs you write yourself, over 25 top educational and adventure software manufacturers are currently designing programs to be compatible with the ECHO II. Be watching for details.



Value

Each ECHO comes ready to use with a speaker and tutorial-style manual. The ECHO II, priced at $149.95, also comes with a variety of demonstration and utility programs. The new ECHO GP (General Purpose), priced at $199.95 is a stand-alone unit with its own on-board microprocessor; it will interface with any computer through the serial port. All ECHOs have a one year warranty.

Bells And Whistles

If you want bells, whistles, music and sound effects, plus state-of-the-art sprite graphics capabilities, the ECHO technology is available on Synetix Systems' new Supersprite Board.

Check It Out

Most Apple dealers have the ECHO II available for demonstration as part of Street Electronics/ Orange Micro's unique Grappler+™, Bufferboard™, ECHO II™ Talking Demonstration.

Street Electronics Corporation
1140 Mark Avenue Carpinteria, CA 93013
Telephone (805) 684-4593

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CIRCLE 166 ON READER SERVICE CARD

workbook. A few seemed genuinely engaged by what they were doing, but the general consensus was: "Yuk! This is just like school!" These campers probably liked school. But for vacation, they wanted something else.

Keep the goals short and realistic. Some examples:

- Understand the BASIC instructions LET, INPUT, GOTO;
- Complete one drill program by the end of a week;
- If you learn to use the word processor, you may be able to finish your report **and** go on the Scout weekend next month.

Don't say, "learn BASIC," or "improve your math skills," or "finish learning this material in time to do better on your next reading test."

What can you expect to see in a computer-literate child?

Many teachers who are savvy about computers and experienced in using them with children report a noticable change in the way children think and behave. For example, Robert Engberg, a junior high school teacher in San Diego, notes an increase in the ability to handle independent projects and in self-confidence. Granted, some of this may be due to the personal attention and the newness of computers in the classroom. But the nonlinear nature of the computer experience makes it an open environment for creative thinking.

But the non-linear nature of the computer experience makes it an open environment for creative thinking.

Step 6. Turn Your Computing Environment into Your Child's Computer Learning Environment.

Your Apple is probably in a place that's comfortable and convenient for you. Will it be as comfortable and convenient for your child? Try out the desk height and the chair's height and comfort. Is the monitor too far above eye level? Would the whole set-up be better off on the floor? It is a movable computer, after all. And is it shielded from distractions, but within your attention range so you can give support and help, or do some unobtrusive observing?

You might want to take a few hints from classroom teachers:

- Provide explicit operating instructions. You and your child should agree on a set of rules. Perhaps the two of you can make a poster listing them, to be displayed when the child uses the computer;
- Once you and the child set the goals, you might make some progress cards or set up a progress report. The two of you should agree on when a stated goal has been achieved or if one should be revised or scrapped. Don't make it like a school report card.

Step 7. Integrate Games into Your Plan

Is there life after the maze? Games arouse wrath in some people and predictions of the downfall of civilization in others. Too many hours racked up in front of the screen chasing improbable characters through a maze or zapping equally improbable aliens can cause blurry eyes, hand fatigue, and antisocial behavior. Yet game playing is really more complex than some might think. Scholars study it and they find that skill at games fosters:

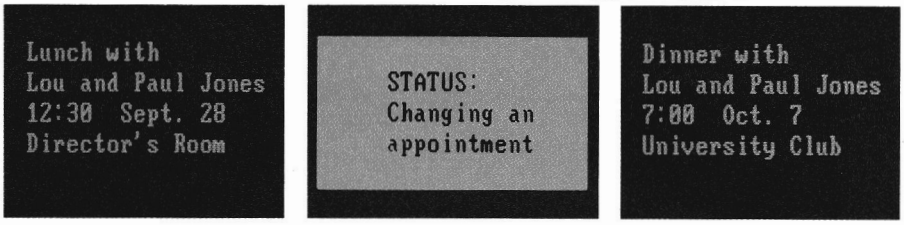
- Hand-eye coordination;
- Learning to select among possible choices or devise strategies;
- Accomplishing a goal, whether playing the fastest game, achieving the highest score, reaching the next or highest level, or making the fewest poor selection of choices;
- Role playing—imagination, behaving as a different person would, with perhaps different goals; this could lead to a better performance due to lack of inhibitions;
- Social values—the player learns something about himself—making choices between violence and reason, or between winner-take-all and compromise.

Analyzing games is important because good educational software has a big game factor, and your child's preference in games is a clue to the type of educational software she or he may relate to best. Types of games include the fast action games such as the mazes and zap-the-aliens; escape from the room and find the treasure; dodge-the-danger; find the culprit and solve the mystery; and rescue the victim. You may be relieved to know that the latest surveys indicate that nonviolent games are taking over the best seller list.

Step 8. Select Software that Fits into Your Plan.

There's more bad than good software available. One survey found that perhaps

FOR JUST $50 YOU CAN KEEP UP WITH THE JONESES.



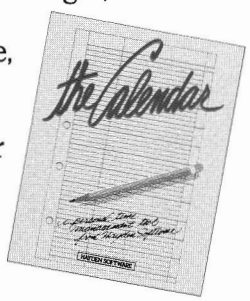
With The Calendar from Hayden Software, you'll not only keep up with the Joneses, chances are, you'll be there ahead of them.

The Calendar's multi-window design makes it easy to keep track of all your business appointments, make schedule changes, and plan ahead.

And when you check out The Calendar's* price, you'll also find that keeping up with the Joneses has never been easier.

For more information, see your local retailer, or call 1-800-343-1218 (In MA 617-937-0200). Hayden Software, 600 Suffolk St, Lowell, MA 01853.

*Runs on the Apple II, II+, IIe, the IBM PC and compatibles.



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Educational News

Orange Plus Educational News located at 23801 Calabasas Road / Suite 2050 / Calabasas, CA 91302 / (213) 999-5210

Legal Apple^Type Compatible

New Computer runs CP/M & Apple^Type Software



CALABASAS - Now instructors can teach Apple-type programs such as LOGO in one class and professional-style word processing in another without any hardware changes. Dual microprocessors (Z80-A & 6502, two computers in one case), with the radical new Orange Plus development, the "EuroROM", allows the machine to read/write/work with Apple-type software as well as CP/M programs and access either CPU via the keyboard.

The ***"ORANGE+TWO"***™ is a brand new direction in the evolution of the personal computer. ORANGEFORTH-83, a derivative of Fig-FORTH — a readily available public domain language, is resident in ROM*. Also included is CP/M 3.0, Digital Research's latest CP/M version. There is also a built-in disk drive controller for two Apple-type drives, a cassette interface, joystick port, color graphics and ASCII keyboard with numeric keypad. For expert word processing, the keyboard features upper and lower case (lower case characters are true descenders) with auto repeat.

This new breed of computer is a break-through for educators and school systems throughout the world. The ability to run both Apple-type and CP/M software on the same machine relieves financially-pressed educators from expensive equipment burdens, allowing them to spend more money where it counts... **on the teachers.**

*Available on disk at extra cost.

Orange Plus Koala Pad

With the touch of your finger, the Orange Plus Koala Pad (Touch Tablet with Micro Illustrator) takes control of your computer to create beautiful, high-resolution computer graphics. Finally, a full-featured graphics tablet at an affordable price.

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Built-in CP/M 2.2	n/c
Digital Research's CP/M 3.0	n/c
Built-in disk drive controller card for two Apple-type drives	n/c
Numeric keypad with separate return key	n/c
110/220 volt switch selectable power supply, 50-60 Hz	n/c
Full function ASCII keyboard with auto repeat	n/c
Cassette Interface	n/c
Grounded metal base plate	n/c
Adjustable audio volume	n/c
ORANGEFORTH-83, Z80-A FORTH language, resident in ROM	n/c
Z80-A CPU, a 2nd computer	n/c
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TOTAL *"ORANGE+TWO"*™	**$1295.00**

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Controller & Interface for Hard Disk**
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**Includes everything necessary to be installed in "ORANGE+TWO", Apple or Franklin Computer

The above are suggested retail prices. Prices may vary from state to state.

CIRCLE 160 ON READER SERVICE CARD

one educational program out of ten could be classified as excellent. But this is changing rapidly, and more and more software is available that combines creativity with real learning. Children's software comes in entertainment games, CAI, educational games that use various entertainment game formats to teach a subject or skill, creativity software for drawing or assembling designs, logic software, and simulations. Unfortunately, simulations, which offer participation in drawn-from-life situations, are mainly for high school students. But

This is changing rapidly, and more and more software is available that combines creativity with real learning.

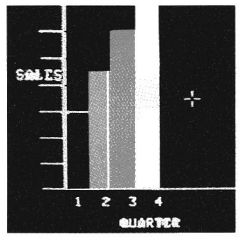
your junior high school student may be ready for some of them.

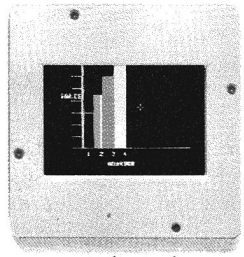
Selecting software can be like selecting a book. Some you use just once, while others you return to over and over. Good software should grow with the child, at least over a period of time. Always preview software before you buy it. Here are some questions to ask yourself as you do:

- Software for children must have graphics. But make sure graphics aren't there just for movement or to take up space. They should do something to move the action forward. Evaluate the action and movement. Is it action for action's sake?
- What is its stated purpose? Does it achieve it?
- How interactive is it? Is the user an active participant or a button pusher?
- Does it further your overall goals? Where does it lead?
- How long will it hold your child's interest? Is it mediocre or does it capture his or her imagination?
- Will it grow with your child's skill?
- Does it offer positive feedback?
- What is its violence level? Is it all "search and destroy," or does it offer other types of interaction?
- What is the program's attitude toward the child user—Encouraging? Patronizing? Authoritarian? Does it turn errors into positive experiences?
- How much does it take advantage of

FOR JUST $100 YOU CAN PRODUCE YOUR OWN SHOW.







The Producer from Hayden Software lets you produce low-cost, professional business presentations.

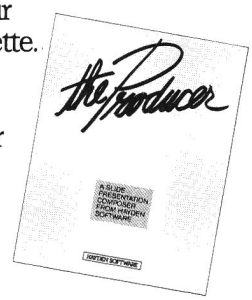
An extensive graphics capability means you can transform boring data into compelling charts and pictures. A rainbow of colors, multiple type faces and letter sizes are at your fingertips.

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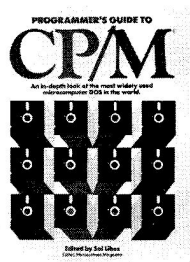
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the computer's abilities? Could it just as well be a book, a board game, or a set of cards?

Keep a record of the software your child uses best and begin selecting software together.

Step 9. As the Child's Knowledge and Skill Grow, Encourage Responsibility for His or Her Own Computing Experience.

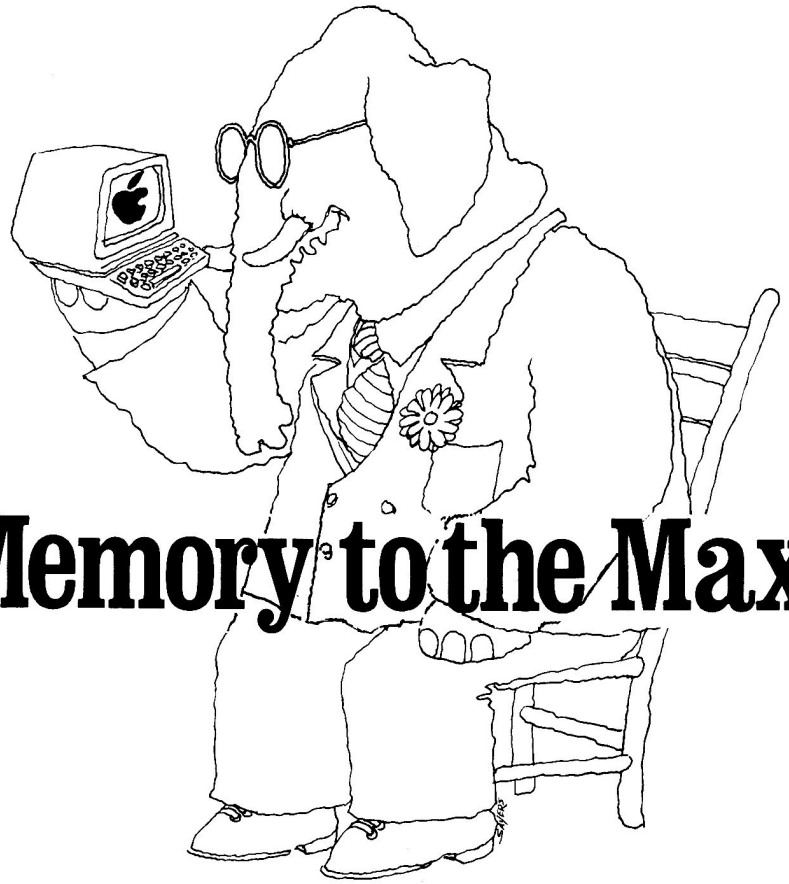
Computer use involves social issues as well as personal preference. Think these through yourself and have occasional discussions about them with your child:

- If this is the age of the computer, it also seems to be the age of software piracy. Software is expensive. And many people—you, perhaps—trade programs for personal use. How much of this trading is acceptable? Where do you draw the line?
- The headline reads "Computer Whiz Erases Others' Work." An electronic file is like a metal file cabinet: it may contain private information. Ask your child to respect your files, as you do other personal papers. And you should be willing to respect your child's files, also, as you would a diary or other childhood secrets. A good foundation this way will help when your child runs into the moral shades of gray out there in the real computer world.
- Is your daughter pulling back from computer use? The prevalence of male-oriented games and the link in some schools between computers and math may create computer anxiety in some girls. Search out female role models and gender-free software. Many teachers have found that motivated girls are more creative programmers than most boys are.

Step 10. Keep It Fun

Don't get so carried away with computer literacy that you forget about the computer as entertainment. By all means integrate the computer into other aspects of life. And have your child use it socially with friends. Don't be too protective of the computer. I know, it cost a bundle. But even preschoolers can learn to put a disk into the drive properly. And a few grape jelly-smeared keys or drops of Kool-Aid on a disk won't spell disaster.

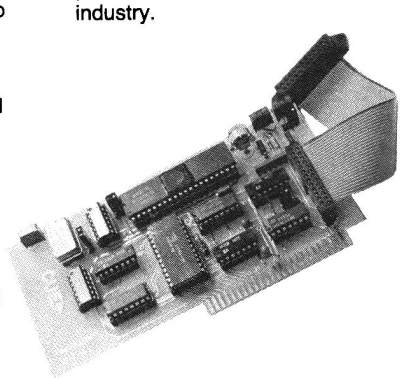
Creating a rational plan of computer education for and with your child will be a foundation for life in a computerized future. As your child progresses, don't be surprised some not-too-distant day when you hear a childish voice saying, "Now let me show you something new about the Apple." ✚



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The DiscMaster II by Data Cue expands the storage of your Apple II or Apple II compatable systems. The DiscMaster allows you to connect two 8" or two 3½" double density disk drives per controller to your computer. The drivers are supplied for DOS 3.3 and PASCAL 1.1 operating systems. Optional drives are available to read and write standard 8" CP/M, IBM P.C., DEC P.C. and SUPERBRAIN disks.

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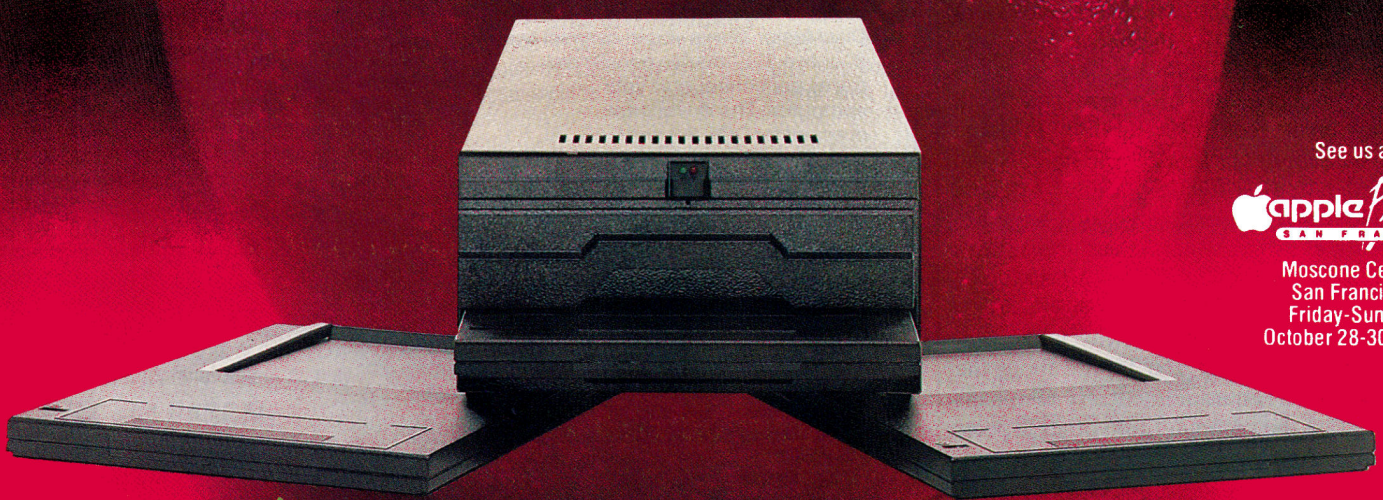
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▸HARDWARE REVIEW/BY HANK HARRISON

THE QUIET REVOLUTION

The Olivetti PR 2300 ink-jet printer ushers in a new technology at an affordable price.

Good things come in smaller and smaller packages, and the "goodest" peripheral I've seen in years is the Olivetti PR 2300, the first ink-jet printer to hit the market at under $500.

It may have escaped a lot of peoples' attention, but Olivetti makes an excellent line of daisy-wheel printers, designated ET 111, ET 121, and so on. I bought mine in Europe; with the addition of an Escon interface box, it has served me dutifully for three years.

I'm not surprised that the first commercially feasible spark-jet printer is an Olivetti, but I am surprised that nothing else like it is now on the market. On the other hand, Olivetti is known for its research and development and quality-control standards in Europe, and there is no reason why the firm shouldn't enjoy a market lead with this new printer technology.

The first time I saw a PR 2300 running, I was quite impressed, especially when I realized that the system used no ribbons, ran at about 80 characters per second with full text pages, and was almost silent.

When I called Olivetti in New York to inquire about this printer, I discovered that in North America, Olivetti is now called Docutel/Olivetti. (Docutel manufactures automated bank tellers.)

I asked Annette Colarusso, manager for consumer products, if she would provide me with an assembly-line model of the PR 2300 for review. Annette consented, with the proviso that I let her know if I found any bugs.

The printer came promptly, a few days later. Within ten minutes of its arrival, I got it running, without reading the manual—a practice I don't recommend under normal conditions, but an excellent strategy for evaluation purposes. My first criterion was met—the printer was plug-compatible with my Apple IIe.

In the ensuing days I put the PR 2300 through several bench tests and found that it ran remarkably well from any standard Centronics port with a standard parallel cable. I hooked it up to some other computers, including other Apples, and ran some *Graforth* programs; a program called *Data Plotting Software for Micros;* and PIE writer, my favorite Apple word processor. I did not have the optional serial-interface card, so I did not work with the printer in the RS-232 mode.

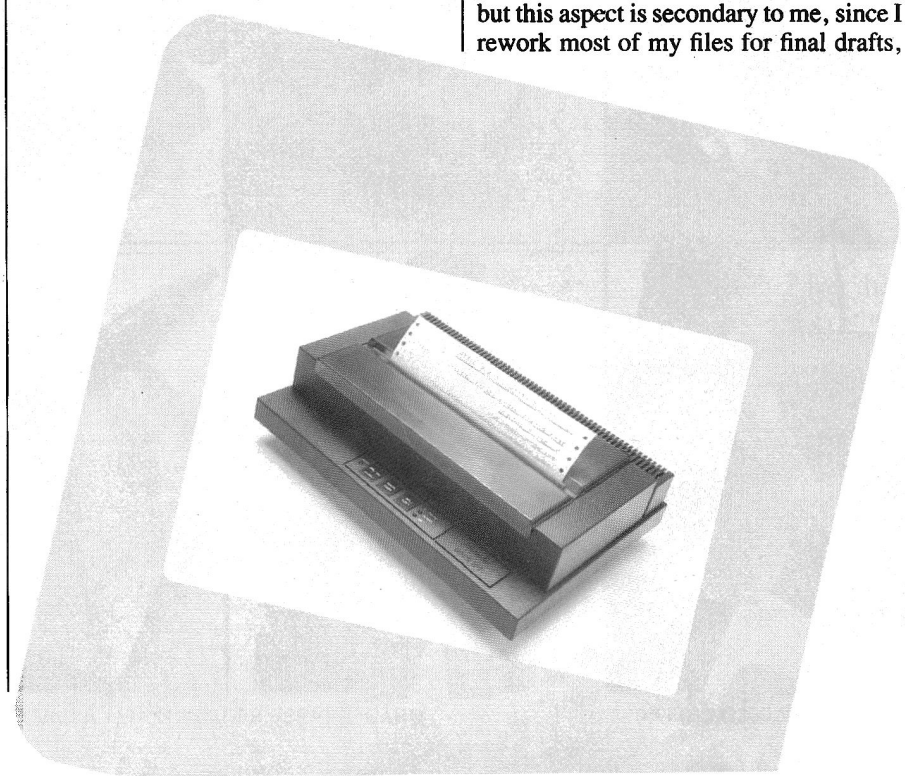
The next week Ed Riddle of Menlo Corporation, a software-development house in Silicon Valley, took the printer to work and was mobbed by other programmers who wanted to try out this new toy.

Impressed enough to buy a PR 2300 of his own, Ed hooked up the printer to a network supporting an Apple III and an IBM Personal Computer. The only problem arose when he had to make a cable for the PC. Apparently IBM's parallel port does not conform to international handshaking protocols.

As for my own needs, the PR 2300 is ideal. I have been sent on two recent assignments to Beirut and travel to Europe at least once a year. I wanted a printer that was virtually bulletproof and compatible with international electrical variations as well as with my Apple. I also needed a lightweight, portable, and silent printer. The PR 2300 meets all of these criteria.

Print and Graphics Quality

The PR 2300's print quality is good, but this aspect is secondary to me, since I rework most of my files for final drafts,



send them to a typesetter, or print them out later on a letter-quality daisy-wheel printer. I need a good, hard-working peripheral that can generate first-draft hard copy so quietly that it won't disturb a room full of drunken journalists playing poker in a war zone.

In addition to being rugged enough to drop, the PR 2300 comes with some subsystems that you won't find on most other printers at any cost. The unit's designers have aimed for optimum graphics performance. They have taken advantage of the fact that the printhead operates bidirectionally and is not bound by height or width.

Most of the graphics capabilities beyond the ASCII character set are software-driven by escape commands, as listed in the manual. The escape commands act as system calls—any competent programmer can easily exploit them.

Most word processors don't provide graphics, because daisy-wheel printers can't paint pictures in pixels, but ink-jet technology offers new flexibility because it prints pixel by pixel instead of dot by dot.

In the Graphics mode, the PR 2300 functions more fluidly than do wire-matrix printers. It can literally paint on paper anything a word-processing or graphics program can generate. For example, I experimented with a four-string graphics patch in *Graforth*. It generated a text file in which every tenth word was three times larger than normal.

Certain escape sequences give you double-height and double-width printing. This feature could prove handy for printing speeches, labels, or title pages,

It can literally paint on paper.

or in other situations in which large lettering is necessary.

I call the PR 2300's print "draft" quality. The print is good enough that you can read and edit hard copy as a backup if you lose a disk. It is excellent for in-house communications, graphics, and program printouts.

The PR 2300 makes an ideal printer for programmers, schools, and industries and is an excellent second printer for long word-processing chores for which you use a slower letter-quality printer only on the final pass.

By now you're wondering how this machine works, right?

Theory of Operation

The entire system depends on a small glass tube called a dry-ink reservoir. Dry-ink-reservoir technology is not the same as dot-matrix technology. The two are similar in final look, but the dots result from two entirely different techniques.

Dot-matrix printing, also called "wire matrix" printing, is impact printing. In typical dot-matrix technology, the printer thrusts out one of seven wires from inside a magnetized head. The wire forms a dot by striking a ribbon that is up against the paper; the ink fades with use, and you have to step up the print pressure to achieve proper blackening. Seven strikes are usually sufficient to form a matrix in the shape of an ASCII character.

As with any impact typewriter, the dot-matrix printer's impact surface is backed by a rubber platen, which wears out, as does the ribbon.

Dry-ink-reservoir technology does not require impact. Thus, the ribbon and platen are eliminated, and so are hundreds of moving parts. A lightweight glass tube the size of a common wooden match forms the spark-jet characters. The tube, which is filled with dry ink, passes through a controlled electrical

WHEN YOU'RE BAN



field until the desired character matrix is built up. This process is rapid—the PR 2300 produces lines of text as quickly as a typical impact printer can.

The Dry-Ink Tube

The ribbon and ribbon-carriage apparatus are gone altogether in the PR 2300, which saves space.

A single dry-ink reservoir carries enough inking compound to generate 150,000 characters. The compound comes in ampoules, which take the place of the ribbon; refills cost less than $2 each. A box of four, sufficient to print all but the final draft of a full novel, would fit comfortably in the palm of a hand.

One hundred of these small tubes would cost less than $150, but a supply that size would exceed the expected lifetime of the machine. One hundred replacement tubes would carry an ink reservoir sufficient to produce the *Encyclopedia Brittanica*.

The ink tubes are clean. Your fingers never get messy, as they do with ribbon printers, because the entire refill module slips in and out in a second. The dry-ink reservoir also assures character uniformity, since there is no ribbon to fade.

Ink-Low Alarm

You load each ink tube with a small spring and a metal push platform. The tiny dry-ink supply is pushed forward as it is used and triggers an alarm when the ink supply falls below a certain point.

On each pass the head travels over a tiny magnetic field. The field is actually a sensor connected to some clever circuit-interrupt logic. When the sensor perceives the metal spring or push platform, it triggers an ink-low alarm and lights a red LED labeled "Ink Low" on the front panel.

The first alarm indicates a reserve of less than 6000 characters. After the first cycle, the alarm sequence repeats for a few seconds every 1000 characters. On the sixth of these cycles, the system shuts itself down. You restart it by manipulating the mode ("Local/On Line") toggle located on the front panel. This series of alarms should be enough warning for anyone.

You can easily install a new ink reservoir, even while paper is in the feeder, and the printer operation resumes without the loss of a single character from the 1K on-board buffer.

An Inside Look at the Technology

Spark-jet technology has nothing to do with a jet of air as in an automobile-carburetor venturi. The ink jet in the PR 2300 is an electronic vortex formed on the paper surface between the glass reservoir tube and a thin blue steel strip running the full width of the paper.

The computer sends the ASCII signal, under software control, to the printer-control board, through a dual in-line package (DIP) switch that can be set for many international character sets, including Swedish, German, Japanese, Italian, French, American, and British. The printer firmware translates the incoming signal into its own pattern through a resident Z80 circuit.

The translated pattern is sent, as a series of charged impulses, down the steel strip to form an invisible line of characters (numbers, letters, punctuation marks or parts of graphics) behind the paper. The low-mass glass tube simply passes through the fields, depositing microscopic amounts of fast-drying ink on the paper surface.

A low-energy static spark or piezoelectric vortex creates the PR 2300's invisible characters. If you remember your high-school physics class, you'll recall seeing iron shavings being scattered on a piece of paper. When a magnet passed under the paper, the dynes, lines of magnetic flux, were able to penetrate the paper and align the ferrous shavings into the shape the magnet created, normally along a bipolar axis. Ink-

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jet technology uses this principle with an electromagnet, which you can shape electronically, turn off and on, and put under software control. It's that simple.

The design engineering of the PR 2300 brings a variety of tried-and-true physical and chemical principles to bear. This is not a "me too" peripheral. The paper-feed mechanism, the motor-control circuitry, and the on-board-operations switches, as well as the spark-jet system, are all innovative.

Fewer Moving Parts

Control of moving parts is an important element in any technology. The PR 2300's printhead is nothing more than a glass tube that you snap into a lightweight carrier, which is driven rapidly back and forth by a small pulse motor. A second motor, half the size of a normal stepper motor, drives the paper-feed mechanism.

In all printers, the size of the motor necessary to move the paper through the system is reduced in proportion to the strain against its gear system. In most cases a third motor throws the wire, or the hammer in the case of daisywheels. This motor must ride back and forth with the head, adding to its weight, slowing it down, and heating up the system in general.

When the size of the motor is reduced, or when a motor is eliminated altogether, heat dissipation is more even, parts don't wear out as quickly, the price can be dropped, and more features can be added.

The next step is to scale down the power supply, a step made possible by reduced demands on moving parts and servo mechanisms. Shrinking the power supply eliminates the need for extra venting space and cuts operating costs significantly.

This is not a "me-too" peripheral

The PR 2300 was obviously reverse-engineered, starting with minimum needs. Its design proves that an entire printer chassis and case can fit in a compact space without overheating. On one occasion I made the mistake of leaving the printer on all night. The next day I noticed that the "power on" light was lit. I checked the printer for signs of heat exhaustion, but it was doing just fine. I felt the back of the case, immediately under the transformer. It was warm to the touch, but there was no significant heat buildup, even though the ambient temperature was 86° F.

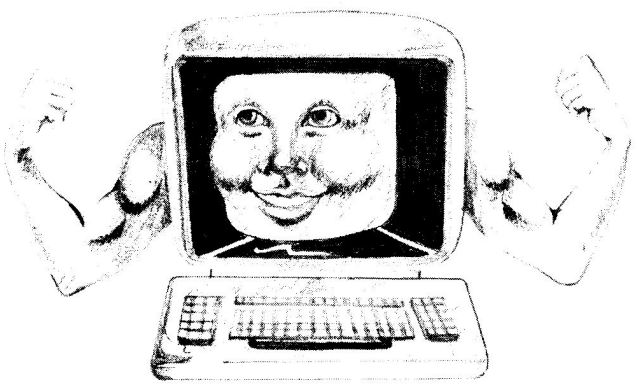
The PR 2300 DC servo motors are driven by a switching power supply. The motors are capable of handling 100, 117, 200, and 220 VAC currents and transients, which makes this printer ideal for international operation. A switch- or fuse-selectible power module would be a desirable option in future models.

Paper Handling

The PR 2300 paper-feed mechanism is integral and tucked inside the case, which is surprising, since the printer itself is only slightly wider than a standard sheet of paper. It comes with both tractor-feed (pin-feed), and pressure-feed mechanisms.

The paper-feed mechanism is cylindrical. Three soft rubber rings align and hold the paper properly as it feeds through the printer. The system comes with an outside spool mechanism for nonperforated paper, but single sheets are easy to feed, and nonperforated forms can go through without the paper-roll holder.

You can select the paper width in the Pin Feed mode by adjusting the right-



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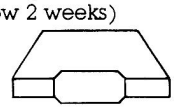
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P/S Buffer Card interfaces with most popular parallel printer cards including Apple,™ Epson,™ Grappler,™ Graphitti,™ PRT-1,™ and Tymac.™ If you don't already have a parallel card, order the P/S Buffer "Stand-Alone" Card. It includes a built-in parallel interface. An optional graphitti plug-in ROM allows you to dump the Apple hi-res graphic screens with a few simple keyboard commands.

Many applications programs and operating systems such as CP/M™ and Apple Pascal™ require that the parallel interface be in a specific slot. So, leave it there. When you wish to print parallel, or serial, or both at the same time, just "tell" P/S Buffer Card what to do. It's that easy.

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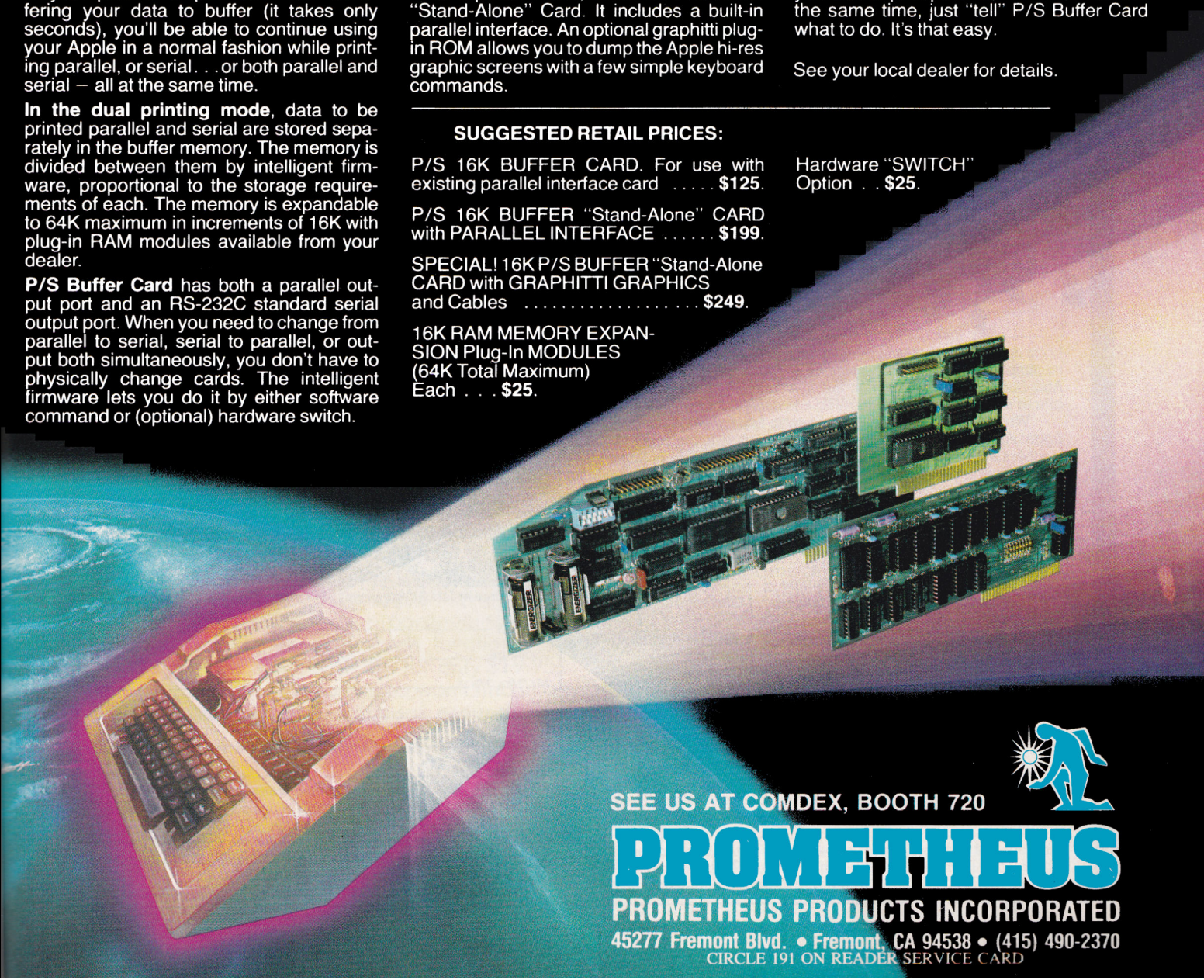
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hand pin wheel, which is part of a sliding collar. For pressure-feed operation, you simply move the collar to the extreme right. The printer can easily accommodate any pin- or pressure-fed forms narrower than nine inches wide. In all cases the forms arrive at the serrated edge built into the dust cover for easy tear-off.

The PR 2300's reference manual is a well-written booklet that includes all the information you need to get started. It is a thin, no frills affair, but it gets the job done, and the English is excellent. It contains tips for the first-time user, as well as complex material for systems designers or anyone else who prefers to gaze at schematics. The manual has plenty of photos, circuit diagrams, tables, and tutorial illustrations.

I would like to see more attention to the documentation for the PR 2300, especially in terms of special software patches and programs that can fully utilize the unharnessed potential of this machine. I have a feeling that more PR 2300 documentation, specific to various computers, CP/M systems, cable connections and hardware interfaces will be in demand in the first quarter of 1984.

Clearing up a Controversy

Any new system is bound to be controversial, and the PR 2300 is no exception. The print style in the PR 2300 has no descenders, but Olivetti has designed the system to simulate them by lowering problem letters, such as *y* and *g*, closer to the theoretical base line. Furthermore, rumor has it that optional ROMS, in many type styles that will include descenders, are on the way.

An announcement appeared recently that a "wet ink" tube was available for this ink-jet printer, but it was not true. Increasing the force field or adjusting the glass tube controls ink darkness, and these adjustments come with the current system.

Still more controversy has arisen over the definition of ink-jet technology. Some people have called the PR 2300 a "laser printer," but this label is patently ridiculous, since even a small YAG laser would cost more than the entire PR 2300.

Ink-jet laser technology, under development in various research labs since at least 1976, works on a photo-optic principle and is expensive. The spark-jet technology of the PR 2300 has nothing to do with lasers.

Conclusions

Ongoing improvements in ink chemistry, more precise control of the apparatus that positions the glass tube, and stronger "spark" fields are all in the offing, but they'll appear only if the public adopts this kind of technology over conventional systems. A wider-carriage version should be feasible for those who need data sheets.

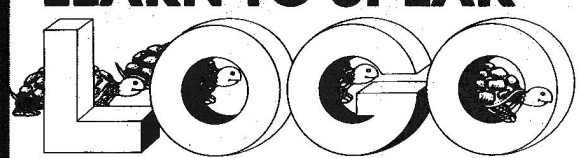
The PR 2300 is not as well known as some dot-matrix printers that cost twice as much, but it is superior to many of them.

More important, the Olivetti ink-jet printer, as I tested it—I took it down to the board level—is more durable than any commercial system I have seen at any price. In fact, the only printers I have encountered with a higher standard of construction were a Dutch daisy-wheel printer and a Diablo built for the U.S. military.

The Olivetti PR 2300, designed in Italy and manufactured in Singapore, affords a glimpse of the kind of products we can expect from Common Market countries in the future.

Ink-jet print technology is a spark of the future. The quietness of the system is catchy, and the printer now has a cult following. It's creating a quiet revolution of sorts. In fact, the whole design concept is so simple and inexpensive that you'll wish you had thought of it yourself. ✚

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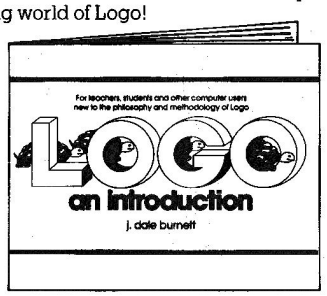
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TK!SO
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TK!Solver does for equations what word processing did for words. The first thing you should know about the TK!Solver™ program is that it is not a spreadsheet. Instead, it does something completely unheard of (until now)—it turns your personal computer into a voracious equation processor.

The next thing you should know is that if the TK!Solver program can't make life with your personal computer easier (and pay for itself), even if you use it only 15 minutes a week, you are a very rare person.

And finally, you should know exactly what equation processing is, and how it works. If you keep reading this, you will.

Equation processing with TK!Solver, or problem solving made easy. The best way to understand what the TK!Solver program *is*, is to understand what it *does*. The following simple example is designed to do just that. If you're still a little in the dark after reading it, stop in at your local computer store for a very enlightening hands-on demonstration.

Begin by setting up your problem. The TK!Solver program lets you do it quickly, easily, and naturally. For example, a car costs $9785. What would be the monthly payment on a three-year loan if the down payment is 25% and the interest rate is 15%?

STEP 1. Formulate the necessary equations to solve your problem and enter them on the "Rule Sheet" simply by typing them in (as in the screen photo). For example: "price−down = loan."



STEP 2. Enter your known values the same way on the "Variable Sheet." For example: "9785" for price. You may also enter units and comments, if you want.*

STEP 3. Type the action command ("!" on your keyboard) to solve the problem.

STEP 4. TK!Solver displays the answer: the monthly payment is $254.40.

Backsolving, the heart of TK!Solver. Now that you've defined the problem and solved it, TK!Solver's unique backsolving ability also lets you think "backwards" to solve for any variable, regardless of its position in the equation. For example, if you can only afford a monthly payment of $200, you can re-solve the problem in terms of that constraint. The TK!Solver program will solve the problem, displaying your choice of a higher down payment, a longer loan term, or a lesser interest rate. This unique backsolving capability forms the basis of TK!Solver's remarkably flexible problem-solving ability.

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Also, as you can see from the example on the screen, TK!Solver deals not only with single variables, but with entire equations and sets of simultaneous equations. It also deals with much more complicated problems than this one. How complicated? That's up to you. What kinds of problems? That's up to you, too, but popular applications include finance, engineering, science, design, and education.

Other extremely useful and interesting things TK!Solver does. Aside from its basic problem-solving abilities, the TK!Solver program performs a number of pretty fancy tricks. Like: *Iterative Solving;* in which TK!Solver performs successive approximations of an answer when confronted with equations that cannot be solved directly, like exp (x) = 2 – x • y and sin (x • y) = 3 – x – y. Like: *List Solving;* in which TK!Solver attacks complete lists of input values and solves them all, allowing you to examine numerous alternative solutions, and pick the one you like best. Like: *Tables and Graphs;* using the values you produced with the List Solver, the TK!Solver program will automatically produce tables and graphs of your data. You can look at your formatted output on the screen or send it to your printer with a single keystroke. And like: *Automatic Unit Conversion;* in which TK!Solver lets you formulate problems in one unit of measurement, and display answers in another. Very convenient what with all this talk about going metric.

The TK!Solver program also provides a wide variety of specialized business and mathematical functions like trig and log and net present value.

Then, there's TK!Solver's on-screen Help facility that provides information on commands and features any time you want it. Just type "?" and a topic name.

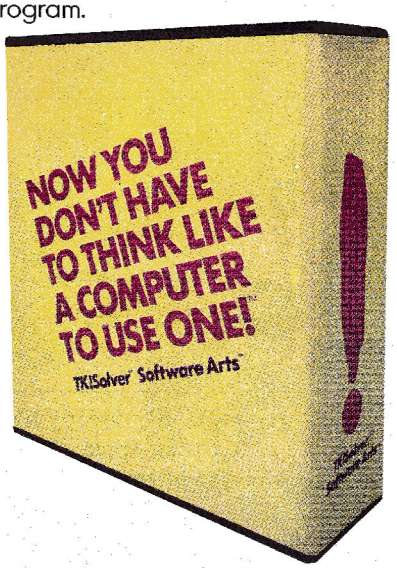
And of course the TK!Solver program combines all these features in one *integrated program.*

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TK!SolverPack application packages available from Software Arts include Financial Management, Mechanical Engineering, Building Design and Construction, and Introductory Science. Additional TK!SolverPacks are on the way from Software Arts, McGraw-Hill,™ and others.

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CUDDLE UP TO A KOALA PAD

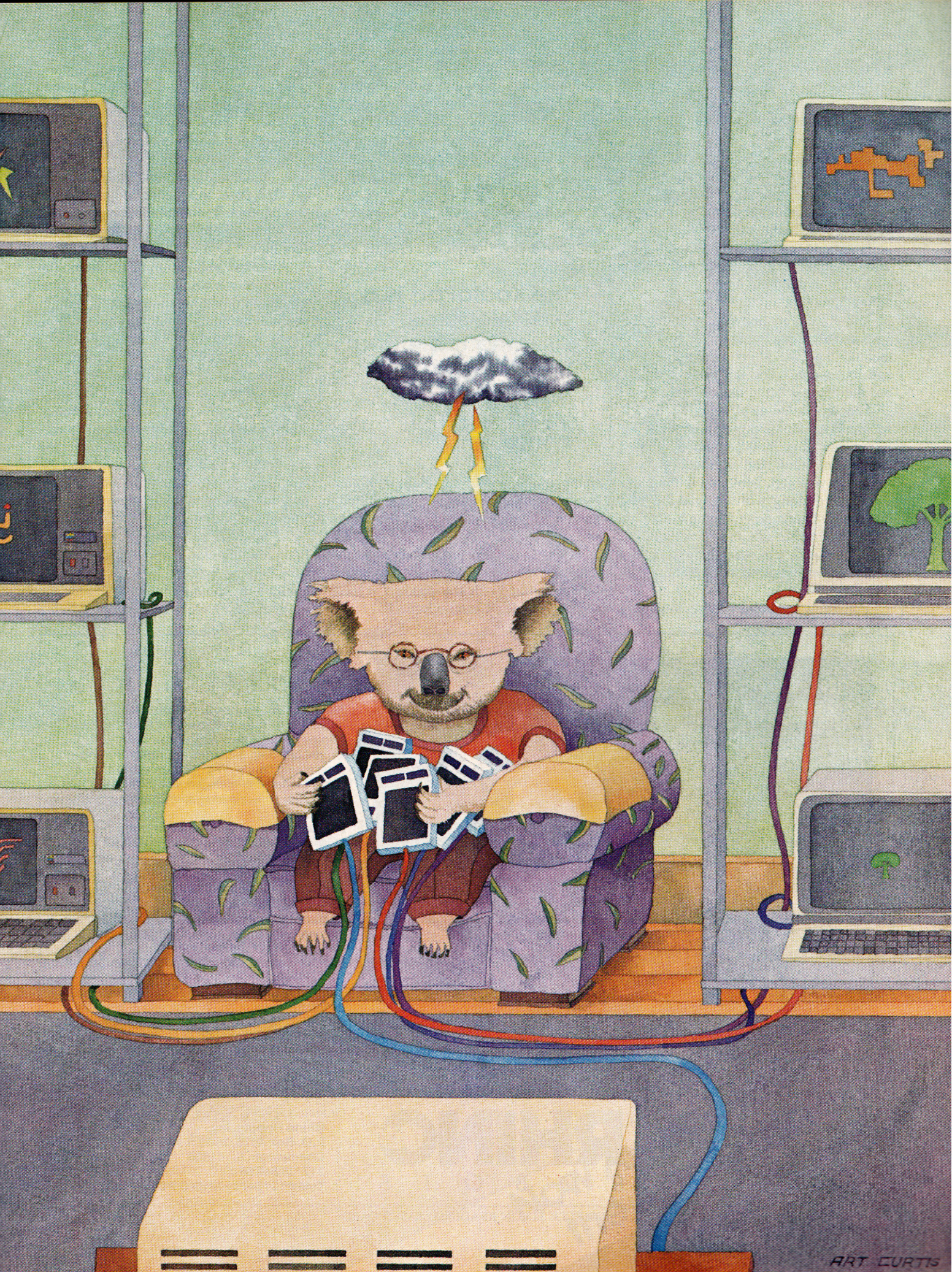
New pressure-sensitive tablet lets you draw, pick from menus, and control games.

Going directly from thought to result on your Apple can be one step closer if you add the KoalaPad Touch Tablet. With selected software, you can use this tablet to draw, pick from menus, and control games. It's a lot of fun and potentially very useful, but the initial Koala software and the manuals could use improvement.

The KoalaPad is a pressure-sensitive drawing tablet that translates position on the pad into inputs for your computer. In some ways, it's like a flat joystick; in fact, the Apple version plugs right into the game-paddle socket. You can use it as a paddle in many games, and you can draw or point on it more easily than you can with either joysticks or trackball game controllers.

The initial software releases from Koala include

- *Micro Illustrator* (a sketching program)
- *KoalaGrams* (a spelling program for young children)
- *Spider Eater* (a musical note- and pitch-recognition game)
- *Coloring Series I and II* (geometrical


ART CURTIS

pictures to color and modify)
- *Logo Design Master* (makes Logo procedures out of drawings)
- *Instant Programmer's Guide* (explains how to use the pad in BASIC programs).

Most of these programs cost about $30 or $40 dollars, except for the *Instant Programmer's Guide*, which is $15. Several more packages are under development, and Koala says it will cooperate with outside software developers who want to make use of the Touch Tablet with their programs.

What You Get

The KoalaPad package includes the Touch-Tablet itself, a plastic stylus, a manual, and the *Micro Illustrator* disk and its manual. The list price is $125, but the price is often discounted.

The KoalaPad itself is a 4.25-inch square black, plastic pad in a 6-inch by 8-inch housing. You can set it on any convenient hard, flat surface or even hold it in your lap. Mounted in the plastic housing along with the pad are two large bar-shaped push buttons. Just as with the fire buttons on game controllers, the Apple can read these switches and use their state to control the software.

You draw or point on the touchpad either with a finger or the stylus. Using a finger is nice because it's so direct, and you don't have to worry about misplacing it somewhere. You may, however, find that it requires an appreciable pressure on the softer parts of your finger for your touch to register. A knuckle, a callus, or a fingernail work just fine, though.

The stylus is the size and shape of a large pencil but has a slightly blunted point. Although anything else of that shape might work, the manual strenuously warns against the use of any implement besides a finger or the stylus on the pad.

The KoalaPad is a pressure-sensitive drawing tablet that translates position on the pad into inputs for your computer.

A single 12-page manual serves as the reference for all models of the Touch Tablet (along with the product release for the Apple, Commodore, IBM and Atari versions are available). Although Koala has tried to make the manual clear and "user-friendly," its effort has been only partly successful.

After a brief introduction and some notes about the care of the tablet, the main section of the manual is a listing of how the device plugs into each computer. One point the manual emphasizes is that the four KoalaPad models are slightly different, and you must have the correct model to use it on your Apple.

After the installation instructions, the Apple section also includes a few paragraphs on how to read the tablet position in BASIC. You can skip this information if you don't write your own software.

In fact, you're better off reading just the installation section and the care instructions in the manual. If you do read all 12 pages cover to cover, you'll notice that the table of contents does not correlate with the manual sections; some proofreading remains to be done, and the language in spots seems like a translation from a foreign tongue. There's even a "Special Note" that tells you something like "software not written for the KoalaPad probably won't work with it, except for most that will."

Using the Touchpad

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to install or use a KoalaPad. The actual instructions for installing the touchpad are mercifully brief—you unplug your computer, take out any game paddle you already have plugged in, substitute the plug from the KoalaPad, and plug your computer back in again. The manual even has a sketch of where the plug goes in and which way to point it.

You will have to pop the cover off your Apple to reach the game-paddle socket, and the inside of a computer is no place for a young child to play. So although you can let even a small child use the pad, it would be better to leave the installation to those old enough to appreciate the ways of electricity.

The original game-paddle socket on the Apple was not designed for frequent changes of plugs and devices, so if you want to use the KoalaPad intermittently and some other game controller in between, you might think about investing in one of the extender cords that brings the paddle socket out of the case. But even so, be careful of the pins on the end of the Koala cable—they're not meant for rough treatment and are easy to bend or crush.

In case you want to write your own programs using Touch Tablet input, the KoalaPad owners' manual gives simple instructions for how to do it in BASIC. Just as with joysticks, the PDL(0) and PDL (1) functions read the tablet x and y positions (how far over and up) respectively. More details about programming appear in the *Instant Programmer's Guide* software package.

The Micro Illustrator

Although you can use the KoalaPad with any software that reads the paddle ports, Koala does supply the *Micro Illustrator* program with the Apple II KoalaPad package. This program lets you sketch and draw on the Apple screen. Besides the KoalaPad and the program disk, you need an Apple II, II+, or IIe that includes at least 48K of memory and Applesoft.

The program is basically a computer-assisted doodle pad. Using eight different "brushes," you can draw in two sets of nine colors each—because of the way the Apple produces colors, you can work with only one set of seven colors plus black and white at once. You can draw freehand or have the program make points, lines, rays, and filled and outline boxes and circles.

If you like your drawing, you can save it on disk and bring it back for modification, or just to show it off. Although you issue all other commands directly through the KoalaPad, you do have to use the keyboard to store and retrieve pictures. Program saving is in standard Apple bit-map form, so you can exchange pictures between this and other programs, including PILOT and Logo. You use the KoalaPad itself to pick from a menu with sections for drawing modes and commands, brush style, and color. To make a selection in any category, you use the KoalaPad to position a cursor over the box containing your choice, and then press either button. To go to and from the drawing, you push either button when you are not touching the pad (and therefore no cursor or brush is showing).

For example, after the program comes up in the initial menu, you might move the cursor to the top row and click the button for the Draw mode. Then, moving the cursor down to the row of boxes for brushes, you could click the button over the diamond shape. Next, moving down to the color, you would pick whatever color you liked.

A single click, with no finger or stylus on the pad, gives you a blank screen, all ready for drawing. Finally, you'd move the cursor to where you wanted to start and hold down the left button to start to draw. Although the description

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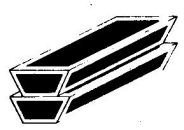
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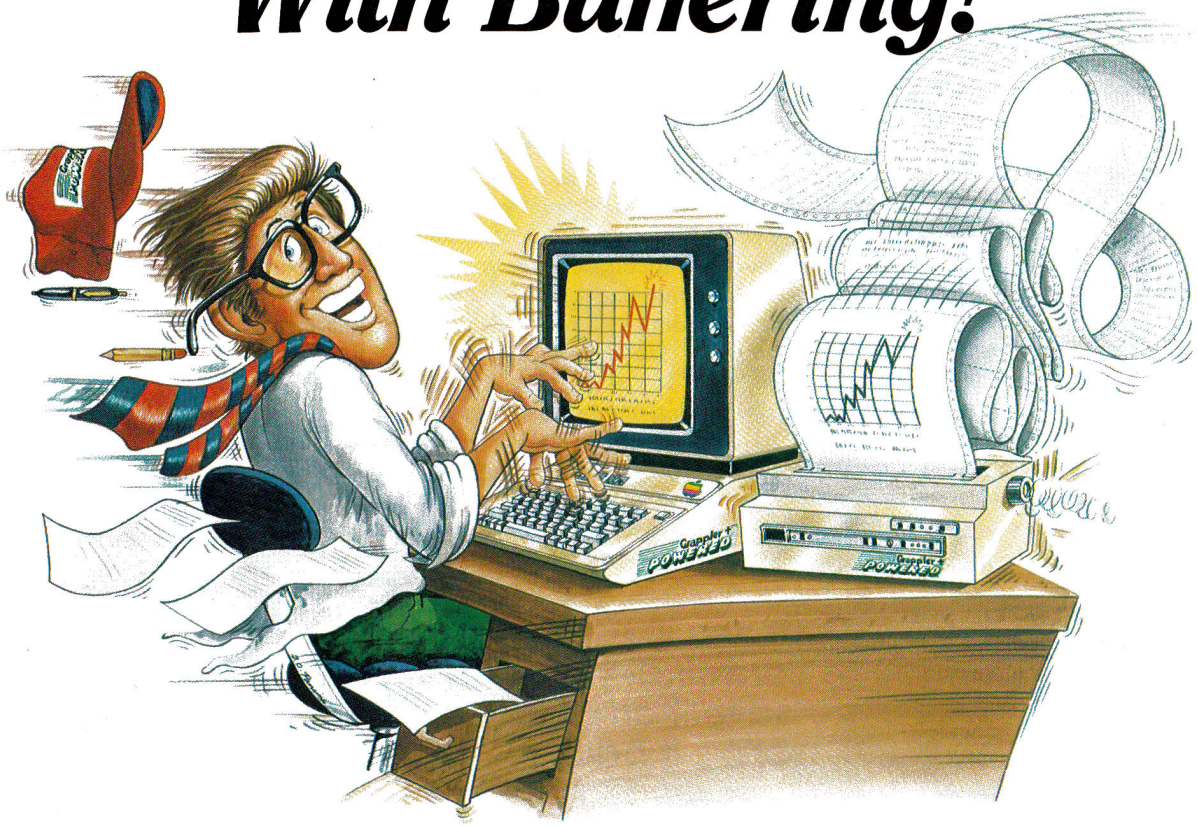


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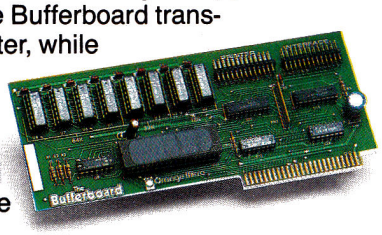


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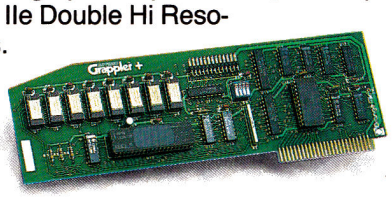


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sounds long, the process is fairly rapid after a little practice.

Another striking feature in *Micro Illustrator* is the Magnify mode. When you switch from the Normal position to Magnify, the scale of your whole drawing is enlarged by a factor of eight (you see about the 1/64th of the picture surrounding the brush position). In this mode, the brush stays fixed at the center of the screen, and lines and shapes move instead. As you move your position on the Touch Tablet, the drawing seems to whiz by. I found it took a few tries before I could actually use this mode to add fine details.

Most people seem to find *Micro Illustrator* quite enjoyable, and I have seen lines of people waiting to try it at shows and stores. But, like a blank piece of paper and a box of colored pencils, it does require creativity and initiative from the user. Although Koala recommends it for age 7 and up, I've watched some kids pass it up for programs with more action and sound.

With a little practice, you can create impressive abstract works, even if you're not much of a doodler. Representational drawing takes more practice, unfortunately. Since you can erase at any time or switch to a black or wide color brush, however, it's easy to erase a section and start again.

On the less pleasing side, the operation of the program can be confusing. Although you can switch from your drawing to the menu and back at any time and the menu has a Help selection, the on-screen help is limited and not completely clear.

One of the more obscure aspects is using the push buttons in the various drawing modes. If you are drawing freehand, the right button acts like a shift lock, turning the Draw mode on and off, but you have to hold down the left button to make the brush leave an image.

When you are drawing attached lines, either push button anchors the line at the brush's current position and starts a new line from there. In the Rays position, you have to push either button once to anchor the base of the rays, let it go to move the brush out to the length of the ray you want, hold the button down as you move the brush sideways to create the ray pattern, and finally let go to detach the brush. I've watched several people struggle unsuccessfully to figure this out.

Spider Eater

Spider Eater is a program for teaching users to recognize musical notes quickly, either from musical notation or actual pitch. The package includes an overlay printed as a piano-style keyboard section of slightly over one octave, the software diskette, and a short manual. The overlay fits right over the KoalaPad's surface, with two tabs sliding into notches in the housing.

The object of the game is to quickly recognize a note the program gives you and press the corresponding key image on the touchpad. The program keeps score, assigning point values for correct answers and fast response.

Spider Eater uses a series of spider images bouncing across the screen and then jumping to one of the lines and spaces of the musical staff. If you select the corresponding key on the overlay, a "spider eater" face appears, and the spider vanishes. If you enter an incorrect note, the spider instead jumps up to a web in the upper left of the screen.

To run the program, you first use the touchpad to select from a menu your choice of slow, medium, and fast speeds of play and whether you want the notes shown on the musical staff or just played as tones. There is also a game-instructions choice, which provides a summary of how to use the program.

If you like your drawing, you can save it on disk and bring it back for modification, or just to show it off.

If you pick a note-recognition entry in the menu, the program asks you whether you have one player or two. If you pick two, the scoreboard prompts for each player to run through the set of notes, shows both point totals, and flashes the higher score.

Although Koala says it's gearing the program to all ages, the graphics and theme music seem aimed at younger users. It's the kind of program that you'll either love or hate, so you should try it out at a computer store before buying.

Spider Eater is another program that is effective as far as it goes but that would have been better with some changes. For example, the program shows only notes in the treble clef; a small bit of programming and another overlay would have added the bass clef as well. Furthermore, the notes extend from the E above middle C to the F one octave above that, putting us in the key of E for a full scale. But it turns out that the sharps and flats (the black notes) shown on the keyboard do not work—the program interprets all key presses as naturals (white notes).

KoalaGrams

The first in a planned series of *KoalaGrams* programs is a simple spelling word game for young children. Using the touchpad, you rearrange a jumbled series of letters to form the correct words. Each set (except a set of words you provide yourself) comes with pictures illustrating the object or concept the word represents.

Although you direct the letter movement from the touchpad, animated koala bears do much of the on-screen movement, and another of these big-eyed teddies looks on from the top portion of the screen. There is no numerical scoring, but the bear gets a series of honey jars if you complete each puzzle in time.

If you want help with a word, you can press either button on the KoalaPad, and the program puts one of the letters in the correct position. The program, according to the manual, is designed to make sure a child will always be able to succeed.

Again, *KoalaGrams* is a generally successful program, but with a few odd aspects. One nice feature is that you can run the program with or without sound—great if you think that, for a while at least, your kids' computer should be seen and not heard. The drawings are generally effective, and the koala teddy bear is hard to resist. If you take a long time to solve a puzzle, there is no horrible trumpet of electronic victory from the computer—instead, the program simply waits for you to finally get the right answer.

On the other hand, although it is a word program for beginning readers, at several points *KoalaGrams* gives written instructions or comments on the screen, such as GETTING YOUR PUZZLES. There is no help screen, so if you and your kids forget how to work the program, you'd better not lose the small instruction card.

Other Software

Several other software products in the Koala series are clearly oriented toward the Logo language. The *Coloring Books* are by noted Logo proponent David Thornburg. These are a series of mostly symmetric geometric shapes that you can color in with the *Micro Illustrator*. If you like these, you might be better off getting Thornburg's book and writing your own Logo programs.

Future Plans

Koala has ambitious plans for future

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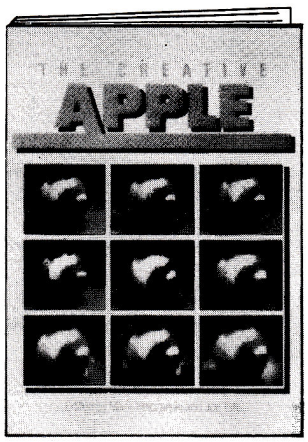
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HOW IT WORKS: THE TECHNICAL SIDE

To your Apple programs, the KoalaPad seems to be just another variable-resistor game paddle, but inside the tablet, it's slightly more complicated.

The tablet surface is one layer of a two-layer resistive sandwich, and pressure on the surface creates a signal corresponding to the position where the layers meet. The job of the electronics is to take that signal, change it into two separate x and y position signals, and tailor it to the form the Apple needs.

The output from the pad is a voltage that the Apple feeds to the input of a comparison circuit. To read the paddle, the Apple signals the start of a timing cycle to the paddle input. The Apple then counts how long it takes for the input signal to reach a trigger point, and this is the game-paddle-input value.

Although the KoalaPad itself sends slightly different signals even for close points, the Apple firmware is set to distinguish only 256 points in each direction. But that's enough to move by a single dot on a high-resolution screen.

software releases. According to the company, by early next year, it will have announced more than a dozen new software products. Some will be drawing programs, some games, some educational, and some will be serious business products.

Among the drawing programs are a Mother Goose coloring book and some improved utilities for the *Micro Illustrator* program. One of these is a printer-driver utility that should enable you to use more than two dozen popular printers to produce hard-copy versions of *Micro Illustrator* drawings without other special hardware.

Educational programs will include extensions to the *KoalaGrams* series, including some for arithmetic and simple mathematics such as sets and groups.

One product that might be of interest to a more limited audience is a program that will teach and play music by shape notes. This is a form of notation that crops up in many older hymnals and songbooks, and the ability to read this type of notes would open this music up to more amateur and serious musicians.

In the business market, Koala claims, the K-CAD computer-aided-design system will be an industrial-quality product for two-dimensional layout. This product will be followed by a text editor and, somewhat after that, by a Lisa-like desktop manager.

Should You Buy One?

As it stands, the KoalaPad may be worthwhile for games and educational programs. With the right software, it could also be a useful input device for business and home use as well. You can use it with most game-paddle programs, but, for some programs, the cursor movement will be opposite from the direction on the pad.

Support from Koala has not always been as helpful as it could be, and a few touchpads in the first batch of Touch Tablets had reliability problems, but the company has since licked the technical problems, moved to larger quarters, and hired more support people. It's now promising technical support for users and even an 800 number sometime early next year.

Several people who have tried my Touch Tablet liked it much better than a mouse, and a more universal model with RS-232 (serial-port) output is in the works. A Lisa model would be nice, too.

If you like drawing and the price seems reasonable for you, the KoalaPad may be just the accessory you want next. It's better for slower, controlled movement than for fast-action games. The initial software is a lot of fun, even with its occasional shortcomings. As Koala develops more software, you may find one of its packages alone a sufficient incentive for getting a KoalaPad. ✚

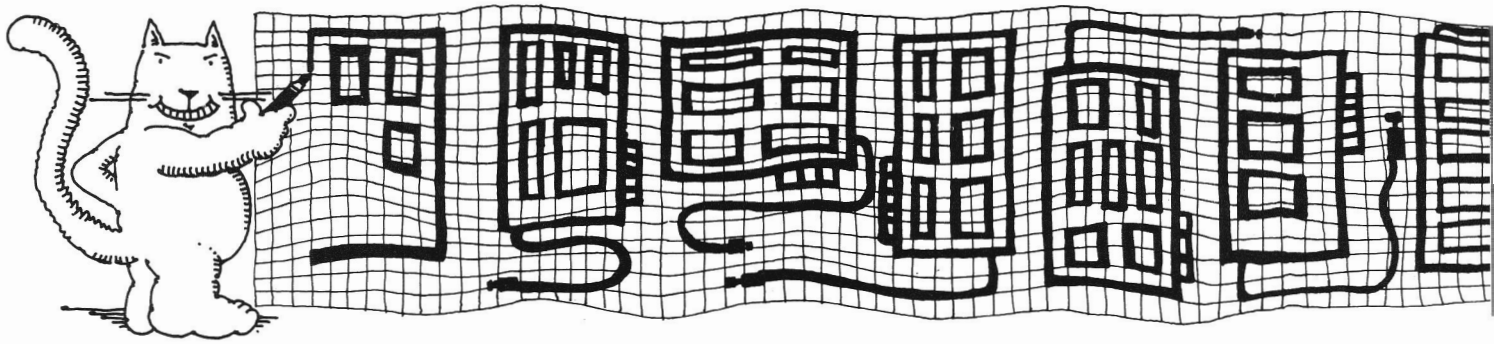
A+ REPORT CARD KOALAPAD

Training time	A
Hardware ease of use	B
Software ease of use	B
On-screen messages	C
"User-friendliness"	A-
Documentation	C
Speed	–
Cost/benefit ratio	A
Overall score	**B+**

SOURCES & REQUIREMENTS

Koala Technologies Corporation
3100 Patrick Henry Drive
Santa Clara CA 95050
(408) 986-8866

Requires:
Apple II,II+, or IIe computer
48K bytes and Applesoft
For best results, a color TV or video Monitor



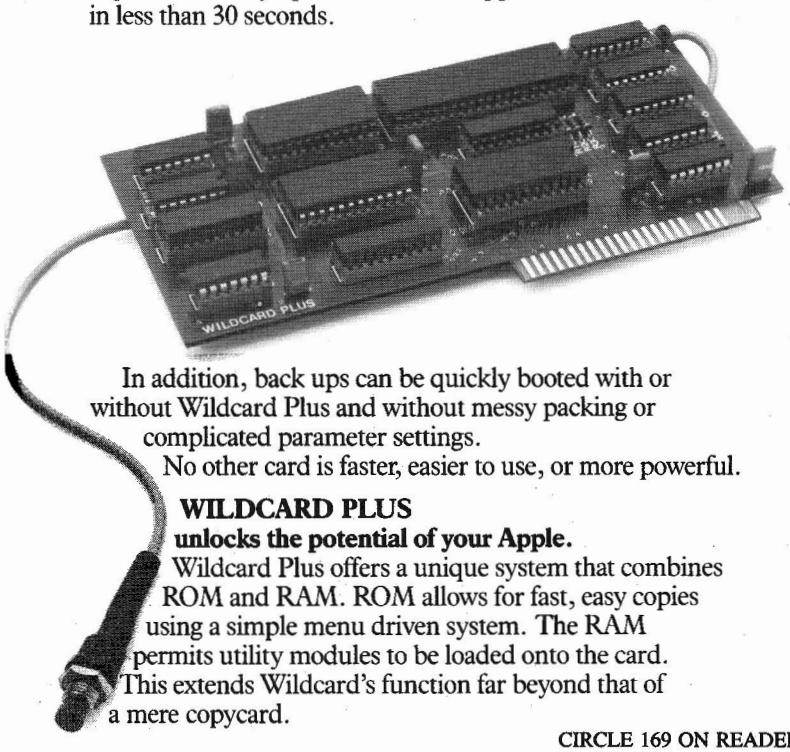
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Color II (+ or e)		$ 179	$139
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★ **CCS**, Serial Interface 7710A		$ 150	$ 99
★ **Central Point**, Alaska Card (copier, + or e)		$ 130	$ 99
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Key Tronic, KB200 keyboard (II +)		$ 298	$219
★ **Koala**, Graphics Pad		$ 125	$ 85
Market Microscope		$ 700	$525
Kraft, Joystick (Ap II II +)		$ 65	$ 49
Paddle (Ap II II +)		$ 50	$ 39
M&R, Sup R fan (+ or e)		$ 50	$ 39
★ **Microsoft**, Z80 Softcard (+ or e)		$ 345	$235
Z80 Softcard Plus (+ or e)		$ 645	$459
Softcard Premium Pack (II +)		$ 695	$495
Softcard Premium Pack (IIe)		$ 495	$395
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★ **Orange Micro**, Grappler Plus (e or +)		$ 175	$119
16K Buffer Board for Grappler +		$ 175	$119
Buffered Grappler + 16K		$ 245	$179
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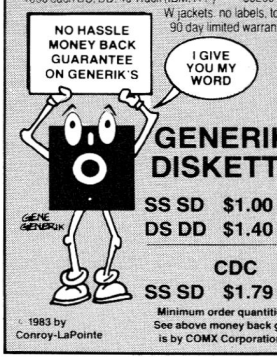
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10 each, SS, SD, 35T (Apple, Atari)	$ 45	$ 18
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10 each, SS, DD, 48T (Apple, IBM)	$ 55	$ 19
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Smartmodem 1200 (RS-232)	$ 699	$ 535
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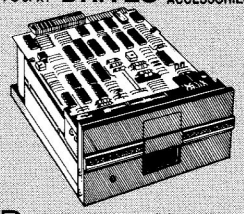
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OKIDATA, 82A, 80 col., 120 cps, Para.	$ 549	$ 448
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92, 160 CPS, 80 Col., Para.	$ 699	$ 559
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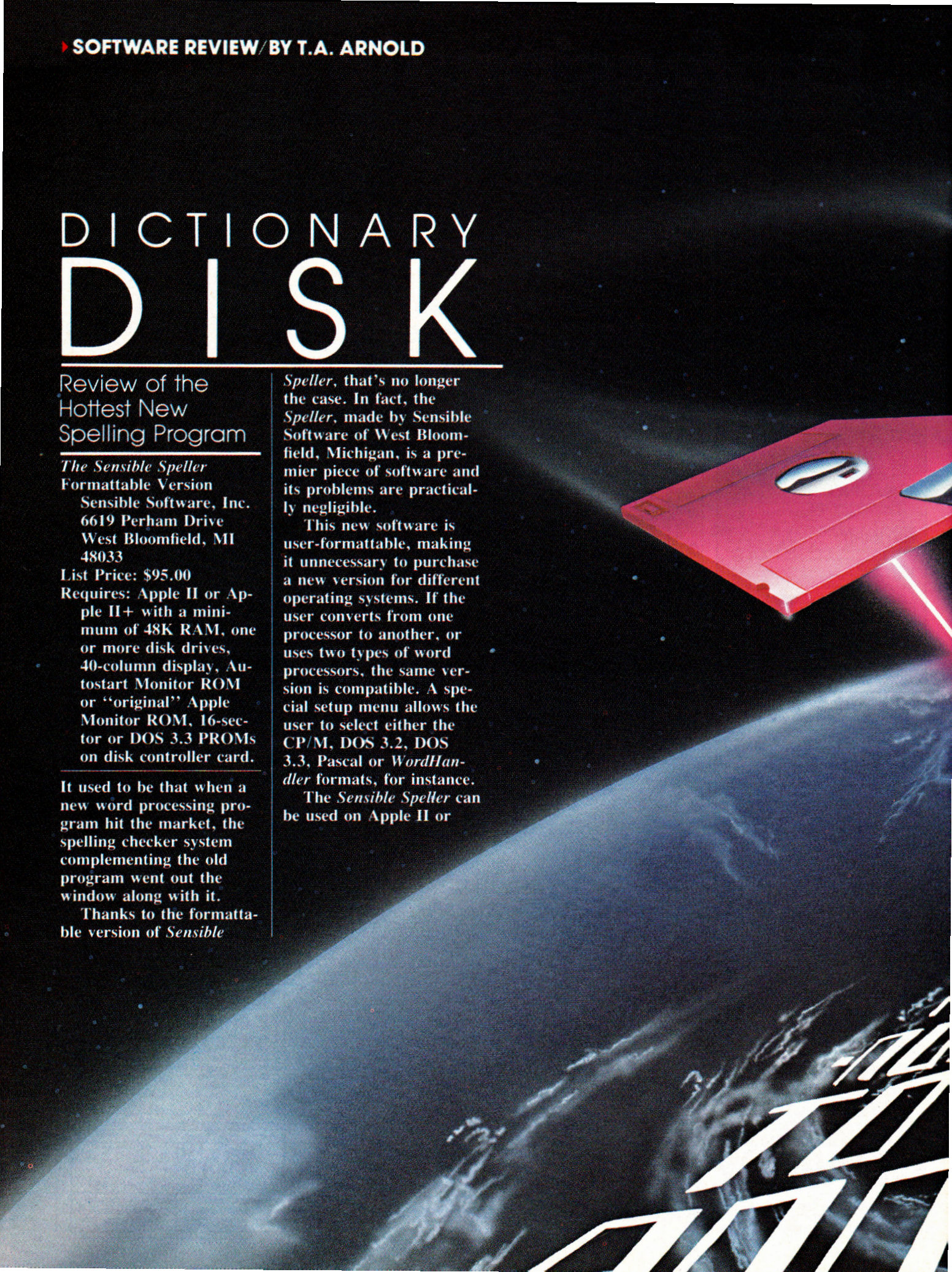
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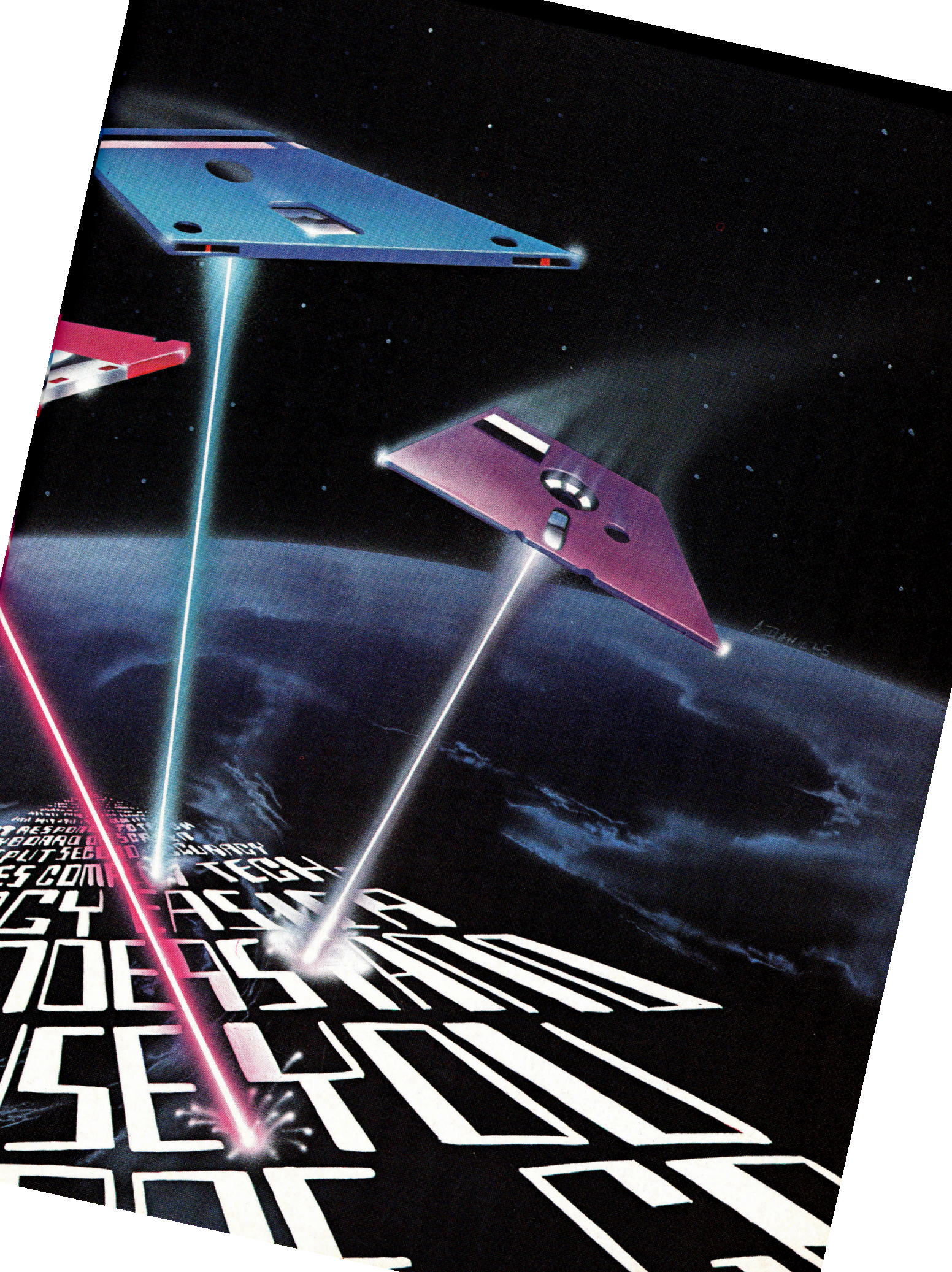
It used to be that when a new word processing program hit the market, the spelling checker system complementing the old program went out the window along with it.

Thanks to the formattable version of *Sensible Speller*, that's no longer the case. In fact, the *Speller*, made by Sensible Software of West Bloomfield, Michigan, is a premier piece of software and its problems are practically negligible.

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II+ computers, provided they are equipped with a minimum of 48K RAM and a 5¼-inch disk drive. And, internally, the Apple must also have either an Autostart Monitor ROM or the original monitor and a 16-sector or DOS 3.3 PROM on the disk controller card. As an option, the program also lets you print out hard copy of either unknown- or misspelled-word lists.

This new software is user-formattable, making it unnecessary to purchase a new version for different operating systems.

The Soft Side

Since all versions of the *Sensible Speller* operate in the DOS 3.3 file system, files to be proofread must either be created on a DOS 3.3 disk or transferred to one through the Apple Muffin program or a comparable copy program. When formatted for Pascal or other versions, the *Speller* will still operate in the DOS 3.3 mode and will directly proofread text files from the document disk.

The two dictionary disks are not copy protected, and working copies can be made using either the *Copy* or *Copy A* programs from the Apple System Master.

The Package and a Petit Problem

The *Speller* comes with a 51-page operating manual, two copy-protected program disks, and two dictionary disks taken from the Concise Edition of the *Random House Dictionary*. Of the dictionary disks, the main one contains 45,000 of the most commonly used words, and the smaller supplemental version includes less frequently used ones.

The problem is with the user manual. It is difficult to follow because it is not well written and some of the information is vague. But those inadequacies don't create too many troubles because the program is so easy to use that the manual is rarely needed.

Put to the Test

The four-phase proofreading program begins once the user instructs the program to accept the default slot for the printer or designates a slot. But before that, he must complete a few procedures.

The user should insert the *Sensible Speller* program disk only after he has saved the text file. He then can remove the word processing program from Drive 1 and replace it with the *Speller*.

From the main menu, the user is presented with a series of options. After that is done, the program prompts the user to insert the document disk into drive 2. The user selects a text file and then must choose from another series of proofreading options before he begins the four phases.

In the first phase, words are collected and stored in RAM. The display shows a count of the total document words, including command characters as well as unique words.

Then the dictionary words are read and checked against the document words now in RAM. Any unknown words are temporarily flagged for later review. When this process is finished, a prompt noting the number of unknown words appears along with a question asking the user if he wants to check the list against another dictionary. An affirmative answer begins the checking process and a negative reply, the subsequent phase.

In the third phase, the unknown words appear as they do in the text, and the user then can select from the options. They are : (A)dd new word to dictionary; (L)ist possible correct words from dictionary; (M)ark the word with an up-arrow (^) in the original document; and (I)gnore word and continue to next.

The last phase is a time-consuming operation. It seems to take much longer than the two minutes the manual indicates.

In the last phase, unknown words can be added to the dictionary.

The last phase is a time-consuming operation. It requires passing through a new set of user options and creating another dictionary disk. It seems to take much longer than the two minutes the manual indicates. ✚

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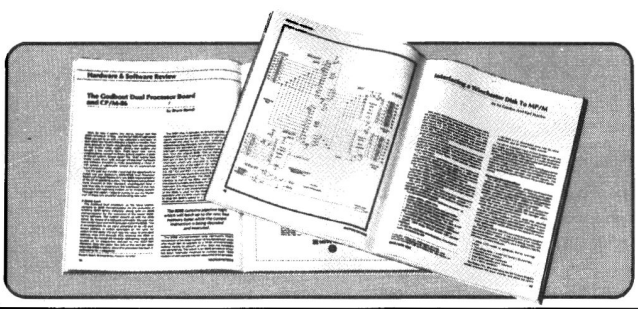
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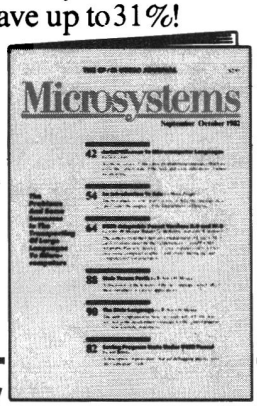
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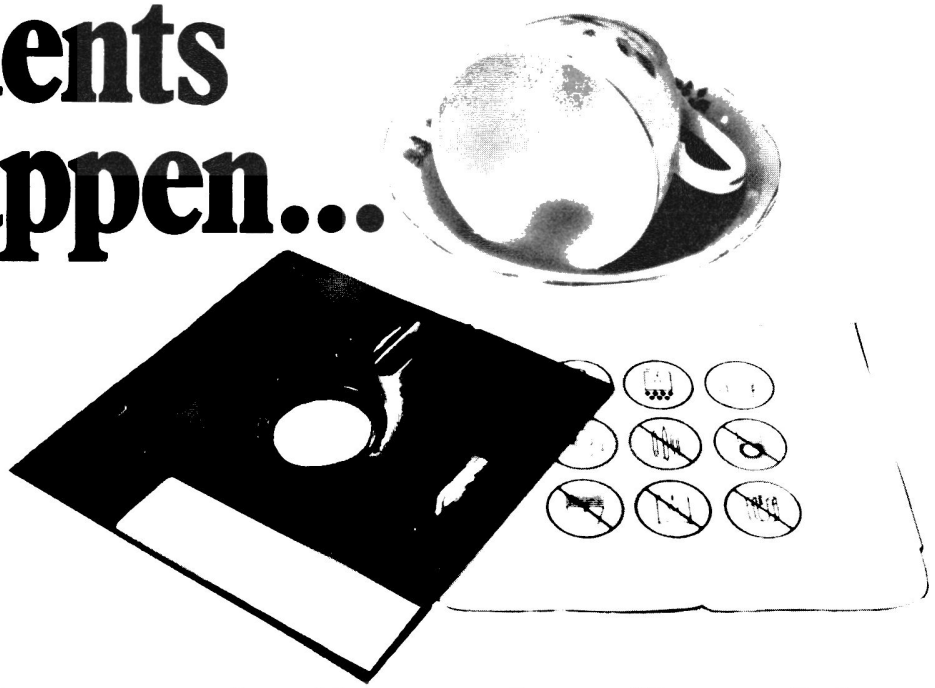
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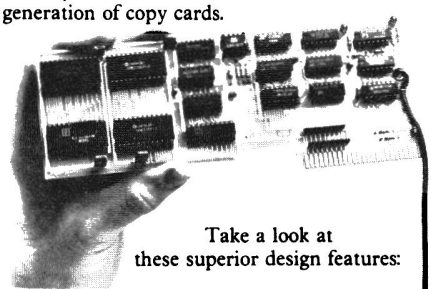
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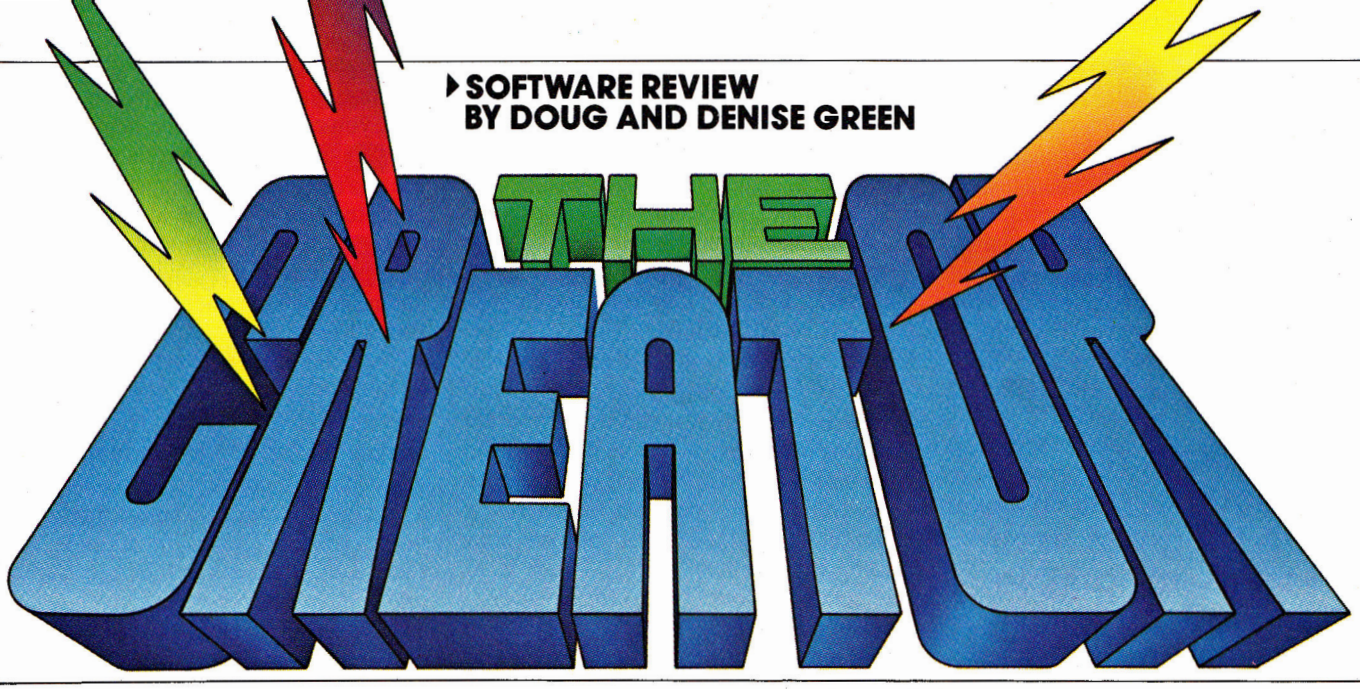
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CIRCLE 157 ON READER SERVICE CARD

▸SOFTWARE REVIEW
BY DOUG AND DENISE GREEN



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Once upon a time, if you wanted to make the computer do something constructive for you, the choices were either to pay a programmer or program it yourself. As time went by, various software packages became available for just about everything, including databases, word processors, and graphing packages. If you were willing to pay a price and adapt to the software, you did not have to write your own program.

Now there is the *Creator Program* from Software Technology. Using this two-disk package, even with no knowledge of *BASIC*, you can make your own programs. As a bonus, you can adapt the programs that you create or give them away without feeling like you've pirated them.

Interprets and Translates

The *Creator* is a *BASIC* program generator that operates as an interpreter. As the user, you answer a series of questions about the design of your program. The *Creator* interprets your inputs and translates them into *BASIC* code. After the code has been generated, you can list it, modify it, or merge it with other programs.

Technically, it is a *Topographical Interactive Structured Interpreter (TISI)*. The English commands given to the *Creator* will be processed under its set of structured *BASIC* commands and linked together to produce Applesoft *BASIC*.

There are two ways to use the program. You can create individual subroutines from the 16 different modules available and merge them together to form a program, merge them into an existing *BASIC* program, or generate a library of subroutines. The other way is to create an entire program at one time.

Subroutines

The 16 Function modules are subroutines for creating portions of a complete program. They include title pages, instructions, a list of options available for a given program, input routines to allow users to enter data, routines to view data as it is entered, simple word processors, sorts, searches, print routines, a variety of options for storing and using numerical data, four sound routines, and outputs to the screen or printer in a specified format. The output routine includes the formats for mailing list, horizontal columns, and a free format for invoice type reports.

The Creator is a BASIC program generator that operates as an interpreter.

Functions can be combined into complete programs. However, there are two important points to keep in mind. When separate functions or subroutines are merged, the line numbers of your *BASIC* programs must be different from each other. And they must be in a logical order of execution, from the lowest number to the highest number, or the program will not run correctly. For example, you will get an error message such as *bad subscript error* if a subroutine refers to a program variable that has not yet been defined.

Program Core

In addition to the Function modules, there is the Program Generator or Create Program option. We believe that this option is the simplest one to use, especially for beginners. The ability to generate entire programs from start to finish is a powerful and useful feature.

Although the 16 subroutines are interesting and flexible, you must be able to merge them together logically. Create Program walks you through the process of writing a program by answering a series of questions and does all of the design and numbering for you. Keep in mind that the *Creator* is oriented toward business applications.

A tutorial leads you through a sample database program, which is an excellent beginning program for a wide variety of uses. It contains a title screen, an instructional screen, input, change data, delete data, view data, sort, search, and print output in a report format.

The Basics

Once you have successfully created your program, you must store it on a data disk and prepare it for use. You must know how to initialize or format blank

disks in order to store programs. The program manual explains clearly how to prepare disks. It is a good policy to prepare three or four blank disks at one time for backups and working copies.

Once the *Creator* has generated your subroutines or program, it gives you the option of saving them on your data disk. All programs are saved as Text files and must be converted to Applesoft *BASIC* before they can be used. Fortunately,

We found no serious bugs, and the program itself seems impossible to crash.

this is a simple process, which is done by typing EXEC and the Text file name; you then resave the program under a new name. Longer *Creator* programs require as many as four separate Text files that you must EXEC separately and save as one single Applesoft *BASIC* file.

You can avoid some problems if you use a separate disk for each program that you create. This is important for the complete database programs into which you will be putting information. You will need the extra space on the disk for your new records, and the *Creator* uses the same Text file names—TOTRCD and DATA FILE—to store your records on the disk. You could lose all of your data unless you changed these file names. It is much easier and wiser to use separate disks for important programs.

Useful Modifications

The *Creator* is a remarkably innovative program. Considering its complexity, it is easy to learn and use if you are willing to invest a few hours with the manual. Once you become familiar with the product, it is possible to generate a workable database in about one hour complete with sorts, three-level searches, and one style of formatted output.

You must design an outline or flowchart so that your program will accomplish your predefined goals. A clear understanding of data files, including records and fields, is also important.

The more you know about BASIC, the more powerful *Creator* becomes. You will have a better understanding about problems that may occur, and you can modify your code to suit your own needs. Otherwise you will be limited to the subroutines contained in the program.

If you find that parts of your programs function more slowly than you would like, you can add machine-language routines, compile all or part of a program, or use a faster operating system on your unprotected disk. This also means that the *Creator* is ideal for anyone needing multiple copies of a program without having to pay for each copy.

Bar Charts

Two interesting Function modules included with the *Creator* are word processing and bar charts. The bar chart module allows you to construct a program that will convert monthly data into a high-resolution bar graph containing a year's worth of data. In addition, the same data, once entered, is transformed into a quarterly report, a percentage of each month's data compared with the yearly total, and a point representation. The vertical axis is scaled, and titles can be placed on both the top and bottom of the chart along with a display of minimum, maximum, and average amounts.

Generated bar charts are limited to monthly data scaled along the horizontal axis. There is no printout routine to make copies of your charts, which is another example of how user knowledge of BASIC can be helpful.

Word Processing

The word-processing module allows

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The SENSIBLE SPELLER works with more Apple word processors than any other spelling program, including: DOS 3.2, DOS 3.3 (Apple Writer—all versions, Bank Street Writer, Magic Window, Screen Writer, etc.), SuperText, Word Handler, CP/M (Wordstar, etc.), and Pascal word processors.

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*April 1983, Softalk magazine reader survey.
**Not all features are available with CP/M, Pascal, and Word Handler.

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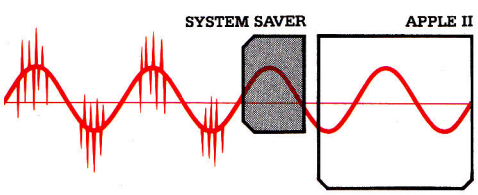
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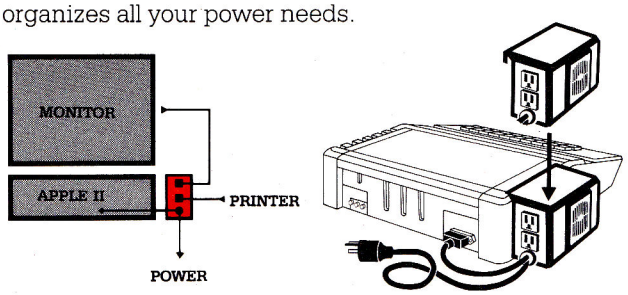
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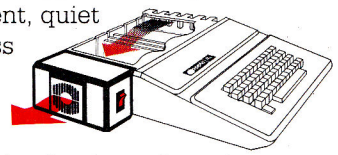


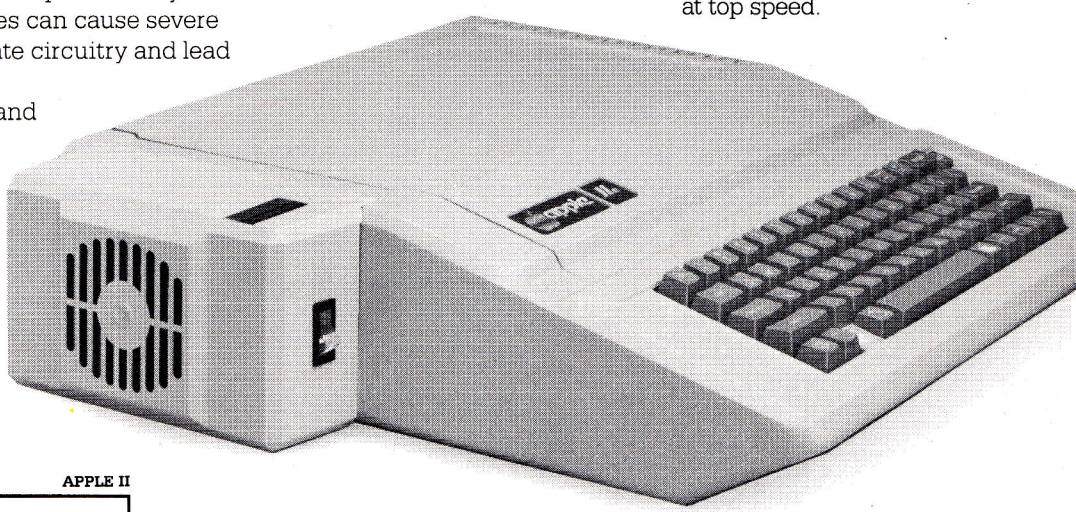
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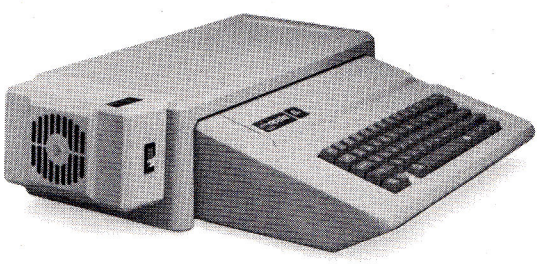
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you to create a word processor with a line editor. You can only get a 40-character column width. There is no word wraparound, so you must press RETURN at the end of the line and divide the words manually. You can get lowercase letters with a hardware modification on the II+ or by using a IIe.

Word-processing files are saved on your disk as Text files followed by the extension .DPA. Files are easier to find, but we had problems if we tried to load a file and typed the name incorrectly. The word processor indicates that no file was selected, but it also saves the incorrectly spelled file. This became even more confusing with the addition of lowercase letters on the Apple IIe.

A Few Bugs

It would be almost impossible for a program as complicated as the *Creator* to be completely bug-free. Luckily, we found no serious bugs, and the program itself seems impossible to crash.

We discovered a few things that may save you some frustration. Using the Apple IIe lets you use lowercase letters in your programs, but be careful with the word processor. You must use the Uppercase mode when responding to the questions as you design your programs.

When you are using the Create Program mode, the code is generated in several different parts. You can edit each part before the code is generated, but you cannot backup before the code is finished. For example, as we were finishing up the Instruction portion, we were moved to the Input portion. We were unable to get back to the Instruction portion to do any editing.

Once we finished the sample database program in the manual, we tried using it. All went well, except that it crashes if you try to view data before any has yet been entered. You have to reboot the database program to get going again.

As we put our subroutines on the disk, we found that often our *HELLO* program was included at the beginning. This can be eliminated either by typing NEW before merging subroutines or writing the same line numbers in one of your subroutines over the *HELLO* program.

Reference Work

Don't be intimidated by the 173-page manual written by Gary and Sylvie Haffer. It is well organized and easy to use, either as a tutorial or a reference manual. The manual contains a brief introductory tutorial, an overview of how to use BASIC, definitions of commonly used commands, a guide to writing programs along with a flowchart, how to use the product to create or merge programs, a detailed user's manual, enhancements to the created program, tips and useful facts on using BASIC and DOS, sample application programs, and an index.

Go to the Source

A program as complex as the *Creator* may require some help. Telephone support is available for registered users, who must supply their serial numbers. A seven-day grace period is allowed for new purchasers. The people at Software Technology can be reached at (617) 244-2590.

We spoke to Gary Haffer, who is the author of the program and very knowledgeable. The quality of the product seems worth the $250 price tag.

Owners who have completed their warranty cards are entitled to a backup copy of the program. Defective disks will be replaced within a 90-day period.

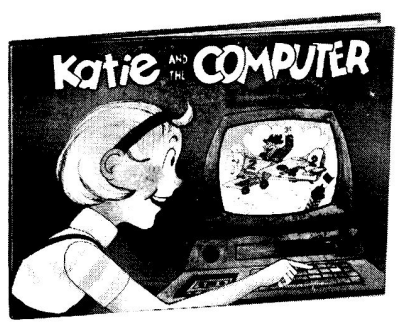
Easy to Use

Compared to other programs that we have seen, the *Creator* is very easy to use. While the BASIC programs that you create might not perform quickly, the ability to modify the generated code is an option you rarely have. This type of software is the wave of the future in programming and is a must for educational institutions that teach programming. ✚

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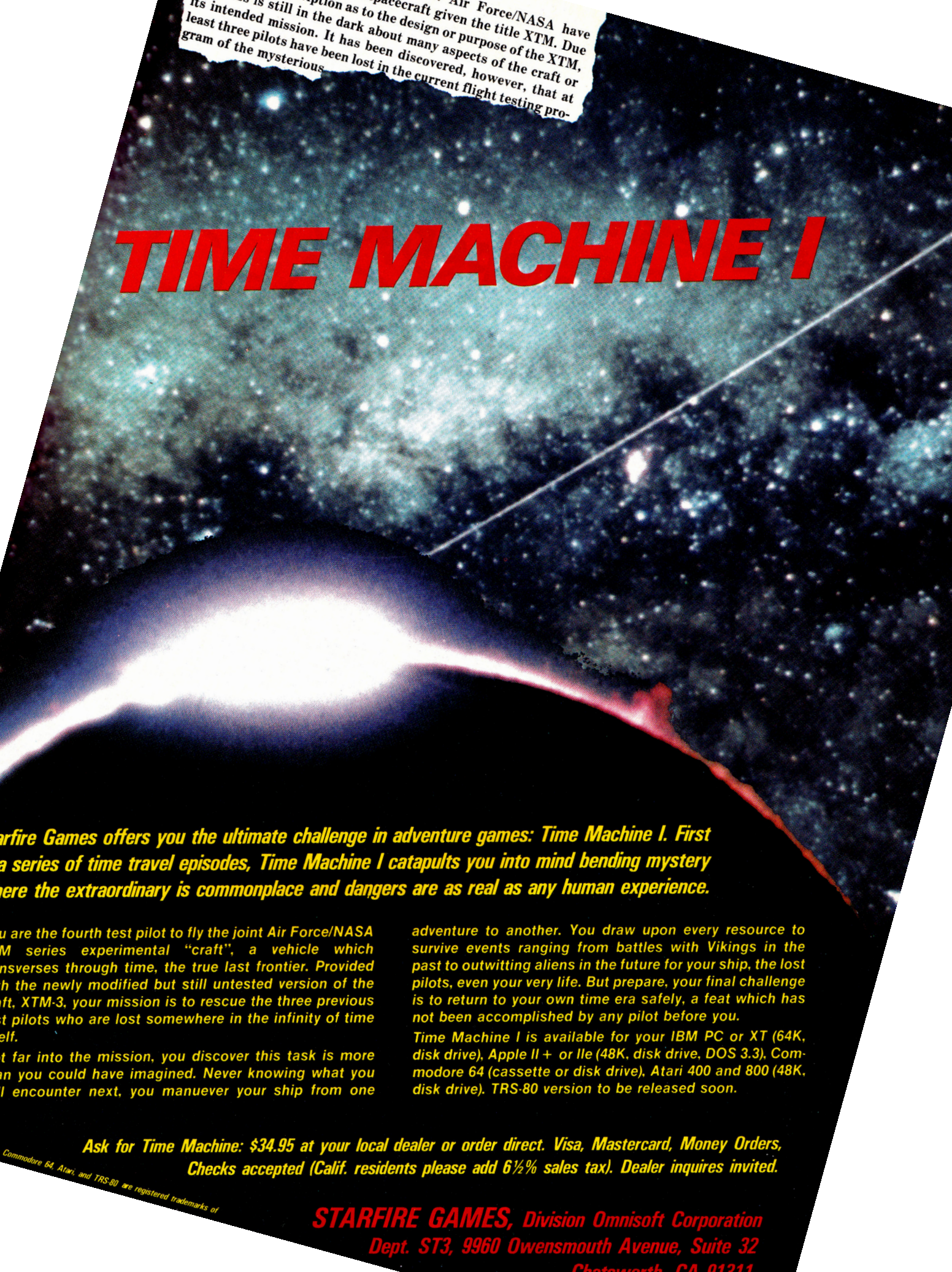
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MAKING HI-RES CHARACTERS

PART I

A two-part tutorial on making the most of Apple color graphics.

Nothing adds more clarity and interest to educational programs, games, or sales reports than computer graphics. The Apple has easily learned, powerful capabilities in this field, but all too often Apple users don't take full advantage of them. Here is a guide to help you get started or add to what you already know about high-resolution graphics on the Apple. A familiarity with BASIC is recommended, but is not essential for understanding the programs discussed in this article.

Apple offers you a choice of using six different screen modes: text pages 1 and 2; low-resolution graphics pages 1 and 2; and high-resolution graphics pages 1 and 2. Text page 1 (40 × 24 characters) is used for most BASIC programming, while text page 2 can be accessed by more experienced programmers. The low-res pages let you construct pictures using rectangular blocks. Sixteen colors are available in the low-resolution mode, with a screen layout of 40 × 40 blocks. High resolution permits only eight colors, but allows drawing lines between single points ("pixels"), thus providing far greater detail. Page 1 in both low- and high-resolution graphics includes four lines of text at the bottom, while page 2 is full-screen graphics.

In HGR (hi-res page 1) the screen is 280 pixels wide (0 to 279) and 160 pixels high (0 to 159) with four ordinary text lines at the bottom. The width of the HGR2 screen is the same, but it is 192 pixels high (0 to 191). Make sure all your coordinates are within the limits mentioned or you'll get a nasty ILLEGAL QUANTITY ERROR. The upper left-hand corner is the (0,0) mark, so plotting is a bit different than it is on a Cartesian coordinate system. When determining the coordinates of a point you must always remember to count first across and then down. A point roughly one third down the center of the screen is at coordinates (140,64), for example. It's always a good idea to draw your pictures on graph paper first.

Getting Started

We leave the standard TEXT page and invoke the High-Resolution Graphics mode by simply entering the command

When determining the coordinates of a point, you must always remember to count first across and then down.

HGR (or HGR2). This step is crucial, because if you try to plot any points before typing HGR or HGR2, some of the upper portions of a very long program may be lost. Next, select a color with HCOLOR = n where n is an integer from 0 to 7, inclusive. In order, the colors are: blackl; green; violet; whitel; black2; orange/red; blue; and white2, although the specific hues will depend on your particular monitor. The chosen HCOLOR will continue throughout your program until you change it. For monochrome monitors, it's a good idea to stick with HCOLOR = 3.

A single point is placed on the screen with HPLOT X,Y. The program below produces a single green dot roughly in the center of the display. The timing loop in line 120 keeps it on the screen for a short time before returning to the Text mode to add to the program.

```
 10 REM—GREEN DOT—
 20 HGR
 30 HCOLOR = 1
 40 HPLOT 139,80
120 FOR T = 1 TO 3000:
    NEXT T
130 TEXT
```

That dot, one pixel in size, is hardly noticeable, and it would take thousands of hours if we had to draw a complete picture one point at a time. We can simplify life by drawing lines from point to point. Unlike low-res graphics, diagonal lines are just as simple as vertical or horizontal ones in high-res. If we add line 60 below to our existing program, we get a blue line beneath the green speck. Lines 80–110 draw a white rectangle around this primitive sketch.

```
 50 REM—HORIZONAL LINE—
 60 HCOLOR = 6: HPLOT
    130,100 TO
    150,100
 70 REM—RECTANGLE—
 80 HCOLOR = 3: HPLOT
    100,50 TO
    180,50: REM TOP
 90 HPLOT 180,50 T
    180,110:
    REM RIGHT SIDE
100 HPLOT 180,110 TO
    100,110:
    REM BOTTOM
110 HPLOT 100,110 TO
    100,50:
    REM LEFT SIDE
```

There's also an easier way to draw our rectangle. Lines may be linked together in a chain of a maximum 239 characters per line. Thus, the output of the program will be the same if you delete lines 90–

110 and change line 80 to read:

```
80 HCOLOR = 3: HPLOT
   100,50 TO
   180,50 TO 180,110 TO
   100,110 TO 100,50
```

Quirks in Color

If you are using a color monitor, you may have encountered one or more anomalies in the display, especially if you tried changing the color or the exact positions of the lines. There are several pitfalls to avoid when using color with Apple hi-res graphics, but color is easy to handle if you're careful. Monochrome monitors can use all the sample programs without these peculiarities.

There are several pitfalls to avoid when using color with Apple hi-res graphics, but color is easy to handle if you're careful.

First, white vertical (and to a lesser degree diagonal) lines often do not appear white on a color monitor. They usually come out as violet and green, or orange and blue, depending on your screen's adjustments. To avoid this problem, you must plot two "white" lines immediately next to one another. The blurring between the adjacent rows of pixels results in a doubly-thick, but nonetheless white, line.

Second, the very solution to the previous difficulty may pose another problem. If a line of HCOLOR 1 or 2 (usually green and violet respectively) is plotted adjacent to a line of HCOLOR 5 or 6 (often orange/red and blue), you will notice a "bleeding" effect. The color is a combination of the two original lines. You may of course use this to your advantage to develop different hues. If you want the colors to remain as they are, you'll have to experiment and make minor adjustments in the color or coordinates of your picture.

Third (and last), not all parts of the screens on most monitors used with Apples are capable of displaying all colors. The problem is that (excluding black and white) odd-numbered colors cannot be plotted on vertical lines with even X-coordinates. Likewise, even-numbered colors can't be plotted on odd X-coordinates. The safest way to create a picture, therefore, is to draw it with HCOLOR=3 to make sure the lines look correct and, if necessary, alter the color to correct any slight imperfections. If you are finished with a drawing that is missing several vertical lines and you are certain that you haven't forgotten segments of the program code, check to see if you have attempted to plot a line in a color that can't appear at a particular location on the screen.

Using HGR (or HGR2), HCOLOR, and HPLOT to draw points and line segments, you have at your disposal the tools to create an infinite number of shapes and pictures. The very simple shapes illustrated here merely allow greater program readability. Certainly the Apple is capable of more complex figures than these.

Functional Graphics

Apple hi-res graphics can be used to plot mathematical functions as well. Below is a program that will draw a sine-wave on the screen. Notice that a scaling and shifting factor is needed on both the X and Y axes so the graph will fit neatly on the screen. If you are mathematically inclined, you may wish to modify lines 30–60 to plot other functions.

```
 10 REM–SIN WAVE–
 20 HGR2: HCOLOR = 3
 30 FOR X = –3 * 3.14159
    TO
    3 * 3.14159 STEP .03
 40 Y = 100 * SIN(X)
 50  YO  =  Y  /  (300  /  191)
    +96:
    REM ADJUST Y–AXIS
 60  XO  =  X  /  (6  *  3.14159/
    279)
    + 140: REM ADJUST X–
    AXIS
 70 HPLOT XO,YO
 80 NEXT X
 90 FOR T = 1 TO 3000:
    NEXT T
100 TEXT
```

In this program variables have been substituted for actual values in the HPLOT statements. Applesoft permits the use of variables in HCOLOR statements as well. Variables allow greater flexibility and speed of program execution. If you plot a picture using actual numbers for X and Y coordinates, the shape can only appear in that size and location on the screen. However, if you use variables you may change the size and position of your drawing. The next program demonstrates the magnification of a triangle. The data in line 130 are just the coordinates of the triangle's vertices relative to the starting position (140,50). You can easily substitute other values as long as you set the value of N in line 30 to the number of sides of your shape.

```
 10 REM–MAGNIFICATION OF
    TRIANGLE–
 20 HGR: HCOLOR = 3
 30 N=3: DIM X (N),Y(N):
    REM 3 VERTICES OF
    TRIANGLE
 40 HOME
 50 VTAB 22: INPUT
    ''MAGNIFICATION
    1–10 ?'';M
 60 IF M<1 OR M>10 THEN
    20
 70 XC=140: YC=50:
    REM CENTER STARTING
    POSITION
 80 FOR A=0 TO N: READ
    X(A),Y(A):
    NEXT A
 90 HPLOT XC + M *
    X(0),YC
    + M * Y(0)
100 FOR B=1 TO N
110 HPLOT TO XC + M *
    X(B),YC
    + M * Y(B)
120 NEXT B
130 DATA
0,0,10,10,–10,10,0,0
```

Notice the use of VTAB before the printing statement in the text lines at the bottom of the screen. Without this, the words would have printed normally on the text page, hidden "behind" the graphics page. When you're in the graphics mode, the HOME command (line 40) clears the text on the bottom of the HGR screen as well as the unseen TEXT page. To erase only the graphics portion of the page, use HGR (or HGR2) again.

Line 110 is also a bit curious since we have previously used HPLOT in the form of HPLOT X,Y or HPLOT X1,Y1 TO X2,Y2. However, HPLOT TO X2,Y2 is acceptable as well. This continues a line from the last point plotted to (X2,Y2). The HCOLOR will be that of the last point, even if you changed it in the interim.

Variables allow greater flexibility and speed of program execution.

Onward to Animation

Now we've come to the point where introductory animation can be performed. For those familiar with the latest video games, the movement will seem slow and not very smooth. Faster and more complicated methods of animation

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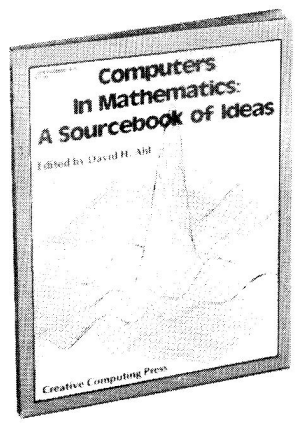
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will be included in Part II of this article. For now, let's stick to moving a square around the screen using HPLOTs. In the listing below, a square is placed in the center of the screen. The program then waits for you to hit a key, and the square is drawn then in black to erase its trail as it "moves." The J, K, I, and M keys (arranged in a diamond) move the square left, right, up, and down in 1-pixel increments. For those with Apple IIe's, holding one of these keys down will cause the square to remain in motion until it hits the edge of the screen. With previous Apples, you hold down the letter and repeat key (REPT) simultaneously. The value for X or Y is altered and checked for an illegal quantity. The value of Y increases when the "M" key is hit because the Y values become greater toward the bottom of the screen. The square is then redrawn in its new location and waits until another key is pressed.

```
 10 REM-MOVING SQUARE-
 20 REM-USING J, K, I, M
    KEYS-
 30 HGR2: HCOLOR = 3
 40 X = 140: Y = 80
 50 HPLOT X-10,Y-10 TO
    X+10,Y-10
    TO X+10,Y+10 TO X-
    10,Y+10
    TO X-10,Y-10
 60 GET G$
 70 IF G$<>''K'' AND
    G$<>''J' AND
    G$<>''I'' AND
    G$<>''M'' THEN 60
 80 HCOLOR = 0: REM BLACK
    TO ERASE
 90 HPLOT X-10,Y-10 TO
    X+10,Y-10
    TO X+10,Y+10 TO X-
    10,Y+10
    TO X-10,Y-10
100 IF G$=''K'' THEN
    X=X+1
110 IF G$=''J'' THEN X=X-
    1
120 IF G$=''I'' THEN Y=Y-
    1
130 IF G$=''M'' THEN
    Y=Y+1
140 IF X<10 THEN X=10
150 IF X>269 THEN X=269
160 IF Y<10 THEN Y=10
170 IF Y>181 THEN Y=181
180 HCOLOR = 3
190 GOTO 50
```

With this background, the easiest and best way to learn Apple high-resolution graphics is to sit down and experiment. For those already comfortable with this level of graphics programming, here are some further hints and suggestions. ✚

Exploring Further

1. When you must flip back and forth from a drawing to TEXT, you may use POKE–16304,0 to switch from text to graphics without clearing the graphics screen. Your picture then appears all at once instead of being redrawn piece by piece. This is useful especially when you are plotting functions that require many calculations and therefore appear somewhat slow.

2. Similarly, you may switch from graphics page 1 to graphics page 2 by using POKE–16299,0, and you may go the other way with POKE–16300,0.

3. To draw a graphics screen with a background color other than black, set an HCOLOR, plot at least one point, and then type CALL 62454. For example,

```
10 HGR: HCOLOR=6: HPLOT
   1,1:
   CALL 62454
```

4. If you have a drawing (perhaps a cover page or one that takes some time to plot), you may wish to save the picture itself instead of the program lines. You may do this if the graphics do not depend upon any variables used earlier in the program. Simply draw the picture in HGR and type:

```
BSAVE NAME,A$2000,
L$2000
```

(where NAME is any legal file name.)

If you are in HGR2, use A$4000,L$2000 instead. To see what you are typing (since there is no text visible in HGR2) hit CTRL-RESET before writing the line above. Your picture is still in memory on the HGR2 page *unless* you type HGR2 again.

You also may want to save the program lines under a different name so you can make changes later.

To retrieve a picture saved in this manner, type the following commands at some appropriate place in your program.

```
HGR (or HGR2)
PRINT CHR$(4);
''BLOAD NAME''
```

5. A large percentage of monitors distort all pictures from the way they appear on graph paper. Most cause drawings to seem taller and thinner than you had intended them to be. If this becomes too noticeable you simply introduce an adjustment factor. To see the difference in the case of a circle, try typing in the following program. An input of 1 as the accuracy and 1 as the adjustment will show you what a circle would ordinarily look like on your monitor. By changing slightly the accuracy and adjustment factors you will get a much better picture. The actual values to use will depend upon your monitor. After a few minutes of experimentation I found that an accuracy of .9 and an adjustment of .8 worked well enough for my needs, but you should try other values to see what works best.

```
10 REM–CIRCLE–
20 HOME
   AC=1 AND ADJ=1–
30 INPUT ''ACCURACY =
   '';AC
40 INPUT ''ADJUSTMENT =
   '';ADJ
50 INPUT ''RADIUS (1–
   75)
   = '';R
60 XC=140: YC=80: REM
   CENTER
70 HGR2: HCOLOR = 3
80 I = 1 / R * AC: REM
   INCREMENT
90 FOR A=0 TO 2 *
   3.14159
   STEP I
100 X=COS(A): Y=SIN(A)
110 HPLOT X * R + XC,Y * R
   * ADJ + YC
120 NEXT A
130 FOR T = 1 TO 4000:
   NEXT T
140 TEXT
```

This circle program uses the polar equation instead of the rectangular formula $X^2 + Y^2 = R^2$. Polar plotting gives points that are basically equidistant from each other, while the alternative approach produces points close together near the Y-axis and far apart near the X-axis.

6. If a hi-res picture is included as part of a very long program that uses many variables, the graphics screen may begin to look odd. If lines disappear or shift, or you see stray dots, your program is probably overwriting the graphics page. When the program executed the line ''HGR'' it may have ruined some of your variables. You have several choices at this point. Table 1 demonstrates such possibilities.

a. Check to see if your program is written as efficiently as possible. Perhaps you can condense lines or rewrite repetitive portions. Note: This will only solve your problems if you are just barely overwriting hi-res, that is, if your program worked fine until you added to it.

b. Use the HGR2 command instead of HGR if you don't need the text lines at the bottom. Use HGR if your program isn't that large but you use many string variables.

c. If you can make a definite break, you can cut your program in two. Be sure that you need not return to the first section or pass variables between the two portions. Delete the second part of the program and save what remains *under a different name*. Load the original again and delete the first part, saving it again under a different name. At the end of the first part, add the line PRINT CHR$(4);''RUN NAME'' (where NAME is what you called the second half). This method works especially well if your picture is a cover page.

d. Reset LOMEM, HIMEM, or employ X=FRE(0) as described in the *Applesoft Basic Programming Reference Manual*.

e. The following solution is from ''Apple Mechanic,'' a utility from Beagle Bros., Inc. You may include it as the first line of a program that is giving you difficulty or save it as a separate one-line program. This loads the program above the graphics pages and changes the pointers that tell the computer where the program begins. If you don't need HGR2, change 24576 to 16384.

```
1 LOC = 24576 +1: IF
  PEEK(103) +
  PEEK(104) * 256 < LOC
  THEN POKE
  LOC–1,0: POKE LOC
  103,LOC–
  INT(LOC/256)*256: POKE
  104,
  INT(LOC/256): PRINT
  CHR$(4);''RUN
  NAME OF PROGRAM''
```

Table 1. Apple Memory Organization

DOS
string variables
HGR2
HGR
numeric variables
program lines
reserved

A simplified map of a portion of Apple's memory structure. Problems occur when program lines push numerical variables into HGR or (less frequently) string variables move down into HGR2.


NOBLE

A WONDERFUL WIZARD IS WOZ

He survived a plane crash and a rock'n'roll festival. Now Steve Wozniak is as fit as a fiddle and ready for work.

The Woz is back. The cofounder of Apple Computer, Inc., and designer of the Apple I and II computers, Stephen Wozniak, 32, is again wandering the carpeted halls of one of Apple Computer's many buildings in Santa Clara County, California. He's back designing computers after a leave that began abruptly when he was injured in an airplane crash in February 1981.

Wozniak returns to Apple at a time when the company is experiencing severe growing pains. In September the company's stock took a tumble when management announced that fourth-quarter profits might fall as much as 73% from the comparable quarter last year.

Apple blamed the decline on flat sales during the summer, two write-offs connected with changes in the company's manufacturing operations, and increased expenses for product development and the latest television advertising campaign.

Despite the fourth-quarter decline from last year, Apple predicts its net income will climb 25 to 30% for the fiscal year. One California analyst was optimistic about the company's future, because the company's financial adjustments reflect the determination of Apple's new president, John Sculley, to get rid of old problems.

Although concerned with Apple's future, as his many meetings with chairman and cofounder Steven Jobs reflect, Wozniak doesn't feel he has a management role. He sees himself as an inventor, creator, and engineer and is working long hours on projects that are part of Apple's future. They are projects that he won't talk about now.

No Holiday

The two years he was absent from Apple weren't really vacation. After he recovered from his injuries, which included a loss of memory of events after the accident, he decided to finish his college degree.

"After the plane crash, I was off work for a year, and since I had one year left to go on my degree, it seemed like a good time to finish." So that his instructors wouldn't treat him like a computer genius, which he says he isn't, Wozniak enrolled at the University of California at Berkeley under the name "Rocky Clark." The alias is a combination of his dog's name, Rocky Raccoon, and his wife's maiden name.

While finishing school, he got sidetracked into the music business and produced two US Festivals, rock concerts that were held in San Bernardino County, during the summers of 1982 and 1983.

Wozniak returns to Apple at a time when the company is experiencing growing pains.

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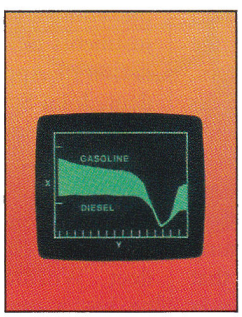
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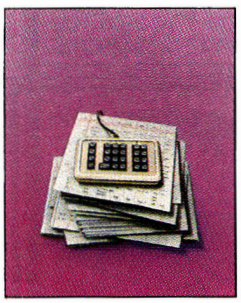
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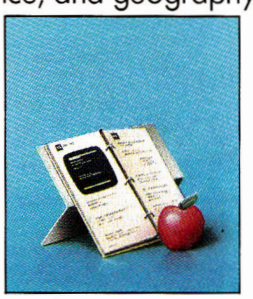


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set up to run the festivals, UNUSON, lost a reported $10 million on the concerts and has two lawsuits against it totaling $15 million, Wozniak plans to put on one more in his life, "unless my life is short," he jokes. "I realized all the incredible things that we did so well that I'd like to do it again. But we need to consider how to make money."

Apple History

Money didn't concern Wozniak seven years ago when he invented the first Apple computer. Putting together a new sophisticated toy for his computer club did. "I didn't know the time was right for a big company," he says as he sits in his small office in the corner of one of Apple's buildings in San Jose. He speaks softly to avoid disturbing other workers. "The computer was not designed as if it would be for a company. It was just to show off at the computer club."

But Steven Jobs went up to Wozniak and said, "Why don't we sell part of it? I think people would be interested in it," and the rest of the story is history. With a few hundred dollars and a year's work in a garage, a computer company was born.

"Steve just wanted to have a company," says Wozniak. His casual dress—blue jeans, pressed white long-sleeved shirt, no tie, running shoes, and a belt buckle with the Apple logo—reflect the relaxed atmosphere in which the Apple employees work. "He was a nontechnical computer user. I was the engineer. We had a person specializing in manufacturing, another in marketing. The right group of people got together at the right time."

'In my computer-science classes, I was disappointed at how the department has formalized its approaches to problem solving.'

Making money was not the top consideration. "We mostly just believed what we were doing was good," says Wozniak, whose brown eyes are all but hidden behind glasses and dark brown hair. "We didn't know where we were going, and we came close to folding." He raises his eyebrows momentarily and folds his hands in front of him, resting his elbows on the chair's arms.

"There's still a lot of that in the company—the motivation in believing that we're doing something for people."

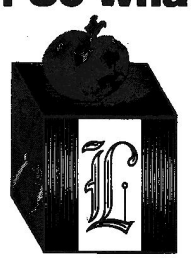
Social Change

His two years away from the company haven't changed that point of view. Wozniak thinks that Apple's primary markets are the home and the school. After lobbying successfully for changes in California's tax laws that would give the company a tax break, Apple gave 9000 computers to schools.

"I've always been concerned with how computers can be used in education and how they fit into the socialization process in the home. Business is not where major social change is happening. People in homes and kids in school are where the social changes are. The importance of that is that it is only possible with inexpensive computers. Before, business could afford them and was using minicomputers. But now everybody can afford a computer," Wozniak says.

In his own home, the computer fit into Wozniak's image of himself as an inventor. "When I was younger, I designed 50 computers for myself that I could never build because I didn't have the parts."

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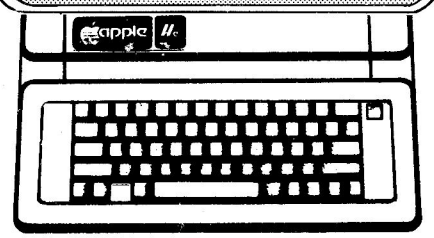
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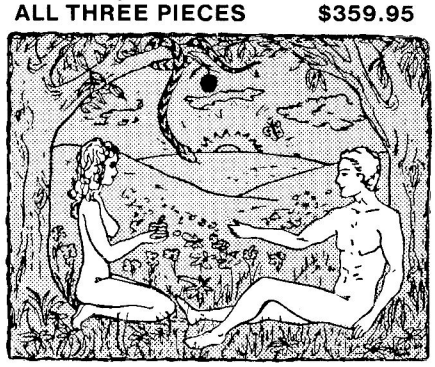
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And when he was fooling around with the machine that eventually became the Apple I, he didn't think about what features he wanted on a personal computer; he thought in terms of "what chips I could afford. I was thinking, 'I only have a few bucks to spend, what can I do?' "

Out of that situation came the Apple. With the company getting so large, and after his exposure to college computer courses, Wozniak has a greater concern for where and how the creative ideas will develop in the future.

"Within the corporate structure of Apple, there are so many complaints from the people who were involved in the early transition that now we can't do a project unless it's recorded on 20 sheets of paper."

Because he's sensitive to engineers who want to go off and tinker on some new project, Wozniak thinks he'll be able to influence the company to loosen its grip on engineers' time and projects. After all, Wozniak was working at Hewlett-Packard when he got the idea for Apple. He checked it out thoroughly with the company before he continued working on the machine. Hewlett-Packard queried its managers and gave Wozniak a legal release to do what he wanted with the project.

Creativity Fades

Wozniak is also concerned with how schools foster or hinder creativity in their students. He isn't very optimistic that today's computer-science students are being taught to think creatively.

He believes intelligence is distributed throughout the body.

UC Berkeley doesn't have as creative an atmosphere now as it did in 1971, the last time he attended the school, according to Wozniak. The computer-science department is more established, and there's not as much thinking going on about the approaches to take to solve problems.

"In five years, the whole area of what you can do with personal computers will be so formalized that a student will be taught not only the problem, but also the solutions," Wozniak says. He maintains that there's not as much creativity in that method as in the method in which he learned, which was to be self-taught.

"In my computer-science classes, I was disappointed at how the department has formalized its approaches to problem-solving in the last ten years. You study problems that have standard approaches to the solutions. I could not get good grades by being clever. I had to do it by studying hard, by learning the given solutions. If I found a new way to solve the problem, it was not acceptable."

Problem Solving

He says he would like to see universities concentrate on teaching students the computer's basic working tools—the languages and the techniques for connecting them. That way, students can find their own way to the solution with the tools at hand.

"For instance," points out Wozniak, "in watching my son grow, I know that the way he learns best is by discovering the solutions himself. When he's motivated to go to a goal, he'll learn the best way to get there, but not because he's taught. The best teacher I can be is to be a collaborator, a friend. I'm not going to teach him the solution."

Although the courses at Berkeley generally reflected state-of-the-art technology, Wozniak thinks that the formal

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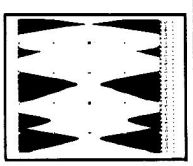
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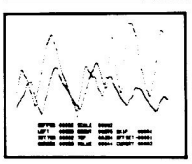
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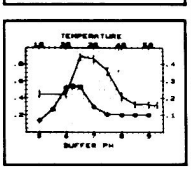


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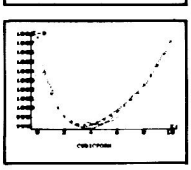


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CIRCLE 195 ON READER SERVICE CARD

approaches to problem solving didn't take advantage of the rapidly changing computer technology, which might not have the chance to get into textbooks.

"The most fun I had in a computer course was when a professor who was working on a problem involved everyone in the search for the solution. He was looking for the solution instead of teaching it," Wozniak says. He pauses and thinks for a moment. "That kind of education can exist today, but I don't think we will see much of it in the near future. The problem is that academics can't really change much, because they are so set in their ways of teaching and learning that their minds tend to be closed to potential new paths of acquiring and storing knowledge."

Body/Mind Dichotomy

But, as he points out, nobody knows how or where memory is stored. One of the latest theories of learning suggests that every cell in the mind contains the entire knowledge of the brain. The model Wozniak favors is that learning can be done and stored by neurons in the muscles as well. He believes intelligence is distributed throughout the body.

"For instance, if you think about playing Pac-Man, it is your hands that learn the game," says Wozniak as he moves an imaginary joystick with his fingers. "When your head gets in the way, you don't do as well. In some types of learning, a task is only learned if motor control is involved. You learn how to move your hand because you see it move. You can't learn how to move your hand by watching someone else move his or hers."

Wozniak thinks academic inflexibility and financial limitations have resulted in today's educational paradigm. In most public schools, everybody learns at the same speed and gets tested for a grade at the same time. "When one professor lectures to 500 university students or one teacher is responsible for 30 grade-school kids, a subject can only be taught in rigid ways. It's difficult or impossible for a student to proceed at his or her own pace."

The problem is that academics can't really change much.

The Future Works

The computer, especially the microcomputer, is changing that. Wozniak likes to look into the future. "Imagine an elementary class with 30 computers, each of which costs no more than a couple of books do now. Instead of students having to learn the same data at the same time, each student can proceed at his or her own pace.

"The computer is the first technological tool that can adapt a learning experience to the understanding and pace of the individual student. It can allow a student to select a given learning goal and the computer will determine the time to reach that goal. The goal is fixed, but the the time spent is variable. There's no way today that a teacher can achieve that kind of flexibility."

Because the educational community is resistant to change, Wozniak thinks it will be 20 years before computers will be used extensively in education. But the technology will be available within 10 years.

"Strange things are happening. The cost of memories is going down so fast. It used to be that 4K was the environment you had to design for. Then it was 16K, now it's 64K. Obviously soon you'll be able to get a megabyte for 40 bucks. And then you'll start supplying a sophisticated software system that will

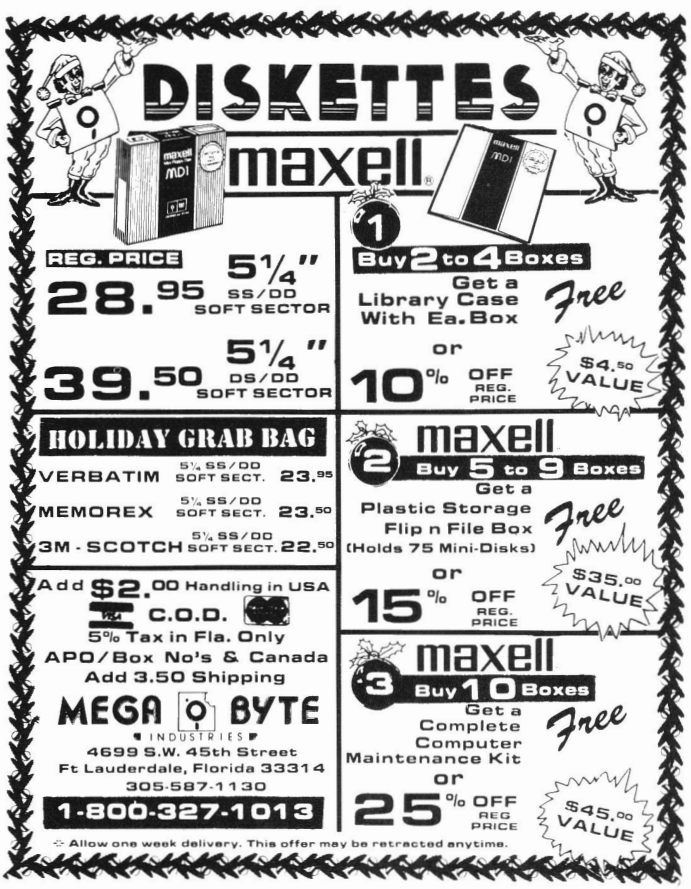


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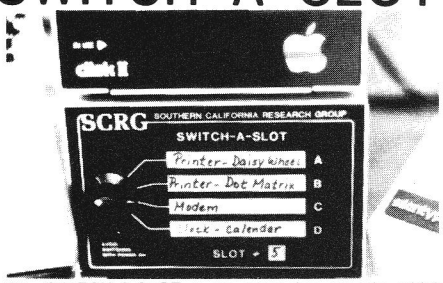
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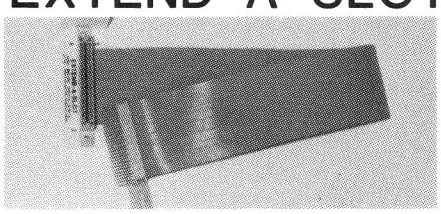
This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

- Allows up to four peripheral cards to be plugged into one peripheral slot.
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- Only selected card draws power.
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- Saves wear and tear on delicate connectors.
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- Accommodates cards up to 10¼" long.
- All connectors gold plated.

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SWITCH-A-SLOT and EXTEND-A-SLOT work well with all slow to medium speed cards, such as Modems, Printers, Clock, 80 Column, Music, etc. They are not recommended for high speed data transfer devices such as disk drive controllers, alternate processor, and memory cards.

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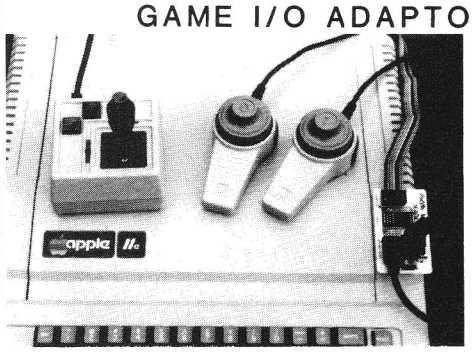
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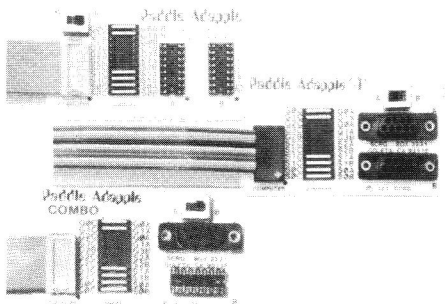
DMAnual controller allows all this while programs are running. Commands can be issued (via push-buttons) in the middle of a program, and the desired result occurs immediatly. The process used (known as CYCLE STEALING) allows immediate execution of these commands without interfering with the normal operation of the program. The card is slot independent, and is connected to a control panel by a four foot cable. DMAnual controller is fully described in the book "UNDERSTANDING THE APPLE][" by Jim Sather (copyright 1983 by Quality Software).

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be commonplace on personal computers. As it gets more complex, the computer will be easier to use. For instance, it takes a very large program to understand either typed or spoken language. When it does, the machine is somehow easier to use. It's not like a more complex machine means it gets more complicated for the user."

When will that easy-to-use machine be around? Ten years, says Wozniak. In ten years, instead of communicating with a machine through our fingertips on a keyboard, we'll be able to give it verbal commands that it will translate into charts or graphs or right answers or wrong answers.

Artificial Intelligence

In the meantime, Wozniak will be learning more about how the mind and body work to apply it to his inventions. "I want to study artificial intelligence—not what's taught today, but totally radical approaches only. I'm not smart enough to understand the developments in artificial intelligence today. I'm going to go after the nice easy things that might result in a machine that learns. Artificial intelligence is the tie, the link, between psychology and the computer."

He also plans to study more psychology, particularly memory and cognitive development. "I want to research the possibility that memory is stored in teeth or other calcium structures. It doesn't sound strange to a microelectronics person that crystalline structures store memory—so why not teeth?"

But Wozniak's major concern now is his work at Apple, and making sure the company stays on top of developments in the industry and is one of the five or ten that he thinks will survive the computer industry shake-out.

Not only does he see major changes in the types of products his company and others will offer in the next few years, but, through education and business applications, he sees large changes in the social structure as well. He gives one example: "Suppose you carry a version of your business card around in your pocket. It has a code on it that allows you to choose when you want to get your salary.

'I want to research the possibility that memory is stored in teeth or other calcium structures.'

There's a computer in a wall, that prints out a check anytime you want one. It figures out taxes and deductions to that point in time. It's a totally flexible system. It can't be done by people alone—only a computer can do it. And it can be done today."

But a system such as that won't develop quickly in companies. We're used to structures in society because we've been brought up with those structures, according to Wozniak. Even though they may be cumbersome in today's world, with today's technology, people will tend to resist change because they're comfortable.

Small Projects

Wozniak's part in the development of all this will be small, he says. "I tend to work on small projects. I'm not involved in the ten-person-year type projects. I'm doing hardware design and microcodes."

He works simply, in a small office that's no larger than the other engineers' offices on his floor and has no personal secretary. He uses a common message-center operator and returns his own calls. He lives a philosophy of life that he is always applying to his work: "For myself, I'm always trying to do more with less." ✚

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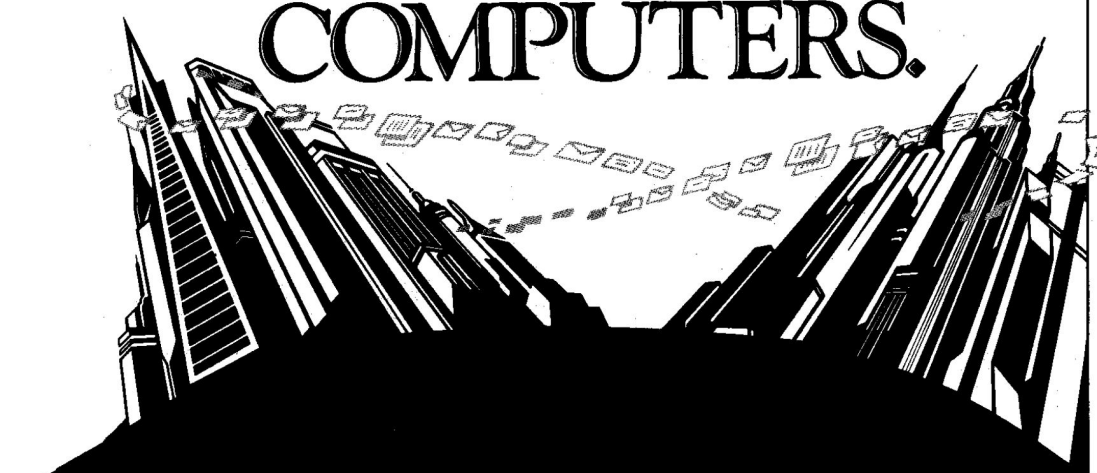
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CIRCLE 123 ON READER SERVICE CARD



AXIS ASSASSIN

Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
List Price: $35.00
Requires: 48K, Apple II, Apple IIe, or Apple II+, and joystick.

CIRCLE 400 ON READER SERVICE CARD

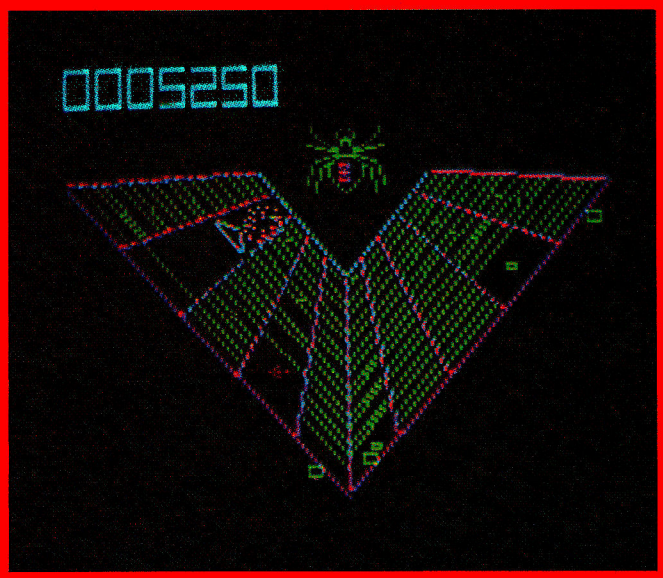
Somewhere across the galactic grid of time lives a giant, green spider called Master Arachnid. He resides in the center of an extensive purple and green web, and controls an army of geometric-shaped terrors. Although the universe does not seem to be in immediate danger, this sinister space spider must be exterminated.

Axis Assassin, a disheartening arcade game, turns you into a white triangle and places you on the trail of the Master Arachnid. With three lives and unlimited firepower, you jump from web section to web section in pursuit of the senior spider. After surviving 20 web sections, you advance to a more difficult level which increases the speed of the Master Arachnid's army. Your secret weapon is one Pulse Bomb per web section. When detonated at the precise moment, this multicolored missile destroys all fighting units and whisks you through a time portal to the arcade arachnid's nest. Here, in the void called "free space," you break through the nest walls, enter the nest, and rescue a fellow assassin.

Joystick controls are very responsive in the web sections. Movement in the four directions is instantaneous, and pressing the firing button detonates a veritable submachine gun. However, in the "free space" near the nest, joystick controls are deliberately sluggish. Although your responsive forward speed remains the same, turning left or right is so futile that it can be equated with sliding on ice. Furthermore, your shots travel slowly, causing your submachine gun to resemble a muzzle-loading musket.

A grand finale?

Oddly enough, once you obliterate the army of spores, spinners, hunters, robot drones, mutant guards and "Xterminators," you are unable to assassinate the Master Arachnid. Each time you shoot the terrible tarantula, he sends another unit of his army after you. A lesson in frustration, the only method an axis assassin can use to destroy this spider is by turning off the computer.



The graphics are spectacular. Each of the 20 different web sections fades into the distance in perfect perspective. Shaped like Vs, Ws, and other angular, geometric planes, these purple frameworks are the battlefields. Arched, purple spinners weave horizontal, green strands across the framework. Diamond-shaped, orange hunters attack like kamikazes while square, green robot drones block meticulously the remaining areas of the framework. Circular, blue spores advance to the edge of the web, then split into two, square, orange mutant guards. In the nest area, a superbly crafted Master Arachnid fidgets within the walls.

Sound effects consist of the usual buzzes, erps, and dings as the webs are strung, the army units are zapped, and assassins explode.

The game suffers because the player becomes apathetic. It doesn't matter how many web sections you cross, how many army units you zap, or how many times you reach the



nest. After fighting the hordes of underlings, you want to destroy the big, green, computerized spider. Unfortunately, you cannot assassinate the arachnid. What are you sent to exterminate? I don't know, but this lack of purpose and reward represents a real shortcoming in the game.

Although most graphics are excellent, the player, a white triangle, resembles a trinket hanging from a charm bracelet, rather than an assassin. I would prefer a sinister-looking spaceship, or a little man dressed in black who is holding a Walther PPK pistol etched with 007.

What are you sent to exterminate? I don't know, but this lack of purpose and reward represents a real shortcoming in the game.

A half-sheet of paper and a few paragraphs inside the album are inadequate as the rule booklet. I prefer documentation with organized sections, step-by-step instructions, and some examples of play.

The game allows you to pause during play, begin at more difficult levels, eliminate the sound effects, and play a slow, demo game with each army unit. The game does not save high scores on disk.

Axis Assassin is lightning fast and full of graphic excellence, but offers no reward for a player's effort. Indifference creeps in as you use a gatling gun to mow down wave upon wave of army units sent by the immortal Master Arachnid. *Axis Assassin* exterminates excitement and should be retired without a pension.

by Russ Lockwood

PINBALL CONSTRUCTION SET

Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
List Price: $40.00
Requires: 48K RAM, Apple II, Apple IIe, or Apple II+, and joystick

CIRCLE 401 ON READER SERVICE CARD

Tired of zapping a billion space terrors, or of gulping enough dots to get digital indigestion? Long for the halcyon days of the pinball parlor when body English meant more than frenetic button-pushing or joystick-twisting?

Wait no longer. *Pinball Construction Set,* by Bill Budge, transforms your Apple into an exciting and challenging pinball machine that does everything except swallow quarters and tilt.

The emphasis is on designing and building your own pinball game. Starting with a blank board and basic set of parts, you use a joystick to manipulate a little hand that picks up bumpers, flippers, targets, ball hoppers, rollovers, and other parts and place up to 128 of them anywhere on the board. You can exchange, replace, delete, or add parts at any time simply by activating the hand.

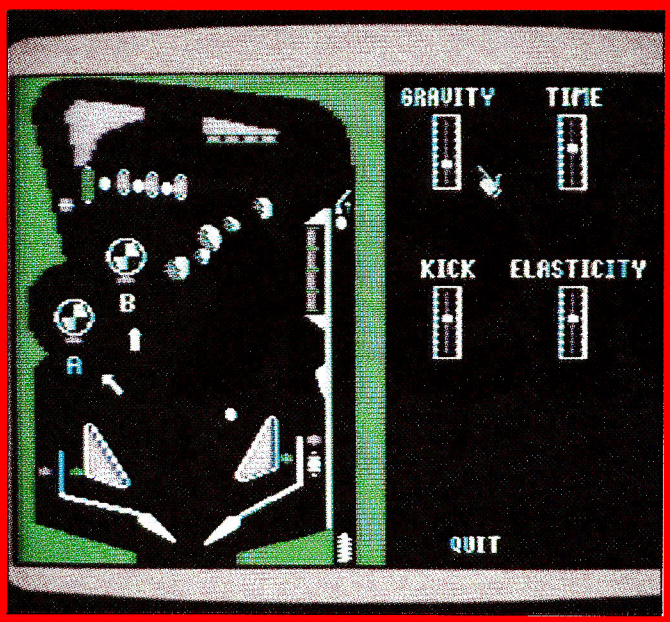
For more excitement you may change the shape of the board. Using an arrow, you can stretch and pinch the angles of certain parts, called polygons, to form an infinite number of shapes. A hammer increases and scissors decrease the number of angles per polygon. A paintbrush allows you to color a polygon white, green, orange, purple, or blue.

For fine details, you can use an on-screen magnifying glass to enlarge a portion of the board. Inside the magnified area, you can color and change any pixel, which leads to many possibilities including invisible flippers, imitation bumpers, and attractive artwork.

Personalizing Your Board

Much of the excitement in designing your own board is the repair of inevitable errors. You'll be surprised when misplaced parts cause balls to get





trapped between bumpers or prohibit balls from ever striking drop targets. I designed a magnificent board and found that a misplaced polygon prevented the ball from ever leaving the chute. After I removed the offending part, the board performed as expected, leaving me a little wiser and happier.

As you build your board, you can test the design by activating a ball and flipper symbol. This feature allows you to play one ball, which permits you to discover misplaced parts.

After completing the board layout, you can use an on-screen screwdriver and pliers to tinker with the scoring values, the sound each part makes when struck by the ball, and the targets that must be hit to gain bonuses. Furthermore, you decide the activity of the game by varying the weight and speed of the ball, by deciding the "kick" bumpers will have, and by determining the "bounce" of the sides, flippers, and polygons.

As always, changing your mind is as easy as pointing your computerized finger. Unfortunately, although grabbing the parts with the hand is simple, the joystick controls are slightly skittish, and practice is required to place the parts precisely. The magnifying glass function also requires attention, especially when you're trying to color the pixels.

The graphics display is excellent because you shape and color the board. Each screen is split in half with the left side containing the pinball board. The right side shows the parts, the score, the magnified area, and other functions activated by the little hand.

Sound Effects, Instructions Increase Game Potential

The game recreates faithfully the whistles and bells of actual pinball machines. You cannot create your own sounds, but you can pick a programmed sound and assign it to a particular target. The sound can also be eliminated entirely.

The 16-page rule booklet represents a major advancement for Electronic Arts instructions. Packed with examples and written in an informal style, it provides a good step-by-step guide to using the program. The booklet notes that 40 games may be saved per disk side. A disk-sized card lists a summary of commands.

The game, whether your creation or one of five preprogrammed games, is dependent upon your set speed, gravity, and other parameters. In general, play is fast and controls are sharp. You can adjust the tension of the ball launcher and can even watch the "spring" contract and expand. Flippers respond quickly to the touch of a joystick button and can catch and hold a ball. Bonus targets light up when hit, drop targets descend, the magnet pulls the ball off course, and the spinner actually spins.

Pinball Construction Set will delight the hard-core pinball fanatic as well as the occasional player. It mimics successfully an actual pinball machine and its build-a-game feature should provide years of designing original and creative games. The uncomplicated format, fine graphics, fast play, and exceptional design make *Pinball Construction Set* a quadruple bonus.

by Russ Lockwood

STAR WARRIOR

Automated Simulations, Inc.
P.O. Box 4247
Mountain View, CA 94040
List Price: $39.95
Requires: 48K, Apple IIe or Apple II+.

CIRCLE 402 ON READER SERVICE CARD

The evil governor, backed by the full power of the Stellar Union, is plundering the conquered planet of Fornax. In desperation, the Fornians summon the moral mercenaries of the galaxy, the Furies. Each arsenal of democracy possesses the firepower of a battalion, yet uses this awesome force to uphold the rights of the downtrodden. In response to the Fornian people's cry of distress, this organization of knights-for-the-needy sends two freelance fighters to save the planet Fornax from Unionism.

Star Warrior turns you into one of the Furies. As a paladin for pay, you choose one of two missions, each with five levels of difficulty. The first, Diversion, is pure firepower. You blast every enemy vehicle and destroy every military installation until recalled. The second scenario, Nuke the Gov, makes you a veritable assassin. You track the tyrant down using sensors and then shoot his installation with nuclear missiles.

Beginning the Play

To accomplish the mission, select one of four suits of powered armor: dragoon, marauder, ninja, or the custom-built model. Each suit contains armor; force field; nuclear missile launcher; powergun; blaster; sensors; and jump, flight, and medical subsystems with decoys optional. Of course, Furies wear white.

You move, fire, and perform other functions by entering one-letter commands. The greater the level of difficulty, the faster you must respond to the game's promptings. The program's quick response time is marred by a slight hesitation while moving from one screen to the next. If you turn the sound off, the speed of play will increase dramatically.

There are nine types of conventional military units at your command: light aircars, heavy aircars, hovercraft, heavy tanks, robot tanks, rapid-firing "mauler" tanks, infantry platoons, "nitron" artillery, and rapid-firing "catarask" artillery. Installations such as civilian towns, military reserves, or military forts are able to fire shots at you. During play, a maxi-

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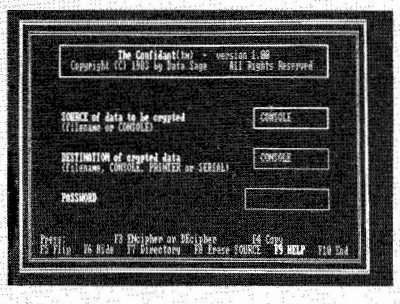
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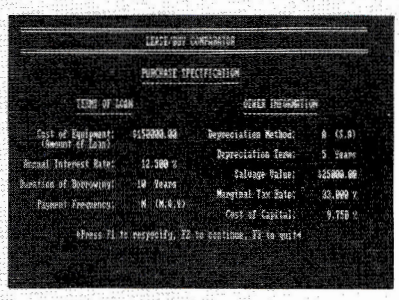
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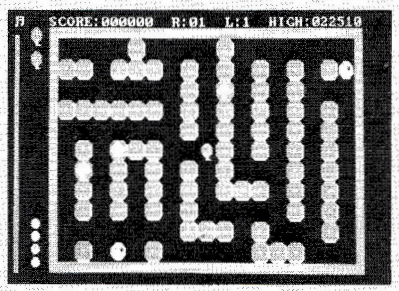
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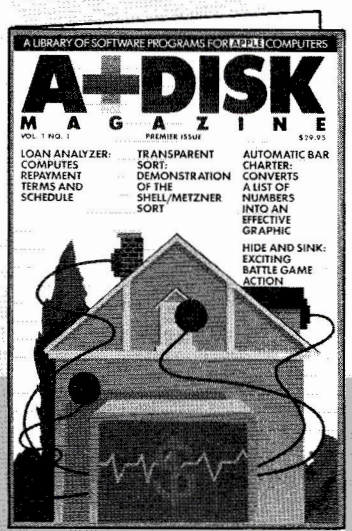
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mum of one unit and one installation is on the screen at any given moment. This gives you a tremendous advantage. Instead of swamping you with their numerical superiority, the units attack piecemeal and become easy targets.

Each screen displays a status report for one square kilometer of the 63-square-kilometer playing area. The report lists damages, direction, energy and missiles left, time, and nearest enemy unit.

Star Warrior's graphics range from dazzling to dreary. Swamps are a putrid green, snow-capped mountains appear as white triangles with a crack, green forests look as if they've been ravaged by gypsy moths, and clear terrain is a basic, black blank. Civilian towns and military reserves are beautiful skylines, but the forts squat like melting scoops of mint ice cream. "Nitron" artillery is sculpted majestically, "maulers" appear sinister, and an infantry platoon resembles a group of soldiers. While the other units are detailed sufficiently, the hovercraft is an aesthetic wreck, akin to an Edsel after a demolition derby.

As a larger-than-life figure, the white knight, Fury, is greater in size than anything on the screen, including tanks, skyscrapers, and mountains. His favorite color is purple. He shoots purple rays, which register purple hits, and, in turn, raise a purple curtain that destroys a unit or installation. As the knight is flying, purple flames spew from the twin nozzles of his jet pack.

The sound effects contain the usual buzzes, erps, and dings representing explosions, blaster rays, and flight. After a while, the sound effects grate on the ears—turning off the sound saves headaches and speeds up play.

A 32-page rule booklet contains thorough instructions. Profusely illustrated, it provides numerous examples with hints intended to help novice Furies tackle the missions. A card provides colorful and detailed maps of the terrain in each scenario. For some reason, the card has mountains printed in blue and swamps in brown.



For some reason, the card has mountains printed in blue and swamps in brown.

Frustrating Furies and Nuclear Missiles

Star Warrior is about as exciting as watching spaceships rust. Strategy and tactics are not required in play, as blasting units and nuking forts becomes tedious and unchallenging. Like Pavlov's dog, you punch the appropriate key whenever the governor's keystone cops appear. Despite claims that level five "is designed to be almost impossible to win" and that the company is "still waiting for the first player to break 2000 points," I completed my tenth play with a score of 3691 points while wearing a custom-built suit in level five of Diversion. So much for challenge.

The huge Fury figure on your screen faces one direction and tends to confuse and distract you while you search for the heading of the status report. The figure adopts a different pose while flying, yet it continues to face in the same direction.

Nuclear missiles fire in eight directions, which is ridiculous because other weapons fire in all directions. This forces Furies to spend valuable turns maneuvering into a firing position.

It is equally frustrating to differentiate between a civilian town or military reserve. Although the installation is firing and hitting you continuously, sighting it can take several turns, which wastes time and tries one's patience.

Star Warrior can make you furious, especially when you consider all the different games you could have been playing. Slow and monotonous with little suspense, this game offers only fury that fizzles quickly into black hole boredom. *Star Warrior* warrants the rank of private.

Russ Lockwood

TEMPLE OF APSHAI

List Price: $39.95
Requires: 48K RAM, Apple IIe or Apple II+
Automated Simulations Inc.
P.O. Box 4247
Mountain View, CA 94040

CIRCLE 403 ON READER SERVICE CARD

In an age long past when reputations were earned by quick wits and even quicker swords, the road to fortune and fame twisted through corridors and rooms of ancient, enchanted ruins. Bold adventurers battled gruesome monsters and evaded traps in order to seize gold, gems, and magical artifacts. One underground complex, tunneled by the followers of insect god Apshai, acquired its own reputation—the maze of Death. Only the bravest or most foolhardy dare to enter the leg-

endary temple.

Temple of Apshai, a fascinating and challenging sword-and-sorcery fantasy game, puts a gleam in your eye and a sword in your fist as you explore 233 rooms of a four-level, underground labyrinth. With sword, shield, and bow, you fight antmen, ghouls, giant fire beetles, and 20 types of monsters in your search for 80 types of treasure and artifacts. Even without monsters, the subterranean passageways are dangerous, containing concealed pits, spears, guillotines, and other traps.

Game Play

The quest starts at an undistinguished inn where the computer generates your character's attributes—intelligence, intuition, ego, strength, constitution, and dexterity—or allows you to load in a character previously saved on disk. Unfortunately, if the computer generates a 98-pound weakling, you must reboot to get different attributes. Your character's name may be as long as 12 letters.

At the inn, you bargain for equipment—sword, shield, bow, arrows, armor, and healing salves—with the tightwad of an innkeeper. If you bid too low, the innkeeper tells you about the fine workmanship or his hungry children, then suggests a price and asks for a new bid. If you bid too low, the innkeeper replies, "I spit on thine offer!" or, "A pox on thee!" and other indignant retorts. When a bargain is struck, the innkeeper responds, "DONE!"

After being outfitted with equipment, you choose your starting level in the temple. The higher the level, the more fearsome the monsters and the greater the treasures. You move about the labyrinth using one-letter commands for direction and numbers for speed. Fighting and special tasks such as searching for traps, grabbing treasure, or looking for secret doors use one-letter commands. You may save characters and unfinished levels on disk.

You might consider mapping each level on paper to avoid getting lost. Since you must exit the temple from where you entered, a map will help you retrace your steps and save time, energy, and unnecessary fighting. When reentering the temple, you can ignore the rooms ransacked previously and head toward the unexplored sections.

At the inn, you bargain for equipment—sword, shield, bow, arrows, armor, and salves—with the tightwad of an innkeeper.

Should your character die brutally, do not despair, fate may yet intervene. Three of the dungeon denizens, Benedic the Cleric, Olias the Dwarf, and Lowenthal the Wizard, possess the power to resurrect. If you accept their magical assistance, you will return from the dead. In return, you must give them gold, treasures, or artifacts.

Instructions, Graphics, Effects

The 56-page rule booklet provides excellent descriptions and good instructions. Filled with illustrations, 40 pages describe the temple, the monsters, and the treasures. During play, you can read the paragraphs which detail the sights, sounds, and smells of each room and corridor. The instructions explain every command except V, vault 24 feet. Presumably a running long jump, it can be utilized only once. Things get tricky and dangerous when you vault over a pit on the way in, but can't vault over it on the way out.

Each screen displays the room you occupy, the surrounding area, and a status report. The report lists the room number, your health, the number of arrows remaining, and how many monsters you've slain.

The graphics are adequate. The temple itself is visually unexciting, with blue walls enclosing large amounts of blank space. The little man representing your character carries a sword and faces in the direction he is traveling. When attacking, he thrusts the sword toward the monster and is rewarded with either a "swish!" (miss) or a "crunch!" (hit). All monsters appear to fit their menacing descriptions except the giant rat, which looks like a cute white mouse. White squares represent treasures, and flickering white squares represent traps.

You also get a choice between standard and Old English letter styles. While standard is readable, Old English becomes a large blur and causes severe eyestrain.

The sound effects are a cut above average. Although the usual whines and dings signal traps and monsters, the raspy sound of your footsteps echoes effectively off the walls. Better yet, the crunching, marching beat quickens as you increase your speed from a walk to a run.

Response time is quick, and leaving a room causes only a slight hesitation as a new room forms on the screen. Movement, battles, and special task commands are acted upon instantaneously. During the battle, the pace is so exciting and hectic that you find yourself as involved as your character. Luckily, the game contains a pause feature.

Temple of Apshai challenges your wit as well as your reflexes. You become involved thoroughly, especially when haggling the innkeeper or battling past monsters. One begins to feel a sword skewer an antman, or the gold run through your fingers. *Temple of Apshai* will answer your prayers for exciting and imaginative fun. ✚

Russ Lockwood





GAMEMASTER

GameMaster Corp.
1723 Howard Street, Suite 219
Evanston, IL 60202

List Price: $40 for complete membership package.

Requires: 300-baud modem with Apple II, Apple IIe, or Apple II+.

CIRCLE 450 ON READER SERVICE CARD

The House That GameMaster Programmed

The house is an electronic meeting place combining the friendly atmosphere of a neighborhood pub with all the excitement of a fun house. You can chat, play a few games, and learn a thing or two while calling the house with your home computer. After you travel the phone lines and through a modem, the GameMaster's mansion can become more fun to visit than grandmother's house.

GameMaster runs a six-story, 35-room electronic mansion containing gaming, information, and communications services. The mansion is housed inside an Alpha Micro computer and can be accessed via a 300-baud modem 24 hours per day, seven days a week. Promoted as a "forum for creative interaction," the service has attracted almost 400 members since its inception four years ago.

The introductory documentation contains a map of the rooms in the mansion and eight pages of relatively thorough instructions. An optional 50-page manual contains the rules, charts, maps, and other useful information needed for playing the games.

After you log in, a "doorkeeper" will escort you into the main foyer, sign you into the guest book, and announce your arrival on the public address system. From the foyer, you can change the name the doorkeeper uses to announce you, check the guest book, or move to another room. The foyer also contains a call function that directly connects you to the GameMaster staff if you experience system problems.

Movement is accomplished in two ways. You can either "walk" through the mansion by giving directions—F for forward, L for left turn, R for right turn—as in an adventure game, or you can activate a portal that will beam you immediately to any room in the house.

The first room to enter should be the mailroom. Besides letting you check your electronic mailbox or pay your bills with a credit card, it contains the latest messages from the GameMaster staff and lists which rooms have been closed for "remodeling." During a recent visit, five of the 35 rooms were closed for repairs.

Let the Fun Begin

All games are located in the basement. The basement is divided into nine rooms—mind, board, club, locker, state, war, engine, time, and chamber—with each room containing games of a certain theme.

The newly remodeled mind room is somewhat bare, containing only an anagram contest. The board room contains games played on boards, and so far has chess and backgammon. No solitaire versions are available, and you must have the actual game in your possession because the computer will not display the board on screen.

The club room caters to card players, with solitaire, blackjack, a bridge tutorial, and two creations called Rac-up and All/None. Football and baseball are found in the locker room, each featuring real-time play and solitaire versions.

The state room contains one game—*Diplomacy*. Although actually a board game, *Diplomacy* requires seven players and emphasizes player negotiation and interaction. Game turns are submitted every three days. Set against a backdrop of pre-World War I Europe, the game lets you perform your own version of shuttle diplomacy and enjoy a game of international politics.

The war room takes you from the smoky backroom to the smoking battlefield. Gamers can choose *Nuke Strike*, a two-player game of nuclear war with ICBMs, ABMs, and spy and killer satellites; or *Destination Midway*, a two-player simulation of the World War II naval battle in the Pacific.

The engine room contains real-time transportation games that test your power to juggle schedules and to make profits. *Makin' Tracks* puts you in charge of a railroad, *Eighteen Wheeler* provides you with a cross-country trucking firm, and *GM Air Freight* gives you an airline company at your disposal. The room also holds a flight simulator, which makes you a pilot on final landing approach, and an in-house creation called *Oil Baron*, which gives you control of an oil drilling firm.

The time and chamber



rooms contain adventure games. In *Mini-Dungeon #1*, you are a warrior on a quest for an artifact, but only have a limited amount of time to explore a labyrinth and grab treasures. The *World of Eamon* contains ten adventures, and if you do not complete a particular adventure, you can set up a ''gaming file'' to store your character and his imaginary land. *Caverns* is another adventure game, which, after you obtain the treasure, asks you to find a ''passport'' that will transport you to a sequel adventure called *City of Rashkar*.

GameMaster Incidentals

If you didn't buy a copy of the 50-page manual, you can find the rules to all the games in the library balcony. A printer can be used to obtain a hard copy. While GameMaster emphasizes interactive game playing, the mansion also contains several information services and four bulletin boards. The library contains all documentation, including game rules, system instructions, and room descriptions.

The kitchen contains 62 recipes for drinks, appetizers, salads, desserts, and main courses. However, not all the delicacies are especially savory. Consider a most unpalatable entry under appetizers called Frog ala Peche. Take one filleted frog, place on top of half a peach, and smother with creamed salamander eggs. Yum–Yum—Kermit on a float.

The pantry, which is a short hop from the kitchen, provides a large spice chart suggesting which of the 48 listed spices will enhance a particular dish. Perhaps a parsley sprig in the frog's mouth would help spice the Frog ala Peche.

The banquet room lists restaurants in the Chicago area, the greenhouse offers gardening tips, and the junk room contains absolutely nothing. The observatory, logically located on the top floor, provides a daily horoscope and biorhythm chart.

The classroom tests your knowledge by giving quizzes on math; vocabulary; spelling; music trivia; state capitals; and the Spanish, French, and German languages.

The newsroom provides updates concerning the *City of Rashkar* adventure game and also lists bulletin boards outside the mansion in the (312) area code.

Four bulletin boards are scattered throughout the mansion. Two of them, the bulletin board and the magic blackboard, contain messages of a general nature. The board in the basement is strictly for game-related information, and the darkroom has a board for photo enthusiasts.

GameMaster also offers two communications services: electronic mail and ''live'' conversation with up to six other people. Electronic mail permits you to send a letter as long as six lines with 80 characters per line to any mansion mailbox. ''Live'' conversations are held in the public parlor, any game room, or in one of three private conference rooms.

Fees, Expenses, and GameMaster's Future

GameMaster charges a reasonable $10 registration fee, which includes introductory documentation, three hours of connect time, and $3 per hour to use the system. Members who prepay for their connect time receive 10% more connect time as a bonus. Those who do not prepay are charged a $3 per month minimum. The rules manual costs $15 plus $2 postage. GameMaster offers a complete membership package containing introductory documentation, a rules manual, and eight hours of connect time for $40.

An electronic mailbox costs $1 per month and gaming files require a one-time $1 fee. A GameMaster newsletter is sent free of charge to all members.

GameMaster holds contests to give away connect time. A crossword puzzle in the newsletter, with clues given through the mansion's public address system, can net $75. Grabbing artifacts in *Mini-Dungeon #1* can net clever adventurers $0.10, $1, or $10 in time per artifact.

The biggest expense is reaching out and touching the mansion.

The biggest expense is reaching out and touching the mansion. GameMaster does not use Tymnet, Telenet, or its own net and must be accessed through Ma Bell's lines. Evanston is near Chicago and, according to the phone book, a direct-dial call from New Jersey to Chicago during the evening hours of 5 P.M. to 11 P.M. will cost $0.37 for the first minute and $0.26 for each additional minute. That comes to $15.71 for the first hour and $15.60 for each additional hour. Calling after 11 P.M. or anytime on Saturday will cost $10.86 for the first hour and $10.80 for each additional hour.

Future Franchise?

GameMaster wants to franchise and have similar mansions in every major metropolitan area. This would allow members to visit using local calling numbers and could make the GameMaster mansion as popular as that fast-food restaurant with the golden arches. So far, GameMaster has no takers.

GameMaster is concentrating on marketing and franchising the mansion and generally maintaining the rooms that are open, so new products are not expected to be available in the near future. Games under development include: *Starship Commander*, a five-player, real-time, high-resolution graphics game of space travel; *Eagles over Britain*, a two-player simulation of the Battle of Britain in World War II; *Medieval Conquest*, a ten-player game to declare yourself king; and a high-resolution graphics game of *Battleship*.

In a manor of speaking, GameMaster could start an electronic cottage industry if its ambitious franchise plans succeed. At a very reasonable price, it offers a good selection of multi-player games and valuable peripheral services such as bulletin boards, live communications, and electronic mail. If you can visit without paying long-distance charges, the GameMaster's mansion may well become your home away from home.

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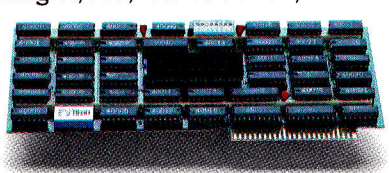


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HOW TO dBASE II

PART II

In a tutorial series on dBASE II, a popular program for database management

In the last issue of *A+*, we explored some of the elementary commands for creating and verifying the structure of a *dBASE II* database file. This installment of the *A+* series on *dBASE II* will look at techniques for entering, storing, and retrieving data, using your newly created *dBASE II* structure.

The final command we covered in the last tutorial was the Display Structure command. Just for review, and to re-orient yourself, you should enter *dBASE II* and "open" your database file with the following commands. (A reminder: The lowercase letters are the ones you type.) *DBASE II* responds in uppercase. The <CR> means to press the Carriage Return key.) Now type

```
A> dbase <CR>
```

Then fill in the date and press Return. When you get the dot prompt, type

```
. use phonebk <CR>
```

As you may remember, the Use command tells *dBASE II* to open any file you stipulate. In this case, it is your "phonebk" file. Next, type

```
. display structure <CR>
```

```
STRUCTURE FOR FILE:    A: PHONEBK. DBF
NUMBER OF RECORDS:     00000
DATE OF LAST UPDATE:   00/00/00
PRIMARY USE DATABASE
(Note: the date you
typed in earlier should
appear in the DATE line.)
FLD     NAME        TYPE    WIDTH    DEC
001     first:name    c       010
002     last:name     c       015
003     street        c       022
004     city          c       013
005     state         c       002
006     zip           c       005
007     phone         c       012
** TOTAL**                    00079
```

You may recall this command from last time. It shows you the structure of the phonebook database that you created as part of the last tutorial.

Check your structure against the one printed here. They should be identical. If they are not, then skip forward to the Modify Structure section to make the necessary changes.

Entering the Data

To many people, *dBASE II*'s response to the display structure is confusing. Just remember that each field in the database is similar to a vertical column on a piece of paper. When the time comes to enter people's names and other information into the database, each one will conceptually occupy one horizontal line in your database (see figure 1).

On your screen, however, this information will appear a bit differently. To see how it will look, type:

```
. append <CR>
```

This command tells *dBASE II* that you wish to add data to the file that is in use, i.e., the "open" file (in this case, "phonebk"). Assuming that *dBASE II* is

```
field # 1        2          3          4        5      6

FIRST:NAME LAST:NAME PHONE:NO   STREET    CITY   STATE


   WARD      MARSTON   688-4466  33 3rd.  Stokey   VA
   HANK      DAVIES    243-7577  13 E. 8th Bondo    CO
  7

 ZIP


19000
80300
```

Figure 1.

correctly installed for your computer system, you should see something like this:

```
RECORD# 00001
first:name  :       :
last:name   :            :
street      :                 :
city        :          :
state       :   :
zip         :     :
phone       :          :
```

(If you only see one line that says:

```
first:name :   :
```

then you probably ran the *dBASE II* Install program incorrectly. Try running it again, and this time make sure to say Y to the question

```
"INSTALL FOR FULL SCREEN
OPERATIONS (Y/N)?".)
```

Assuming you do have the multiline image on your screen, *dBASE II* is now in the full-screen Append mode. This picture is the "blank form" of your first database record, waiting to be filled in. You can now begin typing in the relevant information. Or can you?

Oh no! You forgot to include a "work phone" field. Lots of people have a work phone number, too. Maybe a company name should also be included. Now what? Is it too late to change things?

Modifying the Structure

No. Luckily, *dBASE II* will accommodate 20/20 hindsight by allowing you to modify an existing database structure. At this stage you'll often realize that your structure isn't quite right. Seeing the "form" on the screen or typing in a few trial records can often give you a quick idea of possible shortcomings.

If you haven't typed in any data yet, simply press Return, which will get you out of the Append mode. If you have already typed something into your first record (even a space), you need to type Control-Q to get back to the dot prompt.

Now, in order to change the structure, type

```
. modify structure <CR>
```

DBASE II responds with

```
MODIFY  ERASES  ALL  DATA
RECORDS . . .  PROCEED (Y/
N)?
```

Since you haven't entered any data records (e.g., people's names and addresses), go ahead and type Y. The screen should clear, and then you should see this:

At this stage you'll often realize that your structure isn't quite right.

```
001 first:name  c 010 :
002 last:name   c 015 :
003 street      c 022 :
004 city        c 013 :
005 state       c 002 :
006 zip         c 005 :
007 phone       c 012 :
008
009
010
```

When you modify a structure, you can use the following key sequences—the ^ sign means to hold the Control key down while pressing the letter indicated:

RETURN Moves cursor down one line
^X Moves cursor down one line
^E Moves cursor up one line
^D Moves cursor one space ahead
^S Moves cursor one space back
^Y Erases everything on the line
^N Inserts a new blank line at cursor position
^T Erases the line and moves all lower lines up
^V Toggles the Insert mode on/off
^G Erases character at cursor position
^W Saves the changes you have made
^Q Ignores the changes you made—leaves the structure unchanged

With the codes above, modify the structure to include a work phone number and a company name. Use the following procedure:

First, depress the Return key twice, which will position the cursor on the "street" line. Now type a ^N to insert a new line. On this line type: company c 20. Be sure to line up the columns correctly. Then use the Return key to move down just below the "phone" line. Type in a new line: work:phone c 12.

To save your changes, type ^W. (The *W* is for "write," meaning that your changes will be "written" to the disk and saved.) Now type

```
.display structure <CR>
```

You should see:

```
STRUCTURE FOR FILE:   A:PHONEBK.DBF
NUMBER OF RECORDS:    00000
DATE OF LAST UPDATE:  00/00/00
PRIMARY USE DATABASE
FLD          NAME      TYPE WIDTH DEC
001       first:name     c     010
002       last:name      c     015
003       company        c     020
004       street         c     022
005       city           c     013
006       state          c     002
007       zip            c     005
008       phone          c     012
009       work:phone     c     012
** TOTAL **                    00111
```

Your structure should now look like the above listing. Notice that the new fields, company and work:phone, are now included.

In case you're wondering, another technique lets you modify the structure after a lot of information is in your database. It takes a few more steps, but it can be done. We'll cover this later.

Really Entering Data!

This time it's for real. You can start entering your information by typing the

following command:

```
. append <CR>
```

The screen should clear, and then you

Whenever you add a record to your database, it automatically gets a unique record number.

should see the following:

```
RECORD# 00001
first:name  :      :
last:name   :           :
company     :                :
street      :                :
city        :         :
state       ::
zip         :    :
phone       :         :
work:phone  :         :
```

You are now in *dBASE II*'s Append mode. This is the mode in which you can add new records to a database. To get a feel for appending, go ahead and fill in your first blank "form" with information about someone you know. Use uppercase letters only (for reasons that will become clear later), and don't forget to type in hyphens between the sections of the phone numbers (e.g., 255-555-1515).

Some special keyboard codes can help you correct mistakes and move the cursor around while you're appending your database. Try experimenting with the following control codes in order to get the picture:

RETURN Moves cursor to next field
^X Moves cursor one field ahead (same as RETURN)
^E Moves cursor one field back
^D Moves cursor one space ahead
^S Moves cursor one space back
^Y Erases field contents (press twice)
^V Toggles the Insert mode on/off
^G Erases character at cursor position
^U Marks the record for later deletion from file
DELETE Deletes the character to the left of the cursor

You've probably noticed that most of these codes are identical to the ones you used during the Modify Structure routine, though a few are different. Control-V and Control-E are particularly useful if you make typing errors on previous lines.

When you reach the bottom of one "form," pressing Return will bring up another. Don't bother entering the names in alphabetical order. *DBASE II* will alphabetize them for you later.

While you are adding names, type in the following suspicious information, which we will use later in the tutorial:

```
first:name   : WACKFORD:
last:name    : SQUEERS          :
company      : RALPH NICHOLBY INC.:
street       : 374 TIPPLEMEYER AVE:
city         : CORNMONT      :
state        : CA:
zip          : 94709:
phone        : 415-555-1111:
work:phone   : 415-555-1212:

first:name   : NIMROD :
last:name    : NEVERBURGER      :
company      : BABS' FISH N CHIPS :
street       : 77 EASY STREET       :
city         : COZAD         :
state        : CA:
zip          : 89751:
phone        : 717-555-1597:
work:phone   : 717-555-7951:

first:name   : ADRIATOR:
last:name    : BEDWAX           :
company      : RUG FLOX INC.          :
street       : 158 SNOREWELL BLVD.:
city         : SLEEPYHOLLOW:
state        : CA:
zip          : 02587:
phone        : 207-555-7014:
work:phone   : 207-555-4107:
```

When you reach the end of your list or find a convenient stopping point, the appending process is easy to terminate. Simply press Return when the cursor is on the first space of a new "form," and the program will bring you back to the dot prompt.

Once you have a significant number of records (preferably at least 20) in your database, you can begin to experiment with changing to and retrieving some of the data you have stored. After all, what good is a database if it doesn't provide quick, easy access to information?

Before continuing, though, you want to make sure that any data currently stored in your computer's memory is written out to disk. To do this, type the following:

```
.use <CR>
```

(Note: this closes all files.)

```
.use phonebook <CR>
```

(Note: this reopens the people file.)

The Pointer

You may have noticed, while adding data in the Append process, that a five-digit number appeared on the first row. It is called the record number; *dBASE II* uses it to keep track of your information in an orderly manner. Whenever you add a record to your database, it automatically gets a unique record number.

Much as your eyes focus on a particular line of text as you read, *dBASE II* orients itself by just one record number at any given time. So, even though a database may have an enormous amount of information, your computer and *dBASE II* are aware of only one record at a time.

DBASE II keeps track of the record it's positioned on with an invisible "pointer." This pointer is an internal function of *dBASE II*, but useful data retrieval occurs when you manipulate and adjust this record number with keyboard commands or when *dBASE II* programs take care of it automatically.

To see which record your pointer is currently set to, try typing:

```
. ? # <CR>
```

In this case, the ? is essentially a means of asking *dBASE II*, "What is the value of . . . ?". The # sign is the Record Number function, so this command asked *dBASE II*, "What is the value of the current record number?". In other words, "Where is the pointer?" *DBASE II* should have responded with a five-digit record number.

This procedure is often useful for

What good is a database if it doesn't provide quick, easy access to information?

extracting information from your database, but the current record number doesn't necessarily imply any particular meaning. It may just be sitting where you last left it.

For example, *dBASE II*'s response to your last inquiry was probably the first record of your database. Just for curiosity's sake, you can determine the length of your database by the following method:

```
. goto bottom <CR>
. ? # <CR>
 75
```

I have 75 records in my phonebook database. You can move the record-number pointer around in the database with several commands. As an exercise, try this:

COMMAND	
. goto top <CR>	
. ? # <CR>	
00001	*(Note: moves to record #1 checks the record #)*
. skip <CR>	
RECORD: 00002	*(Note: moves ahead 1 record)*
. skip + 5 <CR>	
RECORD:00007	*(Note: moves ahead 5 records)*
. skip − 1 <CR>	
RECORD:00006	*(Note: moves back 1 record)*

List, Display, and Edit Commands

Now that you have an understanding of the *dBASE II* pointer, you are ready for some data-retrieval commands. The simplest technique for looking at all the information in a database is to type

```
. list <CR>
```

You should now see a lot of information scrolling up and off your screen. It will probably look familiar to you, though not very orderly. This command has instructed *dBASE II* to go to the beginning of your phonebook database and display all the data you have entered so far. The screen looks a bit jumbled because there is too much data in each record to fit neatly onto one line.

You can move the record-number pointer around in the database with several commands.

Luckily, you can use the List command (as well as many other *dBASE II* commands) selectively. This feature allows you to tailor your listing to specific needs. For example, see figure 2 for something more coherent.

It's fairly easy to start getting results. Notice that, once again, the record number makes an appearance. If you want to eliminate the record number from your listing, use the Off command. Here's an example:

```
. list first:name off <CR>
```

So far it looks as though you paid several hundred dollars for a program that makes large lists, doesn't it? But what if you want a specific list of people who live in California or whose phone numbers have a certain prefix? You can do all this (and more) in many ways, but try the commands listed in figure 3 to begin getting the idea. Don't forget the colons and

```
. list first:name,last:name <CR>
. list first:name,last:name,phone <CR>
. list first:name,last:name,company,phone <CR>
```

Figure 2.

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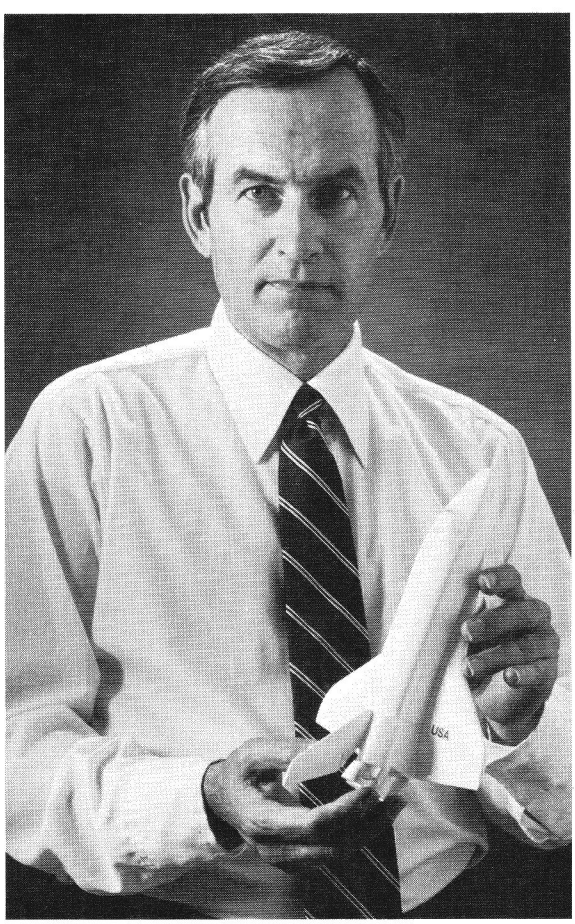
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the quotation marks. Use uppercase when indicated.

```
. goto top
. ? #
. list next 5
. list next 5 first:name,last:name
. list first:name,last:name for state="CA"
. list first:name,last:name for first:name="nimrod"
. list first:name,last:name for first:name="NIMROD"
. list first:name,last:name for last:name="N"
. list first:name,last:name for last:name="NEV"
```

Figure 3.

Now for some notes on what just happened.

- The Next command limits the number of records listed. In this case, it was only five.
- The "for" phrase is a conditional statement. The first command using this phrase was

```
. list first:name,last:name
  for state="CA".
```

(Note: command appears as one line on the screen.)

What this amounts to in English is "Show me all the first names and last names of people who live in California."

- The command with "nimrod" failed to list Nimrod's record because *dBASE II* was looking for lowercase letters. The second form of this command worked because you stipulated uppercase.
- The last two commands are examples of a technique for finding data based on only the first few letters. Assuming you had several last names beginning with the letter *N*, they should have been listed. The NEV command should have listed out at least Nimrod Neverburger's data.

Another command, Display, is similar to List, but it adds two new features. Unlike List, which often scrolls data off your screen before you can look at it, Display lists only 15 records at a time.

Of course, if you ask *dBASE II* to display two lines of data per record, the list would come to 30 lines. Since most machines allow for only 24 lines, there is bound to be an overflow in this case.

The other feature of the Display command is that you can use it to show only the "current" record (the one on which the pointer is located).

Try the variations of the Display command listed in figure 4 to get the hang of it. All of these commands should end with a carriage return. Notice several things about these variations:

- Like the List command, you can use Display with selected fields.
- If you know which record you want to see, you can specify its number for display purposes.
- Uppercase and lowercase distinctions are important. *DBASE II* couldn't locate *adriator* because you entered *ADRIATOR* into your database. Uppercase and lowercase are not the same to *dBASE II*.
- *AD* will locate *ADRIATOR*, as well as anyone else with *AD* as the first two letters of his or her first name.
- The command using *S* should have displayed all your friends whose last name begins with *S*.
- The Display command alone shows you one record only. Once you use the

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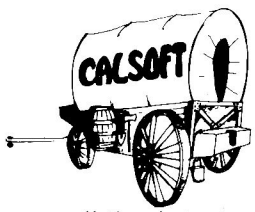
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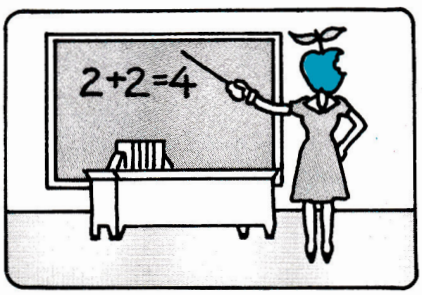
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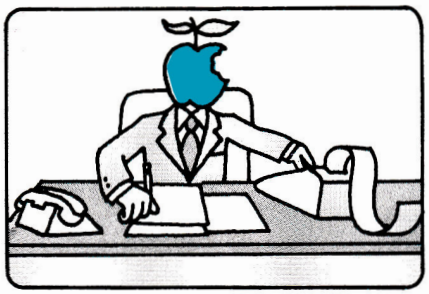
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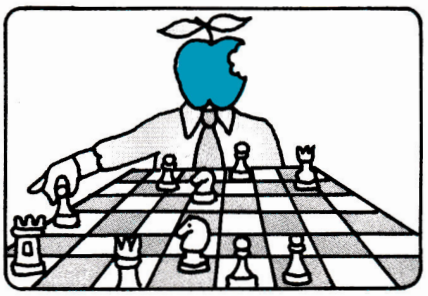
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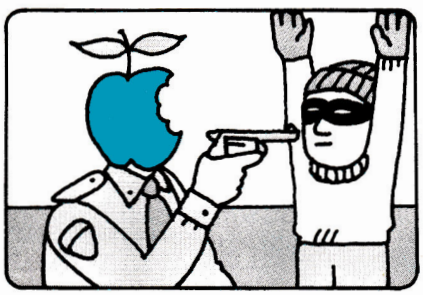
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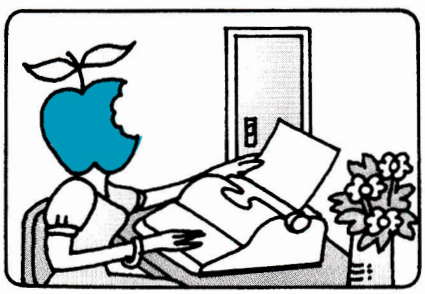
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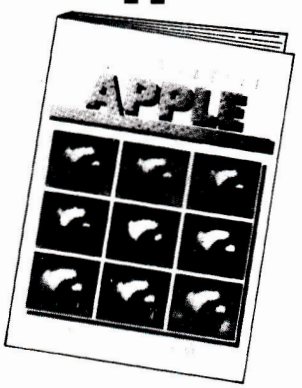
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```
. goto top
. ? #
. display
. display first:name,last:name
. skip
. display
. display first:name,last:name
. display record 5
. display next 5
. display next 5 first:name,last:name
. display for first:name="ADRIATOR"
. display for first:name="adriator"
. display first:name,last:name,city for first:name="ADRIATOR"
. display first:name,last:name,city for first:name="AD"
. display first:name,last:name,phone for last:name="S"
```

Figure 4.

"for" phrase, *dBASE II* goes to the top of the database and displays each record that meets the criteria stipulated in the phrase.

Even though the exact wording of these commands may seem a bit complicated, with a little practice you will find that the syntax (word order) of *dBASE II* commands does make sense.

You can print out any of the listings that appear on your screen—if you have a printer—by adding the phrase *to print* at the end of a command line.

Try some other commands on your own. The worst that can happen is that *dBASE II* will give you an error message. For example, if you were to type:

```
disp last:name for first:
name=JOHN <CR>
```
(Note: command appears as one line on the screen)

DBASE II would answer with the following:

```
*** SYNTAX ERROR ***
                ?
```

```
disp last:name for first:
name=JOHN
```
(Note: command appears as one line on the screen)

```
CORRECT AND RETRY (Y/N)? Y

CHANGE FROM  :john
CHANGE TO    :"JOHN"

disp last:name for first:
name="JOHN"
```
(Note: command appears as one line on the screen)

```
MORE CORRECTIONS(Y/N)?N <CR>

00035    COWART
00040    CARMICHAEL
00051    FYFE
00058    SHAPARD
00060    THORNTON
```

What happened was that *dBASE II* became confused because of the ommission of the quotation marks around John's name. Notice the question mark above *first:name*, just below the syntax-error message. This tells you just how far *dBASE II* got before becoming confused. Remember to look for this clue the next time one of your commands elicits a syntax-error message.

Next Time

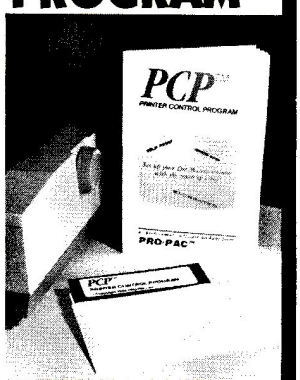
Next month's *dBASE II* column will cover methods for locating information in your database, as well as means for editing data records. In the meantime, continue updating your list, and make sure to keep a current backup of your PHONEBK.DBF file on another disk.✚

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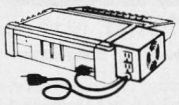
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FOLLOW THE TURTLE TO LOGO

An easy, enjoyable computer language that you can start using in minutes

One reason *Logo* is so accessible is that it was originally designed as a method for teaching computer concepts—but then so were BASIC and Pascal. *Logo* is different because it makes extensive use of simple graphics and has a "friendlier" way of relating to users. And, unlike other teaching languages, *Logo* has not become stretched out of shape in an effort to become a production language for getting work done in the real world.

Logo is particularly oriented toward children, so if you are a kid, have kids, or can remember being a kid, this language may be just for you.

Actually, *Logo* is almost two separate languages combined into one. The easier and more accessible part, called turtle graphics, is a way of making simple drawings. To use this part of the language, you give commands to an imaginary turtle that can draw or erase lines as it crawls across the screen.

The other part of *Logo* is a text-handling language. Just as the turtle lets you work with lengths, directions, and colors, the list part of the language lets you work with letters, words, lists, and sets. *Logo* also provides basic mathematical operations, although complex calculations are really not *Logo*'s usual application.

With both parts of *Logo,* you start out knowing the basics of the language and some predefined extra procedures. But at any time, you can define your own procedures (and even redefine the existing ones), thereby extending the language to become whatever you want it to be.

You normally handle *Logo* as an interpretive language, meaning that each instruction you provide can be executed at once, or you can write a whole series of instructions (or even a complete program) for the computer to do later. Especially with the graphics routines, you can try out instructions in the Immediate mode and see the result on the screen almost instantly. The quick feedback not only helps learning, but also makes the language more enjoyable to use.

Turtle Graphics

The most famous part of *Logo* is its turtle and the turtle-graphics method of making drawings. Turtles can either be "screen turtles," which draw images directly on the computer screen, or "floor turtles," which are small robot-like creatures that roll around on large sheets of paper under control of a *Logo* program.

In both cases, you'll come to think of the turtle as a friendly creature that faithfully and precisely follows drawing and movement instructions from the *Logo*

vocabulary. You can use the turtle to formally learn concepts of programming, mathematics, logic, and aesthetics—or, even better, you can explore many of these concepts just by playing around and having fun.

The Apple version of *Logo* has close to three dozen graphics commands, although you can start by learning only a few (see box, page 200). You'll have to use your imagination to see an actual turtle, however. On the Apple, the turtle is just a triangular cursor, with the point of the acute angle indicating which direction the turtle is presently heading.

The basic commands that you give the turtle are to move forward, move backwards, and to turn right or left. All these are relative movements—they move the turtle from its current position and orientation. Where you end up depends on where you start.

Logo allows you to define new procedures and then use those additions as if they were part of the original *Logo* language.

A set of absolute positioning commands lets you tell the turtle to move to a certain position, to change only its horizontal or vertical position, to rotate enough to point in a certain direction, or to move back to the home, starting position.

You can also use the Apple's color-display ability by changing the "pen color" that the turtle draws with and the background color of the screen. As in any other Apple color display, there are some limitations on color combinations, so you might want to start with some simple one- or two-color drawings.

One aspect of *Logo* that may seem strange at first is that it has no built-in commands for drawing curves. The turtle only knows how to move from point to point, and if you want to make a curve, you have to teach the turtle how to do it. You'll have to express your curves as approximations made of tiny straight-line segments.

For example, if you want the turtle to make a circle, you might decide that you'd get a sufficiently close approximation by drawing the corresponding polygon with 120 sides. I'll tell you just how to do this in a moment, but first a word about procedures.

Procedures

Even though *Logo* does not know how to draw circles or do hundreds of other useful procedures, you can simply teach it how. *Logo* allows you to define new procedures and then use those additions as if they were part of the original *Logo* language.

In *Apple Logo,* you tell the computer you want to define a new procedure by answering the *Logo* prompt with an input line starting with TO, followed by the name of the new word you want to teach *Logo*. *Logo* takes that line as a signal not to execute each line as you type it in, but to switch instead to the Definition mode.

In the Definition mode, you can add, delete, or find words and lines until your definition is just the way you want it. When you are done, this mode leaves a copy of the new procedure in the area of memory that contains your work space and adds the new word to *Logo*'s current vocabulary.

Going back to the example of teaching *Logo* how to draw a circle, you start this way:

```
TO CIRCLE :RADIUS.
```

The TO CIRCLE part tells *Logo* that you are defining a new word, *CIRCLE*. The :RADIUS says that when you use this CIRCLE word, you'll be following it with a single value and that that value will be known (within the definition) as RADIUS.

After you type this input, *Logo* responds by switching to the Definition mode. Instead of the normal *Logo* prompt (?), you'll see the Procedure Definition mode prompt (>) at the start of each line.

In the Definition mode, you can now add the following lines:

```
REPEAT 30 [FORWARD :RADIUS *
  3.1416!RIGHT 360 / 30]
END
```

The REPEAT 30 part says to repeat the instruction list in square brackets 30 times—each of those times, the turtle draws 1/30 of the circle. In each step, the turtle goes forward 1/30 of the circumference and turns 1/30 of the way around. The ! marks where the line was broken to fit on the screen (*Logo* still thinks of it as one logical line). And the closing square bracket ends the list of instructions the turtle is to repeat.

When you type in the special word END, *Logo* leaves the Definition mode and goes back to the Immediate mode. You can then say

```
CIRCLE 100
```

The turtle will draw you an almost-circle with a radius of ten units (see figure 1).

If you want to see how many sides

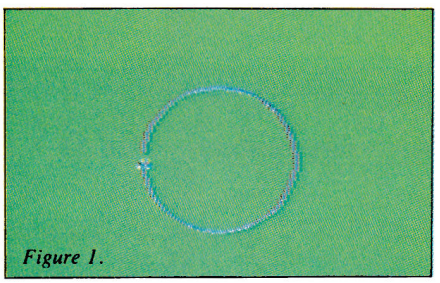


Figure 1.

you need to get an acceptable circle, you can make the number of segments a variable. Then the procedure (see figure 2) would look like this:

```
CIRCLE :RADIUS :SIDES
REPEAT :SIDES! [FORWARD :RA-
  DIUS * 3.1416 / :SIDES
  RIGHT 360 / :SIDES ]
END.
```

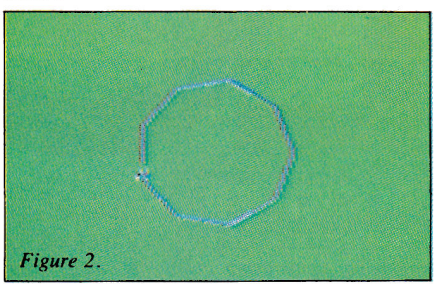


Figure 2.

Step by Step

Procedures in *Logo* can make use of other procedures and even invoke themselves again (a feature called "recursion"). So instead of having to write a single long procedure that does everything, you can build up a series of procedures, test them out, and then combine them into one.

The standard example of how you set up procedures in *Logo* is the instructions for drawing a simple house. The house in question should look like figure 3.

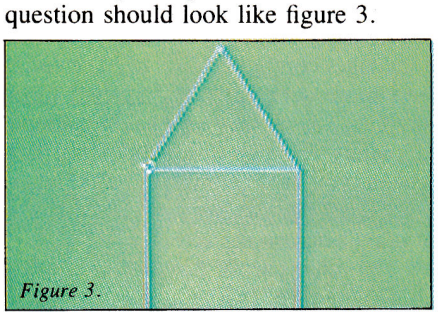
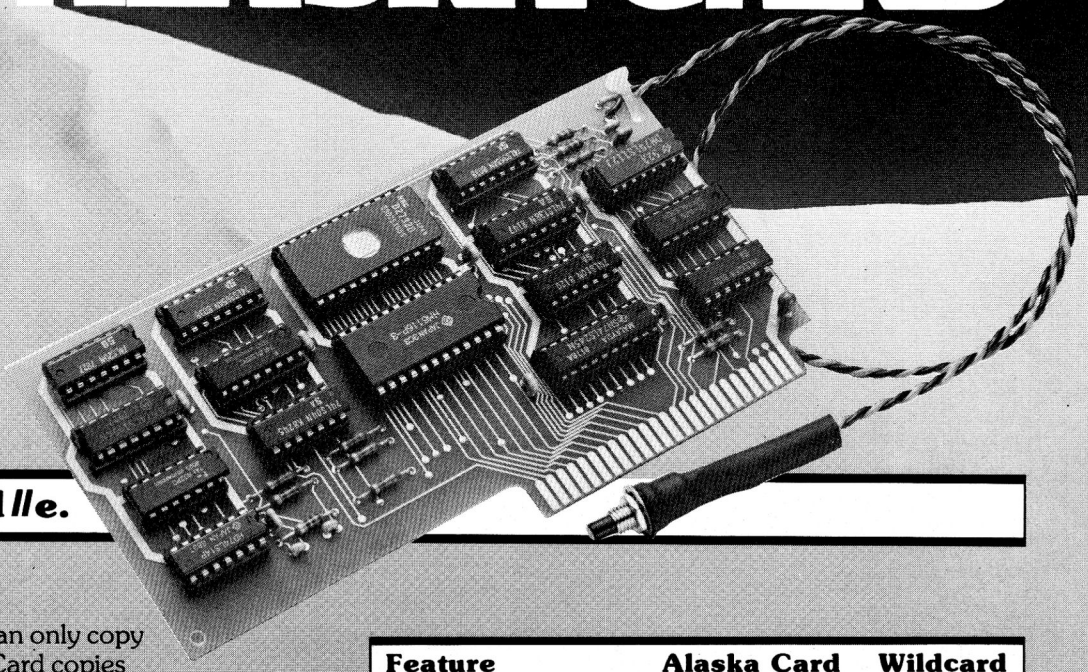


Figure 3.

Instead of writing one procedure to draw the house, you should first define working procedures for drawing a square

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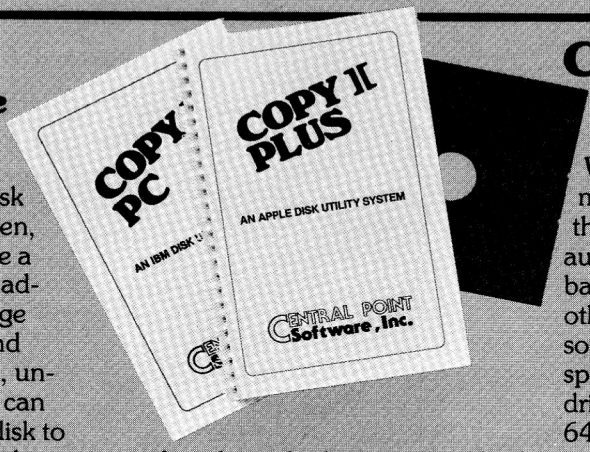
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and a triangle and then combine them into one.

Using turtle graphics, the square procedure (see figure 4) is

```
TO SQUARE :SIZE
REPEAT 4 [FD :SIZE RT 90]
END
```

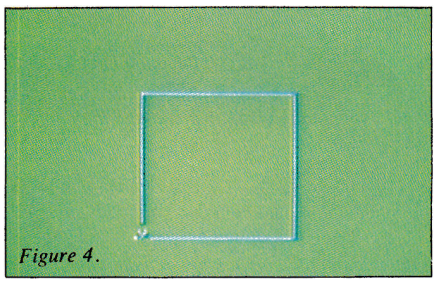


Figure 4.

and the triangle (see figure 5) is

```
TO TRIANGLE :SIZE
REPEAT 3 [FD :SIZE RT 120]
END
```

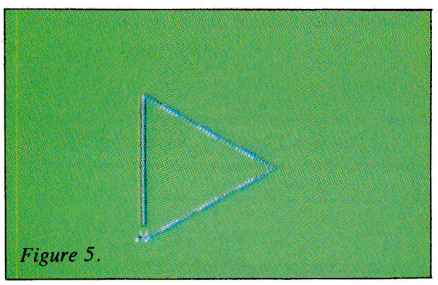


Figure 5.

Simply combining these two procedures as

```
TO HOUSE :SIZE
SQUARE :SIZE
TRIANGLE :SIZE
```

doesn't work. Instead of a house, you get an envelope on its side (see figure 6).

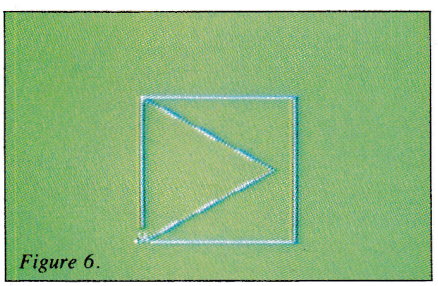


Figure 6.

To make a house, you have to remember that each turtle movement starts where the last left off, at the direction you set last. So after it completes the square, the turtle is at the bottom left corner, facing straight up. To get ready for the triangle roof, the turtle needs to go back up to the top and then turn 1/12th of the way to the right.

In *Apple Logo*, a mistake such as drawing an envelope instead of a house is no problem. You simply call up the editor:

```
EDIT '' HOUSE
```

and then add two lines to get

```
TO HOUSE :SIZE
SQUARE :SIZE
FORWARD :SIZE
RIGHT 30
TRIANGLE :SIZE
```

Expressions, Commands, and Instructions

Procedures can control actions such as drawing on the screen, produce results for other procedures, or gather information. *Logo* categorizes them by whether they produce an output value and what is done with the value.

An expression in *Logo* is a set of symbols and operations that results in a value. For example, 5 + 5 is an expression. A procedure itself is an operation if it returns a value as a result. But a command is a procedure that does not return a value (and presumably triggers an action such as drawing, printing, or rearranging information).

In *Apple Logo*, a mistake such as drawing an envelope instead of a house is no problem.

Logo complains if you have an expression (producing a value), and you don't make use of the result. For example, if you say merely 5 + 5, *Logo* replies, I DON'T KNOW WHAT TO DO WITH 10. And similarly, if you call for the use of a procedure that requires input values, *Logo* makes sure you have provided enough inputs and reports any error.

Words and Lists

For working with text instead of graphics, two of the important building blocks in *Logo* are words and lists. A word in *Logo* is any collection of letters, digits, and punctuation, and a list is a set of words that have been put into an ordered structure. Words and lists can both be literals, or you can store them away in variables.

Words can arrive in your *Logo* program either as literal values that you supply directly or through commands that read the keyboard. You mark literals by prefacing them with a double-quote mark (").

Literals must have a leading quote because unless you tell *Logo* otherwise, it assumes that any word that is not specially marked is the name of a procedure. If the name isn't one *Logo* knows about (either because it was built in or because you defined it), *Logo* considers it an error.

It handles such a situation by replying, I DON'T KNOW HOW TO whatever, where *whatever* is the mystery word. Note that *Logo* employs a leading quote only; a trailing quote may result in errors.

So in *Logo*, "ONE is a word literal, as is "THANK.YOU, but "YOU'RE WELCOME will probably result in an error, unless you've defined WEL-

SOME TURTLE COMMANDS

The Apple version of *Logo* has more than 30 graphics commands. Here's a list of the most commonly used ones:

FORWARD—moves the turtle a given number of units in whichever direction it is pointing. The pen draws a line as it moves, if it is down.

BACKWARD—moves the turtle a given number of units in the direction opposite to the one in which it is pointing. The pen draws a line as it moves, if it is down.

LEFT—turns the turtle's direction a given number of degrees to the left.

RIGHT—turns the turtle's direction a given number of degrees to the right.

SETHEADING—points the turtle in a specified direction, where 0 is straight up.

HOME—starts the turtle over again at the center of the screen, pointing straight up.

PENUP—sets the turtle to move without leaving a line behind it.

PENDOWN—sets the turtle back to its normal state, which leaves a line in the current pen color as the turtle moves.

SETPC—sets the current pen color, from a number representing the six choices, black, white, green, violet, orange, and blue.

SETBG—sets the color for the screen background, from a number representing black, white, green, violet, orange, blue, and a special black for monochrome monitors.

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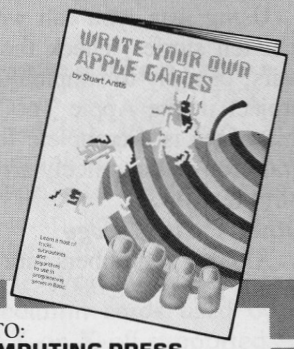
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A side effect of this way of structuring the language is that when you refer to variables by their names, their names are also considered literals. So you would say, MAKE "MINE "MINK to store the value *MINK* in the variable *MINE*.

To access the contents of a variable, the strictly formal *Logo* language wants you to say THING "VARIABLE.NAME. With the more relaxed rules of *Apple Logo*, however, you can use the construction :VARIABLE.NAME instead. The colon prefix tells *Logo* that you want the contents of the variable, not the name or a literal value.

Lists

Lists are the predominant way that *Logo* works with text. The built-in list operations in *Logo* provide for various methods of combining items; splitting them apart; and checking for equality, relation, membership, or type of item. You mark lists in *Logo* by enclosing them in square brackets ([this is a *Logo* list]), with individual elements separated by spaces. A list itself can be an element of a list, so you can build complex data structures if you have the occasion to do so.

Using lists, you can write programs that tell stories, check facts, match up pairs, or reply to simple questions. One project in the Apple Toolkit (see box, this page) is a complete formatter program for making nicely arranged output from text files.

Other Parts of *Logo*

Although numbers are not *Logo*'s strong suit,

The language does provide sufficient capability for most ordinary counting and calculating applications that might go with lists or graphics.

counting and calculating applications that might go with lists or graphics. Apple *Logo* has integers, decimal numbers, and floating-point numbers (made up of decimal numbers with an added multiplier in exponential form). Integers go up to plus and minus 2^{31}; decimals keep six digits of precision, and exponents go from −38 to +37. .

Standard arithmetic operators include addition, subtraction, multiplication, division, remainders, square roots, rounding, and truncation. Naturally, sine, cosine, and arctangent are included for geometry, and random and rerandom functions are there for your games and simulations.

If you try *Logo*, you'll find that it lets you learn about the world of computers as you teach your computer to do what you want done.

Logo also has a set of more traditional control structures for writing longer programs. Along with REPEAT, you can use IFs (including IFFALSE and IFTRUE), TEST, STOP, and GO.

Of course, if you do start to write *Logo* procedures, you'll want to save some of your work. *Logo* comes with a full set of commands just for managing your work space and saving and loading files. In effect, these give you the ability to make libraries of routines to extend your *Logo* in any direction (and the package does come with an initial library of procedures, including two for circles).

So we've gone from turtles to circles to text and back to circles. If you try *Logo*, you'll find that it lets you learn about the world of computers as you teach your computer to do what you want done. In the end, both you and the machine will be more educated. ✚

Apple Logo *is distributed by Apple Computer, Inc., and is available from most Apple dealers. The list price is $175.*

Hardware required: *Apple II, II+, or IIe with a language card or equivalent memory*

SAY, HAVEN'T I SEEN YOU SOMEWHERE BEFORE?

Parts of *Logo* may seem familiar to you if you have been working with small computers, because it borrows extensively from other languages, and other languages have borrowed from it.

Turtle graphics was such a big success in *Logo* that it is showing up in an increasing number of other programs. One place that you'll particularly notice it for the Apple family is in Apple PILOT and SuperPILOT, but it also has been added to Smalltalk, some versions of Pascal, and several drawing and sketching programs.

The list and text-handling parts of *Logo* are direct descendents of the LISP language, which is popular in artificial-intelligence work. Fortunately, some of the more obscure parts of LISP have been omitted, but if you look closely, you'll see a few places where the pull of history has prevailed, and clarity and ease of use in *Logo* have been lost to parallel construction.

Similarly, the *Logo* editor is a cut-down version of EMACS, which is an editor that is also popular at *Logo*'s Massachusetts Institute of Technology birthplace. Versions of the EMACS editor have found their way into many products, of which Perfect Writer for CP/M machines is probably the most widely circulated.

THE *LOGO* TOOLKIT

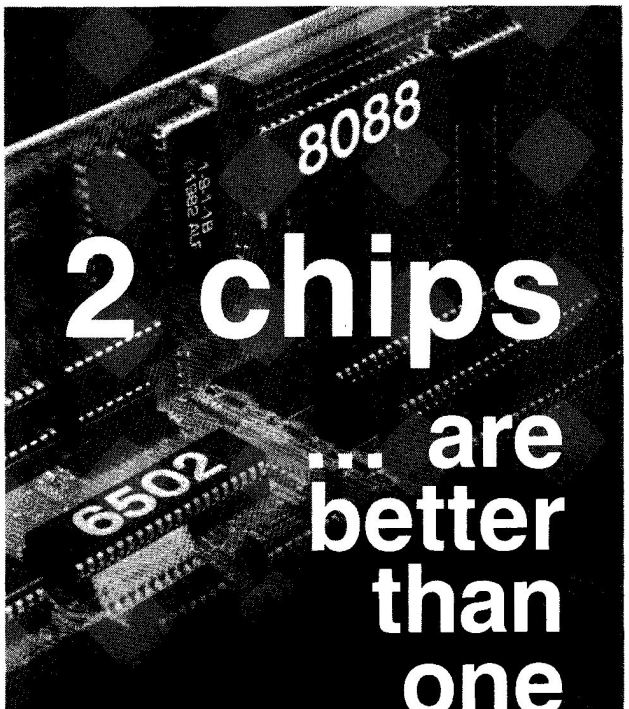
If you have Apple's version of *Logo*, you also ought to get the free *Logo* Toolkit. The Toolkit contains a whole range of *Logo* programs and utilities, including a range from introductory programs for first-time primary-school users to a few sophisticated applications that show *Logo*'s full programming power.

The price is certainly right. Apple is distributing the kit to its dealers and users' groups as two diskettes, and recipients are authorized to make free copies. The manual even comes as a text file on one of the diskettes.

Several of the tools are individually worth the trip down to your dealer. For example, there's a debugging tool to let you run a procedure line by line and examine the variables. Another one lets you save turtle graphics on a disk and then print them out on any of a dozen popular dot-matrix printers. Still another interfaces your *Logo* turtle to several low-cost plotters, including the $250 Radio Shack CGP-115.

There's also a selection of games, including several word games and a few with turtle graphics. You can also see what some people have done with their turtles, including several rather ambitious projects.

And for anyone who is a hard-core computer hacker, there's even a 6502 assembly-language assembler—written in *Logo*.



2 chips ... are better than one

Is your Apple's 6502 processor chip a little overworked lately? Have you been eyeing one of those new, 16-bit systems? But you don't want to give up all your Apple programs ...

Add the powerful 16-bit 8088 processor to your Apple with ALF's Processor Card. Let the 6502 and 8088 work together to tackle your toughest problems—like speeding up your Applesoft and Apple Pascal programs. With the Processor Card, you can use the CP/M™ 86 or MS-DOS™ operating system to run the latest 16-bit software, including many IBM PC programs.

64K or 128K of high-speed memory is available for ALF's Processor Card. Use the Processor Card with 128K as a fast disk emulator or to view sixteen hi-res images in under a second. Or run Basic, C, COBOL, or Pascal with 16-bit performance!

The ALF Processor Card is just $395 (Applesoft speed-up software included). See your Apple dealer today, or contact ALF for more information.

Trademarks: "Apple": Apple Computer, "CP/M": Digital Research, "MS-DOS": Microsoft.

ALF

ALF Products Inc.
1315F Nelson St. Denver, CO 80215
(303) 234 0871 Telex: 4991824

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POWER

. . . on the Apple][

zardax

Word processing at its finest. Powerful and versatile, yet easy to use and natural. Designed for the business and professional environment (or for anyone who wants the best). Simple control commands. Typewriter-style shift and lock. Glossary. Form letters and mailing lists. Menus for disk access and printing. DOS 3.3 compatible text files. 40 or 80 column display. Modifiable drivers for most interface cards and printers. **$210.**

ZIP-COMM

Communications add-on for ZARDAX. Turns ZARDAX into a communicating word processor, to send and receive text files. Talk to other Apples, mainframes, information services, typesetters. Includes terminal mode. 300 or 1,200 baud. Works with serial, modem, and popular 80 column cards used by ZARDAX. Log-on files and X-on X-off supported. $80.

AIDA

"Apple Interactive Data Analysis." **Statistical analysis** package for production research work with large survey data files. Full range of analysis — from descriptive statistics to multiple regression. Complete data manipulation, transformation and case selection. Fast and accurate calculations. Up to 4,000 cases and 255 variables per file. $235.

Just push our button . . .

Action-Research Northwest
11442 Marine View Drive, SW.
Seattle, WA 98146
(206) 241-1645 Source: CL2542

Apple][is a trademark of Apple Computer, Inc.
ZARDAX is a trademark of Computer Solutions, Pty., Australia.

Dealer inquiries invited.

CIRCLE 172 ON READER SERVICE CARD

Apple II

CP/M

IBM PC

SPECTRUM

Professional Software Products

MATHEMATICS SERIES

The Series Includes These 4 Programs:

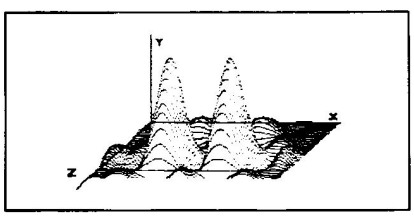
STATISTICAL ANALYSIS I: This menu driven program performs LINEAR REGRESSION analysis, determines the mean, standard deviation and plots the frequency distribution of user-supplied data sets.

NUMERICAL ANALYSIS: HI-RES 2-Dimensional plot of any function. Automatic scaling. At your option, the program will plot the function, plot the INTEGRAL, plot the DERIVATIVE, determine the ROOTS, MAXIMA, MINIMA and INTEGRAL VALUE.

MATRIX: A general purpose, menu driven program for determining the INVERSE and DETERMINANT of any matrix, as well as the SOLUTION to any set of SIMULTANEOUS LINEAR EQUATIONS.

3-D SURFACE PLOTTER: Explore the ELEGANCE and BEAUTY of MATHEMATICS by creating HI-RES PLOTS of 3-dimensional surfaces from any 3-variable equations. Hidden line or transparent plotting.

For APPLE II (48K) and IBM PC (64K) $50.00



BUSINESS SOFTWARE SERIES

Both Programs $250.00

A user-friendly yet comprehensive double-entry accounting system employing screen-oriented data input forms, extensive error-trapping, data validation and special routines for high speed operation. The series includes these two modules:

GENERAL LEDGER: A complete accounting system with these features:

- Up to 500 accounts and 500 transactions per month.
- Interactive on-screen transaction journal.
- Produces these reports:
  - Transactions Journal
  - Account Ledgers
  - Income Statement
  - Balance Sheet
  - Account Listings

For APPLE II and IBM PC $150.00

ACCOUNTS RECEIVABLE

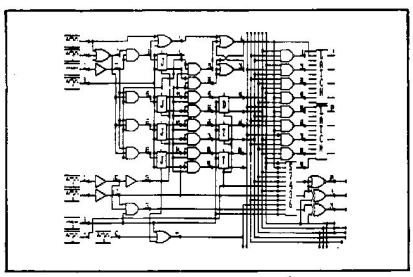
A flexible system with these features

- Up to 500 accounts and up to 500 invoices per diskette.
- Prints invoices, customer statements & address labels.
- Interfaces to General Ledger.
- Interactive screen-based invoice work sheet.
- Produces these reports
  - Aged Receivables
  - Sales Analysis
  - Account Listings
  - Customer Balances

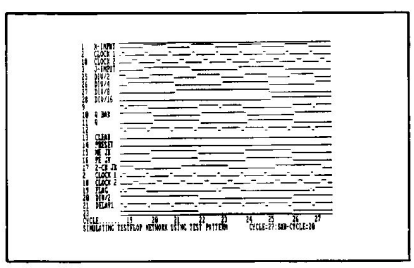
For APPLE II and IBM PC .... (2 DRIVES) .. $150.00

MICRO-LOGIC

An interactive graphics program for designing and simulating digital logic systems. Using the built-in graphics module, the user creates a logic diagram consisting of AND, OR, NAND, NOR, EX-OR, D, T, JK FLIP FLOP and powerful 16 pin user-defined MACRO functions. A typical page of a logic diagram looks like this:



The system provides on-screen editors for NETWORKS/MACROS DATA CHANNELS, CLOCK WAVEFORMS and GATES. GATE attributes include DELAY, TRUTH TABLE, NAME and I/O clocking.



The system is available for Apple II and IBM PC computers. A non-graphics version is available for CP/M 2.2 It uses the network editor to create netlists and text printer plots to display simulation results. All versions require 2- 5 1/4" disk drives.

For APPLE II, IBM PC (192K) and CP/M (70K) $450.00
MANUAL & DEMO DISKETTE $50.00

PERSONAL FINANCE MASTER

The premier personal and small business financial system. Covering all types of accounts including check registers, savings, money market, loan, credit card and other asset or liability accounts, the system has these features:

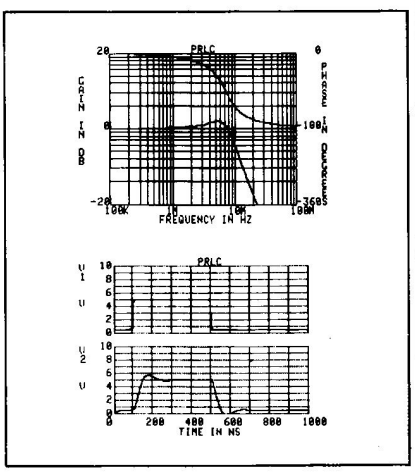
- Handles 25 Asset/Liability Accounts
- Monthly Transaction Reports
- Budgets Income & Expense
- Reconciles to Bank Statements
- Prints Checks & Mailing Labels
- Automatic Year-End Rollover
- Prepares a Net Worth Reports
- Searches for Transactions
- Handles Split Transactions
- User-Friendly Data Entry Forms
- Fast Machine Language Routines
- Extensive Error Trapping
- HI-RES Expense/Income Plots

For APPLE II and IBM PC $75.00

MICRO-CAP

Microcomputer Circuit Analysis Program

Tired of trial & error circuit design? Analyze and debug your designs before you build them. With MICRO-CAP you simply sketch your circuit diagram on the CRT screen and run an AC, DC or TRANSIENT ANALYSIS. Your circuit may consist of RESISTORS, CAPACITORS, INDUCTORS, DIODES, BATTERIES, BIPOLAR or MOS TRANSISTORS, OPAMPS TRANSFORMERS, and SINSUSOIDAL or USER-DEFINED TIME DEPENDENT VOLTAGE SOURCES. MICRO-CAP can analyze any such network containing up to 40 separate nodes. Includes a user controlled MACRO library for modelling complex components such as OPAMPS and Transistors.



For APPLE II and IBM PC computers. A non-graphics version using an on-screen editor to enter networks and text printer plots to display simulation results is available for CP/M (2.2- 5 1/4" SSSD) systems. Requires 2 disk drives.

For APPLE II, IBM PC (192K) and CP/M (70K) $475.00
MANUAL and DEMO DISKETTE $50.00

ORDERING INSTRUCTIONS: All programs are supplied on disk and run on Apple II (64K) or IBM PC (128K) with a single disk drive unless otherwise noted. Detailed instructions included. Orders are shipped within 5 days. Card users include card number. Add $2.50 postage and handling with each order. California residents add 6 1/2% sales tax. Foreign orders add $5.00 postage and handling per product.

SPECTRUM SOFTWARE

690 W. Fremont Ave., Suite F
Sunnyvale, CA 94087

master charge

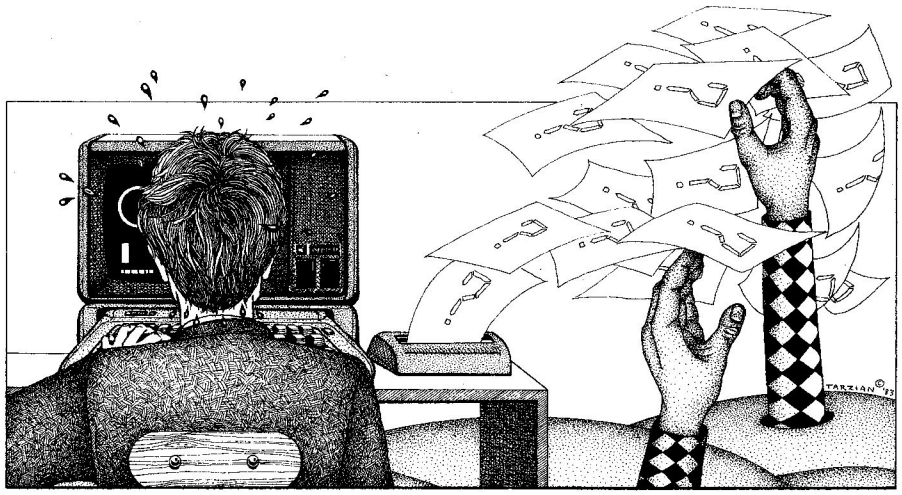
VISA

FOR PHONE ORDERS:
(408) 738-4387
DEALER INQUIRIES INVITED.

CIRCLE 171 ON READER SERVICE CARD

RESCUE SQUAD/BY LINDSAY McGRATH

Questions about Apple III updates, Apple II modifications and more are answered by the Rescue Squad.



Apple III SOS:

Q: I have an Apple III and really like it. A friend told me recently that Apple computer produces updates for the machine. Can you tell me about these updates and where I can find them?

A: *Periodically, Apple releases SOS, or Sophisticated Operating System, updates for the Apple III. These updates are improvements to the Apple III operating system. So far there have been two such updates. The first came out in February 1981, when the operating system was changed from 1.0 to 1.1. This represented a complete reworking of the operating system. There is no compatibility between the 1.0 and 1.1 operating systems. The second update, made in the fall of 1982, changed the system from 1.1 to 1.3 and was released with a new set of device drivers.*

SOS updates are sent to Apple dealers when released. They are not copy-protected. The dealer may choose to hand out the updates or may have Apple III owners bring their boot diskettes into the store to be updated. Only the boot diskette for an application or language need be updated. Data diskettes need not be updated. The console driver for Apple Writer, Access III, and CP/M should not be replaced. For more information, consult your Apple dealer.

Upper Case Letters

Q: Can I modify my Apple so it will produce upper case letters when I use the Shift key with Apple Writer II? I am tired of using the Escape key every time I want a capital to appear.

A: *Yes, you can make that modification. However, the way you do it will depend on the kind of Apple you have. Apple has employed several different keyboards on the Apple II since its introduction, so the modification can be accomplished in one of two ways. On the older keyboard, a wire should be run between pin 2 of 74LS00 and pin 4 of the keyboard connector.*

On the newer keyboard with the piggyback electronic assembly, the wire should be run between pin 9 of the 74LS00 closest to the keyboard connector and pin 4 of the keyboard connector.

In either case, a second wire should connect pin 4 at location A7 to pin 4 at location J14 on the motherboard. Check carefully to make sure the wire isn't connected to pin 7 of H14. The keyboard cable acts as a connection between these two wires.

Apple has employed several different keyboards on the Apple II since its introduction.

To run older software on the Apple IIe, the Shift key modification can be made by soldering across the broken circle labeled X6 on the motherboard. Revision A Apple IIe computers were shipped with the Shift key modification active. To remove it, simply break the circuit at X6.

Take care! If the Shift key modification is active, and you use a joystick or hand control that uses switch 2, be careful never to close the switch and press the Shift key at the same time. Doing this will produce a short circuit that turns off the computer's power supply. If this happens, any programs or data you have in the computer's internal memory will be lost.

Another caution: Remember that any hardware modification not performed by an authorized Apple dealer will void your computer's warranty. If your Apple is still under warranty, you should think carefully before taking on the job yourself.

Replacing Quickfile IIe

Q: My Quickfile IIe diskette no longer boots. How can I replace it without purchasing the product again?

A: *You can't, unless the product is still under warranty. If the product is out of warranty, you'll have to pay for a replacement diskette. All Apple software products are available as replacement parts.*

In the lower right hand corner of your diskette's label is the part number, a three-digit and four-digit number separated by a dash. Normally the out-of-warranty cost for this product is under $20. You can order this from your local authorized Apple dealer. Replacement parts cannot be ordered directly from Apple Computer. ✚

HARDWARE

Sweet-P Personal Plotter
A color pen plotter for creating graphics on any type of paper or acetate for overhead transparencies. It accepts materials from 8½ × 11 inches to 10 feet long. Resolution is 250 step-increments per inch, drawn at six inches per second.

When used with the *Sweet-Plot 80* graphics software, the unit can plot up to 16 graphs on a single 8½ × 11 inch sheet, mix text with graphics, and print text characters from ⅛ inch to 20 inches in height. *(List Price: $795)*

Requires: Parallel Interface Prot.
Enter Computer, Inc.
6867 Nancy Ridge Dr.
San Diego, CA 92121
(619) 450-0601

CIRCLE 500 ON READER SERVICE CARD

Micromodem IIe/ Smartcom I
A modem and communications hardware/software package. It is an enhanced version of the *Hayes Micromodem II* and *Hayes Terminal Program*.

The *Micromodem IIe* is housed on a circuit board that slides into an Apple expansion slot and connects to the telephone line. It lets the computer communicate over telephone lines with other computers and with time-sharing and information services. The modem provides both touch-tone and pulse dialing, a speaker for listening while a call is made, and support for single and multi-line telephone connections.

Smartcom I directs the modem to place and answer computer calls and to send and receive files with any of three file transfer protocols. They include Stop and Start, Send Lines, and the Verification Protocol for error-free transfer between Hayes programs. The program routes data to the printer, stores three numbers for dialing, and works with three Apple operating systems, DOS 3.3, Pascal, and CP/M.

The software offers a set of variable communications parameters, including duplex, character delay, and character definitions. The program also creates, deletes, and displays files and a file directory. *Smartcom I* accommodates up to six disk drives, several printer interface cards, 40- and 80-column displays, and lower case characters.

The *Micromodem IIe* is compatible with any Bell 103-type modem and is approved by the Federal Communications Commission for direct connection to any telephone system in the United States. *(List Price: $329,* Smartcom I *alone, $119)*

Requires: Apple IIe
Hayes Microcomputer Products, Inc.
5923 Peachtree Industrial Blvd.
Norcross, GA 30092
(404) 449-8791

CIRCLE 501 ON READER SERVICE CARD

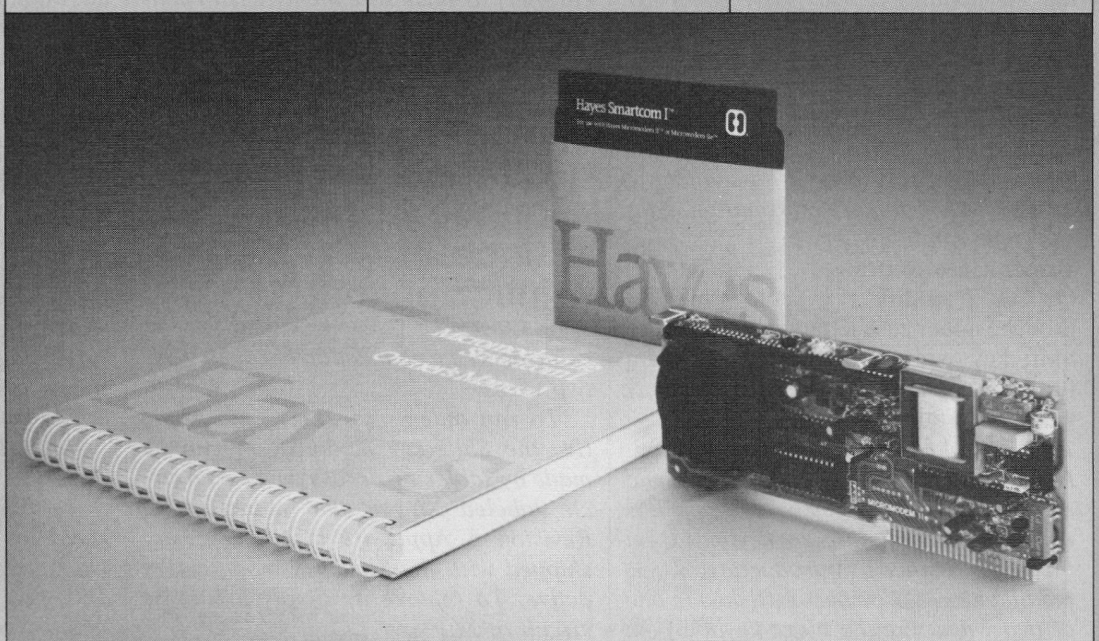
Datafile
A series of 5-, 10-, and 20-megabyte hard-disk drivers for the Apple II, each complete in a Winchester-style subsystem that includes cabinet, power supply, software, and intelligent controller. Datafile drives support three operating systems: CP/M, ADOS, and Pascal. There is no need for hard wiring. Simply install an interface board in any available input-output slot and connect the two units with a ribbon cable. *(List Price: $2995 to $3950)*
Thought Works
3532 West Thomas Rd.
Phoenix, AZ 85019
(602) 269-6841

CIRCLE 502 ON READER SERVICE CARD

Mountain Apple III Hard Disk
A hard disk drive capable of running software for both the Apple III and II series. The hard disk is available in four storage capacities—5Mb, 10Mb, 15Mb, and 20Mb. With it, Apple III users can enter and maintain files in either Apple II or III modes without additional patching and can operate under both Apple SOS and CP/M operating systems.

The *Mountain Hard Disk* features four user-visible partitions which have user-definable volumes on each disk and each volume can be further broken down into subdirectories. Partitioning allows for faster access times than subdirectories. *(List Price: $1995-$3495, depending upon storage capacity)*
Mountain Computer, Inc.
300 El Pueblo Rd.
Scotts Valley, CA 95066
(408) 438-6650

CIRCLE 503 ON READER SERVICE CARD



Micromodem IIe/Smartcom I from Hayes Microcomputer Products.

Apple Joyport
A switch accommodating four fully functional Apple-compatible paddles and two Atari-type joysticks. The Joyport eliminates the need to open the Apple case to switch game input devices. Atari-type sockets are mounted on the front of the Joyport, and Apple game sockets are easily accessible under the snap-on cover. Active inputs can be selected on the external Joyport switches. No modification of the Apple is required.

The Joyport comes with complete documentation, installation instructions, and listings for BASIC and Pascal interface programs. *(List Price: $49.95)*
Requires: Apple II.
Sirius Software Inc.
10364 Rockingham Dr.
Sacramento, CA 95827
(916) 366-1195

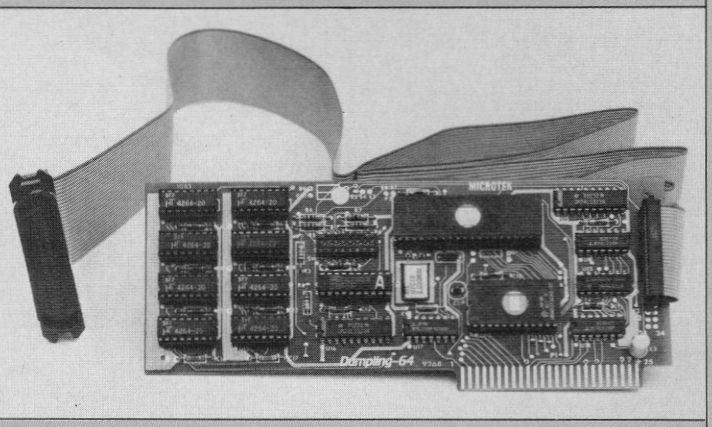
CIRCLE 504 ON READER SERVICE CARD

Magstik
A magnetic self-centering joystick, with dual side-by-side pushbutton switches and a specially designed case that can be used by either hand. An Apple IIe game socket adapter is provided with purchase. *(List Price $64.95)*
Tech Designs, Inc.
3638 Grosvenor Dr.
Ellicott City, MD 21043
(301) 997-2621

CIRCLE 505 ON READER SERVICE CARD

Dumpling-64
A buffered printer interface card supporting a range of parallel printers. The device provides text buffering which frees the user's system for other applications. The *Dumpling-64* supports graphics routines for rotation, inversion, enlargements and screen dumps. It also includes data compression techniques allowing nearly 250K of data to fit into 64K of RAM. The device is available with or without incorporated RAM. *(List Price: $159)*
Microtek, Inc.
4750 Viewridge Ave.
San Diego, CA 92123
(619) 569-0900
TWX: 910-335-1269

CIRCLE 506 ON READER SERVICE CARD



Baffered printer interface card from Microtek, Inc.

Dumpling-GX
A high-resolution printer interface card, upgraded to accommodate additional printers. Those printers include the Quantex, the Okidata 92 and 93, the Okidata 84 Step 2, the GX-100, the Gemini 10 and 15, the Mannesmann Talley MT-160, the Epson FX-80 and -100, and the Data South DS-160.

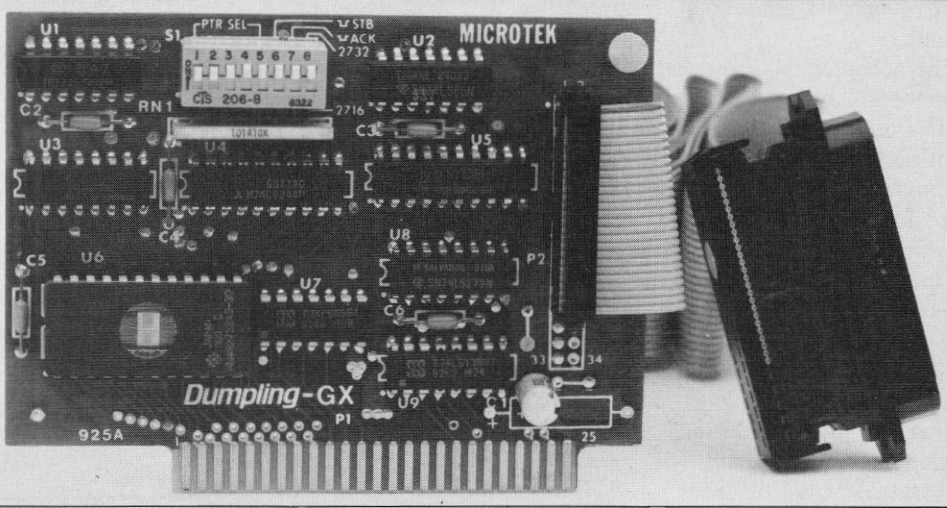
The features offered by this interface card include dual-page screen dumps, side-by-side screen dumps, inversion, enlargements, rotation, enhanced printing fonts, chart recorder mode, and complete formatting. Additional features include bypassing all on-board firmware, lowercase screen dumps, partial line selected screen dumps and jumps to user routines. The DUMPLING-GX is compatible with all operating systems including CP/M. *(List Price: $159)*
Microtek, Inc.
4750 Viewridge Avenue
San Diego, CA 92123
(619) 569-0900

CIRCLE 507 ON READER SERVICE CARD

Premium Softcard IIe
A card that integrates four system enhancements for the Apple IIe. Plugging into the IIe's video slot, the card's 64K-byte random access memory doubles the standard amount of memory and can be used to run much larger programs. In addition, an onboard 80-column display provides better viewing of word processing, electronic spreadsheet, and other programs.

Two versions of the Microsoft BASIC interpreter are included and the upgraded SoftCard is compatible with other language compilers, such as BASIC, FORTRAN, and COBOL. *(List Price: $495)*
Microsoft Corp.
10700 Northrup Way
Bellevue, WA 98004
(206) 828-8080

CIRCLE 508 ON READER SERVICE CARD



High-resolution printer interface card from Microtek, Inc.

SOFTWARE

The Champion

An accounting package written in *dBase II*. The software includes general ledger and financial statements, accounts payable and purchase order, inventory, payroll, and accounts receivable with order entry and point-of-sale support. *The Champion* can access files from the database management system of a *dBase II*. Other features include real-time updating of files, wherein all files are simultaneously updated by newly entered data; help screens, allowing the user to ask questions of the software while continuing to work on the text; data verification for the software checks entered data against user-defined criteria; and the ability to generate reports by codes.

The general ledger component allows accounts with names of up to 28 characters to be established. These account types include title, descriptive, balance, and totaling, which is used to accumulate data for the financial statements. The general ledger is integrated with *The Champion*'s other components.

The accounts receivable component can be set up in either a balance forward or open-item basis and can accommodate up to nine levels of accounts using the order entry system. Open-order and back-order files are maintained, and the component can handle printing orders, invoices, and statements. The point-of-sale invoicing module provides a running cash drawer balance and perpetual inventory record. Provisions for both multiple sales and multiple cash receipts accounts and 62 tax codes are included.

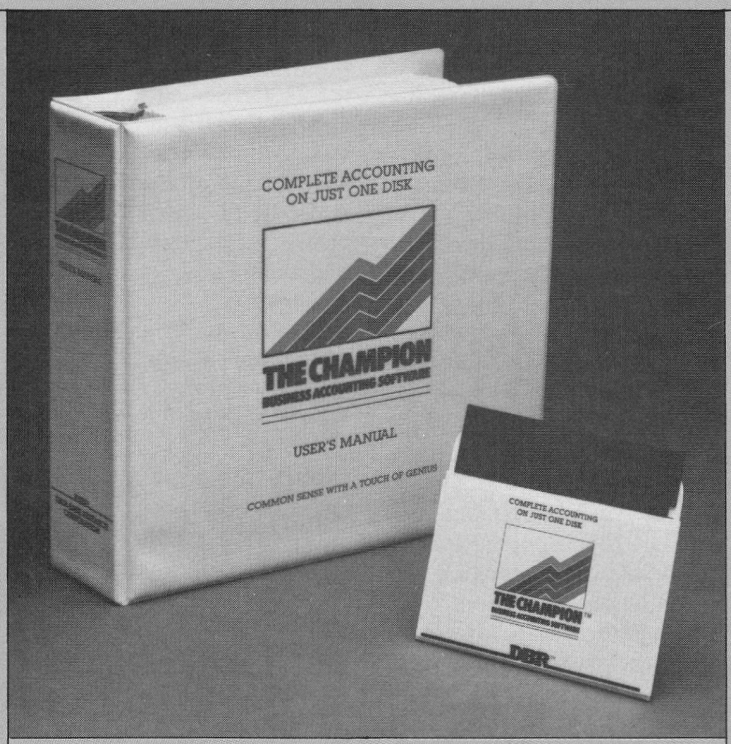
The accounts payable/purchase order component allows partial payments on any invoice. Discounts can be automatically taken if payment is made within the allowed period; all affected inventory balances and costs are updated; any invoice can be distributed to as many accounts as necessary and each account number is verified before updating; and check printing routines use a standard format. Information stored for each vendor includes his number, up to eight characters; his name, address and telephone; and the name of the contact person.

The Champion's inventory module allows inventory to be maintained under the weighted-average cost method by groups or subgroups. The module provides a suggested reorder list to maintain quantity levels. Possible information entered for each item in the user's inventory includes item number, selling price, unit of measure, reorder point, quantity on order, days for delivery, supplier reorder number, and the maximum quantity desired.

The payroll component can integrate weekly, biweekly, semimonthly, or monthly payroll periods with the rest of *The Champion*'s modules. The module allows different tax withholding methods and 14 different pay adjustments including vacations, insurance and advances. The module can automatically produce yearly tax return information, federal form 941, and unemployment tax data, federal form 942.

Data Base Research Corp.
66 S. Van Gordon, #155
Lakewood, CO 80228
(303) 987-2588

CIRCLE 509 ON READER SERVICE CARD



dBase II accounting package from Data Base Research Corp.

Air Nav Workshop

A training tool for the flight instructor, student pilot or anyone interested in aviation. It includes two training aids and a navigation simulator and can simulate a real area, a local area, or just an instructionally useful one. It can customize the number and type of navaid, their locations, ranges and three-letter Morse Code IDs. *(List Price: $40)*

Requires: Apple II+ or IIe, one disk drive (DOS 3.3) Optional: Second drive and graphic printer

Space-Time Associates
20-39 Country Club Drive
Manchester, NH 03102
(603) 625-1094

CIRCLE 510 ON READER SERVICE CARD

State of the Art Word Processing

An integrated word-processing software package that can interface with accounting applications. These applications are also manufactured by State of the Art and include general ledger, accounts receivable, accounts payable, and payroll.

It features word wrap during entry, centering, justifying text, and deletion by character, word line or page.

Depending on the type of printer used, it can also type special characters, change ribbon colors, and set text-reformatting commands for printer. *(List Price: $395)*

Requires: Apple IIe or Apple III

State of the Art
3183-A Airway Avenue
Costa Mesa, CA 92626
(213) 829-1840

CIRCLE 511 ON READER SERVICE CARD

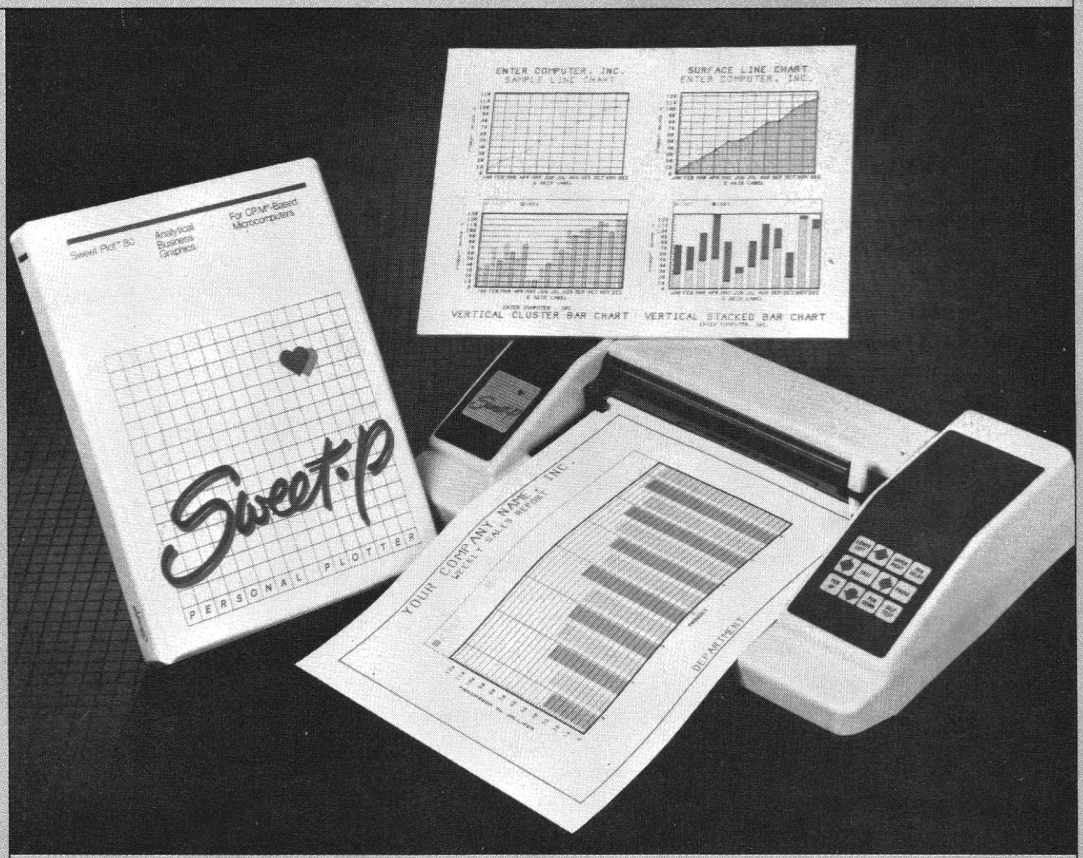
Sweet-Plot 80
A graphics program designed for use with the *Sweet-P Personal Plotter*. The program can accept and manipulate both numeric data and files in Data Exchange Format (DIF). *Sweet-Plot 80* can create color graphics on any type of paper or acetate in sizes from 8½ × 11 inches to ten feet long. Characters can range in size from ⅛ to 20 inches.

The program features menus in simple English. They can perform such functions as creating multiple windows on the user's display and dividing the screen into sections showing different graphs or parts of graphs. Users can select and position up to 16 graphs per 8½ × 11-inch sheet, specifying text and setting grid increments and scale. Menus also allow a user to define such things as color fill, shading, and textures. *(List Price: $350)*
Enter Computer, Inc.
6867 Nancy Ridge Dr.
San Diego, CA 92121
(619) 450-0601

CIRCLE 512 ON READER SERVICE CARD

English Grammar
A two-disk English program for grades 2 through adult. It is designed to teach parts of speech by drilling either combinations of or all parts of speech. Student's answers are stored on a disk for later viewing by teacher or parent. *(List Price: $45)*
Requires: Apple II Plus or Apple IIe.
T.H.E.S.I.S.
P.O. Box 147-E
Garden City, MI 48135
(313) 595-4722

CIRCLE 513 ON READER SERVICE CARD



Graphics program for Sweet-P Personal Plotter from Enter Computer, Inc.

Softerm 1 and Softerm 2
A terminal emulation program that is offered in two versions, depending on user's requirements. *Softerm 1* provides basic terminal communications, at speeds up to 9600 bps, to a variety of host computers, timesharing services, and information services. It includes a built-in telephone book for automatic dialing. All these features are included in *Softerm 2*, which also provides an exact lookalike for many popular CRT terminals.

With built-in disk utilities, local file transfer, and several editing options, *Softerm* is also a file utility program. *(List Price: Softerm 1, $135, Softerm 2, $195)*
Requires: Apple II, II Plus, or IIe, 48K, one disk drive.
Softronics
6626 Prince Edward
Memphis, TN 38119
(901) 683-6850

CIRCLE 514 ON READER SERVICE CARD

Stickybears
Three software games for children in graphic animation. *Stickybear Opposites* and *Stickybear Shapes* are recommended for 3- to 6-year-olds. The first teaches opposites: up and down, full and empty, etc., and the latter teaches recognition of common shapes. In *Stickybear Basketbounce*, a game for the entire family, players win points by catching bouncing bricks, doughnuts, or stars before running out of baskets. *(List Price: $39.95)*
Requires: Apple II or Apple II Plus with 48K and one disk drive, 3.3 DOS; and Apple IIe or Apple III.
Weekly Reader Family Software
Xerox Education Publications
245 Long Hill Rd.
Middletown, CT 06457
(203) 347-7251

CIRCLE 515 ON READER SERVICE CARD

The Visible Computer: 6502
A program that teaches machine language programming. It features high resolution 6502 simulation that allows users to view a program as it is being executed. The user defines the speed at which the program is run. *(List Price: $49.95)*
Requires: 48K, Apple II+.
Software Masters
Suite BB
3330 Hillcroft
Houston, TX 77057
(713) 266-5771

CIRCLE 516 ON READER SERVICE CARD

PRODUCT NEWS

Black's Law Dictionary
An entire word list from a legal dictionary compressed onto a single 5¼-inch diskette. The diskette does not contain a program and must be used with either the *Sensible Speller* program or the *Apple Speller III* program. *(List Price: $99.95)*
Sensible Software, Inc.
6619 Perham Dr.
West Bloomfield, MI 48033
(313) 399-8877

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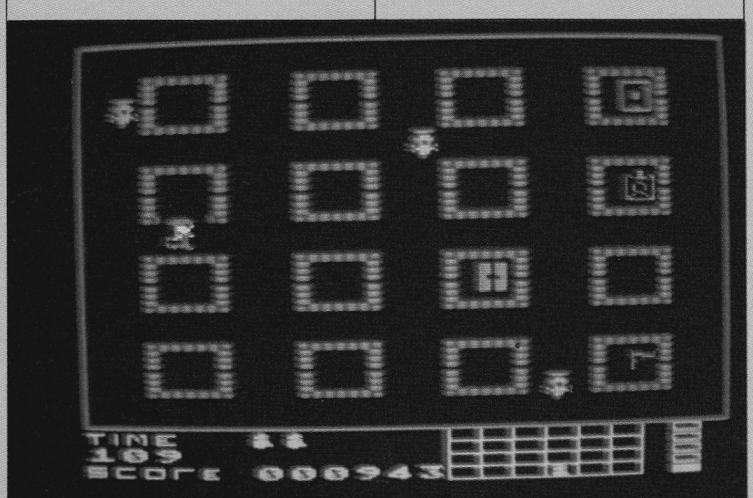
Minit Man
An arcade game that incorporates two types of games taking place on three horizontal screens. The user must defend the launch computer while he is repairing a bridge damaged by the enemy's robots. The goal is to get the three interceptor missiles back in position on the launching pads. Available on Apple disk. *(List Price: $19.95)*
Requires: Joystick
Penguin Software
830 4th Avenue
Geneva, IL 60134
(312) 232-1984

CIRCLE 518 ON READER SERVICE CARD

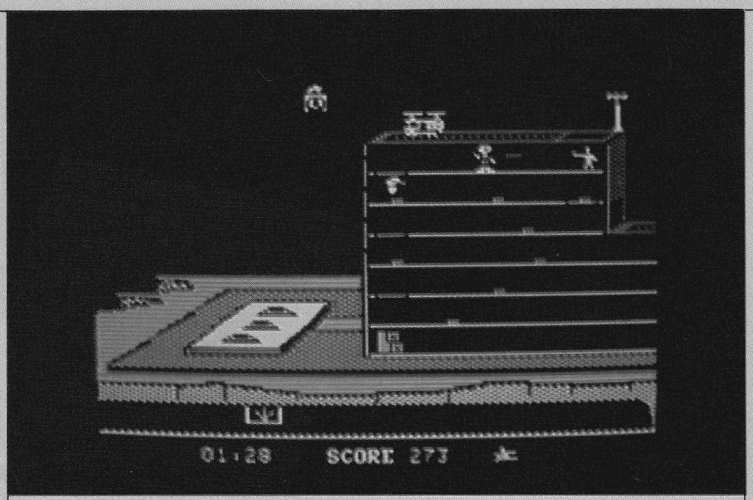
Magic/L
An interactive computer language and development environment for use on CP/M-based systems. MAGIC/L has a forward notation syntax that is readable and easy to maintain. Its structure is similar to that of the C and Pascal languages. Language features include data typing for Char, Integer, Long, Real, and String data and record structures similar to the Struct facility in C. A complete I/O package can provide random access, variable length I/O to any CP/M file. In addition, MAGIC/L source code runs on any other processor and can be compiled and run on CP/M unmodified.

Features also include: command-line recall and edit, CP/M text-file editing, CP/M command facility including many CCP, STAT and PIP funcions, and an 8085 assembler. All these features are available within the MAGIC/L framework. *(List Price: $295)*
Loki Engineering, Inc.
55 Wheeler Street
Cambridge, MA 02138
(617) 576-0666

CIRCLE 519 ON READER SERVICE CARD



Minit Man *arcade game from Penguin Software.*



The Spy Strikes Back, *from Penguin Software.*

The Spy Strikes Back
An arcade game featuring the spy from Spy's Demise. He's back to thwart a terrorist's threat of blackmailing the world community. The user helps him evade the electronic guards as he searches the 120 sections of a five-story castle looking for clues to locate Dr. X's nuclear laboratory. If the laboratory is located in time, the winner receives a prize. Available on Apple disk. *(List Price: $19.95)*
Penguin Software
830 4th Avenue
Geneva, IL 60134
(312) 232-1984

CIRCLE 520 ON READER SERVICE CARD

Loan Handler
A software package specifically designed for the mortgage loan industry. The program gives mortgage bankers the chance to analyze, compute, and print loan forms associated with FNMA, FHLMC, FHA, VA, and second mortgages.

The *Loan Handler* features interactive capabilities. For example, with a *Hayes Micromodem,* the system may be used as a dumb terminal to accept information from other service companies. The program can also interface with word processing and spreadsheet packages. *(List Price: $1150)*
Requires: 64K, Apple II+ or Apple IIe, one disk drive, printer.
Contour
4960 Hamilton Ave.,
Ste. 215
San Jose, CA 95130
(408) 370-1700

CIRCLE 521 ON READER SERVICE CARD

Magic Memory
A directory/data base system that can be operated by the first-time computer user. Magic Memory's screen resembles an address book with tabs designating lettered entries and it provides 24 additional tabs that can be designated in any chosen manner. Suggested headings include: anniversaries, birthdays, deadlines and customer lists. Each tab can store up to 255 entries.
Requires: 48K, Apple II, Apple II+, or Apple IIe.
ARTSCI
5547 Satsuma Ave.
North Hollywood, CA 91601
(213) 501-4179

CIRCLE 522 ON READER SERVICE CARD

The Creator
A software development program allowing users to create custom applications programs in any of five areas, by answering English prompts appearing on-screen. The software includes ready-to-customize applications areas for word processing, database management, bar graphs creation, mailing lists, and invoicing. The separate areas can be used alone, or combined into a single integrated system. It can run on Apple II, II+, IIe, and III systems.

The Creator also allows a user to create applications outside of the provided work areas through English-language routines and prompts. *(List Price: $250)*
Requires: 48K, two drives.
Software Technology for Computers, Inc.
153 California St.
Newton, MA 02158
(617) 244-2590

CIRCLE 523 ON READER SERVICE CARD

PFS Solutions
A dozen new personal computer software products to help users of *PFS:File* and *PFS:Report* perform a myriad of recordkeeping tasks.

The *PFS Solutions* line features products designed to create, revise, and perfect form and report designs. Each product contains a form design and three to seven predefined reports that work with *PFS:File* and *PFS:Report*.

The new software includes: Payroll Management, Mailing Lists, Personnel Records, General Ledger, Check Register, Home Budgeting, Tickler File, Stock Portfolio Manager, Invoice Records, Hardware and Software Library, Home Inventory, and Inventory Records. *(List Price: $20 for each product)*
Requires: 64K, Apple IIe, one disk drive, *PFS:File, PFS:Report*.
Software Publishing Corporation
1901 Landings Dr.
Mountain View, CA 94043
(415) 962-8910

CIRCLE 524 ON READER SERVICE CARD

The Incredible Jack
An integrated software program complete on one disk. It is designed for the first-time user and is totally menu driven. The menu does all functions and it offers word processing, calc analysis, form letters, mailing lists, and filing systems. *(List Price: $179)*
Requires: Apple II, Apple IIe, or Apple II+, two disk drives, 64K.
Business Solutions
60 East Main Street
Kings Park, NY 11754
(516) 269-1120

CIRCLE 525 ON READER SERVICE CARD

MISCELLANEOUS

The Microcomputer Market Place
A directory of over 10,000 companies involved in the microcomputer industry. Compiled from questionnaires completed by company executives, it includes company profiles and cross-indexes of computer hardware and software. Also included is the directory of over 750 pages, a calendar of 165 industry meeting and exhibits and a telephone section with information on 12,000 executives. *(List Price: $75)*
Dekotek, Inc.
2248 Broadway
New York, NY 10024
(212) 799-6602

CIRCLE 526 ON READER SERVICE CARD

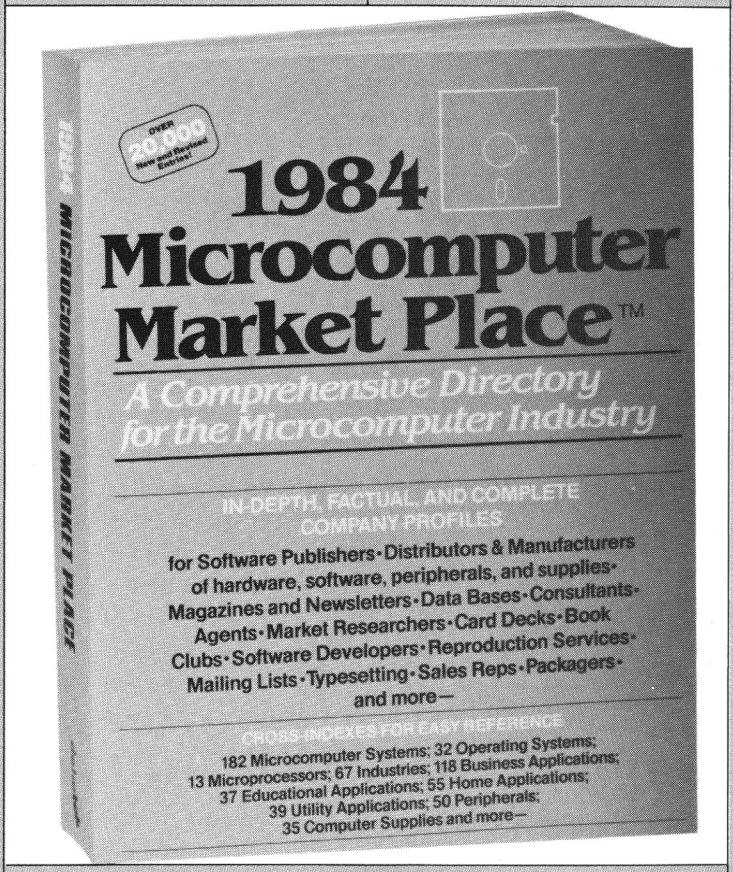
Verfin Head Cleaner Disc
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Zolman International Inc.
45th Floor
600 Montgomery St.
San Francisco, CA 94111
(415) 421-5340

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CLR
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Adamark Inc.
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Ada, MI 49301
(616) 791-2124

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Microcomputer product directory from Dekotek, Inc.

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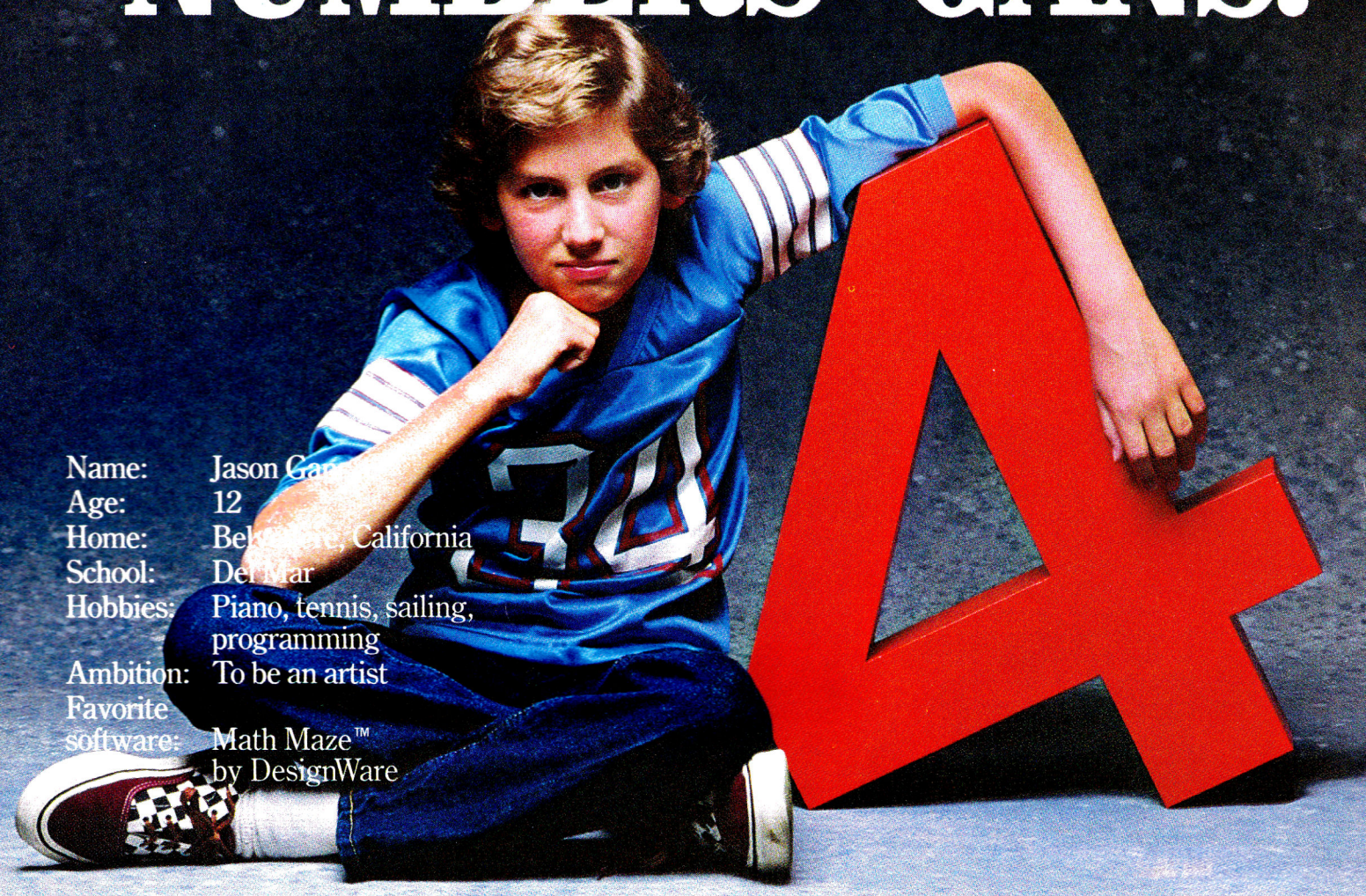
Software
- UCSD p-System Development System
- UCSD Pascal
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- BASIC
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- Artificial Intelligence Laboratory incorporating a Deductive Reasoning System (Spring 1984)

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CIRCLE 173 ON READER SERVICE CARD

THEY CALL HIM "NUMBERS" GANS.



Name: Jason Ga
Age: 12
Home: Bel[illegible], California
School: Del Mar
Hobbies: Piano, tennis, sailing, programming
Ambition: To be an artist
Favorite software: Math Maze™ by DesignWare

"Math Maze is neat because you do more than just add and subtract numbers all the time. You've got to find them first. And then get there before you get caught.

"It's got real good graphics. I can even change the background color. And make the math as challenging as I want.

"There's lots of mazes, too. But the best thing is, I can make up my own. So when my friends come over, I've always got something new."

DESIGNWARE ON CREATIVITY. Children learn the most through creative problem solving. That's why *Math Maze,* like so many DesignWare games, is an open-ended exercise that challenges and nourishes young minds. In a way that's a lot of fun.

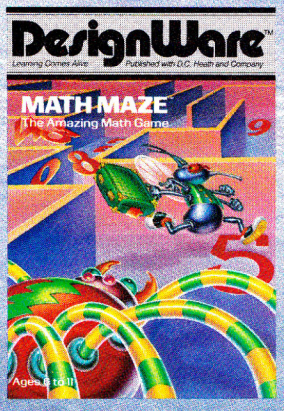
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As Jason Gans says, "Hey—they don't call me 'Numbers' for nothing, you know!"



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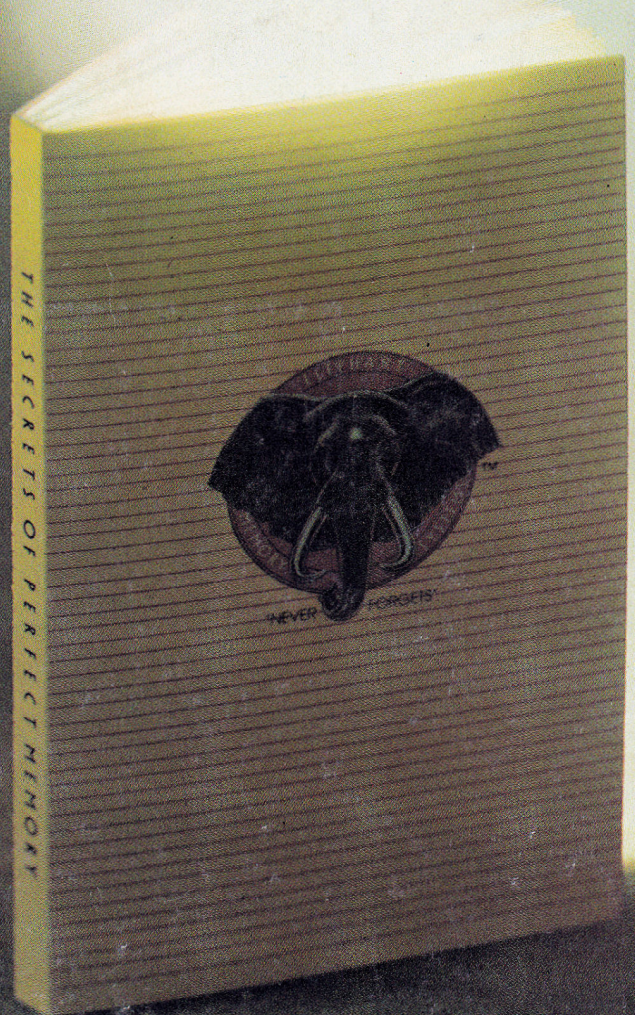
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